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Mobile Payment Services

Towards a Framework for Analysis

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Problem Description

Construct a framework suitable for analyzing the external factors and design of a mobile payment service. Test the framework on existing Telenor mobile payment services to assess its general applicability. Use the framework to assess the attractiveness of a market that Telenor is planning to launch a new mobile payment service in.

Preface

This master thesis is the concluding work of our Master of Science-degree in Industrial Economics and Technology Management at the Norwegian University of Science and Technology. We have chosen a specialization within Strategy and International Business Development, which is reflected in the scope of the thesis.

We would like to thank our supervisor Per Jonny Nesse for his guidance and feedback during the project, as well as Marko Rankovic, Aleksandar Smiljkovic, Per Arvid Gjersum and Mariana Penkova Grozeva for their contribution through interviews.

Trondheim, June 10, 2015

Abstract

The payment services industry has seen great changes the last decades, with mobile phones emerging as a new means for performing payments. Originating from simple services provided to the unbanked in undeveloped markets, advanced services have emerged in most parts of the world. Banks, telecom operators and other third party companies are rapidly launching new and innovative payment service to capitalize on a growing trend. Mobile payment services now reach over 100 million active users worldwide, and is expected to become even more widespread in the coming years.

As mobile payment services are new in most markets, theoretical knowledge on the subject remains relatively limited. Conducting research to heighten the understanding on the manner is therefore considered important to both researchers and practitioners.

This master thesis addresses mobile payment services through three consecutive parts. The first part proposes a theoretical framework for the analysis of mobile payment services, based on a literature review and practitioners feedback. The second part applies the proposed framework to existing Telenor mobile payment services and assesses its general applicability. Following the assessment, minor adjustments to the framework are made. In the last and final part of the thesis, the framework is used for screening potential mobile payment service designs for Bulgaria, suggesting it is an attractive market for Telenor.

A Proposed Framework for Analysis

A literature review and multiple iterations with practitioners resulted in a framework consisting of two parts. The first part represents the context, or environment, surrounding a mobile payment service, and is based on the well established contingency theory. In this theory, the market context is grouped into four contingency environments, namely the (1) *social/cultural*, (2) *commerce*, (3) *technological*, and (4) *legal, regulatory and standardization* environments, and is further decomposed into 12 factors.

The second part of the framework is a conceptualization of mobile payment services through a set of three *service design dimensions*, encompassed by the four contingency theory environments. The three service design dimensions are (1) *end user functionality*, (2) *technology*, and (3) *interoperability*. End user functionality

refers to what payment functionalities the service offers its customers. Technology refers to the communication technology used to connect the sender and receiver of payments. Finally, interoperability refers to how mobile payment services interact with other parts of the financial ecosystem. Within each service design dimension the practitioners can choose from several options.

The contingency theory factors will guide the practitioner to what options are viable in a given market context. The framework's appropriate application is therefore to aid in the screening of potential service designs.

Testing and Revising the Framework

The proposed framework is tested on existing Telenor mobile payment services, in order to assess its general applicability to these services. This is performed through a series of practitioner interviews and a study of the Serbian mobile payment service environment. The findings enable a comparison between practitioners' approach to designing mobile payment services and that of the framework. The comparison reveals several interesting insights. First, the 12 contingency theory factors provide a solid foundation for understanding the environments' impact on mobile payment services design, as they corresponded well with the factors the practitioners report as influential.

Second, only two of the service design dimensions are considered highly relevant by practitioners, namely *end user functionality* and *interoperability*. With regards to the technology dimension, practitioners suggest an alteration in its scope is necessary for it to be equated with the other dimensions. Additionally, several other potential relevant dimensions are also suggested by practitioners. As such, we conclude that end user functionality and interoperability form a basis for all service designs, and that other dimensions can be added to the set at practitioners' discretion. The framework is revised to reflect these insights.

Assessing the Bulgarian Market

Based on the revised framework, an assessment of the Bulgarian mobile payment services market is conducted. The assessment shows that all examined end user functionalities are viable options in Bulgaria. Further, the existing financial infrastructure allows for satisfying interoperability. We therefore conclude that the Bulgarian market for mobile payment services represents an interesting business opportunity for Telenor.

Due to limitations of the study, the framework can only be considered a first step towards a fully verified analysis framework. On this basis, several opportunities for further research are identified.

Sammendrag

Betalingsformidling har endret seg mye det siste tiåret, og betalingstjenester med mobiltelefon er blant de nyeste tilskuddene. Disse tjenestene har utviklet seg fra å være enkle kontantfrie betalingsalternativer i vekstmarkeder, til å bli komplekse tjenester med globalt omfang. Banker, telekomoperatører, og andre tilbydere lanserer hyppig nye og innovative betalingstjenester for å kapitalisere på en voksende trend. Mobile betalingstjenester benyttes i dag av mer enn 100 millioner brukere i hele verden, og er ventet å bli enda mer utbredt i årene som kommer.

Mobile betalingstjenester er fortsatt relativt nytt i de fleste markeder, og følgelig er teoretisk kunnskap om emnet begrenset. Et studie som høyner forståelsen av slike tjenester er derfor vurdert som interessant både for forskere så vel som tilbydere.

Denne mastergradsoppgaven tar for seg mobile betalingstjenester, og består av tre deler. I oppgavens første del presenteres det et teoretisk rammeverk som kan benyttes for å analysere mobile betalingstjenester. Dette rammeverket har opphav i faglitteratur og innspill fra tilbydere av mobile betalingstjenester. I oppgavens andre del blir Telenors eksisterende mobile betalingstjenester betraktet i lys av det nevnte rammeverket, med en påfølgende vurdering av rammeverkets anvendbarhet. Denne vurderingen resulterer i noen endringer til rammeverkets innhold. I oppgavens tredje og siste del benyttes det reviderte rammeverket til å vurdere mulige betalingstjenester i Bulgaria, og resultatet antyder at dette kan være et attraktivt marked for Telenor.

Et foreslått analyserammeverk

En litteraturgjennomgang og flere iterasjoner med utøvere resulterte i et rammeverk som besto av to deler. Den første delen representerer konteksten, eller miljøet, som omgir betalingsløsningen, og baser seg på velkjente *contingency theory*. I denne teorien grupperes miljøet inn i fire, (1) *social/cultural*, (2) *commerce*, (3) *technological*, og (4) *legal, regulatory and standardization*. Disse fire gruppene er videre dekomponert til 12 faktorer.

Den andre delen av rammeverket består av en konseptualisering av mobile betalingstjenester gjennom et sett av tre tjenstedesign-dimensjoner. Disse dimensjonene omringes av de fire nevnte gruppene i miljøet. De tre tjenstedesign-dimensjonene er (1) *end user functionality* (2) *technology*, og (3) *interoperability*. End user functionality referer til hvilken betalingsfunksjonalitet tjenesten tilbyr kun-

dene. Videre beskriver *technology* hvilken kommunikasjonsteknologi som brukes for å koble sammen avsender og mottaker av betalingen. Avslutningsvis refererer *interoperability* til hvordan mobile betalingstjenester samhandler med andre deler av det finansielle økosystemet. Innenfor hver dimensjon av tjenstedesign har tilbyderne flere muligheter å velge mellom.

Contingency theory faktorene identifiserer mulige service designs i en gitt markedskontekst. Således er rammeverkets anvendelsesområde vurdering av alternative tjenstedesigns i potensielle markeder.

Testing og revidering av rammeverket

Det foreslåtte rammeverket blir så testet på Telenors eksisterende mobile betalingstjenester, for å vurdere dets anvendelighet. Dette støttes av flere intervjuer samt et studie av det Serbiske markedet for mobile betalingstjenester. På bakgrunn av dette gjøres det en sammenlikning av rammeverkets og utøvernes tilnærming til design av mobile betalingstjenester. Denne sammenlikningen demonstrerer blant annet at de 12 identifiserte *contingency theory* faktorene gir et solid utgangspunkt for å forstå markedets innvirkning på mobile betalingstjenester.

Videre viser det seg at utøverne vurderer *end user functionality* og *interoperability* som de to viktigste dimensjonene i tjenstedesign. Når det gjelder *technology*-dimensjonen foreslår utøverne å endre dimensjonens omfang og innhold hvis den skal likestilles med de to andre dimensjonene. I tillegg presenteres det andre potensielle dimensjoner man kan betrakte. På bakgrunn av dette konkluderes det med at de to nevnte dimensjonen utgjør en basis for alle tjenstedesigns, og at ekstra dimensjoner kan inkluderes etter eget ønske. Rammeverket blir så revidert for å ta høyde for disse innsiktene.

Vurdering av det bulgarske markedet

Avslutningsvis blir det reviderte rammeverket anvendt på det Bulgarske markedet for mobile betalingstjenester. Undersøkelsen indikerer at alle alternativ av *end user functionalities* er egnet for Bulgaria, samt at den eksisterende finansielle infrastrukturen tilrettelegger for tilfredsstillende *interoperability*. På bakgrunn av dette foreslås det at det bulgarske markedet for mobile betalingstjenester representerer en interessant forretningsmulighet for Telenor.

Grunnet studiets begrensninger er det viktig at rammeverket kun betraktes som et første steg mot et fullstendig verifisert beslutningsverktøy. Med bakgrunn i dette åpner det seg flere muligheter for ytterligere undersøkelser.

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List of Abbreviations

A2A	Account-to-Account
ACH	Automated Clearing House
ATM	Automated Teller Machine
BU	Business Unit
CAGR	Compound Annual Growth Rate
CEE	Central and Eastern Europe
EC	European Commission
Fintech	Financial Technology
HCE	Host Card Emulation
ICT	Information and Communications Technology
IEC	International Electrotechnical Commission
IMF	International Monetary Fund
ISO	International Organization for Standardization
MMO	Mobile Money Operator
MNO	Mobile Network Operator
MPS	Mobile Payment Service
MVNE	Mobile Virtual Network Enabler
MVNO	Mobile Virtual Network Operator
NFC	Near Field Communication
OEM	Original equipment manufacturer
OTP	One-Time Password
P2P	Peer-to-Peer
POS	Point-of-Sale
PSD	Payment Service Directive
QR	Quick Response
RFID	Radio-Frequency Identification
RTGS	Real-Time Gross Settlement
TSM	Trusted Service Manager
UMTS	Universal Mobile Telecommunications System

Chapter 1

Introduction

1.1 Mobile Payment Services

The last decade has seen great changes within the payment services industry, following the emergence of mobile phones as a means to perform payments. A variety of definitions and terms are used for these new services, and throughout this master thesis we adopt the term *mobile payment services* (MPSs) and the following definition:

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. 2007, p. 1).

According to Lacmanovic et al. (2012) a pattern in the evolution of MPSs can be observed. The services often start as a supplement to brick-and-mortar banking, with functionalities such as transaction information and account balances. The services then tend to become more advanced and support new functionalities such as bill payments and peer-to-peer (P2P) transactions. The final step in the evolution is MPSs at the point-of-sale (POS) terminal. The evolution of functionality is often accompanied by a technological evolution as well, typically from SMS to NFC.

85 % of all MPSs have originated from developing countries. Lack of alternative payment methods has been the driving factor for developing a mobile payment ecosystems (Kshetri & Acharya 2012), and MPSs are now available in over 60 % of the world's developing markets (GSMA 2015). However, MPSs are not only widespread in these markets. MPSs' penetration is increasing rapidly worldwide. As of December 2014 there were 255 active MPSs, serving 103 million users in 89 markets (GSMA 2015). These users transacted a total of US\$ 16.3 billion in over 717 million transactions, in December 2014 alone.

The rapid growth of MPSs is due to both existing players expanding and new players entering the market. An example of the former is M-Pesa¹ by Vodafone originating in Kenya and expanding to Europe in 2014². Although mobile payments services have traditionally been operated by mobile network operators (MNOs) and directed towards the unbaked developing markets, (which still offers a significant commercial potential³), providers of new innovative services are increasingly emerging. The group of new players is comprised of both large established electronics companies such as Apple⁴ and Google⁵, as well as smaller financial technology (fintech) startups. The latter type has received a lot of attention lately, reflected in the fact that fintech startups have received nearly US\$ 3 billion in funding in Q1 2015 alone⁶. These companies are challenging the traditional brick-and-mortar services of commercial banks, primarily in the developed markets. Additionally, MPS growth is driven by increasingly advanced handsets and communication infrastructures (Rankovic et al. 2013) as well as the easing of regulation, such as the new PSD2 directive in the European Union⁷.

Despite its growing importance in commerce throughout the world, there are no theoretically founded universal best-practices regarding MPS design⁸ for practitioners. We consider this a research gap, and will address it in our master thesis. More specifically, we would like to assess how external factors affect the various design dimensions of MPSs.

There are two reasons for why our research should prove to be interesting for both practitioners and researchers. First, given the high penetration, rapid growth and amount of business opportunities for new market players, practitioners should have a great interest in understanding MPSs design. This is confirmed by Sherman (2014), who cites a survey reporting that one out of six consumers switch banks due to poor mobile experiences. Dahlberg et al. (2007) also point out that mapping efforts of MPSs would be useful for the practitioners community. Second, our research addresses a gap in the existing literature, which could make it inherently useful for researchers within the field.

¹<http://www.safaricom.co.ke/personal/m-pesa>

²<http://www.vodafone.com/content/index/media/vodafone-group-releases/2014/m-pesa-romania.html>

³McKinsey & Company (2010) Global Financial Inclusion

⁴Apple (2015) Apple Pay, <https://www.apple.com/apple-pay/>

⁵Google (n.d.) Google Wallet, <https://www.google.com/wallet/>

⁶CBInsights (2015) Disruption in Financial Services, https://www.cbinsights.com/reports/Disrupting_Financial_Services_webinar.pdf

⁷Deloitte (2014) The European regulatory agenda on payments is driving major industry change, <http://www2.deloitte.com/content/dam/Deloitte/lu/Documents/risk/lu-european-regulatory-agenda-payments-industry-change-27102014.pdf>

⁸By service design we mean concepts such as choice of end user functionalities and built-in interoperability, similar to what Dahlberg et al. (2007) refer to as *design*.

1.2 Research Scope and Research Questions

As mentioned in the previous section, there exist many different terms for, and definitions of, MPSs. Additionally, MPSs vary considerably with respect to several aspects, including functionalities offered and technologies applied. As such, we have found it necessary to comply with Morse et al. (2002)'s suggestions regarding research scope. Morse et al. points out that student studies should focus on verifying the *major* concepts to achieve a sufficient depth within the limited time frame available. For these two reasons, we have included some refinements to the our research scope:

- Our study focuses on mobile *payment* services, which has a slightly different scope than mobile *financial* services. The term mobile financial services includes all financial services, such as payments, micro-financing, bank accounts etc. mobile payment services however, include only those services that are related to making payments between a sender and receiver, such as P2P transactions and payments at POS terminals. As such, mobile payment services can be seen as a subset of mobile financial services. Seeing as most new mobile services fall within the category of payment services, such as Apple Pay⁹ and Facebook Messenger Payments¹⁰, the chosen scope should be interesting.
- A further distinction should be made between mobile *payment service* and mobile *wallets*. Mobile wallets include several other features in addition to those offered by MPSs. A typical example of such a feature is loyalty cards. The focus is chosen for the same reason as given above.
- We do not distinguish between services in *developed* and *developing* markets.
- We approach MPSs from a mobile money operator's (MMO's)¹¹ perspective. We do not however, distinguish whether this MMO is initiated by a MNO, a financial institution such as a bank, or a third party fintech company. There is one exception to this approach. In part three of our thesis, we will address MPSs from the perspective of Telenor (MNO).

Our master thesis is written in collaboration with Telenor, and this has naturally influenced our research. Based on the problem description and the above mentioned refinements, we have formulated three research questions (RQs):

RQ1 What is a suitable approach for analysing mobile payment services design?

RQ2 How do findings from RQ1 compare to Telenor practitioners' approach to mobile payment services design?

RQ3 Is Bulgaria an attractive market for a Telenor mobile payment service?

⁹Apple (2015) Apple Pay

¹⁰Facebook (2015) Send Money to Friends in Messenger

¹¹As defined by Clark & Gamner (2014)

Both RQ1 and RQ2 represent large tasks, and we have therefore dedicated most of our time and attention to these. A note must be added regarding RQ3. Bulgaria was chosen as a target market because Telenor has indicated that it could be a candidate for a new MPS.

1.3 Approach to Answering the Research Questions

This thesis is structured into four main parts, as illustrated in Figure 1.1. The first three parts each answer a research question, while the fourth part concludes our problem description. Additionally, the study's methodology is explained in chapter 2.

Chapter 2: Methodology		
Part I	Chapter 3: Mobile Payment Services Environment	RQ1
	Chapter 4: Mobile Payment Service Design	
	Chapter 5: Using the Framework	
	Chapter 6: Concluding RQ1	
Part II	Chapter 7: Serbian MPS Environment	RQ2
	Chapter 8: Potential Service Designs for Serbia	
	Chapter 9: Summary of Interviews	
	Chapter 10: Telenor Banka's Service Design	
	Chapter 11: Discussion	
	Chapter 12: Concluding RQ2	
Part III	Chapter 13: Bulgarian MPS Environment	RQ3
	Chapter 14: Assessing the Bulgarian MPS Market	
	Chapter 15: Concluding RQ3	
Part IV	Chapter 16: Conclusions	Problem description
	Chapter 17: Limitations and Further Research	

Figure 1.1 – Structure of the thesis

Chapter 2

Methodology

In this chapter we present the methodology used in answering the research questions. As this thesis has three separate research questions and three corresponding parts, the presentation distinguishes between the methodologies of each part. During the planning of our study's research methodology, we took principles and strategies from Yin (2013) and Morse et al. (2002) into consideration. Several references to these authors are therefore made throughout the description of the methodology.

2.1 Part 1: Constructing a Framework for Analysis

As the first goal of our master thesis was to construct a theoretical framework suitable for analyzing MPSs, a review of the current literature and iterations with practitioners were needed. This approach can be summarized in four steps, as described in Figure 2.1 and the following paragraphs.



Figure 2.1 – The methodology used in part one of our thesis

Step 1: Initial Search

Our review started with a broad ad-hoc search to reveal the scope of the existing literature. As we needed to gain a thorough understanding of MPSs, a broad search with generic terms was deemed the best way to proceed. According to Levy & Ellis (2006), the benefits of this approach is that generic terms have a tendency to remain valid for a longer time as the literature evolves. We would therefore avoid the exclusion of relevant contributions due to our bias. Based on the ad-hoc search, a search algorithm including the keywords *mobile payments* and *m-commerce* was created:

"mobile payment*" AND (mcommerce OR m-commerce)

The algorithm search was performed in two databases, Scopus and ProQuest, and revealed a considerable amount of literature concerning MPSs. Given the novelty of MPSs, the number of literary contributions have increased the recent five years. We have therefore restricted our search to the time period of 2010-2015. After the removal of duplicates, 122 articles remained.

Step 2: Categorization of Initial Findings

The 122 articles were categorized according to their topics. The three most prominent topics were *adoption factors* (59 articles), *technical descriptions and proposals* (21 articles), and *analysis frameworks* (11 articles). The fact that only 11 articles concerned analysis frameworks further underpins that our thesis can make a valuable contribution to both theory and practitioners.

Step 3: Review of Existing Analysis Frameworks

Next, the full text of the 11 articles concerning frameworks were read by both authors. Of the 11 articles, 7 were eliminated due to being outside the scope of our research questions. Based on the remaining 4 articles we performed back-and forward tracking to find additional contributions that our initial search did not uncover. Additionally, we received some articles from colleagues of our supervisor in Telenor. The resulting set of 21 articles then formed the basis for the 4 contingency environments, as described in chapter 3.

Step 4: Discussing Service Design Dimensions With Practitioners

Once the contingency environments were in place, we commenced the research for relevant and important MPS design dimensions. As our literature review did not provide us with adequate amount of articles exploring service design dimensions, we had to seek advice from practitioners. Several practitioners gave us guidance on which dimensions were considered most important, primary through e-mail correspondence via our supervisor. The dimensions recurring most often were *end user functionality*, *technology*, and *interoperability*, as described in chapter 4.

We received several articles from the mentioned practitioners, as well as performing specific article searches when further information was needed to describe a dimension. In total, 10 articles formed the basis for the description, in addition to anecdotal evidence from existing MPSs.

2.2 Part 2: Testing the Framework

The goal of the second part of our thesis was to assess the proposed frameworks general applicability, by comparing its approach to service design with practitioners' approach.

The following description is based on the methodology framework presented by Yin (2013). It should be noted that before commencing the data collection, we prepared a case study protocol to guide us during our research. This protocol is attached in Appendix A.

2.2.1 Research Method

Our chosen research method is a qualitative, descriptive case study. According to Yin (2013), a case study is best suited for research questions of a *why* and *how* nature, when the researcher does not need to control the behavioral events, and when the focus is contemporary events. Further, a descriptive case study is "a case study whose purpose is to describe a phenomenon [...] in its real-world context" (Yin 2013, p. 238), and is typically used when answering *how* questions. This corresponds clearly with what we set out to achieve in this part of the thesis, and the method should therefore be well suited. Finally, Creswell (2003) explains that the case study falls within the qualitative research strategy.

2.2.2 Research Design

Unit of Analysis

According to Yin (2013), defining the unit of analysis consists of at least two steps, namely (1) defining the case, and (2) setting boundaries for the case. As we are investigating MPSs, a natural unit of analysis is the payment service itself. In the real-world, this translates to a firm or a firm's sub-unit providing the service. Due to time and resource constraints, and the researchers' inexperience with case studies, it was deemed that a single case was the most appropriate approach. This unit of analysis corresponds to a *holistic single-case design* as per Yin's definitions.

A natural boundary of the case is the firm or firm's sub-unit itself. However, as our framework described in part one of the thesis takes both the MPS's design and environmental factors into consideration, we clearly need to gather evidence about the case's context as well.

Telenor Banka as Case Company

As both our pre-thesis work and this thesis has been conducted in collaboration with Telenor, it seemed natural to choose a case company from within the Telenor Group. Telenor Group have several sub-units that provide MPSs, for example Telenor banka in Serbia and Easypaisa in Pakistan¹. Telenor banka was chosen for two reasons. First, it is a service that is located in a market that is not too distant from Norway, making information sufficiently accessible. Second, Telenor banka has a high adoption rate so far, exceeding 50.000 customers (Bakken & Finstad 2015), implying a successful service design. It must be noted that Telenor banka has traditional bank services in addition to their MPS, such as micro-loans for

¹Telenor Group (n.d.) Financial Services, <http://www.telenor.com/innovation/financial-services/>

handsets. When we refer to Telenor banka throughout this thesis, we specifically refer to Telenor banka's MPS.

2.2.3 Data Collection

The data for the second part of our thesis came from two sources, interviews and documentation. The selection of these was based on the description of six possible sources of data given by Yin (2013).

Interviews

As we chose a qualitative and descriptive research method, interviews stood out as a well suited data source. The flexibility in interviews allowed us to have open ended conversations with the MPSs practitioners, and adjust our questions or focus if the practitioners provided information that we had not foreseen.

Interviewees were selected in collaboration with our supervisor. Initially, we discussed what types of interviewees to look for. We decided on practitioners who had been part of the launch and implementation of new MPSs, preferably from different parts of the case company. After this, our supervisor contacted potential candidates to request interviews. Because of time limitations and difficulties with getting in touch with interviewees, we were forced to narrow down the list of potentials.

In addition to interviewing practitioners from the case firm Telenor banka, it was jointly concluded with our supervisor that it would be beneficial to conduct interviews with a few selected additional practitioners from Valyou and Telenor Group Financial Services. The goal of these interviews was not to perform a multi-case study, but rather to get perspectives from a different context than Telenor banka, in turn strengthening the external validity of our analysis. Additionally, after interviewing two Telenor banka employees, we were quite confident that we had the insights needed to understand the service design and external factors taken into consideration. The interviewees are presented in Table 2.1. The findings from the interviews with Gjersum and Grozeva were used to supplement our discussion in chapter 11.

Name	Position	Company
Marko Rankovic	Project and Portfolio Manager	Telenor banka
Aleksandar Smiljkovic	Strategy Expert	Telenor banka
Per Arvid Gjersum	Key Account Manager	Valyou
Mariana Penkova Grozeva	Senior Advisor	Telenor Group Financial Services

Table 2.1 – List of interviewees

The data gathering from the interviews followed a three step process:

1. **Conduct interview.** After the interviewee was contacted and a time confirmed, the interview was conducted via telephone or video conference calls. Calls seemed appropriate as (1) most interviewees were situated geographically far away from us, and (2) we had limited time available. In the beginning, our supervisor attended the interviews to guide us. The interviews were recorded, with the consent from all interviewees. Additionally, one of the researchers made written notes during the interview while the other led the conversation with the interviewee. We strived to conduct the interviews as open discussions with an overall line of inquiry according to the case study protocol (see Appendix A).

When we presented our framework to the interviewees as part of a introducing to the topics of discussion, the four contingency environments were simplified to *environment*. This was done to reduce the risk of bias in the interviewees' responses regarding what was taken into consideration when designing the MPSs. The only exception to this was the first interview, with Marko Rankovic, where the full framework was discussed openly.

2. **Summarize findings.** Afterwards, the findings from the interviews were summarized in written form. This was done through combining the written notes with the recording. The summary was reviewed by both authors to ensure the information was correct.
3. **Verification with interviewee.** The final step was to confirm the summary with the interviewee. The summary was sent to the interviewees, who could make comments and additional inputs if needed. The full summaries with the final notes from the interviewees are presented in chapter 9.

The whole interview process was performed iteratively, which means that we summarized and analyzed the findings from each interview before commencing the next. Hence, we adhered to the *collecting and analyzing data concurrently*-principle by Morse et al. (2002).

When using the findings from the interviews, they are cited as the interviewee's last name. For example, the findings from the interview with Marko Rankovic are referred to as (Rankovic).

Documentation

In addition to primary data in the form of interviews, we collected secondary data in the form of documentation describing the environment, or context, of a MPS in Serbia. This information was needed when examining what environmental factors affected MPS design. Sources for this category of information included amongst other white papers, consultancy reports, market surveys and news clippings. In accordance with the recommendation from Yin (2013), we strived to exercise care when using these electronic sources. One example of a measure taken

was consistently trying to locate original sources when coming across websites referring to findings from a report, market survey etc, thus verifying its validity. An overview of our sources is shown in Table 2.2 below.

Source type	Number of sources
Market report/white paper	31
Institution/company website	24
Published article	8
News clipping	7
Law	6
Conference paper	2
Total	78

Table 2.2 – Sources used in study of the Serbian MPS environment

2.2.4 Data Analysis

According to Yin (2013), there are four general strategies for analyzing case study evidence, one of which is *relying on theoretical propositions*. As part 1 of our thesis addresses the construction of a proposed theoretical framework, this seemed to be a fitting strategy to use.

Further, Yin highlights five techniques for analyzing case study evidence. Our chosen method is the *pattern matching* technique, which in our case implies mapping findings against our proposed framework. This proved to be a suited method for gaining satisfying overview of all findings, and also for comparing the different perspectives of the practitioners. More specifically, this method consisted of (1) mapping the market characteristics of Serbia to the contingency environments and factors, and (2) mapping the findings from the interviews to the framework's proposed service design dimensions. The latter included assessing which environmental factors influenced what design dimensions, and gave us an understanding of the practitioners' approaches to service design.

2.3 Part 3: Assessing the Bulgarian MPS Market

The goal of the third part of our thesis was to assess the attractiveness of a market Telenor is planing to enter with a new MPS, by applying the revised framework. This is a process that is somewhat similar to that of part two, and hence the methodology is similar as well. Nevertheless, we will give a brief summary of the methodology below.

2.3.1 Research Method and Design

As we needed to analyze the Bulgarian market according to our proposed framework's approach, the research method can be described as a descriptive case study. As we were not researching a specific firm or service, what corresponds most to a unit of analysis is the Bulgarian market for MPSs.

2.3.2 Data Collection

Similarly to part two, secondary sources of evidence were researched to understand the contingency environment. Specific sources were among other white papers, consultancy reports, market surveys and news clippings. Again, we made efforts to locate all the original sources of findings, following the advice given by Yin (2013) to avoid slant, incompleteness and bias. An overview of sources used is shown in Table 2.3 below.

Source type	Number of sources
Institution/company website	32
Market report/white paper	19
Law	6
News clipping	4
Total	61

Table 2.3 – Sources used in study of the Bulgarian MPS environment

2.3.3 Data Analysis

For the data analysis, we utilized the pattern matching technique to get an overview of all findings addressing the Bulgarian contingency environment. As we did not perform any interviews of practitioners with regards to the Bulgarian context, the pattern mapping had to be supplemented with our own assessment. This assessment consisted of applying the findings from the second part of the thesis to the market characteristics of Bulgaria.

2.4 Limitations to the Methodology

In the next subsections, a discussion of the four test outlined by Yin (2013) for evaluating the quality of research design is presented. This discussion is followed by an account of the methodological shortcomings.

2.4.1 Discussion of the Research Design's Quality

Construct Validity

Construct validity concerns the development of operational measures that correspond to the concepts being studied. We have taken two measures that especially addresses construct validity. First, we have based our proposed framework on previous research and interviews of practitioners, which should increase the validity of our measures. Second, we have used multiple sources of evidence, in line with Yin's recommendation. Also, the fact that we first constructed a proposed framework in part one, and performed an iterative interview process to initially verify the framework in part two, implies that we followed the principles for *thinking theoretically* and *theory development* put forth by Morse et al. (2002). Since we used multiple sources of evidence, and conducted all interviews together, two of Yin's triangulation principles have been utilized, namely *data* and *investigator* triangulation (p.120). Finally, we used different methodological approaches in the three parts of the thesis, making it easier for us to comply with the *methodological coherence* principle of Morse et al. (2002).

External Validity

External validity concerns the issue of whether a study's findings are generalizable to other cases and situations (Yin 2013). Our study's external validity is limited by among other a homogeneous distribution of interviewees, which will be further discussed below. To compensate for limitations related to external validity, two measures have been taken. First, basing our theoretical framework on several previous contributions implies that the study's theoretical foundation should be sufficiently grounded. Second, we generalize our findings to theoretical propositions, i.e. our proposed framework, and not to samples or populations. This is what Yin (2013) calls *analytic* generalization and recommends for descriptive case studies.

Reliability

Reliability issues are related to whether later researchers are able to follow our procedures and reach the same conclusions by conducting the same case study. Yin mentions two specific measures to overcome reliability issues, making a case study protocol and keeping a case study database. As previously mentioned, we created the case study protocol attached in Appendix A before commencing the data collection phase. We will not however, maintain an electronic case study database accessible for future researchers to inspect. The reason is that this master thesis is the concluding work of the authors' master's degree, whereafter the university does not keep a library of case study databases. A measure we have taken to overcome this issue is to provide as unbiased records as possible of our collected evidence in chapter 7, chapter 9 and chapter 13.

Internal validity is according to Yin mainly a concern for explanatory studies, and not for descriptive and exploratory studies. A discussion of this test is therefore

not provided.

2.4.2 Limited Amount of Relevant Previous Literature

As mentioned above, our review of the literature revealed that there were a limited number of articles presenting analysis frameworks for MPSs. As such, we did not eliminate any articles based on a journal screening, such as the SCImago Journal & Country Rank². The obvious limitation of this approach is that some of the articles may have been of lower academic standards. Nevertheless, we might also have lost valuable contributions, not least from the back-tracking process, if these contributions had been eliminated.

2.4.3 A Single Case Design

Our chosen research design is a single case study, and as mentioned above, the choice was motivated by among other by time constraints. We realize that this is a somewhat narrow foundation for making generalizations, even to theoretical propositions. A way to overcome this limitation would have been to perform a multiple-case study. A multiple-case design allows for a cross-case synthesis (Yin 2013), possibly yielding additional insights.

2.4.4 Time and Resource Restrictions Limiting Data Collection

This study has been performed by two researchers over a period of approximately five months, which has been a limiting factor for the time available for performing a thorough data collection. This time restriction is further underpinned by the fact that our pre-thesis work was related to another topic, and we therefore needed to spend a considerable time performing a new literature review. These limiting factors has resulted in the fact that we have not been able to interview more than 4 interviewees. To compensate for this limitation, we focused our interviews on the decisions made by practitioners regarding MPSs, and used secondary sources to understand the services' environment.

2.4.5 Homogeneous Distribution of Interviewees

As mentioned above, we included interviewees outside the immediate case unit to gain further perspective on the practitioners' approaches. However, all practitioners represent services in markets with many similarities, and as such our study faces the limitation of a homogeneous distribution of interviewees. Even though several of our interviewees claimed that the environmental factors should be universal across markets, this is a short coming to the study. Doing an equivalent study in other markets, e.g. by interviewing Easypaisa in Pakistan,

²SCImago Journal & Country Rank (2015) About us, <http://www.scimagojr.com/>

therefore represents a possibility for further research.

In addition to interviewing practitioners with a MNO perspective, it could have been useful to interview practitioners from other relevant industries. Examples of such are primarily banking and fintech industries.

2.4.6 Difficulty of Verifying Secondary Electronic Data Sources

As mentioned, we used several secondary electronic data sources during the study, especially when collecting information on the MPS environments in Serbia and Bulgaria. Even though we strived to locate and verify the original sources, this was not always possible. As such, this may have limited the analysis of the environments. The limitation could have been overcome by for example interviewing an industry or market expert, enabling data triangulation.

2.4.7 Limitations Related to Subjectivity and Reliability

As mentioned above, reliability issues are related to whether other researchers are able to recreate the same conclusions by following our procedures and conducting the same case study. In relation to this, we would like to highlight three limitations. The first is concerning our discussions with practitioners regarding the selection of service design dimensions. We had limited knowledge about the topic at the time, and were only partially able to critically assess the practitioners' input. The sample of practitioners used in the process was also somewhat limited. Second, our documentation collection regarding the Serbian and Bulgarian MPS environments represents a limitation. This is because the documentation was collected through numerous sporadic searches online that did not follow a specific procedure. The third limitation is related to the data analysis, as described above. The analysis followed Yin (2013)'s pattern matching technique, but nevertheless required our subjective assessment, which is hard to explicitly account for in a methodology chapter. All of these limitations reduce the reliability of our study, and therefore also other researchers' ability to replicate our study.

An additional discussion of non-methodology related limitations of the study is provided in chapter 17.

Part I

Constructing a Framework for Analysis

Introduction to Part One

This first part of the master thesis will present the reader to the proposed framework for analysing MPS design. In our attempt to build the framework, we rely on existing theories and discussions with selected practitioners.

Our framework consists of two main parts: (1) a set of four environments encompassing (2) a MPS design, as shown in Figure 2.2. The four environments are considered to constitute the MPS's context, and are based on contingency theory. Contingency theory is a well established theory within the field of strategy, and as such provides a solid foundation for our framework.

The second part of our framework is a conceptualization of MPSs as a set of service design dimensions. Due to the time and resource limitations of a master thesis, we have found it necessary to limit our analysis to three dimensions: (1) end user functionality, (2) technology and (3) interoperability. It is important to note that several other dimensions exist, such as business model and ownership structure. Our set of dimensions can thus be considered a subset of all possible dimensions.

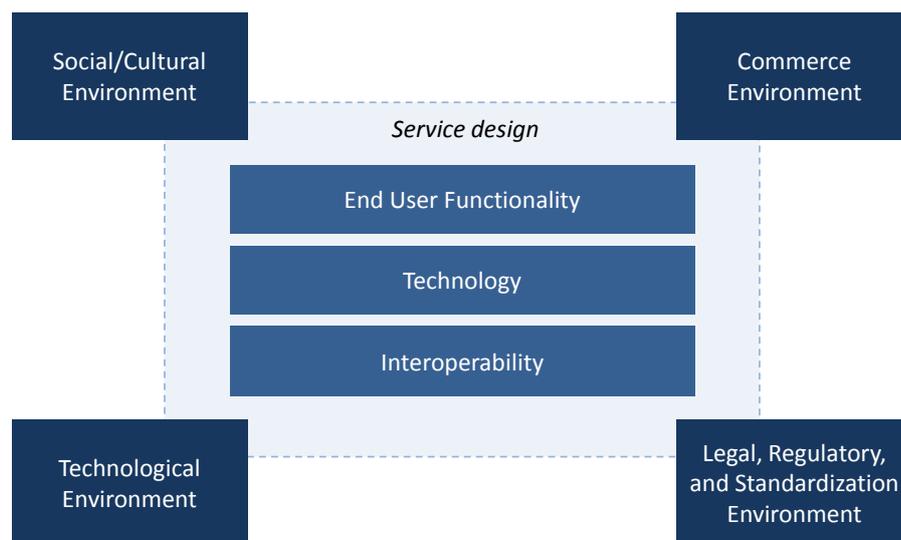


Figure 2.2 – The proposed framework for analysis

We also find it necessary to point out that the proposed framework is at an early stage. It does not attempt to provide practitioners with a comprehensive decision tool for designing their MPSs. Rather, it provides a structured approach to performing a screening of potential service designs in a specific market context. As a note, we take a viable service design option to be an option that can be implemented without significant limitations in the market at the time of analysis or in the near future.

Part one is structured as the following. First, the contingency environments are presented in detail in chapter 3. Next, chapter 4 provides a presentation of the three service design dimensions. Finally, chapter 5 explains how the framework is to be applied.

Chapter 3

Mobile Payment Services Environment

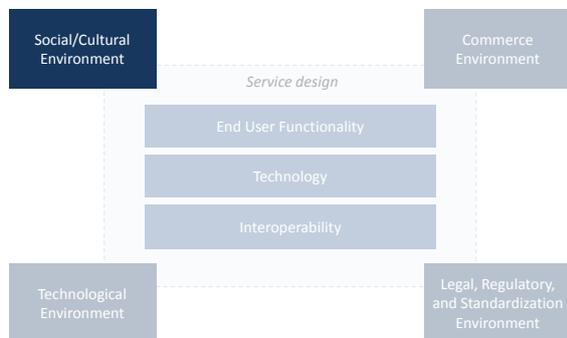
Researchers started to adopt a new direction in the 1960s, where a remarkably simple concept paved way for major advancements in organizational management studies. The new direction questioned whether there existed a single, best way to manage organizations. Instead, it emphasized how environmental and situational factors influenced organizational management (Zeithaml et al. 1988). This new direction is what we today know as Contingency Theory. Since then, contingency theory has been discussed by many authors, and is still an active research area.

Contingency factors can be seen as the context in which organizational decisions are made. Since these are external to the organization, they are for the most part beyond the reach and control of the organization. In spite of this it is necessary for managers to carefully consider the factors when making decisions (Dahlberg & Mallat 2002).

Three aspects make contingency theory appropriate in our analysis framework. First of all, it is well suited for analyzing strategies and the contexts in which these are made (Dahlberg et al. 2007). Secondly, as MPSs differ in systematic ways across markets (Dahlberg et al. 2007), contingency theory's environmental factors represent a practical way to take these differences into consideration. Finally, contingency theory applies especially to firms employing emergent technology, since firms need to take the fierce competition that characterizes these markets into consideration (Lee & Miller 1996).

Contingency theory generally does not specify which environmental factors are relevant for different industries. A key challenge is therefore to identify the appropriate factors. Through our review of the literature, we found 12 factors that can be categorized into 4 environments: the *social/cultural*, *commerce*, *technological*, and *legal, regulatory and standardization* environments. The latter will be referred to as the *legal* environment for simplicity.

3.1 Social/Cultural Environment



The social and cultural environment concern people's consumption habits and buying behavior, which in the end affects their need for new payment services (Dahlberg et al. 2007). Javalgi & Ramsey (2001) states that the social factors "embody a culture's fundamental organization, including its groups and institutions, its system of social infrastructure and associated relationships, and the process by which resources are distributed" (p. 381). Other elements

include language, education level, belief and values which influence people's behavior. We have divided the social/cultural environment into four factors: (1) *payment culture*, (2) *purchasing power and appreciation for leisure*, (3) *education level* and (4) *demographics*.

3.1.1 Payment Culture

Dahlberg et al. (2007) introduce three specific factors in their work, one of which is the payment culture. The payment culture can vary extensively across national borders and regions. Böhle & Krueger (2001) highlight three examples of widely different payment cultures: Japan with its cash-centric culture, Scandinavia with its account/giro-centric culture and USA and France with a wide adoption of cheques. The existing payment culture in a market will clearly have an impact on new MPSs, such as what interoperability a service should have with existing bank account systems and payment card schemes. Steinfield & Klein (1999) go on to say that the traditions inherent in the culture not only affect adoption rate, but also the degree to which a certain business model will succeed or not. An example will illustrate this: In Norway, the merchants pay the payment card scheme fees. When new mobile payment system, such as mCASH, transfer this economic burden to the customers for their P2P-transfer service¹, it might have a profound impact on the customers' willingness to use the service.

Another important aspect is the presence of already adopted payment solutions in the market. This could be both mobile payment systems and other e-commerce solutions. It seems reasonable to believe that if consumers have adopted for example online shopping, the threshold for adopting mobile payment solutions could be somewhat lowered. Related to this, the general attitude towards electronic payment solutions can affect the adoption rate significantly. In some markets, consumers might be sceptical towards new solutions, as they have a fear

¹mCASH (2015) Hva koster det å bruke mCASH (priser), <http://help.mca.sh/hc/no/articles/200417012>

of losing their funds to fraudulent solutions (Di Pietro et al. 2005). The impact of existing mobile payment systems in the market will be further discussed under the commerce environment in section 3.2.

3.1.2 Purchasing Power and Appreciation for Leisure

Consumers' appreciation for leisure has a significant impact on the demand for new mobile payment systems Dahlberg et al. (2007). The more developed a country is, and the higher the purchasing power, the more opportunity the people have to free up time and money for leisure activities. Purchasing power will also affect the degree to which people can afford smartphones that enable MPSs. These two factors therefore significantly affect the chance of success for new mobile payment systems.

In addition to effects of purchasing power and appreciation for leisure, more general economic preferences of consumers must be taken into consideration, such as price sensitivity. For example, in some Asian markets consumers tend to be price sensitive with regards to telecommunication services, and can therefore switch SIM-cards on a daily basis (n.d.). This will clearly affect at least the technical aspect of the MPSs, with regards to the type of secure element and other security measures.

3.1.3 Education Level

Education is found to be an important characteristic which explains consumer behavior in general, as well as abilities and desires to adopt new technological innovations (Venkatesh et al. 2003, Dahlberg & Oorni 2007). Education level is a somewhat broad term, and can mean anything from rudimentary reading and writing skills, to higher educational degrees. Yap & Hii (2009) argue that college students are more likely to adopt new technologies because of their high education level.

An example from Telenor will further shed light on the importance of a population's education level. Telenor's mobile network operator in Thailand, dtac, is working to connect the unconnected part of the population to the internet². The least educated part of the population are illiterate, with the result that dtac must design their interface much more based on icons and non-textual elements.

3.1.4 Demographics

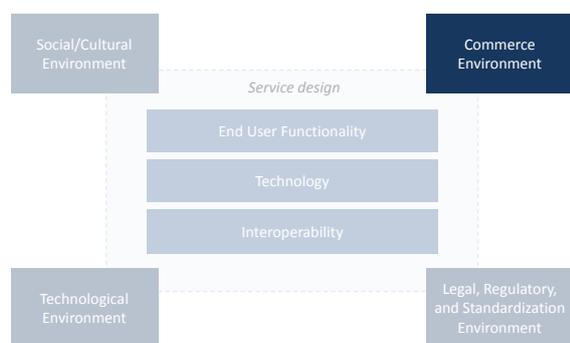
Jayawardhena & Foley (2000) highlight the impact demographic trends have on the kind of products and services that businesses provide, and how they deliver them.

²Lecture at NTNU by Per Helmersen 23.09.2014 and Telenor Group (n.d) Telenor drives mobile internet adoption across Asia, <http://www.telenor.com/media/articles/2014/telenor-drives-mobile-internet-adoption-across-asia/>

Jayawardhena & Foley argue that when the number of young people entering the workforce steadily declines, the need for services supporting financial self-reliance increases. A demand which in turn can be addressed by new innovative MPSs. The demographic changes observed around the world therefore clearly have to be taken into account when making decisions regarding new MPSs.

Dahlberg et al. (2007) also propose that the degree of mobility of people affects adoption of MPSs. The mobility of people varies from region to region, with developed countries having considerably higher mobility. When people are more mobile, and perhaps work in other countries, MPSs must address the need for international interoperability.

3.2 Commerce Environment



The commerce environment includes factors concerning availability, convenience, and quality of supporting services such as banks and telecommunication providers (Javalgi & Ramsey 2001). Dahlberg et al. (2007) expand beyond this and includes "the development of the Internet and mobile networks into commercial channels [...]" (p. 6). The three factors within the commerce environment are the (1) *financial services infrastructure*, (2) *telecommunication infrastructure* and (3) *supporting industries*.

3.2.1 Financial Services Infrastructure

The financial services industry and infrastructure varies widely from country to country. This includes, but is not restricted to, the prevalence of banks and bank accounts, online banking services, payment card schemes and existing mobile payment solutions. In addition to the existence of these services, their automation and self-service orientation is of importance (Dahlberg et al. 2007).

Dahlberg et al. also discuss the effects of whether a market is bank-centric or market-centric, i.e. how dominant the banks' role are. Banks have a dominating role in many markets, making the entry of new and small players challenging. The dominance of the banks depends on industry consolidation and the degree of collaboration between banks.

The existence of other MPSs in a market can have two effects on new services. First, it can have raised the awareness of and trust in these systems, possibly simplifying the introduction of new services. Secondly, existing solutions might have a high market share, so that most customers of a new service have to come at the expense

of existing services. This can obviously make the introduction of new service more challenging.

Existing payment card schemes, such as Visa and MasterCard also have an effect on the introduction of new MPSs. If one or more well established and widespread schemes exist, a new service can use these to increase the trust in the service and speed up its adoption. (Trust will increase because customers are familiar with the existing schemes, and adoption will speed up because the new payment services does not have to connect to a cumbersome country-specific bank account system). This has been the preferred approach of many new MPSs today, such as Facebook's P2P transfer³, Snapcash⁴, and Apple Pay⁵.

In addition to specific existing services and commercial infrastructure, the existence of national infrastructure is important to take into consideration. Examples of national infrastructure are national banks, bank consortia, automated clearing houses (ACHs⁶), and other country-proprietary systems. An example of the latter is Norway's BankAxept, a payment card scheme collectively established by the banks, which has a remarkably high penetration rate⁷. The type of transfers supported and number of participants connected can obviously vary from country to country, but the existence of such a system can considerably ease and speed up the introduction of a new MPSs.

The share of unbanked consumers in a market also affects the potential for new MPSs. In many parts of the world, such as Africa and some parts of Asia, a significant proportion of the population does not have access to basic banking services, but rather rely on cash for their financial needs. MPSs can therefore address an unmet fundamental banking need in such countries.

3.2.2 Telecommunication Infrastructure

The second factor within the commercial environment is the telecommunication infrastructure. Within this factor, the main concern is the extent of established mobile data communication networks, such as 3G and LTE networks. It is first and foremost the wireless infrastructure that affects the mobile phone users ability to use their phones for payments. However, fixed line infrastructure might be the most relevant for the merchant side (connecting payment terminals to the rest of the payment infrastructure). The degree of industry consolidation and the industry's ability to turn the mobile networks into commercial channels are other important aspects to consider, according to Dahlberg et al. (2007).

³Facebook (2015) Send money to friends in messenger, <http://newsroom.fb.com/news/2015/03/send-money-to-friends-in-messenger/>

⁴Snapchat (2014) Introducing Snapcash, <http://blog.snapchat.com/post/102895720555/introducing-snapcash>

⁵Apple (n.d) Apple-Pay, <http://www.apple.com/apple-pay/>

⁶See e.g. <https://www.nacha.org/>

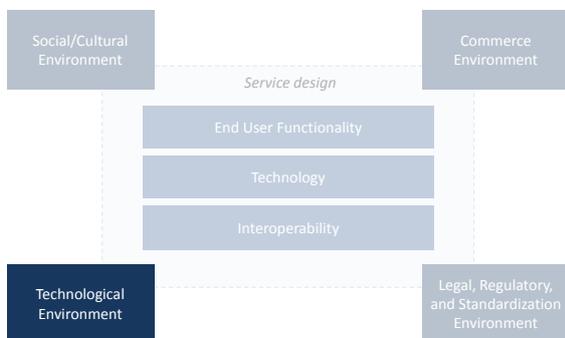
⁷bankaxept (2015) Om oss, <http://www.bankaxept.no/no/Hoved/om-oss/>

Dahlberg et al. (2007) further emphasizes how the increasing ubiquity of mobile computing increases the importance of the role of telecommunication operators as payment service providers. This view is supported by Hampe et al. (2000) who give several arguments for the increased role of telecommunication operators, two of which will be highlighted here. First of all, mobile phones are linked to individuals, which simplifies the identification and authorization process. Secondly, most mobile operators already have established systems for checking credit worthiness and billing that are familiar to the customers.

3.2.3 Supporting Industries

The existence of certain supporting industries can simplify and speed up the introduction of MPSs. Examples include industry consultancies and associations promoting collaboration across the MPS ecosystem. Another important example is the credit rating industry, which was briefly touched upon in the previous section. Telecom operators offering post-paid subscriptions will inevitably be preoccupied with the customers' solvency and payment history, and are therefore dependent on a systems for handling this.

3.3 Technological Environment



The third contingency environment is the technological environment, which importance has been emphasized by several authors, e.g. Javalgi & Ramsey (2001), Dahlberg & Mallat (2002) and Dahlberg et al. (2007). Javalgi & Ramsey (2001) underpin that there can exist large technological differences between markets, which is also confirmed by GSMA⁸. Dahlberg et al. (2007) highlights how technical development can enable "more reliable, user friendly,

versatile, and functionally rich mobile payment services" (p. 7). Zmijewska (2005) emphasizes how there exists some uncertainty concerning which technology will prevail in the market. We highlight three factors within the technological environment: (1) *handset technology*, (2) *merchant terminal technology* and (3) *identification and authorization systems*.

3.3.1 Handset Technology

Handset technology encompasses all technological aspects of mobile phones, for both smartphones and more traditional mobile phones. One of the major aspects

⁸GSMA (2015) GSMA Mobile Economy 2015, <http://www.gsmamobileeconomy.com/>

to consider is the penetration rates of mobile phones in general and smartphones specifically. As with many other factors, the penetration rate of phones can vary significantly between developed and developing countries⁹.

Beyond penetration rates, the mobile payment-enabling technologies within the handsets are of great importance. Many of the newest smartphones have support for NFC technology, but this is not necessarily the case for the majority of handsets in developing countries. Dahlberg et al. (2007) argue that mobile handset technology has a very short development cycle compared to communication networks technology. This implies that changes are happening rapidly. One of the challenges is therefore to agree on a common standard. The fact that many major technological players have established their own standards underpins this point.

The technology in the handset is going to have considerable effect on the level of security that can be reached. Many new smart phones come with support for biometric finger print identification, which according to Rankovic et al. (2013) represents the highest authentication level. However, in many developing countries these phones have very low penetration, and the mobile payment solutions must rely on other identification and authorization mechanisms.

3.3.2 Merchant Terminal Technology

Merchant terminal technology is equally important as handset technologies. To enable communication between consumers and merchants, the merchant terminal must support the same technical standards as the handset. To roll out new terminals supporting new technical standard takes considerable effort and time, so if a mobile payment solution is able to use the existing terminals, it could significantly speed up the adoption process. Just as with handset technology, there exists a myriad of standards and technologies within the area of merchant terminals, implying that the standardization challenge is just as predominant within this factor. Even though MPSs encompass more than just POS transactions, it is undoubtedly one of the main application areas, underpinning the factor's importance.

3.3.3 Identification and Authorization Systems

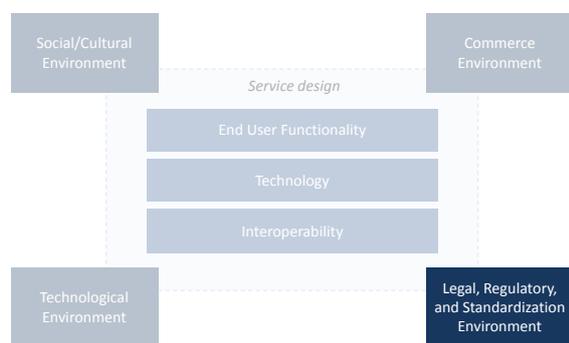
Di Pietro et al. (2005) describe how the incidence of cyber crimes has increased significantly. Naturally, the risk of fraud can reduce consumers' confidence in mobile payment systems. The choice of a proven identification and authentication scheme therefore is of great importance to new mobile payment systems.

It is possible to steal a mobile device just as a credit card. Additional authentication measures beyond simple hardware possession should therefore be in place

⁹GSM (2015) GSM Mobile Economy 2015, <http://www.gsmamobileeconomy.com/>

to address consumers' security concerns. The ease with which this can be implemented varies greatly from country to country. In Norway, all major banks have united themselves around the BankID authentication solution¹⁰, which is a turn-key solution that can be adopted quickly. In most other markets, however, such solutions do not exist.

3.4 Legal, Regulatory, and Standardization Environment



The legal environment concerns regulations, jurisdictions and other norms that mobile payment solutions need to comply with. These factors can both boost the development of new services, as well as hinder the development (Dahlberg et al. 2007). Karnouskos et al. (2004) also emphasize that the legal framework can hinder development of cross-country payment services, which is underpinned by the fact that almost all existing solutions target

a solely local market. We address two factors within this environment: (1) *National and international regulation* and (2) *standardization*.

3.4.1 National and International Regulation

Several authors have discussed how cross-border mobile transactions can be very complex to facilitate due to laws and regulations (Javalgi & Ramsey 2001, Dahlberg et al. 2007). At the same time, the authors also highlight how new efforts from for example the European Commission can unify regulation and simplify the implementation of new cross-border MPSs.

As MPSs often involve players from several industries (e.g. banks and MNOs), there are several regulation regimes to take into consideration. And even though regulation of these industries have become less complex in the later years (Jayawardhena & Foley 2000), compliance still requires a considerable effort. Beyond the direct industry regulation, one of the biggest concerns deal with privacy issues, according to Javalgi & Ramsey (2001). Many countries have strict regulation on how personal information can be used by commercial operators. This obviously has implications for MPS operators who's business model is based on utilizing behavioral data, such as mCASH¹¹.

¹⁰bankID (n.d) Om oss, <https://www.bankid.no/Om-oss/>

¹¹According to mCASH COO Anders Nicolai Bakke at "Betalingformidling 2015"

Member countries of the EU have to deal with transnational laws in addition to their own, as mentioned above. An example of this kind of law is the upcoming update to EU's Payment Services Directive, named PSD2. The implications of the new regulation is that third party players are allowed to initiate transactions from customer's bank accounts. This has the potential to degrade banks to commodity providers if they are not able to innovate as fast as new entrants¹².

Firms looking to establish new MPSs therefore have to consider a wide array of regulations, ranging from banking license related laws to personal privacy regulations. As most of these regulations are relatively steady over time and cannot be affected by management, they set clear limitations on what firms can do. For example, when Telenor set out to launch a MPS in Serbia, they needed to obtain a banking license because of regulations. Telenor chose to solve this challenge by acquiring an existing bank, KBC Banka¹³.

3.4.2 Standardization

Karnouskos et al. (2004) touches upon how the absence of standards in mobile telecom specifications prevent interoperability between services. This lack of interoperability can have an effect on the adoption rate of new MPSs, as the perceived usefulness can be limited.

As a result of the absence of standards, several standardization consortia have been established (Karnouskos et al. 2004, Lim 2005, Dahlberg et al. 2007). These consortia are usually oriented towards one of the two main types of players in the MPS industry, MNOs and banks (Lim 2005). Some examples of organizations are GSMA (oriented towards MNOs), Mobey Forum (oriented towards banks), and ISO (cross industry-oriented) (Lim 2005, Karnouskos 2004).

Even though the efforts to standardize can be seen as a positive addition, the sheer number of organizations trying to achieve standardization can make the choice of standard difficult.

In conclusion, the four contingency environments can be decomposed into 12 contingency factors. The environments and factors are summarized in Figure 3.1 below.

¹²Tom Hay at "Betalingssformidling 2015" conference and <http://www.finextra.com/blogs/fullblog.aspx?blogid=10303>

¹³Telenor group (n.d) Telenor opens Serbia's most available bank, <http://www.telenor.com/media/press-releases/2014/telenor-opens-serbias-most-available-bank/>

Social/Cultural Environment (4)	Commerce Environment (3)	Technological Environment (3)	Legal, Regulatory, and Standardization Environment (2)
<ul style="list-style-type: none">• Payment culture• Purchasing power and appreciation for leisure• Education level• Demographic composition	<ul style="list-style-type: none">• Financial services infrastructure• Telecommunication infrastructure• Supporting industries	<ul style="list-style-type: none">• Handset technology• Merchant terminal technology• Identification and authorization systems	<ul style="list-style-type: none">• National and international regulation• Standardization

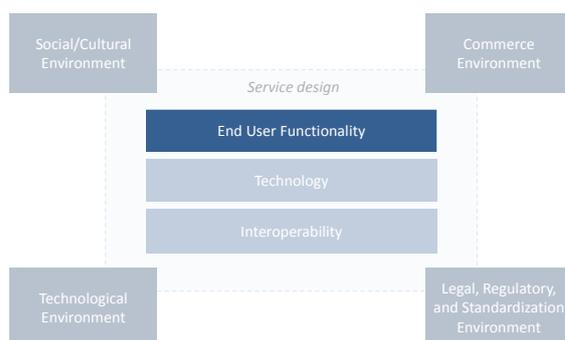
Figure 3.1 – Four environments and 12 factors summarized

Chapter 4

Mobile Payment Service Design

In this chapter we will introduce the three chosen MPS design dimensions and related theoretical contributions. As mentioned in the introduction to this part of thesis, the service design dimensions represent a conceptualization of MPSs. The selection of dimensions was based on existing literature and discussions with practitioners, and the resulting dimensions are (1) *end user functionality*, (2) *technology*, and (3) *interoperability*. It is important to note that other dimensions exist, that also could have been included. Examples of such are *business model* and *ownership structure*. As such, our three chosen dimensions can be considered a subset of all possible dimensions. In the following three sections, each dimension will be presented in detail.

4.1 End User Functionality



The end user functionality dimension concerns the various functionalities MPS providers can offer their customers. This can encompass a vast amount of services, ranging from those that have been offered by banks for many years, to new and innovative services. In line with our research scope, the relevant services are *payment* services that can be offered through mobile channels. Several authors have discussed services that can be offered, e.g.

Labrou et al. (2004) and Lacmanovic et al. (2012). We will now give a short summary of these along with examples of each.

4.1.1 P2P Payments

P2P payments are transfers of funds between two consumers. A typical use case is transfer of money between friends after enjoying a meal at a restaurant. Transfers can be both domestic and international (Labrou et al. 2004). According to Bradford et al. (2012), three models of P2P payments have emerged:

- **Nonbank-centric** A nonbank intermediary transfers funds from one consumer to another. PayPal¹ is an example of such an intermediary.
- **Bank-centric:** Banks transfer the funds from the account of the sender to the account of the receiver. Telenor banka is an example of a MPS that has bank-centric P2P payments.
- **Card-centric:** Payments are processed entirely over a card scheme network, such as Visa. The new Norwegian service Vipps² is an example of a service with card-centric model.

P2P payments are offered by most MPSs, and several large social media firms have also entered this business area. Two examples are Facebook³ and Snapcash⁴.

4.1.2 POS Payments

POS payments are payments where a mobile phone is used to pay for goods or services at a POS terminal. Typical use cases are grocery shopping, taxis and restaurants. Mobile POS payments are becoming increasingly popular among consumers⁵, and many banks and MNOs are launching such services. An example of such a service in Norway is Valyou⁶. Lately several non-traditional players have also entering this market, such as Apple⁷ and Google⁸.

Labrou et al. (2004) have emphasized how mobile POS payment is the most complex end user functionality to implement, from a business perspective. This is because it often requires integration with the stores' back-end IT systems.

¹PayPal (2015) Send Money, Transfer Money or Pay Online with PayPal, <https://www.paypal.com/us/webapps/mpp/send-money-online>

²Vipps (n.d.) Vipps - send penger fra mobilen, <https://www.vipps.no/>

³Facebook (2015) Send Money to Friends in Messenger <http://newsroom.fb.com/news/2015/03/send-money-to-friends-in-messenger/>

⁴Snapchat (2014) Introducing Snapcash <http://blog.snapchat.com/post/102895720555/introducing-snapcash>

⁵eMarketer (2014) Consumers Bullish on a Mobile Payments Future, <http://www.emarketer.com/Article/Consumers-Bullish-on-Mobile-Payments-Future/1011265>

⁶Valyou (2015) Valyou for business, <http://valyou.no/en/valyou-for-business/>

⁷Apple (2015) Apple Pay, <https://www.apple.com/apple-pay/>

⁸The Verge (2015) <http://www.theverge.com/2015/3/2/8131861/android-pay-google-mwc>

4.1.3 Bill Payments

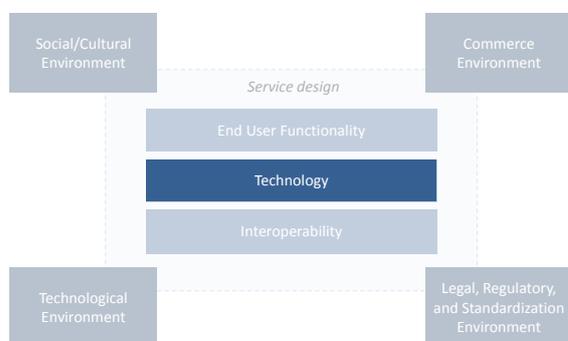
Closely related to P2P payments one finds bill payments. The main difference is that the receiver is a business instead of a consumer. The transfer is in most cases performed by filling in the receiver's bank account number and the amount to be transferred, alongside a customer identification number. Bill payments can be both domestic and international.

Several operators have started to offer a service where the bill can be sent automatically to the payer's bank, and the transaction authorized by a single click. An example is the well established Norwegian eFaktura⁹.

4.1.4 Web Store-Front Payments

Web store-front payments is a service where consumers can pay for goods or services at Internet stores. After the user has chosen the items to purchase, the payment is completed with a mobile phone (Labrou et al. 2004). mCASH is an example of such a service in Norway, where consumers can scan a QR code in the web store checkout. The transaction is then authorized directly on the phone¹⁰.

4.2 Technology



The technology dimension of MPS design can include many subdimensions, but in line with the scope of our thesis, we will address the following: the technology enabling the user's hand-held device to communicate with either a (1) POS terminal, (2) another user's device, or (3) the MPS's servers. As such, both proximity and remote communication technologies are discussed. Figure 4.1 illustrates the scope.

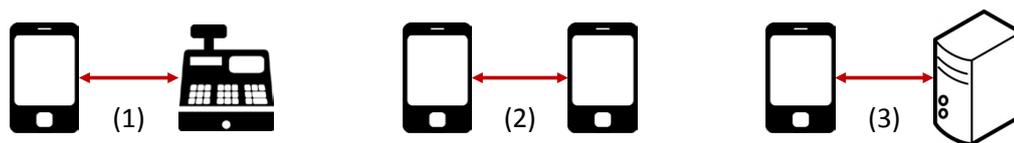


Figure 4.1 – Scope of the technology dimension

⁹Nets (n.d.) Faktura rett i nettbanken, <http://www.efaktura.no/Privat/om-eFaktura/Pages/default.aspx>

¹⁰mCASH (2015) Betaling på nett, <http://www.efaktura.no/Privat/om-eFaktura/Pages/default.aspx>

4.2.1 Near Field Communication

Our initial literature review uncovered that Near Field Communication (NFC) is a frequently returning topic in mobile payment theory. Among others, Madlmayr et al. (2014) explain how NFC is a proximity radio frequency-based technology which allows data transfers within a range of 10 cm. Several services use NFC, e.g. Valyou and Apple Pay.

4.2.2 Barcodes and Quick Response Codes

Barcodes and Quick Response (QR) codes are other widely adopted technologies which consist of machine readable patterns through which information can be transferred. If one is to transfer credentials for payment purposes, these can be encrypted within the patterns or stored in the cloud (Hayashi & Bradford 2014). Two examples of payment service providers who use this technology are mCASH and CurrentC¹¹.

4.2.3 Cloud Technology

According to Hayashi & Bradford (2014), cloud technology uses remotely located servers for storing and processing data. This removes limitations of local data storage and processing capacity, as well as reduces the upfront investments that have to be made by the merchants. To maintain sufficient security, the solution uses encryption and tokenization. Examples of services that use this technology are Paypal and Square Wallet (Hayashi & Bradford 2014).

4.2.4 SMS

SMS has existed for a long time and has found its use as a supporting technology for mobile payments (Valcourt et al. 2005). SMS based services can generally take two forms. First, as a premium rate short message, where the user sends a message to a specific phone number which charges the user a higher price than usual messages. An example of such a service is Strex¹². Second, SMS can be used as a carrier of payment transaction data, basically initiating and/or authorizing the transactions. M-Pesa is an example of such a service¹³.

Ali et al. (2014) lists other technologies in addition to those mentioned above (RFID, Bluetooth, infrared), but also acknowledges that these technologies have

¹¹CurrentC (2015) <http://currentc.com/>

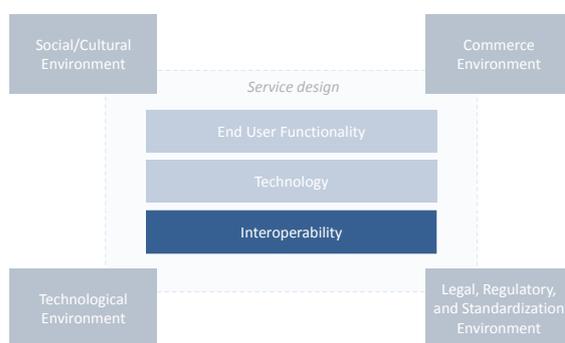
¹²Strex (n.d.) Trygg mobilbetaling, <https://strex.no/mobilbetaling>

¹³M-Pesa (2015) Send (Transfer) Money, <http://www.safaricom.co.ke/personal/m-pesa/m-pesa-services/m-pesa-person-to-person/send-transfer-money>

some drawbacks regarding either functionality or performance. In addition, these technologies are not as widespread as the above. For these two reasons, other technologies will not be discussed any further.

Our four chosen technologies can be classified as either proximity or remote technologies. *NFC* and *barcodes and QR codes* are classified as proximity technologies, while *cloud technology* and *SMS* are classified as remote technologies.

4.3 Interoperability



Interoperability is the third dimension of our service design. In difference to the two first dimensions, interoperability does not manifest itself in equally clear options. The reason for this is the fact that interoperability options vary considerably with the market context. We will however, give a presentation of the elements making up the ecosystem of an interoperable service, and how the presence or absence of elements affect what interoperability options are

available. First, a few words about interoperability in general are in order.

Interoperability in payments systems has been researched extensively the recent years, e.g. by Benson & Loftesness (2012), Mantri & Feng (2011) and Männle (2003). A wide body of research supports its importance for the success of MPSs, and both Mantri & Feng (2011) and Männle (2003) suggest that the the main reason of MPSs failures till date is that systems do not work together. Clark & Gamner (2014) define interoperability as enabling customers to perform money transfers between two accounts at different mobile money schemes, or between an account at a mobile money scheme and a regular bank account.

Benson & Loftesness (2012) suggest that increased interoperability in payment systems benefit all participants in the ecosystem. First, consumers and merchants find it easier to make and accept payments. Second, the MPS operators and the supporting industry gain revenue from payments in interoperable systems that they otherwise would miss out on (Benson & Loftesness 2012). Despite this, a robust ecosystem of interoperability seldom comes into place on its own.

4.3.1 The Ecosystem of Interoperable Services

In the ecosystem of MPS, several parties can be involved in the provision of interoperability. Fundamental for all interoperable services are the presence of a *Mobile Money Operator* (MMO) operating the service and a *financial institution* holding customers' money (e.g. bank account). These can be two separate entities

(mobile operator and bank) or a unified entity (mobile bank). When describing the interoperability of a service, one is basically referring to how these parties jointly operate to provide a seamless payment service for the end-user. There are several ways for obtaining this, and some of these are examined by Clark & Gamner (2014) in their work on implementation methods for interoperability.

Clark & Gamner's possibilities for interoperability range from simple agreements between MMOs and financial institutions, to involving third party facilitators. The former and simplest approach is termed bilateral agreements, meaning that actors of the payment ecosystem are connected to each other through bilateral connections and agreements. To exemplify, customers of M-Pesa and MTN Mobile Money in East Africa will be able to transfer money to each other in the near future, following an agreement between the two companies¹⁴. See Figure 4.2 below. Both telecom operators and banks have considerable experience with building bilateral agreements for interoperability (Clark & Gamner 2014). The challenge with such a network is the increasing complexity following an increase in number of parties involved. Consequently, Clark & Gamner suggest other methods for interoperability including supporting infrastructure.

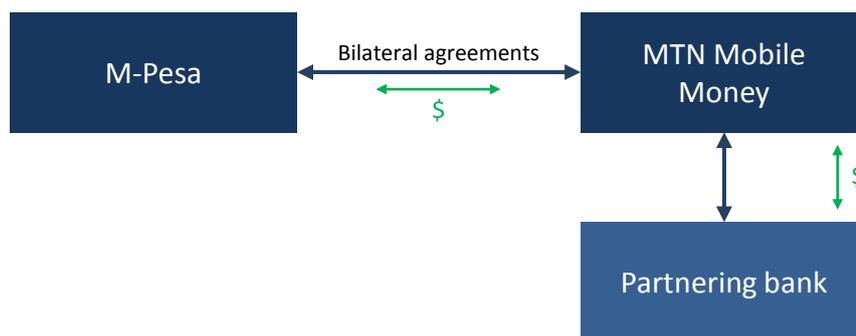


Figure 4.2 – Bilateral agreement between M-Pesa (mobile bank) and MTN Mobile Money (mobile operator and bank)

The supporting infrastructure used for interoperability includes among other processors and clearing houses (Clark & Gamner 2014). The former can take the form of a neutral or commercial single point switch which routes traffic between the MMOs and as such offers a single connection to the external financial infrastructure (see Figure 4.3). A single switch reduces the number of connections needed in the ecosystem, simplifying interoperability for participants. On the other hand, a new settlement approach and operational rules might be needed, increasing the complexity (Clark & Gamner 2014). Using commercial processors might be appropriate in cases where an existing organisation runs a widely distributed payment network in the market (e.g an ATM network operator). However, in undeveloped markets, the solution might be time consuming and costly to implement (Clark & Gamner 2014). The cost must be carried by the MMO

¹⁴Mobilepaymentstoday (2015) M-Pesa, MTN Mobile Money align services in Africa, <http://www.mobilepaymentstoday.com/news/m-pesa-mtn-mobile-money-align-services-in-africa/>

or the end user. The MMOs might not have the financial strength to carry the cost, and moving the cost to the end user is expected to significantly deteriorate the attractiveness of the service (Clark & Gamner 2014).

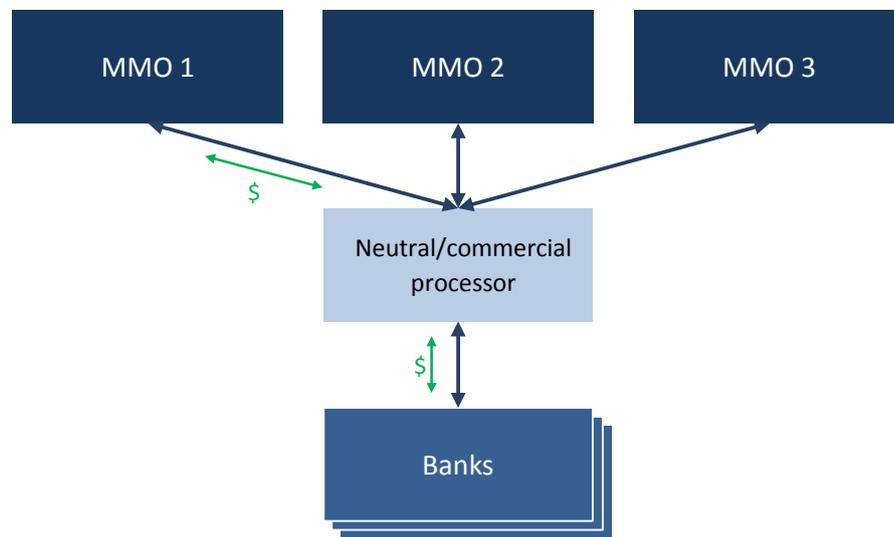


Figure 4.3 – Processor serving as a single point switch between MMOs and the financial infrastructure

Clark & Gamner also explore options where MMOs connect directly to the inter-bank clearing system (see Figure 4.4). This way, the MMO would submit transactions directly without using a partner bank. This enables all transactions, including e-money transactions, to be passed through the clearing house (Clark & Gamner 2014). However, e-money is not compatible with current rules and interfaces for most clearing houses, and changing this would require agreements with the banking sector and central banks (Clark & Gamner 2014).

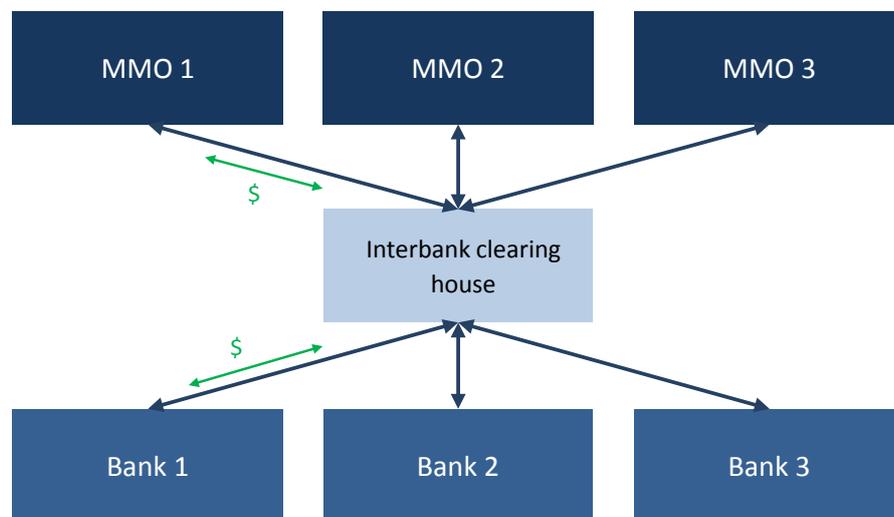


Figure 4.4 – Interbank clearing system connecting MMOs with the financial infrastructure

As demonstrated by these examples, interoperability in payment services can be achieved by different means and configurations. Clark & Gamner (2014) suggest that practitioners base their choice of interoperability option on the market context, which is in line with our contingency environments.

Our three chosen service design dimensions and their corresponding options are summarized below in Figure 4.5. The contingency factors will guide the practitioners to what options are viable in a given market context. The use of the framework is discussed in the next chapter.

End user functionality	P2P	POS	Bill payments	Web store-front
Technology	NFC	Barcodes/QR	Cloud technology	SMS
Interoperability*	Bilateral agreements	Single-point switch	Commercial processor	ACH-connection

Figure 4.5 – Service design dimensions and corresponding options

* Other interoperability options can be available given specific market contexts.

Chapter 5

Using the Framework

This chapter will describe the procedure for using our proposed framework. We would like to remind the reader that the purpose of our framework is to provide practitioners with a structured approach to the screening of potential MPS designs in a given market context. The procedure is a two-step process as described in Figure 5.1 below.



Figure 5.1 – Two-step process for using the framework

Step 1: Gathering Information About Contingency Factors

In order to analyze which service designs are viable, practitioners have to perform an assessment of the contingency factors presented in our framework. The approach to this task may vary depending on the practitioner's available resources and previous experience. In any case, information about all 12 contingency factors should be gathered. The information can be collected from many sources, e.g. market surveys and interviews with market experts. Practitioners can also perform a desktop study and examine available consultant reports, statistical data etc. We advise practitioners to use a combination of these two options to acquire a thorough understanding of the environment.

To make an informed screening, the collected data should be summarized in a structured way so that all information can be grasped properly.

Step 2: Screening of Viable Design Options

Once an appropriate understanding of the contingency factors is attained, the screening can commence. The practitioner must make a subjective judgement of each contingency factor's impact on the design option. Each factor can have several types of impact on a design option: it can (1) be in favor of it, (2) disfavor it, (3) be a prerequisite to it, or (4) inflict no restrictions on it.

After all impacts on the options are assessed, they should be summarized so that a comparison of an option's viability can be made relative to the remaining options. This assessment will result in a subset of options that are most viable. As mentioned earlier, we take a viable service design option to be an option that can be implemented without significant limitations at the time of analysis or in the near future. It should also be noted that most options can be viable, given enough time and resources. But as most firms have limited amounts of both, it is necessary to narrow down the list of options to those most viable.

Given the fact that our framework merely represents a screening tool, practitioners must make the final decision regarding the MPS design based on a further in-depth analysis of the most viable options. Also, practitioners have the freedom to launch the MPS in a stepwise manner, by for example starting with one end user functionality and adding more as the customer base grows. These two points are not explored any further in our study.

Chapter 6

Concluding RQ1

This first part of our master thesis has aimed at answering our first research question:

RQ1 What is a suitable approach for analysing mobile payment services design?

To answer this RQ in a satisfying manner, we conducted a literature review supplemented by iterative discussions with practitioners. The process resulted in a analysis framework consisting of two main parts, as illustrated in Figure 2.2.

First, based on existing theory on MPSs, four contingency environments were identified, with several underlying factors within each environment. For simplicity, Table 6.1 summarizes the environments and factors.

Second, encompassed by the four contingency environments, MPSs are conceptualized as a set of service design dimensions. The three dimensions found to be most important are (1) *end user functionality*, (2) *technology*, and (3) *interoperability*. Within these dimensions, practitioners are faced with several options that may or may not be viable in a given market. The dimensions and the corresponding options are summarized in Table 6.2.

The contingency factors will guide practitioners to which options are viable, according to the procedure outlined in chapter 5.

We conclude that the proposed framework is a satisfactory answer to RQ1. The subsequent parts of our study will use the framework as a starting point, as we aim to provide an assessment of its general applicability in part two, and use it to analyze the Bulgarian MPS market's attractiveness for Telenor in part three.

Environment	Factor
Social/cultural	Payment culture Purchasing power and appreciation for leisure Education level Demographic composition
Commerce	Financial infrastructure Telecommunication infrastructure Supporting industries
Technological	Handset technology Merchant terminal technology Identification and authorization systems
Legal	National and international regulation Standardization

Table 6.1 – List of contingency environments and factors

Dimension	Option
End user functionality	P2P POS Bill payments Web store-front
Technology	NFC Barcodes/QR Cloud technology SMS
Interoperability	Bilateral agreements Single-point switch Commercial processor ACH-connection <i>Other options can be available given market context</i>

Table 6.2 – List of design dimensions and corresponding options

Part II

Testing the Framework

Introduction to Part Two

In part two of this thesis we will address RQ2 through a three step process. First, in chapter 8, an analysis of potential MPS designs for the Serbian market is provided. The analysis is structured according to our three proposed design dimensions, and takes data about the Serbian environment from chapter 7 into consideration. Second, a classification of Telenor banka's service design is presented in chapter 10. This classification is based on the data gathered through the interviews summarized in chapter 9. Third, chapter 11 provides a thorough discussion of our findings and implications for the proposed framework. Chapter 12 concludes part two and answers RQ2.

Chapter 7 and chapter 9 gives the reader a comprehensive overview of the empirical data we have collected. Both chapters present the data in a purely objective manner and are intended for those particularly interested in the background supporting our analysis.

Chapter 7

Serbian MPS Environment

In this chapter, we will present our findings from the desktop study of the Serbian MPS environment. The findings will be presented according to the four contingency environments outlined in our proposed framework in chapter 3.

In retrospect, we see that not all of the listed findings directly influenced decisions on service design, as presented in the next chapter. However, we suggest all findings are important for an adequate description of the context for MPSs, so they are included in spite of this.

7.1 Social/Cultural Environment

7.1.1 Payment Culture

Cash and Check-Centricity

In 2013, about 80 % of all transactions in Serbia were carried out by cash or checks (Euromonitor 2014*b*). Payment cards are becoming increasingly popular, but of the six million payment card issued in 2013, merely 50 % were actively used (Euromonitor 2014*b*). Besides a hindering payment culture, Euromonitor (2014*b*) put forward several reasons for low adoption of payment cards. First, the general low purchasing power of the population. Second, consumers lack trust in payment cards in fear of fraud attempts. Third, people in Serbia generally like the feeling of having cash in their wallets. Fourth, there are extremely high interest rates on credit cards (23-33 % on an annual level). Additionally, Davidović & Simović (2013) argue how discounts given to cash payments only further limits the adoption.

Electronic payments in general are becoming popular, and according to Business Monitor International (2015*c*), half of payment orders in Serbia are now carried out electronically.

ATMs and other self-service terminals have become popular for paying bills, and several banks have therefore introduced this payment option at many locations

(Euromonitor 2014b).

Adoption of Existing Services

The Serbian e-commerce industry has grown significantly the latest years, with a 39 % growth from 2012 to 2013¹. Despite the high growth, in 2013, only 35 % of the population had used e-commerce, and less than 10 % Internet banking (RATEL 2014b, Statistical Office of the Republic of Serbia 2014).

Several telecom operators have started to offer bill payment via SMS, with close to 1 million users (Eaton 2014). Additionally, 21 banks claim to have a mobile banking service other than SMS-based notifications (Eaton 2014), but merely 50.000 consumers have been using mobile applications for making payments since 2011 (Euromonitor 2014b).

Eaton suggest that "the use of mobile banking in Serbia has yet to be widely adopted" (p. 16).

Attitudes to Financial Institutions

As mentioned above, some parts of the Serbian population fear being subjects to fraud attempts when using payment cards, and several authors claim that the typical Serbian consumer is mistrustful (Travica et al. 2007, Jošanov & Jošanov 2007). Reasons given are consumers' bad experience with bank's credit guarantees and retailers' compliance with consumer purchasing rights, following troublesome years for the economy the last decades.

According to Euromonitor (2014b), consumers are also sceptical to using payment cards when buying online, where only 25 % choose to use cards. The rest either transfer money by going to the bank, using postal orders, or pay with cash when the product arrives.

However, Jošanov & Jošanov (2007) suggest the trust of consumers is increasing, bolstered by a credit rating system that has improved significantly the recent year, becoming one of best systems in the world according to the World Bank (Simovic et al. 2009). Also, Jošanov & Jošanov mention that increasing regulation of black markets have eased the mistrust.

7.1.2 Purchasing Power and Appreciation for Leisure

Purchasing Power

Serbia is considered an upper-middle income economy in transition². Since the political reforms of 2000, Serbia has experienced fast economic growth (PWC

¹Ecommerce News (2014) Ecommerce Serbia grows, <http://ecommercenews.eu/e-commerce-serbia-grows-39-to-e70-4mln/>

²Santander Trade (2015) Serbia: General Presentation, <https://en.santandertrade.com/analyse-markets/serbia/general-presentation>

2013). Despite this, a study by GfK³ found that Serbians had a purchasing power approximately four times lower than the European average in 2013. Several neighboring countries, such as Hungary and Romania, had higher purchasing power per capita.

Approximately 9 % of the population are living below the poverty threshold (CIA 2013). However, the distribution of poverty is geographically uneven, with higher poverty rates in the rural areas than in the large cities (PWC 2013). There is also an unevenness between the North-West and the South-East, with the South-East being a more economically struggling region⁴.

The unemployment rate in Serbia was 16.8 % in the fourth quarter of 2014 (Statistical Office of the Republic of Serbia 2015a). It has been steadily decreasing the last years, down from 25.5 % in 2012 (National Bank of Serbia 2013a). However, according to PWC (2013), it is difficult to obtain accurate statistics on the unemployment rate because a significant proportion of the population works in the grey economy.

Appreciation for Leisure

Serbians have a strong demand for mobile multimedia services. Of their annual budget, Serbians on average spend 4,4 % on communications, in comparison to 4,5 % spent on recreation and culture (Statistical Office of the Republic of Serbia 2015b).

However, Business Monitor International (2015b) reports that there are less favorable consumer spending dynamics in play, as advanced services are not as high on consumers' list of priorities as previously estimated.

Price Sensitivity and Other Preferences

A survey of shoppers in CEE performed by INCOMA Research and GfK in 2006 revealed that approximately 16 % of Serbian shoppers fit within the category "Thrifty Shopper". This behavior is characterized by focus on price, especially on using various special offers and markdowns⁵. Serbian consumers are further characterized as having high brand awareness, low purchasing power and high price sensitivity⁶.

Travica et al. (2007) highlight how most of the Serbian consumer traditionally have been oriented towards national brands, with the exception of young consumer

³GfK (2013) GfK study shows uneven distribution of purchasing power across Europe, <http://www.gfk.com/news-and-events/press-room/press-releases/Pages/purchasing-power-europe-2013-14.aspx>

⁴GfK (2010) Purchasing power in Serbia , http://www.gfk-geomarketing.de/en/gfk_purchasing_power_serbia_2010.html

⁵kurzycz (2016) PRICE SENSITIVITY IN CENTRAL AND EASTERN EUROPE, <http://www.kurzy.cz/zpravvy/120901-cenova-citlivost-ve-stredni-a-vychodni-evrope-segmentace-zakazniku-ve-studii-spolecnosti-incoma/>

⁶Deutsche Systembau (n.d) Retail Parks Serbia, <http://www.deutsche-systembau.com/investments/investments-in-serbia/retail-parks-serbia/index.php>

groups that have a preference for international brands. The international brands may be perceived as a symbol of social status and wealth.

7.1.3 Education Level

Serbia has a fully developed education system at all levels (Travica et al. 2007). Technical studies have traditionally been very popular in Serbia, especially within the fields of electronics engineering. According to Statistical Office of the Republic of Serbia (2015b), 16 % of the population have achieved a degree from a college or university. Despite this, Serbia scores below average on international rankings (PISA⁷). Results in 2009 revealed that 15 year olds are performing below average in reading, mathematics and science literacy. In total, only about 2 % of the population are considered illiterate⁸.

According to RATEL (2014b), 100 % of students use Internet regularly. This high penetration rate among students has been consistently high since 2011.

7.1.4 Demographics

Demographic Composition

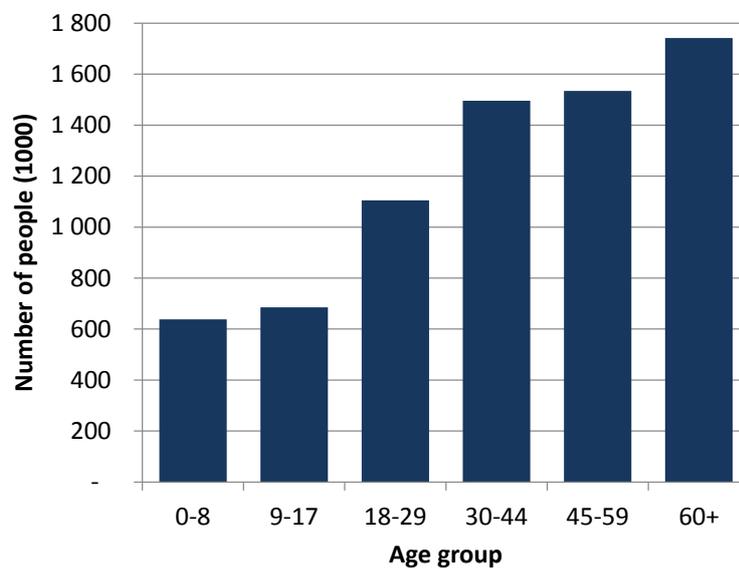


Figure 7.1 – Serbian demographic composition

The Serbian population is amongst the 10 oldest in the world⁹, and the composition is as shown in Figure 7.1 (Euromonitor 2014b). More over, the part of the population aged 60+ has been on a rise since 2000. It is the only part of the

⁷OECD (n.d) Pisa, <http://www.oecd.org/pisa/>

⁸The World Bank (2013) Databank Serbia, <http://data.worldbank.org/country/serbia>

⁹InSerbia (2014) Demographics In Serbia, <http://inserbia.info/today/2013/03/demographics/>

population that is growing, due to low birth rates and aging of the existing population.

Labour Mobility

Labour mobility within Serbia is very low, mainly because of high costs associated with living outside the place of permanent residence, in addition to cultural implications (Gligorov et al. 2011). In contrast, outward migration is very high, and according to Gligorov et al. remittances represent an important share of the GDP (7,6 % in 2011¹⁰). A large portion of this migration is by highly educated people, which constitutes a brain drain for Serbia.

Several measures have made outward migration easier for citizens of Serbia. Firstly, the citizens have since December 2009 been allowed to travel to countries of the Schengen zone without a visa (Sasikumar 2013). Secondly, government agreements with other countries regarding exchange of experts have facilitated mobility of students, recent graduates and youth experts¹¹. Thirdly, the advancements of electronic money transfer services have enabled expats abroad to move money to people living in Serbia, and conversely the other way¹².

7.2 Commerce Environment

7.2.1 Financial Services Infrastructure

Industry Consolidation

Recovering from major setbacks by the recent financial crisis, financial sector stability of Serbia is steadily improving, including restructuring and privatisation of commercial banks (Business Monitor International 2015c). As of today, the banking system of Serbia consists of the central bank, the National Bank of Serbia (NBS), and 30 licensed commercial banks (National Bank of Serbia 2015).

An empirical examination of Serbian banks conducted by Miljković et al. (2013) conclude that the Serbian banking sector is characterized by extremely unconcentrated (fragmented) structure. This is evident if one observes the concentration of market shares in total assets, capital, loans, deposits and interest income (Miljković et al. 2013). However, the concentration of market shares in net profit suggest the banking sector is moderately concentrated. As such, the analysis indicates high differences between banks in terms of financial strength and business results, and thus Miljković et al. expected consolidation of banks in the future. Recent research of Božović et al. (2014) supports this expectation,

¹⁰ECONOMIC RESEARCH (2011) Remittance Inflows to GDP for Serbia, <http://research.stlouisfed.org/fred2/series/DDO11RSA156NWDB>

¹¹3rd Annual Forum of the EU Strategy for the Danube Region (2014) <http://www.danubeforumvienna.eu/>

¹²Market Wired 2015 (2015) Unified Signal [...], <http://finance.yahoo.com/news/unified-signal-incs-mobile-wallet-140000913.html>

suggesting that the banks founded by acquisition have the greatest share in the banking sector in Serbia at the moment.

Payment Instruments

In 2014, 83,1 % of all Serbian inhabitants aged 15 and more had an account at a formal financial institution (The World Bank 2014*d*). More over, 57,8 % possessed a debit card and 15,2 % a credit card (The World Bank 2014*d*). In 2013, the cards issued by the commercial banks supported the following card schemes: Visa, Mastercard, Diners, American Express, and DinaCard (National Bank of Serbia 2013*b*). Of all banks operating in Serbia, 19 deployed POS terminals, reaching 62656 terminals country wide (National Bank of Serbia 2013*b*).

DinaCard is a national payment card which has been available in Serbia for more than ten years. The DinaCard system consist of 27 banks, 25 of which issue debit cards and 21 issue credit cards, and 7 processing companies (DinaCard 2015). As of mid-2013, almost half of all payment cards in Serbia were DinaCards (Connections 2014). Consequently, DinaCard has the largest acquiring network in the country, which consists of more than 58,000 POS terminals and more than 2,800 ATMs (DinaCard 2015).

Electronic transfers are becoming increasingly popular in Serbia. Credit transfers (paper-based or automated) are the dominant cashless payment instrument in terms of both volume and value (Connections 2014). Additionally, direct debits are available and used for low-value payments such as utility bills (Connections 2014)

Payment System

The main characteristic of the payment card business in Serbia is a lack of a joint clearing center for payment cards issued domestically, except for Dina Card (Žorić et al. 2010, Obradović et al. 2010). Every card acquiring bank has its own system for acceptance and processing of transactions. Some banks even have several providers for various types of cards and various POS terminals. This results in merchants having several POS terminals and several contracts with several banks. All these facts make card operations expensive and complex, and has resulted in high banking fees. The latter is emphasised as a problem by Telenors chief of Europe, which he exemplifies by the high fees on withdrawal of money (Bakken & Finstad 2015).

Settlement of net items from clearing by DinaCard, Visa, and MasterCard payment cards is performed in the Real-time-gross settlement (RTGS) and clearing system (HSBC 2015). RTGS and clearing system are owned and operated by the National Banks of Serbia, and settle all interbank payment orders in Serbia (Radovanović & Milosević 2010). American Express and Diners Club credit cards are settled via their respective international card schemes (HSBC 2015).

Online Banking

All commercial banks in Serbia have some form of Internet banking solution, and a majority of the banks have mobile banking services beyond SMS based notifications (Eaton 2014). Three companies, Asseco, New Frontier, and Halcom dominate the market of mobile and desktop Internet banking solutions in Serbia (Eaton 2014). These three companies provide the infrastructure for the solutions in terms of client, security, and back-end systems. However, research indicates that the existing solutions (and their apps) have relatively low number of app downloads.

Existing Mobile Money Operators

Overall, mobile payments services in Serbia is still new to market. Users primarily use basic mobile banking services such as paying bills and account monitoring (Business Monitor International 2015c). However, mobile money operators have increasingly entered the market the recent years:

- **Telenor banka:** In 2013, Telenor Serbia acquired KBC Banka, and launched the financial institution *Telenor banka* the following year (Business Monitor International 2015c). Telenor banka provides customers with a wide range of mobile banking services, including MPSs¹³.
- **MeaWallet:** A trilateral agreement between MeaWallet, Tieto and Chip Card has resulted in a new MPS, launched in 2015¹⁴. Amongst other, MeaWallet offer NFC POS payments¹⁵.
- **Banca Intensa:** The bank offers a basic MPS to their customers through iOS and Android apps¹⁶. They have also entered in a partnership with Intesa Sanpaolo Card and Visa to offer a Host Card Emulation (HCE)-based mobile POS payments¹⁷.

Third party providers are also establishing their services in Serbia. As an example, Unified Signal, a Mobile Virtual Network Enabler (MVNE), is launching its mobile wallet technology the coming year¹⁸. The system will enable m-commerce for Mobile Virtual Network Operators (MVNO) clients.

¹³Telenor Group (2014) Telenor opens Serbia's most available bank, <http://www.telenor.com/media/press-releases/2014/telenor-opens-serbias-most-available-bank/>

¹⁴Tieto (2014) Tieto in cooperation with MeaWallet and Chip Card to introduce mobile payments in Serbia, <http://www.tieto.com/news/tieto-in-cooperation-with-meawallet-and-chip-card-to-introduce-mobile-payments-in-serbia>

¹⁵Chip Card (2015) Mobile Wallet, http://www.chipcard.rs/sadrzaj.php?id_sadrzaja=17

¹⁶Banca Intensa (n.d) Intensa Mobi, <http://www.bancaintesa.rs/code/navigate.aspx?Id=1145>

¹⁷Banca Intensa (2015) Media Release, <https://www.intesasanpaolocard.com/media/78471/press%20release%2014%2004%202015.pdf>

¹⁸Unified Signal (2015) Mobile Commerce, <http://www.unifiedsignal.com/solutions/mobilecommerce>

In addition, some established banks are broadening their services by introducing mobile banking applications, such as Eurobank Serbia¹⁹. However, these services merely represent a renewal of traditional brick and mortar services, by enabling customers to use their mobile phones for services such as paying bills and checking account balance. Another example is the added services of DinaCard, including bill payments and card-to-card money transfer (i.e. transfer of funds between DinaCard cardholders' accounts) through mobile phones (Radovanović & Milosević 2010).

7.2.2 Telecommunication Infrastructure

Mobile Phone Usage

In 2013, RATEL (2014b) reported that 87 % of all individuals in Serbia used a mobile phone, with a penetration of 128 %. In 2014, mobile phone penetration was estimated to 134 % (Business Monitor International 2015c). Of the entire mobile market, the 3G subscription market was estimated to 49,9 %, and forecasted to reach 70,6 % by 2018 (Business Monitor International 2015c). In the coming years, it is expected an increasing transition from prepaid to postpaid subscriptions, as wireless data services are becoming increasingly more important drivers of the overall mobile market. In the transition, discounting of prepaid subscriptions are expected to some degree, decreasing the overall mobile penetration in the market (Business Monitor International 2015c).

Mobile Operators

Business Monitor International (2015c) reports the following telecommunication industry consolidation as of June 2014:

- **mts** (Telekom Srbija's mobile unit) with 45,1 % market share.
- **Telenor Serbia** with 33,1 % market share.
- **Vip** with 21,8 % market share.

In addition, a fourth actor is entering the market. In September 2013, it was reported that the cable company SBB will enter the market as a MVNO. However, as of end of 2014 the MVNO was yet to be launched (Business Monitor International 2015c).

Mobile Data Networks

The Serbian ICT infrastructure has a quality that is below EU countries (Vojvodina ICT Cluster 2013). There is a technological gap between Serbia and North West European countries equivalent to a few decades. As an example, 3G mobile services were first made commercially available in Serbia in 2006 (Business Monitor International 2015c). However, ICT infrastructure is improving every year, and the past few years have seen significant advancements of quality

¹⁹Eurobank Serbia (2015) M-Banking, <http://www.eurobank.rs/services/services/m-banking.1523.html>

(Vojvodina ICT Cluster 2013).

According to RATEL (2014b), the three mobile operators provided a public network coverage of over 95 % of Serbian territory in 2013. All operators are taking measures to improve their infrastructure additionally. Firstly, the mobile providers have upgraded their 3G base stations to dual carrier (DC) HSPA+, easing the transition to 4G and LTE in the future (Business Monitor International 2015c). Secondly, according to the Regulatory Agency for Electronic Communications and Postal Services (RATEL), all three operators have fulfilled the financial requirements granting them licenses in 4G bandwidth²⁰. As a result, RATEL expect that 4G will be available in Serbia from May 2015.

Fixed Line Infrastructure

Business Monitor International (2015c) expects the fixed-line market in Serbia to decline as operators face the challenge of fixed-to-mobile substitution. By the end of 2013, broadband subscriptions reached a penetration of 20.4 % (Business Monitor International 2015c). This includes services delivered by fixed-line infrastructure, such as DSL, cable and fixed wireless, as well as mobile broadband subscriptions (excluding 3G subscriptions for mobile handsets that are also used for voice services). Broadband subscriptions grew strongly in 2013, and Business Monitor International (2015c) expects both fixed and mobile broadband growth to drive the market in the coming years. Investments in wireless data network infrastructure, such as LTE coverage and higher capacity DSL is expected to drive subscription growth.

As part of a plan for developing the broadband infrastructure, the Serbian government adopted the *Strategy of Broadband Network and Service Development in the Republic of Serbia by 2016* in 2014 (RATEL 2014c). One of the goals is to align Serbian infrastructure development plans with that of the EU strategy *Europe 2020*²¹.

7.2.3 Supporting Industries

Among the supporting industries is the Association of Serbian Banks (ASB). ASB is the single banking association in Serbia, with all commercial banks being members²². The association works for strengthening the banks' position both domestically and internationally²³. Among the pillars of the associations activities are payment system and electronic banking.

Within the ASB, the *Credit Bureau* organization was formed. Credit Bureau is a national-level institution for monitoring of and supervision over credit exposure

²⁰Ratel (2015) 4G Decisions Awarded, http://www.ratel.rs/information/news.134.html?article_id=1607

²¹European Commission (2015) Europe 2020, <http://ec.europa.eu/europe2020/>

²²National Bank of Serbia (2013) Payment Card Market in Serbia, <http://ema.com.ua/wp-content/uploads/conference/2013/april/materials/2-4.pdf>

²³ASB (2015) About Us, <http://www.ubs-asb.com/Default.aspx?tabid=9056>

of individuals and legal entities. Its members are all banks, leasing companies, all mobile network operators, all government funds and agencies, insurance companies and other institutions. According to Simovic et al. (2009), and as noted earlier, the Serbian credit bureau model is ranked as one of the best in the world by the World bank.

Serbian Telecommunication Agency (RATEL) is an independent organization which implements policies, encourages market competition, works to improve network capacity and quality, and protects the interest of end users (RATEL 2010).

7.3 Technological Environment

7.3.1 Handset Technology

Technology maturity

When assessing the overall technological readiness of the Serbian market, it scores low on "availability of latest technology" on The Global Competitiveness Index (World Economic Forum 2014c). However, the prevalence of mobile phones are very high, and as of 2012, number of mobile phones in the country passed 10 millions, corresponding to 1,4 mobile phone per citizen (Euromonitor 2014b).

Mobile operators are taking actions to exploit the high interest in mobile phone services. As an example, all mobile operators in Serbia offer WPKI technology in SIM cards to enable the mobile banking apps of the various Serbian banks (Eaton 2014).

Smartphones

A wide range of the latest smartphones are offered to the Serbian consumers through among others mt:s²⁴, Telenor Serbia²⁵, and Vip²⁶. Despite this, Business Monitor International (2015c) estimates that only 15 % of all handsets in Serbia are smartphones.

The number of 3G users has, however, grown exponentially over the last five years from 762.307 in 2009 to 4,2 million in 2013. As a result, Business Monitor International (2015c) believes that the 3G and 4G users will account for 70.6 % of the total market by the end of 2018. Business Monitor International (2015c) suggests that deployment of lower-cost handsets and 4G networks scheduled to be launched soon will stimulate the growth. According to Portio Research (2013), CEE is classified as a "replacement market", meaning that substitution of handsets drive the growth in the market. It is estimated a compounded annual growth rate of 26,2 % till 2016, with growing popularity of smartphones given as a reason.

²⁴mts (2015) Wes Shop, <https://webshop.telekom.rs/>

²⁵Telenor Serbia (2015) Mobile phones/Online shop, <https://www.telenor.rs/en/Consumer/webshop/Mobile-phones/>

²⁶vip (2015) Mobile devices, <https://www.vipmobile.rs/pocetna.1.html>

7.3.2 Merchant Terminal Technology

According to World Economic Forum (2014c), *firm level technology absorption* in Serbia is in the lower end of the The Global Competitiveness Index. However, according to Mellon Group, a provider of front-end and back-end transaction solutions and services, the majority of payment cards in Serbia are contactless, and the proportion of NFC-equipped POS terminals is increasing steadily (Mellongroup 2015).

Additionally, as noted in subsection 7.2.1, several other providers of POS terminal are present in the market due to the complex system for acceptance and processing of payment transactions. Mellon²⁷, Fujitsu²⁸, Credit Agricole²⁹, and UniCredit Bank³⁰ all provide terminals based on the latest technological novelties. Established schemes, such as MasterCard's PayPass, is supported by several MPSs already in Serbia (Business Monitor International 2015c).

7.3.3 Identification and Authorization System

There are numerous methods for electronic identity available in Serbia (Eaton 2014), with commercial banks having separate mechanisms for access to online banking services. Looking ahead, the Serbian government is planning to introduce a nation-wide scheme, using chipped identity cards for access to government services. However, this has yet to be implemented (Eaton 2014).

Certain banks use the OTAPOS authorization system. According to Radovanović & Milosević (2010) this service is fairly secure for authorization of payments and uses electronic signing by six-digit code delivered via SMS.

Additionally, Radovanović & Milosević (2010) suggest new measures for secure transactions are increasingly being introduced by the banks. Amongst other, they mention the implementation of a digital certificate on SIM cards.

7.4 Legal/Regulatory Environment

7.4.1 National and International Regulation

Serbia has developed into a stable country with a growing market economy, after ten years of extensive reforms. As a member of IMF, the country exercises sound economic policies in support of the World Bank and other international institutions. Serbia is currently also negotiating with EU about becoming a member of the union (PWC 2013).

In addition to specific regulation of the banking and telecommunication industry,

²⁷Mellon (2015) eftPOS Terminals, <http://mellongroup.com/products/eftpos-terminals>

²⁸Fujitsu (2015) PoS Systems, <http://www.fujitsu.com/rs/solutions/industry/retail/solutions/pos-sytems/>

²⁹Credit Agricole (2015) POS terminals, <http://www.creditagricole.rs/credit-agricole/english/sme/pos-terminals/>

³⁰UniCredit Bank (2015) POS Terminals, <http://www.unicreditbank.rs/?jez=EN&p=1087>

Serbia has several relevant general laws applicable to all industries. A new competition law was adopted in 2009, which applies to all market players undertaking activities of public interest. A year thereafter, in 2010, a law on consumer protection was adopted. The law harmonizes with EU standards, and regulates among other the fundamental rights of the consumers, liabilities, warranties (PWC 2013).

Despite the government's effort to protect consumers and simplify the business environment, World Economic Forum indicated that "inefficient government bureaucracy" is the most problematic factor for doing business in Serbia (World Economic Forum 2014c). This is also supported by Business Monitor International (2015b).

Regulation of Banks

The National Bank of Serbia is responsible for the banking regulation in Serbia (Eaton 2014). Through the implementation of system reforms, NBS has established a reliable, modern payment operations system that enables fast transactions. Technological clusters in Serbia now consider the regulations to be considerably improved from the past³¹.

NBS has prepared a number of regulations that are particularly important for electronic banking, according to Radovanović & Milosević (2010), some of which are:

- **Law on Banks:** Regulates the establishment, operations and organization of banks. Amongst others, it states that only licensed banks can engage in the acceptance of deposits, granting of loans and issue payment cards. Banking licenses are issued by NBS (NBS 2015).
- **Law on Payment Services:** Regulates the conditions and manner in which payment services can be conducted. The law also embraces electronic money, and states that not only banks and the public post operator can provide payment services in Serbia, but also electronic money and payment institutions (NBS 2014). It is the first law to allow for all types of payment services, also leading-edge ones³², and goes into effect in October 2015.
- **Law on Payment Transactions:** Regulates payments in dinars, the local currency. It states, for example, that all payments in dinars should be effected through current accounts held within a bank in Serbia (NBS 2011a).
- **Law on Protection of Users of Financial Services:** The law regulates the protection of consumers who use financial services (NBS 2011b). The financial institutions are generally assumed to be stronger parties, and could impose unfavorable terms and conditions on their customers, which

³¹VOICT (2013) ICT In Serbia, http://www.daad.rs/imperia/md/content/informationszentren/belgrad/23012013_ict_in_serbia_at_a_glance_2013.pdf

³²infobalkans (2015) NBS: New payment services law to bring improvements, <http://www.infobalkans.com/2015/01/06/nbs-new-payment-services-law-bring-improvements>

therefore need protection (PWC 2013).

We did not encounter an official NBS strategy or position on MPSs, other than the provisions in the Law on Payment Transactions mentioned above.

Regulation of Telecom Operators

Regulation of the telecom sector in Serbia is managed by RATEL.

Serbia has a unified law for both telecommunications and other electronic communication services, namely the *Law on Electronic Communications*. The law governs for instance how an electronic communications provider can perform activities, the usage of electronic communications equipment, and how market operators with significant market power can be ex ante regulated. Amendments to the law made in mid 2014 places emphasis on network neutrality, such as "Universal services shall be provided on the principle of technological neutrality with the prescribed level of quality and at affordable prices [...]" (RATEL 2014a, p. 1).

Even though the Serbian telecom regulation is gradually modernized and harmonized with international standards, the GSM Association still considers the Serbian regulation a barriers that prevents the development of mobile payment markets and improving financial inclusion³³.

Privacy Regulation

Serbia's *Law on Personal Data Protection* came into effect in 2009, and aligned data protection with international standards, particularly EU standards (Komnencic 2009). The law specifies the duties of anyone who collects and processes personal data, such as: (1) a declaration of intent and a description of what is to be recorded must be sent to the Commissioner for Personal Data Protection, and (2) that consent must be collected from the person who's information is to be registered and used (Commissioner for Personal Data Protection 2009).

7.4.2 Standardization

The Institute for Standardization of Serbia (ISS) is the only nationally recognized standardization body in Serbia. The institute acts as a legal entity, operates in accordance with regulation of public services, and was founded by the government³⁴.

³³GSMA (2015) Mobile Money for the Unbanked, <http://www.gsma.com/mobilefordevelopment/is-regulation-holding-back-financial-inclusion-a-look-at-the-evidence>

³⁴ISS (n.d.) About ISS, http://www.iss.rs/en/button_4.html

Banking Standardization

Serbian banks are joined in the Association of Serbian Banks (ASB), as mentioned above. According to Eaton (2014), ASB does not facilitate any self-regulation of the banking industry. It is further noted by Eaton that ASB has no formal interest in mobile banking. Also, ASB has no history of supporting shared infrastructure projects besides the interbank clearing system.

None of the banks in Serbia are currently members of MobeyForum, the global industry association for financial institutions on the future of mobile financial services³⁵.

Telecom Standardization

The NETSI Telecommunications technologies committee of ISS is the national committee with responsibility for telecommunications, including fixed, mobile, radio and Internet technology³⁶. It ensures compliance of Serbian standards with EU and international standards, such as the globally-applicable standards from ETSI, the European Telecommunications Standards Institute³⁷.

All three Serbian MNOs are full members of GSMA³⁸.

³⁵MobeyForum (2015) Our Members, <http://www.mobeyforum.org/about-us/our-members/>

³⁶ISS (n.d.) Technical Committees, http://www.iss.rs/en/tc/?national_committee_id=807

³⁷ETSI (2015) About, <http://www.etsi.org/about>

³⁸GSMA (2015) Full Members, <http://www.gsma.com/membership/who-are-our-gsma-members/full-membership/>

Chapter 8

Potential Service Designs for Serbia

In this chapter we will present a screening of MPS design options for a MPS in Serbia. The analysis will be performed through the use of our proposed framework and the findings from the desktop study of Serbia. If not stated otherwise, the sources to the arguments below can be found in chapter 7.

We will first discuss the three service design dimensions individually before giving a overall summary.

8.1 End User Functionality

In general, there are three characteristics of the Serbian market that need to be taken into consideration across all service types. First, the Serbian population is growing steadily older, and the large proportion of elderly consumers can be sceptical towards new technological services, especially those that involve economic transactions. Second, mobile banking is yet to be widely adopted, implying that consumers are not very used to utilizing their phones for payment purposes. This is underpinned by the fact that 80 % of all transactions are currently performed with cash or checks. Third, the Serbian population is relatively well educated, with a low degree of illiteracy. This implies that consumers should be able to understand and use advanced services as long as a minimum level of attention is devoted to user experience by the developer and service provider.

8.1.1 P2P Payment

Two arguments make P2P payments an interesting service to offer the Serbian population. Firstly, there exist significant geographical differences in purchasing power between the North-West and the South-East. Secondly, regulation and policy facilitation have made international migration easier in the later years. The ability to transfer money domestic and abroad can therefore be of great value to consumers, especially to those with family and friends in other regions of

the country and abroad. P2P payments are therefore a viable option from the social/cultural and legal environments.

Additionally, the banks centric financial system in Serbia should facilitate P2P payments in a satisfying manner. Since a growing proportion of the population have access to bank accounts, P2P payments can be implemented within the existing infrastructure. This implies that P2P payments also are a viable option from a commercial environmental point of view.

The technological environment does not impose any specific limitations on implementing P2P payments. In conclusion, P2P payments seem like very viable option.

8.1.2 POS Payment

As noted, the Serbian population are frequent users of cash, and even though a significant amount of payment cards are issued, only about half of the cards are actively used. This is primarily because of trust issues and the fact that many Serbians enjoy the feeling of having cash in their pockets. These factors indicate that a significant behavioural change is needed for successful adoption of mobile POS payments, from a social/cultural environmental viewpoint.

The technological and commercial environments impose challenges on the introduction of mobile POS payments for two reasons. First, even though there are over 60.000 POS terminals nationwide, it is highly uncertain that a significant proportion of these readily support mobile phone based transactions. As all providers of new POS terminals support technological novelties, we believe that this situation will change in the future, albeit it may delay immediate adoption. Further, as most mobile POS payment services rely on existing cards schemes, the situation is further complicated in Serbia. The reason for this is that every card acquiring bank has its own system for transaction acceptance and processing. Some banks even have several providers for various cards and terminals. This fact creates a complex infrastructure to approach for new MPS operators.

The legal environment does not impose significant limitations on the implementation of POS payments. In conclusion, mobile POS payment is a somewhat viable option, but considerable complexity has to be overcome at this point in time.

8.1.3 Bill Payment

There currently exist three main types of bill payment services in Serbia: (1) going to a bank branch and waiting in line for a bank teller to process the invoice, (2) go to an ATM that support bill payment, or (3) use the SMS-based bill payment service that several operators have started to offer lately. All of these services seem somewhat cumbersome, so from from a social/cultural environment, one can argue that new and innovative bill payment services are addressing customer

needs in Serbia.

The technological and commercial environments facilitate bill payments well, with a ready interbank clearing system, and established standards for invoices and bills.

The legal environment does not impose any specific limitations. Bill payments therefore seem to be a very viable and attractive end user functionality to offer.

8.1.4 Web Store-Front Payments

E-commerce is not particularly widespread in Serbia as of now, but is seeing rapid growth. The online market channel is in fact the only channel growing across all types of goods. With regards to consumer attitudes, consumers are sceptical to using payment cards online, implying that the use of mobile phones for paying for online purchases will require a significant change of behavior.

Web store-front payment services use scanning of a QR-code (shown on a computer screen) with a smart phone camera, or SMS, as communication technologies. As such, there does not seem to be any major technological barriers for implementation.

The commercial and legal environment do not imply any significant limitations on the implementation of web store-front payments. Web store-front payment functionality therefore seems like a somewhat viable option in Serbia.

A summary of the end user functionality screening in Serbia is presented in Table 8.1 below.

	Pros	Cons	Conclusion
P2P	<ul style="list-style-type: none"> • Geographical wealth-difference in population • Increasing outward migration 	<ul style="list-style-type: none"> • No particular limiting environmental factors 	Viable functionality
POS	<ul style="list-style-type: none"> • Large future potential 	<ul style="list-style-type: none"> • Significant behavioral change is needed • Complex payment scheme infrastructure 	Somewhat viable, but complex to implement now
Bill payment	<ul style="list-style-type: none"> • Inherent consumer need • Existing facilitating infrastructure in place 	<ul style="list-style-type: none"> • No particular limiting environmental factors 	Viable functionality
Web store-front	<ul style="list-style-type: none"> • High growth in e-commerce 	<ul style="list-style-type: none"> • Consumers still prefer to pay for online shopping with cash • Uncertainty about consumer demand for service 	Somewhat viable functionality

Table 8.1 – Summary of end user functionality screening in Serbia

8.2 Technology

There are three general observations of the Serbian market that need to be taken into account when analyzing the technology options. First, Serbia scores low on the "availability of latest technology" index, according to World Economic Forum. Second, advanced services are not as high on consumers' preference list now, due to uncertain economic times. Third, the Serbian population is relatively highly educated, with technical educations being popular. This indicates that the population should be very capable of handling advanced handsets. Fourth, mobile phone penetration is high, well above 100 %. 3G coverage is very high, and over 50 % of mobile phone subscribers have 3G enabled. Only 15 % of phones in the market are smart phones, but the deployment of lower-cost handset from Asia has the potential to increase penetration significantly in the near future. The first two observations are in favor of less advanced technologies, but the latter two are in favor of more advanced.

8.2.1 NFC

The Serbian population is sceptical towards new financial services, which could potential hinder the adoption of a NFC based services initially, as consumers need to get used to the new technology.

On the other hand, most existing payment cards support contactless payments. Also, a growing proportion of POS terminals support NFC, as do the new and more advanced handsets being deployed. Further, several payment service providers have launched NFC pilot tests. These three facts imply that the commercial and technological environments do not represent absolute barriers for using NFC.

The legal environment does not impose any limitations on using NFC. In conclusion, there are no major limitations to using NFC technology, but practitioners should be aware of the fact that consumer behavioral change might delay the adoption somewhat.

8.2.2 Barcodes and QR Codes

Barcodes and QR-codes are simpler technologies than NFC, and as such represent a smaller technology advancement for Serbians, possibly enabling a faster adoption rate.

In most cases, scanning of barcodes and QR-codes only requires a customer with a smart phone, and a merchant with a print of the code. As such, there are no major limitations from the commercial and technological environments.

There are no limitations from the legal environment on using barcodes and QR-codes. We can therefore conclude that Barcodes and QR-codes represents viable technologies.

8.2.3 Cloud Technology

Cloud technology based MPS represent a notable change in payment behavior for Serbian consumers. This is because they prefer cash or payment cards for making payments today. The fact that Serbians are starting to get familiar with smart phone usage might moderate the effect on the adoption rate of cloud technology based MPS.

The telecommunication infrastructure is well developed with high 3G-coverage, and mobile phone subscriptions are increasingly supporting high speed data transfers with mobile networks. Combined with the increasingly more advanced handsets being deployed, the commercial and technological environments should not impose any particular limitations on the use of cloud technology.

The legal environment does not impose any limitations on using cloud technology. In conclusion, cloud technology seems to be a viable option.

8.2.4 SMS

The Serbian population has been using SMS for a long time, and are as such very familiar with the technology. Despite this, a barrier from the social/cultural environment might be that SMS-based MPSs are perceived as old fashioned. Once more advanced services start to gain ground, these might be preferred given their novelty in technology.

The existing telecommunication infrastructure and handsets support SMS fully. Given that several providers in the market have launched SMS services for bill payments, the banking infrastructure should also readily facilitate this technology. Hence, the commercial and technological environments support SMS technology.

Using SMS technology in MPSs should not be limited by the legal environment. We therefore conclude that SMS is a viable option in the Serbian market. Given the fact that it can be perceived as old fashioned, practitioners should consider using SMS as a supplementary technology.

The screening of the viability of the different options within the technology dimension in the Serbian market is summarized in Table 8.2 below.

	Pros	Cons	Conclusion
NFC	<ul style="list-style-type: none"> Most likely the solution of the future 	<ul style="list-style-type: none"> Behavioral change needed Some technological barriers still present 	Viable technology in the long run
Barcode/QR-codes	<ul style="list-style-type: none"> Somewhat familiar technologies for consumers Not too complicated to implement for merchants 	<ul style="list-style-type: none"> Smart phone penetration still low 	Viable technology
Cloud technology	<ul style="list-style-type: none"> Supported by existing telecommunication infrastructure 	<ul style="list-style-type: none"> A notable change in consumer behavior Smart phone penetration still low 	Viable technology
SMS	<ul style="list-style-type: none"> Familiar technology for consumers Existing solutions in place 	<ul style="list-style-type: none"> Can be perceived as old fashioned technology 	Viable supporting technology

Table 8.2 – Summary of technology screening in Serbia

8.3 Interoperability

In the following subsections, interoperability is discussed as the final dimension of service design. Firstly, the market conditions affecting interoperability the most is presented. Secondly, options for interoperability are explored, including an evaluation of the most viable options.

8.3.1 Market context

Several findings from the desktop-study on Serbia influence the possibilities for MPS interoperability:

- The RTGS and clearing system owned and operated by NBS provide interbank clearing of transactions.
- The commercial banking industry is very fragmented with many actors.
- All commercial banks operating in Serbia offer online banking with several services.
- Currently there are few existing mobile money schemes, with low penetration.
- Several international card schemes are present in the market, including MasterCard, Visa, and America Express.
- The national payment card DinaCard has the only widespread acquiring system for payments in Serbia.
- Overall, the potential users of MPSs have a low purchasing power.
- The newly added Law on Payment Services allows non-financial institutions to provide payment services in Serbia.

8.3.2 Evaluation of options

The law on payment services introduced in 2015 paves the way for third-party providers of MPS in Serbia. Prior to this law, only financial institutions were allowed to provide payment services, and consequently the MMO and financial institution had to be one entity. With this new law comes new ways for providing MPSs, and new possibilities for interoperability.

The combination of a fragmented banking industry and limited amount of existing mobile payment providers is expected to influence the suitable option for MPS interoperability. Regarding the former, numerous commercial banks might impose challenges with bilateral agreements. Direct connections to a high number of bank interfaces makes it difficult to manage the scale of the option, and time to market is expected to be slow for all banks (Clark & Gamner 2014). On the other hand, a limited amount of existing mobile payment providers might favour such

a solution. Firstly, it follows naturally that it requires limited agreements between MMOs. More importantly, it is a viable option compared to a single processor solution. A (single-point switch) processor needs to be enabled for both bank and MMO interfaces and settlement, demanding a complex technical architecture (Clark & Gamner 2014). Currently, there does not exist such a single-point switch in Serbia. Consequently, it would require the MMOs to fund the development, which in the end is most likely transferred to the end-user in terms of transaction costs in the service. Given the low purchasing power of end-users in Serbia, this options is not regarded as viable, in agreement with (Clark & Gamner 2014).

The former section might indicate that a combination of the two extreme options of interoperability will result in a viable solution. The first possible option is for MMOs to partner up with a commercial bank. With this option, the MMO interoperates with all commercial banks through the inter-bank RTGS and clearing system, and to other MMOs via bilateral agreements. Such a solution is expected to simplify banking integration, and be relatively fast to deploy (Clark & Gamner 2014). The fact that Telecom Serbia and Banca Intensa have partnered up before launching their MPS should indicate that this is a viable solution. This solution is illustrated in Figure 8.1 below.

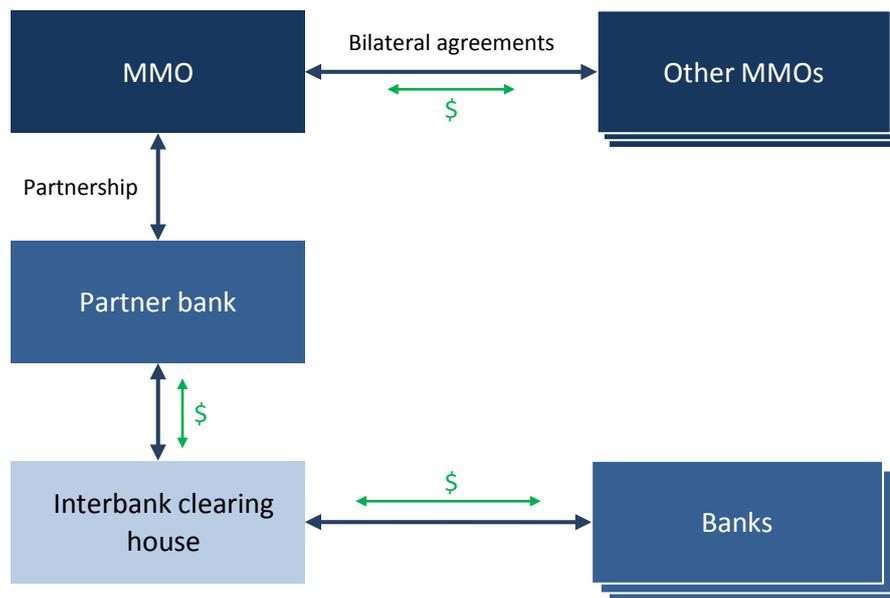


Figure 8.1 – Interoperability through a partner bank and bilateral agreements

The second option involves combining established commercial processors for the banking interface with bilateral agreements for MMO interoperability, as illustrated in Figure 8.2 below. This includes using established card schemes, such as DinaCard, Visa, and MasterCard. As a majority of all payment cards in Serbia are DinaCards, and all commercial banks issue it, DinaCard's acquiring system can facilitate interoperability with the banking infrastructure. Such a solution simplifies the bank integration, without the cost associated with developing a single-point switch processor mentioned previously. As several of the MPSs soon

to be launched are implementing MasterCard's PayPass in their service, this seems like a viable solution as well.

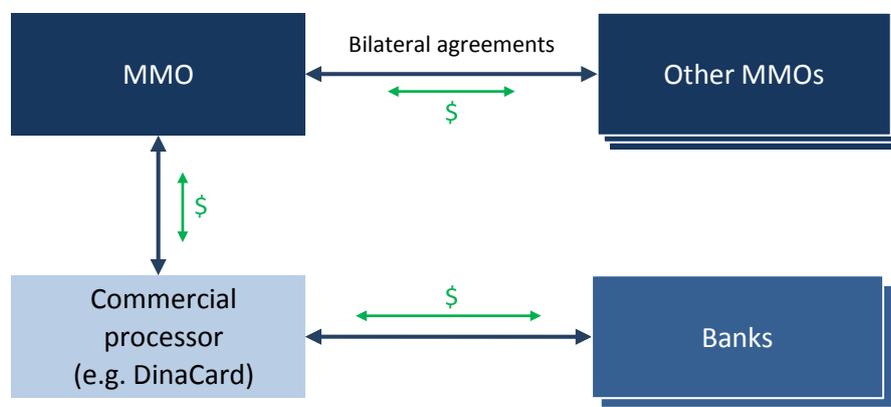


Figure 8.2 – Interoperability through a commercial processor and bilateral agreements

An additional strength of the two proposed solutions is that they provide access to the ACH of the NBS, without any need to alter the ACHs operation rules. This is needed for a direct connectivity to ACHs (Clark & Gamner 2014), and given the novelty of MPS in Serbia, such alterations are not assumed to be topical to date.

8.4 Summary of Analysis

The viable design options for the Serbian market are summarized in Figure 8.3 below.

End user functionality	P2P	POS	Bill payments	Web store-front
Technology	NFC	Barcodes/QR	Cloud technology	SMS
Interoperability	Bilateral agreements	Single-point switch	Commercial processor	Partner bank

Figure 8.3 – Summary of potential service designs for Serbia

Chapter 9

Summary of Interviews

In the following sections, we present summaries of the interviews conducted. First, we would like to briefly repeat a point from the methodology outlined in chapter 2. We have interviewed practitioners from both the case company Telenor banka and from Valyou and Telenor Group Financial Services. Since the two interviews with Telenor banka practitioners were conducted first, we were fairly confident that we had gained a sufficient insight into the case company to perform our analysis. We therefore concluded jointly with our supervisor to broaden our perspective by including practitioners from outside the primary case company. The findings from these interviews are primarily used to support the discussion in chapter 11.

9.1 Marko Rankovic

Name:	Marko Rankovic
Position:	Project and Portfolio Manager
Organization:	Telenor banka
Method:	Telephone interview
Date:	17.03.2015

Rankovic has over nine years of experience from the banking industry, in various positions ranging from Senior Strategy Expert at Telenor banka to a consultant at SAS Institute. The majority of his work has been within business development projects, business analysis and product management. In addition to commercial engagements, Rankovic has researched payments, processing, electronic banking channels and other topics which has resulted in over 30 published papers.

In this interview, Rankovic was introduced to our proposed framework, which formed the basis for an open discussion.

Contingency Theory

Rankovic confirmed that Contingency theory is a well suited framework for analyzing the environment of MPSs. All four environments were discussed and

Rankovic mentioned two examples of findings in these environments from the Serbian market. First, within the social/cultural environment, Serbian consumers have some issues with trusting new financial solutions, especially e-commerce and m-commerce solutions. This is because of the history of a series of bankers trapping hard currency savings and engaging in scheming in the 1990s. Secondly, within the commerce environment, there currently does not exist any commercial clearing houses in Serbia, which complicates the issue of interoperability between payment schemes according to Rankovic.

System Design Dimensions

System design is an important aspect to consider for practitioners when introducing new MPSs, Rankovic explained. There are several dimensions within system design that need to be considered, and one of the most important is the end user functionality. With this he meant what functionality the services will support, such as P2P, POS payments, and bank account management. Rankovic stressed that the decision about which functionality to offer should take consumer needs into consideration. The reason for this is the fact that, historically, financial institutions in CEE have followed an evolutionary approach when developing new generations of financial services. The steps have typically been from traditional banking in the brick and mortar sense, to web based services and in the final step mobile services. Usually, the services offered at each new step has been a subset of the services offered in the previous. This implies that the services offered through mobile are limited compared to the traditional services, and offer less customer value. In order to succeed, the development of new mobile based services should rather follow a revolutionary approach in close collaboration with the consumers, according to Rankovic.

Next, Rankovic explained that there are several layers of technology within the domain of MPSs. Two of the layers that he mentioned were authentication and handset-to-POS-terminal technologies, where examples within the last layer are QR-codes and NFC.

The last system design dimension, interoperability was briefly discussed towards the end. Rankovic explained that interoperability is a huge challenge for providers of MPSs in most parts of the world. The reason for this is the complexity of the existing banking infrastructure, and the lack of centralized clearing houses supported by all financial institutions. Cross-border interoperability is especially complex because of national regulation that is only partially coordinated. According to Rankovic, one of the main prerequisites of making an informed decision regarding interoperability is having a good overview of the main actors in an industry, i.e. the existing banks, MNOs, national banks, ACHs and card schemes.

9.2 Aleksandar Smiljkovic

Name:	Aleksandar Smiljkovic
Position:	Strategy Expert
Organization:	Telenor banka
Method:	Telephone interview
Date:	30.04.2015

Smiljkovic has been working with financial services in Telenor for nearly four years, and has been involved in the development of various financial services. Prior to the launch of Telenor banka, Smiljkovic was responsible for development of digital channels as a member of the product development team. Smiljkovic is now responsible for analysis and planning of Telenor banka's strategy.

The interview started with an introduction to the proposed framework, and Smiljkovic shared his initial thoughts on it. He confirmed that end user functionality, technology and interoperability are three important dimensions, and that applying our framework for analyzing services in the context of a market is an interesting approach. He further shared the overarching idea of Telenor banka's approach to service design, namely that they always focus on meeting customers' demand, regardless of design dimension.

End User Functionality

Smiljkovic explained that the fundamental idea behind Telenor banka's end user functionality was a complete migration of the customer experience from traditional banking branches to a mobile application. He then introduced the specific functionalities:

- Access to Telenor banka's financial services through iOS and Android apps, and responsive web design¹ for Internet banking.
- Bill payments, both traditional and their new service *bills on click*.
- P2P transfers to mobile phone numbers or e-mail addresses.
- Foreign currency payment.
- Online account opening.

Smiljkovic indicated that Telenor banka has plans to include POS payments in their end user functionality once their customer base grows. A note on bill payments was further made. Telenor banka had recently launched a *bills on click* service, where merchants can send the invoices directly to the systems of Telenor banka. This way, customers don't have to wait in line at banking branches. In addition to the above mentioned functionalities, Telenor banka also offers several

¹Google Developers (n.d) Responsive Web Design Basics, <https://developers.google.com/web/fundamentals/layouts/rwd-fundamentals/>

supplementary services to improve their user experience. Smiljkovic underlined how all of these measures were taken due to their high focus on customer needs.

When asked about how Telenor banka came to the decisions regarding end user functionality, Smiljkovic explained a process starting with market research to identify consumers habits, needs, and expectations concerning MPSs. Additionally, Telenor banka used best-practices from established MPSs in other markets. Finally, legal requirements acted as preconditions on the decision regarding end user functionality.

Technology

When asked about which technological aspects that are most important, Smiljkovic suggested that technology should be considered as a means for satisfying customer needs and elevating customer experience. As such, all aspects are important, but only as a means to meet an end. Smiljkovic further explained the common misunderstanding of basing new services solely on technology innovations rather than solving customer's problems. According to Smiljkovic, this is a widespread problem, and typical examples are NFC-pilot tests that are not well grounded in customer demand.

One aspect of technology that was highlighted by Smiljkovic was the choice between hybrid and native apps for smart phones. Telenor banka chose the latter, as native apps were expected to provide a better user experience. Smiljkovic also touched upon security during the interview. He claimed that there is a constant trade-off between simplicity and security. Security measures, such as PIN codes and certificates, increase the complexity of a service and challenges the ease-of-use for customers. Consequently, Telenor banka focused on making security measures as simple as possible, without compromising basic security principles.

With regards to external factors other than customer demand affecting the choice of technology, Smiljkovic explained that choosing vendors of technology was challenging, as Telenor banka needed tailored solutions for their unique services. Additionally, each vendor contract needed to be approved by the national bank. Beyond this, there were some requirements of business continuity, security, risk, etc. which is typical for the banking industry. None of the requirements were particularly burdensome for Telenor banka, according to Smiljkovic.

Interoperability

Smiljkovic suggested that interoperability is very important for lifting customer experience, but equally challenging to implement, for two reasons. Firstly, interoperability is driven by external factors, and not by the MPS provider. In the domestic market of Serbia, the most influencing driver for interoperability is the central bank with its central clearing system. Internationally, the most influencing drivers on interoperability are the established card schemes.

Secondly, Smiljkovic emphasized the fact that no provider of MPSs can drive

interoperability alone, due to the high cost of integrating with other services. When initially launching a MPS, some boundaries to the interoperability of the service will follow. As such, Smiljkovic argued that providers strive to close these boundaries, and as you grow in size, these boundaries become smaller, finally resulting in a completely open system.

Telenor banka has taken several measures to increase interoperability. First, interoperability with other Serbian banks are enabled through the clearing house of the national bank. As a result, customers can send money to any bank, in and outside the country. As an improvement of traditional P2P transfers, Telenor banka's customers are enabled to make P2P transfers to non-customers by addressing their mobile phone number or e-mail. When doing so, the transfer is deposited in the bank, and the non-customer receives a notification about the money waiting to be collected. Second, Telenor banka provides interoperability with merchants and bill issuers by using a standing order platform with modified logic. According to Smiljkovic, Telenor banka engage in making merchants adopt these systems, increasing the interoperability to their customers. Third, all clients receive a MasterCard debit card, supporting contactless payments through PayPass² and online payments through 3D Secure³.

Transferability of Takeaways

Smiljkovic suggested that although market input is unique, the rationale of basing decisions on solving customer problems is universal. With regards to the framework, Smiljkovic believes customer needs, bank industry setup and regulations differ the most, and technology the least, across markets.

9.3 Per Arvid Gjersum

Name:	Per Arvid Gjersum
Position:	Key Account Manager
Organization:	Valyou
Method:	Telephone interview
Date:	18.05.2015

Per Arvid Gjersum has 26 years of experience with card payments from prior positions in DNB and American Express. In addition, Gjersum has experience from advertising agencies. Gjersum is currently a Key Account Manager at the payment service Valyou, responsible for agreements with banks and their acquisition of end-user of the service.

The interview started with a brief introduction of the proposed framework, after which the framework was discussed in a sequential manner. The most important findings are presented in the next subsections.

²MasterCard (2015) PayPass, <http://www.mastercard.ca/paypass.html>

³CA Technologies (2015) Payment Security, <http://www.ca.com/us/products/payment-security.aspx?intcmp=searchresultclick&resultnum=2>

End User Functionality

Valyou offers a mobile wallet, aiming to substitute the physical payment instruments. A pilot project indicated POS payments were preferred the most by end-users. More over, as the majority owners of Valyou are banks, choosing POS payments as the main end-user functionality was a natural choice, Gjersum explained. Additionally, this choice enabled Valyou to use the established payment infrastructure, easing the implementation of the service. To heighten customer experience in the future, Valyou is planning to broaden their service to include m-commerce, coupons and ticketing within transportation. Gjersum pointed out that Valyou will not offer P2P transfers, as doing so would challenge the existing services of their customers, the banks. However if a bank offers P2P transfers, this service could be included in Valyou to improve the user experience.

The decision of choosing POS as the main functionality was also rationalised by looking at similar services in different markets. A vast majority of MPSs have started with POS payments, as the providers aim to implement mobile phones in daily purchasing. Gjersum explained that as soon as this is achieved, additional services can be included with less effort. Other external inputs were also used in the early phase of Valyou's launch. Valyou acquired the help of MPS consultants, who applied their existing experience with payment services to advice Valyou on viable and recommended design options. For example, the consultants were greatly involved in the selection of vendors.

Technology

At the very beginning of the Valyou-project, a secure service was identified as the most crucial factor for successful adoption of the service, given its importance to customers. With this in mind, NFC with SIM-cards as secure element for storing payment card information, combined with BankID for identification were chosen. Other secure elements were also considered, including HCE and embedded chip. Gjersum suggest the latter has emerged as a viable option lately as telecommunication operators are exploring several ways to utilize SIM-cards. In any case, Valyou decided on the secure element most desired by customers.

More over, Gjersum explained that NFC technology was chosen for several reasons. Firstly, it was preferred due to compatibility with international card schemes (Visa, MasterCard, etc). By complying with these standards Valyou is able to use existing infrastructure. Consequently, all POS terminals supporting these standards readily enable customers to use Valyou at the terminal. Secondly, NFC is considered the most customer-friendly solution within POS payments (e.g. in comparison to using QR codes). Thirdly, Apple announcing the use of NFC for Apple Pay is expected to be another important driver for the adoption of NFC as a global standard. The reason for this is that Apple has significant influence due to their high share of the handset market.

Gjersum also suggested that Apple's choice might foster new business opportunities for Valyou. Apple's upcoming entry in the European market is still surrounded

with uncertainty, as the implementation in for example Norway might require a change of business model and approach to agreements with banks. As a result, Valyou's existing infrastructure could possibly be used by Apple to facilitate the introduction of the service.

Interoperability

In order to provide a satisfying service to end-users, Valyou depends on interaction between numerous actors, including handset manufacturers, merchant terminals, card schemes, banks etc. Consequently, Valyou is an "open" solution", meaning that all banks and telecommunication providers are able to support the service, as long as they agree to using Valyou as their Trusted Service Manager (TSM). This includes special agreements between Valyou, the banks, and card issuers.

Valyou currently supports Visa Debit, but as the service is based on Global Platform⁴ standards, including other card schemes at a later point in time will require little effort. This is the current plan for expanding the service in the coming years. As an example, Gjersum mentioned that Valyou is considering to enable MasterCard's PayPass in their service.

For the end users, the interoperability of Valyou is limited to terminals of merchants who have enabled payments via NFC and the card schemes. As the vast majority of terminals support Valyou, the merchants represent the bottleneck according to Gjersum.

Transferability of Findings Across Markets

Overall, Gjersum expected that the rationale for the choices made during the development of Valyou also applies to other markets, with only a few exceptions. For example, Norway has a unique collaboration between the telecommunication and banking industry. The absence of this in some markets might affect the service design of the payment solution significantly. Additionally, differing security standards across markets is expected to influence the technological architecture of the service.

9.4 Mariana Penkova Grozeva

Name:	Mariana Penkova Grozeva
Position:	Senior Advisor
Organization:	Telenor Group Financial Services
Method:	Telephone interview
Date:	25.05.2015

Mariana Grozeva has worked with telecommunications, digital and financial services since 1978. She has worked with most parts of the telecommunication and digital services value

⁴Global Platform (2015), <http://www.globalplatform.org/>

chain and ecosystem through her positions in among other Bulgarian Telecom, Nexans and Telenor. She is currently a cross channel senior advisor at Telenor Group's Financial Services department for the mobile payment value chain and technologies. The department supports the development and operation of all Telenor-owned payment services.

As Grozeva represents a department that supports the MPSs of other Business Units (BUs), the discussion followed a slightly different course than the first three interviews. This is reflected in the structure of the summary below.

Approach to Designing Mobile Payment Services

Financial Services offer Telenor's BUs strategic guidance and advice during the design and operation of MPSs. In doing so, they follow a universal three step process for gathering relevant data concerning the specific market environment in each country.

- 1. Evaluation of regulatory and legal environment.** Telenor need to understand what regulations they must comply with, e.g. what kind of licenses that are needed to perform financial services. This can have implications for among other choice of partners, business model and what services one can offer. In addition to the current state of the legal framework, one needs to consider the risk of changes within it. Grozeva argue that such a thorough risk framework and analysis must be in place prior to any financial service startup.
- 2. Mapping of existing commercial environment.** The next step is to map the different players and services existing in the market. This ranges from banking infrastructure to existing established MPSs.
- 3. Perform Customer Research.** The third step is to perform customer research, usually in the form of a market survey. In this step, Telenor tries to understand the specific needs and segmentation of the consumers, and fine-tune the end user functionality offered.

Grozeva emphasized that this approach is followed in each market in which Telenor intends to launch a MPS. She also underlined how the factors and basic principles taken into consideration are usually the same in all markets. And even though there exist some differences between the developed and developing markets, most markets have many similarities. Because of this, Telenor is able to transfer learnings and best-practices from country to country in an attempt to exploit synergies and optimize processes. Grozeva further offered some specific insights regarding the three design dimensions.

End User Functionality

End user functionality and value proposition has to be derived from the market research performed in advance of the design process, according to Grozeva. Because of differences from country to country, the set of services to be offered can

vary greatly. For instance, some markets may lack basic banking services, and P2P transactions might therefore address an unmet demand in the market. Grozeva further explained that there is a basic set of functionalities that MPS providers usually have to offer to attract customers, such as P2P transactions. In addition to these basic functionalities, advanced services can be added, depending on the market. In any case, a clear product strategy and value proposition to the customer has to be the foundation for the choice of end user functionality.

Technology

Technological choices have to start with the business model, customers and end user functionality in mind, Grozeva stressed, since those choices have a large impact on what technologies might be appropriate. This is especially critical for the choice of back-end solution, channel access technology and front-end design. When it comes to back-end technology however, providers are more free to make choices, as there exists a wide range of ready made back-end technologies that offer more or less similar functionalities and complies with what is needed, according to Grozeva. The important thing to remember though, is that the technology should support the providers' business model, plans for future growth and expansion of functionality. One way to achieve this is to choose technology that is scalable in functionality and capacity, module-based, and can be expanded as the demand and product portfolio develops. A final argument that was made by Grozeva is that security, privacy and compliance to internationally recognized standards within the financial services industry has to be a top priority at any time when choosing technology for mobile financial services.

Interoperability

Interoperability choices first and foremost depend on the set of end user functionalities that a provider wishes to offer its customers, according to Grozeva. In most markets there exists some form of financial infrastructure that providers can lean on, such as a national clearing system. This system can either be accessed directly by the provider, or through a partner bank. When choosing to rely on a partner bank, providers need to be aware of the lock-in risk involved with relying too much on one bank in markets with many banks, Grozeva mentioned. As such, interoperability concerns both technical integrations and strategic commercial agreements. Finally, Grozeva added that interoperability is a more important dimension than technology to design a successful mobile financial service. The reason for this being that there exist many adequate technical solutions a provider can use, but only a limited set of interoperability options per specific market.

Additional Observations on Service Design

Grozeva added two observations towards the end of the interview. First, she explained that almost no providers have succeeded with a universal strategy for their payment services across markets. Those who have tried have succeeded only with either a few end user functionalities or in a few markets. This is because local

conditions must be taken into consideration when designing the services. Second, there are several other payment service design dimensions that a model could take into consideration. Examples that Grozeva offered were *business model* and *market and distribution strategy*.

Chapter 10

Telenor Banka's Service Design

In this chapter we will classify Telenor banka's service design according to the dimensions presented in chapter 4. The classification is primarily based on the information collected in the interview with Aleksandar Smiljkovic. As such, it does not represent an analysis of whether the design is suited to the Serbian environment or not. The classification serves as input to the discussion following in chapter 11.

First, a short introduction to Telenor banka is in order. Telenor banka is Telenor Group's first wholly-owned financial institution, located in Serbia. The bank opened in 2014, and is a fully online financial institution that enables customers to use mobile banking services for most banking needs. As mentioned in chapter 2, we refer to Telenor banka's MPS as *Telenor banka* for simplicity.

10.1 End User Functionality

Telenor banka offers two of the four end user functionalities previously outlined:

- **P2P-transfers:** In addition to the traditional process where the sender types in the receiver's bank account number, Telenor banka has added support for sending directly to phone numbers and e-mail addresses, greatly simplifying the process (Smiljkovic).
- **Bill payments:** Consumers can pay all types of bills, domestic and international, through their mobile application. This can be done in two ways. (1) by filling in payment details such as the receiver's bank account number and a customer identification number manually, or (2) receive electronic invoices directly in the mobile bank. The latter implies that the bill comes pre-filled with all the information needed, and all the consumers have to do is confirm the payment (Smiljkovic).

Even though Telenor banka does not offer POS and Web store front as end user functionalities, two remarks are in order. First, through their agreement with MasterCard¹, contactless payment cards are offered. Second, online purchases are also supported through the customers' MasterCard. As such, the two last functionalities are supported through other means than mobile services directly. (Smiljkovic).

10.2 Technology

Telenor banka applies primarily cloud technology in their MPS. The users access the MPS through iOS and Android apps², which in turn communicate with the servers via the mobile data network. This is to support the remote services Telenor banka has chosen as end user functionalities (Smiljkovic).

In addition to cloud technology, SMS is used for sending one time passwords when needed for security reasons (Smiljkovic).

10.3 Interoperability

Telenor banka is a fully owned financial institution, licenced as a commercial bank by the NBS. Because of this, interoperability with other banks is enabled by direct connections to the national RTGS and clearing system. With reference to the previous mentioned options for interoperability, Telenor banka corresponds to the *partner bank* option, with the exception of Telenor having acquired the bank instead of partnering with it. Additionally, Telenor banka issues MasterCards which are compatible with merchant terminals supporting MasterCard PayPass. Beyond this, there are no forms for direct interoperability with other MPSs, as these are still in the test-pilot phase. Figure 10.1 below illustrates Telenor banka's interoperability.

¹Telenor Group (2015) Financial Services, <http://www.telenor.com/innovation/financial-services/>

²Telenor banka (2014) Products and services / E-banking, <http://telenorbanka.rs/en/Retail/E-banking/>

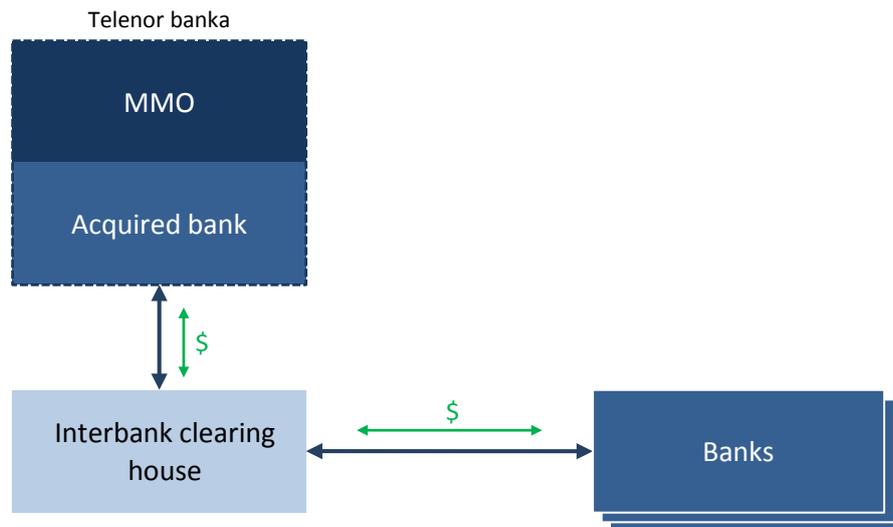


Figure 10.1 – Interoperability through an acquired bank

10.4 Summary of Analysis

A summary of Telenor banka’s service design is shown in Figure 10.2 below.

End user functionality	P2P	POS	Bill payments	Web store-front
Technology	NFC	Barcodes/QR	Cloud technology	SMS
Interoperability	Bilateral agreements	Single-point switch	Commercial processor	Partner bank

Figure 10.2 – Summary of Telenor banka’s service design

Chapter 11

Discussion

This chapter sets out to discuss the applicability of our proposed framework. The discussion consists of five sections. First, a comparison of the potential service designs for Serbia and Telenor banka's service design is provided. Second, the viability of using contingency environments and factors for service design decisions is explored, supported by the practitioner interviews. Third, a discussion of the service design dimensions is provided, also based on practitioner interviews. Fourth, we highlight several alternative perspectives to our proposed framework. The fifth and final section summarizes the discussion and provides a revised framework.

To ease the readability of the discussion, each section is addressed in a sequential manner and concluded with key takeaways, as described by Figure 11.1.

Discussion	11.1 Comparing Potential Designs with Telenor banka
	11.2 Contingency Theory Environments and Factors
	11.3 Service Design Dimensions
	11.4 Alternative Perspectives to our Framework
Summary	11.5 Proposing a Revised Framework

Figure 11.1 – Overview of the discussion

11.1 Comparing Potential Designs with Telenor banka

This section presents a comparison of potential service designs in Serbia and the service design of Telenor banka. The three service design dimensions are examined and discussed in a sequential manner, followed by an overall assessment.

11.1.1 End User Functionality

The end user functionalities of potential service designs for a MPS in Serbia include P2P transfers and bill payments as the most viable options. This is similar to the service design of Telenor banka. In the set of viable functionalities, P2P transfers and Bill payments were considered viable mainly due to their attractive value proposition to customers and the facilitating financial infrastructure in Serbia. Providing end-user functionality on the rationale of satisfying customers need is highly in line with Telenor banka's approach (Smiljkovic).

Additionally, the potential service designs include POS and web store-front payments as somewhat viable options. The desktop study of Serbia indicate that both of these functionalities have a large future potential, but are dependent on customer behavioral change. In line with this, Telenor banka does not currently support POS. However, the bank issues MasterCards compatible with contactless payment. More over, Smiljkovic indicates that Telenor banka will include POS as soon as their customer base is of an adequate size, in support of the set of potential service designs.

Overall, the potential end user functionalities are mostly in line with those of Telenor banka.

11.1.2 Technology

The potential service designs in Serbia suggest that all technology options are viable. This deviates from the technologies applied in Telenor banka, where only cloud technology, and SMS-technology to some extent, are currently applied to support the end user functionalities. As the set of potential service designs explores all viable options, with some being alternatives to one another, it follows naturally that the results deviate some from Telenor banka, where only complimentary technologies are included.

NFC was regarded a viable option in the near future, however an alteration of the present purchasing behaviour is suggested necessary, similar to the arguments given for POS. Although not currently applied, Telenor banka is positioning themselves to support the technology in the future, in support of the potential service design.

The rationale for the technology decisions also differs somewhat between the

potential service designs and the service design of Telenor banka. The potential service designs are chosen based on an assessment of a technology's viability, with input from all four contingency environments. As such, the decision is based on a comprehensive evaluation of all possible options. This method differs from how Telenor banka came to their decision about what technology to implement. According to Smiljkovic, technology is first and foremost regarded as a means for providing the desired end user functionality. As a result, decisions on technology are not made isolated, but rather in conjunction with other decisions. However, we assume that factors beyond customer centricity are regarded as preconditions for technology choices. As an example, Telenor banka uses cloud technology, which is dependent on mobile data coverage. Even though this technology was chosen to maximize the user experience, it is natural to assume that the existence of a functioning 3G network in Serbia served as a precondition for this decision.

Overall, the set of potential technologies and approach deviate somewhat from that of Telenor banka.

11.1.3 Interoperability

The potential interoperability options for a MPS in Serbia include (1) partnership with bank combined with bilateral agreements, and (2) using a commercial processor combined with bilateral agreements. The market conditions, such as a fragmented banking industry and limited supporting infrastructure, influenced the possibilities the most.

An assessment of the interoperability of Telenor banka reveals many similarities. The first proposed option represents Telenor the most, with the exception that Telenor has *acquired* a bank rather than *partnered* with one. As a licenced commercial bank, Telenor banka interoperates with the banking industry through the national RTGS and clearing system. However, no bilateral agreements are currently implemented as there are no other well established MMOs to collaborate with.

Telenor banka launched their services prior to the new law on payment services. At the time of launch, a banking license was required in order to provide payment services, and consequently the second option of interoperability was not viable. More over, as Telenor banka provides financial services beyond mobile payments, a banking license is still required, also limiting the interoperability options.

Smiljkovic suggests that decisions on interoperability are based on external factors, with a facilitating infrastructure and prevalence of card schemes as the main drivers. A similar rationale influenced the decision on interoperability in our set of potential interoperability options in Serbia. The absence of a commercial processors, with the exception of DinaCard's acquiring system, limited the possible options.

Overall, the set of potential interoperability options share many similarities with

the service design of Telenor banka. This holds for both the viable options and the rationale taken into consideration.

11.1.4 Overall assessment

From the three former subsections we see that the set of potential service designs in Serbia correspond well with the design chosen by Telenor banka. The most notable deviation was within the technology dimension, where Telenor used the contingency environments more as a precondition than factors affecting the decision. In addition to the corresponding design, the factors taken into consideration when deciding on a design also correspond to a large extent. From this we can conclude that our framework's approach to finding viable service design options yield the same results as practitioners' approach, strengthening the case for our framework.

Takeaway 1: The potential service designs identified by applying our proposed framework to Serbia corresponded well with the service design of Telenor Banka.

11.2 Contingency Environments and Factors

This section will examine the viability of using contingency environments and factors in decisions regarding MPS design. Initially, we present an overview of the most prominent contingency environments and factors used in the analysis of potential service designs for a MPS in Serbia. Next, the overview is discussed in light of practitioners' assessment of the influencing factors, finally followed by concluding remarks.

11.2.1 Prominent Contingency Environments and Factors in our Analysis

In order to discuss the impact of the contingency environments and factors, we have performed an assessment based on the analysis in chapter 8. We assessed whether a listed factor enabled, disabled, or served as a precondition for a design option. If the factor enabled or disabled the option, the factor was considered to impact the dimension. If the factor was a precondition or did not limit the decision, it was considered to not impact the decisions in any *particular way*. The assessment was conducted in a sequential manner for all factors and dimensions of the service design. The more a factor impacted a dimension, the darker the corresponding color in Table 11.1, which also illustrates the aggregated impact of each contingency environment.

Table 11.1 demonstrates a somewhat heterogeneous distribution of the four environments' impact on the service design. The factors in social/cultural

Contingency Environment	Contingency Factor	End user functionality	Technology	Inter-operability	Environment sum
Social/cultural	Payment Culture	High	Medium	Low	High
	Purchasing power and appreciation for leisure	Low	Medium	Low	
	Education Level	Low	Low	Low	
	Demographic Composition	Medium	Low	Low	
Commerce	Financial Services Infrastructure	High	Medium	High	High
	Telecommunication infrastructure	Low	High	Low	
	Supporting Industries	Low	Low	Low	
Technological	Handset Technology	Low	Medium	Low	Medium
	Merchant Terminal Technology	Low	Low	Low	
	Identification and authorization systems	Low	Low	Low	
Legal	National and International Regulation	Low	Low	Low	Low
	Standardization	Low	Low	Low	

Table 11.1 – Impact of contingency factors on proposed service designs for Serbia

environment imposes the greatest impact on the service design, closely followed by the factors of the commercial environment. And conversely, the factors of the technological and legal environments impose little impact on the service design. Two main reasons might explain this distribution.

Firstly, the technological and legal environments include a higher amount of pre-conditions compared to the others, as we see it. According to our assessment described above, those environments were therefore not considered to impact the alternatives in the service design as much. This seems reasonable, as especially the legal environment includes laws that providers of a MPS must comply with across all options and dimensions. Further, one might assume that the technology environment differs the least across markets, as technological novelties are readily available by many international commercial actors. Consequently, these environments do not impact significantly in any direction.

Secondly, it is obvious that some individual factors impose relatively greater impact on the service design. Most notably are *financial services infrastructure* and *telecommunication infrastructure*, as they are considered elementary for providing a MPS. Additionally, modern payment services are still novel in Serbia, making

payment culture a prominent factor.

Even though Table 11.1 indicates that some factors and environments influence the service design more than others, two notes should be made. First, we would like to emphasize that our assessment was subjective and thus limits other researchers' ability to track our chain of evidence. Second, the assessment represents the influence of environmental factors on a specific *set* of service design dimensions. If one were to alter the set, by introducing for example a MMO ownership structure dimension, it is reasonable to believe that the distribution of influencing factors would be altered as well. The alteration would probably increase the impact of at least the legal environment. Consequently, this latter note greatly influences the generalizability of our assessment outside the immediate framework.

11.2.2 Practitioner's Assessment of Influencing Factors

When mapping the market environment for a new MPS, Mariana Grozeva describes a three-step approach. In short, three main characteristics of the market are emphasized: (1) regulations, (2) commercial environment and (3) customer needs. Grozeva further suggests that this is a universal approach, implying that the same characteristics are considered for all markets.

The importance of regulations for a provider of payment services goes without saying. However, its influence on the service design was not captured by Table 11.1 as it was considered a pre-conditions for the viable service design, as described in the former section.

In all interviews, commercial infrastructure were suggested as having greatest influence on the service design, especially with regards to interoperability. Both Rankovic and Smiljkovic argued the challenge of a satisfying interoperable service, as it is mainly driven by available financial infrastructure in the market (including banks, payment clearing systems and card schemes). More over, Gjersum explained that using established infrastructure to easing the implantation of their service was an important strategic decision for Valyou. As a result, NFC technology was chosen partly due to to compatibility with international card schemes. These findings are aligned with the influence of the commercial environment demonstrated in Table 11.1.

Not captured by Table 11.1 is the importance of supportive collaboration between the banking and telecom industry for a sustainable MPS ecosystem. Gjersum highlights how this collaboration has improved the Norwegian ecosystem for MPSs. He also highlights how absence of such collaboration can significantly impede the deployment of MPSs. We did not detect any significant collaboration attempts between the banking and telecom industry in Serbia, and its impact on the service design was therefore not considered, in accordance with the method described above.

Both Gjersum and Rankovic argued that they relied on other commercial actors

during the launch of their services. Gjersum explained that Apple's choice of NFC technology reinforced their own choice. They further also relied on best practices from other practitioners and consultancies for decisions regarding their service design. These influencing factors were not emphasized in our assessment. This might be because we undervalued the importance of using best practice from other markets or major commercial actors.

Gjersum further explained that the choice of POS payments as the main end user functionality was greatly affected by Valyou's intention to comply with customers' purchasing habits. This is in line with the environmental factor *payment culture* in our framework, and the fact that the factor was considered to have high impact in Table 11.1.

Although Grozeva describes a universal approach used by Telenor Financial Services for assessing the influential factors of a market, she also argue that almost no providers have succeeded with creating a universal strategy for payment services across markets. This underpins the need to take local conditions, such as customer needs, into consideration to create a successful MPS.

Independent of service design dimension, a customer-centric approach was a driving influence in decisions regarding development and implementation of payment services (Rankovic, Smiljkovic). More over, Smiljkovic emphasizes that addressing actual customer needs was the single most important success-criteria for Telenor banka. Consequently, decisions regarding other service design dimensions were affected. For example, Telenor banka considered the technology dimensions a means to an end, i.e. to meet the customer needs in a satisfying manner (Smiljkovic). Additionally, Smiljkovic explained a typical misunderstanding in the MPSs industry. Namely to base pilot tests on technology innovations rather than meeting customer demands in new ways. NFC-pilot projects was mentioned as an example that frequently appears.

Customer need is not explicitly included in the list of contingency factors. Given its importance to practitioners, one might argue this could represent a significant shortcoming in our framework. However, as our framework includes factors that can function as proxies for customer needs, such as *payment culture*, we consider them implicitly covered. As the framework's contingency factors take differences across markets into consideration, it will also take differences in customer needs into consideration. As such, our framework makes allowances for practitioners mindset and approach. This is confirmed by Rankovic who states that contingency is well suited for analyzing the environment of MPSs.

In conclusion, there are many similarities between the practitioners' and our assessment of the influencing factors. Our framework is therefore in line with practitioners' approach, further strengthening the case for our framework.

Takeaway 2: The factors identified by our framework as most influential to service design decisions, correspond well with practitioners own assessment

on the manner.

11.3 Service Design Dimensions

As described in chapter 2, the service design in our proposed framework emerged from multiple iterations with researchers in the field of MPSs. This resulted in the three dimensions end user functionality, technology and interoperability. We assumed that the iterative process shed enough light on which service design dimensions were most important for practitioners, and that the three dimensions would serve as a good foundation for our research in this part of the thesis. Conducting interviews with practitioners has shed further light on this assumption, which will be elaborated and discussed below.

11.3.1 End User Functionality

Rankovic suggests that end user functionality is one of the most important dimensions to consider within MPS design. A reason for this is the unfortunate evolutionary approach financial institutions have undertaken when providing new service generations. This approach has resulted in mobile services that are restricted subsets of traditional services. Rankovic suggests that providers instead should re-think their value proposition, emphasizing the importance of addressing customer needs when developing new services. Such an approach is highly appreciated by all other practitioners interviewed. As a result, Valyou and Telenor banka provide different sets of end user functionalities to meet their customers' demand. Valyou's customers are commercial banks, and Valyou therefore offers services that complement the banks' services. Telenor banka's customers are the end users, hence they instead offer P2P transactions and bill payments that fits with the existing Serbian payment culture.

Due to the importance for practitioners, including end user functionality as one of the service design dimensions in our framework is considered highly relevant.

11.3.2 Technology

Several practitioners explain how decisions regarding technology in service design is greatly affected by the practitioners aim to satisfy customer needs. Once the end user functionality of a service is decided, Rankovic suggest technology is applied as a means for realizing the desired functionality. Consequently, technology decisions are in practice subject to chosen end user functionalities and market conditions. This reasoning is supported by all interviewees. More over, several interviewees suggest technology decisions are subject to the least constraints, as technological novelties rapidly spread across markets.

Further, several interviewees showed greater interest in other technological aspects of MPSs than the one we address. Recurring examples were technology related

to security, such as identification and authorization systems. Because of the complexity of these technological aspects and the given scope of our thesis, we did not pursue them any further. Due to this reasoning, we conclude that our technology dimension offers limited value to practitioners as is.

11.3.3 Interoperability

All interviewees suggest interoperability is the service design dimension that represents the greatest challenge for practitioners. A reason for this is the major influence of existing financial infrastructure on viable interoperability options. Because of the high costs of establishing new interoperability schemes, Rankovic suggests that viable options are in practice restricted to what the current infrastructure enables. Most markets today have a infrastructure designed for traditional bank-oriented financial services, not for MPSs. The interoperability dimension is therefore highly relevant for practitioners.

11.3.4 Overall Assessment

The previous subsections demonstrate that practitioners and researcher generally agree on the importance of the chosen service design dimensions, with the exception of technology. Practitioners also highlighted other dimensions that could have been included in the framework:

- **Business model.** As highlighted several times by Grozeva, business models are important to evaluate. A sound business model will ensure that the MPS contributes positively to Telenor's economy and that external partners find it attractive to collaborate with and adopt the service.
- **Identification.** Proper identification-mechanisms to identify the customers is important to ensure a safe and user-friendly MPS, as mentioned by Smiljkovic. The degree of challenge associated with user-identification varies from country to country.

We can therefore conclude that two of our dimensions, *end user functionality* and *interoperability*, are regarded as most relevant by practitioners. Also, other dimensions can potentially be added as well. This point will be further discussed in the last section of this chapter.

Takeaway 3: End user functionality and interoperability are the dimensions regarded as most important by interviewed practitioners.

11.4 Alternative Perspectives to our Framework

According to Yin (2013), a discussion of alternative perspectives is in order for case studies such as the one we have undertaken. This section will therefore address

other perspectives that could have been used to analyze our findings.

One of the clearest alternatives to our framework is provided by Pousttchi et al. (2009), who have created a framework for analysis and engineering of MPS's business models. Even though the focus of the framework is the business model, several of its elements are similar to our design dimensions. For example, the relationship building block (Pousttchi et al. 2009, p. 377) corresponds somewhat to our Interoperability dimension. Further, their model uses a set of options for each building block, an approach similar to ours. In other words, the model represents a realistic alternative to our own framework.

As previously referred to, Dahlberg et al. (2007) has a framework based on contingency theory and Porter's five competitive forces. Their framework represents a slightly different approach, as the five forces are seen as affecting the payment service provider in addition to the external factors. A parallel can be drawn to our model. For example, Dahlberg et al. discusses merchant's power over service provider. This is related to our environmental factor *merchant terminal technology*, in that the established terminal standard forms a precondition for viable design options. As such, Dahlberg et al.'s framework does not undermine our framework, but merely provides another perspective we acknowledge. It should also be noted that Dahlberg et al. constructed their framework to support their literature review.

Rankovic et al. (2013) introduce an overview of MPSs which incorporates three distinct flows, *product*, *data*, and *money* flows. Although this framework or model gives a good understanding of MPS design, it also has some limitations. It does not provide a complete overview of all the design choices practitioners have at their disposal. As mentioned above, our framework does not either, but it is however made clear to the reader where additional dimensions fit in the framework. This is not the case in the model presented by Rankovic et al.

Several authors discuss the role of the different market players, such as Gaur & Ondrus (2012) who discuss banks' role. Also, a considerable amount of the existing literature concerns adoption factors of MPSs, as mentioned in chapter 2. Zampou et al. (2012) describe how this literature mostly is based on behavioral theories, such as the Technology Acceptance Model (Davis 1989). This latter approach could be used to gain an understanding of which design options give the highest adoption rates. Although these are very important contributions, we feel they do not offer the same broad overview of the service design as our proposed framework.

It also seems appropriate to address the more general strategic frameworks and tools, such as SWOT-analysis and Porter's 5 competitive forces. SWOT-analysis is one of the most respected and used strategic planning tools, as agreed by several authors (Helms & Nixon 2010). Helms & Nixon further explains how its simplicity enables practitioners to assess alternatives in complex situations. Porter's 5 competitive forces (Porter 2008) is another well renowned strategic framework.

It is used among others by Dahlberg et al. (2007) in their framework, as described above. Despite the fact that these are well established frameworks, we feel that they do not offer the granularity that is needed when making decisions about MPS design.

As mentioned in the above sections, practitioners interviewed have also used other approaches to determine the system design. Two approaches are particularly noteworthy at this point. First, Valyou extensively used established industry best-practices during the launch of their service (Gjersum). These best-practices enabled Valyou to use technological standards etc. that had been tested thoroughly in the industry, thus reducing time to market and cost. Second, Telenor banka had a meticulous customer-centric approach to their design process. They also considered environmental factors, such as banking regulation, mere preconditions for the design choices (Smiljkovic). The best-practice approach used by the interviewed practitioners necessarily represents a viable alternative perspective on our findings. If not to say that it can represent an gap between our theory and practice, which has been a known problem in scholarly thinking in the past (Kessels & Korthagen 1996).

In summary, there are several plausible alternative perspectives that can explain our findings. While we acknowledge these alternatives, we stand by our initial arguments in part one for the choice of contingency theory as an approach to analyzing MPS design.

Takeaway 4: Our framework represents a satisfying alternative to other approaches for analyzing MPS design.

11.5 Proposing a Revised Framework

The above assessments of our framework have brought forward several interesting insights.

Initially, it was demonstrated that the potential service designs identified by applying our framework to Serbia corresponded well with the service design of Telenor Banka. Moreover, the factors identified by our framework as most influential to service design decisions aligned with practitioners' own assessments. These findings suggest two important characteristics of the framework. Firstly, using contingency environments and factors to identify the market characteristics that influence service design decisions seems like a viable approach. Secondly, the subjective assessment needed when assessing a factor's influence on service design does not seem to compromise the outcome in a noteworthy manner. This latter condition is reasoned by the fact that our suggestion of influential factors corresponded well with those of practitioners, despite our lack of corresponding industry expertise. Moreover, practitioners suggested additional influencing factors, such as MNO and banking collaboration and driving commercial actors. Although these were not accounted for in our assessment, a post-evaluation of the

impact on viable options did not alter the potential service designs.

The above discussions indicate that researchers and practitioners agree on the importance of the chosen service design dimensions, with the exception of the technology-dimension. There is little doubt that technology is important in service design, as Lacmanovic et al. (2012) underpins how most successful service providers will be "those that combine visionary technology with strong customer centricity" (p. 1774). However, as mentioned above, feedback from practitioners suggests that our approach to technology offers limited value. Instead, focusing on a specific technological element, such as channel access technology, might offer considerably more value. Additionally, Grozeva adds that, from a strategic perspective, interoperability is a more important dimension than technology. The reason being that there exist many adequate technical solutions a provider can use, but only a limited set of interoperability options. For these reasons, we propose that the current technology dimension of our framework is removed.

Further, we suggest that contingency environments and factors have an impact on all service design dimensions. However, it is reasonable to believe that an alteration of service design dimensions will accompany an alteration of a factor's degree of impact on the service design. We therefore see two possible approaches for revising the framework.

First, one can make an effort to understand the degree of impact of each factor on the service design. This approach would require us to keep the contingency environments and set of service design dimensions static. As previous findings suggest that commercial and sociocultural environments are most prominent, thoroughly addressing these two would be interesting. However, as we have limited amount of empirical findings on the degree of impact of the factors, further research would be required to follow this approach.

The second way to revise the framework is to only keep the contingency environments static, and alter the set of service design dimensions according to practitioners' desire. This alteration could be done by both adding and removing dimensions. This alteration excludes the opportunity to understand the degree of each factor's impact on the service design, as described above. However, the value of the framework for practitioners is expected to increase as it facilitates the possibility of addressing all desired service design dimensions, instead of limiting itself to few. For example, Grozeva mentions several times that the business model dimension is an interesting dimension. Moreover, as all interviewees represent services in Europe, it is quite possible that practitioners from other markets would have been preoccupied with other dimensions.

Our belief is that the second approach is the most appropriate to follow. Two reasons suggest that this is the best alternative. First, the contingency environments and factors are theoretically grounded, as they are a result of a literature review. The system design dimensions however, are a result of practitioners' input, and are thus limited to a minor number of subjective

contributions. As such, one can argue that only the contingency environments are sufficiently grounded, whilst the service design dimensions are affected by the interest of the practitioners included in the study. By only keeping the contingency environments static, we therefore reduce the limitation of this subjectivity. Second, the latter approach is assumed to be most aligned with practitioners' customer-centric approach. It is assumed that the influence of each environment changes in line with customer needs from market to market. As such, by considering all environments without ascribing greater importance to any specific environment or factor, the framework is more receptive to market-specificities.

Even though we suggest that the set of service design dimensions can be altered according to practitioners' desire, we propose that *end user functionality* and *interoperability* form a basis for any service design. This is because of the importance of the dimensions to the interviewed practitioners. Beyond this, every desired service design dimension can be included. We expect the chosen set to be the result of the characteristics of the market and BU.

To conclude the discussion of our findings, we propose a revision of our framework from part one. The original four contingency environments remain unchanged, but some changes on the service design dimensions are proposed. In line with the above arguments, end user functionality and interoperability are considered to form the basis for service design. To account for practitioners' desire and differences in market contexts, further dimensions can be added at practitioners' discretion. The resulting revised framework is illustrated in Figure 11.2 below.

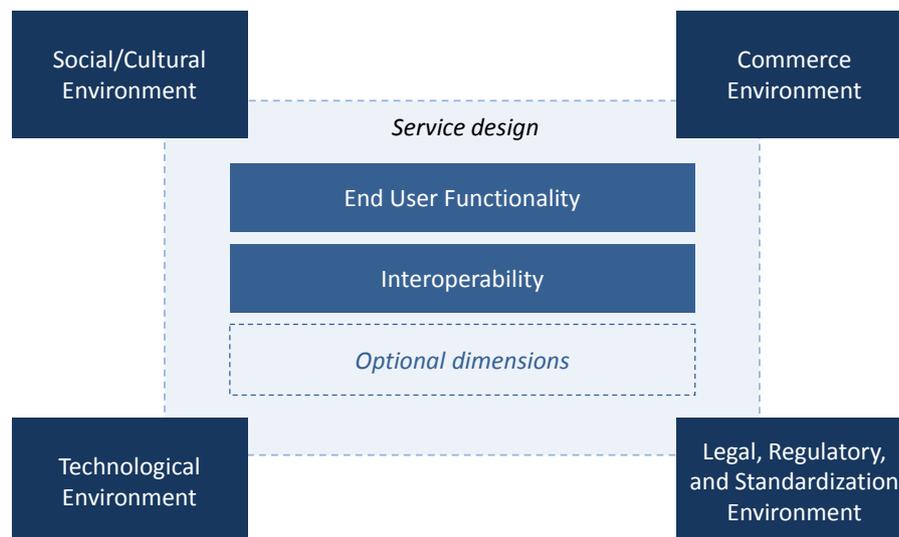


Figure 11.2 – The revised framework for analysis

Chapter 12

Concluding RQ2

This second part of our thesis has aimed to provide an assessment of the proposed framework's general applicability, by answering the research question:

RQ2 How do findings from RQ1 compare to Telenor practitioners' approach to mobile payment services design?

The research question was approached in a stepwise manner. First, secondary data of the Serbian MPS environment was collected, enabling us to use our framework for exploring potential service designs. Second, interviews were conducted in order to (1) examine Telenor banka's service design, and (2) understand practitioners approach to designing MPSs. These two elements formed the basis for the following discussion. The discussion compared our set of potential service designs for Serbia with Telenor banka's design, explored the impact of the environmental factors on the service design, and finally evaluated our choice of service design dimensions.

The discussion resulted in two conclusions. First, contingency environments and factors are well suited to understand what impacts the service design of MPSs. Second, two service design dimensions were proposed to form a basis for all system design, namely *end user functionality* and *interoperability*. These basic dimensions can be supplemented by several other dimensions, at practitioners' discretion. The resulting revised framework is shown in Figure 11.2.

Through these steps we have tested the framework to assess its general applicability. We therefore conclude that RQ2 has been answered.

Part III

Assessing the Bulgarian MPS Market

Introduction to Part Three

In this final part of our thesis we address RQ3 through a screening similar to that presented in part two. Chapter 13 gives the reader an overview of the empirical data regarding the Bulgarian MPS environment, collected through a desktop study. The data is presented in a purely objective manner, and is intended for readers particularly interested in the background supporting our analysis. Next, chapter 14 assesses viable service design options, in order to indicate whether Bulgaria represents an interesting market for Telenor. The assessment follows the revised framework presented in section 11.5, with two design dimensions, end user functionality and interoperability as shown in Figure 12.1. Finally, chapter 15 concludes part three and answers RQ3.

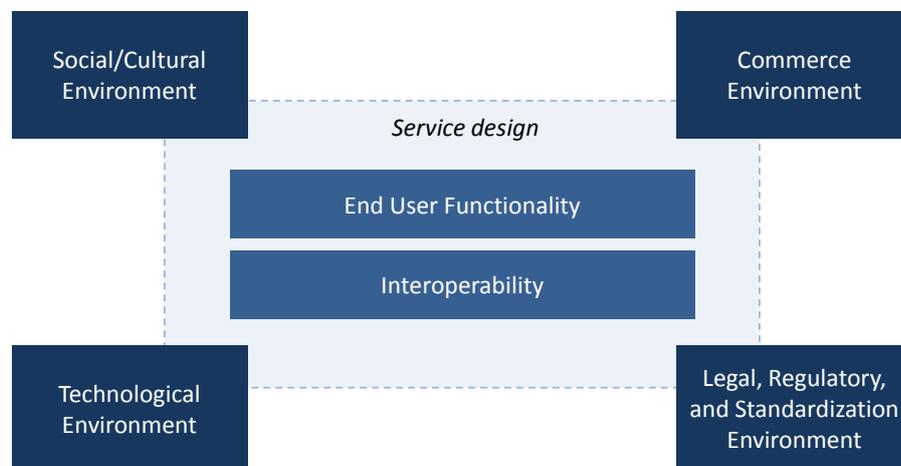


Figure 12.1 – Framework applied for assessing the Bulgarian MPS Market

Chapter 13

Bulgarian MPS Environment

In this chapter, we will present our findings from the desktop study of the Bulgarian MPS environment. The findings will be presented according to the four contingency environments outlined in chapter 3.

In retrospect, we see that not all of the listed findings directly influenced decisions on service design, as presented in the next chapter. However, we suggest all findings are important for an adequate description of the context for MPSs, so they are included in spite of this.

13.1 Social/Cultural Environment

13.1.1 Payment Culture

Cash-Centricity

The Bulgarian population prefers cash for most of their transactions (Euromonitor 2014a), despite the fact that a majority of consumers own a payment card. Payment cards are used 2-5 times per month, and primarily for withdrawing money at ATMs. Most online purchases are also paid for by cash on delivery, even though services such as PayPal are starting to become more popular (Euromonitor 2014a).

Adoption of Existing Services

ATMs in Bulgaria often support bill payments, usually utility bills and loan repayments. According to Euromonitor (2014a), these services are becoming increasingly popular. Further, households in Bulgaria are starting to use the online channel to make retail shopping, with 44 % of consumers preferring to purchase goods online (Euromonitor 2014a). PayPal is popular among young consumers, especially for international purchases. Domestically, urban dwellers have started to use ePay.bg to pay bills, transfer money peer-to-peer, and perform online purchases (Euromonitor 2014a).

According to Euromonitor, mobile shopping is also gaining ground. One-third of consumers report using mobile phones for online purchases several times a year, and 17 % report using it up to several times per month.

Attitudes to Financial Institutions

The World Bank (2012) reports that Bulgarian consumers have limited financial knowledge and low trust in privately owned financial institutions. One of the reasons given for this is the fact that there still remain many gaps in the legal financial consumer protection framework.

13.1.2 Purchasing Power and Appreciation for Leisure

Purchasing Power

The Bulgarian purchasing power is currently low (Business Monitor International 2014), and is at USD 13.800 per capita, placing them at 92nd place worldwide (CIA 2013). This corresponds to 35th place in Europe, right behind Serbia¹.

The country also has a rapidly increasing unemployment rate at 13 % in 2013 (Euromonitor 2014a). According to Euromonitor, this has reduced the spending power of the growing middle class. Nevertheless, Euromonitor expects the purchasing power to increase in the near future, supported by Business Monitor International (2014). However, Business Monitor International (2013) reports that research and statistics about purchasing power in Bulgaria are hindered by a large grey market, which is near 40 %.

Appreciation for Leisure

In Bulgaria, the most popular leisure time activity is watching TV (Euromonitor 2014a). Second to watching TV, using a computer is the next most popular activity. This activity is comprised of both browsing the Internet and playing games, and in total amounts to about 1,4 hours per day on average. The increasing penetration of Internet is increasing the time spent on computer-related activities. The introduction of Wi-Fi networks has also enabled Bulgarian consumers to have several Internet enabled devices connected simultaneously (Euromonitor 2014a).

Price Sensitivity and Other Preferences

Bulgaria has a culture of price sensitivity, similar to many other Eastern European countries (Business Monitor International 2014), and consumers often look for discounts and special offers during their weekly shopping (Euromonitor 2014a).

There are two main types of consumers in the Bulgarian market, according to Euromonitor. First, the "out of touch" consumer, who has value-oriented spending habits and look for the best price/quality ratios during shopping. This behavior is

¹GfK (2013) GfK Purchasing Power Europe, <http://www.gfk.com/news-and-events/press-room/press-releases/Pages/purchasing-power-europe-2013-14.aspx>

underpinned by the fact that over 70 % of the population performs online research in advance of major costly purchases. Second, is the "European consumers", who focus on quality and healthy lifestyle. These consumers try to mirror similar trends in other European cities, and are primarily residing in the larger cities.

13.1.3 Education Level

The educational system in Bulgaria is similar to many other European countries, with basic education, secondary schools, colleges and universities. With regards to education level attainment rates, above 50 % of the population finishes upper secondary school, and above 20 % attains university degrees (National Statistical Institute 2014). According to CIA (2013), the literacy rate of the total population of age 15 and above is 98.4 %.

13.1.4 Demographics

Demographic Composition

The Bulgarian population's demographic composition according to age groups is shown in Figure 13.1 (Euromonitor 2014a).

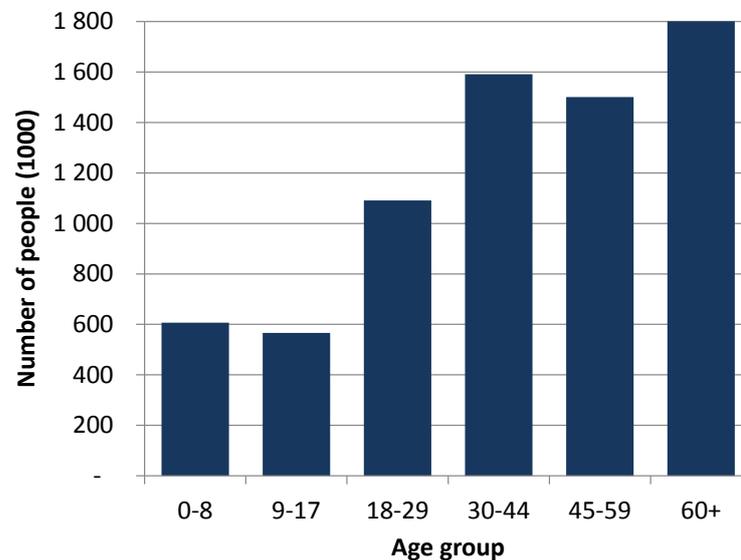


Figure 13.1 – Bulgarian demographic composition

According to CIA (2013), Bulgaria has the world's 17th oldest population, with a median age of 42,6 years. Economic uncertain times provoke couples to postpone having children, creating a sharp decline in birth rates. As a result, Bulgaria's population is aging with an unprecedented speed worldwide (Euromonitor 2014a).

Labour Mobility

As a part of the EU, and with the right to free movement, the Bulgarian population is now free to migrate to EU countries and seek work there². According to Euromonitor (2014a), Bulgaria is seeing growing outward migration. The migration is also enabled by new ATM services offering convenient remittances, which has become quite popular in Bulgarian ex-pat communities (Euromonitor 2014a).

13.2 Commerce Environment

13.2.1 Financial Services Infrastructure

Industry Consolidation

Bulgaria's banking sector has improved significantly the last two decades. Bank supervision was lax during the early 1990s, with collusive relations and unprofitable loans granted by state-owned banks (Arton Capital Bulgaria 2015). Major reforms influenced by stronger supervision and tighter prudential rules for the banking sector (PacNet Services Ltd. 2011), enhanced by additional demands following the EU-membership (European Central Bank 2007), has stabilized the banking sector. As of today, 90 % of all banks are privatized (Arton Capital Bulgaria 2015), and foreign banks hold over 70 percent of bank capital (PacNet Services Ltd. 2011).

However, recent episodes might suggest the banking system of Bulgaria is still facing challenges. Two commercial banks recently sparked a shock to the system when they were discovered to run on deposits (BBC Monitoring European 2014b), and mid-2014, the fourth largest bank in the country closed³. More over, the Bulgarian National Bank (BNB) has recently found it necessary to impose additional laws against those who disseminate misleading or untrue information (BBC Monitoring European 2014a). Additionally, World Economic Forum (2014b) reports that corruption and poor access to financing, in addition to inefficient government bureaucracy, is the most problematic factors for doing business in Bulgaria (World Economic Forum 2014b).

Payment Instruments

As of today, 29 commercial banks operate in Bulgaria (PacNet Services Ltd. 2011). In 2014, 63 % of all Bulgarian inhabitants aged 15 and more had an account at a formal financial institution (The World Bank 2014c). More over, 55,9 % possessed a debit card in 2014 and 24,8 % a credit card (in 2011) (The World Bank 2014c). Payment cards in Bulgaria have had a positive growth lately, mainly driven by

²Coulter/LSE (2014) New European Trade Unions Forum, <http://blogs.lse.ac.uk/netuf/2014/07/28/314/>

³Euromonitor International (2015) Direct Selling in Bulgaria <http://www.euromonitor.com/direct-selling-in-bulgaria/report>

rising consumer awareness for electronic payments and the adoption of new technology such as contactless cards (World Bank 2015).

Payment System

BNB operates as the central bank of Bulgaria. It plays a key role in the Bulgarian economy, maintaining the stability of the Bulgarian currency, in addition to strengthening and developing the banking and credit system (Bulgarian National Bank 2015). More over, BNB is responsible for the interoperability and integration of the Bulgarian payment system (European Central Bank 2007).

Several significant measures have been taken the recent years for the improvement of the Bulgarian payment system (European Central Bank 2007). In 1992, a banking integrated system for electronic transfers (BISERA) was introduced, enabling interbank client payments in national currency initiated for settlement at a designated time (Bulgarian National Bank 2015). In 1995, The Bank Organisation for Payments Initiated by Cards (BORICA) was established, enabling card processing in Bulgaria (Bulgarian National Bank 2015). Additionally, a real time gross settlement system (RINGS), launched in 2003, provides final settlement for all payments in the country (European Central Bank 2007). Most recent, a system for servicing interbank client payments in euro initiated for settlement at a designated time BISERA7-EUR was put into operation in 2010 (Bulgarian National Bank 2015).

Actors in the Bulgarian payment system are (1) system operators (e.g. BORICA and BISERA), (2) performing institutions (issuers of electronic payment instruments) and (3) payment mechanisms in settlement systems (e.g. RINGS).

BORICA, a joint venture by BNB and 28 of the commercial Banks in Bulgaria, is a key actor in the Bulgarian payment system, which develops and maintains the whole infrastructure. According to (Borica 2015), the activities of BORICA include (1) designing and operating payment systems, (2) interbank money transfers, (3) providing interoperability with local and international authorization centres, card operators and payment systems operators, and (4) designing and operating authorization systems for card payments.

PacNet, a commercial provider of international payment processing services, operates in Bulgaria. PacNet offers several services: (1) enabling merchants to accept card payments, (2) depositing and clearing of third-party checks, (3) direct debit (ACH) and eCheck processing, and (4) local electronic payment (PacNet Services Ltd. 2011).

BNB owns and operates RINGS, and all licensed banks are participants. The following operations is executed in RINGS ⁴:

- All payments for which the original initiator and the ultimate recipient have

⁴Bulgarian National Bank (2015) Real-time Gross Settlement System in Bulgaria - RINGS <http://www.bnb.bg/PaymentSystem/PSRealTimeGrossSettlementSystem/PSRTGSSIntroduction/index.htm>

settlement accounts with the BNB.

- Payments initiated by payment systems or securities settlement systems whose settlement agent is the BNB.
- Bank customers' payments equal or exceeding BGN 100.000.

Online Banking

Our desktop study showed that all commercial banks provide Internet banking to their customers. All traditional banking services are offered through this channel, such as bill payments, money transfers and account handling.

Existing Mobile Money Operators

According to World Bank (2015), MPSs are gaining popularity in Bulgaria, and are being offered by banks, private companies and technology providers. We uncovered the following initiatives by mobile operators:

- **iPay:** Globul (Prior to being acquired by Telenor) and InterCard Finance launched iPay in 2012. The service includes amongst other contactless sticker POS-payment with Mastercard PayPass, bill payments and P2P transfers⁵.
- **MobilTel (Mtel):** In collaboration with First Investment Bank, Mtel launched a NFC mobile payment trial in 2012⁶, enabling POS payments to NFC-enabled smartphones by MasterCard PayPass (Business Monitor International 2015a).
- **CellumPay:** MNO Vivacom and the leading European-based mobile wallet provider Cellum offers several payment services through the application Cellumpay, amongst other bill payments by QR-code technology⁷.

Additionally, several service from non-telecom operators were identified:

- **Mobb:** A MPS offered by the payment system operator BORICA, including POS payment and P2P money transfers⁸. Mobb is enabled for all existing cardholders with cards issued by Mobb partner banks.
- **ePay.bg:** By using ePay.bg, customers can make mobile payments from bank cards or micro accounts, and additionally send and receive money through the same channel⁹.

⁵iPay (2015) iPayTag, <https://www.ipay.eu/nor/en/personal/web>

⁶Telecompaper (2013) and confirmed the launch of NFC mobile payments by year-end 2013 <http://www.telecompaper.com/news/mtel-confirms-launch-of-nfc-mobile-payments-by-year-end--939856>

⁷Vivacom (2015) Mobile Payments <http://www.vivacom.bg/bg/residential/ceni-i-uslugi/mobilni-uslugi/zabavlenie-i-info/mobilni-plashtanija/cellum-pay>

⁸Mobb (2015) Mobile Payment Services <https://www.mobb.bg/en/services/payment/>

⁹ePay.bg (2015) About Us <https://www.epay.bg/v3main/front?p=about>

13.2.2 Telecommunication Infrastructure

Mobile Phone Usage

There were almost 11 million mobile subscriptions in Bulgaria at the end of September 2014. According to Business Monitor International (2015a), mobile phone penetration was estimated to 151,1 % in 2014, with 3G and 4G phone subscribers accounting for 39,4 % of the total market. Business Monitor International (2015a) expects an uptake of mobile subscriptions, due to growth in the 3G and 4G segments driven by high smartphone demand. Consequently, BMI forecasts a mobile penetration of 159,4 % by 2019, with 3G and 4G phone subscriptions accounting for 54 % of the total market.

Bulgaria's mobile market has the highest proportions of postpaid subscribers in Central and Eastern Europe, reaching 76.6 % at the end of Q314 (Business Monitor International 2015a). It is expected that this proportion will increase, driven by the proliferation of smartphones and demand for mobile broadband subscriptions supporting high-speed mobile data services (Business Monitor International 2015a).

Mobile Operators

Business Monitor International (2015a) reports the following telecommunication industry consolidation as of Q314:

- **Mtel**, mobile operator with a market share of 37,6 %
- **Telenor Bulgaria**, mobile operator with a market share of 36,8 %
- **Vivacom**, mobile operator with a market share of 25,6 %
- **MAX Telecom**, offers only mobile data subscriptions

Additionally, Bulstacom is expected to enter the market as a fourth mobile operator in the near future.

Mobile Data Networks

All operators are increasing their spending on telecommunication infrastructure, and introducing next generation access networks. According to Business Monitor International (2015a), the planned investments in mobile infrastructure in 2014 increased by 19 % compared to 2013. As of today, Mtel, Telenor Bulgaria and Vivacom all have 3G networks, while Max Telecom has launched a 4G network (Business Monitor International 2015a).

Fixed Line Infrastructure

BMI suggests that the fix-line telephone market is deteriorating as a result of fixed-to-mobile conversion. However, the share of Internet users was estimated to 61,4 % of the population in 2014, with broadband subscriptions accounting for 37,2 % (Business Monitor International 2015a). According to data from the European

Commission, 92,5 % of homes in Bulgaria were covered by broadband at year-end of 2012. A steady growth in subscriptions is expected in the coming years.

In 2014, a plan for construction of the next generation broadband Internet infrastructure in Bulgaria was approved by the government. This sets out to provide Internet access with a speed of 30+ Mbps to the entire population and speeds of 100Mbps to at least 50 % of households and 80 % of businesses by 2020 (Business Monitor International 2015a).

13.2.3 Supporting Industries

Several additional initiatives is expected to strengthen the telecommunication network the coming years.

Vestitel, a Bulgarian telecommunication networks provider¹⁰ is building a new fibre-optic link between Bulgaria and Greece, adding to its existing fibre-optic link between the countries (Business Monitor International 2014). Ultimately, Vestitel is aiming for a full connection of the Balkan region with external links to Europe and Asia. Additionally, Bulgaria is joining the Trans-Eurasian Information Super Highway (TASIM)¹¹ in the near future, a regional initiative aiming to create a transnational fiber-optic backbone targeting primarily the countries of Eurasia from Western Europe to Eastern Asia.

The Bulgarian Cluster for Information and Communication Technologies is an initiative supporting the establishment and development of ICT clusters in Bulgaria (ICT Cluster 2015). The founding intention was to create a platform for fruitful collaboration between ICT businesses and state administration, to boost ICT SME growth in Bulgaria. Several Associations have been formed under this initiative, including The Telecommunications Association¹², and Bulgarian Cluster Telecommunications¹³ (BCT).

The Telecommunications Association is a non-profit, non-governmental organization, founded for facilitating cooperation between actors of the Bulgarian telecommunication market, among other by consulting the national policy and regulatory authorities in telecommunications market regulations. Its members are amongst other international and local manufactures and suppliers of communications equipment, legal and telecom consultants, and telecommunication providers.

The Bulgarian Cluster Telecommunications has members from almost the entire product range of telecommunication services. The cluster focuses its efforts towards the implementation of best practices in management processes, improvement of marketing strategies, and achievement of higher degrees of international-

¹⁰Vestitel (2015) About Us <http://www.vestitel.bg/en/about-us/company>

¹¹Tasim (2015) About, <http://tasim.net/about.html>

¹²The Telecommunications Associations (2015) About, <http://www.astel-bg.com/>

¹³Bulgarian Cluster Telecommunications (2015) About the cluster, <http://btcluster.org/en/content/about-us>

ization and penetration of new markets for its members.

13.3 Technological Environment

13.3.1 Handset Technology

Technology maturity

World Economic Forum (2014a) rank the technology readiness of the Bulgarian market in the lower end of the scale, both with regards to firm level technology absorption and availability of latest technologies. For example, Bulgaria was the last EU country where Apple's 3G iPhone was made available in November 2008 (Business Monitor International 2014).

The high consumer price sensitivity has boost the demand for cheap smartphones, particularly devices running Google's Android, because of lower price on devices from East Asian manufacturers (Business Monitor International 2014). Android accounted for 76.6 % of mobile traffic in Bulgaria in September 2014 (Business Monitor International 2014).

Smartphones

The supply of low and mid-range Android smartphones have increased smartphone penetration across a wider segment of the population (Business Monitor International 2014, 2015a). In 2014, handset sales accounted for 47 % of the total spending on consumer electronics. Although 2014 was expected to be peek year for smartphone sales, a growth of total handsets equal to an increase by 3,2 % in 2015 is expected, making handset sales the outperforming segment of the overall consumer electronic market (Business Monitor International 2014). By 2018, Business Monitor International (2014) expects the majority of handset sales to be smartphones.

13.3.2 Merchant Terminal Technology

Despite a high ATM penetration (PacNet Services Ltd. 2011) and preference for cash payments, actors of the payment ecosystem are taking initiatives to support modern payment services. As contactless cards are becoming more popular, banks are starting to offer PayPass and PayWave cards to their customers (World Bank 2015). More over, e-commerce saw a significant growth during 2009-2013, due to rising online and mobile penetration and an increase in the presence of online payment gateways and stores (World Bank 2015). As examples, the software companies Voicecom¹⁴, and SafeCharge¹⁵ both offer comprehensive online payment solution for merchants.

¹⁴Voicecom (2015) MobilePayments http://www.voicecom.bg/quick_overview.php?lang=en

¹⁵Safecharge (2015) Solutions, <http://www.safecharge.com/overview/solutions/>

Our desktop study indicates that there are several providers of modern POS-terminals in Bulgaria, including Mellon Bulgaria EAD¹⁶, Exelio¹⁷ and Asseco SEE OOD¹⁸. According to World Bank (2015), growth of POS terminals is considered to be an important driver in the payment industry, indicating an increasing preference for cashless payments. At the end of 2013, 73241 terminals were installed across the country. World Bank (2015) expects the growth to continue, reaching 92964 terminals by 2018, equal to a penetration of 1.315 terminals per 100.000 Bulgarian.

13.3.3 Identification and Authorization System

According to World Bank (2015), the value of card fraud increased during the period of 2009-2013. To counteract this trend, banks are implementing technologies such as EMV chip-based technology. Additionally, some banks are offering the 3-D Secure Code service, including DSK Bank, Raiffeisenbank and TBI Bank (World Bank 2015).

13.4 Legal/Regulatory Environment

13.4.1 National and International Regulation

After becoming a member of the EU, Bulgaria has fully aligned its regulatory framework with EU standards¹⁹. The country also acknowledges international jurisdiction, such as ICJ²⁰ and ICCt²¹ (CIA 2013).

The World Bank (2014b) ranks the Bulgarian environment for doing business at 38th place in 2015. This is a significant improvement from 66th place in 2013 (The World Bank 2014a). Despite this, there exists a lack of political will to see through much needed reforms, according to Business Monitor International (2013). They also highlight that further extensive action is needed to reduce corruption, improve the criminal justice system and create administrative capacity. These three areas are also mentioned as problem areas by The World Bank (2014a). However, Business Monitor International (2014) explains that one area of the legal framework has received a successful modernization, namely the governance of commercial transactions.

¹⁶Mellon (2015) Point-of-Sale Solutions, <http://mellongroup.com/products-categories/point-sale-solutions>

¹⁷Exelio (2015) Products, <http://www.exelio-alliance.bg/>

¹⁸Asseco SEE OOD (2015) Offer, <https://asseco.com/see/offer/industries/payment-industry/>

¹⁹Eurolink Investment Group (2015) Business and Legal Environment, <http://eurolink-bulgaria.com/bulgaria/business-and-legal-environment/>

²⁰International Court of Justice (n.d.) <http://www.icj-cij.org/homepage/>

²¹International Criminal Court (n.d.) ICC, http://www.icc-pi.int/en_menus/icc/Pages/default.aspx

Regulation of Banks

BNB regulates and supervises the banking industry's activities in Bulgaria, and operates under the Law on the Bulgarian National Bank²². According to BNB, there exists several laws, ordinances, rules of procedures, policies etc. for the regulation of the banking industry. Two of the laws can be highlighted:

- **Law on Payment Services and Payment Systems:** The law regulates payment service providers' activities and services, procedures for licensing of payment institutions and requirements for information provisions. For example, all companies that wish to conduct payment activities need to apply for a license from BNB. Amendments were made to the law in 2011 so that electronic money institutions were included in the scope of the law. The operation of MMOs are therefor thoroughly covered by the law (BNB 2012).
- **Law on Credit Institutions:** The law regulates all credit institutions (banks) that engage in the activity of publicly accepting deposits or other repayable funds. Examples of requirements are for the granting of licenses and institutions' activities (BNB 2015).

Despite the fact that a comprehensive regulatory framework exists, The World Bank (2012) underpins that there exist many gaps that have led to consumers having limited financial knowledge and low trust in financial institutions.

We did not encounter any specific BNB strategies or positions on MPSs.

Regulation of Telecom Operators

The government body responsible for the regulation of the telecom industry in Bulgaria is The Communications Regulation Commission (CRC). CRC is an independent authority that controls electronic communication activities within the country. The goals are to ensure competition in the market, increase communications technologies development, and protect consumers²³. Another relevant government body is the Executive Agency for Electronic Communication Networks and Information Systems, which constructs, maintains and operate electronic communications networks for the state administration, which is part of the integrated communication system of the country²⁴.

According to CRC, there are several laws that regulate communications in Bulgaria, some of which are²⁵:

- **Law on Electronic Communications:** The law regulates the provisions of electronic communications, hereunder information transfers performed by wire, optical, radio waves or other electromagnetic mediums (CRC 2011).

²²BNB (n.d.) Bulgarian National Bank <http://www.bnb.bg/>

²³CRC (n.d.) CRC Mission <http://www.crc.bg/index.php?lang=en>

²⁴EAECNIS (2015) Agency, <http://www.esmis.government.bg/page.php?c=1>

²⁵CRC (n.d.) Primary legislation, <http://www.crc.bg/section.php?id=25&lang=en>

Amongst other, the law states that "public electronic communications shall be provided after submitting a notification to the Commission" (CRC 2011, p. 20).

- **Law for the Electronic Document and Electronic Signature:** This law regulates the use of electronic documents and electronic signatures of these. One particular provision is the equalization of the electronic signature with the hand signature. The law also regulates the activity of providing identification services (CRC 2011).

Bulgaria has to follow EU regulations also within the telecommunication industry. An example of a EU law that holds for the Bulgarian market is the *Regulation (EC) No 717/2007* (European Parliament 2007). According to Openforum Academy (2013), the Bulgarian government has not taken an official position regarding network neutrality.

Privacy Regulation

The Ministry of Economy, Energy and Tourism is Bulgaria's main government authority overseeing consumer protection. In addition, the National Consumer Protection Council is responsible for the development of national policies and strategies (The World Bank 2012). According to The World Bank, the council has had a slow start, and coordination between government agencies responsible for the protection of customers of financial services is insufficient.

In addition to the financial services specific provisions for consumer protection in the Law on BNB (BNB 2010), there exists a general Consumer Protection Act. The act regulates "the protection of consumers, the powers of State bodies and the activity of consumer associations" (of Economy 2013, p. 1). The scope of the law is fundamental consumer rights, such as the rights to protection of economic interests with regards to unfair commercial practices and sales methods (of Economy 2013).

13.4.2 Standardization

The Bulgarian Institute for Standardization (BDS) is the official government body for standardization. The institute develops and approves national standards, and participate in the work of several international standardization organizations, such as ISO and IEC²⁶.

Banking Standardization

The Association of Banks in Bulgaria (ABB) is the politically independent non-profit organization of banks in Bulgaria. ABB aims to support its members' activities, rights and interests. It does so by encouraging collaboration and cooperation between banks and preparing statements on legal acts drafts. All

²⁶BDS (n.d.) Bulgarian institute for standardization <http://www.bds-bg.org/>

commercial banks are members of the organization. ABB is a full member of the European Banking Federation and the European Payments Council²⁷, and has several committees and working groups, such as *Payment SYstems Committee*, *Information Technologies Committee* and *SWIFT*²⁸ *User Group*. ABB does not, however, have any official interests in mobile payments.

BDS has a committee working on standards related to banking, namely the *TC-84 Banking, securities and other financial Services* committee²⁹.

The Dutch bank ING is the only bank in Bulgaria that is a member of MobeyForum³⁰. ING, however, only serves corporate clients in Bulgaria³¹.

Telecom Standardization

BDS also has a committee working on standards for telecommunication, the *TC-57 Information and communication technology* committee³². No MNOs are sector members of the International Telecommunication Union³³, but all are members of GSMA³⁴.

No further associations besides those mentioned in subsection 13.2.3 and above were found during our desktop study.

²⁷ABB (2015) About us, <http://abanksb.bg/en/about-us/>

²⁸SWIFT (n.d) About SWIFT, http://www.swift.com/about_swift/index

²⁹BDS (n.d.) Technical Commitees, <http://www.bds-bg.org/en/tc/index.php>

³⁰MobeyForum (2015) Our Members, <http://www.mobeyforum.org/about-us/our-members/>

³¹ING (2015) Home, <http://www.ingcb.bg/en/home>

³²BDS (n.d.) Technical Commitees, <http://www.bds-bg.org/en/tc/index.php>

³³ITU (2013) Membership-list, http://www.itu.int/online/mm/scripts/mm.list?_search=SEC&_languageid=1

³⁴GSMA (2015) Full Members, <http://www.gsma.com/membership/who-are-our-gsma-members/full-membership/>

Chapter 14

Assessment of the Bulgarian MPS Market

This chapter presents an assessment of the Bulgarian MPS market's attractiveness for Telenor. The assessment is performed through a screening of viable options, which should provide an indication of the market's attractiveness. The screening is performed in the same manner as the screening of designs for Serbia, with two distinctions. First, in line with the revision of the framework in part two, we only perform a screening of the end user functionality and interoperability dimensions. Second, we approach this screening from Telenor's point of view, i.e. from an MNO's point of view. If not stated otherwise, the sources to the arguments below can be found above in chapter 13.

14.1 End User Functionality

There are several general observations of the Bulgarian MPS market that should be taken into consideration for all end functionality options. First, the population is rapidly aging and has low trust in privately owned financial institutions. The aging population can be sceptical towards new technological services, fueling the mistrust in financial institutions. Second, the population still prefers to pay with cash, even for online purchases, despite the fact that payment cards are becoming widespread. Third, the purchasing power in Bulgaria is quite low, and a large part of the population is characterized as being price sensitive. Fourth, several MPSs are already launched, with a wide range of end user functionalities offered to customers. Finally, the Bulgarian population is relatively highly educated, and penetration of mobile and smart phones is high. Hence, consumers should be able to use most types of end user functionalities discussed.

14.1.1 P2P Payment

A significant proportion of the Bulgarian population has access to accounts at a formal financial institutions, and they have been able to use P2P payments for a long time, albeit through more traditional channels. Further, international migration is becoming an increasing phenomenon in Bulgaria. After becoming a member of the EU, Bulgarians have started to migrate to other countries to seek work. In this relation, it is worth mentioning that remittances through ATMs has become popular in Bulgarian ex-pat communities. All of this signifies that P2P payments are viable and quite possibly attractive service from the social/cultural and legal environment.

As touched upon above, consumers in Bulgaria are able to use the bank-centric financial infrastructure to conduct P2P payments, which is in favor of P2P payments. Also, several MPSs have started to offer P2P payments, indicating that this is a service in demand. We can therefore conclude that from a commercial environment point of view, P2P payments are a viable option as well.

With a rapidly increasing penetration of smartphones, no specific limitations are imposed from the technological environment. To conclude, we propose that P2P is a viable option in Bulgaria.

14.1.2 POS Payment

As mentioned above, Bulgarians still prefer cash for most of their transactions, similar to the situation in Serbia. This can imply that a significant behavioral change is needed to use mobile POS payments. However, the fact that Bulgarians are starting to adopt mobile shopping in addition to Internet shopping might point in the opposite direction. Thus, we suggest that from a social/cultural environment point of view, mobile POS payments are somewhat viable, especially in the long term.

From commercial and technological environments perspectives, several arguments are in favor of providing mobile POS payments. First, the increasing penetration of smart phones with NFC compatibility, fueled by the introduction of affordable models from Asian manufacturers, points to the fact that handsets should not inhibit POS payments. Second, several actors have already launched mobile POS services. Third, the card schemes and settlements' systems in Bulgaria are relatively mature and advanced. Fourth, POS terminals are widespread, and several commercial actors offer new POS terminals complying with international standards. These findings point to POS payments being a viable option.

The legal environment does not imply any specific limitations regarding the introduction of mobile POS payments. We therefore conclude that POS payments are a viable option, but it should be noted that a slight behavioral change is needed.

14.1.3 Bill Payment

Bulgarian consumers have several options when it comes to bill payments today. In addition to the traditional bank and Internet channels, several providers now offer bill payments through ATMs, which has become quite popular. Further, several MPSs have started to offer bill payments, such as ePay.bg and Globul iPayWallet. These findings imply that bill payments through MPSs is a viable and possibly attractive functionality to offer from a social/cultural environments' perspective.

The commercial and technological environments should facilitate bill payments well. First, the interbank clearing system already has provisions for bill payments used by today's services. Second, modern handsets should not limit implementation of bill payments in any particular way.

Finally, the legal environment does not impose any specific limitations to offering bill payments. As such, we can conclude that bill payments are a viable and attractive functionality to offer in Bulgaria.

14.1.4 Web Store-Front Payment

Bulgarians are starting to get used to purchasing goods and services online, through both Internet and mobile shopping. And even though they often pay for this shopping by cash, it signifies that a major behavioral change might not be needed to adopt mobile web store-front payments. This argument is also underpinned by the fact that several existing MPSs have started to offer this functionality, such as Mobb and ePay.bg. The social/cultural environment should therefore not impose any major limitations to implementing web store-front payment functionality.

As existing services have succeeded with launching this functionality, there should not be any major limitations from the technological environment point of view. Similarly, the assessment of the commercial and legal environments have not yielded any limitations to offering web store-front payments. We can therefore conclude that this end user functionality is a viable option in Bulgaria.

The viable end user functionalities for the Bulgarian market are summarized in Table 14.1 below.

	Pros	Cons	Conclusion
P2P	<ul style="list-style-type: none"> • Bank-centric structure enabling P2P • Increasing outward migration 	<ul style="list-style-type: none"> • No particular limiting environmental factors 	Viable functionality
POS	<ul style="list-style-type: none"> • Large future potential • Increasing penetration of smart phones • Financial infrastructure in support 	<ul style="list-style-type: none"> • Some behavioral change is needed 	Somewhat viable functionality
Bill payment	<ul style="list-style-type: none"> • Inherent consumer need • Existing facilitating infrastructure in place 	<ul style="list-style-type: none"> • No particular limiting environmental factors 	Viable functionality
Web store-front	<ul style="list-style-type: none"> • Internet and mobile shopping growing • Similar services already offered 	<ul style="list-style-type: none"> • Consumers still prefer to pay for online shopping with cash 	Viable functionality

Table 14.1 – Summary of end user functionality screening in Bulgaria

14.2 Interoperability

In the following subsections, interoperability is discussed as the second and last dimension of our revised framework. First, the market conditions affecting interoperability the most are presented. Second, several options for achieving interoperability are explored, including an evaluation of the most viable options.

14.2.1 Market context

Several findings from our desktop-study of the Bulgarian market are assumed to influence the possibilities for MPS interoperability:

- The Bulgarian public is price sensitive and demonstrate low purchasing power. However, findings suggest that the latter is starting to improve.
- 29 commercial banks operate in Bulgaria, with all providing Internet banking to their customers.
- Finding indicate a somewhat inefficient banking industry.
- Several international card schemes are present in the market, including MasterCard, Visa, and American Express.
- The Real Time Gross Settlement System (RINGS) operated by Bulgarian National Bank provides interbank clearing of transactions.

- BORICA has a key role in the payment system of Bulgaria. Amongst other, BORICA provides (1) interoperability with local and international authorization centres, card operators and payment system operators, and (2) authorization of card payments, including MasterCard, Visa and American Express.
- Some MMOs are present in the Bulgarian market, including Mobb and iPay.
- The Law on Payment Services and Payment Systems enables electronic money institutions to provide payment services.

14.2.2 Evaluation of options

Similar to the situation in Serbia, the Law on Payment Services and Payment Systems enables third party financial institutions to provide payment services in Bulgaria. As such, options of interoperability beyond the approach of acquiring a bank should be addressed.

With reference to reasoning given previously in section 8.3 and by Clark & Gamner (2014), a high number of commercial banks in Bulgaria might impose challenges with an interoperability option based purely on bilateral agreements.

Currently there is no commercial processor enabled for both bank and MMO settlements in Bulgaria, described as a single-point switch by Clark & Gamner (2014). Given the high cost following the development of such a processor (Clark & Gamner 2014), and the price sensitivity of the Bulgarian population, it is not considered a viable options.

However, other elements of the Bulgarian financial infrastructure might facilitate interoperability in a satisfying manner. The payment system operator BORICA provides authorization and payment clearing for Visa, MasterCard and American Express issued by all banks in Bulgaria. One should therefore explore the possibility of utilizing BORICA for interoperability as a *Commercial processor for bank interface*, in line with the description by Clark & Gamner (2014). Clark & Gamner suggest this may be appropriate where an existing organisation runs a payment network in the market, as is the case with BORICA in Bulgaria. However, Clark & Gamner further suggest the per-transaction cost following this option might affect the attractiveness to customers. Given the low purchasing power of the population, and the fact that BORICA operates its own MPS *Mobb*, this option is not without challenges.

The first viable option is illustrated in Figure 14.1. The MMO interoperates with the banking industry through BORICA as a commercial processor. Moreover, Clark & Gamner (2014) suggest combining this with inter-MMO interoperability through bilateral agreements. Although some MMOs are already present in the market, the low number should not impose any difficulties with the scalability of the option. However, given the maturity of the financial infrastructure in

Bulgaria, the necessity of inter-MMO interoperability through bilateral agreements is questionable.

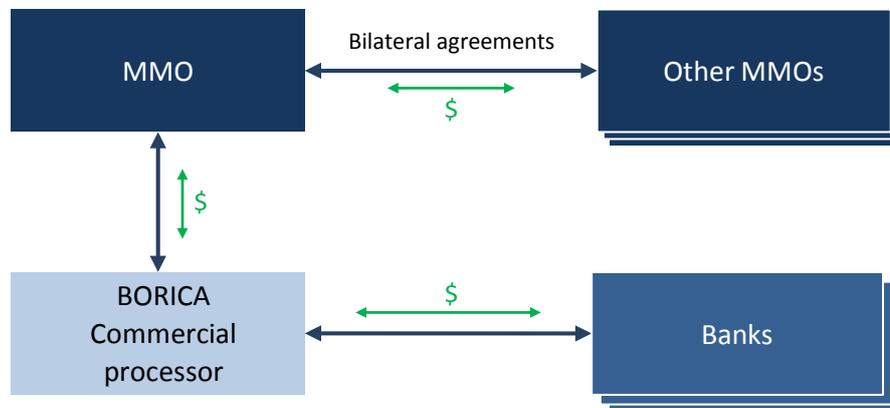


Figure 14.1 – Interoperability through commercial processor BORICA

A second viable option would entail involving a commercial bank for interoperability through the RINGS inter-bank payment clearing system. Two possible approaches would enable this: (1) partnering with a bank, or (2) acquiring a bank. Although these approaches should simplify banking integration, and be relatively fast to deploy (Clark & Gamner 2014), some challenges are expected to follow. Firstly, the desktop study on Bulgaria indicates a somewhat inefficient banking industry, facing problems like shortage and corruption. Secondly, Gjersum suggests adequate bank and MNO cooperation is an important pre-requisite for interoperability, and no such initiatives or supporting associations have been identified. Thirdly, all banks are increasingly maturing in their online and payment services, plausibly limiting their incentives to collaborate. Although these findings are not assumed to inhibit the option, they do however impose challenges to overcome for a MMO.

The second possible option is demonstrated in Figure 14.2. As described, the MMO interoperates with the banking industry through the partnering/acquired bank's access to RINGS. Similar to option number one, inter-MMO interoperability is secured through bilateral agreements.

One final note should be made regarding the choice between these two outlined interoperability options. If one intends to offer financial services beyond payment services, such as accepting deposits, the Law on Credit Institutions requires that a bank license is acquired. Therefore, if one intends to offer such services, only the second option is viable.

14.3 Summary of Analysis

In conclusion, the screening process indicates four viable end user functionalities and two viable interoperability options are present. The options are summarized in Figure 14.3 below. Seeing as there exists a range of viable end user functionalities

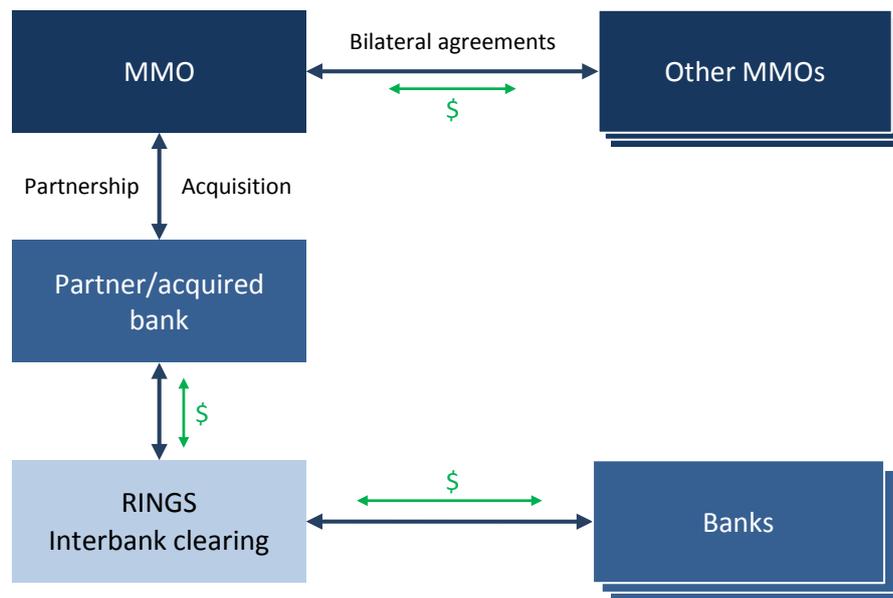


Figure 14.2 – Interoperability through a partner or acquired bank

and interoperability options, we conclude that the Bulgarian market should be attractive for Telenor. This is also underpinned by the fact that Bulgaria appears to allow for more viable options than Serbia, a market that Telenor already has entered. If Telenor decides that Bulgaria represents an interesting opportunity, the next steps would be to perform further in-depth analysis of the viable options, in line with the process outlined in chapter 5.

End user functionality	P2P	POS	Bill payments	Web store-front
Interoperability	Commercial processor		Partner/acquired bank	

Figure 14.3 – Summary of potential service designs for Bulgaria

If one compares this screening with the one for Serbia in chapter 8, it seems that the MNO point of view of this analysis did not have a particular impact on what viable options resulted. We believe that the choice of end user functionality and interoperability as service design dimensions is the primary reason for this.

Chapter 15

Concluding RQ3

This part of our thesis has aimed at answering the following RQ:

RQ3 Is Bulgaria an attractive market for a Telenor mobile payment service?

To answer this RQ, we have conducted a screening of potential service designs. The screening was based on data collected through a desktop study of the Bulgarian market, and conducted in line with the revised framework presented in chapter 11. The screening resulted in a set of viable options, as illustrated in Figure 14.3. The findings can be summarized in two parts.

First, four end user functionalities were deemed viable for Bulgaria: (1) P2P transfers, (2) POS payments, (3) bill payments, and (4) web store-front payments. Thus, we find that all functionalities outlined in the framework are viable.

Second, two interoperability options were outlined. The first is interoperability with the bank infrastructure through a commercial processor such as BORICA and bilateral agreements with other MMOs. The second is interoperability with the bank infrastructure through a partner or acquired bank and the RINGS interbank clearing system, and bilateral agreements with other MMOs. If a MPS provider intends to offer more traditional financial services, such as deposits, only the second option is viable due to the legal framework.

Based on the fact that a range of end user functionalities and interoperability options are viable in Bulgaria, we concluded that the Bulgarian MPS market should be attractive for Telenor. Thus, we consider RQ3 to be answered in a satisfactory manner.

Part IV

Conclusions

Chapter 16

Conclusion

This master thesis set out to research MPSs in collaboration with Telenor. Through answering three research questions, several insights were uncovered. These will be discussed in the following sections along with implications for Telenor, other practitioners, and researchers.

16.1 Main Findings

The study's first part addressed RQ1: *What is a suitable approach for analysing mobile payment services design?* Through a literature review and multiple iterations with researchers and practitioners, we proposed a framework consisting of two main parts describing a MPS and its context. The context was constituted by 12 contingency factors, while the MPS was conceptualized by three service design dimensions. It was concluded that the appropriate application of the framework was to perform a screening of potential MPS designs in a given market. During our review, only a limited amount of existing literature on the topic was uncovered, and our framework was therefore considered highly topical.

In our study's second part we addressed RQ2: *How do findings from RQ1 compare to Telenor practitioners' approach to mobile payment services design?* On the basis of multiple interviews with practitioners in Telenor, several assessments of the framework were performed. From the assessments we concluded that the contingency factors provided a solid foundation for understanding MPSs environments, but that one of our design dimensions was considered less relevant by practitioners. We therefore proposed a revision of the framework, where only the two most relevant service design dimensions remained. These two dimensions were regarded as forming the basis for all MPS design, a basis that practitioners can expand by adding further dimensions at their discretion.

In the third and final part of the study we addressed RQ3: *Is Bulgaria an attractive market for a Telenor mobile payment service?* To answer this research question, we performed a screening of potential service designs for the Bulgarian market by

using the revised framework proposed in part two. We concluded that most service design options were viable, and that the Bulgarian market for MPSs therefore can be considered attractive.

16.2 Implications for Telenor and Other Practitioners

The findings from our master thesis impose several implications for Telenor and other practitioners. However, public access to this thesis will be restricted for five years, as it may contain sensitive information about Telenor. Consequently, we have chosen to address the implications of the study primarily to Telenor.

First and foremost, our research on some of Telenor's BUs suggest their practice is well aligned with researchers' perspective on MPS design. As such, our conceptualization of practices can be valuable for Telenor as it can be applied to other BUs as well, guiding future MPS development. Two parts of our research particularly stand out.

Firstly, the 12 contingency factors provide a structured approach for identifying important market characteristics to consider when screening potential MPS designs in a market. By understanding the 12 factors, practitioners at Telenor should get a comprehensive overview of the market context affecting their MPS.

Secondly, the conceptualization of MPS design as a set of dimensions should also be valuable. As two dimensions were identified as being most important through an iterative process based on both theory and practice, these can be considered as a basic set of dimensions that should be considered across all markets. Additionally, we have suggested that practitioners can add extra dimensions at their discretion. Each Telenor BU should carefully consider what additional dimensions are most appropriate and include these in their service design.

To exemplify the latter, our research suggests that Bulgaria is an attractive market for Telenor to launch a MPS. However, findings indicate a somewhat inefficient banking industry, afflicted with liquidity shortage and corruption. As such, we find it appropriate for the service design of a MPS in Bulgaria to include an ownerships structure-dimension, addressing Telenor's relation to the banking industry. We believe that market specificities will be present in most markets, and that these should drive the choice of which service design dimensions to include. In Myanmar for example, where Telenor is considering to launch a MPS, it could be appropriate to include a dimensions that addresses customer identification, as input from practitioners at Telenor suggest this is a challenge in undeveloped markets.

The combination of a basic set of dimensions, supplemented with other dimensions if desired, is considered to give our framework the necessary robustness and flexibility to be used in practice. Finally, it should be noted that most of the aforementioned implications also hold for practitioners outside Telenor.

16.3 Implications for Researchers

Our literature review indicated a research gap in the literature concerning approaches for analyzing MPS design. By building on existing literature and conceptualizing practitioners' approach, our framework represents a first step towards the closing of the identified research gap and bridging of theory and practice. Other researchers can use our framework as a basis for further studies to enhance our understanding of MPSs. Several suggestions for such further research are given in the next chapter.

Chapter 17

Limitations and Further Research

17.1 Limitations to the Study

Besides the typical time and resource limitations that a master thesis implies (Morse et al. 2002), several limitations of our study have been identified and will be discussed below. First, the research methodology has some limitations, as highlighted in chapter 2. These are limitations related to the small amounts of previous literature on the subject, a single case study research design, homogeneous distribution of interviewees, difficulty of verifying secondary electronic sources, and subjectivity.

Relating to part one of this report, our proposed framework is of a general nature. By general nature we mean that the contingency factors' impact on the specific service design dimensions is not explicitly articulated. This requires practitioners to use their subjective judgements of the environment's impact on a MPS in their chosen market. As such, the practical use of our framework is somewhat restricted to performing only initial screenings. This limitation is not something we can take specific measures to avoid in our study, but rather something that can be addressed by later researchers.

This general nature of the proposed framework might very well be the result of the broad scope of our thesis. Even though we made several refinements to our research scope in chapter 1, the broad scope imposes limitations of our study. We might have been able to provide a stronger academic contribution if we had focused on a narrower aspect of MPSs. For example, we could have focus on a single design dimension, and explored the impact of the contingency factors in more detail.

Further, in the second part of our report we tested our proposed framework to assess its applicability in analyzing MPS design. This was intended to be a first step towards an verification of the framework. However, verification of a theoretical construct is a very complex task, and considered above our academic level. We therefore recognize the need for considerable amounts of further research

to provide a satisfactory verification of the framework.

Our framework has a given set of alternatives for each design dimension, such as P2P, POS, bill payments and web store-front for the end user functionality dimension. This predetermined set could limit practitioners' creativity regarding new service design. The reason for this is that if practitioners follow the framework strictly, they are limited to the combination of already existing ideas. Practitioners should therefore try to avoid seeing our design dimension options as a complete list, and rather use them as starting points.

Another important limitation is related to subjectivity in the study. First, our own subjectivity might have affected interpretations of findings from the practitioner interviews as well as the way they have been presented. We have tried to restrict the impact of this limitation by cross-checking each others work, verifying the interview summaries with the interviewees, and by basing our framework on existing theories. Second, as our primary data is based on a homogeneous distribution of interviewees, we can not rule out the subjectivity on behalf of the interviewees. This subjectivity is related to the fact that all interviewees are practitioners in markets with similar market characteristics, and that the number of interviewees is low. This second point had most impact on the service design dimensions.

17.2 Further Research

Based on the identified limitations above and opportunities uncovered during our study, we propose some directions for future research. In addition to broadening the general understanding of MPSs, these directions are expected to increase the value of the study for Telenor and other practitioners.

First and foremost, a more comprehensive verification of our proposed framework is in order. We have identified two specific approaches to such a verification.

First, it would be interesting to perform a quantitative study on how the market context influences MPSs design. This could be accomplished through creating a survey targeting practitioners involved in the development of MPSs in various markets. If such a study is to be performed in collaboration with Telenor, BUs offering MPSs and Telenor Group Financial Services would be an appropriate target group. The survey should aim to address the target group's assessment of influencing contingency factors. Conducting such a survey would give Telenor a broader understanding of (1) which market characteristics are most dominant in decisions regarding service design, and (2) which influencing factors appear to be independent of market specificities. This task involves understanding the relationship between two sets of variables, and we therefore consider it a challenging task. However, the result of such a study would considerably strengthen the value of the framework, as practitioner become conscious of the factors to consider when developing MPSs.

Second, researchers could expand on our proposed framework by researching additional service design dimensions. This should also prove valuable for practitioners, as several interviewees have mentioned other possible dimensions to include in the service design. One way to approach this would be to perform an exploratory study where practitioners similar to those mentioned above are interviewed. The practitioners should be interviewed regarding which dimensions they have made decisions about, and which dimensions they consider to be important. Such a study could eventually result in a framework with a complete set of service design dimensions, representing a valuable tool for all practitioners regardless of previous experience. Given that the service design part of our framework has the least theoretical foundation, further research on the part would significantly increase the framework's overall strength.

Additionally, we did not uncover many frameworks concerning the design of MPSs during our literature review. Moreover, the only significant published literature review was presented by Dahlberg et al. (2007). Seeing as their review was published nearly a decade ago, an updated thorough review of literature covering MPS design would be useful for other researchers in the future.

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Appendix A

Case Study Protocol

Yin (2013) introduces the case study protocol, and emphasizes the importance of the document as a guide to the researchers. This protocol functioned as a working document during the early stages of the research performed. It has only been moderately adjusted afterwards to fit the format of the report.

Overview of the Case Study

The goal of the study is to map important environmental factors that have an impact on the success of MPSs. The study should especially focus on how the environmental factors impact the payment system's design. By system design we mean dimensions of the service that the offering firm must make decisions about, such as which end user functionality to implement in the service.

The study will be performed in collaboration with Telenor. Our supervisor is a Senior Adviser at Telenor Research, and will provide interviewees. As such, Telenor employees are one of our audiences. Other audiences are the NTNU master thesis examiners and practitioners working with other MPSs.

Our proposition is that contingency theory with 4 environments (social/cultural, commerce, technological, legal/regulatory) will provide a good overview of the factors affecting MPS's system design. It is also assumed that end user functionality, technology and interoperability are among the most interesting system design dimensions. Further material about the theoretical background is removed from this case study protocol to reduce its length. See Part I for more information.

Data Collection Procedures

Our data collection will consist of two main parts, (1) collection evidence about the Serbian and Bulgarian MPS environments from secondary sources, as well as (2) collecting evidence about telecom operators practical approach to decisions

regarding MPS system's design.

The approach for the two parts are outlined below:

- **Primary data:** data will be collected through interviews. The goal is to perform a single case study, and interview employees from different parts of a case company. In addition, selected other practitioners could be included to get additional perspectives. Our supervisor will aid us in getting access to the right interviewees.
- **Secondary data:** data will be collected through a systematic Internet search. By first performing an ad hoc search, we hope to identify the right keywords. The ad hoc search will also be based on our theoretical background research. When the final keywords are determined, searches will be performed in various search engines to ensure sufficient coverage. Sources will be Google, Google Scholar, Scopus and ProQuest. In addition, we will contact several research bureaus, such as Euromonitor, to request reports on the topic.

Some details on the interviews themselves are in order:

- The interviews will be conducted by both authors to ensure that all data is collected and that a smooth dialogue with the interviewee is maintained. Our supervisor will be present at the first interviews to provide guidance.
- The interviews will be recorded so that transcription is possible, also ensuring that no relevant information is lost. Afterwards, the relevant information is extracted and sent to the interviewee for confirmation.
- It will be important to gain consent from the interviewees before making recordings. After the interview is recorded, it will be important to keep the recording securely stored, so that potentially sensitive personal and company information isn't compromised.

Data Collection Questions

According to Yin (2013), there are different types of questions. A distinction can especially be made between questions that are aimed at the case researchers, and those that are aimed at the interviewee. The former will guide the researcher on the broader line of inquiry during the data collection, while the latter can serve as more detailed operational instructions for the individual interviews. In the following we will highlight both the broader line of inquiry as well as the more operational instructions for performing interviews.

A.0.1 Broad Line of Inquiry

In the following, the **bold** paragraphs represent our broader line of inquiry, while the bulleted lists represents sources of information to be pursued.

Describe the factors MPS providers take into account when making decisions.

- Verify theoretical constructs with industry experts, making sure to capture several viewpoints.

Define the Serbian MPS environment.

- Collect data regarding the environments as described in theory from secondary sources.

Define the decisions made by a MPS provider regarding the service's system design.

- Operationalize the practical decision making process:
 - What decisions regarding system design do they consider to be the most important?
 - What do they take into consideration when making the decisions?
 - What does the chronological decision making process look like?
 - Regarding Technological dimension: what sub-dimensions of technology are most important to focus on, given the market at hand?
- Collect data in support of the interview findings, such as organizational policies and internal reports on the topics.

Define the Bulgarian MPS environment.

- Collect data regarding the environments as described in theory from secondary sources.

A.0.2 Operational Interview Guide

The following interview guide will be used during the interviews. It must be noted that it will only serve as a basic guide, and that some adaptations have to be made during the course of the interview to facilitate an open dialogue.

The specific questions to be asked follow in Table A.1 on the next page.

Category	Question
Introduction	Short introduction of ourselves and our framework What is your background and role in the firm?
End user functionality	What end user functionality (application) does your service offer? How did you choose these functionalities? What factors did you take into consideration when choosing these functionalities?
Technology	Which technology categories are important for your MPS? What choices did you make within these categories? How did you choose these alternatives? What factors have you taken into consideration when making the decision?
Interoperability	What kind of interoperability have you built into your service? How did you choose these interoperability options? What factors have you taken into consideration when making the decision?
Other	Are there any other important aspects you feel we have not covered? What other important decision were made during the development of your service?
Transferability of takeaways	Are any of the topics discussed today transferable to other markets?

Table A.1 – Operational interview guide

Guide for the Case Study Report

The case study report will be written in the form of a master thesis. The audiences are as mentioned above. The thesis' outline can be summarized as follows:

- Introduction
- A thorough description of the methodology employed in the study
- Theoretical background
- Application of theory to existing MPSs and assessment of the theory's applicability
- Assessment of a potential new market that a telecom operator wishes to enter
- Conclusions, limitations and guidance for further research.

NTNU will provide guidelines and requirements for the format of the report. Because the report may contain possible sensitive company information, access to the thesis will be restricted for 5 years.