Opportunities and challenges of mobile payment services

The perspective of service providers

TATJANA APANASEVIC

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Striving to better, oft we mar what’s well.

KING LEAR by William Shakespeare
Abstract

Mobile payments are transforming the payments industry. These services open up the opportunity for non-banking actors to enter the market. In order to embrace this challenge, banks, traditional payments market players, are forced to launch mobile payments. However, in Europe and most developed economies, a big number of launched services get terminated soon after their introduction in the market. Hence, the ability of different actors to act locally calls for additional research.

The main objective of this thesis is to broaden knowledge and understanding about the ways mobile payment service providers address the opportunities and challenges of mobile payment services. In order to investigate this problem, this research (i) explores factors stimulating and hindering the introduction of mobile payments using perspectives of different types of service providers (i.e., banks, independent providers, direct operator billing providers, retailers, and public transport companies) and (ii) seeks to explain the importance of these factors for each type of provider.

The primary data collected using interview method. More than 40 industry representatives in six countries were contacted. The Service, Technology, Organisation, and Finance (STOF) model was used as a theoretical research framework. This is a business modelling framework that specifies a set of critical design issues that have to be considered within each model’s domain.

Research findings highlight that the organisation domain is the key domain, which affects all other domains and has an impact on the general viability of the business model. A comparison of the approaches used by different service providers to address each of the critical design issues helped to identify the factors that are most important within each domain. These factors stimulate or hinder development of a viable business model within each category of service providers.

This research contributes to a better understanding of challenges and success factors associated with the design of business models for new mobile services and uses the lens of the STOF model. The contributions to the academic research on mobile payments are: (i) collection and analysis of a rich empirical data set on mobile payment services implemented in six Northern European countries, (ii) discussion of a bigger picture by connecting research findings to the context of the existing payment system, (iii) extension of knowledge on business models for mobile ticketing, and (iv) extension of knowledge on the value of mobile ticketing services in the business-to-business (B2B) context.

Keywords: Mobile payments, Mobile ticketing, Business model, STOF, Service provider, Payment services provider

Det övergripande syftet med denna avhandling är att bredda kunskap och förståelse om hur tjänsteleverantörer hanterar möjligheter och utmaningar med mobila betalningar. Forskningen har fokuserat på att: (i) identifiera faktorer som stimulerar eller försvårar lansering av betalningslösningar för olika typer av tjänsteleverantörer (banker, oberoende betalningsleverantörer, telekomoperatörer, detaljhandel och kollektivtrafiktjänster) och (ii) förklara inverkan av olika faktorer för varje typ av leverantör.


Resultaten pekar på att ”Organisation” är den viktigaste domänen i affärsmodellen, denna påverkar de övriga domänerna samt affärsmodellens allmänna bärkraft. En jämförelse av de strategier som olika tjänsteleverantörer använder för att hantera kritiska designproblem har använts för att peka ut de faktorer som är de viktigaste inom varje domän.

Denna forskningen bidrar till en bättre förståelse av utmaningar och framgångsfaktorer i samband med utformningen av affärsmodeller för nya mobila betalningstjänster. Bidragen till den akademiska forskningen om mobila betalningslösningar är: (i) insamling och analys av ett brett empiriskt material om mobila betalningslösningar i sex nordeuropeiska länder, (ii) en diskussion av helhetsbilden genom att koppla forskningsresultaten om nya betalningslösningar till det befintliga betalningssystemet, (iii) utökad kunskap om affärsmodeller för mobila biljettjänster, och (iv) breddad kunskap om värdet av mobila biljettjänster inom business-to-business (B2B).

Nyckelord: Mobila betalningstjänster, Mobil biljettjänster, Affärsmodeller, STOF, Tjänsteleverantör, Leverantörer av betalningstjänster
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In that period of my life, when I was an artist, a successful graphic designer running own design studio, even in my wildest dreams I would not be able to imagine that once I would make a PhD at an engineering school. However, this happened. Now, finalising my PhD study, I would like to thank everyone who contributed in any way along my PhD journey.

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Stockholm, May 2018
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<th>Description</th>
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<tbody>
<tr>
<td>ACH</td>
<td>Automated Clearing House</td>
</tr>
<tr>
<td>ARA</td>
<td>Actors-Resources-Activities</td>
</tr>
<tr>
<td>ATM</td>
<td>Automated Teller Machine</td>
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<tr>
<td>B2B</td>
<td>Business-to-Business</td>
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<td>BIBO</td>
<td>Be In Be Out</td>
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<td>C2B</td>
<td>Customer-to-Business</td>
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<td>HCE</td>
<td>Host Card Emulation</td>
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<tr>
<td>ICT</td>
<td>Information and Communication Technology</td>
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<td>IMP</td>
<td>Industrial Marketing and Purchasing</td>
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<td>IT</td>
<td>Information Technology</td>
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<td>MNO</td>
<td>Mobile Network Operator</td>
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<td>NFC</td>
<td>Near Field Communications</td>
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<td>OTT</td>
<td>Over The Top</td>
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<td>P2P</td>
<td>Person-to-Person or Peer-to-Peer</td>
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<td>PDA</td>
<td>Personal Digital Assistant</td>
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<td>PoS</td>
<td>Point of Sale</td>
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<td>PSD</td>
<td>Payment Service Directive</td>
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<td>PTO</td>
<td>Public Transport Organisation</td>
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<td>QR code</td>
<td>Quick Response code</td>
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<tr>
<td>RFID</td>
<td>Radio-Frequency IDentification</td>
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<td>SEPA</td>
<td>Single Euro Payments Area</td>
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<td>SMS</td>
<td>Short Message Service</td>
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<tr>
<td>STOF</td>
<td>Service, Technology, Organisation, Finance</td>
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<td>TSM</td>
<td>Trusted Service Manager</td>
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Part I

Thesis Overview
Chapter 1

Introduction

The introductory chapter presents the general overview of the thesis. It starts with the background description, which leads to the problem formulation, research motivation, research questions, and the general research approach. Then it briefly presents a summary of research contributions.

1.1 Background

1.1.1 Traditional payments industry

*Payment* can be defined as a process of transfer of funds from payer to payee in an exchange of good or services (Kokkola, 2010). Historically, payments have been a central function of financial institutions. The introduction of the first credit card in the 1950s became the breaking point that significantly changed the industry (Gardner, 2009).

Today, the payments industry involves organisations that are mainly focused on debit and credit card payment handling and processing of related data. A non-exhaustive list of major industry actors comprises regulation authorities, central banks, banks, payment card associations (e.g., Visa and MasterCard), and clearing houses. Additionally, there are organisations associated with businesses related to automated teller machines (ATMs) and Points of Sale (PoS) (e.g., providers of hardware and software for ATM and PoS terminals). In some countries, there are payment processors that aggregate and handle payments as intermediaries between companies and banks. Finally, the service and maintenance of ATMs require cash handling, hence, there are companies offering cash-in-transit services and cash producers.

Visa and MasterCard are major payment card networks that represent well-established and organised payment systems. These systems have a large scale and present global networks connecting banks, ATMs, a huge network of retailers, and customers worldwide. For example, in 2016, Visa had 335 million cards in circulation, processed
83.2 billion transactions, and received $6.9 billion in net income (Visa, 2016). During the same year, MasterCard had 230 million cards in circulation, processed 15.2 billion transactions, and took in $4.1 billion in net income (MasterCard, 2017a). These card networks allow transfers of money funds globally with interchange fees of about 2–3 per cent paid by merchants for transaction clearing and settlement and additional fees paid by card holders. This way, payment card networks have developed a successful business model resulting in high revenues.

1.1.2 Mobile payment services

Advances in Information and Communication Technology (ICT) and the appearance and rapid penetration of smartphones have enabled new mobile services that are transforming the payments industry. In this thesis, I consider mobile payments, mobile ticketing services, and contactless cards and use the following definitions:

- ‘Mobile payments are payments for goods, services, and bills with a mobile device (such as a mobile phone, smart-phone, or personal digital assistant (PDA)) by taking advantage of wireless and other communication technologies’ (Dahlberg et al., 2008b, p. 165).

- Mobile ticketing represents a solution integrating ticketing and payment service and ‘allows customers to request, pay, activate, and validate a ticket using a mobile device’ (Apanasevic and Markendahl, 2018, p. 293).

- Contactless cards represent a payment solution enabled by wireless communication technology on different devices (debit and credit cards, smartphones and tablets, wearable devices, stickers, and key fobs) (The UK Card Association, n.d.).

Mobile payments have optimistically been expected to become another ‘big thing’ (Dahlberg et al., 2008b; Ozcan and Santos, 2015). These services open up the opportunity for non-banking actors to enter the market (Capgemini and BNP Paribas, 2016; McKinsey, 2015). The newcomers are mobile network operators, independent companies aiming at delivery of financial services (e.g., Square, USA; iZettle, Seamless, Sweden), major mobile phone manufacturers (e.g., Apple, Google, and Samsung), social network providers (e.g., Facebook), and large retailers (e.g., Starbucks, USA; Alibaba Group, China).

Mobile payment services offer a number of benefits to different stakeholders:

- Mobile and contactless payments provide an alternative to cash. Use of these services leads to significant savings for merchants and society when compared to cash handling costs (Chen, 2008; Mallat and Tuunainen, 2008; Sveriges Riksbank, 2013).
• Mobile payment services can ensure easier, faster, and more convenient service for customers and merchants. Integration of loyalty programmes with the payment service gives merchants the opportunity of creating direct relationships with customers (Ondrus and Lyytinen, 2011). Mobile payments may offer a faster transaction time compared to a bank card. In this case, benefits for merchants are reduced queues, increased sales, higher revenues, and a positive effect on the company’s image (Karnouskos and Fokus, 2004; Mallat and Tuunainen, 2008).

• Mobile payment services can be integrated with other services (e.g., public transport ticketing) and provide unique additional value to customers (Chen, 2008).

Mobile payments result in an increase of digital transactions and may lead to a cashless society. This has a number of negative aspects. I list some of them below:

• Not all groups of the population are technology-savvy. This means that some certain groups might be excluded (e.g., elderly people, the population of rural areas). These groups need an alternative payment method and cash is one example of it.

• There are certain security, data privacy, and fraud risks associated with digital transactions (Achord et al., 2017). Hacked service or bank accounts and credit card fraud result in financial loss for both end-users and merchants.

• A cashless society implies dominance of bank card–based payments. This means a lack of competition, dominance of a few major card payment providers, and a growth of service fees for merchants and consumers (Achord et al., 2017).

• Cash is considered ‘a free public good’ (Achord et al., 2017, p. 47), despite it has costs for banks and society. For an individual customer, payments in cash do not imply additional costs, while payments using bank accounts and bank cards have transaction costs. For businesses, bank card–based payments have transaction fees and set requirements on IT systems, card payment terminals, and Internet connection (Achord et al., 2017).

• Cash has social and cultural value. ‘Cash is personal’ (Achord et al., 2017, p. 52) because it includes a physical contact with money and is related to some traditions (e.g., pocket money). Cash is a good tool to stay in control of budget and personal finances (Achord et al., 2017). In contrary, digital and contactless payments are ‘impersonal’ (Achord et al., 2017, p. 52) and remove ‘the pain of parting with physical cash’ (Achord et al., 2017, p. 52). This may result in greater and irresponsible spending.
There are some examples of successful mobile payment services in advanced economies, such as Osaifu-Keitai, a mobile wallet in Japan. Three other successful services to mention are Swish (Sweden), MobilePay (Denmark), and Vipps (Norway). Initially designed as person-to-person or peer-to-peer (P2P) money transfer services, these services are increasingly used in the context of customer-to-business (C2B) payments. However, in remaining European countries and most developed economies, the rate of adoption of mobile payment services is still lower than expected (Dahlberg et al., 2008a; Mallat, 2007; Ondrus et al., 2009; Ozcan and Santos, 2015). For example, Apple Pay and other Pay wallets ‘account for around 1% of card transactions in the US’ (Balaban, 2017). During the last decade, a large number of mobile payment services were terminated soon after their introduction in the market, for example, PostFinance and m-Maestro in Switzerland (Ondrus et al., 2009), Telia Mobil wallet (Telia, 2012) and Bart in Sweden (SvD, 2014), O2 Wallet in the United Kingdom (Clark, 2014), and Swipp in Denmark (Swipp, 2017). Valyou (Boden, 2015) and mCASH (SpareBank 1, 2017) were terminated in Norway. Additionally, Danske Bank closed down ‘its own competitor app MobilePay in Norway’ (Turula, 2017). WyWallet, a mobile operator billing service in Sweden, is going to be terminated on the 25th of May, 2018, due to ‘the fact that the mobile operators have chosen to terminate the cooperation agreement with PayEx’ (WyWallet, n.d.), a service provider. In the United States, the payment service Isis (rebranded to Softcard) was closed down in March 2015 (Welch, 2015).

At the same time, mobile payment services flourish in the context of emerging economies. Regions where mobile money transfer services succeed are: (i) sub-Saharan Africa (e.g., Kenya) (GSMA, 2016), (ii) southeastern Asia (e.g., the Philippines, Pakistan, and India) (GSMA, 2014; McCarty and Bjaerum, 2013; Smart, n.d.), and (iii) Latin America (GSMA, 2014). These economies have no developed bank infrastructure but exhibit high penetration of mobile phones (McKinsey, 2016). In these circumstances, mobile network operators offer money transfer and financial services to unbanked populations. However, it is not likely that these services will penetrate in the context of the complex payments market of developed countries (Dahlberg et al., 2015b).

1.2 Problem formulation, research motivation, and research questions

1.2.1 Problem formulation

During the period 1999–2016, academic research on mobile payments focused on two major topics: customer adoption and technological aspects of mobile payments (Dahlberg et al., 2008b, 2015b; Apanasevic et al., n.d.). The category of papers exploring business aspects of mobile payments remains rather limited and takes only the third position based on number of publications (Dahlberg et al., 2008b, 2015b; Apanasevic et al., n.d.). Publications within this category explore the ecosystems of mobile payments, business models developed for mobile payments, actors and their roles, and issues of
collaboration (Apanasevic et al., n.d.). However, the research on business aspects of mobile payments is still evolving, and a number of important problems in this area require a better understanding.

One problem that calls for additional research is related to the ability of different actors to act locally or globally (Dahlberg et al., 2015b). Indeed, different types of actors can provide mobile payments. These actors have different capabilities, different starting positions when launching the service, and different limitations. For example, banks can offer services to local customers, while Visa and MasterCard operate a global network.

This thesis focuses on the ability of different actors to act locally. The focus on local markets is justified by the high degree of failure among mobile payment services. This highlights the fact that mobile payment service providers still have difficulties addressing challenges related to the provision of these services in national markets. Hence, the research problem that this thesis addresses is: How do mobile payment service providers address the opportunities and challenges of mobile payment services?

1.2.2 Research motivation and research questions

As discussed above, different types of actors can provide mobile payments. In this thesis, I consider five types of providers: (i) banks; (ii) independent providers that are non-bank actors, usually occupied in the Information Technology (IT) industry; (iii) direct operator billing providers that are non-bank actors collaborating with mobile network operators in adding mobile payments to mobile phone bills; (iv) retailers; and (v) public transport companies that collaborate with a number of technology and payment service providers in order to offer mobile ticketing and payment services.

The starting point to offer mobile payments is different for each category of actors. Indeed, banks and retailers with their own banks are the payments industry incumbents that have a customer base, bank accounts, trust, and experience in offering payment services. Non-bank actors (independent providers and direct operator billing providers) need to find a way to enter the payments market, build a customer base and network of merchants, and offer a competitive payment service price in relation to alternatives (e.g., payment cards). Public transport companies have a customer base, operate a public transport network, and seek to improve their ticketing service and its profitability. In order to offer mobile payments, each service provider needs to consider a number of factors, for example, its own resources, potential collaboration partners, available technology, the market segment to target, the value proposition of the service, and pricing. Some of these factors pose a challenge, and some offer an opportunity. Therefore, the research questions to address are the following:

**RQ1:** What stimulates and hinders the introduction of mobile payment services?

**RQ2:** Why are the identified factors important for different mobile payment service providers?
In order to answer these research questions, I have conducted a multiple case study. The analysis revolves around approaches used by different types of mobile payment providers in order to address the different challenges and opportunities of mobile payments. Descriptions of case studies and findings are presented in Chapter 4.

For analysis purposes, I use a business modelling framework. The reasoning behind selection of this approach is that a business model represents a conceptual model of a business, including its organisational and financial ‘architecture’ (Teece, 2010). Hence, it reflects the approaches used by service providers to address the key challenges of mobile payments or to make use of offered opportunities.

A number of frameworks have been developed for business model analysis. The most well-known example is the business model canvas (Osterwalder and Pigneur, 2010). This is a universal approach that helps to develop a business model for a product or a service offered within any industry. However, this approach has nine components, which would make the analysis very broad. Another important limitation of this framework is its focus on individual companies (Bouwman et al., 2012). This approach is less suitable for analysis of business models created for services that require building a value network for a service offering (Bouwman et al., 2012). Finally, the business model canvas does not provide links between business model design variables, and this allows too much freedom for interpretation (Bouwman et al., 2012).

In this thesis, I apply the Service, Technology, Organisation, Finance (STOF) model (Haaker et al., 2006; Bouwman et al., 2008). The STOF model is a conceptual framework that helps to design or describe a business model. One of the main reasons for the selection of STOF is the fact that this model is specifically tailored to the specifics of mobile services. It looks beyond the individual firm and considers the multi-actor collaboration needed to provide a mobile service (Haaker et al., 2006). This way, the model helps to analyse ‘a collaborative effort of multiple companies to offer a joint proposition to their customers’ (Haaker et al., 2006, p. 647). Provision of mobile payments requires collaboration among different actors, and the STOF model fits the purposes of this research well. Another reason is the conciseness of the model. Its four key components (service, technology, organisation, and finance domains) cover major aspects and provide a holistic picture of business models. Additionally, the model describes interdependencies among the core domains and ‘interdependences of critical design issues per and between domains’ (Bouwman et al., 2012, p. 238). A detailed description of the model is provided in Chapter 2 and its use in the analysis is described in Chapter 3.

With the help of the STOF model, I compare approaches used by different mobile payment service providers to address critical design issues within each model’s domain and to identify the most important ones. The key critical design issues in the service domain are customer targeting and creating service value; in the technology domain, selection of the technological solution and its integration and compatibility with existing infrastructures; in the organisation domain, partner selection in the service value network; and in the finance domain, pricing, which defines service profitability. The analysis results are presented in Chapter 5.
Research findings suggest that the organisation domain is the most critical component of a business model for mobile payments. In most cases, a single company has no needed resources to provide these services alone. A service provider uses some form of collaboration with other actors in order to gain access to their resources. Moreover, the implemented analysis makes it possible to draw another conclusion: settings in the organisation domain to a great extent influence technology, financial, and service domains. Answers to research questions are provided in Chapter 6.

1.3 Research scope and delimitations

The thesis is focused on approaches used by different types of mobile payment providers in relation to mobile payment services. The unit of analysis is a company – a mobile payment service provider. Types of providers considered in the thesis are banks, independent providers, direct operator billing providers, retailers, and public transport companies (see Figure 1.1). The range of analysed services includes mobile payment services, mobile public transport ticketing services, and contactless cards. The analysis of the value networks of these services considers actors directly involved in the service provision process. The interviews were performed during the period from 2012 to 2017.

Geographically, the research considers services that were launched in six Northern European countries: Estonia, Denmark, Lithuania, Norway, Sweden, and the United

Figure 1.1: Overview of actors considered in the thesis.
Kingdom. The selection of these countries was motivated by their similarity in levels of access to banking services, smartphone penetration, availability of fast mobile Internet, and availability of services in the focus.

1.4 Summary of contributions

This research contributes to the business model concept, the STOF model, and academic research on mobile payments. A more detailed discussion of research contributions is provided in Chapter 6.

1.4.1 Research on mobile payments

This research contributes to the academic research on mobile payments by collecting a rich empirical data set on mobile payment services. This includes 13 cases of mobile payment services and 18 cases of mobile public transport ticketing services implemented in six countries. The large data set and the analysis of perspectives on five types of mobile payment service providers allows discussion of a bigger picture by connecting research findings to the context of the existing payment system. This is another contribution. Additionally, I address the call for additional research and explore the ability of different types of service providers to offer mobile payments locally based on their capabilities and limitations.

One of the identified research gaps is a lack of research on business models for mobile payments. This thesis contributes by extending knowledge in this area. Additionally, this research extends knowledge on business models for mobile ticketing by analysing four types of mobile ticketing services.

Research on the value of new services in the business-to-business (B2B) context has been rather scarce. This research contributes by exploring categories of value of mobile ticketing services for public transport companies. Additionally, this research confirms findings of previous research on the customer value propositions of mobile payment and mobile ticketing services.

1.4.2 Business model concept and the STOF model

This research extends knowledge and contributes to a better understanding of challenges and success factors associated with the design of business models for new mobile services. Analysis of business models developed by different types of service providers helps to identify factors that stimulate or hinder development of a viable business model within each category of service provider.

This research makes some contributions to the STOF model. First, it confirms the model’s applicability for research and analysis of business models designed for mobile services. This research also contributes by identifying the most critical business model domain. Based on the analysis of business models developed within one area, the research results suggest that the organisation domain is the most crucial domain. Moreover, the setting of the organisation domain has a large impact on settings in
technology, service, and finance domains, meaning that it affects the viability of the
designed business model. Additionally, this research contributes by determining
the key critical design issues within each of the business model domains. Finally,
this research illustrates networked business model thinking. This approach offers a
collective understanding of opportunities to exploit at the network level. Use of this
approach could potentially enrich the STOF model.

1.4.3 Overview of publications included in the thesis

This PhD thesis cuts across different types of publications (see Table 1.1). Some
initial results of research on mobile payments were presented in the Licentiate thesis
‘Challenges related to the introduction of innovative service in the market’. This
work contributed to two under-researched topics in the mobile payments literature: (i)
adoption of mobile payments by merchants and (ii) the effect that mobile payments
have on business networks. The research findings identify retailers’ needs regarding
a mobile payment service and highlight the importance of collaboration for mobile
payment service due to its positive impact on service enhancement and the customer
value proposition. In the PhD thesis, I use a different theoretical background but reuse
and extend the data collected for the Licentiate thesis. I also reuse a part of the overviewed
literature, which is presented in Section 2.1.3 of this thesis.

The papers included in this thesis are listed below (see Table 1.1). The majority of
the included papers discuss different aspects of mobile ticketing. In order to compensate
for this slightly unbalanced contribution of included papers, the thesis presents primary
data and cases about all types of providers. A list of publications not included in the
thesis is provided in Appendix A.

Table 1.1: Publications included in the thesis.

<table>
<thead>
<tr>
<th>Paper</th>
<th>Focus</th>
<th>Contribution for thesis</th>
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<tbody>
<tr>
<td>Paper A</td>
<td>Theoretical and methodological approaches</td>
<td>Overview of related work and identification of research gaps (Chapters 1, 2)</td>
</tr>
<tr>
<td>Paper B</td>
<td>Adoption of mobile payments by merchants</td>
<td>Value of mobile payments in retail (Chapter 4)</td>
</tr>
<tr>
<td>Paper C</td>
<td>Business networks in mobile payments</td>
<td>Business networks of mobile payments used in retail (Chapters 2, 4)</td>
</tr>
<tr>
<td>Paper D</td>
<td>Customer expectations of mobile ticketing</td>
<td>Description of mobile ticketing cases in Sweden (Chapter 4)</td>
</tr>
<tr>
<td>Paper E</td>
<td>Expectations of different stakeholders for mobile ticketing</td>
<td>Challenges for different stakeholders in mobile ticketing (Chapters 4, 5, 6)</td>
</tr>
<tr>
<td>Paper F</td>
<td>Challenges related to business models of mobile ticketing</td>
<td>Challenges related to business models of mobile ticketing (Chapters 4, 5, 6)</td>
</tr>
<tr>
<td>Paper G</td>
<td>Value of mobile ticketing for public transport companies and customers</td>
<td>Customer value proposition and value of mobile ticketing for public transport companies (Chapters 2, 4, 5, 6)</td>
</tr>
<tr>
<td>Apanasevic, 2018</td>
<td>Overview of collected primary data</td>
<td>Collected evidence for analysed cases (Chapters 4, 5, 6)</td>
</tr>
</tbody>
</table>
General overview of research in mobile payments


The main objective of **Paper A** is to examine how the mobile payments research has been conducted from the methodological and theoretical perspectives. One of the findings was estimation of research gaps in academic research. Analysis of the findings helped to estimate a range of methodological and theoretical characteristics of mobile payments research and to propose possible future trends and a context-oriented approach based on socio-technical system theory. For this paper, T. Apanasevic acted as the first author in the writing of the paper, development of the analysis framework, and analysis. N. Arvidsson and J. Markendahl contributed in the paper revision process. Additionally, N. Arvidsson contributed by proposal and application of the socio-technical system theory.

On mobile payments in retail


**Paper B** explores the expectations of different stakeholders for mobile payment services. The major focus is on the adoption of mobile payments by retailers. T. Apanasevic acted as the first author in data collection and analysis, the writing of the paper, and development of the theoretical framework. J. Markendahl and N. Arvidsson contributed with data collection on the initial banks’ expectations of mobile payment in 2010–2013 and discussions of the paper.


**Paper C** explores the effect of mobile payment introduction on business networks in retailing. The major focus of analysis is on the changes in membership of payment business networks and relations among actors caused by the introduction of new services. The Actors-Resources-Activities (ARA) framework was used to model business networks. The impact of mobile ticketing was analysed in terms of its effect on: (i) interdependencies among involved companies; (ii) the dynamism or adjustments of relations and reshaping of interactions among actors; and (iii) the variety of possible activities, resources, and economic value.
On mobile public transport ticketing services


**Paper D** and **Paper E** address the period of change from the ‘old SMS’ ticketing system to the ‘new SMS’ in Sweden in 2013, when public transport passengers had to register in order to use the service. **Paper D** explores the attitudes of public transport customers to the public transportation’s ticketing services. The research identifies a number of problems negatively affecting customers’ willingness to use the service. **Paper E** provides analysis of expectations of the major groups of mobile public transport ticketing stakeholders related to the change in mobile ticketing in this period. For these papers, T. Apanasevic acted as the first author in the writing of the papers, development of the theoretical framework, and analysis. All authors participated during focus group discussions. J. Markendahl and N. Arvidsson contributed with data collection and discussions of the paper.


These papers focus on analysis of different aspect of mobile ticketing services offered in six northern European countries. The main purpose of **Paper F** is to investigate challenges related to the introduction and launch of mobile ticketing services. We categorise challenges to using the STOF model, specifying challenges related to service, technology, organisational, and financial aspects. **Paper G** explores the value of mobile ticketing services for public transport companies and customers. For these papers, T. Apanasevic acted as the first author in the writing of the paper, data collection, analysis, and interpretation of results. J. Markendahl contributed with data collection and discussions of the paper.
Primary data report


This thesis builds upon a big set of primary data that was not published previously. For this reason, I additionally include the report presenting collected primary data and evidence in the thesis. The data is structured using the STOF model’s parameters. This report is available in DiVA electronic database. I refer to this report using usual reference format (i.e., Apanasevic, 2018) to distinguish from academic publications.

1.5 Thesis outline

This thesis consists of seven chapters. The theoretical background is presented in the next chapter. In Chapter 3, I discuss methodology used for the thesis. This is followed by a description of case studies and findings in Chapter 4. Analysis is provided in Chapter 5. Chapter 6 is dedicated to discussion of the findings, theoretical contributions, and practical implications. Finally, the conclusions and further work are discussed in Chapter 7. This is followed by reprints of selected publications and the primary data report.
This chapter presents the key aspects of related work on mobile payments, mobile ticketing, and the theoretical background. The main overviewed concept is the business model. The chapter then introduces the STOF model used as a research framework.

2.1 Related work and research gaps

2.1.1 Previous research on mobile payment services

Researchers have been exploring the phenomenon of mobile payment for about two decades. Between 1999 and 2016, the dominant research directions in this multidisciplinary area were customer adoption and technological aspects (Dahlberg et al., 2008b, 2015b; Paper A). Research on business aspects remains not that extensive (Dahlberg et al., 2015b; Paper A).

Due to the fact that the current study is focused on business aspects of mobile payments, it is interesting to examine what type of research is conducted within this research theme. It is possible to distinguish several research topics.

Business ecosystems of mobile payments. A few articles analyse business ecosystems of mobile payments by using economic theories. Au and Kauffman (2008) use different aspects of economic theory in order to formulate a framework suitable for analysis of issues of different stakeholders involved in mobile payments. Ozcan and Santos (2015) explore the emergence of mobile payment market architecture by using the theory of market emergence and resource dependence theory. Another approach is to use the concept of ecosystems in combination with strategy theories. Examples of this approach are Hedman and Henningsson (2015) and Guo and Bouwman (2016), which analyse different cooperation strategies used in business ecosystems of mobile payments. Liu et al. (2015) perform retrospective analysis of evolution in the area of mobile payment
innovations by using a technology ecosystem model. In this analysis, the researchers consider the impact of competition and cooperation, and the role of regulatory forces.

**Business models for mobile payments.** The research on business models for mobile payments has been rather limited. In the period from 2006 to 2016, there were only eight papers specifically focused on business models for mobile payment services (see Appendix B, Table B.1). Carton et al. (2012) propose a framework for analysis of the value proposition of mobile payments, an important part of the business model. Dennehy et al. (2015) propose a framework helping to represent the participation of multiple actors in a business model. Juntunen et al. (2012) analyse the business model of a Near Field Communication (NFC)–based mobile ticketing service. Ondrus and Lyytinen (2011) use a business model framework in order to assess possible consequences that would arise if Apple and Google entered the mobile payments market. Pousttchi (2008) proposes reference models for the value-based analysis of mobile payment use cases. Pousttchi et al. (2009) develop a framework for the development of mobile payment business models. Zolnowski et al. (2014) propose a business model for the retail industry.

**Strategies of multi-sided platform providers.** A number of researchers conceptualise mobile payments as multi-sided platforms in their recent studies. Usually, the theory of multi-sided platforms is used together with strategy theories. For example, Kazan and Damsgaard (2013) propose a framework suitable for the analysis of platform providers’ strategies. Ondrus et al. (2015) distinguish platform openness at three levels (provider, technology, and user) and examine strategies that can increase or decrease a platform’s market potential at each level. Staykova and Damsgaard (2015) construct a framework for the analysis of market entry and expansion strategies and find out that optimal timing of both entry and expansion is equally important. Zhong and Nieminen (2015) propose a framework for the analysis of service innovation and development in a co-opetitive environment and apply it to investigate strategies of different mobile payment platform providers. The main finding is that collaboration between platform providers results in opportunities to access superior resources and capabilities, and to gain co-opetitive advantage. De Reuver et al. (2015) combined collective action and platform theories in order to explore issues of collaboration between mobile network operators and banks. The main identified issues are ‘different strategic objectives, conflicts, lack of interdependencies, and governance issues’ (de Reuver et al., 2015, p. 12).

This assessment reveals a rather limited number of publications on strategies and approaches used by service providers. This represents one of the identified research gaps. This thesis contributes to extending knowledge in this area.

### 2.1.2 Previous research on mobile ticketing service

Mobile payments represent a standalone mobile service offering ‘payment functionality in different scenarios’ (Pousttchi, 2008, p. 189), for example, payments at PoS or P2P money transfers. Mobile ticketing services represent a scenario where mobile payments are provided within mobile commerce (Pousttchi, 2008). In this case, public transport companies provide value added services (i.e., purchase of mobile tickets) by using the
mobile sales channel. This is the main difference between mobile payments and mobile ticketing. Dahlberg et al. (2008b), in their definition of mobile payments, state that mobile devices can be used in different payment scenarios, and one of them is transport fare payment. Hence, mobile ticketing is one of the mobile payment scenarios included in this research.

Academic literature on mobile ticketing is rather limited. It is possible to notice the same trend as in the mobile payments research: the dominant research aspects are technological aspects (Ceipidor et al., 2013; Derler et al., 2011; Ekberg and Tamrakar, 2011; Ghiron et al., 2009; Leal et al., 2015; Lüke et al., 2009; Rodrigues et al., 2014; Widmann et al., 2012) and customer adoption (Brakewood et al., 2014; Cheng and Huang, 2013; Di Pietro et al., 2015; Mallat et al., 2009). In the context of this research, it is important to mention findings by Mallat et al. (2009). These researchers highlight the importance of the use context for mobile ticketing adoption and identify the main benefits for customers, which are increased usefulness of the service and mobility. The specified advantages of mobility are reduced queuing and service availability anytime and anywhere (Mallat et al., 2009).

The identified research gap is a lack of publications addressing business aspects of mobile ticketing. Just one paper investigates the business model and value network of mobile ticketing services (Juntunen et al., 2012). Markendahl (2013) explores the change of market structure in SMS ticketing in Sweden. A mobile ticketing use case scenario is discussed among reference models proposed by Pousttchi (2008). This thesis contributes through the analysis of business models, value networks, and value of mobile ticketing services.

2.1.3 A key issue related to mobile payment services

According to the findings of studies on adoption of different electronic and mobile payment instruments (van Hove, 1999; Plouffe et al., 2000; Mallat, 2007), network externalities are an important obstacle to the wider penetration of payment services. Due to network externalities, growth rates of new products are delayed, and a company gets a lower profit (Goldenberg et al., 2010). The effect of direct network externalities means that increasing numbers of service or product adopters increase the value of this service or product for all users (Economides, 1996; Song et al., 2009), such as in the case of telephones and fax machines.

Mobile payments are subject to indirect network externalities (Economides, 1996; van Hove, 1999) because these services should be adopted by both merchants and consumers (Plouffe et al., 2000). Hence, service adoption by merchants depends on service adoption by consumers, and vice versa (Plouffe et al., 2000). This situation, also known as the ‘chicken and egg’ dilemma, is challenging for mobile payment service providers. A new payment service without a critical mass of consumers is not attractive for merchants’ investment, and consumers will not adopt a new payment method without ubiquitous service infrastructure (van Hove, 1999; Mallat, 2007). Critical mass is “the minimum number of adopters of an interactive innovation for the future rate of adoption
to be self-sustaining” (Mahler and Rogers, 1999, p. 721). Previous studies (Szmigin and Bourne, 1999; Plouffé et al., 2000; van Hove, 2001) have provided empirical evidence that shows that a lack of critical mass is a factor, which leads to the failure of payment systems’ (Apanasevic, 2015, pp. 26-27).

2.2 The business model concept

In this thesis, I use the business model concept for analysis of mobile payment and mobile ticketing services. Starting from the 1990s, interest in this concept showed significant growth: about 16,950 articles were published during 1990–2013 (Wirtz et al., 2016). Researchers (Al-Debei and Avison, 2010; Chesbrough and Rosenbloom, 2002; Morris et al., 2005; Osterwalder et al., 2005; Wirtz et al., 2016; Zott et al., 2011) explain this dramatic increase in interest in this topic by the explosion of electronic business and development in the ICT area. Hence, the major focus of researchers has been on e-business and e-commerce (Al-Debei and Avison, 2010). However, the business model concept was applied in different domains, including business management and strategy, telecommunications, the software industry, and e-governance (Al-Debei and Avison, 2010).

A significant number of publications have addressed the business model concept. However, many key aspects of the concept still remain unclear. That is why some researchers consider the concept an ill-defined ‘buzzword’ (Seddon et al., 2004). Others (Teece, 2010, p. 175) state that it ‘lacks theoretical grounding in economics or in business studies’. In addition, the business model concept ‘has sometimes been misperceived as a substitute of corporate strategy, business process, or business case’ (Al-Debei and Avison, 2010, p. 360) and misused (DaSilva and Trkman, 2014). A number of extensive systematic literature reviews (Al-Debei and Avison, 2010; Pateli and Giaglis, 2004; Wirtz et al., 2016; Zott et al., 2011) aim to clarify what the business model concept is and what its main components are. Below, I discuss a definition for the term ‘business model’, explore its structural elements, and present a networked business model approach.

2.2.1 Business model definition

There is no common or unified definition of the term ‘business model’. Over time, many researchers have provided their own definitions of the term. I provide some different definitions of the term ‘business model’ proposed by different authors during the period 2000–2010 (see Appendix B, Table B.2).

It is notable that researchers agree regarding some key aspects (Wirtz et al., 2016). For example, business models generally refer to the ways firms create and capture value from a service, product, or technology (Amit and Zott, 2001; Chesbrough and Rosenbloom, 2002; Gordijn et al., 2000; Haaker et al., 2006; Johnson et al., 2008; Magretta, 2002). Business models also reflect the logic used by a firm in order to create and deliver value to customers (Casadeus-Masanell and Ricart, 2010; Magretta, 2002; Osterwalder et al., 2005).
It is also evident that different definitions highlight different things. For example, Chesbrough and Rosenbloom (2002, p. 532) describe the business model as ‘a focusing device’ mediating between technology and economic value. Magretta (2002, p. 87) defines the business model as a story that explains ‘how enterprises work’ and ‘how the pieces of a business fit together’. Casadeus-Masanell and Ricart (2010) refer to the business model as the logic of the firm. Camponovo and Pigneur (2003, p. 4) see it as ‘a detailed conceptualisation of an enterprise’s strategy’. The business model is ‘a conceptual tool’ for Osterwalder et al. (2005, p. 10) and an ‘interrelated set of decision variables’ for Morris et al. (2005, p. 727). Some definitions seek to break the business model into its structural elements (Hedman and Kalling, 2003; Johnson et al., 2008; Osterwalder et al., 2005).

Some researchers and practitioners misuse the business model concept or see it as a substitute to strategy (Al-Debei and Avison, 2010; Casadeus-Masanell and Ricart, 2010; DaSilva and Trkman, 2014). Distinctions and connections among the concepts of business model, strategy, and business processes are as follows:

- **Difference between strategy and business model.** According to Porter (1996, p. 68), strategy is ‘the creation of a unique and valuable position, involving different sets of actors’. Strategy can be defined as ‘a contingent plan of actions designed to achieve a particular goal’ (Casadeus-Masanell and Ricart, 2010, p. 203). In this context, business models represent different choices of management regarding a company’s operation and the outcomes of these choices. Hence, strategy is a contingent plan of which business model to use. The business model reflects strategy and is derived from it (Al-Debei and Avison, 2010; Casadeus-Masanell and Ricart, 2010).

- **Difference between business model and business process.** A business process describes how a firm operates, that is, what activities it performs and how these activities are carried out in order to provide a service (Al-Debei and Avison, 2010; Casadeus-Masanell and Ricart, 2010; Gordijn et al., 2000). Business processes are derived from a business model but not defined by it (Al-Debei and Avison, 2010; Gordijn et al., 2000).

### 2.2.2 Components of business model

Many researchers seek to define the structure of the business model and to specify its primary components. Analysis of business model components discussed in 12 studies published between 2002 and 2016 is presented in Table 2.1. The list of papers includes two literature reviews (Al-Debei and Avison, 2010; Wirtz et al., 2016).

Researchers propose different combinations of business model components, and they use different terms and different levels of abstraction (see Appendix B, Table B.3). However, there is agreement regarding the core components. These are: (i) the value
proposition of the service or product, (ii) resources and capabilities, (iii) the market segment or target customers, (iv) the revenue model and cost structure, and (v) the value network. A review of recent literature (Wirtz et al., 2016) suggests a business model framework that integrates different components proposed by previous studies and provides a holistic picture. The framework consists of strategic components, customer and market components, and value creation components. Each of the components consists of three models (see Figure 2.1).

### 2.2.3 Networked Business Model

The literature on business models is mainly firm-centric (Bankvall et al., 2017; Palo and Tähtinen, 2013). However, new, innovative services or products are usually provided by a number of business actors collaborating in a business network. Zott and Amit (2007, 2010) argue that a business model is a combination of interdependent activities that transcend the focal firm and embed it in its environment. Consequently, choices of partners have an impact on the business model of the focal firm (Freytag and Clarke, 2012). For this reason, a business model should consider business networks and partnerships (Wirtz et al., 2016).

The Industrial Marketing and Purchasing (IMP) Group has a long tradition of research on business networks and relationships among business actors. IMP researchers

<table>
<thead>
<tr>
<th>Component</th>
<th>References</th>
<th>No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value proposition</td>
<td>Al-Debei and Avison, 2010; Chesbrough and Rosenbloom, 2002; Demil and Lecocq, 2010; Haaker et al., 2006; Hedman and Kalling, 2003; Johnson et al., 2008; Magretta, 2002; Mason and Spring, 2011; Morris et al., 2005; Osterwalder et al., 2005; Pousttchi et al., 2009; Wirtz et al., 2016</td>
<td>12</td>
</tr>
<tr>
<td>Resources and capabilities</td>
<td>Al-Debei and Avison, 2010; Chesbrough and Rosenbloom, 2002; Demil and Lecocq, 2010; Haaker et al., 2006; Hedman and Kalling, 2003; Johnson et al., 2008; Magretta, 2002; Mason and Spring, 2011; Morris et al., 2005; Osterwalder et al., 2005; Pousttchi et al., 2009; Wirtz et al., 2016</td>
<td>12</td>
</tr>
<tr>
<td>Market segment or target customers</td>
<td>Al-Debei and Avison, 2010; Chesbrough and Rosenbloom, 2002; Haaker et al., 2006; Hedman and Kalling, 2003; Johnson et al., 2008; Magretta, 2002; Morris et al., 2005; Osterwalder et al., 2005; Pousttchi et al., 2009; Wirtz et al., 2016</td>
<td>10</td>
</tr>
<tr>
<td>Revenue model and cost structure</td>
<td>Al-Debei and Avison, 2010; Chesbrough and Rosenbloom, 2002; Demil and Lecocq, 2010; Haaker et al., 2006; Johnson et al., 2008; Magretta, 2002; Morris et al., 2005; Osterwalder et al., 2005; Pousttchi et al., 2009; Wirtz et al., 2016</td>
<td>10</td>
</tr>
<tr>
<td>Value network</td>
<td>Al-Debei and Avison, 2010; Chesbrough and Rosenbloom, 2002; Demil and Lecocq, 2010; Haaker et al., 2006; Hedman and Kalling, 2003; Mason and Spring, 2011; Osterwalder et al., 2005; Wirtz et al., 2016</td>
<td>8</td>
</tr>
<tr>
<td>Strategy</td>
<td>Chesbrough and Rosenbloom, 2002; Wirtz et al., 2016</td>
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<tr>
<td>Technology</td>
<td>Haaker et al., 2006; Wirtz et al., 2016</td>
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<td>Marketing</td>
<td>Morris et al., 2005; Osterwalder et al., 2005</td>
<td>2</td>
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<tr>
<td>Procurement</td>
<td>Wirtz et al., 2016</td>
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<tr>
<td>Competitors</td>
<td>Hedman and Kalling, 2003</td>
<td>1</td>
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<tr>
<td>Threat consideration</td>
<td>Pousttchi et al., 2009</td>
<td>1</td>
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</table>
state that any single organisation lacks the resources needed to provide a service or to produce a product alone (Håkansson and Snehota, 1989). Due to this reason, companies join business networks and are connected through resource ties and activity links (Håkansson and Snehota, 1989, 1995). ‘This affects resources and activities of other actors involved into the network. [Hence], company’s resources are “partly controlled by demands and requirements of counterparts, while ‘external resources’ owned by counterparts, are partly controlled”’ (Baraldi et al., 2007) by the company’ (Paper C).

As mentioned, business models conceptualise the way a firm creates and captures value from a service or product. Often, value is created in a network. Hence, IMP researchers extend the firm-centric business model concept by using a network perspective. At the firm level, companies have individual business models. At the network level, companies align individual business models with a collective business model (Palo and Tähtinen, 2013). The key elements of a networked business model are: (i) the service and value it offers to customers, (ii) actors and roles, and (iii) value exchange activities between business network actors (Palo, 2010). Hence, a networked business model explains: (i) how network actors will capture value creation for customers and the network (Bankvall et al., 2017; Palo and Tähtinen, 2013) and (ii) what business exchange patterns will emerge (Bankvall et al., 2017). This approach leads to the development of ‘collective understanding of the business opportunities and shaping the action to exploit them’ (Palo and Tähtinen, 2013, p. 775).
2.3 Theoretical research framework: The STOF model

The STOF model focuses on the design of business models for new services that are based on new technological developments (such as new information and communication technologies, digitisation, increased mobility of devices, etc.) that enable new services (platforms, architectures) for knowledge sharing, collaboration, or e-commerce transactions, anywhere, anytime (Bouwman et al., 2008). Examples of services are media industry services, e-health, e-payment services, marketplaces, e-travel, e-learning, and so forth. In other words, these are services provided via the Internet or via mobile networks (Bouwman et al., 2008).

Mobile services usually require collaboration among different actors that form complex value networks and jointly provide services to customers. The STOF framework takes into consideration a value network ‘in which multiple actors collaborate in delivering innovative services, each contributing their own specific resources and capabilities’ (Bouwman et al., 2008, p. 28). Due to this, STOF is suitable for the design of business models for mobile services. Researchers have applied this framework for the analysis of mobile ticketing services (Juntunen et al., 2012), mobile payments (Guo et al., 2013), location based services (Ryschka et al., 2014), and e-health (Menko et al., 2013).

The STOF model is a conceptualised description of the main business model components. The main domains of the model are service, technology, organisation, and
finance (see Figure 2.2). Additionally, the model focuses on value provided for customers and service providers.

In order to develop a viable business model, the developer needs to have a good understanding of critical design issues – those variables that are of critical ‘importance to the viability and sustainability’ of the given business model (Bouwman et al., 2008, p. 72). Critical design issues found in each domain are discussed below.

### 2.3.1 Service domain

The central concept in the service domain is the ‘value’ of the mobile service offering that is created for a customer (Haaker et al., 2006). Many researchers (Balasubramanian et al., 2002; Camponovo and Pigneur, 2003; Chen and Nath, 2004; Clarke, 2001; Heinonen and Pura, 2008; Kakihara and Sørensen, 2002; Pousttchi, 2008; Vanhaverbeke and Cloodt, 2005) have explored the customer value propositions of mobile services. Mobility is the major source of distinctive value propositions. Kakihara and Sørensen (2002) specify three dimensions of mobility: (i) spatial mobility is related to changes of geographic location; (ii) temporal mobility is linked to time aspects, such as saving time, speeding up activities, and planning activities; (iii) contextual mobility is related to a certain physical or social situation. Other dimensions of mobile service value are personalisation (Balasubramanian et al., 2002; Camponovo and Pigneur, 2003; Chen and Nath, 2004; Clarke, 2001; Heinonen and Pura, 2008; Pousttchi, 2008), efficiency enhancement (Chen and Nath, 2004; Vanhaverbeke and Cloodt, 2005), and convenience (Clarke, 2001; Vanhaverbeke and Cloodt, 2005). A summary of mobile service value categories is provided in Table 2.2. A more detailed discussion of customer value propositions can be found in Paper G.

Mobile services and payments are examples of B2B services. In order to attract business customers (e.g., merchants and public transport companies), these services have to offer value for them. In terms proposed by Lapierre (1997), this is value in use, or

<table>
<thead>
<tr>
<th>Value</th>
<th>References</th>
<th>No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personalisation</td>
<td>Balasubramanian et al., 2002; Chen and Nath, 2004; Clarke, 2001; Heinonen and Pura, 2008; Pousttchi, 2008</td>
<td>5</td>
</tr>
<tr>
<td>Localisation</td>
<td>Balasubramanian et al., 2002; Chen and Nath, 2004; Clarke, 2001; Kakihara and Sørensen, 2002; Pousttchi, 2008</td>
<td>5</td>
</tr>
<tr>
<td>Temporal mobility</td>
<td>Balasubramanian et al., 2002; Clarke, 2001; Heinonen and Pura, 2008; Kakihara and Sørensen, 2002; Pousttchi, 2008</td>
<td>5</td>
</tr>
<tr>
<td>Contextual mobility</td>
<td>Mallat et al., 2009; Kakihara and Sørensen, 2002; Pousttchi, 2008</td>
<td>3</td>
</tr>
<tr>
<td>Efficiency enhancement</td>
<td>Chen and Nath, 2004; Vanhaverbeke and Cloodt, 2005</td>
<td>2</td>
</tr>
<tr>
<td>Convenience</td>
<td>Clarke, 2001; Vanhaverbeke and Cloodt, 2005</td>
<td>2</td>
</tr>
<tr>
<td>Complementarities</td>
<td>Amit and Zott, 2001; Vanhaverbeke and Cloodt, 2005</td>
<td>2</td>
</tr>
<tr>
<td>Enabling property</td>
<td>Vanhaverbeke and Cloodt, 2005</td>
<td>2</td>
</tr>
<tr>
<td>Service ubiquity</td>
<td>Clarke, 2001</td>
<td>1</td>
</tr>
</tbody>
</table>
value that business customers gain after service delivery. At a general level, the concept of value networks addresses the value creation process in the business context. The main types of value are economic value and intangible benefits (i.e., knowledge, customer loyalty, sense of community, enhanced brand perception, etc.) (Allee, 2000; 2008). Liu et al. (2005) specify three dimensions of business service value: (i) economic value or a trade-off among quality and cost in comparison to competitors, (ii) value from the core service or a service offering benefits compared to competitors, and (iii) value of the support service offered by a service provider. Research on the value of mobile payments and mobile services in the B2B context is very limited. There are just a few studies: Mallat and Tuunainen (2008) explore the benefits of mobile payments for retailers, and Komulainen et al. (2007) study the value of mobile advertisement services for retailers. The value dimensions of mobile services in the B2B context are summarised in Table 2.3 (more details in Paper G).

Table 2.3: Value propositions of mobile services in the B2B context.

<table>
<thead>
<tr>
<th>Value</th>
<th>References</th>
<th>No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Financial/economic value/commercial effectiveness (increase in purchases)</td>
<td>Allee, 2000; Allee 2008; Lapierre, 1997; Liu et al., 2005 Komulainen et al., 2007; Mallat and Tuunainen, 2008</td>
<td>6</td>
</tr>
<tr>
<td>Intangible benefits (knowledge, customer loyalty, enhanced brand perception, etc.)</td>
<td>Allee, 2000; Allee 2008; Mallat and Tuunainen, 2008 (enhanced brand perception); Komulainen et al., 2007 (pioneering); Liu et al., 2005</td>
<td>5</td>
</tr>
<tr>
<td>Enhanced service provision to customers (new payment option)</td>
<td>Mallat and Tuunainen, 2008; Chen and Nath, 2004; Vanhaeverbeke and Cloodt, 2005</td>
<td>3</td>
</tr>
<tr>
<td>Value of the support service</td>
<td>Liu et al., 2005; Komulainen et al., 2007</td>
<td>2</td>
</tr>
<tr>
<td>Technical functionality</td>
<td>Komulainen et al., 2007</td>
<td>1</td>
</tr>
<tr>
<td>Communication</td>
<td>Komulainen et al., 2007</td>
<td>1</td>
</tr>
<tr>
<td>Increased availability of products and services</td>
<td>Mallat and Tuunainen, 2008</td>
<td>1</td>
</tr>
<tr>
<td>Opportunity to provide new services and content</td>
<td>Mallat and Tuunainen, 2008</td>
<td>1</td>
</tr>
<tr>
<td>Attracting new customers</td>
<td>Mallat and Tuunainen, 2008</td>
<td>1</td>
</tr>
<tr>
<td>Lower service cost</td>
<td>Mallat and Tuunainen, 2008</td>
<td>1</td>
</tr>
</tbody>
</table>

Table 2.4: Critical design issues in the service domain (Haaker et al., 2006, p. 652).

<table>
<thead>
<tr>
<th>Critical design issues</th>
<th>Description</th>
<th>Balance of requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Targeting</td>
<td>How to define a profitable target group?</td>
<td>Mass market or niche market B2C or B2B service</td>
</tr>
<tr>
<td>Creating value elements</td>
<td>How to create value for the target users?</td>
<td>Technological possibilities versus user needs</td>
</tr>
<tr>
<td>Branding</td>
<td>How to promote the service?</td>
<td>Branding, provider’s versus service brand</td>
</tr>
<tr>
<td>Customer retention</td>
<td>How to stimulate recurrent use of the service? How to keep customers satisfied and loyal?</td>
<td>Customer lock-in versus customer annoyance (e.g. service bundling, personalisation)</td>
</tr>
</tbody>
</table>
Critical design issues in the service domain are targeting, creating value elements, branding, and customer retention (Haaker et al., 2006). The key aspects of these critical design issues are summarised in Table 2.4.

2.3.2 Technology domain

Service requirements determine the technology domain. A central concept in the technology domain is functionality that enables certain IT systems’ capabilities for end-users (Haaker et al., 2006). Hence, functionality is related to a system’s technical architecture, service platforms, applications, devices, and required infrastructure (Bouwman et al., 2008; Haaker et al., 2006). Important decisions regarding the technical architecture include interoperable system versus non-interoperable and open versus closed (Haaker et al., 2006). Other critical design issues are service security, quality of service, system integration, accessibility for customers, and management of use profiles (Bouwman et al., 2008; Haaker et al., 2006). The key aspects of these critical design issues are listed in Table 2.5.

<table>
<thead>
<tr>
<th>Critical design issues</th>
<th>Description</th>
<th>Balance of requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Security</td>
<td>How to arrange secure access and communication?</td>
<td>Ease of use versus privacy abuse</td>
</tr>
<tr>
<td>Quality of service</td>
<td>How to ensure the desired level of quality?</td>
<td>Quality versus costs</td>
</tr>
<tr>
<td>System integration</td>
<td>How to integrate new services with existing systems?</td>
<td>Flexibility versus cost</td>
</tr>
<tr>
<td>Accessibility</td>
<td>How to realise technical accessibility to the service for the target group?</td>
<td>Open or restricted service access</td>
</tr>
<tr>
<td>Management of user profiles</td>
<td>How to manage and maintain user profiles?</td>
<td>User involvement versus automatic profile generation</td>
</tr>
</tbody>
</table>

2.3.3 Organisation domain

The central concepts in the organisation domain are resources and capabilities that are owned by the organisation or that have to be reached through value network actors (Haaker et al., 2006). Researchers (Bouwman et al., 2008; Haaker et al., 2006; Hedman and Kalling, 2003; Pateli and Giaglis, 2004) notice that a single company does not have the needed resources to provide a service alone and must collaborate with others by building a value network, obtaining access to needed resources and capabilities, and jointly delivering customer value.

A value network is a set of relatively independent actors having different assets and competencies, performing certain roles, and interacting in order to achieve economic or social value (Allee, 2008; Peppard and Rylander, 2006; Vanhaverbeke and Cloodt,
2005). This definition corresponds to the definition of ‘business network’ by IMP researchers. A *business network* is a set of business actors that are connected through business relationships that allow them to access and exploit the resources of other parties and link the activities of these parties together (Håkansson and Snehota, 1989; Anderson et al., 1994).

Other important aspects of the organisation domain are the division of roles among business actors, relations among them, the resources and capabilities of the actors, and the governance of the value network. Value networks shape the roles of the involved actors in creating value (Chesbrough and Rosenbloom, 2002), when firms interact and exchange tangible and intangible assets (Allee, 2008). This way, companies become dependent on other involved parties (Vanhaverbeke and Cloodt, 2005). Usually, the central firm that brings all the actors together performs the network orchestration, governance, and management (Vanhaverbeke and Cloodt, 2005). This ‘involves using appropriate governance mechanisms, developing inter-firm knowledge, sharing routines, making appropriate relation-specific investments, and initiating necessary changes to the partnership as it evolves’ (Gulati et al., 2000, p. 209).

Critical design issues related to the organisation domain are partner selection, network openness, network governance, and network complexity (Bouwman et al., 2008). The key aspects of these critical design issues are summarised in Table 2.6.

Table 2.6: Critical design issues in the organisation domain (Haaker et al., 2006, p. 655).

<table>
<thead>
<tr>
<th>Critical design issues</th>
<th>Description</th>
<th>Strategic interests</th>
</tr>
</thead>
<tbody>
<tr>
<td>Partner selection</td>
<td>How are partners selected?</td>
<td>Access to resources and capabilities of others</td>
</tr>
<tr>
<td>Network openness</td>
<td>Who is allowed to join the value network?</td>
<td>Actors who can join the value network, control, and customer reach</td>
</tr>
<tr>
<td>Network governance</td>
<td>How is the value network orchestrated?</td>
<td>Customer ownership, control over capabilities and resources</td>
</tr>
<tr>
<td></td>
<td>Who is the dominant actor?</td>
<td></td>
</tr>
<tr>
<td>Network complexity</td>
<td>How to manage the increasing number of relations with actors in the network?</td>
<td>Control over the value network, access to resources and capabilities</td>
</tr>
</tbody>
</table>

### 2.3.4 Financial domain

The key concepts in the financial domain are revenue models, investment decisions, and sharing of revenues and costs by network actors (Bouwman et al., 2008; Haaker et al., 2006). Due to the fact that revenues depend on prices, mobile payment providers need to consider prices for both types of customers: end-users and merchants (Eisenmann et al., 2006; Evans and Schmalensee, 2008).

Critical design issues related to the financial domain are pricing, division of investment and risks, valuation of contributions and benefits, and division of costs and revenues (Bouwman et al., 2008). The key aspects of these critical design issues are summarised in Table 2.7.


Table 2.7: Critical design issues in the financial domain (Haaker et al., 2006, p. 657).

<table>
<thead>
<tr>
<th>Critical design issues</th>
<th>Description</th>
<th>Strategic interests</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pricing</td>
<td>How to price the service for end-users and customers?</td>
<td>Realise network profitability</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Realise market share</td>
</tr>
<tr>
<td>Division of investment</td>
<td>How to divide the investments among the business partners?</td>
<td>Match individual partners’ profitability and risk</td>
</tr>
<tr>
<td>Valuation of contributions and benefits</td>
<td>How to measure and quantify partners’ contributions and benefits?</td>
<td>Fair division of costs and revenues</td>
</tr>
<tr>
<td>Division of costs and revenues</td>
<td>How to divide the costs and revenues among the business partners?</td>
<td>Balance between individual partners’ profitability and network profitability</td>
</tr>
</tbody>
</table>

2.4 Application of the STOF model

Consideration of critical design issues helps in designing a viable business model that aims at creating value for customers and involved business actors. For this reason, the critical design issues within each discussed domain served as analysis criteria (see Tables 2.4–2.7).

The same tables provide a description of each critical design issue. It is formulated in a form of a question that each service provider has to consider and address. Additionally, there are requirements that have to be balanced (i.e., in the service and technology domains), and strategic interests that have to be considered (i.e., in the organisation and finance domains). When applying STOF, I analysed how each service provider addressed a certain question. This indicates what approach that was used to balance requirements or considering strategic interests. For example, when analysing the critical design issue creating value elements, I was considering approaches of each service provider used to create value propositions for different groups of customers (considering their needs and wishes or not) based on possibilities of available technology. This type of analysis was performed for each critical design issue. In the next chapter, I discuss the used research methodology and approach.
Chapter 3

Methodology

This chapter provides a description of the methodology and research approach used in the thesis. More specifically, I present research methods used and the approaches to data collection, data analysis, and interpretation (see Figure 3.1). I also discuss the validity and reliability of the research.

![Research approach diagram](image)

Figure 3.1: Research approach.

3.1 Research method

This research started with identification of the research problem and formulation of the research questions. This is discussed in Section 1.2.

In order to address the formulated research questions, a qualitative research method is applied. The main reasons behind using this method are: (i) a need to explore and understand the specifics of the phenomenon and (ii) the fact that the phenomenon to be understood is related to knowledge of others (Ritchie et al., 2013). Qualitative research is based on non-quantitative data collection and analysis methods (Adams et al., 2007).
One qualitative research method is the *multiple case study*. The *case study* research method contributes to ‘our knowledge of individual, group, organisational, social, political, and related phenomena’ (Yin, 2009, p. 4) and is commonly used in psychology, sociology, political science, business, economics, and other social sciences. A case study can be defined as ‘an in-depth study, which explores issues, present and past, as they affect one or more units (organisation, group, department, or person)’ (Adams et al., 2007, p. 112). The *multiple case study* approach allows cross-case analysis, identification of common patterns, and more accurate theory generalisation (Eisenhardt, 1989; Yin, 2009). Hence, multiple case studies result in a more robust study (Yin, 2009). That is why this approach is considered more advantageous (Yin, 2009).

Use of multiple case studies implies the use of replication logics, which corresponds to the same approach that is used in multiple experiments (Yin, 2009). From the perspective of this thesis, this means that each case shows either similar results within each specified group or contrasting results due to predicted reasons. Hence, each individual case indicates ‘how and why a particular proposition was demonstrated (or not demonstrated)’ (Yin, 2009, p. 56). Analysis across cases indicates why certain cases produce certain results and other cases produce contrasting results (Yin, 2009).

This research focuses on mobile payment services provided in Northern Europe. More specifically, I consider six countries: Estonia, Denmark, Lithuania, Norway, Sweden, and the United Kingdom. This research explores the perspectives of five types of providers: banks, independent providers, direct operator billing providers, retailers, and public transport companies. In summary, I analyse 13 mobile payment solutions and 18 mobile ticketing solutions (see Table 3.1).

### 3.2 Data collection

The next step is data collection. Case study evidence may be collected from different sources. Eisenhardt (1989, p. 534) mentions ‘archives, interviews, questionnaires, and observations’. Yin (2009, p. 99) refers to six sources: ‘documentation, archival records, interviews, direct observation, participant-observation, and physical artifacts’. In the current study, the main data sources are: (i) interviews, (ii) documentation, and (iii) participation in collaborative projects.

#### 3.2.1 Interviews

The most important source of primary data was in-depth semi-structured interviews. The interviews were conducted with representatives of companies taking part in the selected mobile payments cases. The interviewing process included the following stages: (i) development of the interview protocol, (ii) conducting of interviews, and (iii) transcription of interview records. Some interviewees expressed a wish to review and comment on their interview transcripts.

The questions of the interview protocol were formulated based on the research questions and research objectives. The sets of questions addressed the following themes:
Table 3.1: List of case studies.

<table>
<thead>
<tr>
<th>Country</th>
<th>Case studies, providers</th>
<th>Types of providers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sweden</td>
<td>Bart, Swedbank</td>
<td>Bank</td>
</tr>
<tr>
<td></td>
<td>Swish, GetSwish AB</td>
<td>Collaborating banks</td>
</tr>
<tr>
<td></td>
<td>WyWallet</td>
<td>Direct operator billing provider</td>
</tr>
<tr>
<td></td>
<td>SEQR, Seamless</td>
<td>Independent provider</td>
</tr>
<tr>
<td></td>
<td>ICA card, ICA Banken</td>
<td>Retailer’s bank</td>
</tr>
<tr>
<td></td>
<td>SMS ticketing service</td>
<td>All Swedish public transport companies</td>
</tr>
<tr>
<td></td>
<td>Bleningetrafiken, in-app ticketing</td>
<td>Public transport company</td>
</tr>
<tr>
<td></td>
<td>Länstrafiken Kronenberg, in-app ticketing</td>
<td>Public transport company</td>
</tr>
<tr>
<td></td>
<td>Skånetrafiken, in-app ticketing</td>
<td>Public transport company</td>
</tr>
<tr>
<td></td>
<td>Västrafik, in-app ticketing</td>
<td>Public transport company</td>
</tr>
<tr>
<td></td>
<td>Karlstadsbuss, in-app ticketing</td>
<td>Public transport company</td>
</tr>
<tr>
<td></td>
<td>SL, in-app ticketing</td>
<td>Public transport company</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Bank</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Collaboration between a mobile network operator and a bank</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Technology solution provider</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Public transport company</td>
</tr>
<tr>
<td>Norway</td>
<td>Vipps, DNB</td>
<td>Bank</td>
</tr>
<tr>
<td></td>
<td>Valyou, TSM Nordic</td>
<td>Collaboration between a mobile network operator and a bank</td>
</tr>
<tr>
<td></td>
<td>MeaWallet</td>
<td>Public transport company</td>
</tr>
<tr>
<td></td>
<td>Ruter</td>
<td>Public transport company</td>
</tr>
<tr>
<td></td>
<td>- In-app ticketing</td>
<td>Public transport company</td>
</tr>
<tr>
<td></td>
<td>- BIBO solution</td>
<td>Public transport company</td>
</tr>
<tr>
<td></td>
<td>Skyss, in-app ticketing</td>
<td>Public transport company</td>
</tr>
<tr>
<td>Denmark</td>
<td>MobilePay, Danske Bank</td>
<td>Bank</td>
</tr>
<tr>
<td></td>
<td>Copenhagen Metro and Movia</td>
<td>Public transport companies</td>
</tr>
<tr>
<td></td>
<td>- SMS ticketing service</td>
<td>Public transport company</td>
</tr>
<tr>
<td></td>
<td>- In-app ticketing</td>
<td>Public transport company</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>Transport for London, contactless card</td>
<td>Public transport company</td>
</tr>
<tr>
<td>Estonia</td>
<td>Fortumo</td>
<td>Direct operator billing provider</td>
</tr>
<tr>
<td></td>
<td>T-pilet, in-app ticketing</td>
<td>Technology solution provider</td>
</tr>
<tr>
<td></td>
<td>T-Solutions, in-app ticketing</td>
<td>Technology solution provider</td>
</tr>
<tr>
<td></td>
<td>Jiffi, BIBO solution</td>
<td>Technology solution provider</td>
</tr>
<tr>
<td></td>
<td>Ridango, in-app ticketing</td>
<td>Technology solution provider</td>
</tr>
<tr>
<td>Lithuania</td>
<td>Mokipay</td>
<td>Independent provider</td>
</tr>
<tr>
<td></td>
<td>PaySera</td>
<td>Independent provider</td>
</tr>
<tr>
<td></td>
<td>WioPay, WoraPay</td>
<td>Independent provider</td>
</tr>
<tr>
<td></td>
<td>mTicket, Suisiekimo paslaugos, in-app ticketing</td>
<td>Public transport company</td>
</tr>
</tbody>
</table>

BIBO: Be In Be Out

(i) the background of the interviewee and the company; (ii) the history of the mobile payment service development, service characteristics, and competition strategies; (iii) description of the main partners, their roles, and cooperation strategies; (iv) the main business clients and their feedback; (v) general feedback from the service’s end-users; and (vi) service advantages and disadvantages. A sample interview protocol is provided in Appendix C. Most of the interviews lasted between one and two hours. A majority of the respondents agreed to have the interviews recorded. In the cases where permission to record the interview was not received, the researcher took notes.
The contacted companies and organisations represent different types of mobile payment stakeholders. These include banks, central banks, mobile network operators, independent mobile payment service providers, retailers, a Trusted Service Manager (TSM), a payment processor, technology developers and providers, and public transport companies (see Appendix D, Table D.1). In addition, three industry experts from Denmark, Norway, and the United Kingdom were interviewed.

The majority of the contacted respondents are top- and middle-level managers who took an active role and were involved in the development process of mobile payment services. These interviewees were qualified as having needed expertise and knowledge. For reasons of confidentiality, the interviewees’ names are not disclosed.

The interviews were conducted in the period from April 2012 to January 2017. The total number of interviewees contacted is 42. The total number of interviews carried out is 43. One respondent responded in written form.

3.2.2 Documentation

Documentation is secondary information that can be found through Internet searches and that may take the form of mass media articles, formal studies, or evaluations of case studies (Yin, 2009). For this study, I used corporate press releases, market analysis reports, websites, and media articles available online. This data helped in understanding the background situation in the market and to track the development of mobile payment services. This information complemented the information about the selected case studies.

3.2.3 Collaborative projects

Participation in collaborative research projects included meetings with industry partners, and discussions of business ecosystems, business models, and value-added services for mobile payment and mobile ticketing services (see Appendix D, Table D.2). The scope of the projects included end-user focus group discussions and end-user surveys on mobile payment and ticketing services.

Additionally, I attended a number of industry events and workshops. They helped in understanding the state of art of the payments market and to meet with different business players providing mobile payments services.

3.3 Data analysis and interpretation

The unit of analysis is a company, that is, a mobile payment service provider. The analysis focuses on approaches used by different types of providers to address the challenges of mobile payment services.

The process started with the analysis of the interview transcripts. Respondents’ responses were grouped and rearranged by use of the critical design issues for each STOF model’s domain as classifying criteria (see Tables 2.4–2.7 in Section 2.3). This
way, findings for each case were structured according to the four domains of the STOF model: service, technology, organisation, and finance. Within each domain, the findings were further categorised according to corresponding critical design issues. Detailed primary data is presented in Apanasevic (2018).

As mentioned, I classified the case studies in five groups based on the actors providing the services: banks, independent providers, direct operator billing providers, retailers, and public transport companies. I performed a cross-case analysis within each group of actors. This helped to aggregate critical design issues and to identify typical approaches and patterns within each category of providers. Cases and aggregated actor-specific findings are presented in Chapter 4.

The critical design issues aggregated for each type of mobile payment provider became a departing point for analysis. Based on these data, the goal was to specify the key critical design issues within each domain that had the biggest impact on the business model’s viability for all types of providers. In order to do that, I compared approaches used by the different actors for each critical design issue. If each provider used a different approach to address a certain critical design issue, I considered that this factor exhibited the highest degree of diversity. If all providers used the same or similar approaches, I considered that this factor had the lowest degree of diversity. In order to evaluate the diversity of approaches, I used the following scale:

1 – similar approach used by all 5 types of actors;
2 – similar approach used by 4 types of actors;
3 – similar approach used by 3 types of actors;
4 – similar approach used by 2 types of actors;
5 – all actors had different approaches.

The analysis is presented in Chapter 5.

3.4 Validity and reliability of research

I used the STOF model in order to analyse how mobile payment service providers address certain critical design issues. The critical design issues were used as analysis criteria (see Tables 2.4–2.7 in Section 2.3). Each critical design issue requires providing an answer to a certain question. Thus, based on primary data, I studied how each provider addressed this question and what approaches were used.

In total, there are 17 critical design issues applied for the analysis of five types of actors. As a result, the primary data presents a large data set, with a large number of aspects to consider. There is a certain challenge in analysing large data sets. In order to handle that, I sought to reach consistency and accuracy in applied method. In order to achieve this and to ensure quality in the research design, I apply the following four tests important for multiple case study research: (i) construct validity, (ii) internal validity, (iii) external validity, and (iv) reliability (Yin, 2009, p. 40). These are discussed below.
3.4.1 Construct validity

Validity reflects whether a measurement instrument measures what it is intended to measure (Long and Johnson, 2000; Golafshani, 2003). Construct validity is ‘identifying correct operational measures for the concepts being studied’ (Yin, 2009, p. 40). In order to increase construct validity, Yin (2009) recommends the following tactics: (i) using multiple sources of evidence or triangulation of different sources of data, (ii) establishing a chain of evidence (or to show ‘the derivation of any evidence from initial research questions to ultimate case study conclusions’ (Yin, 2009, p. 122)), and (iii) asking respondents to review the draft of the case study report.

In this research, I used two of these recommended tactics. One was the use of multiple sources of evidence because triangulation of different data sources results in a higher level of findings validity (Gupta and Awasthy, 2015). The following approach was used in data triangulation:

- A combination of primary and secondary data was used for case descriptions.
- Different companies (partners) collaborating for service provision were interviewed in order to get different perspectives (e.g., a bank, a mobile operator, and a service provider, in the case of Valyou).
- Industry experts and representatives of central banks who could provide insights on the selected cases and payment market situations were interviewed.

Following another tactics, some respondents were willing to review drafts of the reports and papers. Their comments helped to make the case descriptions more exact.

3.4.2 Internal validity

Internal validity is important when ‘seeking to establish a causal relationship’ (Yin, 2009, p. 40) – when explaining that certain conditions lead to other conditions. Yin suggests four approaches to ensure internal validity. Pattern-matching logic is used to compare empirical patterns with predicted ones. If the patterns match, the results strengthen the internal validity of the case (Yin, 2009). Another approach is explanation building. This means case analysis is performed in a form of an explanation that is built about the case (Yin, 2009). The third approach is the use of rival explanations as patterns. It requires the formulation of rival propositions about independent variable patterns that are mutually exclusive (Yin, 2009). Finally, internal validity can be strengthened by the use of logic models. This approach requires the analysis of a complex chain of events over a certain time period (Yin, 2009). The use of logic models implies matching empiric observations to predicted events.

In this research, I applied the rival explanations approach. The analysis of business models suggests a number of different variables. In the case study protocol, I made a
number of rival predictions regarding the behaviour patterns of mobile payment service providers when developing different aspects of business models. The example of propositions about cooperation in a value network is provided below:

RQ10. How do actors cooperate when providing mobile payment services?

P10.1. Business actors cooperate and share roles and responsibilities in order to provide mobile payments.

P10.2. Business actors do not cooperate.

P10.3. Business actors both collaborate and compete, and share roles and responsibilities.

Each proposition predicts a different pattern of behaviour and different outcomes. As the research findings showed, the first pattern is the most common across mobile payment providers, while both the second and the third were observed in a few cases.

3.4.3 External validity

External validity refers to ‘defining the domain to which a study’s findings can be generalised’ (Yin, 2009, p. 40). This test concerns whether the findings ‘are generalisable beyond’ (Yin, 2009, p. 43) the certain case study, and its results can be applied to another case study. Use of replication logic is a suggested approach when seeking to increase external validity.

In this research, I used replication logic. I grouped case studies in categories based on the type of mobile payment service provider. I expected that cases would show similar or almost similar patterns within each group of service providers, and this would lead to generalised findings. Then I compared and contrasted results across different groups of service providers.

3.4.4 Reliability

Reliability serves to demonstrate that a study can be repeated and another investigator will get the same results (Yin, 2009). Reliability addresses data collection procedures. Recommended approaches to increase reliability are: (i) use of case study protocols and (ii) development of a case study database.

To allow researchers to repeat a case study, the research process and procedures have to be well documented. A case study protocol serves this purpose. I have developed and followed a case study protocol in order to ensure a unified approach in data collection and to increase the reliability of the research. The main objective of the case study protocol is to define ‘the procedures and general rules to be followed’ (Yin, 2009, p. 79). Hence, this is an important guide to follow in implementing a multiple case study (Yin, 2009). For the protocol development, I used the template proposed by Brereton et al. (2008).
Additionally, I have organised a case study database. The database provides two collections: (i) a collected database that includes interview transcripts, interview records, and collected secondary data and (ii) reports and articles that were produced based on these case studies.

Finally, use of the interview protocol helped in following the same procedure when interviewing industry representatives. Following the same structure and asking the same range of questions aided in obtaining primary data that was structured consistently.

### 3.4.5 Delimitations

The focus of this thesis is on approaches used by different types of mobile payment providers in order to address the challenges and opportunities of mobile payment services. I consider five types of providers: banks, independent providers, operator billing providers, retailers, and public transport companies. These groups of providers were selected because they operated in the selected markets and offered their services during the period when this research was conducted (2012–2016).

Considered types of services are mobile payment services, mobile public transport ticketing services, and contactless payment cards. Analysis of value networks organised for these services is limited to actors that are directly involved in the service offering process.

Geographically, this research is focused on mobile payment services provided in Northern Europe. More specifically, I consider six countries: Estonia, Denmark, Lithuania, Norway, Sweden, and the United Kingdom. The reasons behind the selection of the aforementioned markets are the following:

- All these countries are characterised by a high level of smartphone penetration and accessible and fast mobile Internet services.

- The population of each country has a similar level of access to banking services.

- Some market actors (e.g., banks and independent providers) are present in more than one country or across a number of countries and participate in mobile payment initiatives in these countries. For example, Swedbank, SEB, Nordea, DNB, Danske Bank, and Handelsbanken are present in Scandinavia, the Baltics, and the United Kingdom, while Paysera and WoraPay are present in the Baltics and the United Kingdom.

- A number of mobile payment initiatives have been launched in these markets by actors within the focus.
• The selected markets differ in terms of regulation, their level of competition, and barriers to market entry; hence, it is interesting to compare how mobile payment service providers compete in different market settings.

The research was performed in the period from 2012 to 2016. Descriptions of and data from case studies may cover earlier periods of time, depending on the historic circumstances of each individual case.
Chapter 4

Cases and Findings

In this chapter, I briefly present case studies grouped based on the type of actor providing mobile payment services. Case study descriptions are based on primary data received during interviews with industry representatives. I use secondary data to complement primary data with statistical data, factual data, and recent updates on selected services and providers’ decisions. Then I present key findings. The key findings are categorised according to the STOF model domains: service, technology, organisation, and finance.

4.1 Mobile payment services provided by banks

4.1.1 Case studies

4.1.1.1 Bart, Sweden

Swedbank launched Bart, a bank account–based mobile payment solution, in 2011. The service used the Visa and MasterCard infrastructure and required a separate PoS payment terminal (Paper B). Bart was an offline payment system with a high security level.

Axfood, the third largest Swedish retailer, was the only retailer interested in this solution. It also participated in service development. Bart was installed in 400 stores of Axfood’s grocery chains (Willys and Hemköp) all over Sweden by June 2013 (Swedbank, 2013; Paper B, Paper C).

The Bart app was linked to customers’ bank accounts. The service mainly functioned as a bank card replacement for PoS payments. Additionally, it allowed saving receipts. Initially, only Swedbank’s customers could use the service, and only when shopping in Axfood’s stores. Later, the service was opened up to customers of other banks. However, the number of service users was low (about 20,000) (Wiklund, 2014). Swedbank discontinued Bart on the 28th of February, 2014.
4.1.1.2 Swish, Sweden

Swish is a joint mobile payment service that was developed and launched by six major Swedish banks (SEB, Swedbank and Sparbankerna, Danske Bank, Handelsbanken, Lånsförsäkringar, and Nordea). These banks are the service owners. Some banks became participants later: Skandia in 2013, and ICA Banken, Sparbanken Syd, and Sparbanken Öresund in 2014. GetSwish AB was established to manage the Swish intellectual property and brand in 2012. However, the actual service providers are the banks.

Banks in Sweden jointly own payment infrastructure (e.g., Bankgirot, an automated clearing house (ACH); Bankomat, which handles ATMs; and a company that issues BankID, a credential used for the electronic identification of persons in Sweden). Swish is built on top of this infrastructure. It uses the real-time payment platform Bankgirot and the mobile BankID (MobileID). Hence, the service has a high security level.

The Swish app is linked to customers’ bank accounts. Initially, the service allowed P2P money transfers between customers’ bank accounts, using a mobile phone number as an identifier. Swish was launched in December 2012 and quickly became very popular. The number of users reached 5.4 million by May 2017. In June 2014, the banks enabled a new option: Swish for Company (Swish Företag), a C2B solution. In January 2016, Swish for e-commerce (Swish Handel) became available. Later, it was terminated and relaunched in January 2017.

4.1.1.3 MobilePay, Denmark

Danske Bank is a dominant bank in Denmark. It participated in the development of Swipps, a common mobile payment project, in collaboration with other Danish banks. The announced launch of a mobile payment service by mobile network operators became a reason for Danske Bank to quit the joint project and to develop own solution.

MobilePay is a bank card–based mobile payment service launched by Danske Bank in May 2013. MobilePay is built on top of the existing payment infrastructure. The service is bank independent. In the beginning, it offered a P2P money transfer service between private customers, using a mobile phone number as an identifier. The solution quickly became very popular. In four months, the number of users reached 500,000. In February 2014, MobilePay launched a C2B payment solution. In June 2014, it became possible to integrate MobilePay as a payment method in the apps of merchants. In July 2014, a solution for e-commerce became available. In 2016, Danske Bank invited other Danish banks to join as distribution partners (DanskeBank, 2016).

4.1.1.4 Valyou, Norway

In 2006, Telenor, the dominant Norwegian mobile network operator, and DNB, the largest Norwegian bank, decided to collaborate on a joint NFC-based mobile payment service. In 2008, the companies jointly established TSM Nordic. Its objective was to provide a mobile payment service. The companies implemented a number of NFC-based payment trials (Clark, 2009, 2011).
Valyou was a bank card–based NFC service with the secure element placed in the SIM card. It was launched in November 2014. The service targeted customers of both DNB and Telenor who were Android phone users and Visa cardholders. Later, two banks (SpareBank 1 and Scandia:banken) joined this initiative. The service only offered PoS payments. About 2000 stores in Norway accepted Valyou (e.g., Starbucks and Coffee Espresso chains). However, the biggest local retailers did not join this initiative. The service did not attract a sufficient number of users and was closed down in November 2015.

4.1.1.5 Vipps, Norway

Vipps is a bank card–based mobile payment service. DNB launched it in May 2015. The service is bank independent, handset independent, and mobile network operator independent. Vipps relies on the existing payment infrastructure.

Initially, the service provided P2P money transfers. It became very popular and reached 1.4 million users by May 2016 (Henriksen, 2016). Later in 2016, Vipps Business, a C2B solution, became available. It supports in-store, invoice, e-commerce, and in-app payments. The Vipps service became so popular that more than 100 banks joined the service by 2017. DNB plans to establish a company responsible for management of the service. DNB will own 52 per cent of the stake, and 48 per cent will be shared among other banks (Nysveen, 2017).

4.1.2 Findings: Successful approaches and challenges for banks

Based on analysis of critical design issues (Apanasevic, 2018), it is possible to identify successful approaches and challenges that banks need to deal with when designing a business model for mobile payment services. A summary is provided in Table 4.1.

4.1.2.1 Service domain

Targeting. Evidence shows that a more successful approach for banks was to target one market segment through another: offering a P2P solution and reaching a critical mass of customers and then entering the B2B segment and offering services for business customers (C2B solution) (Swish, MobilePay, and Vipps). In the case of Bart, the bank targeted its own customers who also were customers of Axfod. In the case of Valyou, the service targeted individuals who were customers of both the bank and the mobile operator. However, in these two cases the services did not reach a critical mass of customers and had a small network of retailers.

Creating value elements. In three cases (Swish, MobilePay, Vipps), the services offer clear value to end-users who do not carry cash. An easy solution for cash replacement that initially focused on money transfers between people suited local habits well, such as splitting bills. The value for merchants is in increased revenues, a large customer base, and integration with loyalty programmes, e-commerce, and m-commerce. In two cases
(Bart and Valyou), the services simply replaced a bank card and did not offer added value, neither to end-users nor to merchants.

**Branding.** In three cases (Swish, MobilePay, Vipps), the services received positive word-of-mouth. In one case (Valyou), there was no marketing for the service, and customers might not have been aware of it.

**Customer retention.** Three services (Swish, MobilePay, Vipps) offer new services and functionalities for customers and merchants (e.g., in the Swish app, QR-code reading, a list of favourites, and maintaining history; in the MobilePay app, the ability to use six cards, digital receipts, and loyalty programmes). They can also be used to pay parking fees and to pay within the apps of merchants and public transport companies. Bart and Valyou services did not offer new services.

### 4.1.2.2 Technology domain

**Security.** In four cases, the services are easy to use. One service (Bart) proved to be complicated for both retailers’ personnel and end-users (Paper B). Mobile payments provided by banks are secured through different measures (e.g., PIN code, MobileID).


**Quality of service.** The majority of analysed services (Bart, Swish, MobilePay, Vipps) ensure high service quality, instant payments in real time, and service personalisation. In the case of Valyou, providers used a new and immature technology. About 30 per cent of users had enrollment issues.

**System integration.** All mobile payments offered by banks are interoperable and compatible with the existing payment infrastructure and are bank card– or account-based. In some cases (Swish, MobilePay, Vipps), the services became a market standard. Bart required separate payment terminals, and this was considered one of its disadvantages (Paper B).

**Accessibility by customers.** Only limited groups of customers could use Bart and Valyou services. In three cases (Swish, MobilePay, Vipps), the services are available to the entire population. MobilePay and Vipps were available to customers of other banks. In the case of Swish, each bank serves its own customers, but all banks together reach about 98 per cent of the Swedish population.

**Management of user profiles.** In all cases, the banks perform user account management, since the mobile payment services are linked to bank accounts.

### 4.1.2.3 Organisation domain

**Partner selection and network openness.** The major resources and capabilities of banks are experience and knowledge in the payment industry; their customer bases, bank accounts, and payments infrastructure; and trust. In some cases, there is a long-term collaboration between banks (Swish) or between a bank and a mobile operator (Valyou). A generalised value network is provided in Figure 4.1.

In each individual case, banks used different approaches to organise a value network. Generalising, banks tend to use different forms of collaboration, keeping the value network open for other banks, in order to combine resources, to have a wider customer reach and bigger scale, and to develop a single service standard (Swish, MobilePay, Vipps). A less successful approach is to limit the service value network to one or a few banks (Bart, Valyou).

![Figure 4.1: Generalised value network of mobile services provided by banks (focus on the payment process).](image)
Network governance. In terms of network governance, Swedbank was the key actor in the case of Bart. The key actors in Valyou were DNB and Telenor. However, there was no deeper commitment to the service. The parties did not fulfill their responsibilities (e.g., DNB did not market the service, and Telenor did not send NFC-enabled SIM cards to customers in advance). The key actors in Swish are the bank owners. Each of the banks serves its own customers. Cooperation and competition aspects are well defined. Collaborative work can be time consuming. The key actors in MobilePay and Vipps are Danske Bank and DNB, respectively. These banks govern their networks.

Network complexity. Valyou, being an NFC-based service, required a large and complex ecosystem. Swish is another example of a complex network, where a large number of Swedish payment market representatives took part. In other cases, the networks were relatively less complex.

4.1.2.4 Finance domain

Pricing. In all cases, the service is free for end-users, and merchants pay service fees and/or transaction fees. In the case of Valyou, the service transaction cost for merchants was higher than the cost of BankAxept, a domestic payment scheme in Norway. Three services (Swish, MobilePay, Vipps) have reached a large market share, and two services (Bart and Valyou) had small numbers of users.

Division of investments. In the cases of Swish and Valyou, collaborating parties shared the service development costs.

Valuation of contributions and benefits. Contributions and benefits are shared based on agreements (Swish, Valyou).

Division of costs and revenues. In all cases, the sources of revenues for banks are transaction fees paid by merchants and increased volumes of digital transactions. Additionally, a decreasing amount of cash means a reduction of cash handling costs. In the case of MobilePay, an additional possible source of revenues might be the joining of other banks as service distribution partners. Collaboration with additional partners results in additional costs; for example, the bank had to pay a SIM card rental fee to the mobile operator (Valyou).

4.2 Mobile payment services provided by independent providers

4.2.1 Case studies

4.2.1.1 SEQR, Sweden

Seamless launched SEQR in spring 2012. SEQR is a PoS payment service that requires a separate service account. In 2013, it was integrated with the cashier system LS Retail, and SEQR does not require additional equipment in stores. The service does not use the Visa or MasterCard infrastructure. Financial service and credit companies Gothia and Collector perform the role of payment processors and handle payment transfers and customer billing (Paper B). SEQR service users need to have a contract with one of these companies.
In the beginning, Seamless targeted merchants. The offering includes a free service roll-out and a transaction fee that is 50 per cent less than bank card fees. Axfood and McDonald’s were the first big retailers that launched the service (Paper C). Today, about 4,000 stores accept SEQR (SEQR, n.d.).

In 2014, Seamless began to focus on service customers. It launched a cashback payment and integrated the loyalty programmes of Hemköp, Willys, and Appoteks-gruppen with the SEQR app. Other services are saved digital receipts, sending money between accounts (P2P), p-commerce (payments using printed advertisements), e-commerce, and parking payments. In July 2016, a Host Card Emulation (HCE) payment system was introduced in the SEQR app. This solution enabled contactless payments for Android phone users. Hence, these users do not need contracts with Collector or Gothia.

### 4.2.1.2 Mokipay, Lithuania

Mokipay, an NFC-based payment service for PoS payments, was developed by Mokipay Europe (McLean, 2011). The service requires a separate pre-paid account. Service accounts are not related to mobile phone subscriptions and are managed by Mokipay. A mobile phone number serves as a user identifier.

In August 2011, the service was launched by Omnitel (now Telia), a Lithuanian mobile network operator. In the beginning, only Omnitel customers could use the service. Later, it opened up to customers of all mobile operators. Mokipay invested heavily in the service infrastructure. However, the service failed to enter the general market due to: (i) a low number of customers, (ii) a higher service cost compared to the costs of bank cards, and (iii) the high cost of NFC infrastructure and terminals.

In the beginning of 2012, Mokipay became a part of an investment group. This group develops a number of activities, and one of them is offering educational services. The managers focused on building services around schools. The Mokipay wallet was integrated with NFC-enabled ID cards for schoolchildren. Canteens in a number of schools accept Mokipay, as the service cost is lower than cash handling costs. The use of NFC-enabled cards helps canteens to speed up payments, to reduce queues, and to minimize the amount of cash handled.

Other Mokipay functionalities are access control in the form of school attendance reports for parents, identification of schoolchildren when borrowing books at libraries, P2P money transfers within the school, and payments for copying and printing services. Additionally, Mokipay was integrated with the wallet of an electronic diary (www.tamo.lt) for schools. In 2014, Mokipay integrated services for school payments with Paysera.

### 4.2.1.3 Paysera, Lithuania

Paysera launched a mobile wallet, Paysera, in 2013. The service requires a separate prepaid account and has own infrastructure. It is integrated with some popular cashier systems and does not require separate equipment. The service offers mobile payments, saving digital receipts, sending money between accounts (P2P), viewing menus from restaurants, a Paysera card, e-commerce, and parking payments.
The Paysera wallet is available to all private and business customers, but Paysera managers focus on scenarios where mobile payment would bring more value than payment with a payment card. One scenario is order placement (or pre-ordering) and mobile payments in restaurants during the busy lunch time. The value for customers is saved time: (i) pre-ordering in the app eliminates the need to wait in a queue, and (ii) mobile payment both eliminates the need to wait while a server brings a card payment terminal and allows customers to pay when they are ready. Restaurants can serve more people during busy lunch hours. Another scenario is payments at petrol stations. A driver can pay by scanning a QR code at the station. There is no need to go inside and wait in the queue. Paysera also offers a mobile payment solution for small merchants. For restaurants and merchants, Paysera offers transaction fees that are lower than bank card fees.

4.2.1.4 WoraPay, Lithuania and the United Kingdom

WoraPay, a Lithuanian start-up, launched its mobile payment service, WioPay, in 2013. In 2015, the company partnered with Lloyds Banking Group and launched its service in Lloyds restaurants in London.

The service targets merchants and payment service providers (e.g., banks, mobile operators, independent payment service providers, etc.). In Lithuania, the main idea behind the service is to link merchants to mobile wallets provided by different payment service providers. The main benefits for merchants are increased sales and revenues, reduced amounts of cash, optimised work for personnel, and faster service. This solution eliminates the need for self-service and self-ordering terminals.

The service offered in London focuses on pre-ordering of drinks at cafes, pubs, and so forth while commuting. End-users can see the order’s status in real time and collect it when it is ready without waiting in a queue. The service can also be used in the stores, where customers can scan prices while shopping (i.e., self-scanning) and pay when leaving the shop.

4.2.2 Findings: Successful approaches and challenges for independent providers

Based on analysis of critical design issues (Apanasevic, 2018), it is possible to identify successful approaches and challenges that independent providers need to deal with when designing a business model for mobile payment services. A summary is provided in Table 4.2.

4.2.2.1 Service domain

Targeting. In three cases, independent providers target specific niche markets (Mokipay: schools; Paysera: restaurants, small merchants, and petrol stations and their customers; WoraPay: restaurants and coffee shops). The SEQR service targets the general market. Independent providers select different customer targeting approaches: both customers
and merchants (Mokipay, Paysera), segment by segment (SEQR), or business customers only (WoraPay). The major challenge for independent providers in the service domain is reaching a critical mass of customers and building a network of merchants.

**Creating value elements.** All analysed services offer a clear value proposition to different types of customers. For end-users, this is additional value in a specific context (e.g., SEQR offers a range of value-added services and different payment scenarios; Mokipay offers value in the educational context; Paysera and WoraPay offer pre-ordering and self-checkout services), time savings, reduced queuing, and faster payments. The major value for merchants is decreased amounts of cash, faster customer service, lower transaction costs, increased revenues, and more efficient work for personnel. Payment providers can reach more merchants (WoraPay).

**Branding.** In all cases, the payment services are branded as highly secure. It is common to carry out marketing campaigns when introducing a service in the market. New functionalities, service bundling, and personalisation keep all types of customers engaged and loyal.

**Customer retention.** All services offer different service bundles (e.g., PoS payments, P2P money transfers, and e-commerce). The services are constantly updated with new, different functionalities (e.g., cashback function, integration with merchants’ loyalty programmes, restaurant menus). Personalisation is another important characteristic.

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**Table 4.2: Critical design issues and challenges from the perspective of independent providers.**

<table>
<thead>
<tr>
<th>Successful approaches</th>
<th>Challenges</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Service domain</strong></td>
<td></td>
</tr>
<tr>
<td>Services target general market, might be focused on a niche</td>
<td>Difficult to reach critical mass of customers and to build network of retailers in the general market</td>
</tr>
<tr>
<td>Clear value proposition for all types of customers</td>
<td></td>
</tr>
<tr>
<td>Secure service, marketing campaigns</td>
<td></td>
</tr>
<tr>
<td>Service bundling, new functionalities for customers and merchants</td>
<td></td>
</tr>
<tr>
<td><strong>Technology domain</strong></td>
<td></td>
</tr>
<tr>
<td>High quality, easy-to-use service</td>
<td>A need for a separate service account</td>
</tr>
<tr>
<td>Alternative technological platform and infrastructure</td>
<td>A need to develop the service infrastructure</td>
</tr>
<tr>
<td>Service interoperable and compatible with the existing infrastructure and integrated with cashier systems</td>
<td></td>
</tr>
<tr>
<td>Entire population can access the service</td>
<td></td>
</tr>
<tr>
<td><strong>Organisation domain</strong></td>
<td></td>
</tr>
<tr>
<td>Resources: technology, payment solution, financial license</td>
<td>Need to access missing resources through collaboration</td>
</tr>
<tr>
<td>Collaboration with different actors (merchants, financial institutions, etc.)</td>
<td>Network is closed for other providers to join</td>
</tr>
<tr>
<td>Low level of network complexity</td>
<td></td>
</tr>
<tr>
<td><strong>Financial domain</strong></td>
<td></td>
</tr>
<tr>
<td>Mobile payment service is free for end-users</td>
<td>Mobile payment has a higher cost than card payment, but lower than cash handling cost</td>
</tr>
<tr>
<td>Service fee for merchants lower than alternatives</td>
<td>Additional costs due to collaboration with additional partners and service integration</td>
</tr>
<tr>
<td>Investment shared with partners</td>
<td>Investment in service infrastructure</td>
</tr>
<tr>
<td>Revenues come from increasing volumes of digital transactions and transaction fees paid by merchants</td>
<td></td>
</tr>
</tbody>
</table>
4.2.2.2 Technology domain

Security. All analysed services are easy to use. Service access is secured by PIN codes.

Quality of service. All services ensure high service quality, providing real-time instant payment service.

System integration. Independent providers tend to build an alternative payment service infrastructure. In the cases of Mokipay and Paysera, bank accounts are used only to transfer money to the account of the mobile payment service. Then, all transactions happen within the mobile payment service’s network. SEQR is a post-paid service; the service users receive a monthly bill. In the case of WoraPay, users select the payment service that they wish to use. The challenges are related to the need for a separate prepaid service account. This makes it inconvenient for users to transfer money to the service account from their main bank account.

All solutions are interoperable and compatible with the existing payment infrastructure. Paysera, SEQR, and WoraPay are integrated with popular cashier systems. Challenges are related to the following: (i) service infrastructure development and related costs (Mokipay) and (ii) service integration with different cashier system providers and the IT systems of merchants, and related costs (Paysera).

Accessibility by customers. In all cases, mobile payment services are available for all customers.

Management of user profiles. Independent providers manage user accounts and can use this data for customer credibility evaluation (Mokipay).

4.2.2.3 Organisation domain

Partner selection. The major resources and capabilities of independent providers are technology, developed payment solutions, financial licenses, and, sometimes, previous business relations with retailers. Independent providers do not have their own customers and need to collaborate with other business actors (e.g., large retailers) in order to reach customers (e.g., SEQR, Mokipay, WoraPay). There can be collaboration with credit companies that handle customer billing (SEQR). Additionally, there is collaboration with

![Diagram](https://via.placeholder.com/150)

Figure 4.2: Generalised value network organised by independent providers (focus on the payment process).
cashier system providers (SEQR, Paysera). This need to collaborate with other actors in order to reach missing resources and customers is one of the challenges. In Lithuania, newcomers face high market entry barriers and challenging competition with banks. Due to this, Mokipay, Paysera, and WoraPay collaborate on different aspects. A generalised value network is provided in Figure 4.2.

**Network openness.** The networks are closed for other independent providers to join (SEQR, Mokipay, Paysera). This is a challenge because this may limit the potential reach of customers. In the case of WoraPay, other independent providers can be business customers.

**Network governance.** The providers are the key actors that orchestrate and govern the network and serve their customers.

**Network complexity.** There is a relatively low level of network complexity.

### 4.2.2.4 Finance domain

**Pricing.** In all cases, the service is free for end-users, and merchants pay transaction fees. In the case of WoraPay, payment providers pay a service fee. The offering of competitive service fees for merchants is a key success factor for independent providers. For example, Mokipay can only compete with cash handling costs. It is also challenging for independent providers to reach a large market share and a critical mass of users.

**Division of investments.** In the case of Mokipay, collaborating parties share service development costs. WoraPay, as a start-up, has received investment from Lloyds Bank.

**Valuation of contributions and benefits.** Contributions of participating parties are based on agreements (SEQR, Mokipay, WoraPay).

**Division of costs and revenues.** The financial value for independent providers is in increasing volumes of digital transactions and transaction fees paid by merchants. Additional costs are commissions paid to partners (SEQR), costs of integration with cashier system providers and compensations of banks transaction costs when end-users transfer money to service accounts (Paysera).

### 4.3 Mobile payment services provided by direct operator billing providers

**Direct operator billing** is a mobile payment method that allows users to include payments in their mobile phone bills (Fortumo, n.d.). An alternative name is *direct carrier billing*.

#### 4.3.1 Case studies

##### 4.3.1.1 WyWallet, Sweden

Starting from February 2013, new regulation norms prohibited Swedish mobile operators from handling payments for non-telecom services, such as SMS parking and public transport ticketing (Markendahl, 2013). In response, mobile operators founded a joint
venture, 4T Sverige. In June 2012, the company launched WyWallet, a service processing SMS payments on behalf of mobile operators. Accumulate, an IT company, developed the wallet. PayEx, a payment processor, was in charge of payment handling.

Initially, WyWallet’s offered services were (i) SMS payments, (ii) online payments, (iii) PoS payments, (iv) a P2P money transfer service, (v) top-up of prepaid mobile phone accounts, and (iv) coupons. At that time, the main customer target group was public transport passengers. Following the regulation, WyWallet required customer registration. This resulted in a negative customer reaction, and the service was perceived as too complicated (Paper D).

In 2015, PayEx acquired 4T Sverige and WyWallet. The service was redesigned and simplified. In March 2016, the mobile wallet and mobile app were withdrawn from the market. Account access is mobile responsive when customers surf into their accounts with their mobile browser. The service offers (i) SMS payments, (ii) online payments, and (iii) in-app payments. WyWallet customers can select from the following payment alternatives: (i) mobile operator billing, (ii) a payment card associated with the WyWallet account, and (iii) a separate WyWallet invoice. Growing customer segments are online media users, Facebook users, and charities. There were 1.8 million registered service users in March 2017 (PayEx, 2017). A unique offer to merchants is an instant transfer of 700 SEK and integration of WyWallet as a payment method online and in merchants’ apps. However, the mobile operators have decided to discontinue cooperation with PayEx, and the service is going to be terminated on the 25th of May, 2018 (WyWallet, n.d.).

4.3.1.2 Fortumo, Estonia

Fortumo was founded in Estonia in 2007. The service is provided in Estonia; however, the company’s major focus is on emerging economies, such as Brazil, India, Indonesia, Saudi Arabia, Turkey, and developed economies such as Germany and France.

Fortumo offers a direct operator billing platform that allows the inclusion of online payments in mobile operator bills. Fortumo collaborates with more than 350 mobile operators in more than 100 countries (Fortumo, 2017). First, the company creates integration with mobile operators. Business customers integrate the Fortumo solution in their online stores or mobile apps. The main market segment is virtual and digital goods (e.g., game developers, social networks, music and video streaming services). The business clients include companies of all sizes. Among the customers are leading app stores (Google Play, Windows Phone Store), digital media companies (Sony, Gaana), music and video streaming service providers (Spotify, Netflix, Viaplay), gaming companies (EA Mobile, Gameloft, Rovio), social networks (Facebook), and payment service providers (PayPal) (Fortumo, 2017).

4.3.2 Findings: Successful approaches and challenges for direct operator billing providers

Based on analysis of critical design issues (Apanasevic, 2018), it is possible to identify successful approaches and challenges that direct operator billing providers need to deal
with when designing a business model for mobile payment services. A summary is
provided in Table 4.3.

4.3.2.1 Service domain

Targeting. Direct operator billing providers (WyWallet, Fortumo) target niche markets
(e.g., media and digital content providers, gamers, developers, self-service services) and
focus on business customers (B2B area). Offered payment services are not suitable in
the PoS payment context, and this is a challenge.

Creating value elements. The services provide a clear service value proposition to
all types of customers. For end-users, it is an alternative to card payments. Value for
merchants includes a high rate of conversion,¹ a competitive price, no need to integrate
with each mobile operator, and a payment alternative to cash, bank card payments,
and invoices (Fortumo, WyWallet). WyWallet offers instant transactions of up to 700
SEK and takes the risk in the case of fraud. Finally, other payment service providers
can integrate operator billing among their offered payment methods. This makes their
services more valuable for merchants.

Branding. Direct operator billing services are secure, as the phone number is used as
a token. Fortumo is a big global player. It participates at conferences in order to reach
large merchants.

¹ ‘The conversion rate is the percentage of users who take a desired action’ (Nielsen, 2013). In the case of
e-commerce, this is the percentage of site visitors who make a purchase (Nielsen, 2013).

Table 4.3: Critical design issues and challenges from the perspective of direct
operator billing providers.

<table>
<thead>
<tr>
<th>Successful approaches</th>
<th>Challenges</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Service domain</strong></td>
<td>Service domain</td>
</tr>
<tr>
<td>Focus on a niche market and business customers (B2B)</td>
<td>The service is not suitable in the PoS payment context</td>
</tr>
<tr>
<td>Clear value proposition for all types of customers</td>
<td></td>
</tr>
<tr>
<td>Secure service</td>
<td></td>
</tr>
<tr>
<td>Service bundling, new functionalities for customers</td>
<td></td>
</tr>
<tr>
<td><strong>Technology domain</strong></td>
<td></td>
</tr>
<tr>
<td>High quality, easy-to-use service</td>
<td></td>
</tr>
<tr>
<td>Alternative technological platform and infrastructure</td>
<td></td>
</tr>
<tr>
<td>Easy integration for merchants</td>
<td></td>
</tr>
<tr>
<td>Service available to all mobile operators’ customers</td>
<td></td>
</tr>
<tr>
<td><strong>Organisation domain</strong></td>
<td></td>
</tr>
<tr>
<td>Resources: technology, payment solution, relations with mobile network operators</td>
<td></td>
</tr>
<tr>
<td>Collaboration with mobile network operators and payment processors</td>
<td></td>
</tr>
<tr>
<td>Network is open for other payment providers as business customers</td>
<td></td>
</tr>
<tr>
<td><strong>Financial domain</strong></td>
<td></td>
</tr>
<tr>
<td>Competitive service fee for merchants</td>
<td></td>
</tr>
<tr>
<td>Revenues from service fees paid by merchants, and commissions paid by payment service providers</td>
<td>Mobile payments may have a higher cost than bank card payments</td>
</tr>
</tbody>
</table>

¹ 'The conversion rate is the percentage of users who take a desired action' (Nielsen, 2013). In the case of
e-commerce, this is the percentage of site visitors who make a purchase (Nielsen, 2013).
Customer retention. In terms of customer retention, PayEx improves WyWallet, makes it simpler, and adds new types of merchants (digital content providers and e-commerce). Fortumo offers better technical and commercial conditions to merchants and, in some countries, a better payment flow (i.e., fewer steps in the payment process) to end-users.

4.3.2.2 Technology domain

Security. In the past, due to regulation, WyWallet required mandatory customer registration, and this was perceived as too complicated. Today, operator billing solutions (Fortumo, WyWallet) are easy to use. A mobile phone’s number is a token for service access. Encryption of sent data enables service security.

Quality of service. Fortumo and WyWallet ensure a high quality of service and a smooth and simple payment process. The service offers easy integration for merchants.

System integration. Direct operator billing providers (Fortumo, WyWallet) have developed an alternative payment infrastructure. Providers integrate the service with mobile operators and offer easy service integration for merchants. There can be technical challenges when integrating with mobile operators because they may use different technological platforms.

Accessibility by customers. All customers with a mobile phone subscription or prepaid account can use the service.

Management of user profiles. Direct operator billing providers perform user account management (WyWallet).

4.3.2.3 Organisation domain

Partner selection. The major resources and assets of direct operator billing providers are technical payment solutions and established relationships with mobile network operators. There might be collaboration with payment processors that handle internal

![Figure 4.3: Generalised value network of direct operator billing service (focus on the payment process).]
payment settlement. Other payment service providers can join the value networks as business customers. A generalised value network is provided in Figure 4.3.

Network openness. The payment networks are open for other payment providers to join as business customers.

Network governance. Service providers are the key actors that manage and govern the networks and serve their customers. In the case of WyWallet, the challenges in the organisation domain were related to the period when the company was managed by mobile network operators. They had different views on service development and did not support the service.

Network complexity. The network has a relatively high level of complexity.

4.3.2.4 Finance domain

Pricing. The direct operator billing service is free for end-users, but there is an invoice fee for users who want to receive them (WyWallet). Merchants pay a competitive service fee. WyWallet’s market share is growing. Fortumo is a global company and a very big player.

Division of investments. In 2013, Fortumo received investment from Intell Capital and Grey croft Partners for further business development.

Valuation of contributions and benefits. Contributions of participating parties are based on agreements.

Division of costs and revenues. In all cases, the sources of revenues are service fees paid by merchants and other payment service providers. The service costs include commissions paid to mobile network operators. It is challenging to negotiate the payment conditions with operators. Mobile operators are used to have 30–50 per cent revenue share. Due to this, the service price can be higher than for alternative payment services. This makes it challenging for direct operator billing providers to offer attractive prices to merchants. For example, Uber, micro-finance services, and PayPal can pay about 3–5 per cent for the service, and streaming services about 10–15 per cent. At the same time, operator billing services help mobile operators to gain revenues from Over The Top (OTT) services, such as Skype, Viber, Spotify, and Netflix.

4.4 Payment solutions provided by retailers

Retailers mainly use payment methods that are already popular in the market. Some retailers integrate loyalty programme apps with bank card payments. In this case study, a retailer launched its own payment solution.

4.4.1 ICA Banken’s contactless card, Sweden

The core business of ICA Gruppen is grocery retail. The group owns ICA Sverige; ICA Banken; ICA Real Estate; Apotek Hjärtat, a pharmacy company; Hemtex, a chain offering textile and goods for the home; and Rimi Baltic, a grocery chain operating in the Baltic countries (ICA Gruppen, n.d.).
ICA Sverige is the largest Swedish grocery retailer, operating about 1,300 stores. Owners of ICA stores are independent retailers that manage their stores themselves. ICA Sverige coordinates logistics, provides general marketing information, and helps retailers in business development.

ICA Banken was founded in 2002–2003. It is a full-service bank with more than 500,000 clients. The bank’s main mission is to provide easy, efficient, and cheap payments to the ICA system.

ICA Sverige became the first actor that introduced contactless payments in Sweden. By December 2014, it had installed NFC-enabled payment terminals in all stores (Sellebråten, 2014). During 2015, ICA Banken changed all of its clients’ bank cards to contactless (ICA Gruppen, 2014). These cards allow payments of amounts below 250 SEK without entering a PIN code, just by swiping the card over the NFC payment terminal. At the beginning of 2016, statistics showed that about 80–90 per cent of contactless card transactions are less than 250 SEK. In addition, the card is integrated with the retailer’s loyalty programme. Discount coupons can be downloaded to the contactless card, and personalised offers are shown in ICA Handla, a mobile app.

4.4.2 Findings: Successful approaches and challenges for retailers

There is only one case of a retailer, and this makes generalisation impossible. Hence, I classify successful approaches and potential challenges for the retailer in Table 4.4. Primary data is presented in Apanasevic (2018).

4.4.2.1 Service domain

**Targeting.** The target group of ICA Banken’s contactless card is ICA customers. This is a successful approach for the retailer but also a challenge. It may limit the bank’s opportunities to attract more customers and achieve a wider scale. This solution simultaneously targets both ICA customers and ICA retailers.

**Creating value elements.** The service’s offered value proposition is unique for the retailer’s customers: an easy payment process for amounts below 250 SEK, integration with all digital ICA channels and loyalty programmes, a faster payment process, reduced queuing and shopping time, and an attractive price for the card service. The value for retailers includes decreased amounts of cash, lower transaction costs, faster service of customers (meaning that more customers can be served), and payment integration with ICA’s loyalty programmes.

**Branding.** The contactless card is secure. Its introduction aimed at improving the retailer’s brand by making it more innovative and modern, and attracting mass media attention.

**Customer retention.** The retailer seeks to create loyalty in different ways. The new service bundle offers an integration of ICA Banken’s card with ICA loyalty programmes and a mobile app. The app’s functionalities allow: (i) downloading coupons to the ICA
Table 4.4: Critical design issues and challenges from the perspective of retailers.

<table>
<thead>
<tr>
<th>Successful approaches</th>
<th>Challenges</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Service domain</strong></td>
<td></td>
</tr>
<tr>
<td>Focus on a niche market</td>
<td></td>
</tr>
<tr>
<td>Clear value proposition for end-users and retailers</td>
<td></td>
</tr>
<tr>
<td>Secure service, media attention</td>
<td></td>
</tr>
<tr>
<td>Service bundling, new functionalities for customers</td>
<td></td>
</tr>
<tr>
<td><strong>Technology domain</strong></td>
<td></td>
</tr>
<tr>
<td>High quality, easy-to-use service</td>
<td></td>
</tr>
<tr>
<td>Service is interoperable, compatible, and integrated with the existing payment infrastructure</td>
<td></td>
</tr>
<tr>
<td>Service is available to all customers but focused on the retailer’s own customers</td>
<td></td>
</tr>
<tr>
<td><strong>Organisation domain</strong></td>
<td></td>
</tr>
<tr>
<td>Resources: combination of retailer’s and bank’s resources</td>
<td></td>
</tr>
<tr>
<td>Value network is closed</td>
<td></td>
</tr>
<tr>
<td><strong>Financial domain</strong></td>
<td></td>
</tr>
<tr>
<td>The bank offers good prices for contactless cards to end-users</td>
<td></td>
</tr>
<tr>
<td>Cheaper payment system for ICA retailers</td>
<td></td>
</tr>
<tr>
<td>Increased revenues because of increased volumes of digital transactions and decreased cash handling costs</td>
<td></td>
</tr>
<tr>
<td><strong>Service domain</strong></td>
<td></td>
</tr>
<tr>
<td>Focus on a niche market</td>
<td></td>
</tr>
<tr>
<td>Customers need to manage multiple cards</td>
<td></td>
</tr>
<tr>
<td><strong>Technology domain</strong></td>
<td></td>
</tr>
<tr>
<td>No PIN code for small amounts, but random request to enter a PIN code</td>
<td></td>
</tr>
<tr>
<td><strong>Organisation domain</strong></td>
<td></td>
</tr>
<tr>
<td>Closed network may limit potential reach of customers</td>
<td></td>
</tr>
<tr>
<td><strong>Financial domain</strong></td>
<td></td>
</tr>
</tbody>
</table>

Banken card, (ii) connecting to a bank account, (iii) viewing personalised offers and collected bonuses, and (iv) a self-scanning and payment solution based on the ICA Banken card.

4.4.2.2 Technology domain

**Security.** The service is easy to use for both the retailer’s personnel and end-users. The user is fully identified. There is no need to use a PIN code for amounts below 250 SEK; however, users might be asked to enter a PIN code on a random basis. A possible challenge is customers’ perceptions of contactless cards as not safe, as there is no PIN code for small amounts.

**Quality of service.** The service is of high quality. It is convenient, simple, and integrated with the retailer’s loyalty programmes.

**System integration.** Contactless cards are interoperable and compatible with the existing payment infrastructure, cashier system, and NFC-enabled terminals in Sweden and abroad. However, customers may need to manage multiple bank cards and top-up the ICA bank account from their main bank account.

**Accessibility by customers.** The service is available to all customers wishing to open an account at ICA Banken.

**Management of user profiles.** ICA Banken manages the bank accounts. ICA Sverige manages the user loyalty accounts and personalised offers.
4.4.2.3 Organisation domain

Partner selection. In this case, there is a unique situation where a retailer owns a bank. This provides a unique combination of assets, resources, and competencies. From one side, the retailer has a large customer base and a large number of retail stores. From another side, the bank has competency in the payments area. A value network is provided in Figure 4.4.

Network openness. The service network is closed for other actors to join. This is a challenge because it may limit the potential reach of customers.

Network governance. The retailer is the key actor that orchestrates and governs the network, has a relationship with the customers, and serves them.

Network complexity. The network complexity is relatively low.

4.4.2.4 Finance domain

Pricing. From the financial perspective, the bank offers good prices for a contactless card to its customers. Storeowners benefit from a cheaper payment system within ICA. And the revenue streams increase because of increased volumes of digital transactions and decrease costs associated with cash handling.

Division of investments. ICA Banken invested in service development, payment infrastructure installation, service integration with cashier systems, and licensing. ICA storeowners had no investment cost. Evaluation of each party’s contribution is based on their agreement.

Valuation of contributions and benefits. Contributions are evaluated based on agreement.

Division of costs and revenues. Interconnection between ICA Banken’s card and ICA loyalty and bonus programmes encourages ICA customers to pay with ICA Banken’s card in ICA stores. This means that revenues come from an increased number of digital transactions at lower cost and increased sales. Increasing the volume of ICA Banken card’s transactions would allow ICA retailers to save on the transaction fees they pay to other banks. Additionally, this results in a reduced amount of cash payments and reduced cash handling costs.
4.5 Mobile ticketing solutions provided by public transport companies

It is possible to specify four types of mobile ticketing services: SMS ticketing, in-app ticketing, Be In Be Out (BIBO) ticketing (a kind of in-app ticketing), and contactless bank card–based ticketing (Paper F, Paper G). A list of reference companies for each type of mobile ticketing service is provided in Table 4.5.

<table>
<thead>
<tr>
<th>Service type</th>
<th>Reference public transport companies</th>
</tr>
</thead>
<tbody>
<tr>
<td>SMS ticketing service</td>
<td>Unified SMS ticketing solution in Sweden, SMS ticketing solution in Copenhagen (Denmark)</td>
</tr>
<tr>
<td>In-app ticketing service</td>
<td>Blentingetrafiken, Länstrafiken Kronaberg, Skånetrafiken, Västrafik, Karlstadståss, SL (Sweden); Ruter, Skyss (Norway); Copenhagen Metro, Movia (Denmark); Ridango, T grupp (Estonia); Susisiekimo Paslaugos (Lithuania)</td>
</tr>
<tr>
<td>BIBO ticketing service</td>
<td>Ruter (Norway); Jiffi (Estonia)</td>
</tr>
<tr>
<td>Contactless bank card</td>
<td>Transport for London (United Kingdom)</td>
</tr>
</tbody>
</table>

4.5.1 Description of services

4.5.1.1 SMS ticketing service

‘The SMS ticketing service became available in Sweden and Copenhagen around 2009. Passengers could purchase a ticket by sending a premium SMS with a ticket code. The service mainly offered single tickets. Mobile network operators included SMS ticket payments in mobile phone subscription bills. The service became very popular among passengers. It is possible to buy SMS tickets in Copenhagen today. In Sweden, mobile operators had to stop including payments for non-telecom services in subscription bills due to [a] change in regulation. Other payment service providers replaced mobile operators in [the] SMS ticketing business in February 2013 (Markendahl, 2013; Paper E). Additionally, new rules obligated passengers wishing to use SMS ticketing to register with the new payment service providers. This change was negatively received by passengers, and the volume of SMS ticket sales dropped dramatically. Since introducing in-app tickets, the majority of Swedish public transport companies have terminated SMS ticketing services’ (Paper G, p. 297).

4.5.1.2 In-app ticketing service

‘The introduction of in-app ticketing services started around 2013–2014. In the beginning, mobile apps offered only single tickets. With time, the ticket assortment was extended, and the majority of apps now offer the full or almost full range of tickets. Available payment methods include Visa/MasterCard (in Denmark, Estonia, Sweden, Norway), invoices (in Sweden), mobile operator billing (in Denmark, Estonia, and
mobile payment services (in Denmark, Norway, and Sweden), and [an] electronic payment solution developed by banks (in Lithuania and Estonia). Mobile ticketing apps are available in both Android and iOS versions. In Sweden, where [the] public transport system is closed, public transport companies install optical readers for mobile ticket validation. The share of mobile in-app tickets was: (i) less than 10 per cent in Lithuania, Estonia, and the majority of Swedish regions in 2016, (ii) about 40 per cent of all single tickets and 17 per cent of all season passes in Copenhagen in 2015, and (iii) more than 50–60 per cent in Oslo and Bergen in Norway in 2016’ (Paper G, p. 297).

4.5.1.3 BIBO ticketing service

‘BIBO is an innovative seamless ticketing system. This solution is based on iBeacons and micro-location technology. The system automatically starts [a] mobile ticket in the app on the smartphone when the passenger enters the bus and stops when he or she leaves. This solution allows automatic customer billing based on actual use of public transport. Service pilots are running in Oslo, Tallinn, and Tartu’ (Paper G, p. 297).

4.5.1.4 Contactless bank card used for ticketing service

‘In September 2014, Transport for London (TfL) introduced a new ticketing solution in London based on MasterCard contactless payment technology (MasterCard, 2017b). Passengers can buy tickets using contactless MasterCard payment cards, NFC-enabled smartphones, or other contactless devices. The solution is easy for customers to use: they just need to touch special readers with a contactless card or device when they enter and leave the transport system. The solution provides two types of tickets and targets two groups of customers: (i) customers using [the] ‘pay as you go’ approach and (ii) customers who previously used ‘seven-day Travelcards’ (MasterCard, 2017b). These groups of customers can benefit from price capping (i.e., automatic calculation of the best price for the travel) on a daily or weekly basis, respectively. The solution has become very successful, with about 40 per cent of all ‘pay as you go’ trips paid via contactless payments by July 2017 (TfL, 2017)’ (Paper G, p. 297).

4.5.2 Findings: Successful approaches and challenges for public transport companies

Based on analysis of critical design issues (Apanasevic, 2018), it is possible to identify successful approaches and challenges that public transport companies need to deal with when designing a business model for mobile payment and ticketing services. A summary is provided in Table 4.6.

4.5.2.1 Service domain

Targeting. Mobile ticketing solutions target the general market. In some cases, services target certain customer segments; for example, SMS ticketing targets non-frequent public transport passengers and youth using single tickets, and contactless ticketing is
good for passengers using the ‘pay as you go’ approach, former ‘seven-day Travelcard’ users, and city guests.

Creating value elements. All types of mobile ticket offer an easy and convenient way to buy a ticket and allow spontaneous travel. SMS and in-app tickets are available anytime and from any location. In-app and BIBO ticketing can integrate different payment methods (e.g., Visa/MasterCard, invoices, operator billing, and mobile payments). The small ticket assortment offered by SMS ticketing and some apps is a challenge for public transport companies. However, an increasing number of apps are offering a wider assortment of tickets.

The value of mobile ticketing to the public transport company includes enhanced technical functionality and lower service costs (in-app, BIBO, contactless), increased sales and travelling (SMS, in-app, contactless), a safer working environment for bus drivers because of reduced amounts of cash (SMS, in-app), more efficient transport operation (in-app, BIBO), and a closer relationship with customers (in-app) (more details in Paper G).

Branding. The introduction of mobile ticketing has a positive impact on a company’s image.

<table>
<thead>
<tr>
<th>Successful approaches</th>
<th>Challenges</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Service domain</strong></td>
<td><strong>Service domain</strong></td>
</tr>
<tr>
<td>Service targets a generic market or a market segment</td>
<td>Small ticket assortment (SMS, some mobile apps)</td>
</tr>
<tr>
<td>Clear value for end-users and public transport companies</td>
<td>Small market share of mobile tickets</td>
</tr>
<tr>
<td>Secure service and positive brand perception</td>
<td><strong>Technology domain</strong></td>
</tr>
<tr>
<td>New service bundles and functionalities for end-users</td>
<td>Security issues</td>
</tr>
<tr>
<td><strong>Technology domain</strong></td>
<td>Issues with 3D payment card security</td>
</tr>
<tr>
<td>Easy-to-use service</td>
<td>Quality of service issues</td>
</tr>
<tr>
<td>More measures to protect security in the mobile app</td>
<td>A need for specific hardware</td>
</tr>
<tr>
<td>Mobile ticketing is integrated with the existing ticketing and payment infrastructure</td>
<td>Some groups of passengers can be excluded</td>
</tr>
<tr>
<td>Development of national mobile ticket standard</td>
<td><strong>Organisation domain</strong></td>
</tr>
<tr>
<td>Service available to all passengers</td>
<td>Complicated value network</td>
</tr>
<tr>
<td><strong>Financial domain</strong></td>
<td><strong>Financial domain</strong></td>
</tr>
<tr>
<td>Lower cost of mobile/contactless tickets compared to cash</td>
<td>Higher cost of mobile tickets compared to RFID cards</td>
</tr>
<tr>
<td>Increased revenues because of increased volumes of sold tickets and decreased cash handling costs</td>
<td>Commissions paid to partners</td>
</tr>
</tbody>
</table>

RFID: Radio-Frequency IDentification
Customer retention. Mobile ticketing offers new service bundles, for example, price capping and an online user account bundled with a contactless card, or new services (e.g., route planning, travel information, combined mobility) bundled with in-app ticketing. New functionalities (e.g., reminders, ticket sharing, trip evaluation) are available in in-app ticketing. BIBO ticketing offers seamless handling of mobile ticketing. Use of applications and contactless cards allows personalisation of services.

4.5.2.2 Technology domain

Security. It is easy to falsify SMS tickets. There are more measures to protect ticket security in the app (e.g., changing daily words or colours, animations) (Paper F). In some cases, there are issues with the 3D security of the payment card associated with the app (Paper F). In the case of TfL, contactless payments do not require entering a PIN code.

Quality of service. All types of mobile ticketing services are easy and convenient for customers to use. Service quality issues may result from limited SMS ticketing service reliability, a lack of travelling statistics (SMS and in-app ticketing), discharging smartphone batteries, and the lack of common standards for phone characteristics (Paper F).

System integration. All types of mobile ticketing services are integrated with the existing ticketing and payment infrastructure. Mobile ticketing services might require special infrastructure (e.g., optical readers in the case of in-app ticketing, iBeacons in the case of BIBO ticketing). Public transport companies in Sweden developed a unified standard for mobile ticketing. Public transport companies in Norway agreed to develop mobile ticketing together.

Accessibility by customers. All passengers can access the majority of mobile ticketing services. SMS, some in-app services, and contactless ticketing target non-frequent users and offer single tickets. Some in-app ticketing services offer the complete range of available tickets and can be used by all categories of passengers. However, some groups of customers can be excluded (e.g., tourists with foreign mobile phone numbers cannot use SMS tickets; passengers with feature phones cannot use in-app and BIBO ticketing) (Paper F).

Management of user profiles. It is common that the technology solution provider manages user accounts and data. Public transport companies can access the accounts of registered users (in-app, BIBO, contactless).

4.5.2.3 Organisation domain

Partner selection. The major resources and capabilities of public transport companies include operation of the public transport network that is used by a large number of citizens. In order to enable an SMS ticketing service, a public transport company contracts: (i) an SMS aggregator and ticket provider that is responsible for aggregation of SMS ticket requests and SMS ticket delivery to customers and (ii) a payment service
provider. Mobile network operators perform this role and include payments for SMS ticketing in mobile phone subscription bills (see Figure 4.5a).

In the cases of in-app, BIBO, and contactless ticketing, a public transport company contracts: (i) a technical solution provider that is responsible for the provision, installation, and maintenance of the procured ticketing system and its connection to the database of the public transport company and (ii) a payment service provider that handles bank card payments, invoices, mobile payments, and customer billing. Payment processors and banks can perform this role. Banks handle the clearing and settlement of bank card payments (see Figure 4.5b). Figure 4.5 depicts generalised value networks for mobile ticketing services.

In addition, public transport companies may collaborate in order to solve common issues (e.g., the development of single mobile ticket standard in Sweden).

Network openness. Value networks are open to other actors to join. Public transport companies accomplish this through the procurement process. They evaluate proposals and award contracts to selected actors.

Network governance. The public transport company is the key actor orchestrating the network.

Network complexity. Different types of mobile ticketing (SMS and in-app) are often provided simultaneously. Additionally, mobile ticketing apps integrate different types of alternative payment methods (bank cards, mobile payments, and operator billing). This implies a complex value network (see Figure 4.6).

4.5.2.4 Finance domain

Pricing. In the majority of cases, mobile tickets have higher costs than tickets bought with preloaded wallets on RFID (Radio-Frequency IDentification) smart cards (Paper F). Generalising, the majority of public transport companies prefer using smart travel cards because this is a cheaper solution with better security and provides better travel statistics (Paper F). A number of in-app solutions still have very small market shares.
From the financial perspective, the cost of mobile and contactless ticketing is lower compared to cash.

Division of investments. A public transport company makes the decisions regarding the procurement of a ticketing system or, in some cases, its development.

Valuation of contributions and benefits. Contributions of participating parties are based on agreements and contracts.

Division of costs and revenues. Due to mobile ticketing, the revenue streams of a public transport company increase because of increased volumes of sold tickets and decreased costs associated with cash handling. However, the participation of multiple actors implies additional costs related to commissions paid to these actors.

Summing up, in this chapter I presented findings regarding how different mobile payment service providers address certain critical design issues when designing business models for mobile payment services. Despite the fact that the providers represent different industry sectors, it is possible to track some similarities in their approaches. At the same time, in order to address certain critical design issues, service providers often use completely different approaches. This is discussed in more detail in the following chapter.
In this chapter, I identify the key critical design issues within each domain of the STOF model. In order to do this, I compare approaches that different types of providers use for each critical design issue and identify those that show the highest degree of diversity in approaches. These are targeting and creating value elements in the service domain, service integration in the technology domain, partner selection in the organisation domain, and pricing in the finance domain (see Figure 5.1, details in Appendix E, Table E.1). Hence, I consider these issues the most significant within their respective domains.

Figure 5.1: Evaluation of diversity of approaches.
5.1 Service domain arrangements

Within this research, targeting and creating value elements were the critical design issues with the highest diversity of patterns used by different types of providers (see Table 5.1). Hence, these critical design issues are the key issues in the service domain. This is in line with previous findings. According to Haaker et al. (2006) and Bouwman et al. (2008), value is the essential concept of the service domain. At the same time, a selected and clearly defined customer segment helps service providers to focus on customers’ needs and offer an attractive value proposition (Bouwman et al., 2008).

If a payment provider makes the right decisions regarding market targeting and creating value elements, this will have a positive effect on the business model for mobile payments. Selection of a customer targeting strategy depends on the payment provider’s initial customer base. Banks have their own customers bases. Hence, it is easier for these actors to start from customer base building and offering a P2P solution. The offered services propose important value for cashless users and fit well with local payment habits (i.e., splitting bills). After reaching a significant number of users, banks start offering C2B solutions that offer economic value for merchants.

Independent providers do not have their own customers. The majority choose to target a specific niche market. Mobile payment services offer value that is specifically tailored to the niche-specific needs of customers and merchants. This leads to the simultaneous building of a customer base and a network of merchants.

Direct operator billing providers target business customers in niche markets. Selection of niche markets is determined by the specifics of operator billing; it can be used in the contexts of e- and m-commerce but is not suitable for PoS payments. Operator billing creates value for merchants willing to offer alternative payment methods for customers.

Table 5.1: Cross-actor analysis of targeting and value element creation patterns.

<table>
<thead>
<tr>
<th></th>
<th>Targeting</th>
<th>Created value elements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Banks</td>
<td>Targeting segment by segment (P2P and C2B)</td>
<td>Easy solution replacing cash for end-users</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Economic value for merchants</td>
</tr>
<tr>
<td>Independent providers</td>
<td>Focus on a niche market</td>
<td>Value in a certain context for end-users</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Economic value and more efficient work for merchants</td>
</tr>
<tr>
<td>Direct operator billing providers</td>
<td>Focus on a niche market and business customers (B2B)</td>
<td>Alternative payment service for end-users</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Economic value for merchants</td>
</tr>
<tr>
<td>Retailers</td>
<td>A niche market, their own customers and stores</td>
<td>Retailer’s unique offer for its own customers</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Economic value and more efficient work for retailers</td>
</tr>
<tr>
<td>Public transport</td>
<td>(i) Customer segments</td>
<td>Easy ticketing solution replacing cash for end-users</td>
</tr>
<tr>
<td>companies</td>
<td>(ii) All passengers</td>
<td>Economic value (lower service cost, increased sales and travelling), more efficient transport operation, enhanced technical functionality, safer working environment, closer relationships with customers for public transport company</td>
</tr>
</tbody>
</table>
Retailers target a niche market representing their own customers and stores. However, these actors can offer a unique value proposition to end-users. The retailer gains economic value and increased work efficiency.

Public transport companies have their own bases of passengers. Mobile ticketing may target one segment and be a replacement for single tickets and cash, or it may target all customers. Public transport companies benefit from economic value (lower service costs, increased sales and travelling), more efficient transport operation, enhanced technical functionality, a safer working environment, and closer relationships with customers.

The evidence shows that mobile payment services fail if they serve only to replace a bank card and do not create added value. Examples are Bart and Valyou.

### 5.2 Technology domain arrangements

Within this research, the selected technological solution for the service and related system integration exhibited the highest diversity of patterns used by different types of providers (see Table 5.2). System integration with the existing payment infrastructure is the key factor affecting merchants’ adoption of mobile payment services (Mallat and Tuunainen, 2008).

System integration is a trade-off between flexibility and cost (Haaker et al., 2006; Bouwman et al., 2008). This research has additionally shown that different approaches to system integration depend on differences in resources to which different types of providers have access. The providers used approaches that can be specified in three groups.

1. **Solutions integrated with the existing card payment infrastructure**

   (i) Banks develop and govern the existing payment infrastructure. It is logical for these actors to develop mobile payment services that are based on and integrated with this infrastructure and linked to either bank accounts or bank cards.

   (ii) A retailer, via its own bank, used the existing payment infrastructure. However, it focused on the use of contactless cards and NFC-enabled payment terminals.

<table>
<thead>
<tr>
<th>Resources</th>
<th>Service integration</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Banks</strong></td>
<td>Payment infrastructure, bank accounts, bank cards</td>
</tr>
<tr>
<td>Independent providers</td>
<td>Alternative payment infrastructure, separate service accounts</td>
</tr>
<tr>
<td>Direct operator billing providers</td>
<td>Alternative payment infrastructure</td>
</tr>
<tr>
<td><strong>Retailers</strong></td>
<td>Payment infrastructure, bank accounts, bank cards</td>
</tr>
<tr>
<td><strong>Public transport companies</strong></td>
<td>Ticketing infrastructure</td>
</tr>
</tbody>
</table>
2. **Alternative payment infrastructure**

(i) An alternative payment system provided by independent providers usually requires a separate service account, which poses a challenge for customers. In this case, the banks’ payment system is used to transfer money to a prepaid service wallet. After this, the money transactions happen within the alternative system. This solution may imply the following categories of cost: financial license costs, service infrastructure development costs, high costs of integration with cashier software systems, expensive and technologically challenging integration with merchants’ cashier terminals.

(ii) Direct operator billing providers also offer alternative payment systems integrated with mobile operators’ platforms and merchants’ stores. This solution may imply financial license costs and sometimes challenging technical integration with the platforms of mobile operators. However, providers offer easy integration with merchants.

3. **Integration of payment and ticketing solutions**

Mobile ticketing solutions require compatibility and integration with two types of infrastructure. Mobile ticketing apps usually offer different types of alternative payment instruments (e.g., payment cards, operator billing, mobile payments, invoices). This means a need to integrate with different payment providers and, consequently, integration costs. Mobile ticketing also requires integration with the ticketing infrastructure. This implies costs related to needed infrastructure deployment (e.g., optical readers for mobile tickets, making the system compatible with other standards).

5.3 **Organisation domain arrangements**

The central concepts in the organisation domain are resources and capabilities that service providers need to access in order to provide services (Haaker et al., 2006). This is usually done through partnerships with other business players. Within this research, **partner selection** resulted in the most different approaches used by different providers (see Table 5.3). This factor affects the structure of the service value network.

The analysed cases show that different types of mobile payment providers have different starting points in terms of resources, capabilities, and their position in the payments value network. This affects the approaches that different actors use regarding the selection of partners.

Banks are a part of the payments value network and have resources and capabilities needed to offer mobile payments. Examples include payment infrastructures, bank accounts, expertise, trust, customer bases, and customer accounts. Hence, these actors have the best position. A less successful approach for a single bank is to provide mobile
payments only to its own customers. The analysed cases demonstrated a number of successful approaches used by banks. A single bank may introduce a new business logic for mobile payments and serve customers of other banks (e.g., MobilePay, Vipps). Alternatively, banks may collaborate and join resources in order to reach an entire population (e.g., Swish). Some banks introduce new business models, such as opening a service to other banks by making them distribution partners (MobilePay) or offering a share of the service (Vipps).

Independent providers are IT companies whose expertise is related to technology development. The main resources of these actors are developed technological platforms, payment solutions, and financial licenses. However, these actors do not have their own customer bases, networks of merchants, or trust. Independent providers collaborate with large retailers or restaurant chains in order to reach customers through them.

The main resources of direct operator billing providers are technological platforms, payment solutions, and financial licenses. These actors do not have networks of merchants, their own customers, or trust. In order to provide services, providers need access to mobile network operators’ platforms. Hence, they collaborate with mobile network operators and focus on the B2B sector and building a network of merchants.

Retailers combine their own resources and capabilities with those of a bank. Being a part of the payments value network, these actors use a bank’s resources and capabilities to develop and launch a service focused on serving the retailer’s network of stores and customers. The combination of the two roles eliminates the need for additional partners.

Public transport companies have passenger bases, transport networks, and ticketing infrastructures. In order to offer mobile ticketing, these actors need a technological solution for mobile ticketing and payments. Thus, the main partners are providers of mobile ticketing technological solutions and payment service providers.

<table>
<thead>
<tr>
<th>Resources that need to be accessed</th>
<th>Partner selection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Banks</td>
<td>Collaboration with other banks and organisations in the banking sector</td>
</tr>
<tr>
<td>Independent providers</td>
<td>Customer base, network of merchants, trust</td>
</tr>
<tr>
<td>Direct operator billing providers</td>
<td>Access to technological platforms of mobile network operators, customer base, network of merchants, trust</td>
</tr>
<tr>
<td>Retailers</td>
<td>–</td>
</tr>
<tr>
<td>Public transport companies</td>
<td>Technological mobile ticketing solution, payment solution</td>
</tr>
</tbody>
</table>
5.4 Finance domain arrangements

The central concepts in the financial domain revolve around revenue models and sharing of revenues (Haaker et al., 2006). Price setting is one of the factors defining revenues. It serves to realise service profitability and/or market share. Pricing is set based on service cost. From this perspective, pricing exhibited the highest level of diversity across the different types of providers within this research (see Table 5.4).

Mobile payments represent a two-sided market that connects two types of customers: customers and merchants. Service providers need to set a price for both sides of the market (Eisenmann et al., 2006; Rochet and Tirole, 2003). Usually, one side is charged below marginal cost (Evans and Schmalensee, 2008). This side is called the ‘subsidy side’ (Eisenmann et al., 2006). When this side is attracted in large volume, it makes the service attractive for the ‘money side’, which pays higher fees in order to reach the ‘subsidy side’ (Eisenmann et al., 2006). In the case of mobile payments, retailers usually represent the ‘money side’ and pay service and/or transaction fees, while end-users use the service free of charge.

Banks provide mobile payment services based on already existing payment infrastructures. This means that there are no additional costs to provide mobile payments, and the costs are at least the same or lower when compared to the cost of bank card payments. Banks offer attractive service and/or transaction fees for merchants. Their large market shares allow banks to benefit from increasing volumes of digital transactions and reduced costs of cash handling.

Independent providers offer alternative mobile payment services. However, funds for service accounts are transferred from end-users’ bank accounts. In the context of the Scandinavian market, where there are no transaction fees for money transfers across bank cards and the accounts of private customers, alternative payment solutions can compete with the existing payment system. The situation is different in Lithuania, where there are such transaction fees. This means that money transferred to the service account from a bank account already has a cost. In order to attract service users, some providers compensate end-users for this fee (Paysera). Some providers can only compete with cash handling costs. In this situation, it is challenging to realise service profitability and to achieve a large market share.

<table>
<thead>
<tr>
<th>Sources of costs</th>
<th>Market share</th>
</tr>
</thead>
<tbody>
<tr>
<td>Banks</td>
<td>No additional cost</td>
</tr>
<tr>
<td>Independent providers</td>
<td>Cost of money transferred to the mobile payment system</td>
</tr>
<tr>
<td>Direct operator billing providers</td>
<td>Commissions to mobile network operators</td>
</tr>
<tr>
<td>Retailers</td>
<td>Administration cost to customers</td>
</tr>
<tr>
<td>Public transport companies</td>
<td>Commissions and fees to payment service providers</td>
</tr>
</tbody>
</table>
Pricing is a challenge for direct operator billing providers. The service cost depends on commissions paid to mobile network operators. These actors used to receiving high commissions (about 30–50 per cent of revenues). Depending on reached agreements, the service might have a higher price compared to a bank card. However, the service is an alternative to card payments, and merchants are interested in it. The service’s market share is growing in certain niche markets.

Contactless cards that retailers offer have administration costs to customers. The service is niche oriented, and its use is growing.

In many cases, mobile tickets have a higher cost than tickets on plastic travel cards. This is reflected in the higher prices of mobile tickets. Costs are related to commissions and fees paid to payment service providers. The market share of mobile tickets varies from low (not exceeding 10 per cent) to high (more than 50 per cent). Public transport companies forecast increases in sales and revenues of mobile tickets.

5.5 Use of the STOF model

I applied the STOF model in order to analyse the business models developed and used by different mobile payment service providers. The model helped to identify critical design issues that had the highest degree of diversity in approaches used by different service providers in the arrangements of the service, technology, organisation, and finance domains.

Following Bouwman et al. (2008), targeting, creating value elements, and pricing are interrelated and define a service value proposition for customers in the selected target market or market segment. Creating value elements for a service focuses on the value that the service creates for customers. Targeting helps to identify a target group and maintain focus on certain customers’ needs (Bouwman et al., 2008). This also means offering value for these customers. Finally, pricing is part of the service offering (Bouwman et al., 2008). Hence, these critical design issues define the service value proposition offered to selected target customers. Based on the discussion in Section 5.1, an attractive service value offered to specific types of customers (both end-users and merchants) at a competitive price has a positive impact on reaching a critical mass of customers and the opportunity to build a network of merchants (see Figure 5.2).

Following Bouwman et al. (2008), compatibility and the degree of integration of the mobile payments with the existing payment infrastructure and solutions create barriers to merchant adoption. Recalling the discussion in Section 5.2, solutions based on bank cards and bank accounts make use of the existing infrastructure and do not require investment on the part of merchants. Integration of alternative payment systems results in integration costs that merchants are not willing to take. This means that service providers need either to negotiate with merchants regarding sharing integration costs or to take on these costs themselves. At the same time, integration of mobile payments with the existing payment infrastructure affects customer adoption. For customers, it is easier
to use solutions linked to their bank card or accounts, rather than transferring money to the accounts of alternative services. In this context, service adoption by customers is unrelated to service adoption by merchants and service costs.

Access to critical resources is the key factor for partner selection (Bouwman et al., 2008). As discussed in Section 5.3, the need to access certain resources defines the selection of partners. Consequently, this determines the structure of the service value network. At the same time, the participation of additional partners implies the division of revenues and an increase in service costs. Hence, it affects the service cost structure.

Pricing is affected by service cost. The strategic interests for pricing are to reach service profitability and/or a significant market share (Bouwman et al., 2008). As discussed in Section 5.4, service providers experience different additional costs when offering mobile payments. This affects the price they can offer to merchants. The ability or inability of payment service providers to offer a competitive price in relation to

![Figure 5.2: The use of the STOF model.](image-url)
available alternatives and to gain a certain market share affects the service’s profitability and the service provider’s revenues, which is a value for the service provider.

In the next chapter, I discuss the relationships identified in Figure 5.2. I use these findings in order to answer the research questions.
Chapter 6

Discussion

The aim of this thesis is to analyse how mobile payment service providers address opportunities and challenges of mobile payment services. In this chapter, I discuss the research results and answer the research questions.

6.1 Factors that stimulate and hinder the introduction of mobile payments

Application of the STOF model helped to identify similarities and differences in critical design issues across different types of service providers in the service, technology, organisation, and finance domains to yield the first conclusion of the implemented analysis. This was an expected finding because different types of providers target different markets or market segments, create different values for customers, use different technological solutions, partner with different types of actors, and have different service cost structures.

This research aimed to explore: What stimulates and hinders the introduction of mobile payment services? The implemented analysis of different business models made it possible to draw a conclusion that the organisation domain is the most important domain affecting the development of business models for mobile payments. I explain the logic behind this conclusion below.

The resources that are owned by different service providers and their positions in the payments value network define what kinds of resources and capabilities they have to acquire. This defines what types of partners should be invited to the service value network (i.e., partner selection). For example, in order to achieve a wide reach of customers, a bank may need collaboration with other banks; in order to gain access to the technological platforms of mobile operators, operator billing providers need to collaborate with these actors (see Section 5.3 for more details). In this way, collaboration
takes different forms: collaboration between players within the same industry, across industries, and with business customers (merchants). All this implies the different compositions and structures of service value networks.

The importance of the organisation domain lies in its significant influence on all other domains of the business model and, as a result, on the ability to design a viable business model. This leads to the next conclusion: the organisation domain has a large impact on the technological solutions used (technology domain), service profitability (finance domain), and the customers base that can be reached (service domain). Below, I discuss why the settings of the organisation domain are critical and illustrate how they affect other domains for each type of mobile payment service provider. The discussion focuses on critical design factors that were found to be important in Chapter 5. I use relationships illustrated in Figure 5.2, position them inside the original STOF model (see Figure 2.2), and discuss for each type of provider. The organisation domain is intentionally placed at the top position in the figures below in order to highlight its importance.

6.1.1 Banks

**Partner selection.** Banks are a part of payments value networks. This means that these actors have experience in payments, customer bases, bank accounts, and access to the existing payments infrastructure (see Figure 6.1). Analysed cases showed that it is challenging for a single bank to succeed in mobile payments if it focuses on serving its own customers. In order to have a nation-wide customer reach, banks may use two strategies: (i) jointly developing a service in collaboration and/or (ii) developing a service alone, making it available to all customers, and serving customers of other banks. In the latter case, banks still invite other banks to join the service. This leads to collaboration among banks and the sharing of service development costs. Collaboration between competitors is known as *co-opetition* (Brandenburger and Nalebuff, 1996).

**System integration.** Banks’ solutions are based on bank cards or bank accounts (these are banks’ resources) and are fully integrated and compatible with the payments infrastructure and cashier systems. This results in a fast-growing network of merchants accepting these services. Services that are based on banks’ cards or accounts should not affect the cost structure of banks’ mobile payment services. Additionally, these services are linked to customers’ bank accounts or one or more bank cards. This approach creates lower barriers for customers to start using the service.

**Targeting, Creating value elements, and Pricing.** Banks, as financial institutions offering payment services, have information about the services that are most frequently used by customers. Additionally, these actors have good knowledge of customers’ payment habits. Based on this knowledge, banks can offer a solution with great value to the majority of their customers in a certain context: that is, an easy cash replacement for cashless customers in the contexts of P2P and C2B payments, free of charge. This attractive value proposition results in reaching a large customer base. Consequently, a large service customer base, in combination with competitive prices, attracts a large number of merchants.
Pricing. A critical mass of customers and attractive service pricing are needed in order to attract a wide merchant network and to gain a bigger market share. The combination of these factors results in service profitability and value for banks.

6.1.2 Retailers

Retailers can be considered as a specific case of banks.

Partner selection. A retailer and a bank together have a combination of resources that does not require other parties. Retailers have access to the bank’s resources, capabilities, and existing payments infrastructure (see Figure 6.2). These two actors form a value network, and the service cost structure is not affected by the participation of additional players.

System integration. The retailer’s offered solution (a contactless card) is fully integrated and compatible with the existing payment infrastructure. However, the main focus is on the niche – its own retail stores. The service cost was associated with the deployment of an NFC payment infrastructure in the stores and was covered by the bank. In terms of customer adoption, the customer needs to manage multiple bank accounts. This might result in some inconvenience and negatively affect customer adoption.

Targeting, Creating value elements, and Pricing. The retailer targets a niche market – its own customers. The service offers a unique value proposition in relation to the retailer’s loyalty programmes, at a good price. In this case, it is possible to talk about a

Figure 6.1: Factors affecting business model of mobile payments in the case of banks.
growing customer base due to the fact that the service focuses on a niche market. This solution targets the retailer’s stores and offers a cheaper payment solution.

**Pricing.** Attractive service pricing is offered only to the niche (the retailer’s stores). A cheap and efficient payment solution results in service profitability and value for the retailer.

### 6.1.3 Independent providers

**Partner selection.** Independent providers seek to compete with the existing card payment solutions. These actors have a technological solution. A crucial resource that independent providers need is a critical mass of customers. This leads to collaboration with players who have customers, namely, retail and restaurant chains (see Figure 6.3). These actors are business customers, and collaboration with them does not affect the service cost structure. In this way, independent providers build both sides of the market simultaneously.

**System integration.** Independent providers are not part of the payments value network; they develop alternative payment infrastructures. This results in a number of challenges. First, service integration is associated with additional costs. From one side, merchants are not willing to invest in additional payment solutions, and this creates a barrier to merchant adoption. From another side, a higher service cost makes it
challenging to offer a competitive price to merchants and negatively affects merchant adoption. Second, alternative payment systems with prepaid service accounts are less convenient for customers. They need to manage additional payment accounts, and this might be a barrier to customer adoption.

Targeting, Creating value elements, and Pricing. The services target the entire population; however, some independent providers target specific market segments and niche markets (e.g., pre-ordering, payments at restaurants during the busy lunch time). In the latter cases, solutions have a considerable value for customers in a certain context, usually free of charge. This seems to be a successful approach because mobile payments offer specific added value in these niche markets that cannot be created by payment cards. In this way, independent providers achieve growth in their customer base in niche markets. At the same time, the services offer a certain value to merchants in the same niche markets.

This approach is known as a co-existence strategy that is based on distinctive positioning of the service (Cennemo and Santalo, 2013). A focus on smaller niche segments, different from their competitors’, results in a smaller market overlap, a different value network, and a niche-specific service offering (Cennemo and Santalo, 2013). However, the existence of other payment alternatives makes it challenging for independent providers to succeed in the general market, to reach a critical mass of customers, and to build a network of merchants.
Pricing. In order to attract merchants, independent providers need to offer them a competitive service price. Based on the evidence, this is easier to do in some countries but challenging in others, where there is a cost associated with money transfers to the mobile service account. In the latter cases, it affects pricing and creates problems in offering a good service price to merchants and expanding market share. The services have low profitability, and this negatively affects service value for service providers.

6.1.4 Direct operator billing providers

Partner selection. The most critical resource that direct operator billing providers need is access to the technological platforms of mobile operators (see Figure 6.4). This predefines the structure of the value network. At the same time, commissions paid to mobile operators affect the service cost structure.

System integration. Direct operator billing providers develop an alternative payment service. From one side, these solutions are integrated with the platforms of mobile operators, and this means certain integration costs for providers. From another side, payment providers offer easy integration for merchants. In turn, this facilitates service adoption by merchants. In terms of customer adoption, operator billing services are easy to use and do not require additional efforts from customers. The numbers of customers using these services are usually high.

Figure 6.4: Factors affecting business model of mobile payments in the case of direct operator billing providers.

MNO: Mobile Network Operator
Targeting, Creating value elements, and Pricing. Direct operator billing providers target B2B customers in specific niche markets and use the co-existence strategy. In order to build a network of merchants, these providers offer specific value: a high rate of conversion, an alternative payment method offered to customers, a competitive price, and no need to integrate with each mobile operator. Operator billing providers are less interested in their own customer base, because anyone who has a mobile phone account or subscription can use this service. Moreover, the service is easy for customers to use and offers value in the specific context of niche markets (e.g., e- and m-commerce). This results in the growth of the customer base.

Pricing. Challenges for direct operator billing providers are related to the high commissions paid to mobile operators (which can be country specific). This means a challenge to offer a good service price to merchants. However, merchants operating in certain markets (e.g., online commerce, digital content providers) are interested in offering alternative payment methods. Thus, services are profitable and result in value for service providers.

### 6.1.5 Public transport companies

**Partner selection.** The critical resources that a public transport company needs are technological solutions for mobile ticketing and mobile payments. This leads to collaboration with technology solution providers and payment service providers and
defines the structure of the service value network (see Figure 6.5). Mobile ticketing may integrate different types of payments (direct operator billing, mobile payments, bank cards, etc.). For this reason, the value networks of mobile ticketing services are complicated and may involve many actors. This also means certain commissions or service fees paid to different partners that affect the service cost structure.

System integration. Public transport companies need to integrate mobile ticketing solutions with the existing payment and ticketing infrastructures. From one side, these actors offer mobile ticketing and payment services, and from another side, they are adopters of mobile payments. Adoption of mobile payments depends on the service price – which affects the cost of the mobile ticketing service – and the ability of the service to meet the requirements of public transport companies. At the technological level, the integration of different ticketing and payment solutions causes a number of challenges due to different standards for the technologies used and results in certain costs. Different types of mobile ticketing services have different levels of customer adoption. If a provider succeeds in offering an easy solution that meets the needs of customers, customers tend to adopt it.

Targeting, Creating value elements, and Pricing. Mobile ticketing services target public transport passengers: all types of passengers or specific groups. In each case, the service creates value for the targeted customer groups and offers a convenient way to buy a ticket in the context of a spontaneous trip. In some cases, mobile tickets have higher prices than other types of tickets. In other cases, ticket prices are the same, independent of the sales channel. Consequently, selected price policies affect the growth of the customer base.

Pricing. One of the challenges for some public transport companies is the higher cost of mobile tickets compared to other sales channels. In a number of cases, mobile tickets are more expensive due to commissions paid to partners. For this reason, passengers select alternative ticketing solutions (e.g., plastic travel cards). This results in a small market share for mobile payment and lower service profitability for public transport companies.

6.2 Importance of identified factors for different mobile payment service providers

In the previous section, I have outlined the main factors that may hinder or stimulate the introduction of mobile payment services. I conclude that the organisation domain has the biggest impact on other business model domains, and argue that the payment service provider’s starting point in terms of resources, capabilities, and position in the payments value network is a source of major differences across the business models developed by different types of providers. This leads to the question: Why are the identified factors important for different mobile payment service providers? In order to answer this question, it is necessary to consider the settings of the payments industry.

The payments industry poses the same challenges to all types of payment service providers. The most critical issue is known as indirect externalities (Economides, 1996;
van Hove, 1999). In other words, payment service providers need both to reach a critical mass of customers and to build a network of merchants. Payment providers’ revenues usually come from transaction fees paid by merchants. Most commonly, transaction fees are within 1–3 per cent (in some exceptional cases 5–10 per cent) of the payment amount. This means that financial value can be gained only when a service reaches a large scale and large volumes of turnover. The example of a credit card payment transaction illustrates how transaction fees are applied (see Figure 6.6).

In Figure 5.2, I have identified the key important critical design issues. Based on the illustrated relationships, these critical design issues affect a service provider’s abilities to reach a critical mass of customers and to build a network of merchants. This is discussed in more detail below.

**Targeting.** Different types of mobile payment service providers use different customer targeting strategies and focus on different market segments. Some providers target the general market (i.e., the entire population). In this case, providers reach a critical mass of customers in one segment and then target another segment. Other providers focus on niche markets. Using a coexistence strategy, focusing on different niche markets, and offering niche-specific services make it possible to grow customer bases and, simultaneously, attract merchants operating in these market segments.

**Creating value elements.** Researchers (Balasubramanian et al., 2002; Camponovo and Pigneur, 2003; Chen and Nath, 2004; Clarke, 2001; Heinonen and Pura, 2008; Kakihara and Sørensen, 2002; Pousttchi, 2008; Vanhaverbeke and Cloodt, 2005) examined different aspects of customer value propositions for mobile services. This research confirms previous results and shows that such factors as temporal and contextual mobility, personalisation, efficiency enhancement, convenience, new functionalities, and new service bundles are important to building a customer base and reaching a critical mass of customers. Services offered by different mobile payment providers offer different types of value to customers (e.g., banks offer an easy cash replacement in P2P money transfers, independent providers offer pre-ordering, retailers offer a payment solution...
linked to loyalty programmes, direct operator billing providers offer alternative payments for online purchases, public transport companies offer an easy ticketing solution. This research supports the importance of the use context for mobile services (Mallat et al., 2009).

Merchants are business customers of mobile payment providers. These actors pay in order to use the service; however, the benefits and value for them are increased revenues due to increasing sales and reaching new customers. This is in line with the findings of previous research (Mallat and Tuunainen, 2008). Additional types of value identified by this research are more efficient work of personnel and decreased cash handling costs. These aspects of mobile payments can facilitate the building of merchant network.

Mobile ticketing services are provided by public transport companies. However, in many cases these services are developed by technology providers. This means that mobile ticketing is a service provided in the B2B context. This research explores the value of mobile ticketing to public transport companies, including enhanced technical functionality and lower service cost, increased sales and travelling, a safer working environment for bus drivers because of reduced amounts of cash, more efficient transport operation, and closer relationships with customers. Enhanced technical functionality is related to the higher reliability and security of app-based mobile tickets, flexible pricing, and exact travel statistics. 'The financial value of in-app ticketing is in increased sales and lower service cost. This corresponds to findings on value of mobile payments for retailers (Mallat and Tuunainen, 2008) and mobile services (Komulainen et al., 2007)' (Paper G, p. 303). A new category of value identified in this research is a better working environment. Mobile ticketing aims to replace cash on buses. This contributes to a safer working environment for bus drivers. The operational value of mobile ticketing ‘results in faster boarding, more efficient driving, and keeping routes on schedule’ (Paper G, p. 303). This is a critical value making public transportation more efficient. Finally, ‘reputational and customer relationship value is in increased service accessibility, closer relationship with customers’ (Paper G, p. 303), and positive impact on the transport company’s brand. This corresponds to the benefits of mobile payments for retailers (Mallat and Tuunainen, 2008) and drives the introduction of mobile ticketing and payment services by public transport companies.

**Pricing.** Setting attractive prices is important in order to attract both end-users and merchants. Mobile payments are usually offered free of charge to end-users in order to reach a critical mass. Providers of mobile payments seek to offer a competitive price to merchants in order to compete with alternative payment methods. Some types of actors have issues offering competitive prices. In some markets, fees set for transactions across private accounts make it challenging for independent providers to offer lower service prices compared to alternatives. Collaboration with partners increases the cost of direct operator billing and also makes it difficult to offer a competitive price. This makes these services relatively less attractive to merchants and creates an obstacle to building a network of merchants.

**System integration.** Mobile payment services that are based on bank cards or bank accounts are more convenient and attractive for customers because they do not require
additional efforts from customers. At the same time, if a new payment solution is based on the existing payments infrastructure and does not require additional integration and hardware, this facilitates its adoption by merchants (Paper B). An example of a service that does not require any special hardware and is easy to integrate is direct operator billing.

Alternative payment services that require additional service accounts are less convenient for service customers because they have to manage multiple accounts. Such services require integration with the existing payment infrastructure and cashier terminals, and, in some cases, there is a need for additional payment terminals. Merchants are not willing to invest in additional infrastructure, and such an approach is an obstacle to merchant adoption of new services (Paper B). This means that a service provider must take on the high costs of service integration.

Partner selection. Partner selection is based on the resources that have to be acquired for a service offering. In a number of cases, mobile payment providers need access to the customer base of other players and use different forms of collaboration. For example, banks use a co-opetitive approach and collaborate in order to gain a wide customer reach. Independent providers collaborate with B2B customers and large retail chains in order to reach their customers. Direct operator billing providers reach customers through mobile network operators.

6.3 Discussion of research results in the context of the payments industry

This research performed analysis and comparison of business models used for mobile payments by five different types of actors. This approach helps to provide a more holistic picture by using the perspectives of different mobile payment providers. Banks are the incumbents of the payments industry. New actors (namely, independent providers and direct operator billing providers) seek to challenge banks by offering new solutions. How successful is this competition between banks and non-bank players? In this section, I discuss research findings in the context of the payments industry and relate them to the following aspects: (i) the payment process, (ii) the payment service provider’s position in the payments value network, (iii) the ability of new players to add value or reduce a cost, (iv) payments in the context, (v) competing multiple solutions, and (vi) regulation of the payments market. This is discussed below.

6.3.1 Payment process

New technology is a driving force to develop mobile payments. However, mobile payments do not change the payment process itself. In developed countries, a person receives income to her or his main bank account and then redistributes funds from this bank account by paying retailers, bills, loan, rent, and so forth. A retailer receives money on his or her bank account and redistributes it by paying salaries, rents, and so forth (see Figure 6.7).
The discussed payment process is closely linked to service integration and its link to customer adoption (see Figure 5.2). The majority of mobile payments are built on top of the existing payment system and are linked to bank cards or bank accounts. This means that mobile payments change neither the payment process nor the way the information about the cardholder’s account and the payment amount is transferred and handled within the payment system. From this perspective, mobile payment services just replace a card with a phone. This might not be enough to motivate customers to use this service and to foster its adoption.

This was confirmed by one of the interviewed industry experts, who additionally commented: ‘Currently it is an impossible situation, if you come to your employer and say: “I want 5 per cent of my salary to be transferred to mobile wallet and 95 per cent of the salary to my bank account.” This is the inconvenience of these services. You need to transfer money to other wallets. And the main point is why to put money to external wallets, when you have your primary credit card?’

In this way, the payment process’ settings become a challenge to independent providers. This has a negative impact on reaching a critical mass of customers.

### 6.3.2 Payment service provider’s position in the payments value network

The position of banks in the payments industry is very strong. These actors are part of the payments value network. This means that a bank’s issued Visa and MasterCard payment cards can be used for payments not only in the local market but also globally. Banks are involved in the payment transaction process, develop and own banking infrastructure, administer customer bank accounts, and issue and administer bank payment cards. Additionally, these actors have licenses, trust, and strong brand images (Gaur and Ondrus, 2012). Thus, banks have a strong basis for providing mobile payments.

Using the example of the analysed case studies, alternative payment systems offered by independent providers are built on top of the existing payments system. This creates unfavourable conditions for independent providers in the markets, where there are transaction costs across private accounts and payment cards (e.g., the Baltic countries,
the United States). This makes it challenging to offer competitive transaction fees for merchants. In the markets where there are no transaction costs across private accounts and payment cards (e.g., Scandinavia), independent providers can achieve lower transaction costs and compete with payment cards. However, there is a challenge to reaching a large scale and large volumes of transactions. In the majority of independent providers’ cases, the volumes of transactions remain low. As one of the interviewed industry experts commented: ‘Obviously, all those that try to put alternative to the banks have to share a smaller cake.’

### 6.3.3 Ability of new players to add value or reduce the cost

Banks are the traditional payments industry’s actors. Their business is organised to ensure efficient and effective payments. For example, Single Euro Payments Area (SEPA) is an EU initiative aiming at deployment of fast instant payments in euros within EU countries (BIS, 2016). Being efficient, banks can offer an interchange fee of about 2–3 per cent (see Section 6.2, Figure 6.6). Based on analysed cases, banks introduce mobile payment services offering value to customers and competitive prices to merchants. Consequently, mobile payment solutions launched by banks have become dominant in Denmark, Norway, and Sweden.

The ability of non-bank payment providers to compete with banks is defined by their ability to add value or reduce the cost of the payment service. Alternative payment systems provided by independent providers are built on the existing bank system. In the markets with transaction costs applied for payments across private accounts and payment cards (e.g., the Baltic countries, the United States), independent providers are not able to offer a competitive price to merchants. Additionally, there are high costs related to service integration with the existing payments infrastructure. This makes it challenging for these players to compete with banks. However, independent providers are able to create specific additional value for customers and merchants in specific niche markets.

In the case of direct operator billing, it is also challenging to reduce the cost of payments due to the rather high commissions paid to mobile operators. Hence, this service might also be more expensive in comparison to banks’ solutions. However, these services create value for customers and merchants in specific niche markets.

This is in line with the comments of an interviewed industry expert: ‘There is a value chain that is very efficient. If you want to move into the value chain, you either have to add value to it, or you have to reduce the cost. It is difficult to reduce the cost, and particularly because the main part of the cost in this value chain is related to two players. One is called Visa, and another is MasterCard.’

### 6.3.4 Payments in the context

The payment process can be divided into three phases: before payment, payment moment, and after payment (see Figure 6.8). At each stage, the service offers certain value to the
end-users. I discuss this in relation to the identified key critical design issue creating value elements and its link to reaching a critical mass of customers (see Figure 5.2).

Before payment. Mobile payment services enable services before payment. This is the context that is not covered by other payment solutions and the area where mobile payments have the potential to add the most value. Two of the analysed cases (WoraPay and Paysera) succeed in offering pre-ordering services.

Payment moment. Bank cards are most frequently used for payments at PoS (Sveriges Riksbank, 2013), meaning they represent strong competition for mobile payments. Some types of mobile payments (e.g., direct operator billing) cannot be used in this context. However, mobile payments and direct operator billing find their niche in online and mobile commerce and in the context of self-checkout payment terminals.

After payment. The advantage of mobile payment services and contactless cards is an opportunity to offer a range of services after payment (loyalty programmes, coupons, bonuses, personalised offers, purchase statistics, etc.). This has added value for customers and merchants.

Summarising, payment is not a problem in developed economies. However, mobile payments contribute by enhancing the shopping experience before and after the payment. These are forces that can drive the penetration of mobile payments. This was confirmed by one of the interviewed industry experts: ‘The use of mobile phones for payments will connect the payment to the shopping experience both before and after the payment.’

6.3.5 Competing multiple payment solutions

One of the reasons why mobile payments penetrate slowly in developed countries is the availability of payment alternatives (Dahlberg et al., 2015a, 2015b). Bank debit and credit cards, credit transfers, and direct debit are popular means of cashless payments in developed countries (BIS, 2012; Sveriges Riksbank, 2013). Additionally, in each market there are a few competing mobile payment services, for example, Mokipay, Paysera, and WoraPay in Lithuania and Swish, SEQR, iZettle, Klarna (offers invoice billing in mobile apps), ApplePay, and Samsung Pay in Sweden.

A large number of competing payment solutions makes it challenging to reach a critical mass for each of them (Dahlberg et al., 2015a). This is illustrated by situations in Norway and Denmark. By the beginning of 2018, only two mobile payment solutions remained in Norway: Strex, an operator billing solution, and Vipps, which won the market over competing solutions. These were mCASH, a joint banks’ solution, and...
MobilePay (Danske Bank). Both were terminated in autumn 2017 (Finextra, 2017; Sparebank 1, 2017). By the beginning of 2018, there were two mobile payment solutions in Denmark: ApplePay (which entered the Danish market in 2017) and MobilePay, the leading solution. A competing joint banks’ service, Swipp, was terminated in February 2017 (Swipp, 2017). In these markets, it is possible to see a force driving the market towards a higher concentration of mobile payment solutions.

6.3.6 Regulation of the payments market

The success of mobile payment services in Denmark and Sweden is based on specifics of local regulation. In Denmark, a mobile payment solution is based on the business model of Dankart, which does not apply transaction fees for cardholders and retailers. In Sweden, there are no transaction fees for cardholders. In other countries, these services would have a transaction fee, and this would limit service use and the number of transactions. An example of this is the Mokipay service in Lithuania, which is built on top of the bank payment system and cannot offer a better service fee for merchants.

The EU regulation in the payments industry (Payment Service Directive 1 (PSD1), PSD2, money laundering directive, privacy directive) sets higher barriers to enter the payment market. The entrance barrier for new players increases dramatically due to the cost of a license, the cost to get all necessary security certifications, the cost of integration with cashier systems, and possible fines. For example, due to a change in regulation and the need to acquire a financial license, mobile network operators had to leave the SMS payments market in Sweden. Finally, national payment solutions have to meet national regulation requirements. In order to have a regional or global solution, it should meet the requirements of payment regulation in different countries and regions (EU, the United States, Latin America, etc.). This was confirmed by one of the interviewed industry experts: ‘The regulation in the payment industry dramatically increases entrance barrier for new players. … A new EU directive is coming now. It is the EU new privacy directive, which regulates how you keep and store data. The directive sets a fine up to 4 per cent of your turnover if something is wrong. And companies in the payments business have quite high turnover. Hence, it will be quite expensive.’

6.4 Firm-centric or networked business model

In this research, I have applied the STOF business model. It perfectly suited the aims of this research and helped to analyse cases and to identify major differences across different providers. An offering of mobile payments requires collaboration between different actors, which may represent different industries, use different ways to organise their businesses, and have different aims and views regarding the service. The discussion in the organisation domain is mainly focused on resources and capabilities that are needed to ‘realise the particular service offering’ (Bouwman et al., 2008, p. 56), the key settings of services’ value networks, the division of roles and activities, and the sharing of revenues and costs.
While implementing this research, it was notable that collaboration and joint service offerings result in ‘complex interdependencies between organisations’ (Bouwman et al., 2008, p. 56). This means that if one company in the value network makes a certain adjustment in its business model, this will affect all other involved parties. This results in certain challenges: a lack of commitment to the service between collaborating actors and a related challenge to govern a complex value network. A number of services have discontinued due to these reasons. Hence, this leads to the question: how can companies jointly offering a service address a lack of commitment, opportunistic behaviour, and related issues of complex value network governance? Based on the evidence, in order to offer a service, it is not enough to organise a value network, to combine resources and the capabilities of involved partners, and to have a long-term collaboration and an agreed division of costs and revenues. It is also important that involved parties be willing to adjust their existing business models.

I believe that mentioned challenges call for future research because the STOF framework does not help to answer the proposed question. The approach that may help to answer the question is the networked business model and I discuss its application below.

The analysed mobile payment services can be classified in the following groups:

- A mobile payment service used as a standalone business of a certain service provider (e.g., services launched by banks, operator billing providers, independent providers). This is a firm-centric business model.

- A mobile payment service integrated in the business processes of other market actors (e.g., retailers, public transport companies). This is an example of a networked business model.

A public transport ticketing service can be used as a good example to illustrate these two perspectives on business models depending on the actor in the focus. Generalising, a ticketing service includes all forms of payments and a large number of interrelated actors: cash and bank cards used at PoS of intermediaries selling tickets, SMS ticketing, and payment service providers processing bank card payments in mobile apps and online shops (see Figure 6.9).

Using a firm-centric approach, Figure 6.9 presents the perspective of a public transport company. This is the key actor that selects partners, organises, manages, and governs the value network and delivers ticketing services to the end-users, either itself (area A in Figure 6.9) or with the help of intermediaries (areas B and C).

Networked business model thinking applies when exploring the perspective of payment service providers (areas B and C in Figure 6.9). These actors have their own firm-specific business models. However, in order to provide ticketing services, these actors need to collaborate with technology providers and public transport companies. Payment service providers are embedded in the value network of the public transport company and are inside of their business. Mobile payment services are used in the B2B context and are integrated in the mobile ticketing app. Each of the involved actors
performs its defined role, creates value, and by doing this contributes to offering the ticketing service. In this context, there is a higher degree of dependency on other actors. Nevertheless, business actors in the analysed case use firm-centric business models. By using this approach, each actor is able to identify possible business opportunities. This supports a statement by Palo and Tähtinen (2013). Taking the next step and developing a networked business model co-created by all involved actors could result in their willingness to align their strategies and processes better, both internally ‘within each company and between partners’ (Heikkilä et al., 2014). This would also provide a collective understanding of the business opportunities of the networked business model, actions that need to be taken by each actor, and better alignment of these actions (Palo and Tähtinen, 2013).

The government of complex value networks and issues related to collaboration between different partners are usually listed between major sources of challenges to introducing mobile payments (Au and Kauffman, 2008; Dahlberg et al., 2015a, 2015b; de Reuver et al., 2015). This was supported by one of the case studies analysed in this thesis, where the service failure was partly affected by the inability of collaborating partners to adjust their firm-level business models. Use of the networked business model approach has the potential to solve these issues.
6.5 Theoretic contribution

This research makes some contributions to academic research. First, it contributes by extending knowledge on business models used for mobile payment services. Additionally, the research seeks to contribute to academic research in mobile payments. This is discussed below.

6.5.1 Contribution to the business model concept and the STOF model

This research addresses a call and contributes to a better understanding of challenges and success factors related to the design of business models for new mobile services (Bouwman et al., 2008). This call is closely related to the research questions that this research aimed to answer. Analysis of different business models developed by different types of mobile service providers helped to identify factors positively or negatively affecting business models for each type of provider. Additionally, I explain why these factors have such impact.

This research makes a number of contributions to the STOF model. First, the model was applied for the analysis of different business models developed by different types of actors and helped to identify similarities and differences in different domains. Hence, this research confirms the applicability of the model for research purposes in the analysis of new mobile services offered by multiple actors.

Another contribution is the identification of the most critical business model domains. Comparison and analysis of different business models designed by different types of providers for one type of mobile service show that the *organisation domain* is one of the most crucial business model domains. This finding contradicts the findings of Guo et al. (2013), who found that service is the most important domain and the organisation domain is the third most important domain. However, these researchers explored business models of mobile payment from the perspective of one type of actor, the banks. Their result might be explained by the fact that banks own and manage the payments infrastructure and have all needed resources to provide mobile payments; hence, the most important thing they are concerned about is service.

This research has a wider perspective and considers business models designed by five different types of mobile payment service provider with different resources and capabilities. I argue that the organisation domain is the most critical because it affects the other business model domains. That is, the settings of this domain determine the resources and capabilities that mobile payment service providers need to access for the service (Faber and Bouwman, 2003), and this explains the selection of partners and the structure of the service value network (i.e., the organisation domain). This affects the available technological solution (the technology domain), the service and targeted market segment (the service domain), and the service’s profitability (the finance domain). Hence, the organisation domain affects the settings of the other domains, and, consequently, the
viability of the business model. It needs to be mentioned that this research only identified the most important domain; the importance of the remaining domains was not ranked.

This research contributes by identifying key critical design issues in each business model domain. These are targeting and creating value elements in the service domain, service integration in the technology domain, partner selection in the organisation domain, and pricing in the finance domain. These factors were selected because each type of payment provider used its own approach in order to address these critical design issues.

The STOF framework does not provide an answer to the question how can companies jointly offering a service address a lack of commitment, opportunistic behaviour, and related issues of complex value network governance? In this thesis, I illustrate the application of networked business model thinking. This approach leads to a collective understanding of possible opportunities to exploit (Palo and Tähtinen, 2013). Use of a combination of firm-level and network-level business models results in a better understanding of potential opportunities and actions that each actor needs to perform. Consequently, the development of network-level business models and a related collective understanding of possible business opportunities would provide a good motivation for all actors to adjust their individual business models to the network business model. I suggest, that use of networked business model thinking has the potential to enrich the STOF model.

6.5.2 Contribution to academic research on mobile payments

One of the major contributions of this research to academic research on mobile payments is the analysis of rich empiric data. In the thesis, I present the perspectives of five different mobile payment service providers. I also contribute by discussing a bigger picture of the payments market, including discussion of mobile payments in the context of the existing payment system. Additionally, I address the call for additional research focused on the ability of different actors to act locally or globally (Dahlberg et al., 2015b). In this thesis, I explore the ability of different types of service providers to offer mobile payments locally based on their capabilities and limitations.

Analysis and comparison of business models designed by different types of providers helps to identify the key challenges and driving forces for each type of actor. Hence, this thesis contributes by extending knowledge on business models used for mobile payment services.

One of the identified research gaps is the lack of publications addressing the business aspects of mobile ticketing. This research contributes through analysis and comparison of business models designed for different types of mobile ticketing services and the identification of major challenges.

Only a few researchers have examined the value of new services in the B2B context. This research contributes by exploring categories of value of mobile ticketing services to public transport companies. The main identified categories are enhanced technical
functionality, financial value, a better working environment, operational value, and reputational and customer relationship value. This research identifies similarities between the value of mobile ticketing to public transport companies and the value of mobile payment to retailers. The similar categories are the financial value and reputational and customer relationship value. This research contributes by identifying a new category of the value of mobile ticketing: a better (or enhanced) working environment.

This research confirms the findings of previous researchers (Balasubramanian et al., 2002; Camponovo and Pigneur, 2003; Chen and Nath, 2004; Clarke, 2001; Heinonen and Pura, 2008; Kakihara and Sørensen, 2002; Pousttchi, 2008; Vanhaverbeke and Cloodt, 2005) on the customer value proposition of mobile payment and mobile ticketing services. Ease of use, temporal and contextual mobility, personalisation, efficiency enhancement, convenience, new functionalities, and new service bundles are important categories of the value proposition of both types of services. This research additionally supports the proposition regarding the importance of the use context for mobile services (Mallat et al., 2009).

### 6.6 Managerial contributions and practical implications

This research has some important managerial and practical implications for practitioners. The most significant research insights are related to the overview of a range of different business models that can be developed for mobile payment services. The research also indicates alternative approaches that can be used to address challenges related to the specifics of mobile payments.

*Banks*, the incumbents of the payments industry, want to protect their existing business models. These actors are challenged by newcomers and are forced to invest in new services, including mobile payments. After a number of failures (e.g., Bart in Sweden), it seems that banks in the Scandinavian countries managed to find a successful approach that fits the needs of local markets and customer habits well. Banks used new approaches to business models, used the approach of service co-creation with customers, experimented with developed services, and shifted their focus from product creation to ecosystem creation. Research findings indicate that banks were very successful in identifying the main ‘pain’ point for their customers – the need for an easy cash replacement when splitting bills. Hence, knowledge of local culture and habits is important for service value propositions. Good and easy service, followed by positive word-of-mouth, justified the new approaches to business models used by banks.

Collaboration versus service development alone requires a separate discussion. It is faster if the service is developed by one bank. Collaboration takes time because banks need to discuss the key points of service. At the same time, collaboration requires setting a work framework and rules governing the collaborative work process. However, the benefits of collaboration are a wider customer reach, a bigger market share, lower costs, and better quality of the infrastructure.

*Independent providers* see business opportunities to offer mobile payment services. These actors compete with banks. The major challenge for these actors is to reach a
critical mass of customers. One of the approaches to building their own customer base that independent providers use is to focus on niche markets. Independent providers experiment with new services and look for scenarios where mobile payments could solve a customer problem and add value that a bank card cannot provide (e.g., pre-ordering at restaurants, payments at school). These providers constantly develop and improve the service, adding new functionalities. At the same time, independent providers understand the need to educate customers. They carry out promotional campaigns in order to create customer awareness regarding the value of the service. ‘Don’t wait for a waitress’ is an example of the main promotional campaign’s message. As a result, the customer base is growing.

Prior to contacting merchants, these actors need to integrate their service with the most popular types of cashier software. Integration has a high cost for independent providers. After the integration, the software has to be upgraded for each cashier terminal in each store, making the service available for use. This also has a cost. Who should cover this cost? This question makes negotiations between independent providers and merchants difficult. Another issue is that the integration takes a long time. An additional issue is the use of old technical equipment that lacks capacity to support new services. A retailer owning a bank is a unique combination of actors and resources, where a bank serves the retailer’s customers and stores. The analysed case study of ICA describes a success story. ICA has two solutions: a self-scanning and payment tool built in ICA’s Handla app and a contactless card. The contactless card allows payments without using a PIN code for transactions below 250 SEK. This makes each low-value transaction faster and makes the work of personnel more efficient, saves time, and decreases the cost of cash handling. Contactless cards linked to the retailer’s loyalty programmes create a unique service offering to ICA customers that seeks to increase their loyalty. ICA Banken was the first bank in Sweden that introduced contactless cards, and ICA Sverige was the first retailer that launched NFC-based payments. This decision had a positive impact on the image of both companies, making them slightly more innovative and more modern, and creating customer awareness.

Direct operator billing providers operate in one of the mobile payment segments. This service cannot be used in the context of physical stores. However, these providers have a clear vision of where their service fits best and focus on such markets as gaming, digital media and content, social media, and charities. These actors target B2B customers by offering them an alternative payment method. Easy integration, a high conversion rate, no need to integrate with each mobile operator, and the opportunity to negotiate special commercial conditions with just one integration partner make this service attractive for merchants. Spotify, Facebook, Netflix, PayPal, Google Play, Microsoft, and Rovio are just some examples of merchants using this type of service. To attract large merchants requires time, trust, and a dedicated business development effort. Customers benefit from easy and smooth payment processes.

Direct operator billing providers collaborate with mobile network operators. Technical integration with mobile operators’ platforms poses certain technical challenges. However,
the capability to solve these issues is the strength of these actors and works as an entry barrier for other actors wishing to offer the same type of service. The commercial side remains challenging. Due to the rather high commissions paid to mobile operators, the service fee might be high and not applicable in such businesses as micro-finance or Uber, where paid commissions cannot exceed 3–4 per cent.

Public transport companies seek to offer an easy and convenient ticketing service to their customers and at the same time to reduce the amount of cash and its handling cost. Some public transport companies have developed mobile payment services themselves (e.g., Ruter). These services are developed in a close collaboration with customers, with careful attention paid to the service interface and user experience. The majority of public transport companies select to contract with technical solution providers.

Public transport companies need to decide what type of ticketing to use. SMS ticketing was the first form of mobile ticketing. Today, the most common type of ticketing is in a mobile app. This allows more functionalities than SMS and is the biggest ticket sales channel in some cases. For TfL, the use of contactless payment cards made the ticket purchasing process the same as purchases in the regular store, which is very convenient for users. Public transport companies are launching new approaches to pricing, for example, price capping, and developing new ticketing solutions, for example, BIBO, which is one possible future direction in the development of mobile ticketing.

Public transport companies contract with ticketing technology solution providers and payment service providers through a procurement process. The formulation of a vision for the service solution in the technical specification might be challenging and requires a clear vision of the type of service the company wants to procure. Technology solution providers make consultations regarding possible options. Collaborative work between partners is usually productive and does not cause problems.

In some countries (Norway, Sweden), public transport companies collaborate in order to develop a single mobile ticket standard. This standard allows interoperability of the ticketing systems, and one public transport company can accept tickets bought from other companies. In the long run, use of a single standard makes a public transport company more independent of technology providers.
Chapter 7

Conclusions

7.1 Concluding remarks

The main objective of this thesis is to broaden knowledge and understanding about the ways mobile payment service providers address the opportunities and challenges of mobile payment services. In order to investigate this problem, I analysed business models developed for mobile payments by different types of providers (i.e., banks, independent providers, direct operator billing providers, retailers, and public transport companies). In this thesis, I sought to answer the following research questions:

**RQ1**: What stimulates and hinders the introduction of mobile payment services?

**RQ2**: Why are the identified factors important for different mobile payment service providers?

The answers to these questions are discussed in Chapter 6. A summary of the main findings is provided below.

**RQ1**: What stimulates and hinders the introduction of mobile payment services?

In order to answer this research question, I used the STOF model. The analysis explored four main domains of business models: service, organisation, technology, and finance. I found that the organisation domain is the key domain, which affects all other domains and has an impact on the general viability of the business model. Indeed, usually a single company lacks the resources or capabilities necessary to offer mobile payment services. The resources that a service provider needs to access for a service offering affect the structure of the service value network (the organisation domain). Available
resources within the value network have a large impact on the technologies that can be used (the technology domain), the service that can be offered and customers that can be targeted (the service domain), and the service profitability that can be reached (the finance domain).

The STOF model specifies a set of critical design issues that have to be considered within each domain. A comparison of the approaches used by different mobile payment service providers to address each of the critical design issues helped to identify the factors that are most important within each domain. Customer targeting and creating value elements are the most crucial factors in the service domain; the selected technological solution and its integration and compatibility with the existing infrastructures, in the technology domain; partner selection, in the organisation domain; and pricing, in the finance domain.

**RQ2: Why are the identified factors important for different mobile payment service providers?**

In order to provide the answer to this question, I considered research findings in the context of the major challenge of the payments industry. More specifically, I discussed how the identified key critical design issues help mobile payment service providers to address indirect network externalities, i.e., to reach a critical mass of customers and to build a wide network of merchants. Based on the research findings, it is possible to conclude the following:

- **Targeting.** Mobile payment service providers use different customer targeting strategies; however, all these strategies aim at attracting as many customers as possible, either in the general market or in specific market segments and niches.

- **Creating value elements.** In order to attract customers and merchants, mobile payment services need to offer an attractive value proposition. Customers benefit from added value offered in specific contexts (e.g., banks offer an easy cash replacement for P2P money transfers, independent providers offer pre-ordering, retailers offer a payment solution linked to loyalty programmes, operator billing providers offer alternative payments for online purchases, and public transport companies offer an easy ticketing solution). Merchants benefit from increased revenues, more efficient work of personnel, and decreased cash handling costs. Public transport companies benefit from enhanced technical functionality and lower service costs, increased sales and travelling, a safer working environment for bus drivers because of reduced amounts of cash, more efficient transport operation, and closer relationships with customers.

- **Pricing.** Attractive service prices are important for customers and merchants. In order to reach a critical customer mass, service are offered for free to customers.
In order to attract merchants, mobile payment service providers seek to offer a competitive price. However, it is challenging for some categories of providers to compete with alternative payment methods and to offer competitive prices. This is due to commissions paid to partners or existing market conditions.

• **System integration.** Merchants are willing to adopt mobile payment services that are based on the existing infrastructure and do not require additional integration, hardware, or investment. From this perspective, solutions that require investment in additional infrastructure are not attractive. At the same time, mobile payment solutions based on bank cards or accounts are more convenient and attractive for customers. Consequently, management of prepaid accounts for alternative payment solutions is less convenient and attractive.

• **Partner selection.** In the context of mobile payments, a customer base can be considered as an important resource. In order to access it, mobile payment providers use different forms of collaboration with actors who own this resource.

Additionally, I discussed whether the competition between banks and non-bank actors is successful. The detailed discussion is provided in Section 6.3. I provide the summary below:

• **Payment process.** It is possible to say that a majority of mobile payments are based on bank cards or bank accounts and do not change the existing payment process. This causes challenges for independent providers because majority of mobile payment services are linked to bank cards or bank accounts. Replacement of a bank card with a phone might be not enough to motivate customer adoption.

• **Payment service provider’s position in the payments value network.** Banks are part of the payments value networks and have needed resources and capabilities. Hence, it is less challenging for them to start offering mobile payments. Actors offering alternative payment solutions build them on top of the existing payment system. This results in a higher service cost and service profitability issues, especially in the markets where there are transaction costs across private accounts and payment cards.

• **Ability of new actors to add value or reduce cost.** Banks are the most efficient actors in offering mobile payment services. These actors can offer added value to customers and a competitive price to merchants. Non-bank actors have fewer abilities to reduce the cost of mobile payments (e.g., high commissions paid to partners or solutions that are built on top of the existing payment system). However, these actors are able to add value to a payments service that bank cards cannot offer.
• **Payments in the context.** Bank cards are most commonly used for payments at PoS. An advantage of mobile payments is the ability to offer additional services before and after payment, that is, to create a unique shopping experience. Moreover, the momentum of mobile payments is towards a focus on services before payment (e.g., pre-ordering).

• **Competing multiple solutions.** A number of competing mobile payment solutions are provided in the analysed countries. A range of different payment options makes it challenging to reach critical mass on each of them. At the same time, some markets (Denmark and Norway) have exhibited a trend towards higher concentration of mobile payment solutions. Services having bigger customer bases win the market over competing solutions having smaller customer bases.

• **Regulation of the payments market.** Existing regulation norms increase market entrance barriers to non-bank payment service providers. Market barriers are associated with the cost of a financial license, the cost of service certification, the cost of service integration with the existing payment infrastructure and cashier software, possible fines, and the need to meet the norms of national or regional regulations.

### 7.2 Summary of contributions

This research contributes to academic research and has managerial and practical implications. Mentioned types of contributions are discussed in Sections 6.5 and 6.6. A summary is provided below.

#### 7.2.1 Summary of theoretical contributions

This research contributes to the business model concept by extending knowledge on challenges and success factors related to the design of business models for new mobile services. This research makes a number of contributions to the STOF model. The research confirmed the model’s suitability for research purposes in the analysis of new mobile services offered by multiple actors. Another contribution is identification of the most critical business model domain, which is the organisation domain. Service provider’s resources, capabilities, and position in the payments value network define partner selection and structure of the service value network. This leads to the next contribution. Results of this research showed that the organisation domain affects other business model domains. Service provider’s and network’s resources affect the technological solution used (the technology domain), participation of multiple partners affect service profitability (the finance domain), and the potential customer base that can be reached (the service domain). The research also contributes by identifying the most important critical design issues within each business model domain. This set of
critical design issues is characterised by the highest diversity in approaches used by service providers and significantly affects business model viability. Finally, this research contributes by the suggestion to extend the STOF framework with elements of networked business model thinking. This approach has a potential to address such issues as a lack of commitment and opportunistic behaviour.

This research makes a number of contributions to academic research on mobile payments. One of the major contributions is collection and analysis of rich empiric data. Another contribution is analysis of the ability of different types of service providers to offer mobile payments locally based on their capabilities and limitations. Analysis of business models developed by different types of service providers operating in different countries allows discussing a bigger picture of the payments market and considering research results in the context of the existing payment system. Being focused on business models, this research contributes by extending knowledge of business models used for mobile payment services and mobile ticketing services. These research areas still require additional research. Only a few researchers have examined value of new mobile services in B2B context. This is the first research exploring categories of value of mobile ticketing services to public transport companies. Additionally, this research confirms findings of previous studies regarding the categories of customer value propositions for mobile payment and mobile ticketing services and the importance of the use context for mobile services.

7.2.2 Summary of managerial contributions and practical implications

The performed research provides a number of managerial contributions and practical implications for practitioners. The most important research insights provide an overview of different business models that can be developed for mobile payment services. Additionally, the research discusses a number of actor-specific alternative approaches and strategies helping to address the challenges related to the specifics of mobile payments. A brief overview is provided below.

In order to protect their existing business, banks develop new approaches to business models, experiment with developed services, and focus on the development of the ecosystem around the service. Good knowledge of local culture and payment habits helps to identify customer needs that mobile payments can solve and offer added value. In order to develop a service, banks may consider collaborating with other banks. This approach takes time and requires a clear work framework and rules, but its benefits are a wider customer reach, a bigger market share, lower costs, and a better quality of infrastructure. However, one bank can develop a service faster by itself than in collaboration.

Independent providers offer alternative payment solutions. Reaching a critical mass of customers is the key challenge for these actors. One possible approach is to focus on niche markets and offer niche-specific services. Additionally, these actors seek to educate customers with the help of promotional campaigns. The integration of alternative
payment systems with cashier software is a long process that results in certain costs. Integration conditions represent a subject of negotiation between independent providers, software providers, and merchants.

The discussed case of a retailer offering a payment service represents a success story. Contactless cards linked to the retailer’s loyalty programmes offer a unique service value proposition to the retailer’s customers. Being the first retailer in the market that launched NFC-based payments created a positive image for the company’s brand and resulted in media attention.

Direct operator billing providers have a clear vision of where their service fits best and focus on specific niche markets and B2B customers. This service has a number of benefits (e.g., easy integration, high conversion rate) that make this service attractive for merchants. Customers benefit from easy and smooth payment processes. Service providers integrate their services with mobile operators’ platforms. The capability to solve technical integration issues is the strength of these actors. The commercial side of the service remains challenging due to the rather high commissions paid to mobile operators.

Public transport companies use different approaches to the development of mobile ticketing. Some companies develop services themselves, and others contract with technical solution providers. Today, the most common type of mobile ticketing is a mobile app. This solution offers a number of additional services to passengers. At the same time, public transport companies are experimenting with other ticketing and payment solutions, e.g., contactless payment cards, seamless ticketing solutions (BIBO), and price capping. In order to develop and offer mobile ticketing services, public transport companies collaborate with technology solution providers and payment service providers. The collaboration process usually is productive. In some countries, public transport companies collaborate in order to develop mobile ticketing jointly and create a better travel experience.

### 7.3 Future work

Further research directions can be related to:

- Theory development.
- The scope of the research.

From the theoretical perspective, one direction of future research might be further development of the STOF model. It can potentially be enriched by some key ideas of the networked business model. Examples are: use of both types of business models – firm-centric and networked, adjustment of individual business models based on the networked business model, and collective understanding of possible business opportunities for all actors.
Additionally, in this research I have identified the key critical design issues within each domain. Future research could further examine the importance of these factors and links among them.

From the perspective of the scope of the research, future research can:

1. *Extend the scope and include more countries.* In this thesis, I have analysed and compared the business models developed for mobile payment services of five types of business actors and related success factors and challenges. The research covered six northern European countries (Denmark, Estonia, Lithuania, Norway, Sweden, and the United Kingdom). One possible direction for future research could be to extend the current research. The future research could include the analysis of a larger number of developed economies in Europe and North America. Additionally, the research could be more focused on the impact of the external environments (e.g., payments market conditions, regulations, etc.) on business models. This approach would provide a more complete picture.

2. *Widen the scope and include other services.* Alternatively, the scope of future research could be widened and additionally include other types of new mobile services, such as connected devices or smart cities. The comparison of business models developed for different types of mobile services would further contribute to a better understanding of the challenges and success factors related to new mobile services.
References


Apanasevic, T., 2015. Challenges related to the introduction of innovative services in the market: Mobile payment services in the Swedish retail industry. Licentiate thesis. KTH Royal Institute of Technology.

REFERENCES


REFERENCES


REFERENCES


REFERENCES


Appendix A

Publications not included in the thesis


Appendix B

Analysis of related work

Table B.1: Research on business models of mobile payments during 2006–2016*

<table>
<thead>
<tr>
<th>Reference</th>
<th>Research focus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carton et al., 2012</td>
<td>Proposition of the framework for value proposition of mobile payments that is an important part of business model</td>
</tr>
<tr>
<td>Dennehy et al., 2015</td>
<td>Designing of a Partnership Management Canvas as a tool used to represent the participation of multiple actors in a business model</td>
</tr>
<tr>
<td>Juntunen et al., 2012</td>
<td>Analysis of business model of mobile ticketing service and estimation of critical business model issues</td>
</tr>
<tr>
<td>Ondrus and Lyytinen, 2011</td>
<td>Application of simplified business model canvas to discuss business models of Google and Apple as possible mobile payment service providers</td>
</tr>
<tr>
<td>Ondrus et al., 2009</td>
<td>Analysis of business models of three Swiss cases and analysis of their fit with the environment</td>
</tr>
<tr>
<td>Pousttchi, 2008</td>
<td>Business model analysis for five different mobile payment scenarios</td>
</tr>
<tr>
<td>Pousttchi et al., 2009</td>
<td>Proposition of a framework for analysis and engineering of business models for mobile payment services</td>
</tr>
<tr>
<td>Zolnowski et al., 2014</td>
<td>Representation of business model of mobile payment service in the retail industry with the help of the service business model canvas</td>
</tr>
</tbody>
</table>

*Analysis of academic literature on mobile payments classified 32 papers in the category ‘Business aspects’ of mobile payments (Paper A). Eight (8) studies out of 32 explore business models of mobile payments.
Table B.2: Some examples of business model definitions.

<table>
<thead>
<tr>
<th>Reference</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gordijn et al., 2000 p. 41</td>
<td>Business model answers question: ‘who is offering what to whom and expects what in return.’ Business model should be focused on concept of value, in order to explain the creation and addition of value in a multi-party stakeholder network, as well as the exchange of value between stakeholders.</td>
</tr>
<tr>
<td>Amit and Zott, 2001, p. 494; Zott and Amit, 2010, p. 216</td>
<td>The business model depicts the design of transaction content, structure, and governance so as to create value through the exploitation of business opportunities. Later the business model was defined as ‘a system of interdependent activities that transcends the focal firm and spans its boundaries.’</td>
</tr>
<tr>
<td>Chesbrough and Rosenbloom, 2002, p. 532</td>
<td>The business model provides a coherent framework that takes technological characteristics and potentials as inputs, and converts them through customers and markets into economic outputs. The business model is thus conceived as a focusing device that mediates between technology development and economic value creation.</td>
</tr>
<tr>
<td>Magretta, 2002, p. 87</td>
<td>Business model is referred as a story that explains how enterprises work. A good business model answers questions: Who is the customer? What does the customer value? How do we make money in this business? What is the underlying economic logic that explains how we can deliver value to customers at an appropriate cost?</td>
</tr>
<tr>
<td>Camponovo and Pigneur, 2003, p. 4</td>
<td>Business model can be seen as a detailed conceptualization of an enterprise’s strategy at an abstract level, which serves as a base for the implementation of business processes.</td>
</tr>
<tr>
<td>Hedman and Kalling, 2003, pp. 52-53</td>
<td>A generic business model includes the following causally related components: customers, competitors, offering, activities and organisation, resources, supply of factor and production inputs, and a longitudinal process component to cover the dynamics of the business model over time.</td>
</tr>
<tr>
<td>Osterwalder et al., 2005, p. 10</td>
<td>A business model is a conceptual tool that contains a set of elements and their relationships and allows expressing the business logic of a specific firm. It is a description of the value a company offers to one or several segments of customers and of the architecture of the firm and its network of partners for creating, marketing, and delivering this value and relationship capital, to generate profitable and sustainable revenue streams.</td>
</tr>
<tr>
<td>Morris et al., 2005, p. 727</td>
<td>A business model is a concise representation of how an interrelated set of decision variables in the areas of venture strategy, architecture, and economics are addressed to create sustainable competitive advantage in defined markets.</td>
</tr>
<tr>
<td>Haaker et al., 2006, p. 647</td>
<td>Authors consider the business model of a networked enterprise that is a collaborative effort of multiple companies to offer a joint proposition to their consumers.</td>
</tr>
<tr>
<td>Johnson et al., 2008, pp. 52-53</td>
<td>A business model consists of four interlocking elements (customer value proposition, profit formula, key resources, and key processes) that, taken together, create and deliver value.</td>
</tr>
<tr>
<td>Casadeus-Masanell and Ricart, 2010, p. 196</td>
<td>Business model refers to the logic of the firm, the way it operates and how it creates value for its stakeholders.</td>
</tr>
</tbody>
</table>
Table B.3: Components of the business model.

<table>
<thead>
<tr>
<th>Reference</th>
<th>Business model components</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chesbrough and Rosenbloom, 2002</td>
<td>Value proposition, market segment, internal value chain, cost structure and profit potential, value network, competitive strategy</td>
</tr>
<tr>
<td>Magretta, 2002</td>
<td>Who is the customer? What does the customer value? How do we make money in this business? What is the underlying economic logic that explains how we can deliver value to customers at an appropriate cost?</td>
</tr>
<tr>
<td>Hedman and Kalling, 2003</td>
<td>Customers, competitors, offering, activities and organisation, resources, supply of factor and production inputs, and a longitudinal dimension</td>
</tr>
<tr>
<td>Osterwalder et al., 2005</td>
<td>Value proposition, target customers, distribution channel, customer relationship, value configuration, capability, partnership, cost structure, revenue model</td>
</tr>
<tr>
<td>Morris et al., 2005</td>
<td>Value offering, market segment, core competences, market positioning, economic model, growth model</td>
</tr>
<tr>
<td>Haaker et al., 2006</td>
<td>Service domain, technology domain, finance domain, organisation domain (Mobile service BM)</td>
</tr>
<tr>
<td>Johnson et al., 2008</td>
<td>Customer value proposition, profit formula, key resources, and key processes</td>
</tr>
<tr>
<td>Pousttchi et al., 2009</td>
<td>Product, customer interface, infrastructure management, financial perspective, threat consideration (Mobile payment BM)</td>
</tr>
<tr>
<td>Demil and Lecocq, 2010</td>
<td>Resources and competence choices, organisational choices (costs), value proposition, choices (revenue)</td>
</tr>
<tr>
<td>Al-Debei and Avison, 2010</td>
<td>Value proposition, value architecture, value network, value finance</td>
</tr>
<tr>
<td>Mason and Spring, 2011</td>
<td>Technology (product, process, core technologies, and infrastructure), market offering (i.e. artefacts or goods, activities and services, access, and value), business network architecture (i.e. capabilities or know-how that a company has, transactions between firms, market and standards, and relationships)</td>
</tr>
<tr>
<td>Wirtz et al., 2016</td>
<td>Strategy, resources, network, customers, market offer, revenue, manufacturing, procurement, finance</td>
</tr>
</tbody>
</table>
Appendix C

Sample interview protocol

With a public transport company

1. Welcoming part: introductory part, explaining of research aims, asking permission to record the interview.

2. The history of mobile ticketing service(-s) development and service(-s) characteristics
   - When was the mobile ticketing service(-s) introduced? and Why? What types of tickets can be bought with this solution? What are the payment options?
   - Who were the main partners? What were their roles and responsibilities? How was the payment organised?
   - How do you ensure service security?
   - Was there any investment in service infrastructure / terminals needed?

3. What are the main advantages of mobile ticketing for transport company?

4. What were the initial expectations about mobile ticketing before its deployment? Did they prove? What are the disadvantages?
5. Use of the mobile app service in comparison to card, and other types of ticket

- How was the awareness created?

- What is the use trend among different types of tickets? (e.g. mobile app ticket vs. card) Is the price of different types of tickets the same?

- Is there a big interest from customers? Do they find it attractive? What are the main comments/feedback of customers using the solution? Does it meet their expectations? Do they ask for more functionality?

6. What are the future plans?

7. Closing part.
# Appendix D

## Primary data collection

Table D.1: Details of interviews.

<table>
<thead>
<tr>
<th>Case, Provider</th>
<th>Interviewee</th>
<th>Time of interview</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sweden</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Adviser at Riksbanken</td>
<td>June 2016</td>
</tr>
<tr>
<td>Bart, Swedbank</td>
<td>Former Bart service developer, Swedbank</td>
<td>March 2014</td>
</tr>
<tr>
<td>SEQR, Seamless</td>
<td>Middle-level manager at Seamless</td>
<td>March 2014</td>
</tr>
<tr>
<td></td>
<td>Middle-level manager at Axfod</td>
<td>March 2014</td>
</tr>
<tr>
<td></td>
<td>Middle-level manager at McDonald’s (written response)</td>
<td>October 2014</td>
</tr>
<tr>
<td>ICA card, ICA Banken</td>
<td>Middle-level manager at ICA Banken</td>
<td>December 2015</td>
</tr>
<tr>
<td>WyWallet</td>
<td>Middle-level manager at WyWallet</td>
<td>15 April 2016</td>
</tr>
<tr>
<td></td>
<td></td>
<td>20 April 2016</td>
</tr>
<tr>
<td>Swish, GetSwish</td>
<td>Member of the board for Swish</td>
<td>June 2016</td>
</tr>
<tr>
<td>Mobile ticketing solutions</td>
<td>Middle-level manager at Blendingetrafiken</td>
<td>January 2016</td>
</tr>
<tr>
<td></td>
<td>Middle-level manager at Skånetrafiken</td>
<td>February 2016</td>
</tr>
<tr>
<td></td>
<td>Middle-level manager at Länstrafiken Kronaberg</td>
<td>February 2016</td>
</tr>
<tr>
<td></td>
<td>Middle-level manager at Karlstadsbuss</td>
<td>March 2016</td>
</tr>
<tr>
<td></td>
<td>Middle-level manager at Västrafik</td>
<td>March 2016</td>
</tr>
<tr>
<td></td>
<td></td>
<td>June 2016</td>
</tr>
<tr>
<td></td>
<td>Middle-level manager at SL</td>
<td>June 2016</td>
</tr>
<tr>
<td></td>
<td>Middle-level manager at Samtrafiken</td>
<td>June 2016</td>
</tr>
<tr>
<td></td>
<td>Middle-level manager at PayEx</td>
<td>April 2016</td>
</tr>
</tbody>
</table>
Table D.1:  Details of interviews (continued).

<table>
<thead>
<tr>
<th>Case, Provider</th>
<th>Interviewee</th>
<th>Time of interview</th>
</tr>
</thead>
<tbody>
<tr>
<td>Norway</td>
<td>Industry expert, Nets, Norway</td>
<td>January 2017</td>
</tr>
<tr>
<td></td>
<td>Former top-level manager at Valyou wallet</td>
<td>April 2012</td>
</tr>
<tr>
<td></td>
<td>Former middle-level manager at DNB</td>
<td>April 2012</td>
</tr>
<tr>
<td></td>
<td>Top-level manager at DNB</td>
<td>April 2016</td>
</tr>
<tr>
<td></td>
<td>Middle-level manager at DNB</td>
<td>April 2016</td>
</tr>
<tr>
<td></td>
<td>Former top-level manager at Valyou wallet</td>
<td>April 2016</td>
</tr>
<tr>
<td></td>
<td>Former middle-level manager at TSM Nordic</td>
<td>April 2016</td>
</tr>
<tr>
<td></td>
<td>Middle-level manager at TSM Nordic</td>
<td>April 2016</td>
</tr>
<tr>
<td></td>
<td>Middle-level manager at MeaWallet</td>
<td>April 2016</td>
</tr>
<tr>
<td></td>
<td>Mobile ticketing solutions</td>
<td>20 April 2016</td>
</tr>
<tr>
<td></td>
<td></td>
<td>29 April 2016</td>
</tr>
<tr>
<td></td>
<td></td>
<td>June 2016</td>
</tr>
<tr>
<td>Denmark</td>
<td>Industry expert, Consultant agency, Denmark</td>
<td>June 2016</td>
</tr>
<tr>
<td></td>
<td>MobilePay, Danske Bank</td>
<td>June 2016</td>
</tr>
<tr>
<td></td>
<td>Mobile ticketing solutions</td>
<td>June 2016</td>
</tr>
<tr>
<td></td>
<td></td>
<td>June 2016</td>
</tr>
<tr>
<td></td>
<td></td>
<td>June 2016</td>
</tr>
<tr>
<td>The UK</td>
<td>Industry expert, Consultant agency, the UK</td>
<td>May 2016</td>
</tr>
<tr>
<td>Estonia</td>
<td>Fortumo, Fortumo</td>
<td>May 2016</td>
</tr>
<tr>
<td></td>
<td>Mobile ticketing solutions</td>
<td>April 2016</td>
</tr>
<tr>
<td></td>
<td></td>
<td>May 2016</td>
</tr>
<tr>
<td>Lithuania</td>
<td>Five (5) board members of the Bank of Lithuania</td>
<td>May 2016</td>
</tr>
<tr>
<td></td>
<td>Mokipay, Antigravity Payment Systems</td>
<td>January 2016</td>
</tr>
<tr>
<td></td>
<td>Mobile ticketing solution mTicket</td>
<td>March 2016</td>
</tr>
<tr>
<td></td>
<td></td>
<td>May 2016</td>
</tr>
<tr>
<td></td>
<td></td>
<td>March 2016</td>
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<tr>
<td></td>
<td></td>
<td>March 2016</td>
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<tr>
<td></td>
<td></td>
<td>March 2016</td>
</tr>
</tbody>
</table>
Table D.2: Collaborative projects.

<table>
<thead>
<tr>
<th>Event</th>
<th>Place</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mobimer</td>
<td>The main objective of the project was to provide a framework for development of a business eco-system for mobile payment services and related added value services. The project was focused on services for public transport. Main partners: Samtrafiken AB, local public transport companies in Stockholm and Uppsala (SL and UL)</td>
<td>2012–2014</td>
</tr>
<tr>
<td>Mutant (Multi-tenant access control with NFC tokens)</td>
<td>The project was a pre-study of real life NFC services implemented on a small scale. The project was focused on technical, security, service, usability, and business model aspects for NFC-based access service. The service was implemented at ICT labs and wireless@kth in Kista and was tested and used by staff, students and visitors. Main partners: Telcred and MeaWallet.</td>
<td>2013–2014</td>
</tr>
</tbody>
</table>
### Appendix E

#### Diversity of approaches

Table E.1: Diversity of approaches.

<table>
<thead>
<tr>
<th>Critical design factors</th>
<th>Rate</th>
<th>Actors that had similar approaches</th>
</tr>
</thead>
<tbody>
<tr>
<td>Targeting</td>
<td>5</td>
<td>All different approaches</td>
</tr>
<tr>
<td>Creating value elements</td>
<td>5</td>
<td>All different approaches</td>
</tr>
<tr>
<td>Branding</td>
<td>4</td>
<td>Retailers, public transport companies seek to improve company image</td>
</tr>
<tr>
<td>Customer retention</td>
<td>2</td>
<td>Banks, independent providers, retailers, public transport companies offer new service bundles and new functionalities</td>
</tr>
<tr>
<td>Security</td>
<td>2</td>
<td>Banks, independent providers, carrier billing providers, retailers offer secure services</td>
</tr>
<tr>
<td>Quality of service</td>
<td>2</td>
<td>Banks, independent providers, carrier billing providers, retailers offer high quality service</td>
</tr>
<tr>
<td>Service integration</td>
<td>5</td>
<td>All different approaches</td>
</tr>
<tr>
<td>Accessibility by customers</td>
<td>1</td>
<td>Banks, independent providers, carrier billing providers, retailers, public transport companies make service open to all customers</td>
</tr>
<tr>
<td>Management of user profiles</td>
<td>2</td>
<td>Banks, independent providers, carrier billing providers, retailers manage user profiles</td>
</tr>
<tr>
<td>Partner selection</td>
<td>5</td>
<td>All different approaches</td>
</tr>
<tr>
<td>Network openness</td>
<td>2</td>
<td>Banks, independent providers, carrier billing providers, public transport companies have open value networks</td>
</tr>
<tr>
<td>Network governance</td>
<td>2</td>
<td>Banks, independent providers, carrier billing providers, public transport companies have open value networks</td>
</tr>
<tr>
<td>Network complexity</td>
<td>3</td>
<td>Banks, independent providers, retailers have relatively low level of value network complexity</td>
</tr>
<tr>
<td>Pricing</td>
<td>5</td>
<td>All different approaches</td>
</tr>
<tr>
<td>Division of investments</td>
<td>2</td>
<td>Banks, independent providers, retailers, public transport companies develop services based on own investments</td>
</tr>
<tr>
<td>Valuing contributions and benefits</td>
<td>1</td>
<td>Banks, independent providers, carrier billing providers, retailers, public transport companies make valuation of contributions and benefits based on agreements</td>
</tr>
<tr>
<td>Division of costs and revenues</td>
<td>3</td>
<td>Banks, independent providers, retailers do not divide costs and revenues</td>
</tr>
</tbody>
</table>
Scale:
1 – similar approach used by all 5 types of actors;
2 – similar approach used by 4 types of actors;
3 – similar approach used by 3 types of actors;
4 – similar approach used by 2 types of actors;
5 – all actors had different approaches
Part II

Paper Reprints