NTNU – Trondheim
Norwegian University of
Science and Technology

An Assessment of NFC Mobile Payment as a Potential Differentiator in Telenor Nordics and Central East Europe

Silje Hornnes Mauseth

Problem description

Describe selected NFC mobile payment services offered worldwide and examine their level of success and success factors. Assess different Telenor markets within the Nordics and Central East Europe in terms of NFC mobile payment and identify the strengths and weaknesses of the investigated markets and initiatives. Propose recommendations to be followed by Telenor based on the identified strengths and weaknesses to guide their NFC strategy and use of NFC mobile payment as a source of differentiation.

Preface

This master thesis is written during the spring of 2015 in connection with the finalising of a five-year Master's degree in Industrial Economics and Technology Management at the Norwegian University of Science and Technology, NTNU. The thesis is a part of the academic specialisation within the field of Strategy and International Business Development, and is partially a continuation of the pre-diploma thesis written during the autumn of 2014 covering differentiation.

The master thesis is written in cooperation with Telenor and aims to investigate NFC mobile payment initiatives as a way to develop recommendations to guide Telenor in their strategy and efforts regarding NFC mobile payment. In addition to providing Telenor with useful insight about NFC mobile payment services, the study has an academic approach by examining general success factors of mobile payment services and suggests a general framework for assessing such initiatives.

Executive Summary

The telecommunication industry is changing rapidly and the entrance of new firms increases the competition. To survive in the rapidly changing environment, MNOs need to pursue innovative services to create growth, value and to differentiate from competitors.

Telenor, one of the world's major mobile operators, has chosen financial services to be a part of their innovation. Mobile financial services can serve different functions in emerging and mature markets, banking the unbanked and convenient electronic transactions respectively. Near Field Communication (NFC) technology plays an important role in the latter function and offers Telenor a range of opportunities related to mobile wallets. NFC is a short-range, bi-directional, wireless communication technology based on Radio Frequency Identification (RFID) technology. Three devices can be involved in NFC communication: NFC mobile devices, NFC readers and NFC tags.

However, the technology itself is seldom enough to create a successful service. This master thesis examines the various success factors of NFC mobile payment services by assessing a selection of such services, both external and internal to Telenor. Strengths and weaknesses are identified regarded NFC in the three Telenor markets Norway, Hungary and Serbia. Recommendations are proposed based on the identified strengths and weaknesses to guide Telenor in their further efforts to successfully using NFC mobile payment as a differentiator.

Selected NFC services and success factors

Four launched NFC mobile payment services are described and assessed according to their degree of success. Cep-T Cüzdan from Turkey and Apple Pay from the US are considered successful, while Google Wallet is considered a failure. The success of MyWallet from Germany is difficult to assess as the service is recently launched. Key success factors presented in the theory section are applied to explain the different degrees of success. Cooperation and partnerships, creating consumer value, the technical solution, available contactless POS terminals, flexibility and timing are among the factors considered to influence the level of success of the four selected services.

Strengths and weaknesses of three Telenor markets' NFC activity

A framework is developed to assess the NFC activity of Telenor Norway, Hungary and Serbia. The framework consists of six pillars that all influence the outcome of a NFC initiative. Strengths and weaknesses are identified regarding each of the six pillars. Some of the strengths and weaknesses are common for more of the markets but most of them are country specific. The identified strengths and weaknesses of the six pillars can be categorised according to the topics presented below:

1. Infrastructure
    a. Contactless POS terminals
    b. NFC ready mobile devices
    c. Payment culture

2. Partnerships and cooperation
    a. Culture of cooperation
    b. Previous experience
    c. Ecosystem involvement
3. Technical solution
    a. Security
    b. Flexibility
    c. Infrastructure requirements
4. Implementation
    a. Visibility and awareness
    b. Marketing efforts and advertising
    c. Education of ecosystem actors
5. Timing and competition
    a. Timing of launch
    b. Domestic and global competition
    c. Time window
6. Regulation
    a. Local regulation
    b. European and global regulation
    c. Standardisation

Although the topics are very different, most of them seem to impact the overall objective, consumer adoption. Creating consumer value to achieve consumer adoption is therefore critical and the strengths may be seen to increase this value, while the weaknesses reduce it.

Proposed recommendations for Telenor's NFC activity

The strengths and weaknesses identified regarding each pillar are organised according to different stages. These stages consist of a pre-stage where the market readiness is measured, and the diffusion stages of a mobile payment solution presented by Ondrus et al. (2009).

Many recommendations are suggested for each pillar to improve an initiative's chance of success. Some of the key recommendations are presented below:

1. Infrastructure
    a. Arrange workshops for key merchants to identify their barriers and benefits to be able to provide an adapted approach.
    b. Prioritise value-added services related to loyalty programs and in-store experience to recruit merchants.
    c. Ensure that all efforts are adapted to the specific market.
2. Partnerships and cooperation
    a. Ensure a win-win business model.
    b. Prioritise communication and clearly specifying the responsibilities of the involved ecosystem actors at an early stage.
    c. Seek to involve more MNOs in the initiative to increase market reach and publicity.

3. Technical solution
    a. Seek flexibility.
4. Implementation
    a. Prioritise marketing and education of merchants and consumers.
    b. Remove adoption barriers as SIM issuance.
5. Timing and cooperation
    a. Develop a decision-supporting tool to assess market readiness.
    b. Seek a unique position for your NFC service.
6. Regulation
    a. Be proactive by monitoring regulators.
    b. Conduct lobbying to influence regulators.
    c. Follow industry standards.

The different recommendations are primarily relevant for different diffusion stages. Hence, by identifying what stages are most critical in their individual case, Telenor can prioritise performing the recommendations influencing these specific stages.

Sammendrag

Telekommunikasjonsindustrien endres raskt og konkurransen intensiveres ved at flere nye MNO-er entrer banen. For å overleve i de raskt skiftende omgivelsene må MNO-ene utnytte innovative tjenester for å skille seg fra konkurrentene og for å skape vekst og kundeverdi.

Telenor, en av verdens største mobiloperatører, har inkludert finansielle tjenester som en del av sin satsing på innovasjon. Mobile finansielle tjenester kan tjene ulike funksjoner i utviklingsland og modne markeder, henholdsvis banktjenester for de uten tilgang til slike tjenester og praktiske elektroniske betalingstransaksjoner. Near Field Communication (NFC) spiller en viktig rolle i forbindelse med den sistnevnte funksjonen, og teknologien gir Telenor en rekke muligheter knyttet til mobile lommebøker og mobilbetaling. NFC er en toveis, trådløs kommunikasjonsteknologi basert på Radio Frequency Identification (RFID) teknologi med kort rekkevidde. Tre enheter kan involveres i NFC-kommunikasjon: NFC-mobiltelefoner, NFC-lesere og NFC-tagger.

Det er imidlertid sjelden at teknologien i seg selv er tilstrekkelig for å skape en vellykket tjeneste. Denne masteroppgaven undersøker de ulike suksessfaktorene for NFC mobilbetalingstjenester ved å analysere og vurdere et utvalg av slike tjenester, både i og utenfor Telenor. Styrker og svakheter er identifisert i forhold til NFC-aktiviteten i de tre Telenor-markedene Norge, Ungarn og Serbia. Forfatteren har foreslått anbefalinger basert på de identifiserte styrkene og svakhetene som skal bidra til å veilede Telenor i sitt videre arbeid med å benytte NFC mobilbetaling som en kilde til differensiering.

Ulike NFC-tjenester og suksessfaktorer

Fire lanserte NFC mobilbetalingstjenester er beskrevet og vurdert i henhold til deres grad av suksess. CEP-T Cüzdan fra Tyrkia og Apple Pay fra USA er begge ansett som vellykkede, mens Google Wallet er ansett som en fiasko. Suksessen til MyWallet fra Tyskland er vanskelig å vurdere da tjenesten er nylig lansert. Teoretiske suksessfaktorer er benyttet for å forklare tjenestenes ulike nivåer av suksess. Samarbeid og partnerskap, skapt kundeverdi, teknisk løsning, tilgjengelighet av kontaktløse POS-terminaler, fleksibilitet og timing er blant de faktorene som anses å påvirke graden av suksess til de fire utvalgte tjenester.

Identifiserte styrker og svakheter ved tre Telenor-markeders NFC aktivitet

Et rammeverk er utviklet for å vurdere NFC-aktiviteten i Telenor Norge, Ungarn og Serbia. Rammeverket består av seks pilarer, 1) infrastruktur, 2) partnerskap og samarbeid, 3) teknisk løsning, 4) implementering, 5) timing og konkurranse og 6) regulering, som alle påvirker utfallet til et NFC-initiativ. Styrker og svakheter er identifisert for hver av de seks pilarene. Noen av styrkene og svakhetene er felles for flere av markedene, men de fleste er spesifikke for hvert enkelt land. De identifiserte styrkene og svakhetene for hver av de seks pilarene kan kategoriseres i henhold til de temaene som presenteres nedenfor:

1. Infrastruktur
   a. Kontaktløse POS-terminaler
   b. NFC-aktiverte mobilenheter
   c. Betalingskultur
2. Partnerskap og samarbeid
   a. Samarbeidskultur
   b. Tidligere samarbeidserfaring
   c. Økosystem og involvering
3. Teknisk løsning
   a. Sikkerhet
   b. Fleksibilitet
   c. Krav til infrastruktur
4. Implementering
   a. Synlighet og bevissthet
   b. Markedsføring og reklame
   c. Utdanning av økosystemaktører
5. Timing og konkurranse
   a. Tidspunkt for lansering
   b. Nasjonal og global konkurranse
   c. Tidsvindu
6. Regulering
   a. Nasjonale reguleringer
   b. Europeisk og global regulering
   c. Standardisering

Selv om temaene på mange måter er veldig forskjellige påvirker de fleste av dem det overordnede målet om forbrukeradopsjon. Å skape kundeverdi for å oppnå forbrukeradopsjon er derfor kritisk for å lykkes med en mobilbetalingstjeneste. De identifiserte styrkene øker kundeverdien, mens svakhetene reduserer den.

Foreslåtte anbefalinger for Telenors videre NFC aktivitet

De avdekkede styrkene og svakhetene er organisert i henhold til deres relevans for utvalgte stadier. Disse stadiene består av et pre-stadium som måler markedets modenhet for mobilbetaling, samt diffusjonsstadier presentert av Ondrus et al. (2009) for en mobilbetalingsløsning.

Flere anbefalinger tilhørende hver pilar er foreslått for å forbedre et NFC-initiativs sannsynlighet for å lykkes. Noen av nøkkelanbefalingene er presentert nedenfor:

1. Infrastruktur
   a. Arrangere workshops for strategiske kjøpmenn for å identifisere deres barrierer for og fordeler ved å kunne tilby en tilpasset tilnærming.
   b. Prioritere verdiøkende tjenester som øker kjøpmennenes incentiver.
   c. Sørge for at alle tilnærminger er tilpasset det aktuelle markedet.
2. Partnerskap og samarbeid
   a. Sikre en vinn-vinn forretningsmodell.
   b. Prioritere kommunikasjon og tydelig ansvarsfordeling blant de involverte økosystemaktørene på et tidlig stadium.

  c. Bestrebe involvering av flere MNO-er for å øke publisitet og markedets rekkevidde.
3. Teknisk løsning
  a. Søke fleksibilitet.
4. Implementering
  a. Prioritere markedsføring og opplæring av forbrukere og kjøpmenn.
  b. Fjerne adopsjonsbarrierer som SIM-utstedelse.
5. Timing og samarbeid
  a. Utvikle et beslutningsstøtteverktøy for å måle markedets modenhet for mobilbetaling.
  b. Forsøke å oppnå en unik posisjon for NFC-tjenesten i markedet.
6. Regulering
  a. Være proaktiv ved å monitorere det regulatoriske miljøet.
  b. Gjennomføre lobbyvirksomhet for å påvirke det regulatoriske miljøet.
  c. Følge industristandarder.

De ulike anbefalingene påvirker ulike diffusjonsstadier. Ved å identifisere hvilke stadier som er mest kritiske i hvert enkelt tilfelle, kan Telenor prioritere de anbefalingene som påvirker disse stadiene i størst mulig grad.

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1 Introduction

There have been great changes within the telecommunication industry during the last decade. Revenues generated from the traditional MNO services voice and SMS are declining in many markets while the usage of data is growing rapidly. In a rapidly changing market, the need for reviewing and adapting strategies is critical for the survival of a MNO. In addition to developing strategies for new revenue sources, the introduction of more MNOs in the market forces the existing players to find ways to differentiate their offerings from the competitors' offerings.

Differentiation is suggested as a strategy for a MNO to survive in a highly competitive and frequently changing industry in the author's pre-diploma thesis (Mauseth, 2014). Different sources of differentiation were identified but the overall goal of improving customer value was shared by all the sources. In the same way as there are many ways to reach a goal, there are many ways to add value for a MNO customer. Telenor Group's strategy involves creating growth and value by monetising the large data growth for instance by their current digital position within financial services.

Mobile financial services could be used by Telenor to bring banking services to the unbanked and give mobile purchasing power to the masses. Mobile financial services are already apparent in many of Telenor's markets including Pakistan, Bangladesh, Thailand, Serbia, Hungary, Malaysia, India and Norway. Mobile proximity payment enabled by NFC technology is among the opportunities brought by mobile financial services. Telenor Norway has launched the NFC mobile wallet Valyou, Telenor Hungary is about to launch such a service, Telenor Pakistan conducts NFC testing (Attaa, 2015) and Telenor Serbia has acquired a bank making NFC mobile payment a potential service.

NFC technology enables a customer to make purchases by touching the card reader terminal in the store with his or her smartphone, thereby removing the need for a physical wallet. In addition to enabling mobile contactless payment, NFC technology offers a range of other opportunities including ticketing, access control and marketing.

This study takes an exploratory approach aiming to uncover NFC mobile payment success factors, strengths and weaknesses of selected Telenor NFC initiatives, and finally recommendations to be followed by Telenor to succeed with their strategy concerning NFC mobile payment. The author believes this report can provide Telenor with valuable insight concerning their exploitation of the NFC technology to differentiate from competitors and create further growth and value.

1.1 Scope of Research and Research Questions

Mobile phones constitute an increasingly part of our everyday life. Constantly evolving technology involves the opportunity to further boost the mobile phone usage. Mobile financial services is one promising area investigated in this thesis. However, as mobile financial services is a wide category covering more services such as mobile banking, mobile microfinance and mobile payment, the scope of this paper is limited to mobile payment, more specifically mobile proximity payment using Near

Field Communication (NFC) technology. NFC is categorised as a proximity payment method. Even though some NFC mobile payment initiatives from various European countries will be briefly assessed, the chief impact of this thesis comes from the assessment of Telenor's NFC mobile payment initiatives in Norway, Serbia and Hungary. The bottom line of the hierarchy in Figure 1 illustrates the scope of research of this paper. In spite of the fact that mobile payment using NFC technology is treated most thoroughly, other functionalities enabled by NFC are also presented as they represent potential add-ons to mobile payment. The thesis will also briefly describe other mobile payment technologies than NFC, as this is important to be able to evaluate NFC initiatives and determine strategies and key success factors.
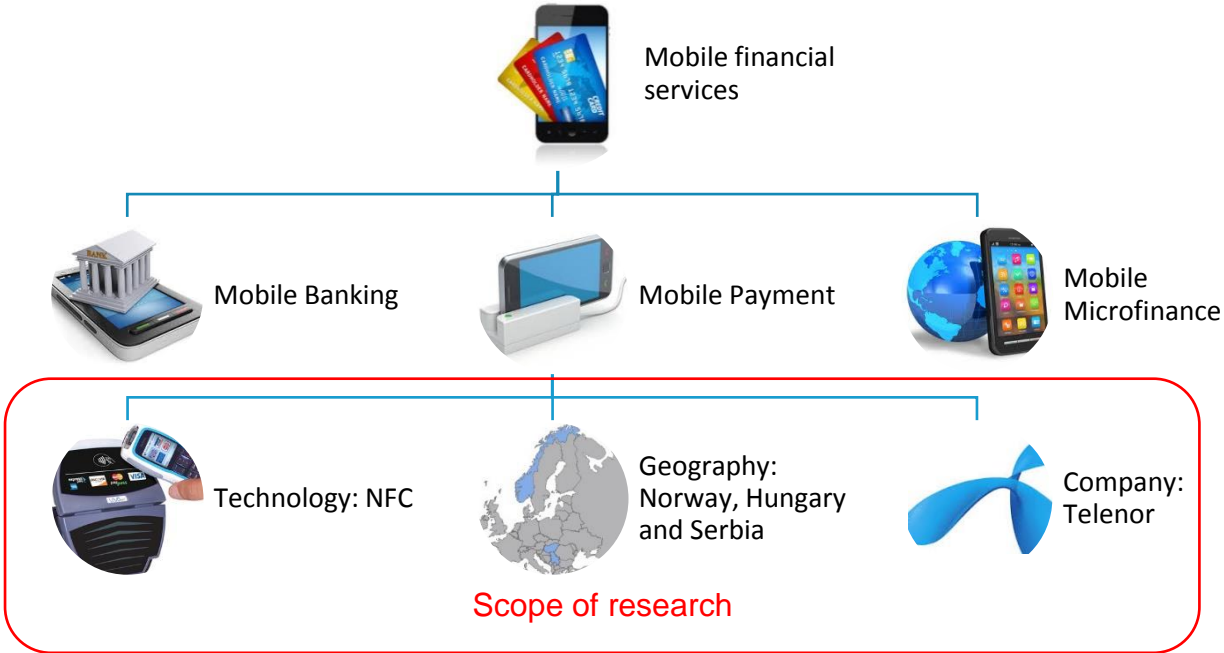
FIGURE 1: SCOPE OF RESEARCH (BOTTOM LINE)

1.1.1 Telenor Group as case company

As a Telenor employee supervised this master thesis, it was natural to choose Telenor Group as the case company. Together with DNB, Telenor has formed the joint venture, TSM Nordic, to offer Norway's first NFC-based mobile payment solution, Valyou. Hence, Telenor is one of the main drivers of introducing NFC mobile payment into the Norwegian market and is eager to use this experience to implement similar services in other footprint markets.

The telecommunication industry is changing and competitive such that succeeding in offering new and innovative services is critical in order to mitigate falling revenues and survive. Therefore, an assessment of NFC mobile payment initiatives is valuable for Telenor Group as it increases their changes of successfully implementing mobile payment and similar services in the future.

1.1.2 Research Questions

Three research questions were formulated based on the context and objectives of the field of research. Research questions are helpful in guiding the research such that

relevant and satisfactory answers are found to the problem definition. The three research questions are presented in Figure 2:

RQ1: What is Near Field Communication (NFC) and how have selected NFC mobile payment initiatives been carried out?

RQ2: What NFC mobile payment initiatives have been carried out by Telenor in the three Telenor markets Norway, Hungary and Serbia, and what are the strengths and weaknesses of these markets/initiatives regarding mobile payment?

RQ3: What recommendations regarding NFC mobile payment should Telenor follow in the Nordic/CEE countries to succeed in using NFC mobile payment as a source for differentiation?

FIGURE 2: RESEARCH QUESTIONS

RQ1 is meant as a starting point to be able to answer the problem definition in a good manner. Hence, RQ1 involves presenting general theory about the NFC technology and what types of services and applications are made possible by using NFC technology, in addition to presenting and assessing some selected NFC deployments worldwide. In this respect, RQ1 serves as the foundation for answering RQ2 and RQ3, which are more case-specific. The findings generated from RQ1 can be helpful when identifying and assessing selected NFC services initiated by the Telenor Group in the Nordics and Central East Europe (CEE) when answering RQ2. Finally, the suggested recommendations resulting from RQ3 are based on among other the answers from the former RQs and should work as a guide to how Telenor Group may use NFC as a way to differentiate themselves from other MNOs in the future.

1.1.3 Required Insights

In order to be able to discuss and assess different NFC initiatives and recommend strategies based on key success factors, understanding the NFC technology and terminology is essential. Furthermore, to extract key lessons, insight concerning potential NFC services and various NFC initiatives are required. Moreover, insight regarding the different environments and macro factors in the countries with a NFC initiative is required to be able to compare and make judgements concerning the various initiatives. Lastly, insight into the actual initiatives in Norway, Serbia and Hungary in terms of strengths and weaknesses is critical in order to recommend valuable and suitable strategies to be used by Telenor in the future. Four concrete insights essential for answering the research questions are formulated:

1. To understand the **technology** enabling NFC mobile payment.

2. To understand the **service domains** enabled by NFC technology and review selected NFC mobile payment **initiatives** carried out.
3. To identify and understand the different **macro factors** applicable in the initiative countries.
4. To understand what are the **strengths and weaknesses** in the selected Telenor initiative processes.

Figure 3 outlines the overall structure of the report in addition to presenting an overview of which chapters give the required insight. A more detailed presentation of the structure of the report follows in the next section.

Basic Insights	Research Questions	The Overall Problem
NFC Technology *Ch. 5*		
NFC services and initiatives *Ch. 6*	RQ1 *Ch. 7*	
Country macro factors *Ch. 9*	RQ2 *Ch. 11*	Problem Description *Conclusion ch. 14*
Initiatives' strengths and weaknesses *Ch. 10*	RQ3 *Ch. 13*	
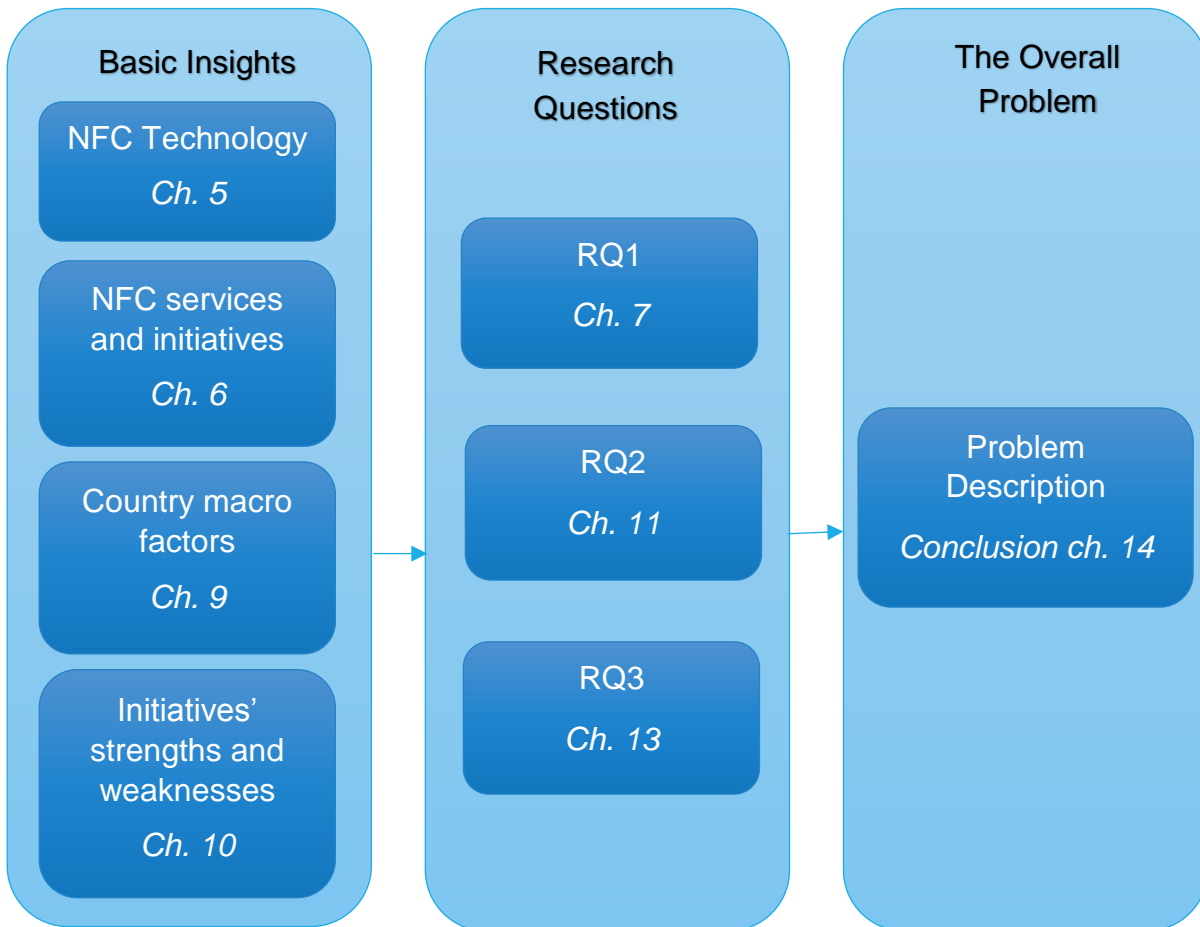
FIGURE 3: STRUCTURE OF THE REPORT

1.2 Guide to the reader

As illustrated in Figure 4, this report is divided into five parts in addition to the introduction.

Part A presents the background of the research and is most relevant for academics but can also be reviewed by readers interested in how the study was conducted. This part contains relevant theory related to differentiation and mobile payment, a chapter describing the methodology of the study and a chapter explaining the approach applied to answer the research questions.

The objective of part B is to answer RQ1. First, an introduction to NFC technology is presented, followed by a review of four selected launched NFC mobile payment services. Chapter 7 sums up and answers RQ1.

Part C treats the units of analysis in the case study and aims to answer RQ2. Chapter 8 includes the summaries of the six interviews conducted. The data collected from the interviews are utilised in chapter 9 and 10 to present and assess the markets and initiatives. A developed framework is used to conduct the assessment in chapter 10.

In part D, the results of all previous parts are utilised to suggest recommendations for Telenor to follow in their future strategy for NFC in the Nordics and CEE. Recommendations are proposed in chapter 12, while chapter 13 sums up and answers RQ3.

Part E seeks to conclude the report by providing an overall conclusion to the problem description, describe implications and suggest further research.

In the appendix, the interview guide, the completed pre-interview schemes of the three countries assessed, an overview of the four selected mobile payment services and a list of abbreviations are included.

Introduction	• Introduction
Part A: Background	• Ch. 2: Relevant theory • Ch. 3: Methodology • Ch. 4: Approach to answering RQs
Part B: Presentation of Near Field Communication	• Ch. 5: Introduction to NFC • Ch. 6: NFC Service Domains and Initiatives • Ch. 7: Answering RQ1
Part C: Presentation and assessment of NFC initiatives in Telenor Group	• Ch. 8: Summaries of the interviews • Ch. 9: Presentation of initiatives • Ch. 10: Assessment of initiatives • Ch. 11: Answering RQ2
Part D: Recommendations for NFC Differentiation in Nordic/CEE Countries	• Ch. 12: Recommendations • Ch. 13: Answering RQ3
Part E: Concluding chapter	• Ch. 14: Conclusion • Ch. 15: Implications • Ch. 16: Further research

FIGURE 4: STRUCTURE OF THE REPORT

1.3 Limitations of the Report

The main limitation of this report is the subjectivity of the author. Qualitative research is often criticised for being too impressionistic and subjective (Bryman and Bell, 2007). The research often begins in an open-ended way and the findings may rely

much on what the researcher finds important and significant. The fact that there is a single author of this report further deteriorates the probability for subjectivity.

To mitigate the limitation of subjectivity the interview findings are cross-referenced, the supervisor is consulted, and secondary data is utilised. In addition, to avoid subjective interpretations of the collected data, the interviewees have validated the interview summaries.

It is impossible to eliminate all subjectivity of the research. The author have to take subjective decisions for instance in association with categorisation of factors and so forth. However, the author believes that the facts, argumentation and findings are presented in a transparent and explicit manner such that all readers can evaluate the concluding recommendations based on the applied data foundation.

A further discussion of limitations and an evaluation of the methodology can be found in chapter 3 Methodology.

Part A: Background

2 Relevant Theory

In a competitive environment with increasing mobile data traffic but decreasing mobile revenues, Telenor as a MNO, could follow a differentiation strategy to mitigate falling revenues. There are many ways for a firm to achieve differentiation.
This study investigates how NFC mobile payment services can be successfully implemented by Telenor to achieve differentiation. The first part of this chapter presents theory regarding the differentiation strategy, what it is, the outcomes, and how it can be achieved. The second part presents theory regarding mobile payment.

2.1 The differentiation strategy

2.1.1 What is differentiation?

Differentiation constitutes one of the three generic strategies that Porter introduced for a firm to achieve competitive advantage: *cost leadership, differentiation* and *focus* (Sloman et al., 2007, Dibb et al., 2006, Kotler and Armstrong, 2014).

Cost leadership involves having a low cost base in terms of low production and distribution costs (Kotler and Armstrong, 2014, Dibb et al., 2006). A firm with a low cost base has the opportunity to charge lower prices and may therefore win a large market share (Kotler and Armstrong, 2014). However, within a single market only the firm with the lowest cost base can secure a competitive advantage by adopting this strategy (Dibb et al., 2006).

Focus involves serving customers in a narrowly defined area of activity, hence serving a few market segments well rather than going for the whole market (Kotler and Armstrong, 2014, Dibb et al., 2006).

The *differentiation strategy* involves offering a unique product or service that differs from the competitors' offerings and creates superior value for the customer (Kotler and Armstrong, 2014, Peter and Donnelly, 2004, Dibb et al., 2006). There is no universal definition of differentiation. Hence, many different definitions of the concept are viable in textbooks and articles.

The three generic strategies are illustrated in Figure 5 in terms of scope and competitive advantage.

Cost leadership (scope: broad & competitive advantage: cost)	Differentiation (scope: broad & competitive advantage: differentiation)
Focus (scope: narrow & competitive advantage: cost or differentiation)	

FIGURE 5: PORTER'S THREE GENERIC STRATEGIES

2.1.2 What are the outcomes of successful differentiation?

By offering a product or service that is different from the competitors' offerings, the firm can charge a premium price (Peter and Donnelly, 2004, Thompson and Formby,

1993, Ivancic and Jelenc, 2012). Differentiation reduces customer's price sensitivity because no perfect substitutes exist (Thompson and Formby, 1993, Petrochilos, 2004). The more differentiated a product or service compared to competitors' offerings, the more inelastic is the demand curve of the offering (Petrochilos, 2004). Figure 6 illustrates this phenomenon, an increased price from P1 to P2 of a product results in a smaller decrease in quantity demanded (b: $Q1-Q2_{in}$ as opposed to a: $Q1-Q2_{el}$) when the demand is inelastic as opposed to elastic.
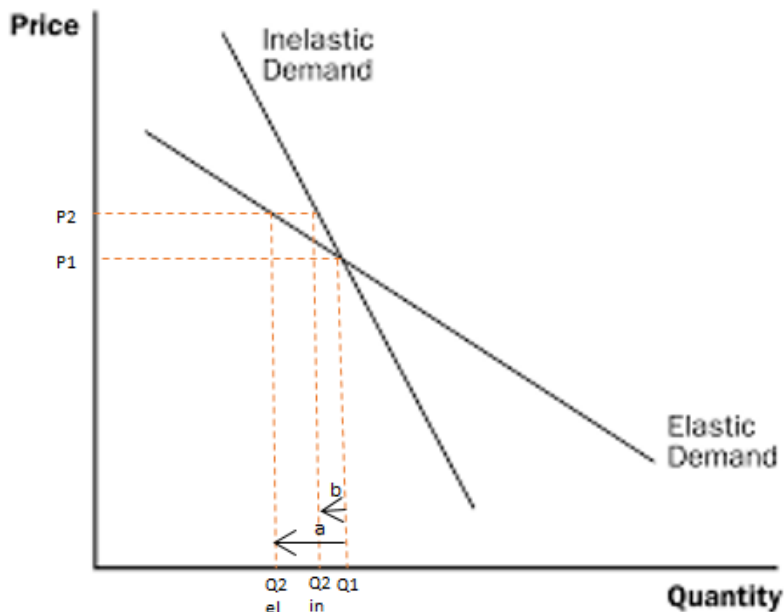
FIGURE 6: INELASTIC AND ELASTIC DEMAND

This fact results in a firm selling a differentiated product/service having higher control of the price compared to a firm offering a standardized product and hence, is not merely a price-taker (Petrochilos, 2004, Palmer, 2009). As achieving differentiation can result in higher costs, the added revenues caused by *differentiation* must outweigh the extra costs to be profitable (Thompson and Formby, 1993). This can be achieved either by keeping the additional costs below the price premium or by selling larger quantities to offset a thinner profit margin (Thompson and Formby, 1993).

Other outcomes of successful differentiation are higher customer loyalty and decreased bargaining power of large buyers as the offering is differentiated from the competitors' offerings such that no close substitutes exist (Thompson and Formby, 1993).

2.1.3 Categories of differentiation
From Mauseth (2014) it is evident that many categorisations of differentiation exist in the literature. Ivancic and Jelenc (2012) present the three differentiation subjects, country, firm and product. Furthermore, Razak and Ilias (2011) suggest that firms can differentiate their offerings along five dimensions: product, services, personnel, channel and image. Four of these dimensions, product, services, personnel and image are also suggested by Kutcher (2000). He emphasises that companies with the most effective differentiation strategy understand that each of these four aspects of the company influences the overall success of their attempt to create uniqueness.

2.1.4 Sources of differentiation

When focusing on the differentiation categories product and service as a part of a firm's differentiation strategy, literature suggests several sources of differentiation (Mauseth, 2014). For instance Ivancic and Jelenc (2012), present six sources of product differentiation: resources and capabilities, innovations, branding and marketing management, technology, quality and time.

Other researchers also emphasise more of these sources. Douglas et al. (2010) claim that guarantees, brand image, features, service and quality, and value are possible strategies for achieving differentiation. Wei-Ming and Kang-Wei (2007) state that corporate reputation is one of the resources fostering differentiation. According to Das and Joshi (2007) various sources of differentiation are new services, brand image, features and technology. In addition, they claim that speed to market is a component of the differentiation strategy for Technology Service Organizations (TSOs).

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                        Firm
                    differentiation

                     Product- and
                       service
                    differentiation

  Innovation      Quality    Branding and    Technology        Time
                              marketing

  New services  Quality features  Customer     Production    Speed to market
                                support service   process

  Features                      Brand image   One component  Delivery and
                                                              ordering time

                                Advertising    New offering
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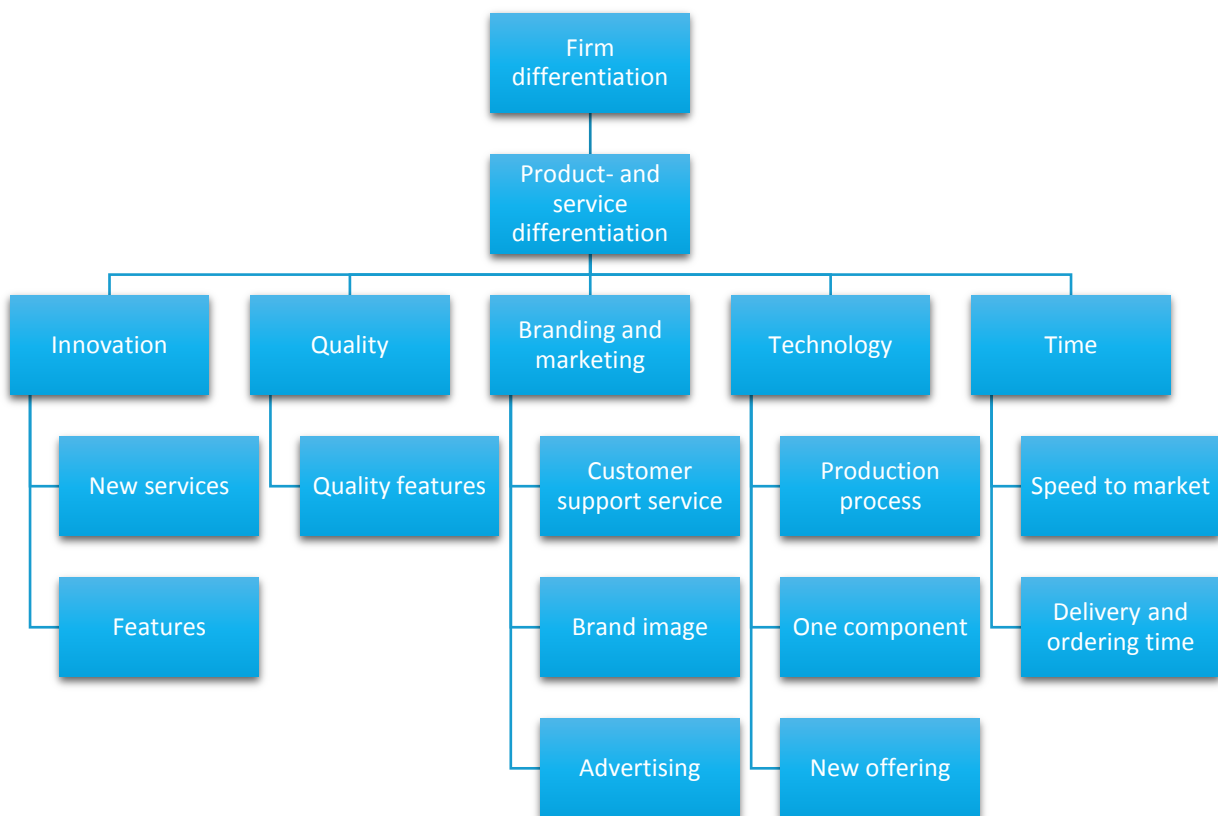
FIGURE 7: CATEGORISATION OF PRODUCT- AND SERVICE DIFFERENTIATION

On the basis of the discussion of product- and service differentiation sources, the literature review of Mauseth (2014) presents a categorisation of the identified differentiation sources. Figure 7 illustrates five of the sources outlined in the literature review: innovation, quality branding and marketing, technology and time. It is evident that some of these sources may overlap. For instance, new technology can be both related to innovation and quality. As claimed by Das and Joshi (2007), radical service innovations often constitute the basis for technological advances. However,

the purpose of this figure is to provide a simplified overview of one categorisation of different sources of differentiation to give the reader a better understanding.

In the assessment of literature presenting differentiation sources related to specific industries, one more source became evident. Qin and Wei (2014) and Tay (2003), suggest respectively cross-border cooperation and supplier leverage and partnering as sources of differentiation. There are many different reasons why cooperation across borders and industries can be beneficial. Costs may be reduced, quality of the offering can be improved, new ideas can be generated, firms can benefit from each other's reputation and position in a market, speed to market can be improved etc. Therefore, cooperation is suggested as a sixth category of differentiation sources, leaving us with the differentiation source categories innovation, quality, branding and marketing, technology, time and cooperation. However, it is important to notice that there is no guarantee that the suggested sources of differentiation improve customer value. The execution of the strategies involving the six sources is critical for the success.

2.1.5 Mobile payment as a potential differentiator

Ovum&MahindraComviva (2012) suggest that digital wallets can have the potential to help a wide range of players from different ecosystems such as mobile, retail and financial services, achieving service enhancement and differentiation. In section 2.2, the theory concerning mobile payment will be presented. The final subsection 2.2.3 draws parallels between mobile payment and the sources of differentiation in 2.1.4 to provide an explanation why mobile payment can be considered a differentiator for Telenor.

2.2 Mobile payment

According to Ovum, mobile payment can be defined as follows: "any form of financial transaction between two parties that is initiated and authorized using a mobile device" (Ubaghs, 2013c, p. 13). Mobile commerce, couponing, location-based offers, and so on, also have a position in the wider mobile payments ecosystem, but as there are no financial transaction from one party to another, they cannot be regarded as mobile payments (Ubaghs, 2013c).

The mobile payments space can be divided into three types as illustrated by Figure 8 (Ubaghs, 2015). Two factors diverge these types, 1) the location of the consumer and the need of the consumer to be in specific vicinity to enact a transaction, and 2) whether they are aimed at payment initiation or payment acceptance. Remote payments and proximity payments are aimed at payment initiation, and proximity payments need the consumer to be in close proximity to a POS terminal to enact a transaction. Mobile proximity payment, which is the focus of this study, can be further subdivided by technology type.

As illustrated in Figure 8, digital wallets might include both remote and proximity payments. Ovum's definition of a digital wallet is "a service that allows users to complete electronic transactions securely using one or more value accounts and authentication identifiers" (Zoller, 2014c, p. 3). Beyond a core payment function, digital wallets act as interfaces to additional applications such as coupons, rewards, and mobile loyalty programs (Zoller, 2014d). Mobile wallets make out a subset of

digital wallets, specifically designed for the mobile environment (Zoller, 2014d). Many mobile wallets typically focus on proximity payment.
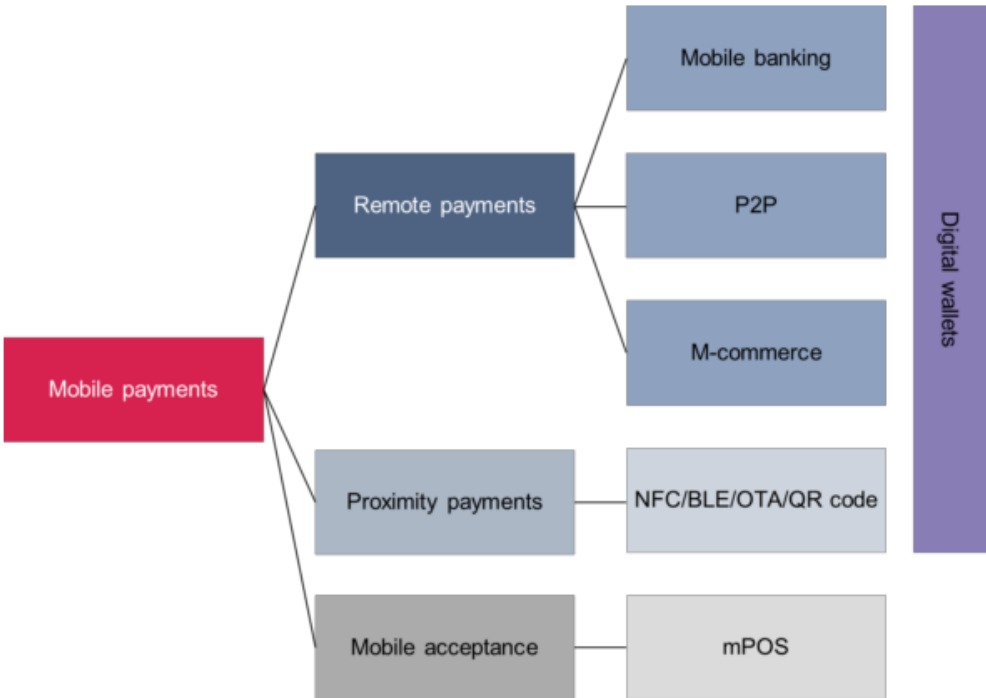
FIGURE 8: THE MOBILE PAYMENT LANDSCAPE (UBAGHS, 2015)

2.2.1 Mobile proximity technologies

There are a number of competing mobile proximity payment technologies (Ubaghs, 2015). The main reason why different technologies are developed is fragmentation in the mobile device and POS infrastructure. The consumer experience, payment transaction flows, and the ease of implementation should all be balanced in a mobile proximity technology hence; the best possible mix of these factors drives the development of the various technologies.

 At this point in time it is impossible to predict whether one specific technology will dominate the market in the future (Ubaghs, 2015). Figure 9 lists the available proximity payment technologies today but there is also a potential for new technologies to have an impact on the market in the future (Ubaghs, 2015).

NFC	• A radio frequency identification protocol that will be described in detail in chapter 5.
Quick response (QR) codes	• Uses a QR code reader for a one-way data transmission. • Available infrastructure but security and user experience issues.
Bluetooth Low Energy (BLE)	• Data transmissions of several meters and low energy usage. • Geared toward the retail and loyalty space.
Hands-free payments	• Make payments using the device's check-in and location capabilities. • Use Wifi infrastructure and SW-based implementations at the POS.
Over-the-air (OTA) payments	• Using remote payment to pay for items in customers' physical proximity. • Transaction in purely online environment.

FIGURE 9: AVAILABLE PROXIMITY PAYMENT TECHNOLOGIES (ADAPTED FROM UBAGHS, 2015)

2.2.2 Mobile payment success factors

Despite positive expectations and mobile payment trials being carried out for a decade, the market has not taken off. However, a number of conducted mobile payment trials and initiatives have resulted in researchers and analysts proposing a number of success factors for mobile payment initiatives. This section presents an overview of success factors described in literature, reports etc.

In the article by Ondrus et al. (2009) they augmented three frameworks for analysing why mobile payments fail with a dynamic model of the diffusion stages of mobile payment. The different stages can be used to categorise the different success factors associated with mobile payment as they indicate what stages need to be successfully conducted to succeed with a mobile payment initiative. Figure 10 presents the diffusion stages.

Prior to entering the diffusion stages, it is important to measure the market's readiness for mobile payments because the amount of new infrastructure and investment required to implement the system affect the success of a service (SmartCardAlliance, 2007). Sapien (2015) emphasises that an initiative's success depends on its ability to catch the wave at the right time. SmartCardAlliance (2007) presents five metrics that could be worth measuring by banks before deciding on a mobile payment strategy:

1. The percent of transactions that is contactless in a specific geographic area.
2. The percent of locations in key merchant segments that have deployed contactless payment readers.

3. Announcements by major carriers about the incorporation of NFC chips into new mobile phones.
4. Implementation of a standard wallet product by a key industry stakeholder.
5. Implementation of secure and trusted provisioning services.

Moreover, Carton and Dennehy (2011) point out that the country-specific payment culture of consumers is influencing the success of the implementation of a mobile payment service. This implies that both local economic and cultural factors are affecting the consumer adoption of mobile payment services. Furthermore, Ubaghs (2015) argues that the growing use of contactless cards in some markets indicates a readiness for a shift towards mobile proximity payment.

Stage 1: Build an alliance between MNO and Financial institutions.

Stage 2: Involve the sellers and business intermediaries side (i.e., merchants) in the development and deployment of the service. Build a sufficient supply in two-sided markets.

Stage 3: Provide an adequate value for the consumers to join the service. Generate incentives to create demand in two-sided markets.

Stage 4: Involve the manufacturers to scale the system and offer interoperability and ease of use. Build up interoperable standards for connectivity and transactions.

Deal with regulatory issues

FIGURE 10: THE DIFFUSION STAGES OF MOBILE PAYMENT (ADAPTED FROM ONDRUS ET AL, 2009)

2.2.2.1 Stage 1: Build an alliance between MNO and Financial institutions

Cooperation is stated as one of the main success factors in a mobile payment initiative. According to Guaus et al. (2008) and Tagawa (2009), cooperation is key to success in NFC mobile payment services. Ubaghs (2014) suggests that the most successful mobile payment business models will be those with a focus on collaboration. NFC makes out an ecosystem with new services, opportunities and an intersection of multiple industries, which requires cooperation among the stakeholders (Tagawa, 2009). SmartCardAlliance (2007) claims that full cooperation and partnership between banks and MNOs are required for a viable mobile proximity payment offering.

Not all business models encourage cooperation. Hence a business model that deliver value to all stakeholders and create a win-win relationships among the ecosystem players must be developed (NFC-Forum, 2008, SmartCardAlliance, 2007). Zoller

(2012) anticipates that mobile wallet business models mixing different revenue streams will be the most viable and sustainable.

GSMA (2014) also outlines collaboration as one of the key factors a MNO needs to consider when deploying a digital commerce proposition. Complexity of the ecosystem is one of the biggest barriers to successful implementation, and collaboration between the actors can reduce this complexity and create economies of scale.

2.2.2.2 Stage 2: Involve the sellers and business intermediaries side

According to SmartCardAlliance (2007) and Gemalto (2014), the success of mobile proximity payment depends directly on the number and diversity of merchant locations providing contactless POS terminals. Also InnovisionResearch&Technology (2007b) emphasises that success depends on adoption by enterprises, including merchants. Zoller (2013) suggests put merchants centre stage as the consumer adoption is likely to be low if mobile proximity payment is not available at a wide variety of merchants.

Furthermore, the relationships and responsibilities of the actors involved in the mobile payment ecosystem are critical (SmartCardAlliance, 2007, NFC-Forum, 2008). Forming the appropriate strategic partnerships might be the difference between success and failure of an initiative (Sapien, 2015). The strength of the relationships formed among all of the business stakeholders also influence the success of a mobile payment transaction model (SmartCardAlliance, 2007). It is important to clearly specify the responsibilities of the different actors in the ecosystem (NFC-Forum, 2008). Especially how the functionalities of the TSM are divided and provided by the ecosystem players are relevant for the initiative's success.

2.2.2.3 Stage 3: Provide an adequate value for the consumers to join the service

Various sources state consumer acceptance and adoption as critical for the success of mobile payment (InnovisionResearch&Technology, 2007b, SmartCardAlliance, 2007, NFC-Forum, 2008). Zoller (2013) claims that education and building awareness should be a priority.

Different methods to achieve consumer adoption are presented. According to NFC-Forum (2008), consumer adoption is achieved by creating value for the consumer. Adding new functionality on top of mobile payment to offer multiple-application capability is required for this. Ubaghs (2015) anticipates the same success factor, platforms including payment alongside other value-added services. SmartCardAlliance (2007) emphasises that requirements as speed, convenience and security must be met by the devices used in a mobile proximity payment initiative. On the other hand, Zoller (2014j) points out that customers are not a homogenous mass such that customer segmentation should be emphasised.

Furthermore, GSMA (2014) outlines ease-of-use as a priority in the development of a mobile payment initiative to create value for the consumer. Consumers expect intuitive and elegant solutions enabling them to control their own experience. SmartCardAlliance (2007) reinforces this view by suggesting that the mechanisms

included in a mobile proximity payment solution must be easy to acquire, use and manage.

2.2.2.4 Stage 4: Involve the manufacturers to scale the system and offer interoperability and ease of use

A flexible solution is emphasised by both GSMA (2014), NFC-Forum (2008), Ubaghs (2015) and Ubaghs (2014). A one-size-fits all solution is likely to fail as there are different regional and local market factors (GSMA, 2014). An open NFC mobile ecosystem is advantageous to support the variety of existing and future models and accommodate different service providers' strategies.

Moreover, making the right technology choices are essential for profitable businesses to be built around the technology (InnovisionResearch&Technology, 2007b). SmartCardAlliance (2007) suggests that complete interoperability among different handsets and different mobile operators and backward compatibility to the existing contactless payments infrastructure are required for a successful deployment. Interoperability is also emphasised as critical by (Gemalto, 2014). Ubaghs (2014) points out that developer-friendly APIs and easy integration are critical. Additionally, TSM functionality is necessary to guarantee a trusted end-to-end system for users' and service providers' applications and data (NFC-Forum, 2008).

After the arrival of HCE, MNOs adopting a SIM based model must tread carefully (Zoller, 2014d, Zoller, 2014a). They should avoid being too aggressive with their rental fees (Zoller, 2012), and strive for a flexible service provisioning and commercial terms (Zoller, 2014d).

2.2.2.5 Stage 1-4: Deal with regulatory issues

Dealing with regulatory issues is something that must be done throughout the complete deployment process to succeed with a mobile payment initiative (Ondrus et al., 2009). GSMA (2014) suggests that a consistency across MNOs and devices should be aimed for. Where possible, a consistent approach to payment, loyalty, couponing and ticketing should be sought by following industry standards and specifications.

2.2.2.6 Overview of success factors

Based on the previous discussion, some key categories of success factors for mobile payment can be extracted. To achieve simplicity and transparency, some of the factors presented above are merged into broader factors, making out wider categories. The eight key success factors extracted from the discussion are presented in Figure 11. All of the presented factors in the figure are emphasised by more sources to influence the success of a mobile payment initiative.

Although presented as different success factors, it is evident that many of the factors are likely to influence each other. There are for instance many of the extracted factors that can be considered to affect the success factor of creating consumer value. However, these factors also provide other forms of value and are therefore included as separate factors.

FIGURE 11: OVERVIEW OF MOBILE PROXIMITY PAYMENT KEY SUCCESS FACTORS

2.2.3 Sources of differentiation identified in mobile payment

Six sources of differentiation are presented in 2.1.5: *innovation, quality, branding and marketing, technology, time and cooperation*. Based on the introduction to mobile payment, several of these sources are applicable.

In many ways, all sources can be considered applicable. It is no doubt that mobile payment can be regarded as *innovative*. Although the enabling technology has existed for some time, most consumers consider paying with your mobile device as an innovative service. Moreover, this leads us to *branding and marketing*. Providing innovative services seems to have a positive influence on a firm's branding and marketing. Especially technology firms such as MNOs are likely to benefit from offering what the consumers consider as innovative services.

The source of *quality* can also be applicable with mobile payment if the provider ensures the quality of the service is satisfying. However, it is important to notice that the applicability of this source depends on the specific mobile payment service offered. The source of *time* is in the same category regarding the fact that the applicability depends on the specific service offered. Time can be a source of differentiation in mobile payment in the cases where the service is first to market, or is first to market in its kind.

Finally, *technology* and *cooperation* are sources of differentiation highly applicable to mobile payment. As presented previously, many types of mobile proximity payment technologies are available. Different choices and mixes of technologies to offer a mobile payment service are therefore available to achieve differentiation. Cooperation is applicable as providing a mobile payment service in most cases require cooperation across different firms and industries.

The relevance of all the six sources of differentiation are assessed in conjunction with mobile payments, and it can be concluded that this service makes out a potential for differentiation.

3 Methodology

The aim of this chapter is to present the methodology followed in the master thesis to ensure reliability and validity. The presentation of the methodology is divided into four parts inspired by Yin (2014), research strategy, research design, data collection and data analysis. The last section of this chapter is used to evaluate the methodology followed and point out limitations of the conducted research. Figure 12 illustrates the methodology followed in this thesis.
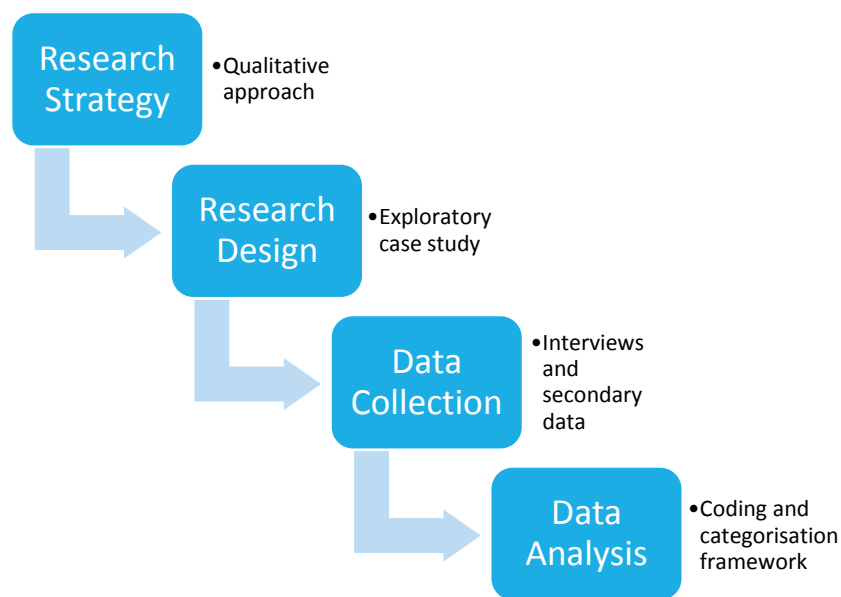
FIGURE 12: OVERVIEW OF THE METHODOLOGY FOLLOWED

3.1 Research Strategy

According to Bryman and Bell (2007) research strategy, a general orientation to the conduct of business research, can be divided into two clusters, quantitative and qualitative research. Qualitative research emphasises words rather than quantification in the collection and analysis of data in addition to having an inductive, rather than deductive approach.

A qualitative approach is chosen for this master thesis on the grounds of the problem definition and scope of research. As recommendations concerning future NFC strategies for Telenor are supposed to emerge from the research, this can be categorised as inductive research, which characterises a qualitative approach.

Selecting a qualitative approach has consequences for the alternatives for research design and data collection. Some methods are more suitable for the objectives of qualitative research than others are. A case study is one of the preferred methods to be used in qualitative research, and the next section argues why this is chosen as the most suitable method for this specific research.

3.2 Research Design

Yin (2014) defines research design as "the logic that links the data to be collected (and the conclusions to be drawn) to the initial questions of study." Another way of saying this is the structure followed in collecting and analysing the data to answer the initial problem definition.

3.2.1 Purpose of the study – Exploratory

Babbie (2013) explains that a study may have three different purposes, exploration, description and explanation. The research questions of this study are all on the "What"-form, and according to Yin (2014), this type of question is a justifiable rationale for conducting an exploratory study. By investigating and analysing the nature of current NFC initiatives from an MNO's perspective, the goal is to explore strategies and key success factors to be followed by Telenor Group in the future. Babbie (2013) suggests an explorative approach suitable when the researcher is inexperienced on the topic or the field of research is relatively new. Hence, an exploratory nature is justified as both of which are the cases in this research.

3.2.2 Research method – Case Study

Five different research methods are presented by Yin (2014): experiment, survey, archival analysis, history and case study. Three conditions can be used to determine when each method should be used, 1) the type of RQs posed, 2) the extent of control a researcher has over actual behavioural events, and 3) the degree of focus on contemporary as opposed to entirely historical events (Yin, 2014). When examining contemporary events without the opportunity to manipulate relevant behaviours, the case study is preferred. The strength of case studies, especially relevant for this thesis, is its ability to deal with a full variety of evidence such as documents, artefacts, interviews, and observations (Yin, 2014). Furthermore, "what" questions can have an explorative nature, and according to Yin (2014), any of the five research methods can be used for exploratory studies.

3.2.2.1 Case Company – Telenor Group

As both the pre-diploma and master thesis were conducted in cooperation with Telenor, it followed naturally to select a case relevant to them. As previously mentioned, mobile financial services, more specifically NFC mobile payment, is one of the types of services available for Telenor to differentiate themselves from other MNOs. Hence, assessing the ongoing NFC initiatives in the Telenor Group seemed like a valuable investment as local differences could be identified and strategies for future NFC initiatives recommended.

Telenor Group operates in 13 markets worldwide. However, as there are huge differences between the countries, opportunities related to NFC mobile payment are more promising in certain countries.

Figure 13 illustrates the status of financial services within Telenor's markets including the units of analysis in this study. The black coloured box indicates the market with a launched NFC service, Norway. The dark grey boxes indicate markets where a NFC service trial is carried out and a service is likely to be launched in the near future. The light grey boxes indicate markets where other forms of mobile financial services exist.

The red line encircles the three countries making out the units of analysis in Telenor, the case company. As indicated by the coloured boxes, these three countries have three different statuses. Telenor Norway has launched a NFC mobile payment solution in cooperation with DNB, Valyou. Telenor Hungary has cooperated with other Hungarian MNOs regarding a NFC mobile payment service and is planning to launch a service during 2015. Telenor Serbia launched Telenor Banka in September 2014 and offers different types of mobile financial services. NFC mobile payment is a potential extension of this bank's services in the future.
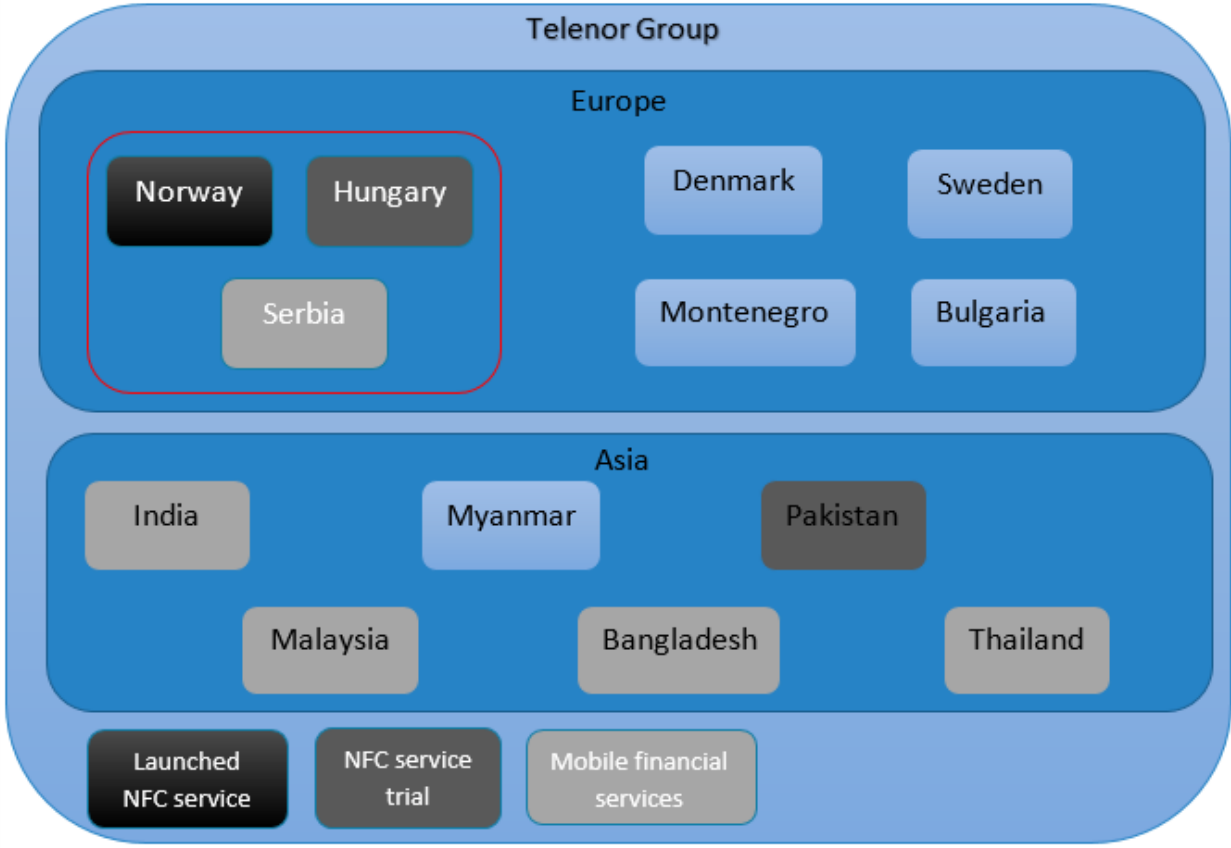
FIGURE 13: MOBILE FINANCIAL SERVICES WITHIN TELENOR AND UNITS OF ANALYSIS

The choice of restricting the case study to three of Telenor Group's business units forms the scope of the data collection as only data from Telenor Norway, Serbia and Hungary is needed.

3.2.3 Theoretical foundation

Two main sources make out the theoretical foundation of this study. The first source is the pre-diploma thesis containing a literature review of product- and service differentiation. However, this theory relates to a higher level than the field of study in this paper. The pre-diploma thesis dealt with the concept of product- and service

differentiation in addition to how MNOs could benefit from using this strategy in a competitive industry. This master thesis, on the other hand, treats a specific service (NFC mobile proximity payment) MNOs can offer to differentiate themselves. This means that a MNO can succeed with their differentiation strategy if successfully offering NFC mobile proximity payment.

The fact that the pre-diploma thesis dealt with higher-level theory of the topic treated in this study entailed a need for complimentary sources to make out the theoretical foundation of this paper. Materials covering NFC, in general and different initiatives and services, were found through electronic literature searches and informants such as my supervisor and interview objects.

All literature was evaluated against the RQs to assess their relevance before included.

3.3 Data Collection

Case study evidence may come from six sources: documents, archival records, interviews, direct observation, participant-observation, and physical artefacts (Yin, 2014). The decision of what sources to use can have major impact on the result of the study. Yin (2014) asserts that no source has a competitive advantage over all the others, they are rather complementary. This indicates that a good case study relies on as many sources as possible.

Based on the research questions and the limited time available, it was decided to collect data using three out of six sources of evidence as illustrated in Figure 14.

FIGURE 14: SIX SOURCES OF EVIDENCE (GREY INDICATES APPLIED SOURCES)

Yin (2014) presents four principles that maximise the benefits from the six sources of evidence if followed:

1. Use multiple sources of evidence
2. Create a case study database
3. Maintain a chain of evidence
4. Exercise care when using data from electronic sources

In this study, three out of six sources of evidence are applied, hence the first principle is followed. The rationale of using multiple sources for data collection is data triangulation (Yin, 2014). Converging lines of inquiry may be developed such that the study findings or conclusions are more accurate and convincing. The *construct validity* of the study is strengthened by data triangulation when developing convergent evidence (Yin, 2014).

The second principle is followed by organising and documenting the data collected for the case study. All the documents and archival records utilised are saved electronically and the interviews are recorded and transcribed. This allows for separate, secondary analysis by other than the researcher, hence increasing the *reliability* of the case study.

A chain of evidence is maintained in this study by citing the relevant sources, thereby including the actual evidence used to arrive at specific findings. Besides, the paper clearly indicates the circumstances under which the evidence is collected, e.g. the time and place of an interview. The result of following this principle is increased *reliability* and *construct validity* (Yin, 2014).

The fourth principle is followed by three cautions: 1) setting limits regarding time spent searching for electronic sources, 2) cross-checking the sources used and the information derived from them, and 3) be sceptical to information from social media sites such as individual blogs.

3.3.1 Interviews
One of the most important sources of case study evidence (Yin, 2014), and the major source of evidence in this case study is interviews. The strengths of interviews are that they are targeted and insightful as they provide explanations and personal views. One the other hand, they have weaknesses important to bear in mind such as bias and reflexivity (Yin, 2014).

Semi-structured interviews were chosen as this was regarded the most appropriate interview type. Semi- structured interviews allow for flexibility at the same time as following a pre-developed interview guide. The flexibility resulting from this approach allows the interviewees to speak quite freely and elaborate on topics of their expertise. This can disclose valuable information in areas not known to be relevant by the interviewer.

Although following a semi-structured approach in all interviews, the sample of interview objects can be divided into two groups. The first group of interviews included industry experts and the interviews were conducted to ensure a broad perspective in the discussion. The information gained from these interviews was mainly relevant for RQ1 and RQ3. The interview guide applied for the group 2 interviews was not used. Instead, the interview structure was more open, only guided

by some main topics decided by the interviewer. The choice of industry experts was based on the contact network of the researcher.

The group 2 interviews were primarily relevant for RQ2 and RQ3. They were quite extensive, trying to uncover important and characteristic aspects of the NFC initiatives in Norway, Serbia and Hungary. The interview guide (Appendix A: Interview Guide) used in these interviews was developed in such a way that local differences between the initiatives should be uncovered. The topics covered in the interview guide concerning the NFC initiative were *general background information, technology, requirements, business model, ecosystem and strategies.* However, as a semi-structured interview type was applied, other topics could also be touched when this followed natural in the interview/conversation. Although the interview guide was mostly followed throughout the four interviews, adaptions to the structure and questions were made based on the experience, knowledge and interest of the interview object. Such an approach is especially suitable in explorative studies because it is difficult to know exactly what you are looking for prior to the interviews.

A pre-interview scheme was used for the group 2 interviews. As all of the interviewees were busy people, the interviewer filled in as much information as possible in this scheme prior to each interview. The pre-interview scheme (Appendix B) contained data about macro factors in the three selected countries, in addition to formal information about the NFC mobile payment initiative in the specific country. This data was important in order to compare the different initiatives in a good manner. The researcher acquiring this information prior to the interview saved time for the interviewee. At the same time, it worked as a countercheck for the researcher because the interviewee confirmed or corrected the collected data in the beginning of the interview.

As my supervisor has experience with mobile payment initiatives within Telenor Group and knows the professional environment, he proposed interviewee objects inside Telenor and made the initial interview requests. The author initiated the contact with the interview object from Valyou to ensure more perspectives on the Norwegian initiative. Table 1 presents the interview participants.

TABLE 1: SAMPLING OF INTERVIEW PARTICIPANTS

Name	Company	Country	Position	RQ relevance
Interview group 1:				
Ragnar Øyno Jensen	EY	Norway	Senior Manager	RQ1 + RQ3
Gilles Ubaghs	Ovum	Australia	Senior Analyst	RQ1 + RQ3
Interview group 2:				
Marko Rankovic	Telenor Banka	Serbia	Strategy and Portfolio Manager	RQ2 + RQ3
Tibor Berkes	Telenor Group	Hungary	Head of Financial Services	RQ2 + RQ3
Arne Munch-Ellingsen	Telenor Norge	Norway	Senior Researcher at Telenor Research	RQ2 + RQ3
Per Arvid Gjersum	Valyou	Norway	Key Account Manager	RQ2 + RQ3

As both time and resources were limited, and the geographical locations of the interviewees were widespread, interviews were conducted by phone. According to Bryman and Bell (2007) there are several advantages and limitations of phone interviews compared to personal interviews. Advantages of telephone interviews are that they are cheaper and quicker to administer, they remove the potential source of bias based on personal characteristics, and they are easier to supervise. The limitations of telephone interviewing are among others that the telephone interviewer cannot engage in observation, and visual aids such as show cards are difficult to employ. Overall, the provided results from the phone interviews were satisfactory. However, the limitation of not being able to observe was challenging from time to time. This expressed itself in the form of interruptions, misunderstandings and inappropriate follow-up questions. Moreover, some of the phone interviews were affected by lost connections resulting in disrupted calls.

To ensure that all data acquired and extracted from the interviews were correct and accurate, all interviews were recorded on the permission by the interviewees. As part of the verification process, the interviews were transcribed in full, and a summary covering the most relevant findings was issued to the respective interviewee for verification. By performing this action, potential misunderstandings and misinterpretations could be corrected, increasing the quality of the data. Furthermore, this post-interview contact allowed for additional inputs by the interviewee, which could further improve the quality of the data. An overview of the process of the interview and verification process is presented in Figure 15.
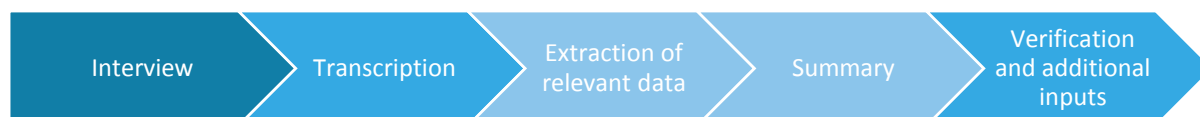
FIGURE 15: OVERVIEW OF THE INTERVIEW AND VERIFICATION PROCESS

3.3.2 Documentation

Documentation is a stable, unobtrusive, specific and broad source of evidence (Yin, 2014). Written reports of events, progress reports, internal records, news clippings, blogs, presentations and white papers are all examples of documentation used in this study. A full list of documentation utilised in this paper is presented in Table 1.

Both systematic database searches and ad-hoc searches using web browsers are carried out. In addition, my supervisor and some of the interviewees have issued relevant documentation such as journal articles and internal reports. According to Yin (2014), the most important use of documentation for case study research is to corroborate and augment evidence from other sources. Hence, documentation is used to support evidence from the interviews, but also to build the theoretical foundation and give a fundamental understanding of NFC technology and services. As documentation can be biased and subjective, the documents have been used carefully. To the greatest extent possible, data is acquired from more than one source.

TABLE 2: UTILISED DOCUMENTATION

Academic Literature	Practitioner Literature
• Journal articles • Conference proceedings • Literature reviews • Books • Pre-diploma thesis • Previous master thesis	• White papers • News articles • Blogs • Consulting firm reports • Industry reports • Presentations • Project reports • Progress reports

3.3.3 Archival records

Archival records were primarily used in the work of finding data about the macro factors describing the environment in the countries focused on. "Public use files" and survey data produced by others were primarily the types of archival records consulted. The records were especially helpful in acquiring data about payment method distributions, POS terminals, and number of banks and MNOs. As with documentation, archival records are often produced for a specific purpose and a specific audience (Yin, 2014). Hence, caution was made when interpreting the usefulness and accuracy of the records, and more sources were mostly applied to ensure the quality of the data.

3.4 Data Analysis

Data analysis consists of producing empirically based findings by examining, categorising, tabulating, testing, or recombining evidence (Yin, 2014). Unlike quantitative data analysis, there are no clear-cut rules about how to analyse qualitative data (Bryman and Bell, 2007). Bryman and Bell (2007) presents two general strategies of qualitative data analysis: analytic induction and grounded theory. None of these strategies are strictly adhered to in this study but the coding tool of grounded theory is applied. "Coding entails reviewing transcripts and/or field notes and giving labels (names) to component parts that seem to be of potential theoretical significance and/or that appear to be particularly salient within the social worlds of those being studied" (Bryman and Bell, 2007, p. 586). The analysis of this study can be divided into three parts, one associated with each research question.

3.4.1 Analysis part 1

The first analysis considers the NFC technology and selected NFC mobile payment services. This part is mainly based on data from secondary sources such as academic literature and practitioner reports. In addition, data collected from the group 1 interviews with industry experts was also partly relevant.

Four different NFC mobile payment services were presented and reviewed based on their success. The theoretical success factors were compared with presented aspects of the different services to explain their degree of success. This analysis was seen as a prerequisite for later analysis by suggesting reasons for success of launched services based on theoretical success factors.

3.4.2 Analysis part 2

The second part of the analysis consisted of assessing the markets and initiatives included in the case study of Telenor. The main source of data was the interviews. Coding was used in the process of categorising the data in the interview transcripts to write summaries and to compare the three markets according to different aspects.

Moreover, a categorisation framework was developed based on theory, the analysis part 1, the interview summaries and discussion with informants. This framework consisted of six pillars influencing the outcome of a NFC mobile payment service. The analysis was conducted by comparing the three units of analysis according to each of the six pillars. This comparison resulted in identified strengths and weaknesses associated with each pillar for all three units. The result of analysis 2, which is a list of identified strengths and weaknesses of the three units, is a prerequisite for the third part of the analysis.

3.4.3 Analysis part 3

The third part of the analysis consists of proposing recommendations for the case company based on the two previous analyses. The identified strengths and weaknesses resulting from analysis 2 are of uttermost importance for the conduction of this final analysis. However, the analysis of the selected mobile payment services in part B and the theory from part A are also utilised.

The author assigned the identified strengths and weaknesses from each pillar to the relevant diffusion stages presented in the theory section. This provides an overall impression of what pillars have the most influence on the different diffusion stages and what weaknesses are obstructing the success of the different stages. On the background of this categorisation, recommendations are suggested to improve the success of the different diffusion stages by affecting the different pillars.

3.5 Evaluation of the Methodology

This section evaluates the quality of the methodology employed in this study. Yin (2014) has introduced four tests with the objective of evaluating a social science methodology by establishing its quality. The four tests are (Yin, 2014, p. 46):

1. **Construct validity:** "identifying correct operational measures for the concepts being studied".
2. **Internal validity**: "seeking to establish a causal relationship, whereby certain conditions are believed to lead to others conditions, as distinguished from spurious relationships".
3. **External validity**: "defining the domain to which a study's findings can be generalized".
4. **Reliability**: "demonstrating that the operations of a study – such as the data collection procedures – can be repeated, with the same results".

3.5.1 Construct validity

In this study where semi-structured interviews are the main source of data, the critical aspect regarding construct validity is whether the interviewer and the interviewee have a mutual understanding of the concepts being discussed and whether the responses of the interviewee are correctly interpreted by the interviewer.

The first part is attempted solved by explaining some of the terms used in the interview guide issued to the interview objects prior to the interview. Nevertheless, the problem of different understanding of concepts could be an issue in this study due to different cultures and backgrounds. Language is a factor reinforcing this issue. Three of the interviews were conducted in Norwegian, while the thesis was written in English. If Norwegian terms are not appropriately translated into English this could weaken the construct validity. In addition, the native language of two of the interview objects interviewed in English was not English. This can result in complications as concepts can be misused or wrongly interpreted. To limit this issue, summaries of the interviews were written in English and corrected and confirmed by the interviewees prior to the analysis. This action also mitigates the second part of the critical aspect presented above regarding correctly interpretations by the interviewer.

Another area of this study potentially weakening the construct validity is that the study relies heavily on the phone interviews, and that the interviews were conducted with only one representative from each firm. The subjectivity of the representative must therefore be taken into account, in addition to the fact that phone interviews may result in misunderstandings. Triangulation and multiple sources of evidence are used during the study to limit this potential problem.

3.5.2 Internal validity
Triangulation and interview validation are the main tools used to ensure internal validity in this study. According to Bryman and Bell (2007), when more than one method or source of data are used in the study of a social phenomenon, triangulation is achieved. As stated in the data collection section, three sources of data are used in this study. To the greatest extent possible, both secondary data and interview findings were cross-referenced to ensure internal validity. However, some data collected from the interviews were not discussed in secondary sources or other interviews. Hence, triangulation was not always possible and this can have a negative impact on this study's internal validity.

Interview validation was conducted to ensure that there were no misunderstandings between the interview objects' perspectives and the researcher's findings. Bryman and Bell (2007) present the goal of respondent validation as seeking confirmation that the findings and impressions of the researcher are congruent with the opinion of those on whom the research was conducted. The form of respondent validation used in this research was that the researcher transcribed and wrote summaries of the interviews, which were submitted to the interviewees for confirmation and potential correction.

The fact that this study relies heavily on the interviews reinforces the need for triangulation and interview validation to ensure internal validity. Additionally, the risk of the interviewees being influenced by subjectivity and self-interest is quite high in this study. It might be especially difficult for Telenor employees to present an objective view as the company has self-interest in the field of research.

Furthermore, the actual process of finding suitable and willing interview objects was difficult. Interview candidates with extensive knowledge and experience within the field were busy and therefore unavailable for interviews. Despite the fact that

valuable insights might have been lost because of this situation, the included interview objects added interesting thoughts resulting in thought-provoking findings.

3.5.3 External validity

According to Bryman and Bell (2007), ensuring external validity in qualitative research may prove difficult because the method conducted in such a study is often a case study or a study of a small sample.

The scope of this research is limited to NFC initiatives conducted by Telenor in selected markets in the Nordics and CEE. Some other initiatives are briefly described, although not thoroughly. The question whether the findings of this study may be transferred across social settings is therefore uncertain.

In one way, as this is a report written with the objective of guiding Telenor in their future NFC strategy, transferability of the findings to other MNOs is therefore not necessary. Regarding the geographical scope of the study, this indicates that the findings are transferable across different Telenor markets in the Nordics and CEE. Three different markets are investigated in detail and these are assessed and compared in order to present findings to be relevant and applicable for more than one specific country.

Industry experts are questioned in an effort to increase the external validity of this study. The perspectives of the industry experts are based on a more generalised approach, and their views are less subjected to subjectivity and self-interest than actors directly involved with NFC mobile payment services and Telenor.

However, as the mobile payment market is changing rapidly and new aspects constantly come into play, the potential transferability of this study may only be valid for a limited period of time.

3.5.4 Reliability

Reliability can be difficult to ensure in qualitative research as it is impossible to recreate the exact same social setting and circumstances of the initial study to make it replicable (Bryman and Bell, 2007). Furthermore, subjectivity of the researcher might be a problem in qualitative research.

However, various strategies are conducted to ensure the highest possible reliability. Yin (2014) emphasises the importance of establishing a chain of evidence. The purpose is to make the derivation from evidence from the initial research questions to the conclusions of the study easy to follow by the reader. Therefore, efforts have been made to make the links between the different parts of the study as clear and logical as possible.

The different phases of the research approach such as problem and research questions formulation, methodology, summaries of the interviews, and comparison of initiatives are well documented in the report to facilitate replication of the research. In addition, the settings of the interviews are documented to make it easier to replicate the circumstances under which the interviews were conducted. Moreover, an interview guide was developed and included in the appendix of the study. The full

recordings and transcripts of the interviews are not included in the study due to practical reasons but these can be made available upon request.

3.5.6 Overview of limitations

Table 3 provides an overview of the limitations resulting from the evaluation of the methodology carried out above and lists the actions performed by the author to mitigate them.

TABLE 3: OVERVIEW OF LIMITATIONS AND MITIGATING ACTIONS

Limitations	Mitigating actions
Only one representative from each firm.	Triangulation and multiple sources of evidence.
Thesis written in English but three interviews conducted in Norwegian.	Respondent validation.
English not native language of interviewees interviewed in English.	Respondent validation.
Risk of interviewees being influenced by subjectivity and self-interest.	Interviewing industry experts and triangulation.
The answers to RQ2 and RQ3 rely heavily on the interviews.	Triangulation and cross-referencing
Subjectivity of the author.	Utilisation of secondary data and respondent validation.
Difficult to recreate data collection as it is impossible to "freeze" a social setting and circumstances.	Document the applicable settings to facilitate an as equal replication as possible.
Interview objects may have different perceptions of concepts due to different cultures and backgrounds.	Different concepts explained in the interview guide.
Subjectivity of firm representatives may weaken the transferability.	Conduct interviews with industry experts.
Not face-to-face but phone interviews.	Interviewer repeating her understandings to increase validity and avoid misunderstandings during the interview.
Some of the ideal interview candidates were unavailable.	Exploit the available candidate objects fully.

4 Approach to Answering Research Questions

The objective of this chapter is to describe the approach to answering the three research questions by clarifying the connection between them, the theory and the methodology. The three following parts of this report seek to answer RQ1, RQ2 and RQ3 respectively. Part B presents an individual answer to RQ1, part C presents and individual answer to RQ2 and finally, part D presents an individual answer to RQ3. A final conclusion to the problem description is included in part E.

4.1 Approach to answering RQ1

The approach to answering RQ1 consists of three stages. The first stage involves introducing the NFC technology. This is also the first required insight stated in 1.1.3. Understanding the enabling technology is a necessary precondition to be able to

understand the assessment of the initiatives and the implications of the strengths and weaknesses identified in part C.

The second insight relates to NFC service domains and different NFC mobile payment initiatives. A description of some of the available NFC service domains are presented based on academic literature, industry reports and white papers. This presentation gives additional understanding of the opportunities generated from NFC.

Finally, four selected NFC mobile payment services are described and assessed according to their success factors. This assessment provides the reader with a more practical understanding of NFC and is therefore valuable for the subsequent analysis. The presentation of these services is based on secondary sources.

4.2 Approach to answering RQ2

Part C presents the macro factors of the three units of analysis, descriptions of the NFC initiatives conducted in these countries and a presentation of strengths and weaknesses related to the NFC initiatives. This part provides insight into NFC mobile initiatives, macro factors and strengths and weaknesses of selected initiatives. The main data source for this part is the interviews but secondary sources are also utilised.

To be able to conduct a structural and thoroughly assessment of the three units of analysis, a framework was developed by the author in collaboration with Rankovic and Ubaghs. The framework consists of six pillars all influencing the outcome of a NFC mobile payment initiative. The six pillars infrastructure, partnerships and cooperation, technical solution, implementation, timing and cooperation and regulation are developed based on presented theory, the assessment of the initiatives in part B and the interviews. The three units of analysis were assessed and compared according to all of the six pillars, and a number of strengths and weaknesses were identified based on this work. The last chapter of part C summarises and provides a holistic view of the identified strengths and weaknesses.

4.3 Approach to answering RQ3

The final research question is answered in part D. First, the relation between the six pillars and the pre-stage and the diffusion stages are presented. The strengths and weaknesses identified in the previous part regarding each pillar are categorised according to their relevance for the different stages.

Secondly, recommendations related to each of the six pillars are proposed. The recommendations are based on all relevant data presented in the report; presented theory and the findings related to RQ1 and RQ2.

Finally, RQ3 is answered by summarising the proposed key recommendations for how to successfully launch a NFC mobile payment service. The overview of the key recommendations indicates which recommendations affects the different stages, hence helping Telenor to prioritise the execution of the recommendations based on what stages are most critical in their case.

Part B: Presentation of Near Field Communication

5 Introduction to NFC

5.1 NFC technology

In late 2002, Sony and Philips jointly developed the NFC technology (Coskun et al., 2013). It is a short-range, bi-directional, wireless communication technology based on Radio Frequency Identification (RFID) technology (Akshay Uttama Nambi et al., 2012, Ozdenizci et al., 2010). There exist three devices which can be involved in NFC communication: NFC mobile, NFC reader and NFC tag (Coskun et al., 2013). Of the two parts involved in NFC communication, one is categorised as initiator and the other as target. The initiator initiates and guides the communication process, whereas the target responds to the request from the initiator. As illustrated in Figure 16, the initiator is either a NFC mobile or a NFC reader, and the target is either a NFC mobile or a NFC tag. NFC communication is categorised as active or passive depending on the generation of a RF field. When both parts use their own energy to generate an RF field to transmit data, active mode is apparent. When only the initiator or the target generates a RF field, passive mode is apparent.

Due to the fact that NFC is a short-range communication technology, two NFC devices must be within the combined operating radius of 4 cm to create the inductive coupling needed between the initiator and the target to transmit data (Coskun et al., 2013, Basili et al., 2014). NFC technology operates at the frequency of 13.56 MHz with data rates of up to a maximum of 424 kbit/s (Basili et al., 2014, Akshay Uttama Nambi et al., 2012). The limited bandwidth restricts big data transfers. When transferring bigger amounts of data, Bluetooth is a more suitable solution (Andersen et al., 2013). However, the transfer can be initiated by using NFC technology to set up the Bluetooth connection fast.

Initiator   Target

FIGURE 16: NFC INTERACTION STYLES

5.2 Operation modes

Three different operation modes are defined for NFC: card emulation, reader/writer and peer-to-peer (NFC-Forum, 2015c). Figure 17 illustrates and describes the three different operation modes. Despite some differences, the three operation modes all have simplicity in common (Madlmayr et al., 2008). Actions are automatically initialised after using a NFC-enabled device to touch another NFC-enabled device, a NFC-tag or a NFC-reader (Ozdenizci et al., 2010). Hence, all modes have the potential of facilitating a user-friendly service interaction (Andersen et al., 2013).

Card emulation:
- Between a NFC-enabled device and an external NFC reader.
- NFC-enabled device acts as a smart card.
- Perform transactions such as purchases, ticketing and transit access control.

Reader/Writer:
- Between a NFC-enabled device and NFC tag.
- Tags can be embedded in for instance posters and displays.
- A potential tool for marketing.
- Able to read timetables, receive special offers, update loyalty cards etc.

Peer-to-peer:
- Between two NFC-enabled devices.
- Enables two NFC-devices to communicate by changing information and share files.
- Able to share business cards, digital photos, WiFi link set-up parameters etc.

FIGURE 17: NFC'S THREE MODES OF OPERATION (ADAPTED FROM NFC-FORUM, 2015C)

5.3 NFC Mobile Architecture

As illustrated in Figure 18, the architecture of a NFC-enabled mobile phone consists of various integrated circuits such as a NFC communication interface and a secure element (SE) (Coskun et al., 2013).
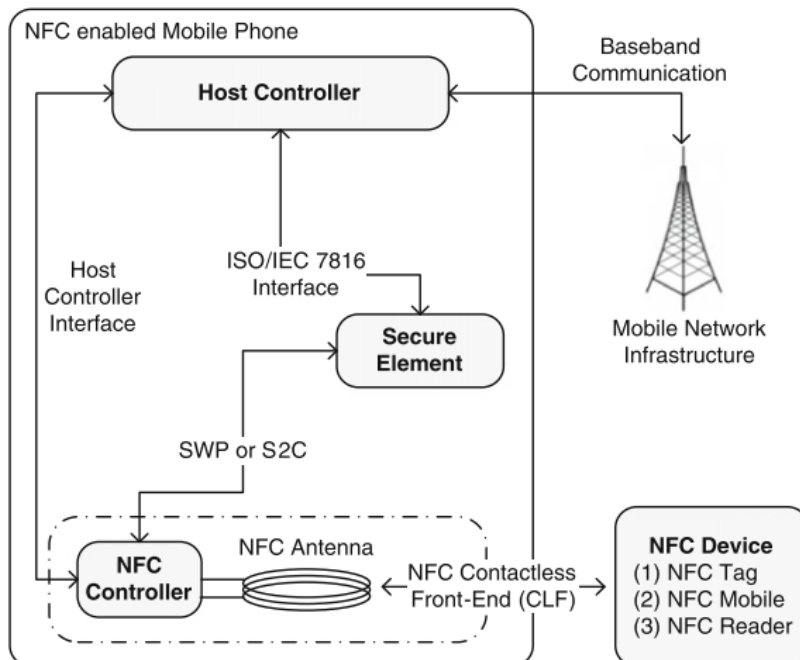
FIGURE 18: GENERAL ARCHITECTURE OF NFC-ENABLED MOBILE (COSKUN ET. AL, 2013)

The NFC interface can be divided into three parts: a NFC contactless analogue/digital front-end, a NFC antenna and an integrated circuit to enable NFC transactions called a NFC controller (Coskun et al., 2013). The secure element

enables the NFC enabled mobile phone to perform secure transactions, in addition to providing a secure environment to store sensitive data (Coskun et al., 2013). According to Coskun et al. (2013), either a Single Wire Protocol or NFC Wired Interface is used to connect the NFC controller to the secure element. The Host Controller is connected to the NFC Controller through the Host Controller Interface (HCI). The Host Controller sets the operating modes of the NFC controller through the HCI, processes data that is sent and received, and establishes the connection between the NFC controller and the secure element, hence, it can be seen as the heart of the NFC Mobile phone (Coskun et al., 2013).

5.4 Secure Element

Because a NFC enabled mobile phone may be used to for instance mobile payment and contactless ticketing, it is evident that the mobile phone must provide a secure area for storing and managing certain data preventing third parties to misuse it. The secure element (SE), consisting of hardware, software, protocols, and interfaces, represents such a secure area (Coskun et al., 2013). There are various SE alternatives in the market and these can be grouped into removable SEs, non-removable SEs, software based SEs on dedicated hardware, and other flexible SE solutions (Coskun et al., 2013). Table 4 briefly describes some alternative SE options.

TABLE 4: SECURE ELEMENT ALTERNATIVES

Removable SEs	**Sticker**: gives NFC functionality to non-NFC mobile phones. Two types available: active and passive
	Secure Memory Card (SMC): provides same high-level security as smart cards and can host multiple applications.
	Universal Integrated Circuit Card (UICC): implemented upon SIM or USIM. Can host non-telecom applications from various service providers.
Non-removable SEs	**Embedded SE**: smart card integrated to the mobile phone. Security level as high as the one supported by a smart card.
Software based SEs	**Trusted Mobile Base (TMB):** defined as a secure isolated section on the CPU of mobile phones.
Flexible solutions	Different Combinations of SIM/UICC, SMC, embedded hardware, NFC controller and antenna.

5.5 Host Card Emulation (HCE)

Host Card Emulation eliminates the need for the SIM or other Secure Elements (SEs) in launched NFC services (Pannifer et al., 2014). This is accomplished by using the card emulation NFC operation mode and allowing the operating system (OS) of the mobile device to communicate directly over the NFC interface. By taking use of this technology, banks can issue mobile NFC products over the top, and cooperation with MNOs is not necessary.

The difference between SE and HCE is the location of the application (payment app) including the payment credentials as illustrated in Figure 19 (Pannifer et al., 2014). The SE is a tamper resistant hardware module (often the SIM), which stores the application containing the payment credentials. There is a direct connection between the SE and the NFC controller/antenna. This is the architecture illustrated in Figure 18. With HCE on the other hand, the payment app is located in the mobile phone OS. This architecture also allows for direct communication with the NFC controller/antenna. Hence, payment apps can be loaded directly into the handset through an app store without involving the MNO.
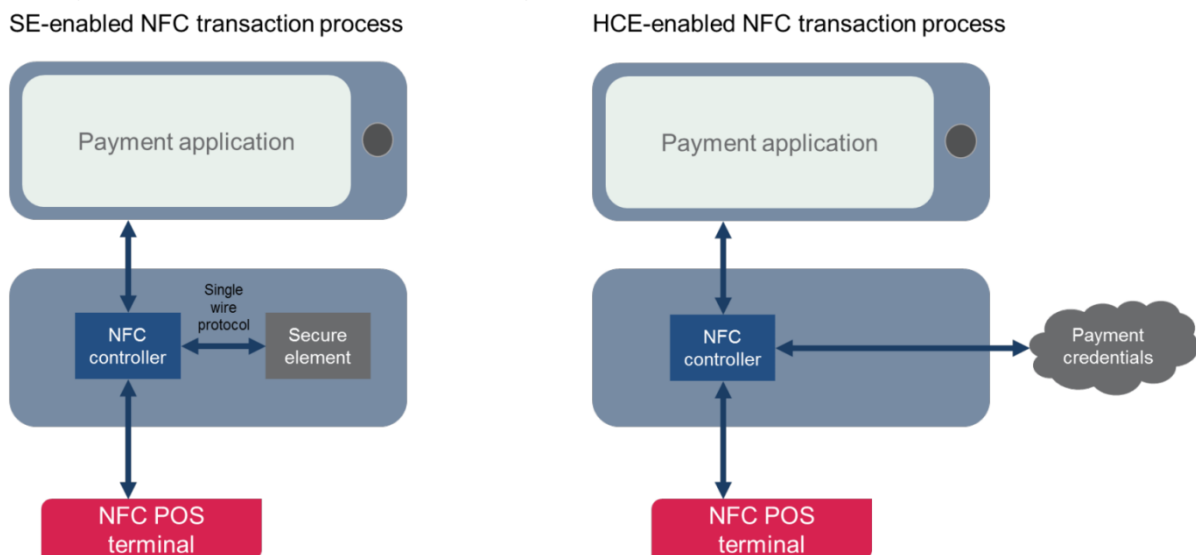
FIGURE 19: SE-ENABLED VS. HCE-ENABLED TRANSACTION PROCESS (UBAGHS, 2015)

SIM SE is a more mature technology than HCE and is already used in various NFC services launched worldwide (Pannifer et al., 2014). On the other hand, HCE technology involves a simplified ecosystem that might reduce the banks' costs. Which approach to choose depends heavily on local conditions (Pannifer et al., 2014). However, it is important to emphasise that SIM SE and HCE are not mutually exclusive (Pannifer et al., 2014). Hybrid models might be the best solutions, at least in the medium term.

6 NFC Service Domains and Initiatives

NFC technology involves a large potential for mobile services (Akshay Uttama Nambi et al., 2012). According to the literature review by Ozdenizci et al. (2010), about 40 % of all publications concerning NFC deals with applications and application development. This chapter introduces NFC mobile payment but also other NFC

service domains available. In addition, this chapter will present and review some NFC mobile payment and mobile wallet initiatives worldwide.

6.1 Service Domains

NFC technology offers a wide range of applications and service domains. As the currently most widely recognised NFC application is mobile payment and this makes out the focus of this thesis, most attention is given to this application. However, other service domains are also briefly discussed as these may be important add-ons to mobile payment to differentiate a specific NFC service.

6.1.1 Mobile Payment

6.1.1.1 Introduction

Mobile payment is probably the most well-known, promising and researched NFC service domain (Coskun et al., 2013). Most of the NFC-services launched and under planning involve mobile payment.

In a mobile payment system based on NFC technology, a NFC-enabled mobile phone acts as an ordinary payment card (McHugh and Yarmey, 2012). To conduct the payment, the customer must tap their NFC enabled phone against a connectionless POS terminal at the merchant. Hence, mobile payment is categorised within the card emulation operation mode of NFC (SmartCardAlliance, 2012).

In addition to being the most widespread NFC application, it can also be categorised as the most complex due to its ecosystem (Coskun et al., 2013). A huge number of participants are involved in the ecosystem of a mobile payment system: MNOs, banks, financial institutions, merchants, consumers etc. According to Benyó (2009) three primary roles in the NFC mobile service environment are the User, the SE Issuer and the Service Provider. In addition, an OTA Provider and a Trusted Service Manager (TSM) must be considered. A TSM acts as a commercial intermediary between the service providers and the SE provider by providing the technology and service support necessary to manage and protect the services (Benyó, 2009, SmartCardAlliance, 2012). Figure 20 illustrates one of the alternative representations of a mobile NFC ecosystem.
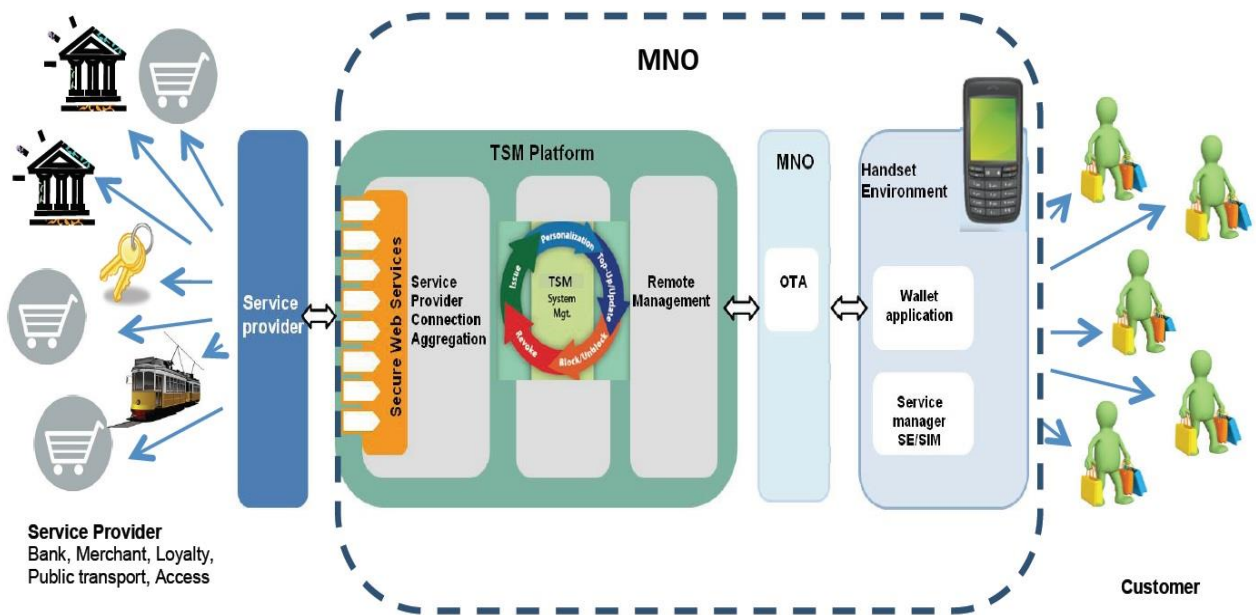
FIGURE 20: A MOBILE NFC ECOSYSTEM (MOBILTARCA, 2012)

Ozcan and Santos (2014) use NFC mobile payment as an example of a potentially new market at the convergence of distinct global industries that may not emerge due to difficulties among important ecosystem actors reaching an agreement upon market architecture. These difficulties can be explained by the ecosystem actors' history of dominance in their own industry and lack of joint collaboration experience.

6.1.2 Other Service Domains

6.1.2.1 Healthcare

Healthcare is one of the fields where IT plays an increasingly important role (Coskun et al., 2013). NFC is one of the IT-technologies well suited for the health care sector due to its ease-of-use, simplicity, and low power consumption. Examples of services made possible by NFC technology are remote health-monitoring, controlling and tracking systems, electronic capturing services, NFC enabled prescription systems, storage of encrypted medical data on tags, and adverse drugs reaction and allergy detection systems in pharmaceutical and medical care (Coskun et al., 2013).

According to Puma et al. (2012) there are four areas benefiting from introducing NFC in the health care sector: patient's security and care, leadership in healthcare, existence of standards and simple human interface. Factors that may delay the adoption of NFC in healthcare are existing ICT infrastructure, costs, information security and healthcare staff adoption.

6.1.2.2 Marketing

NFC technology has the potential to alter the marketing and advertising sector. By placing a tag on advertising posters, consumers with NFC-enabled phones can experience much more than receiving additional information. In addition to receiving data, interactivity is enabled (McHugh and Yarmey, 2012). Interactivity poses the opportunity to make the marketing efforts to be much more customised and

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personalised for instance by issuing coupons, showing videos, enabling social media sharing, and issuing maps and games. In addition, the advertisers can receive rich data and metrics such as date, time and location (Grabert, 2014). This data is valuable for marketers as it can be used to optimise marketing campaigns and review performance. One of the main barriers to immediate adoption of NFC-based marketing is the lack of a critical mass of NFC-enabled mobile phones in the market.

6.1.2.3 Entertainment

NFC offers a range of opportunities within the entertainment sector. Both gaming and social media are examples of fields where NFC can add value. Such applications of NFC technology are receiving increased attention on the user side (Coskun et al., 2013). Mobile gaming can be enhanced by NFC technology's functionality of enabling mobile interaction with tagged, physical objects (Coskun et al., 2013). Other functionality is letting two players receive access to a new level, earn extra points, or get clues by tapping each other devices (McHugh and Yarmey, 2012). Interaction with tagged, physical objects can also be used in conjunction with social media by publishing information with the virtual world. In addition, functionalities as tapping two NFC-enabled devices together to instantly connect over social media is possible (McHugh and Yarmey, 2012).

6.1.2.4 Authentication and Access control

NFC technology can also be used to authentication and access control. By equipping door locks with an actuator and a card reader, access by using a NFC-enabled mobile phone is possible (NFC-Forum, 2015a). In the near future, this is especially relevant for hotels, removing the need for key cards and manual check-in because access rights can be sent in advance to a guest's mobile device. This functionality was tested with positive results in a hotel in Sweden in 2010-2011 (Brown, 2011). NFC-based access control is also valuable and suitable at University campuses (McHugh and Yarmey, 2012).

Examples of uses of NFC-based authentication is at University campuses where NFC- enabled devices substituted student identification (Earles, 2013). In the future, it could be possible replacing passports and driver licenses with an NFC-enabled mobile phone.

6.1.2.5 Data exchange and sharing

Due to its ease-of-use and peer-to-peer operating mode, NFC technology is ideal for data exchange and sharing. The fact that a close proximity is needed between the two devices makes the transmission more secure and a simple tap to begin the transmission is understandable for most users. This type of service is especially valuable for potential business partners wanting to exchange contact details, but also friends and family may value the service as an easy way to share data such as pictures, contact details and videos.

6.1.2.6 Ticketing and loyalty programs

In addition to mobile payment, ticketing and loyalty programs are among the most common functionalities included in mobile wallets. Ticketing within public transportation is already tested more places around the world including Germany, Spain and UK (GSMA, 2012d). NFC can add value to each of the four steps making

out a ticketing process; registration, provision, validation and inspection (NFC-Forum, 2011). Speed, convenience, reduced transport operator costs and simplicity are among the added benefits. Event ticketing is another type of ticketing enabled by NFC technology (NFC-Forum, 2015a).

Loyalty programs or loyalty cards will work the same way as the loyalty cards in your physical wallet but they will be integrated into your mobile phone such that you do not have to carry them with you. Beside, using mobile loyalty programs make it easier for merchants to issue information and coupons to their customers based on their preferences, location and interests.

6.2 Launched NFC services

According to GSMA (2015), more than 150 SIM based NFC services were to be launched by the end of 2014 and almost 60 of these operate as commercial services around the world. In addition to SIM based services, there are also commercial NFC services that are not SIM based.

As a part of this study, four of these services were selected to be presented. Because the focus of this thesis is mobile payment, only services involving mobile payment were considered. Moreover, only services launched in Europe and the US were considered due to the geographical scope of this study, which is the Nordics and Central East Europe. The US was included despite not being part of Europe as this market is in many regards similar to the European and has a high impact on the European market. Furthermore, it was desired that the selected services should represent various technological solutions and varying degrees of success. Hence, two European SIM based services were selected, Cep-T Cüzdan and MyWallet, one cloud based solution from the US, Google Wallet, and one embedded SE solution from the US, Apple Pay. It should be noted that Google Wallet was not initially a cloud based solution but a SIM based. Up until this point, Cep-T Cüzdan and Apple Pay are considered successes, whereas many regard Google Wallet as a failure. MyWallet is still in an early phase and it is therefore difficult to conclude concerning its degree of success.

Table 5 provides a brief overview of the four services to be described more thoroughly in this study. A more detailed table is included in Appendix C.

TABLE 5: THE SELECTED NFC SERVICES

#	Service name	Country	Category	Main Actor(s)	Launch year
1	Cep-T Cüzdan	Turkey	Mobile Wallet (payment, ticketing, loyalty programs)	Turkcell & Yapi Kredi Bank	2011
2	MyWallet	Germany	Mobile Wallet (payment and coupons)	Deutsche Telecom	2014
3	Google Wallet	USA	Mobile wallet (payment, loyalty cards, coupon delivery, management and redemption tools)	Google, MasterCard, Citi, First Data and Sprint	2011
4	Apple Pay	USA	Mobile payment (proximity and remote)	Apple	2014

6.2.1 Comparison of markets

The four initiatives described operate in three different markets, Turkey, Germany and the US. Some macro factors relevant for mobile payment are illustrated in Table 6.

The mobile penetration rate is close to or above 100 % in all three countries, indicating that almost everyone owns a mobile device. The penetration of smart phones differs. In the US, the majority of the mobile devices are smart phones, whereas it is 50 % in Germany and 40 % in Turkey. Considering the ratio of contactless POS terminals to all POS terminals, it is about 5 % in Germany and the US, and 3 % in Turkey. However, the Turkish and German ratios are not recently updated and might therefore be a bit misleading. The number of contactless POS terminals is increasing in all markets. MasterCard has announced that all European retailers wanting to accept consumer payments with MasterCard and Maestro after 2020 have to offer contactless POS terminals by this time (PinsentMasons, 2014). In the US, all POS terminals must be EMV compliant by October 2015 (Gara, 2014). It is likely to believe that this migration will positively affect the number of contactless POS terminals in the country.

TABLE 6: MACRO ENVIRONMENT FACTORS OF THE THREE COUNTRIES

Macro factors	Turkey	Germany	The US
Mobile penetration rate	93 %[1]	140 %[2]	114 %[3]
Smartphone penetration	40 %[4]	50 %[4]	75 %[5]
Contactless POS terminal ratio	3 %[6] (2013)	5 %[7] (March 2014)	5 %[8] (March 2015)

[1] TÜRKTELECOMGROUP. 2014. *Turkey Telecom Sector* [Online]. Available: http://www.ttinvestorrelations.com/turk-telekom-group/investing-in-turk-telekom/turkey-telecom-sector.aspx [Accessed May 24th 2015].

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[3] STATISTA. 2015. *Number of subscribers to wireless carriers in the U.S. from 1st quarter 2013 to 4th quarter 2014, by carrier (in millions)* [Online]. Available: http://www.statista.com/statistics/283507/subscribers-to-top-wireless-carriers-in-the-us/ [Accessed June 7th 2015].

[4] TELLER, S. 11th November 2014 2014. Global smartphone penetration 2014. Available from: https://ondeviceresearch.com/blog/global-smartphone-penetration-2014 [Accessed April 29th 2015].

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[6] GSMA 2013. CASE STUDY: TURKCELL MOBILE WALLET.

[7] CLARK, S. 2014e. *Vodafone rolls out NFC mobile wallet across Germany* [Online]. NFC World. Available: http://www.nfcworld.com/2014/03/11/328247/vodafone-rolls-nfc-mobile-wallet-across-germany/ [Accessed May 24th 2015].

[8] CLARK, S. 2015a. *Apple Pay now at 700,000 locations* [Online]. NFC World. Available: http://www.nfcworld.com/2015/03/09/334526/apple-pay-now-at-700000-locations/ [Accessed May 24th 2015].

6.2.2 Cep-T Cüzdan

6.2.2.1 Presentation

The mobile payment initiative was launched by MNO Turkcell in cooperation with Mastercard and Yapi Kredi Bank in April 2011 (Cisco, 2012, Kazan and Damsgaard, 2013). The two banks Garanti and Akbank were soon to follow and all three offer their own application on the Cep-T Cüzdan platform. Later on, Turkcell has been successful in teaming up with more Turkish banks (Kazan and Damsgaard, 2013). Turkcell's mobile wallet is developed as an end-to-end system including the NFC Gateway Platform, the Cep-T Cüzdan application and the over-the-air (OTA) system (Cisco, 2012).

Turkcell's business model is based on SIM-rental – all banks are charged a monthly fee (Kazan and Damsgaard, 2013). As opposed to most other mobile wallet actors, Turkcell has its own Trusted Service Manager (TSM) solution, which is approved by MasterCard (Cisco, 2012, GSMA, 2013). According to Hakan Tatlici, Product Manager for Turkcell Wallet, "Owning our own infrastructure and wallet solution will shorten the time it takes to integrate and introduce new applications," (GSMA, 2013, p. 2). The secure element is placed on the SIM-card of the consumer (GSMA, 2013). In addition to mobile payment, other non-payment services are also available on the Cep-T Cüzdan platform such as ticketing and loyalty programs. In the future, Turkcell is planning to enable its mobile wallet to support all debit and credit cards on the Turkish market, in addition to including access cards (GSMA, 2013). Figure 21 illustrates a brief timeline for Turkcell's mobile wallet.

Turkcell was the first Turkish operator to offer a NFC-enabled mobile wallet, but has later on got competition from Vodafone Turkey (Cisco, 2012). 50.000 POS terminals were already installed prior to Turkcell's launch and the plan is to convert around two million POS terminals the coming years (GSMA, 2012a). Prior to the launch of the Cep-T Cüzdan, Turkcell was involved with two NFC pilots with Garanti Bank (2008) and Akbank (2009) (GSMA, 2012a).

April 2011: Turkcell launches commercial NFC payments with Yapi Kredi Bank

March 2012: Service signs up 50.000 users

October 2012: Service upgraded, 14 banks signed up

April 2013: Transit card added

January 2012: Third bank (Akbank) joins service

April 2012: Adds location-based offers to service & fourth bank signs up

March 2013: Service reaches 1M customers

End of 2014: More than 2.5 M customers

FIGURE 21: TIMELINE FOR CEP-T CÜZDAN

6.2.2.2 Current status and success factors

In March 2013, Iker Kuruöz, chief information and communication officer (CIO) at Turkcell, claims that the project has been successful. "It has been one of the most advanced mobile payment solutions. So far we have reached almost a million customers and 400,000 credit cards are linked to people's mobile wallets" (Burkitt-Gray, 2013). About one month later, the CEO of Turkcell announced that the service was downloaded to 1.2 million customers indicating a rapid growth (Clark, 2013). By the end of 2014, Turkcell's mobile payment service had more than 2.5 M users and total transactions of more than NOK 350 million (Turkcell, 2014). 2.5 M users make out approximately 7 % of Turkcell's subscribers.

Taking into account the low mobile payment adoption globally, Turkcell's mobile payment service can be considered quite successful. It is considered among the leading mobile wallets in the industry by GSMA.

When comparing the presented theoretical success factors of mobile payment initiatives with Turkcell's service, many factors can be identified. Cooperation is key to succeed with a mobile payment initiative (Tagawa, 2009, Guaus et al., 2008, Ubaghs, 2014, SmartCardAlliance, 2007). Although Turkcell operates as the TSM, an architecture open for cooperation is established. This has involved a number of banks joining the service following the launch.

To create consumer value and user adoption (InnovisionResearch&Technology, 2007b, SmartCardAlliance, 2007, NFC-Forum, 2008), Cep-T Cüzdan offers loyalty programs and ticketing in addition to mobile payment. Moreover, free SIM cards are provided and numbers of promotional campaigns are carried out to create awareness and educate the consumers.

The technological solution chosen by Turkcell is secure and straightforward for service providers. This eases the cooperation within the ecosystem. Furthermore, Cep-T Cüzdan is compatible with all NFC ready smart phones, increasing the customer value. Additionally, 50.000 locations to use the service at launch is considered a good start and provide users with many opportunities to try out the service.

6.2.3 MyWallet

6.2.3.1 Presentation

MyWallet was launched by Deutsche Telekom in Germany in May 2014 (Sahota, 2014). An introductory bonus of €40, a companion card that can be used to make purchases at merchants not equipped to accept contactless payments, and a free NFC SIM card were given to customers who signed up for the service (GSMA, 2015). The service is supported by 18 mobile phone models from Sony Android and Samsung (Boden, 2014b). However, NFC-enabled stickers are available for customers without NFC-enabled phones. Payments are possible at MasterCard PayPass merchants (GSMA, 2015). The service supports a single payment card, the MyWallet card, which is a prepaid MasterCard issued by Deutsche Telekom. In June 2014 the payment service of MyWallet was expanded with digital coupons from the German supermarket chains HIT and Edeka (GSMA, 2015). In the future, Deutsche Telekom plans to offer membership cards and event- and transit tickets to their MyWallet service. Figure 22 presents the timeline for the German MyWallet.

The SE technology used to offer MyWallet is SIM-centric and Giesecke & Devrient has the role as the TSM (GSMA, 2015). The city of Bonn is chosen as a flagship for the technology and new applications are to be tested here (GSMA, 2015, Sahota, 2014). This city possessed nearly 1.000 contactless terminals at shops and restaurants when the service was launched.

Unlike most other MNOs offering a mobile wallet, Deutsche Telekom offers its own payment application through their wholly owned online payment unit ClickandBuy (Balaban, 2014).

July 2012: MasterCard and Deutsche Telekom Unite in European Partnership on Mobile Payments

June 2014: Mobile coupons added to MyWallet

May 2014: Deutsche Telekom launches MyWallet in Germany

Future: add services as tickets, bonus points and membership cards
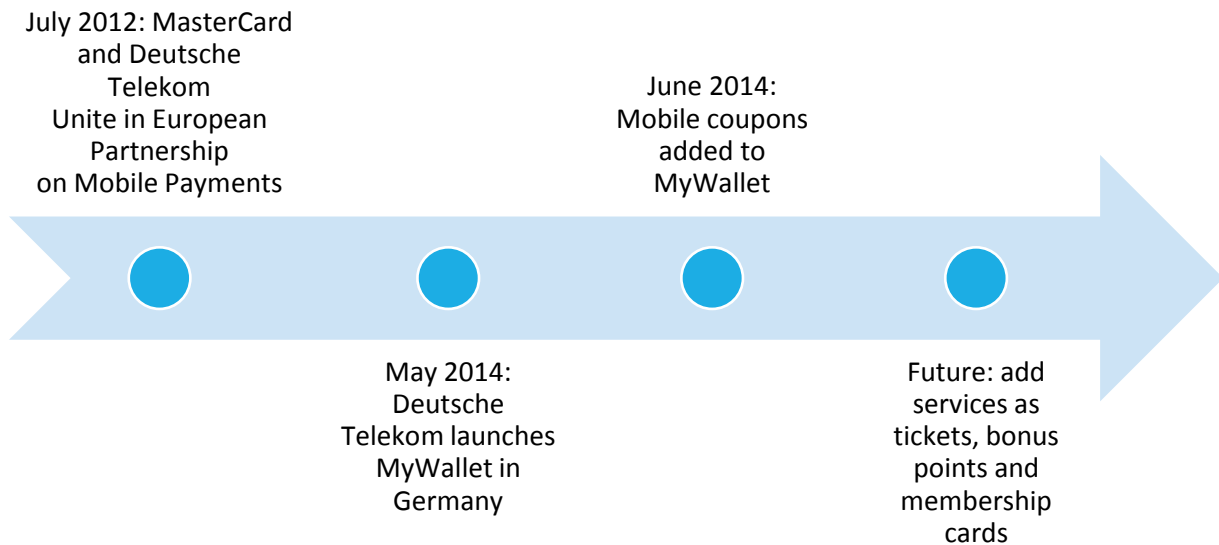
FIGURE 22: TIMELINE FOR MYWALLET

6.2.3.2 Current status and success

One year after the launch of MyWallet it is difficult finding updated statistics and results of the service. The annual report of DeutscheTelekom (2014) does not announce numbers concerning MyWallet's uptake. However, they emphasise that the experience from T-Mobile's launch of MyWallet in Poland has been helpful. Moreover, all three German MNOs went together to promote NFC mobile payment in Berlin in April 2015 indicating an intensified approach to create awareness and adoption (Boden, 2015a). Hence, making a conclusion regarding the success of MyWallet is found to be too early.

The success factor of cooperation and partnerships emphasised by many sources is partly supported by MyWallet. Deutsche Telekom has a strong partnership with MasterCard providing the prepaid MasterCard included in the service. However, due to the use of a prepaid card, there is no cooperation with banks. This simplifies the ecosystem but may reduce the consumer value, as the users need another card, which they must fill up prior to making transactions. Although banks are excluded from the ecosystem, Deutsche Telekom has partnerships with different merchant such as supermarket chains Edeka and Hit. This creates value for the users for instance in terms of couponing.

Additional factors creating value and incentives for the consumers are the introductory bonus offered and the free SIM card. The fact that the owners of all other phones than the 18 MyWallet compatible devices are offered NFC stickers is increasing the customer value. Moreover, choosing Bonn as a flagship city with about 1000 contactless POS terminals is a smart move as this increases the consumer awareness in this part of the country and may therefore be leading the consumer uptake due to higher visibility and better infrastructure.

6.2.4 Google Wallet
6.2.4.1 Presentation
Google Wallet was launched in 2011 by Google in conjunction with MasterCard, Citi, First Data and Sprint (Clark, 2011c). The first version was sent out to all Sprint Nexus S 4G users via an over-the-air software update September 19th in 2011 (Clark, 2011a). Initially, the service was only available for Sprint customers with the specific phone mentioned above. Owners of a Citi MasterCard can upload this payment card into the wallet. Customers not owning a Citi MasterCard can set up a Google-branded prepaid MasterCard instead.

By the end of October 2011, customers could use their Google Wallet at eight US merchants, American Eagle Outfitters, The Container Store, Foot Locker, Guess, Jamba Juice, Macy's, OfficeMax and Toys R Us (Clark, 2011b). Offers were given to Google Wallet users at these merchants.

In August 2012 Google released a second version of Google Wallet (Clark, 2012b). This version avoids the need for card issuers to be directly involved in provisioning their payments cards onto the wallet. Instead, a single prepaid MasterCard is stored on the SE, which is linked to another credit or debit card. This new approach reduces the time of the integration process for banks to add their cards to the wallet to a few weeks. The usage of the wallet doubled in response of the new version (Clark, 2012a).

In May 2013, three mobile devices were added to the list of compatible Google wallet phones (Dyer, 2013). Today, Google Wallet is available on nearly all NFC-enabled Android devices running 4.4 (KitKat) or higher (Google, 2015).

In April 2014 Google Wallet started using HCE and stopped supporting physical SE after years with resistance from carriers (Clark, 2014b). Many US carriers blocked Google Wallet on their phones such that Google needed to come up with a way to get around these blocks.

In July 2014 gift cards and P2P functionality were added to the Google Wallet (Clark, 2014a). In February 2015, Google made an agreement with the US carriers AT&T Mobility, T-Mobile USA and Verizon Wireless that Google Wallet will be pre-installed on their Android devices running the KitKat OS or higher (Clark, 2015c). At the same time, Google acquired technology and intellectual property from Softcard, the joint venture created by the US Carriers offering the Isis mobile wallet (Alba, 2015). Figure 23 presents the timeline of the Google Wallet.

October 2011:
Google Wallet
launched

April 2014: Google
Wallet ends
support for
physical secure
elements and
starts using HCE

February 2015:
Google teams up
with US carriers
for NFC mobile
payments

August 2012:
Google Wallet
2.0 released

July 2014:
Google Wallet
adds support
for gift cards
and P2P
payments
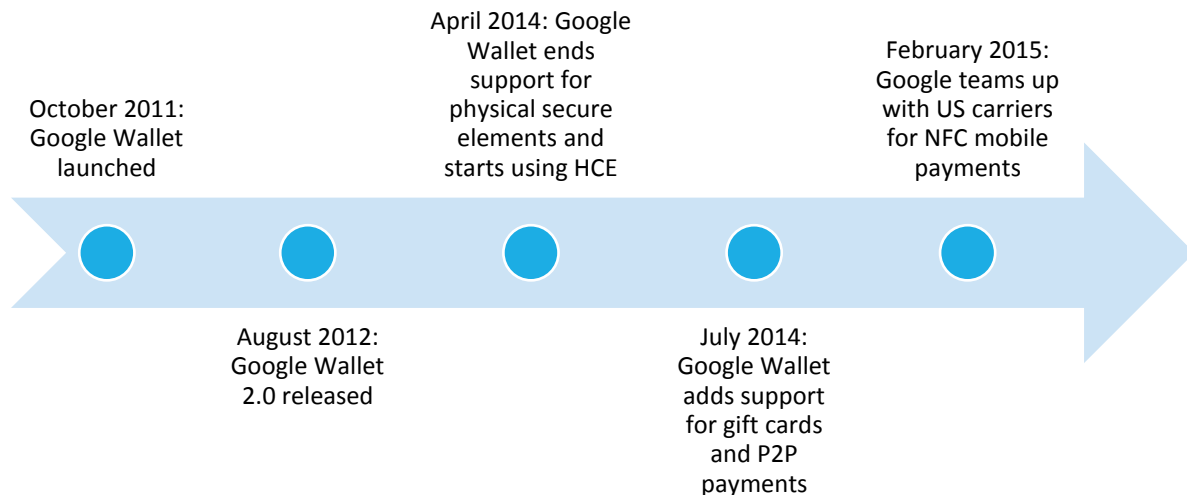
FIGURE 23: TIMELINE FOR GOOGLE WALLET

6.2.4.2 Current status and success

Up until now, Google Wallet is by many considered as a failure. According to Google payments Vice President in 2011 it was one of the biggest investments the firm had ever made and the service was thought to revolutionise the e-commerce space (Carr, 2013). However, in 2013, two years after the launch, the number of downloads were low considering Google's size, and the customer awareness was low. After the introduction of Apple Pay, Google Wallet has seen an uplift in both transactions and number of users (Boden, 2014a).

Many of the presented success factors can be used to explain Google Wallet's failure. Primarily considering cooperation and partnerships. Google struggled making partnerships with both MNOs, banks and merchants (Carr, 2013, Heller, 2014). Sprint was the only supporting carrier as all other big carriers blocked Google Wallet, strongly limiting the flexibility of the service. Additionally the integration of payment cards was slow and the support from merchants was only perfunctory (Heller, 2014). A part of the reasoning for the low support might be the business model. There were major privacy issues associated with the data collection to be used for advertising purposes.

The fact that the service faced a lack of compatibility with devices and initially supported only one phone did neither enhance the initial customer value. Furthermore, the marketing efforts have been less successful such that the market awareness has been limited.

6.2.5 Apple Pay

6.2.5.1 Presentation

Apple Pay was introduced in September 2014 together with iPhone 6, iPhone 6 Plus and Apple Watch. NFC is used as the enabling technology and the SE is embedded within the device (Zoller, 2014a). The payment service will be integrated with the existing Passbook, which supports digital loyalty cards, coupons, rewards, and tickets. Online payment is also supported by Apple Pay.

At launch, Apple Pay could be used at 220.000 locations in the US (Boden, 2014c). Credit and debit cards from the three major networks, American Express, MasterCard, and Visa are available. Initially, Apple Pay had agreements with the six biggest issuing banks in the US, along with a few more. More banks are included continually.

Security is integrated throughout both the hardware and software using tokenization (Boden, 2014c). This means neither Apple nor the merchant receives the credit card number. The use of touch ID fingerprint results in an extra layer of security for transactions (Clark, 2014c). Apple has hundreds of millions of their customers' payment cards in iTunes store such that the cards can be automatically added to Apple Pay when a customer buys an iPhone 6 if the customer wants to (Boden, 2014c).

Apple receives a fee of 0.15% of the transaction from the banks when the customers use Apple Pay for purchases (Clark, 2014c). Apple says they are not in the business of collecting data and will therefore not collect information about the transaction such as when, where and how much (Boden, 2014c). Figure 24 presents a timeline for Apple Pay. The information is based on data from NFC World.
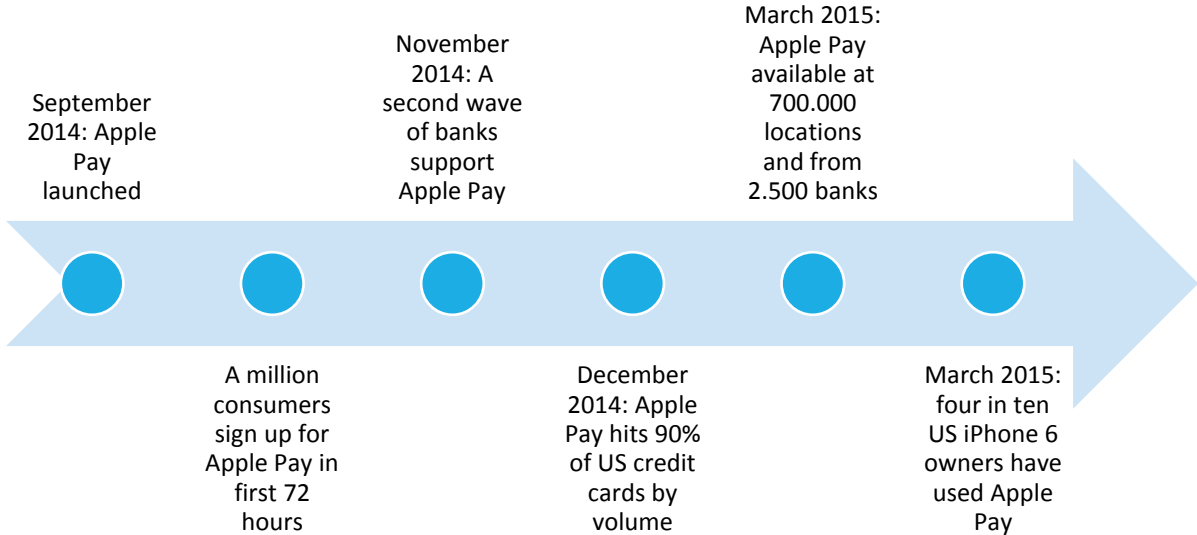
FIGURE 24: TIMELINE FOR APPLE PAY

6.2.5.2 Current status and success

Despite the fact that Apple Pay is recently launched, it is considered a success. By the end of May 2015, 46 % of all US iPhone 6 owners have successfully used Apple Pay (Boden, 2015b). 63 % of those are using the service on a weekly basis. Of the consumers who have used Apple Pay, 67 % claim that they migrate towards merchants accepting the service. In March 2015, Apple Pay was accepted at nearly 700.000 locations and more than 2.500 banks supported the service (Clark, 2015a).

Presented success factors can to a high degree explain the current success of Apple Pay. Apple has a capability to make beneficial partnerships and agreements that improve the value created by the service (Heller, 2014). Major retail brands, financial

institutions and banks are involved. Additionally, flexibility is achieved because Apple owns both the software and hardware included in the solution. This increases their power in negotiations with partners. The inclusion of tokenization and Touch ID, enhancing the security aspect, entails increased customer value and support by banks and merchants. Hence, Apple has chosen a technological solution with many benefits.

Moreover, Apple has strong marketing teams highly successful in creating awareness and visibility of the service (Heller, 2014). In addition, the fact that Apple already has millions of credit cards stored in iTunes reduces consumers' adoption barriers and creates added consumer value. The timing of the launch is also beneficial. The migration to EMV compatible POS terminals by October 2015 is likely to increase the number of contactless terminals (Heller, 2014). Furthermore, other mobile payment services have been around for some years, and hence increased the market awareness of NFC mobile payment.

7 Answering RQ1

What is Near Field Communication (NFC) and how have selected NFC mobile payment initiatives been carried out?

The first part of this RQ is mainly answered in chapter 5. A thorough description of NFC technology is provided and aspects as architecture, operating modes and secure element are discussed. Chapter 6 is related to both parts of the research question. 6.1 presents the different service domains enabled through NFC technology and can therefore be connected to the first part. However, the second part concerning selected NFC mobile payment initiatives is answered in 6.2. Here, four selected launched NFC services are described, and their degree of success is evaluated and compared with theoretical success factors. Selected macro factors are also presented as a means for comparing the markets the services operate in.

The introduction of NFC in chapter 5 is seen as a necessity to be able to investigate the subsequent research questions in a properly manner. The introduction gives the reader a better understanding of the technology in focus and gives an impression of all the opportunities enabled by the technology.

The description of selected NFC initiatives in 6.2 offers interesting and valuable insight concerning NFC success factors, which is used to support the arguments in the part proposing recommendations for Telenor to follow regarding their NFC strategy.

Part C: Presentation and Assessment of NFC Initiatives in Telenor Group

8 Summaries of the Interviews
8.1 Interview with Ragnar Øyno Jensen

Company	Ernst & Young (EY)
Position	Senior Manager at EY Advisory
Place and time	Phone interview, April 22nd 2015
Duration	1 hour and 10 minutes

Jensen is a previous Telenor employee now working in the consulting industry for EY. During his 10 years in Telenor he worked with research, strategy- and business development. He has been in the consulting industry since 2011 where he works mainly with telecom and media related issues but also retail. He has a MBA in finance, strategy and business development from Rotterdam School of Management at Erasmus University.

Overview

Jensen is optimistic regarding contactless mobile payment in general but less optimistic regarding the strength and profitability of the MNOs' position in this ecosystem in the long term. In the short and possible medium term, he can see MNOs holding the position as a SIM-landlord. Different services based on different technologies can exist in parallel for a while. However, in the long run, Jensen believes that a global actor will launch a global standardised mobile payment solution based on a super effective platform ala BankAxept, with minimal transaction costs. He mentions Apple and Google as big, powerful and global players with interesting mobile payment initiatives currently threatening SIM-centric solutions.

Barriers

Jensen also emphasises the existence of barriers for achieving a position as a SIM-landlord in the Norwegian market in the short term. These barriers are limited availability of contactless POS terminals, limited involvement of actors in the ecosystem, and the lack of a strong value proposition of mobile payment towards the customers. The fact that there are few merchants offering contactless NFC payment is one of the biggest challenges facing Valyou. Jensen emphasises that increasing this number is critical for achieving a solid user base. Today, there might be a group of early adopters willing to use NFC mobile payment but limited availability of contactless POS terminals restrict their opportunity. He believes that a Norwegian mobile payment solution must include BankAxept to convince merchants and hence, increase the number of contactless terminals.

Moreover, Jensen emphasises that more of the Norwegian banks and the second biggest MNO in Norway, Netcom, have to get off the fence and engage in the ecosystem for mobile payment in Norway to succeed. This is mainly because Valyou

is currently available for only a small share of the market, and wide adoption is therefore impossible. This situation is further deteriorated by the fact that iPhone users are not potential Valyou users.

The lack of a strong value proposition towards the customers is also lacking according to Jensen. He thinks that it is still a long way to go before users can get rid of their wallets, and at this point he thinks that it seems like card payment is considered easy and convenient enough for most users.

Benefits of the SIM based solution
On the other hand, Jensen mentions two factors that can prolong the existence of the SIM based mobile payment solution, security and power balance in the ecosystem. The security of the payment transaction is very important for most of the consumers. Many actors consider the SIM based SE solution as the most stable and secure today. This can be advantageous for the MNOs as services based on other technologies might struggle to convince the market that required security is offered.

In addition, banks might be reluctant engaging in initiatives lead by global and powerful actors, such as Apple and Google, due to a potential unbalance in the relationship. Banks might also be afraid that such an unbalance might result in a disruption where the global actors enter and take over their position in the long term. At the same time, the question is whether they dare to turn these global players down. Most probably not.

Card schemes and regulation
In terms of transaction costs, the Norwegian market is exceptional due to the BankAxept solution. In most of the other markets, the transaction fees issued by Visa, MasterCard and Amex are applicable and super profits are available. Jensen emphasises that Telenor is present in countries with higher potential for revenue generated from transaction fees than Norway. New regulations within Europe sets a transaction fee roof of 0.3 % for credit cards and 0.2% for debit cards. Regulations concerning the transaction fees impact on the potential revenues for actors within the payment industry. Jensen recommends the study to analyse the transaction costs in various countries to display where a new mobile payment platform will create most value.

MNOs role in mobile payment
In addition to creating new revenue opportunities, Jensen believes that MNOs initiate NFC mobile payment services with the objective of achieving differentiation from other MNOs. However, this objective seems difficult as a successful service most probable needs a standardisation of solutions across all MNOs. As long as the banks are not exclusive with one payment service, the first mover advantage is likely to be minimal, if exist at all, according to Jensen.

The MNOs involvement in mobile payment might result in opportunities for new services and revenues in the future. This can be a motivation to be a part of this work in despite of low profits from transaction fees in Norway. NFC mobile payment enables closer two-way communication with the customer and hence, customised

marketing, customer analytics and loyalty card management are among the services potentially generating revenue for the MNOs in the future.

As an endnote, Jensen points out that MNOs have failed in most of their attempts to take strong positions in adjacent markets and he questions why payments should be different. However, he admits mobile payment to be a fighting chance for MNOs and as long as the required investments are limited, the initiatives can go on living.

8.2 Interview with Gilles Ubaghs

Company	Ovum
Position	Senior Analyst in Financial Services Technology
Place and time	Phone interview, May 6th 2015
Duration	30 minutes

Gilles Ubaghs is a senior analyst in Ovum's Financial Services Technology team. He is located at Ovum's Melbourne office. How payments transformation can be achieved and its implications across the payments value chain, is the major focus of Ubaghs' work. Contactless cards, mobile payments, P2P and online commerce are among the topics he works with. He joined Ovum in 2013 after four years in Ovum's sister company Datamonitor Financial. Previously, Ubaghs worked as a consultant for boutique strategy consultancy PBD Consulting. He holds a BA in Social Anthropology from the London School of Economics and is originally from Belgium.

The mobile payment market

Ubaghs emphasises that the current mobile payment market is diverse. It is growing on many fronts simultaneously, many of which are very different and have very different dynamics. Many people tend to think of mobile payment as NFC payment in store although mobile payment includes many solutions for both proximity and remote payment. In Ubaghs opinion, the remote payment market is healthy and something people are drifting to. The proximity payment market, on the other hand, is more struggling. Ubaghs means developers must make proximity payment more intuitive and seamless. An example is the taxi sharing application Uber where mobile payment is integrated and performed in the background. The focus of the app is: "Let's get a taxi", not "Let's pay for the taxi".

The talk about mobile payment goes back to the 90s. People predicted mobile payment to take over and totally replace wallets by 2005. The logic was that consumers love mobile and have to make payments. Ubaghs emphasises that it is not that easy. Mobile payment is not enough by itself, it needs to add value added services and create in-store experiences. An example of this is the Apple stores where every staff is issued with a mobile POS device that allows customers to go up to any single one of them to pay any time they want.

MNOs role in mobile payment

With the introduction of HCE, Ubaghs thinks the future position of the MNO in the mobile payment ecosystem is uncertain but definitely shrinking. The older model of

NFC payments with MNOs in a central role given a share of the transactions is likely soon to be dead. When Google announced its support for HCE many banks abandoned their ongoing discussions with MNOs immediately. However, Ubaghs points out that there are still benefits of the SIM SE-based model, the security aspect and the fact that MNOs tend to have a good footprint within the consumers space. Hence, he does not think the MNOs are totally out, but the chances of success will very much depend on the market. For a MNO, a discussion whether to take part of a NFC initiative must be based on market considerations such as who are the players, what partnerships are there, how is the payment infrastructure, what kind of contact space is there, etc. The payment market is a funny one because it is global but also local at the same time. Both regulatory and cultural aspects must be taken into account when developing a payment service. Furthermore, Ubaghs emphasises that a MNO cannot do it alone. Partnerships with banks are critical to succeed. However, these partnerships tend to be difficult and challenging.

The shrinkage of the SIM SE-based model indicates that MNOs must look for other forms of revenue generation in terms of mobile payment. Potential opportunities are value added services and data analytics. The latter might prove extremely challenging, as a balance must be found to avoid being perceived as intrusive by the customers.

Moreover, the success of an initiative also depends on how dedicated the MNO is. Ubaghs uses Orange in the UK as an example of a failed initiative partly due to low dedication. They had some devices but it was not properly advertised, and the customers had no clue it was actually there.

Regarding the time aspect, Ubaghs believes that the window for a MNO to launch a mobile wallet is getting tight because of the entrance of high profile actors such as Apple, Google and Samsung. Today, these actors are operating only in the US but it is likely to believe that they will eventually go international. When they do, suddenly the mobile payment competition worldwide is much tougher.

Increased awareness and visibility
Although Apple Pay may increase the mobile payment competition, the introduction of the service is also likely to result in increased merchant and customer awareness. This might benefit mobile payment services already launched in other countries than the US because visibility and awareness are among their biggest problems. Mobile wallet providers execute pilots with satisfying results but the challenge is getting people actually starting to use the service and keep using it. Customer and merchant education, in addition to heavy marketing, are crucial in order to overcome this challenge. Stories of customers with negative experiences with mobile wallets spread quicker than stories of positive experiences.

Ubaghs sees potentially first mover advantages in the mobile payment market but emphasises that it is all about getting enough volume within the market. He points out

that the design of ApplePay facilitates rapid growth as the service is based on the existing payment networks, hence avoiding a disruptive approach.

Mobile payment technologies

Ubaghs does not see a consolidation to one dominating mobile proximity technology in the near term. He thinks the market will stay diverse for some time with the simultaneous existence of different technology solutions. What eventually becomes the most common technology depends on what is perceived as the best service. Hence, Ubaghs recommends actors in the mobile payment ecosystem to be prepared for this volatility by providing flexibility in terms of their solutions.

Regulation and standardisation

Concerning global mobile payment regulation, Ubaghs cannot immediately think of any concrete or direct regulations. Although not regulatory, he believes it might be relevant to keep an eye on the development of the technical standards around tokenization. This technology is robust but currently there exist slightly different models in terms of how it works, and it is likely to believe that a technological standard will be presented in the near future.

8.3 Interview with Marko Rankovic

Company	Telenor Banka (Serbia)
Position	Strategy and Portfolio Manager
Place and time	Skype interview, March 26th 2015
Duration	50 minutes

Rankovic is employed by Telenor Banka in Serbia, Telenor Group's first wholly-owned financial institution opened in September 2014. Telenor Banka is a fully online bank and provides customers with innovative mobile banking services. As a Strategy and Portfolio Manager, Rankovic process all projects and initiatives within the company. He has a Ph.D. in financial services and has been in the banking industry for 10 years.

The Serbian macro environment

Serbia has a population of about 7 million. The mobile subscriber penetration rate is 129 % whereas the smartphone penetration rate is 36 %, although rapidly increasing. Of the about 63.000 POS terminals in Serbia, 1-3 % are contactless and NFC capable. Approximately 80 % of all transactions in Serbia is conducted using cash. There are about 7 million payments cards in Serbia but the activity is relatively low. Rankovic explains the low usage of payment cards with demographics and security reasons. Serbia is an old nation and the elderly people are not comfortable using payment cards. Moreover, from time to time there are newspaper articles claiming payment cards are not secure enough, reinforcing people's lack of confidence in payment cards.

There are about 30 banks in Serbia, although the three biggest banks Banca Intesa, Komercijalna banka and Unicredit bank hold more than 30 % of the market. All banks

operating in Serbia are members of the Association of Serbian Banks. However, the association has no formal power over the banks.

There are three MNOs operating in the Serbian market, Telecom Serbia (mt:s), Telenor and Vip. Telenor is the second biggest MNO with a market share of 31 %, whereas mt:s and Vip hold 53 % and 16 % of the market respectively.

NFC mobile payment initiatives
Rankovic has no knowledge of any materially significant NFC mobile payment initiatives in Serbia currently, neither from Telenor nor from other actors. Telekom Serbia began a NFC mobile payment pilot in Serbia in 2012 but no results or further plans are released.

Although NFC based payment is a part of Telenor Banka's roadmap the time scale is unknown, as they have concluded that it is too early to introduce NFC in the Serbian market.

Challenges
Infrastructure is among the biggest obstacles associated with NFC mobile payment. The number of existing NFC capable POS terminals is low, the same is the usage of payment cards compared to cash. The lack of standards further complicates this issue as a merchant in Serbia may have more than five different POS terminals to be used depending on the customer's payment card. The number of payment cards existing in Serbia is about 7 million. Hence, the number of cards potentially to be migrated to a NFC mobile payment solution is huge. However, as the card holder is defined as active if he used his payment card at least once over the past three months, a huge number of active card holders do not necessarily imply a huge number of potential NFC transactions.

Introduction of NFC based mobile payment involves the need for education of both users and merchants in Serbia as both parties are most used to handle cash transactions. Additionally, time and resources must be devoted to convince people currently scared of using payment cards to use their mobile for payment.

According to Rankovic, there is "no sense to enter a market if you don't have a break-even point in a couple of years or something like that". Based on the characteristics of the Serbian market it is difficult to find such a business models at this time.

Drivers
Banks are presented as one of the main drivers for a NFC mobile payment solution in Serbia. MNOs are also a potential issuer of NFC services. Moreover, card payment schemes as MasterCard and Visa are drivers and are pushing towards contactless and cardless payments for instance by offering contactless MasterPass and PayPass. A NFC mobile payment service involves cost benefits for card vendors due to less physical card issuing. Furthermore, infrastructure simplification is another driver as a higher level of centralisation is achieved. Hence, both physical costs related to infrastructure and maintenance, and operational costs can be reduced. The user benefits are among others speed, convenience, security and enhanced customer experience.

Technology

Rankovic finds QR-codes another category than NFC and BLE technology and hence, a comparison including this technology is difficult. HCE must be used in conjunction with NFC technology and can therefore not be regarded as a substitution but a complement to NFC technology.

Rankovic rates the two technologies, BLE and NFC, equal considering ease of use, reliability, value proposition and scalability. He also rates the two technologies equal regarding security because they face the same challenges. Encryption of sensitive data must be supported and users and merchants must be convinced by the vendors of both technologies that the service is secure enough. The point go to BLE when comparing speed. However, this difference is so small it will have no practical meaning for the user. When considering cost, user/market acceptance, flexibility and maturity NFC is rated best. NFC technology is more established in the market, which leads to higher market/user acceptance and flexibility due to higher support in the existing infrastructure.

If Telenor Banka was to launch a mobile payment solution today, NFC would be the preferred technology as it has higher market acceptance and the existing infrastructure is more developed for this technology.

Considering the SE technology, Rankovic believes that the trend of SE embedded in the SIM is slowly fading and replaced by HCE. Part of the reason for this migration is that application providers such as banks do not want to pay the MNOs for renting space on the SIM card when other alternatives are viable.

Ecosystem

Rankovic mentions banks, MNOs, merchants, users, the Central Bank and card schemes as the most important actors in a NFC mobile payment ecosystem. According to Rankovic a reasonable business model is a prerequisite for a successful NFC ecosystem in Serbia. A joint venture between a bank and a MNO is a potential solution without any specific issues. However, Rankovic believes that the biggest banks must initiate the mobile payment work as they have the best opportunity to influence the infrastructure, controlling one third of the existing POS terminals.

As both the telecom and banking industry in Serbia is extremely competitive, Rankovic thinks MNOs and banks will try to initiate a NFC mobile payment service on their own without cooperating with other actors in their same industry. However, cooperation between a MNO and a bank is necessary to succeed.

The fact that Telenor Group owns a financial institution in Serbia may simplify the work with a mobile payment ecosystem. Telenor Banka has a banking license and is oriented only on online and mobile banking such that NFC mobile payment may be a natural extension or add-on to existing services.

Key success metrics

When asked about key success metrics for a NFC mobile payment service Rankovic extracts metrics from Telenor Banka's virtual business case for NFC. He mentions number of transactions, number of users, the usage of mobile phones and the

number of merchants/acceptance places. In addition, complying with financial industry and security standards are necessary for a successful implementation.

Strategies

Due to lacking infrastructure, especially on the acquiring side, Telenor Banka does not plan to offer NFC mobile payment in the nearest future. In Rankovic's opinion, the biggest banks, Intesa and Komercijalna Banka, must be the initiators for a NFC initiative in Serbia as they control one third of the acquiring points in the country and are therefore in a position to influence the existing infrastructure. Telenor Banka is still a small bank without the same opportunities to influence the merchants to upgrade to contactless POS terminals.

Although the banking and telecom industry in Serbia is highly competitive, Rankovic predicts that a future NFC mobile payment service will come from a joint MNO initiative. Telenor Banka is ready to support a Telenor Group NFC initiative as long as a solid business case makes up the foundation.

MNOs should be aware of the new trend of HCE because this can alter the current most popular technology, which is the SE located on the SIM. The MNOs can potentially lose a revenue stream if the SE is moved from the SIM to the cloud. Hence, the SE evolution should be closely monitored and the different outcomes accounted for.

8.4 Interview with Tibor Berkes

Company	Telenor Hungary
Position	Head of Financial Services
Place and time	Skype interview, April 8th 2015
Duration	50 minutes

Tibor Berkes is the head of Financial Services in Telenor Hungary where his main responsibilities are strategic, service and business development in the Financial Services space. He joined Telenor 10 years ago and has been working with financial services since. He has a Master of Business Administration from Oxford Brookes University where he also worked as an associate lecturer in Business Information Systems and Economics from 2003 to 2004.

The Hungarian macro environment

The population of Hungary is 9.8 million. Mobile penetration is about 115 % and as there exist on average 1.2 bank accounts per inhabitant, the country is considered fully banked. There are three mobile operators in the market; T-Mobile, Telenor Hungary and Vodafone Hungary. OTP is the biggest bank with a market share of 25 %. Overall, there are approximately forty banks in the country.

There are about 90 000 POS terminal in Hungary whereas 40 % is NFC capable. A legislation brought by the Hungarian Government forces all merchants to replace their existing POS terminals into PayPass and NFC capable POS terminals by 2016.

In Hungary there exist 7 million debit cards and about 1.2 million credit cards. According to Berkes, cash is not the dominant payment method in Hungary but it still has strong precedence. Except for Hungarian standards and regulations associated with POS terminals and global standards of MasterCard, Visa and the global platform, Berkes cannot recall any special requirements for NFC implementation in Hungary in addition to the general implementation requirements.

NFC mobile payment initiative
T-Mobile initiated a meeting between the three MNOs in Hungary in 2011 to discuss the possibilities associated with NFC. All of the operators decided that they wanted to be a part of this ecosystem and they established *The Hungarian Mobile Wallet Association* to make out the heart of this ecosystem and convince industry members to take part of this service. MasterCard, OTP Bank and Super Shop, the largest loyalty card provider in Hungary, became the last three out of six founder members of the association. Today, the association counts about 30 members.

The main responsibilities of the association were educating the Hungarian market about NFC and launching a NFC pilot. The pilot started in July 2013 by launching a NFC mobile wallet with payment and loyalty functionalities for 3000 end users. The pilot was only a pilot in terms of the number of users; it was a real system that could be used on any PayPass POS terminal all over the world. As the pilot seemed successful at launch, the functionality was extended to include access control, authentication, event ticketing and public transport ticketing in one Hungarian city. The pilot closed in July 2014 and proved to be quite successful. It was awarded the Hungarian IT Business' Innovation award in 2013, included in GSMA's best practices, and termed "Best NFC Pilot" in Wall Street Journal.

After the closing of the pilot, the three operators started working out their commercial NFC solution. Although initially planned to launch a service together, the time used for the selection of TSM partners and RFQs (Request for Quotation) procedures differed among the MNOs, hence they decided not to wait for each other. T-Mobile launched their NFC service in November 2014 and Telenor and Vodafone Hungary are launching their services during 2015. People being a customer of the MNO and one of the bank members of the association may use the service.

Challenges
Berkes consider the management of a complex ecosystem among the biggest challenges in the development of a NFC service. Although previously cooperating with the other MNOs with payment services, the NFC ecosystem includes actors from many different industries. This further complicates the process as the various actors have different needs, resources, budgets, decision procedures, key performance indicators (KPI) and organisations. Communicating and finding the right balance between the actors are essential. Goals must be set together such that the ecosystem is moving together towards the joint objectives.

Secondly, the customer is not willing to go the extra mile to use NFC services. If enrolment and other processes are too complex, the customers are not going to meet them. Therefore, all processes must be oversimplified and potential barriers removed from the customer.

Another challenge is to convince other members of the industry to join the NFC initiative such that additional functionalities may be offered in the future. Berkes thinks it will be a key to convince different industry members to start NFC development.

Drivers

The three MNOs in Hungary may be considered the main drivers for the Hungarian NFC initiative. T-Mobile initiated the cooperation among the MNOs and together they decided to establish *The Hungarian Mobile Wallet Association.* The six founder members of the association can all be regarded as drivers of the NFC initiative because they work to unite the industry members and prepare the Hungarian market for NFC. They devote resources, both human and financial, with the objective of introducing NFC in the country.

Secondly, the banking sector started to push PayPass cards and PayPass enabled POS terminals in 2009, while the association was established in 2011. Without this process, it would be nearly impossible to make the NFC pilot such a success story. Infrastructure in terms of PayPass enabled POS terminals is crucial for the users to actually benefit from the NFC function and the introduction of PayPass cards made the population familiar with the tap and pay type of payment. Hence, banks should also be credited for driving NFC introduction in Hungary. The same should the Hungarian Government due to their legislation concerning replacement of old POS terminals with contactless POS terminals by 2016.

Technology

Telenor Hungary has gone through an evolution of technologies after establishing the financial services department in 2005 and before investing in NFC technology. SMS-based transactions, interactive mobile-based transactions such as QR-codes, BLE, WAP-based payments and internet-based opportunities are among the technologies tried out by the MNO. Berkes claimed it seemed too difficult implementing nationwide usage of BLE.

The reasons why Telenor Hungary is investing in NFC technology today are for instance its convenience and ease of use. You do not have to carry and search through a wallet every time you are about to make a payment and it is valuable anytime anywhere. Secondly, NFC technology allows for interactivity with the customer. Service providers can launch promotions and communicate with the customers through the wallet. This opportunity may benefit both the customer and the service provider. Thirdly, NFC technology implies financial benefits for the Hungarian customers. Regular financial transactions in Hungary are taxed 0.3 % by the Government while this tax is 0.15 % in NFC transactions. Furthermore, NFC technology is innovative. The new type of payment is considered cool among many of the Hungarian inhabitants. Finally, NFC technology enables selection between many different virtual cards when performing a transaction, retaining the customers' range of options.

The NFC initiatives in Hungary are SIM-centric solutions as suggested by the MNOs. The other ecosystem actors questioned why the MNOs forced the SIM-centric solution when other options were available. This topic was thoroughly discussed but

the MNOs convinced the other actors that the SIM-centric solution is still the most secure. However, this means that customers need a NFC-enabled SIM card to use the service. Berkes does not believe that one SE technology will come out as the winner, rather they will coexist as the European market is fragmented. He thinks that SIM-centric NFC could fire for a long time as it has already gained a foothold in the market and standards are quite set.

Ecosystem
Berkes considers service providers, TSM, MNOs, handset vendors and SIM manufacturers the five key actors in a NFC ecosystem. When mentioning service providers, for instance banks, he also means their infrastructure such as POS terminals.

The Hungarian Mobile Wallet Association is the heart of the NFC ecosystem in Hungary. Of the approximately 30 members, you find MNOs, banks, merchants, loyalty issuers, ticketing and traveling companies etc. All members of the Association pay a membership fee. This money mainly go to communication campaigns conducted by external companies to educate the market and involve more industry players.

Prior to the pilot there was no settlement between the ecosystem actors regarding the financing of the pilot. The pilot was free and every actor paid what was needed for them to offer the agreed service. Considering the business model applied in Telenor's forthcoming NFC mobile wallet service, it is different for the different functionalities included. This means for instance that payment, loyalty and transport ticketing may use different business models. From Telenor's side, the SIM-rental model is suitable in the payment industry. The SIM-rental model is also used associated with loyalty cards but other solutions are worked on, as the users of the loyalty cards do not pay the issuer. Regarding transport ticketing, the SIM-rental model is not applied. In this case, Telenor receives a revenue share from the merchant's product price.

Key success metrics
Berkes believes that one of the key success metrics of the joint Hungarian NFC service is reaching 100.000 customers in a year.

Strategies
Berkes' top advice to other MNOs trying to introduce a NFC service is that they are not going to make it alone. A NFC service is far too complex to make a success on your own and building an ecosystem with partners and service providers is essential. There might be possible to create separated and fragmented solutions suited for different cases. However, if the objective is a nationwide NFC service, then cooperating is the only way, according to Berkes.

Furthermore, Berkes claims that the focus should not be the competition between the MNOs. The idea is to convince and educate the Hungarian market concerning NFC rather than competing on this service. Therefore, he does not regard it as negative that T-Mobile launched their service prior to the two other MNOs. Contrary, he believes the launch of one NFC service strengthen the focus on NFC in general,

which eventually benefit Telenor Hungary as well. In addition, T-Mobile's experiences from the launch can be valuable for Telenor in their development work due to the association and cooperation between the MNOs.

However, despite the fact that convincing and educating the Hungarian market is the main objective of the Association, there is also a potential to compete on the NFC service. Berkes states that it is important to involve and educate the market, both customers and industry actors. Adding more functionality to the NFC service in the future is a natural extension and for this to happen industry actors must be convinced that NFC is here to stay. By building different functions and give your customers some extra you can strengthen the position of NFC in the country at the same time as competing with the other actors.

8.5 Interview with Arne Munch-Ellingsen

Company	Telenor Norway
Position	Senior Researcher
Place and time	Skype interview, April 22nd 2015
Duration	51 minutes

Arne Munch-Ellingsen joined Telenor in 1997 where he started in Telenor Research & Development, later Telenor Research and Innovation. Since April 2012, he has been Senior Research Scientist in Telenor Research where NFC and mobile payment have been among his fields of study. As Munch-Ellingsen is employed in the Next Generation Service Concepts department, the service side is most relevant for his research. He was involved with the NFC City project initiated by Telenor in 2010. Munch-Ellingsen has a Ph.D. in Informatics from the University of Tromsø.

The Norwegian macro environment
The Norwegian population is about 5.2 million but there are 5.3 million mobile subscribers, which gives a mobile penetration rate of 111 %. According to *on device Research,* the Norwegian smart phone penetration was 68 % in the beginning of 2014. However, Munch-Ellingsen notes that the current smart phone penetration in Telenor's network is above 80 % and he believes the numbers are about the same in the other operators' networks as well.

Considering the number of contactless POS terminals currently functioning in the Norwegian market, he confirms that the number is not much higher than 450. However, most of the POS terminals in the Norwegian market are ready for contactless payment but not activated. For instance, all of Norgesgruppen's POS terminals and most of Coop's POS terminals only need a software upgrade to be activated for contactless and NFC payments.

Norway is one of the countries in the world with the highest usage of payment cards. More than 90 % of all payment transactions in Norway are carried out using payment cards. The well-functioning BankAxept system is probably one of the major reasons for this.

NFC mobile payment initiatives

In 2010, Telenor and six other partners DNB, Doorstep, FARA, National Institute for Consumer Research (SIFO - Statens Institutt for forbruksforskning), Troms County Council and University of Tromsø started the NFC City project partly funded by the Research Council of Norway. Telenor had been working with the NFC technology for a long time but NFC City was the first manifested project with heavier investments. TSM Nordic was established as a joint venture between Telenor and DNB, and acted as the Trusted Service Manager for the solution with the SE placed on the SIM card.

A mobile payment pilot, Tap2Pay, was carried out in Oslo during the summer of 2011. 220 DNB and Telenor customers participated in the pilot available at 14 outlets. Tap2Pay was mainly a technical pilot, testing the technical end-to-end system, but also a pilot testing usage aspects such as usability and willingness to pay. The development of a generic and simple integration solution for all banks was of special importance.

In October 2014, the NFC mobile wallet Valyou was launched, almost a year after the initial plan. The owners of the Valyou service are currently Telenor, DNB and Sparebank 1 through TSM Nordic but there is an open invitation for other actors to join. Currently, Valyou includes only a payment service but TSM Nordic plans additional functionality such as loyalty cards, ticketing and authentication in the future.

Challenges

There are many challenges associated with the introduction of NFC mobile payment in Norway. Firstly, there is the technology aspect. New technology solutions are introduced and different actors prefer different solutions. In the long run, payment may look completely different than what we are used to today. Not even banks are necessarily involved. In the short run, HCE might create problems for the MNOs preferred SIM-centric solution. Ecosystems associated with HCE solutions do not need MNOs which simplifies the ecosystem and removes potential SIM-rental fees. Big actors such as Google and Apple are interested in promoting their own mobile payment services and are able to reduce the value chain by handling most of the functions themselves. In addition, NFC is not available on any iPhone except iPhone 6, and NFC on iPhone 6 is restricted to Apple Pay.

Secondly, availability of activated contactless POS terminals is a challenge. Despite the fact that most of existing POS terminals in Norway offers contactless functionality, the merchants do not want to activate them until the BankAxept solution is offered. BankAxept has announced that they will join the Valyou service but a lot of work is required at the technological side.

Thirdly, the complex ecosystem needed to offer a SIM-centric mobile payment service is a challenge. These are further explained below.

Drivers

Munch-Ellingsen argues that the drivers and motivation for introducing NFC mobile payment in various markets are different. He mentions the maturity of the market as one of the factors varying from market to market. The BankAxept solution and high

share of card payments are other factors special for the Norwegian market. One of the drivers of introducing contactless payment in Hungary for instance, is to reduce the usage of cash payments. This is not the case in the Norwegian market.

Munch-Ellingsen thinks one of the most important drivers for Telenor to offer NFC mobile payment, and mobile financial services in general, come from the fact that MNOs are terrified of disruption. Of this reason, many MNOs are trying to enter adjacent markets and be more like OTT actors. To achieve this you have to be in front, take some risks and cross your fingers you succeed with some of the initiatives. Munch-Ellingsen stresses the importance of only entering adjacent markets with potential synergies with existing resources and competences. Hence, one of the drivers of entering the financial services market is that Telenor thinks such synergies exist. However, it is important to back away from unsuccessful initiatives at a point before too many resources are involved.

Technology

Munch-Ellingsen believes a whole bunch of mobile payment technology solutions will be available in the years to come. One of the advantages of NFC is that offline mode is possible. This is one of the drawbacks of the HCE technology as network access is necessary to provide required security. Additionally, the work of convincing the market that the security of HCE transaction is good enough can be challenging. On the other hand, HCE has much shorter transaction times than SE-based NFC solutions due to the availability of the handset processor.

Furthermore, Munch-Ellingsen points out that NFC has a weakness associated with flexibility. BLE for instance offers more flexibility concerning where in the store you can pay due to its higher reach. When using NFC mobile payment, a distance of a few centimetres from the POS terminal is required, hence limiting flexibility.

Munch-Ellingsen does not think that HCE will outcompete the SIM-centric solution completely. He explains that there is also an ongoing development associated with the SIM card. It is likely that the physical SIM card will be replaced by an E-SIM in the near future. With the availability of E-SIM cards, new opportunities associated with provision of credentials and NFC services are presented.

Predictions concerning combinations of different technologies such as NFC and BLE to enable additional functionality for the user are not anticipated by Munch-Ellingsen. He explains this by two reasons, different actors prefer different types of technologies and the value chain would be too complex to handle. However, he admits that both technological and structural changes can occur, hence altering the base conditions.

Ecosystem

Munch-Ellingsen points at four big actors in the ecosystem, the MNOs in one end via a TSM to the service providers, and finally to the consumers in the other end. When considering the number of potential actors within each category it is easy to see why the ecosystem is complex. In addition, for additional functionality to mobile payment, other service providers than banks are needed as well, further increasing the ecosystem.

TSM Nordic can in many ways be regarded as the heart of the ecosystem organising and financing the Valyou ecosystem. Currently there is only one TSM for SIM based mobile payment solutions in Norway. Munch-Ellingsen emphasises that it is important for Telenor and DNB not to present TSM Nordic as "their solution". It is supposed to be an aggregator not necessarily controlled by Telenor.

According to Munch-Ellingsen, time is one of the biggest challenges associated with a complex ecosystem. Setting an idea into reality takes much longer when relying on so many different actors compared to when controlling all elements yourself. This is a significant difference from OTT-services. These are much easier to expand, change or improve as the provider has end-to-end control. Hence, he believes that if a good OTT payment service is introduced to the market, the MNOs do not stand a chance in this market in the future.

Based on experiences from the NFC City project, Munch-Ellingsen says that they had some problems related to the different actors' responsibilities. Telenor's initial plan was letting all service providers develop their own services. However, this did not happen and Telenor had to perform most of the development work, which increased the workload on Telenor.

Key success metrics
Munch-Ellingsen did not have much knowledge of key success metrics as his involvement with the Valyou service is limited. However, he thought the continuous assessment of the performance of the service was more random. On the other hand, he stated that Telenor is a targeted firm so there are definitely some KPIs concerning Valyou. Munch-Ellingsen emphasised the importance of good cut-off mechanisms when entering new markets.

Strategies
Munch-Ellingsen remarks that based on history, it is not always the best technological solution that wins. Therefore, he believes that the future for NFC mobile payment is unpredictable. However, he thinks that user satisfaction is among the most important success factors and that the actor/ecosystem managing to offer the service with the best user satisfaction will stand again as winners.

Regarding the timing of entering the market, Munch-Ellingsen claims that being first to market can be both valuable and harmful depending on the service launched. If you enter the market first with a service based on a good technological solution and manage to build a big and solid customer base, this can be positive as lock-in effects exist. However, a first-to-market service based on a poor technological solution has negative effects, as this will be revealed immediately when new actors enter the market with better solutions.

The timing of entering the market is among the success factors but finding the appropriate timing is difficult. This has been the case for both the NFC City project and Valyou, as many aspects must be taken into account. The NFC City project was maybe a little early regarding technological aspects but on time regarding stimulating contactless and NFC ecosystems, which was one of the major motivations for the project.

As previously mentioned, Munch-Ellingsen commented that there are local differences between markets. Therefore, he believes that Telenor has to live with offering different services in different markets. On the other hand, Telenor wishes to be a global actor as this involves for instance simplification associated with partnership agreements. Based on this, Telenor should endeavour offering a generic service portfolio with a minimum functionality across all markets. What currently makes up this minimum portfolio is an identity solution, a global back-end. How much functionality should be added to this portfolio in the future is not yet decided. However, Telenor has a distribution network that simplifies the process of launching global services.

8.5 Interview with Per Arvid Gjersum

The interview with Per Arvid Gjersum was conducted after the interview with Arne Munch-Ellingsen. Hence, the focus of the interview was the Valyou service, and less attention was therefore given the Norwegian macro environment. The fact that many of the topics were already covered by Munch-Ellingsen, resulted in a reduction of the duration of this interview.

Company	Valyou (TSM Nordic)
Position	Key Account Manager
Place and time	Telephone interview, May 6th 2015
Duration	30 minutes

Per Arvid Gjersum has been Key Account Manager in Valyou since January 2014. He has been involved with mobile payment since 2011, and has 26 years of experience with cards, card acquiring and card payment infrastructure. Previously he has been an employee of DNB and American Express Norway. He holds a degree in business economics.

The Norwegian macro environment
Gjersum confirmed most of the information in the pre-interview scheme but informed that TeliaSonera has acquired Tele2 such that Netcom and Tele2 now make out one MNO, TeliaSonera. He could also inform that the number of contactless POS terminals is currently about 900, but this number increases every week. The percentage of existing POS terminals only needing a software update to be NFC ready is approximately 70 %.

The Norwegian environment differs from most other countries in terms of culture of cooperation. There is a unique culture of cooperation between Norwegian banks and MNOs. Norwegian banks and MNOs have experience of cooperation, for instance in conjunction with BankID.

NFC mobile payment initiatives
Currently there are only two mobile wallet initiatives in Norway. The Valyou service was launched in 2014 and Eika is going to launch their service this summer. Gjersum believes that the introduction of new mobile wallets has a positive influence on Valyou in terms of consumer and merchant awareness.

Currently, the only function supported by Valyou is mobile proximity payment. The current focus of Valyou is to make this service function 100 % before adding supplemental functionality. He emphasises that there is a need for added functionality in the Valyou application to remain interesting for the merchants and consumers in the long term. In the beginning, he believes that mobile proximity payment is enough to attract users due to curiosity and the innovativeness. However, functionality considered added in the future include among others loyalty programs, coupons, ticketing, and access control.

Challenges

One of the key challenges facing Valyou is making users activate and start using the service. With the current solution, there exist some barriers for the consumers to start using the service. Firstly, the Valyou application must be downloaded to your phone. Secondly, a NFC ready SIM card has to be ordered from the MNO. When the consumer receives the new SIM card some days later, mobile banking must be uninstalled and then reinstalled on the new SIM card. What is a challenge here is that when the consumer actually receives the NFC ready SIM card some days later, he/she is not necessarily still enthusiastic about trying out the service because too much hassle is involved.

Another challenge facing Valyou is making the consumers aware of the service altogether. Until now, the consumer awareness of mobile payment has been low. The banks are primarily responsible for marketing the service towards the consumers as they offer the payment cards. Valyou might of course initiate marketing activities for the banks to follow. However, the banks have established two criteria for them to be more proactive towards their customers, the inclusion of more MNOs and a BankAxept solution.

The introduction of HCE might also be a challenge for the SIM based Valyou service. What is the big issue here is whether additional service providers such as banks avoid taking part of the Valyou service because they believe that a HCE solution is cheaper and easier. An extension of this is banks pushing for lower prices, which might result in a change of Valyou's current price model.

The fact that Valyou has no direct agreements with merchants is a challenge. Instead of convincing merchants directly, they have to push other actors to make sure the merchants provide the needed infrastructure. Valyou has ongoing communication with the biggest chains, but they are dependent on other actors making agreements with merchants.

Drivers

Gjersum points out three drivers especially important for Valyou's growth. The first is involvement of more MNOs. TeliaSonera has announced that they will begin issuing NFC ready SIM cards by the end of 2015. The second driver is the inclusion of BankAxept cards in the mobile wallet. Valyou and BankAxept are currently discussing a solution, which they expect will be ready by the autumn in 2015. These two drivers will most probably increase the incentives for more banks to support Valyou, which again increases the number of end users.

The third driver is the introduction of Apple Pay. Gjersum believes that more mobile wallet providers increase the mobile wallet awareness, and a big actor as Apple will definitely create more publicity and visibility. This is likely to benefit Valyou as more Norwegian consumers probably want to try a mobile wallet service.

Technology
Valyou is built upon NFC technology. In Gjersum's opinion, NFC can almost be considered as the standard mobile payment technology due to Apple Pay's NFC support. They are therefore satisfied with their choice of technology and focus 100 % on this solution.

Regarding the introduction of HCE, Gjersum emphasises that they are open for supporting a HCE solution in the future if this is what the market wants, even though Telenor is one of their owners,. At the same time, he considers a SIM based solution as the best and most secure solution today. The SIM based solution is especially convenient from the users' perspective because transactions can be performed offline. According to Visa's regulatory framework, all HCE transactions must be performed online. This means that the end user must open the app and enter the PIN code for every transaction carried out. With the SIM based solution, you do not need to enter the PIN for transactions below 200 NOK, not even opening the application. Gjersum thinks that the introduction of HCE and other solutions have been developed as a response to the MNOs' lack of strategy for their SIM cards.

Ecosystem
Valyou (TSM Nordic) operates as an intermediary between the MNO(s) and banks. TSM Nordic rents space on the MNO's SIM cards, which they resell to the banks. It is up to the banks whether/how they want to charge their payment card customers. There is currently only one MNO taking part of the Valyou ecosystem but TeliaSonera will join by the end of this year. Valyou is constantly in dialog with banks to convince them to take part of the service.

Gjersum believes that the culture of cooperation between banks and MNOs in Norway has reduced the challenges of working in a complex ecosystem. He thinks this process would have been much more difficult in markets with no history or culture of cooperation.

Key success metrics
Gjersum identifies number of end users as their main success criteria. Valyou has two main goals for 2015, achieving their identified metrics for number of end users and merchants. Both of these aspects are critical for Valyou and all activities conducted in 2015 should substantiate these objectives. Gjersum emphasises that it is easier for them to influence the number of end users than merchants, as they do not have any contractual arrangements with merchants. Gjersum points out that if they do not manage to achieve their identified metrics, they have to reconsider the way they work, and try out a new strategy.

Strategies
Valyou's strategy includes adding more functionality to the mobile wallet in the future to keep the end users interested. Another strategy is to educate the end users and

merchants about the service. Especially important is giving the end users information about how to start using the service. This is critical to increase the number of end users. Standardizing the issuing of a NFC ready SIM card when buying a NFC ready mobile device is another strategy planned in the near future. This will remove consumers' existing barrier of needing a new SIM card when buying a NFC ready mobile device and wanting to try Valyou.

What is also important for Valyou's success is involving more banks and MNOs in the service. This demands continually dialog and willingness to compromise from both parties. As a consequence of some banks complains regarding the price demanded by TSM Nordic, changes to the current price structure have to be considered in an effort to please the banks.

Moreover, Valyou must continually consider the pros and cons of offering an HCE solution. Even though Telenor is one of the owners, Valyou has to adapt to the market to survive. There might be easier engaging more banks to the service if such a solution is implemented.

Finally, as a marketing activity to increase the visibility, Gjersum mentions that TSM Nordic uses the name Valyou in presentations and on employees' business cards instead of TSM Nordic. Such an action might help strengthening the mobile wallet's brand.

9 Presentation of initiatives
9.1 Comparison of the three markets
It is evident from reports and the interviews that the market affects the chances of success for a NFC mobile payment solution. Varying macro factors in different countries have an impact on how a service should be designed, implemented and marketed. This chapter will compare the markets in the three countries being investigated, Norway, Serbia and Hungary.

9.1.1 Demographics
With populations of respectively 7.1, 9.9 and 5.2 million, Serbia, Hungary and Norway can all be categorised as relatively small markets. According to CIA (2014), the percentage of the population living in urban areas in Serbia, Hungary and Norway is respectively 55.5 %, 70.8 % and 80.2 %.

9.1.2 Telecom aspects
The mobile penetration rate in all three countries is higher than 100 %. This indicates that most of the population owns a mobile subscription and some people own more than one. Based on numbers from Teller (2014), Norway's smartphone penetration (68 %) is much higher than in Serbia (36 %) and Hungary (36 %). As these number are collected in the beginning of 2014 it is likely to believe that they are substantial increased in all three countries. Munch-Ellingsen informed that the current smartphone penetration in Telenor's Norwegian network is above 80 %.

Both Serbia and Hungary have three MNOs whereas Telenor is the second biggest with a market share of approximately 30 %. In Norway, Telenor is the market leader

with a market share of more than 50 %. TeliaSonera is Norway's second biggest MNO with a market share of 37 %, followed by Network Norway (9 %) and Ventelo and TDC (3 %). Serbia's biggest MNO is mt:s with a market share of 53% and Hungary's biggest MNO is T-Mobile (Magyar Telekom) with a market share of 46 %. Figure 25 illustrates the structure of the telecom markets in Serbia, Hungary and Norway respectively.
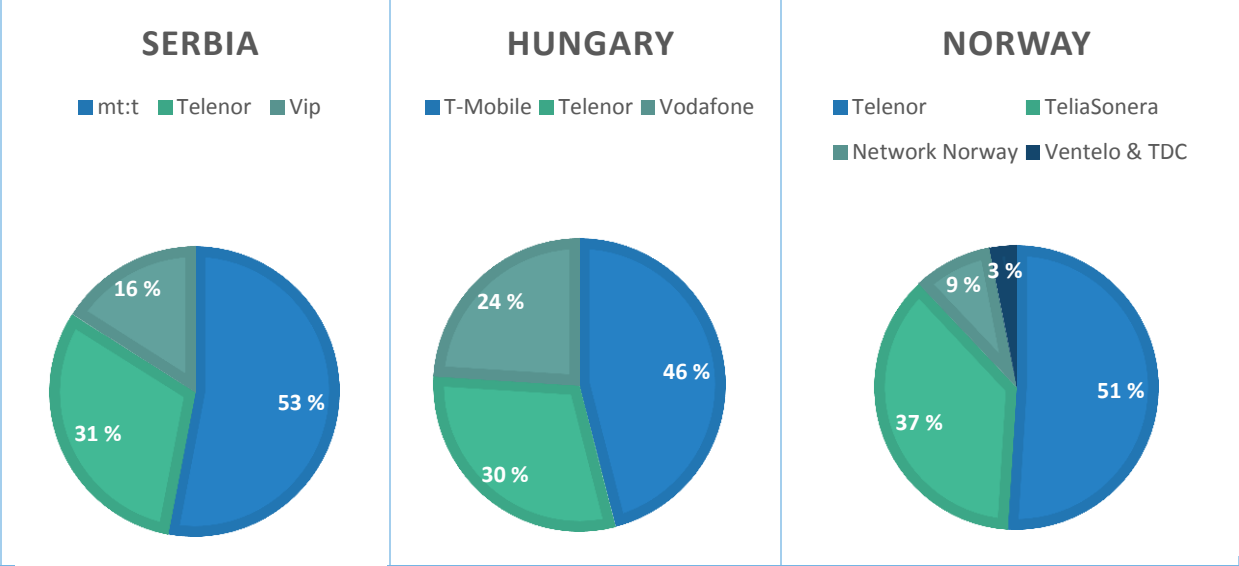
FIGURE 25: COMPARISON OF THE STRUCTURE OF THE TELECOM MARKETS

9.1.3 Financial aspects

The payment method distribution of the selected countries is very different. Norway has one of the highest card payment rates of the world with more than 90 % of all transactions conducted using payment cards. In Serbia, on the contrary, approximately 80 % of all transactions are executed using cash, leaving 20 % of transactions available for card and other types of payments. Compared to the Norwegian and Serbian market, the Hungarian market is most similar to Serbia. Card payments make up about 34 % of the payment transactions. These numbers indicate that the three markets differ extremely in the maturity of payment cards. The high uptake of payment cards in Norway can be partly attributed to the BankAxept solution.

For the merchants to accept NFC mobile payment they need contactless POS terminals. Currently, Hungary has the highest amount of contactless POS terminals. About 40% of all POS terminals in Hungary have contactless functionality. In Norway, the number of contactless POS terminals is about 900. This number is increasing every week but not considerable. However, most of the Norwegian POS terminals contain the contactless functionality but a software upgrade is needed to activate it. Many merchants refuse to upgrade their terminals before the NFC service offers BankAxept. In Serbia, only 1-3 % of the POS terminals are contactless.

In Serbia and Hungary, there are approximately 30 and 40 banks respectively. In Serbia, the three largest banks, Banca Intesa, Komercijalna Banka and Unicredit Bank amount for about 35 % of the market. In Hungary, OTP Bank is the market leader with a market share of approximately 25 %. The four biggest Hungarian banks

represent more than 50 % of the market. In Norway, the three biggest banks, based on total assets, are DNB, Nordea and Danske Bank (FinansNorge, 2014). DNB is the market leader with a share of approximately 45 % of the market. The Association of Serbian Banks, The Hungarian Banking Association and Finance Norway are the banking associations of Serbia, Hungary and Norway respectively.

9.1.4 Competition and regulation

Currently, the competition in the local NFC mobile payment market is small in all of the three countries. In Serbia, there are no commercialised NFC mobile payment services available. A payment pilot was executed by mt:s and Banca Intesa in 2012 but no commercial launch has followed. In Hungary, the situation is different as the three MNOs cooperated to develop a NFC mobile service. Magyar Telekom launched their service in November 2014. The three Hungarian MNOs will offer separate services, which are built upon the same ecosystem. In Norway, Valyou was the first NFC mobile payment service to be launched. In June 2015, Eika will launch a mobile wallet service developed in cooperation with Oberthur, Nets and Samsung. The wallet is based on an embedded SE solution available on selected Samsung handsets.

Although the number of local NFC mobile payment services is still small, this does not mean that the competition in this market is small. Powerful and global actors such as Apple, Google and Samsung do all offer mobile payment services. Even though these services are not available worldwide yet, Telenor and the SIM-centric SE solution can expect tough competition from these actors in the years to come.

Regulations on both national and international mobile payment issues affect the market. Based on the interviews there are no specific regulation on mobile payments in the three countries in focus. However, the Hungarian Government has brought a legislation forcing all POS terminals to be contactless by 2016.

Considering global regulation, the EMV (Europay, MasterCard and Visa) standards affect the development of mobile payment initiatives. Recommended standards from Global Platform and GSMA may also be adhered to although not forced by law. Moreover, it is likely that the European Commission develops EU directives regarding mobile payment in the future.

9.1.5 Overview of the compared factors

Table 7 provides an overview of the compared macro environment factors in Serbia, Hungary and Norway. Most of the data is based on the interviews. Footnotes are inserted when data is collected from other sources.

TABLE 7: OVERVIEW OF MACRO ENVIRONMENT FACTORS

Macro factors	Serbia	Hungary	Norway
Population	7.1 million	9.9 million	5.2 million
Mobile subscribers	9.2 million	11.5 million	5.3 million
Mobile penetration rate	129 %	115 %	111 %
Smartphone penetration	36 %	36 %	80 %
Contactless POS terminal ratio	1-3 %	About 40 %	Less than 1 %
Payment method distribution	Cash: Approx. 80 %[9]	Card payments: 34 %[10]	Cash payment 6 %[11] Card payment 94%
Banks	Approx. 30[12] Banca Intesa (14.5 %) Komercijalna banka (10.8%) Unicredit bank (7.8 %)	Approx. 40 OTP Bank: 25 % K&H Bank: 9 % Erste Postabank: 9 % MKB Bank: 8 % Many small banks: 49 %	Approx. 100[13] (2014) DNB: 45 % Nordea: 11 % Danske Bank: 5 %
MNOs	mt:s: 53 % Telenor: 31 % Vip: 16 %	T-mobile (Magyar Telekom): 46 % Telenor: 30 % Vodafone: 24 %	Telenor: 51 % TeliaSonera: 37 % Network Norway: 9 % Ventelo: 2 % TDC: 1 %
Other NFC mobile wallet initiatives	Pilot in May 2012 by Telekom Srbija and Banca Intesa	MobilTárca launched by Magyar Telecom in November 2014	Eika mobile wallet (June 2015)
Regulation	There are no particular institutions regulating service of m-payments in the CEE region.[14]	There are no particular institutions regulating service of m-payments in the CEE region.[14] Legislation by Hungarian Government.	No particular regulations.

9.2 Development and current status of the initiatives

9.2.1 Norway

The first major NFC project in Telenor Norway was NFC City in 2010. Many actors were involved in the ecosystem and a successful mobile payment pilot was carried out during the summer of 2011. The Valyou service was commercialised in October 2014, one year after initially planned. The main actors in the Valyou ecosystem are Telenor, DNB, Sparebank 1 and TSM Nordic. More banks have announced their support for Valyou and will take part of the ecosystem in the near future.

Currently, mobile proximity payment is the only function included in the mobile wallet but other services are on the roadmap when the payment service functions 100 %. Different barriers and challenges mean that the merchant and consumer uptake of

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[9] TELENORGROUP 2014. Telenor opens Serbia's most available bank.

[10] ECB 2014a. Payment Statistics. European Central Bank.

[11] NTB. 2012. Norge på verdenstoppen i kortbetaling. *Aftenposten*, May 30th.

[12] NATIONALBANKOFSERBIA 2012. BANKING SECTOR IN SERBIA: Second QuarterReport 2012

[13] SPAREBANKFORENINGEN. 2014. *Antall sparebanker - Oversikt over antall sparebanker pr år fra 1922* [Online]. [Accessed May 26th 2015].

[14] KPMG 2009. Mobile Payments in Central & Eastern Europe.

the Valyou service is still quite low. Increasing the numbers of end users and merchants are the two top priorities for Valyou in 2015 according to Gjersum. According to Valyou's web page, 30 mobile devices supported the Valyou service in May 2015. A brief timeline of the Norwegian NFC initiative is shown in Figure 26.

April 2008: Telenor and DNB forms the joint venture TSM Nordic

May-August 2011: Telenor and DnB conduct NFC payment trial in Oslo (Tap2Pay pilot)

During 2015: More banks will support the Valyou wallet

2010: The NFC City project begins

November 2014: Valyou, developed by Telenor and DNB, launches nationwide

Second half of 2015: Valyou includes BankAxept and TeliaSonera

FIGURE 26: TIMELINE FOR THE NORWEGIAN INITIATIVE

9.2.2 Serbia

Telenor Serbia's acquiring of KBC Banka in April 2013 indicates their commitment and investment towards financial services. Telenor Banka is a fully online bank, which offers innovative mobile banking services for their customers. One of the potential services considered is NFC mobile payment. However, different characteristics of the Serbian market have resulted in putting this service on hold. Despite the decision to wait with NFC, the market is evolving and the opportunities involved with NFC mobile payment should be constantly monitored. Figure 27 presents the actions carried out in Serbia during the last couple of year, which can have an impact on a potential future NFC service.

April 2012: Telecom Serbia begins an NFC payments pilot in cooperation with Banca Intesa

September 2014: Telenor Banka opens

April 2013: Telenor acquires KBC Banka

March 2015: Telenor Banka hits 50 000 accounts
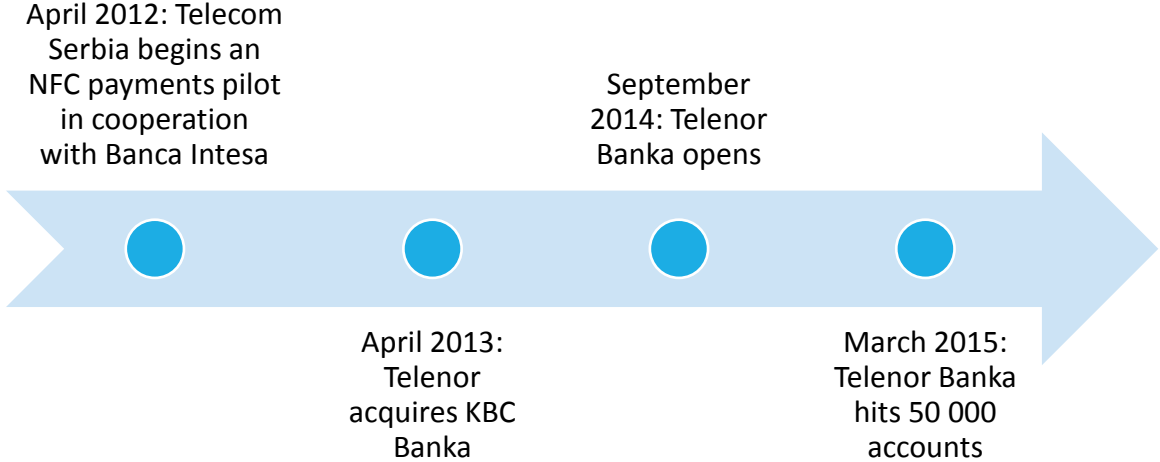
FIGURE 27: TIMELINE FOR THE NFC WORK IN SERBIA

9.2.3 Hungary

The establishment of the Hungarian Mobile Wallet Association by the three Hungarian MNOs in July 2011 symbols the beginning of the Hungarian NFC activity. The main ecosystem actors of the Hungarian initiative are the six founding members of the Hungarian Mobile Wallet Association. The founding members are the three MNOs, Hungary's biggest bank, OTP bank, the loyalty card provider Super Shop and MasterCard. They conducted a highly successful one-year pilot from July 2013 to July 2014 including payment, loyalty, access, and authentication functionality. In the first quarter of 2014, the functionality was extended to include entry cards, ticketing and travel cards.

After the closing of the pilot, each of the MNOs started working on their own mobile wallet solution. Magyar Telekom was first to market and launched their service in November 2014. Both Telenor and Vodafone plan to launch their services during 2015. When this happens, all mobile subscribers in Hungary with a NFC ready device have the opportunity to use mobile proximity payment. Figure 28 shows the timeline of the development of the Hungarian MobilTarca mobile wallet.

July 2011: Hungarian mobile operators form NFC alliance: The Hungarian Mobile Wallet Association (Magyar Telekom, Telenor and Vodafone)

February 2014: MobilTarca expands service range to include event ticketing

November 2014: Magyar Telekom launches the MobilTarca NFC mobile wallet

July 2013: The Hungarian Mobile Wallet Association launches a pilot to test a new NFC mobile payment solution (MobilTarca)

July 2014: Hungarian Mobile Wallet Association reports positive NFC pilot results

During 2015: Telenor and Vodafone to launch their NFC mobile wallets

FIGURE 28: TIMELINE FOR THE HUNGARIAN INITIATIVE

9.2.4 Comparison

Of the three countries, only Telenor Norway has launched a NFC service. Telenor Hungary is almost ready to launch after a successful one-year pilot in cooperation with the two other Hungarian MNOs. In Serbia, on the other hand, a commercial NFC service is far from existing. The opportunities related to NFC are discussed and assessed but currently they do not consider the Serbian market ready for such a service. Figure 29 illustrates the status of the NFC initiatives in the three selected countries according to time.
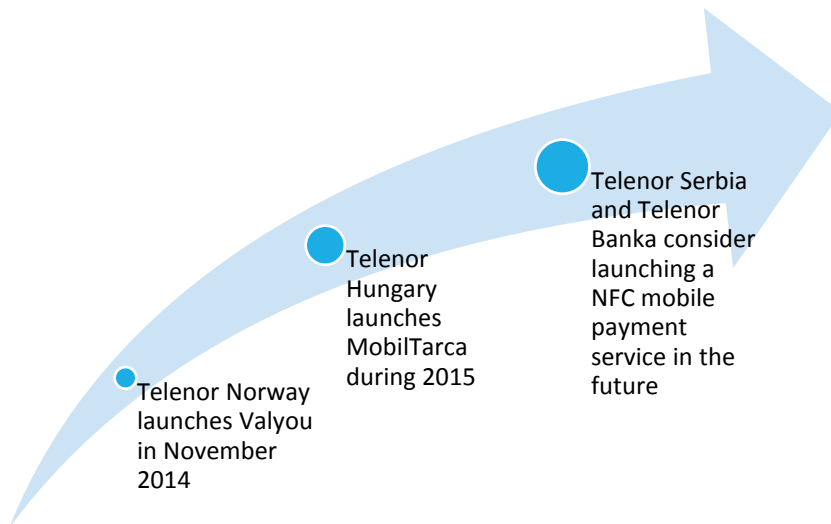
10 Assessment of Initiatives

Based on the success factors presented in the theory section, the data collection process and discussions with Gilles Ubaghs from Ovum and Marko Rankovic from Telenor Banka, six pillars influencing the success of a mobile payment initiative have been identified. The six pillars are illustrated in Figure 30 and explained below. The key success factors from Figure 11 are included in Figure 30 to indicate which pillar they belong.

1. **Infrastructure.** The existing infrastructure in a country has an impact on NFC mobile payment initiatives. Topics of importance are distribution of POS terminals, and contactless POS terminals, the payment method distribution, and the mobile phone and smart phone penetration.
2. **Partnerships and cooperation.** NFC mobile payment and especially mobile wallet services require involvement of many actors from different industries. Which partnerships are created, and how the cooperation in these partnerships work are strongly affecting the outcome of an initiative.
3. **Technical solution.** The technical solution of a service is important as this often correlates with the quality of a service in terms of customer satisfaction, ease of use, security, flexibility etc. The technical solution can also influence the choice of business model and hence, how attractive a service is to join from potential actors' point of view.
4. **Implementation.** The implementation of the service is itself important for the outcome of the initiative. Important aspects of this pillar is to what degree merchants and consumers are aware of the service, educated about how to sign up and use the service, and whether the brand is visible.
5. *Timing and competition.* The timing of launching a mobile payment service is critical to succeed. Different factors influence the best time to commercialise. One of these factors is the existence of other mobile payment or mobile wallet services in a specific country or globally. There might be both advantages and disadvantages of competing services when launching a service.

6. **Regulation.** National, European and global regulations have an impact on mobile payment services. Regulations can change the playing field and are important for actors in the mobile payment ecosystem to pay attention to.

The outcome of an initiative

Infrastructure

Partnerships and cooperation

Technical Solution

Implementation

Timing and competition

Regulation

Available payment-supporting mobile devices

Available contactless POS terminals

Cooperation and partnerships

Right technological solution

A flexible solution

Create consumer value for customer adoption

Timing and market readiness

Deal with regulatory issues

The pillars of mobile payment services

FIGURE 30: THE PILLARS OF MOBILE PAYMENT SERVICES INCLUDING THEORETICAL KEY SUCCESS FACTORS

To assess the presented initiatives and markets, and identify strengths and weaknesses, the six pillars are applied. A comparison of the initiatives and markets is conducted based on each of the six pillars.

10.1 Pillar one: Infrastructure

10.1.1 Comparison

10.1.1.1 NFC ready POS terminals

The availability of NFC ready POS terminals differs between the assessed countries. Despite the fact that Telenor Norway is the only country with a commercialized

service, this market does also have among the lowest penetrations of NFC ready POS terminals. However, the number is increasing every week. In addition, more than 70 % of the existing POS terminals in Norway do only need a software update to be NFC ready. This means that as soon as an agreement between Valyou and the merchant is made, the process of activating the POS terminal is fast, cheap and easy. Hence, there is room for a rapid growth regarding the share of NFC ready terminals.

In Hungary, about 40 % of the POS terminals are NFC ready. In addition, the Hungarian Government has presented a legislation forcing all POS terminals to be replaced by contactless POS terminals by 2016.

The distribution of contactless POS terminals in Serbia is currently low with only 1-3 % of the existing POS terminals. At the same time, as many banks issue contactless payment cards nowadays and the usage of payment cards in Serbia is increasing, it is likely to believe that this number will rise in the future. The speed of this rise however, is difficult to predict.

10.1.1.2 Smart and NFC ready mobile devices

The penetration of smart phones in a market influences the outcomes of a NFC mobile payment initiative because the service is offered through an application. Additionally, only selected smart phones are NFC ready, which is a necessity to use a NFC service.

Of the three countries, Norway has definitely the highest share of smart phones. More than 80 % of the mobile devices in Telenor's network are smart phones and it is likely to believe that the same percentages are present in the other networks as well.

In Serbia and Hungary, the percentage of smart phones is much lower. The penetration is slightly less than 40 % in both of the countries. However, smart phones are more and more common and the number is likely to increase rapidly in both countries in the years to come.

Considering the distribution of NFC ready mobile devices, most new Android- and Microsoft-based smart phones are NFC-enabled. IPhone 6 and 6 Plus are the only NFC ready iPhones, but these are locked for all other services than Apple Pay. The number of NFC ready smart phones is steadily increasing and NFC is likely to be a standard capability of all future smart phones.

10.1.1.3 Payment method distribution

Which payment types are most common in a market might have consequences for the uptake of a NFC mobile payment service. Norway has among the world's highest usage of payment cards. Payment cards conduct approximately 94 % of all transactions. In the other end of the scale, you find Serbia with about 80 % cash usage. The percentage of card payment in Hungary is about 34 %, which is a little higher than Serbia but still far from Norway.

The fact that the markets are used to different types pf payment methods make the starting point of implementing a NFC mobile payment service very different. There is probably a bigger step to go from paying by cash to mobile than from payment cards

to mobile. On the other hand, the perceived value of using mobile instead of cash can be higher than using mobile instead of payment cards.

10.1.2 Strengths and weaknesses

This section will identify the strengths and weaknesses of the existing infrastructure in the three countries in scope based on the conducted comparison.

10.1.2.1 Norway

One of the weaknesses of the Norwegian infrastructure is the lack of NFC ready POS terminals. One the other hand, there is a strength that about 70 % of the existing POS terminals only need a software upgrade to be NFC ready. This means that when an agreement is made between the merchant and Valyou, a small amount of resources are needed from the merchant to provide the necessary functionality.

The high penetration of smart phones is a strength of the Norwegian infrastructure. This means that almost everyone has the opportunity to download and use applications. A weakness of the Norwegian infrastructure from Valyou's perspective is the high market share of iPhones. Apple has a market share of approximately 30 % in Norway, which means that 30 % of the Norwegian mobile subscribers are excluded from Valyou's potential market.

The fact that the payment card usage in Norway is extremely high can be a strength because people are used to pay at a POS terminal. Instead of inserting their payment card into the POS terminal to pay, they can hold their mobile device close to it. On the other hand, most people are satisfied with the payment card method and do not think paying by mobile is worth the extra effort needed to activate such a service.

Figure 31 summarises the identified strengths and weaknesses of the Norwegian infrastructure.

- 70 % of POS terminals only need a software update.	- Less than 1000 NFC ready POS terminals.
- High penetration of smart phones.	- Valyou not available for iPhone-users.
- Increasing number of NFC ready devices.	- People find card payment satisfactory and convenient so there is no urgent need for something else.
- People used to pay at POS terminals due to high usage of payment cards.	
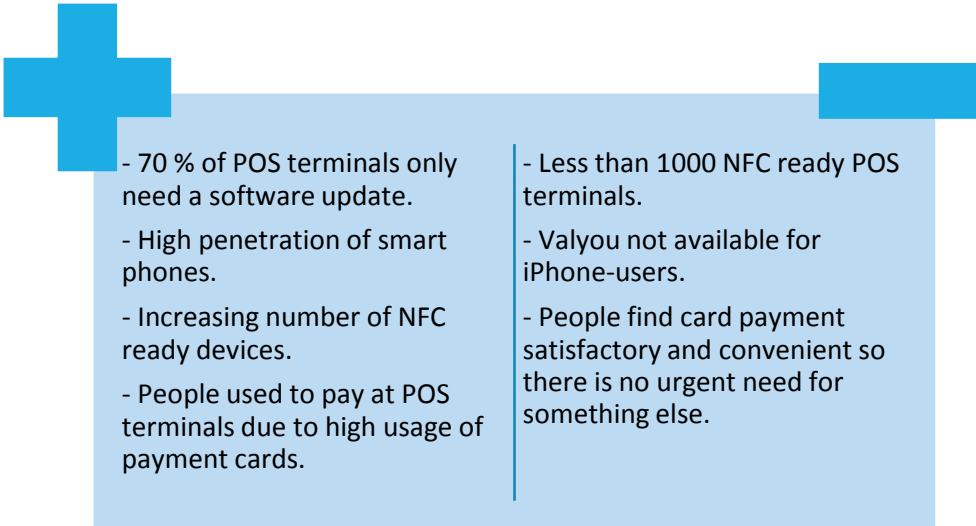
FIGURE 31: STRENGTHS AND WEAKNESSES OF THE NORWEGIAN INFRASTRUCTURE

10.1.2.2 Hungary

The Hungarian infrastructure holds an advantage related to NFC ready POS terminals. There is already a 40 % percentage of NFC ready terminals and legislation

forces all terminals to be contactless by 2016. This means that by 2016, mobile payment service users can use it to pay at all POS terminals in the country.

A weakness of the infrastructure is the relatively low penetration of smart phones, as this is needed to download the mobile payment application. At the same time, this can be seen as a strength because most new smart phones include NFC functionality. Hence, when Hungarians replace their old phone with a smart phone, which it is likely that many of them do in the near future, the device is likely to be NFC ready.

The relatively low usage of payment cards can be seen as a weakness of the Hungarian infrastructure because the consumers may see it as a big step to go from paying with cash to paying with their phone. Many consumers find cash payment easy and convenient, and they appreciate the anonymity. However, when comparing cash payment, card payment and mobile proximity payment, one can point at more benefits of mobile payment compared to cash payment than to card payment. This can prove to be a strength as it can be easier to convince the consumers of the added value involved with mobile payment.

Figure 32 summarises the identified strengths and weaknesses of the Hungarian infrastructure.

- 40 % of POS terminals are NFC ready.	- Quite low penetration of smart phones.
- Legislation forces replacement of all POS terminals to contactless ones by 2016.	- Big step to go from cash payment to mobile payment.
- Most new smart phones are NFC ready so when people buy a smart phone it is likely to be NFC-enabled.	- People appreciate the anonymity involved with cash payment.
- Perceived value of paying by mobile phone is big compared to cash payment.	
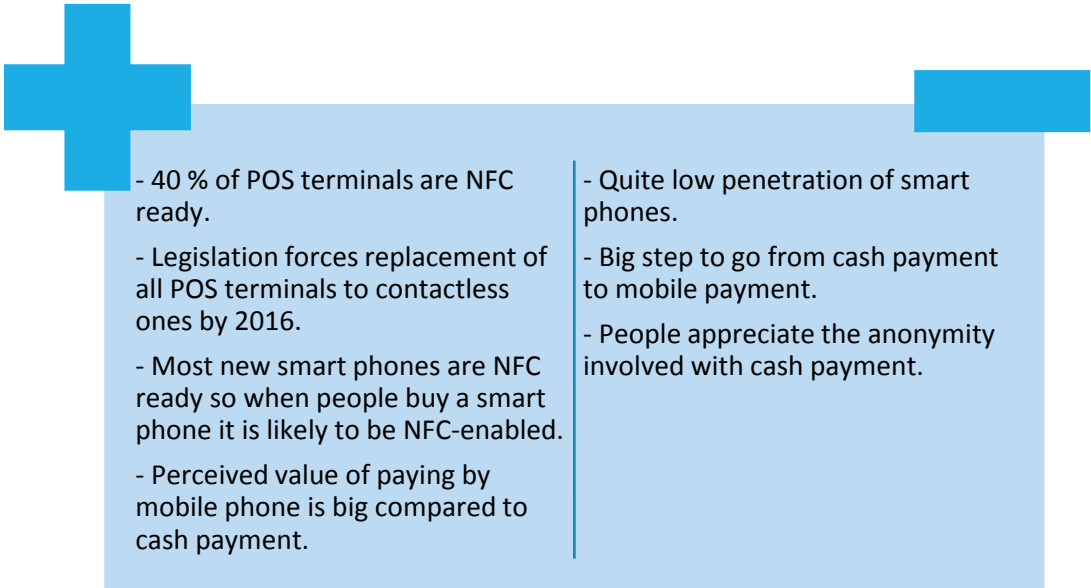
FIGURE 32: STRENGTHS AND WEAKNESSES OF THE HUNGARIAN INFRASTRUCTURE

10.1.2.3 Serbia

In Serbia, there is a low percentage of NFC ready terminals, smart phones and payment card transactions. This result in many weaknesses of the Hungarian infrastructure associated with mobile proximity payment. If the consumer is actually willing to try mobile proximity payment despite the big difference from cash payment and lack of anonymity, it is likely that the consumer cannot because he/she does not have a smart phone to download the application and the merchant visited do not provide a NFC ready POS terminal.

On the other hand, Serbia also has the two strengths identified for Hungary regarding an increasing number of new smart phones with NFC functionality and higher perceived value of mobile payment compared to cash. In addition, more Serbian banks have started issuing contactless payment cards. This might prove positive both for the penetration of contactless POS terminals in the future and the consumers' attitude towards contactless mobile payment as these methods are almost equal.

Figure 33 summarises the identified strengths and weaknesses of the Serbian infrastructure.

- Most new smart phones are NFC ready so when people buy a smart phone it is likely to be NFC enabled.	- Low percentage of NFC ready POS terminals.
- Perceived value of paying by mobile phone is big compared to cash payment.	- Quite low penetration of smart phones.
- More banks are issuing contactless payment cards.	- Big step to go from cash payment to mobile payment.
	- People appreciate the anonymity involved with cash payment.
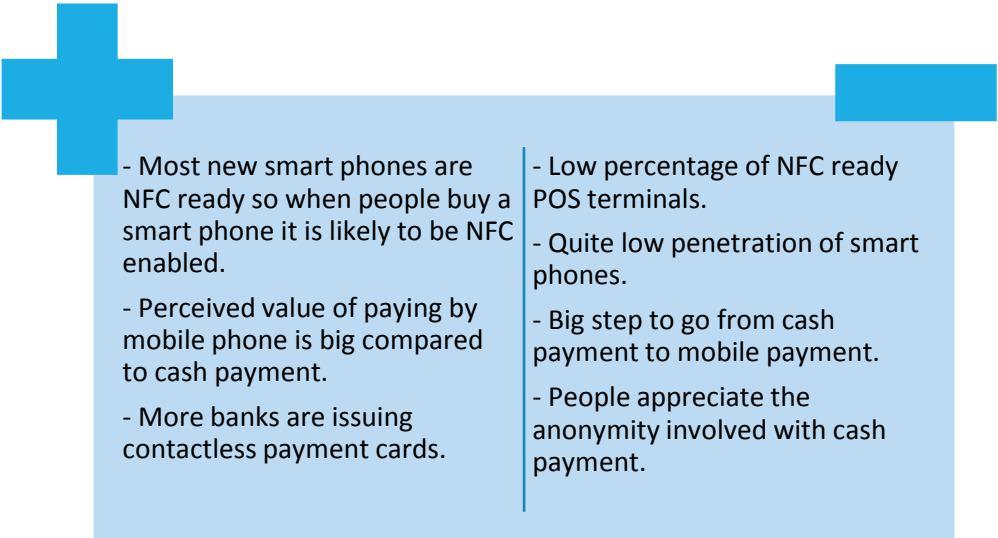
FIGURE 33: STRENGTHS AND WEAKNESSES OF THE SERBIAN INFRASTRUCTURE

10.2 Pillar two: Partnerships and cooperation

10.2.1 Comparison

There are differences between the countries when it comes to partnerships and cooperation. The Norwegian initiative is established based on cooperation and a joint venture between Telenor and Norway's biggest bank, DNB. This joint venture named TSM Nordic (Valyou) is an open initiative for other actors to join. Sparebank 1 recently bought a share of the company. More banks and Norway's second biggest MNO, TeliaSonera have announced their involvement with the NFC initiative.

The Hungarian initiative is based on an association established by the three Hungarian MNOs together with the biggest Hungarian bank, OTP Bank, MasterCard and the loyalty provider SuperShop. These six actors make out the founding members of the association. Among the approximately 30 ordinary members, you find banks, merchants, loyalty issuers, ticketing and traveling companies etc. The current focus in Hungary is creating a national, widespread mobile wallet service, not how this can help the MNOs compete.

Because Serbia has not started working on a NFC initiative, the country is not relevant in this comparison as no partnerships are created. However, the fact that Telenor Serbia has acquired a bank involves opportunities for Telenor Serbia related to mobile financial services and more specifically NFC services.

Norway is among the few countries in the world with a culture of cooperation between banks, MNOs and banks and MNOs. These actors have cooperated in different projects such as for instance BankID through the ages.

The Hungarian MNOs have previously worked together with payment services although banks have not been involved. The cooperation regarding the NFC initiative has been challenging because actors from different industries have different, needs, resources, budgets, decision procedures, key performance indicators (KPI) and organisations.

In Serbia, there is a strong competitive culture between MNOs and banks and the willingness to cooperate with the competitors is low. This is part of the reason why a NFC initiative is put on hold.

10.2.2 Strengths and weaknesses

10.2.2.1 Norway

In Norway, there is a culture of cooperation, especially between banks, MNOs and banks and MNOs. It is difficult succeeding with a NFC mobile payment initiative without the existence of collaboration between these actors. Telenor and DNB have experience from working together for instance associated with BankID. This experience is valuable in the cooperation regarding NFC mobile payment. Hence, the culture of cooperation is a strength of the Norwegian initiative.

Although partnership and cooperation exists, there is still a lack of involved MNOs and banks in the Norwegian initiative. One weakness is that only one MNO and few banks are involved. However, TeliaSonera will most probably support the service by the end of 2015 and this means that the majority of Norwegian mobile subscribers have the opportunity to order a NFC ready SIM card. Additionally, the number of involved banks is increasing as the awareness of the service is strengthened.

Another weakness is the lack of agreements with merchants. This involves a great deal of work to convince merchants to support the service and the communication is difficult. However, BankAxept's announced support for Valyou is a strength because this is likely to increase the number of merchants willing to join the service.

Figure 34 summarises the identified strengths and weaknesses of the Norwegian partnerships and cooperation.

- A culture of cooperation.

- Experience from BankID.

- TeliaSonera has announced support for NFC.

- BankAxept has announced support for Valyou.

- Only one MNO involved.

- Few banks involved.

- No agreements with merchants.
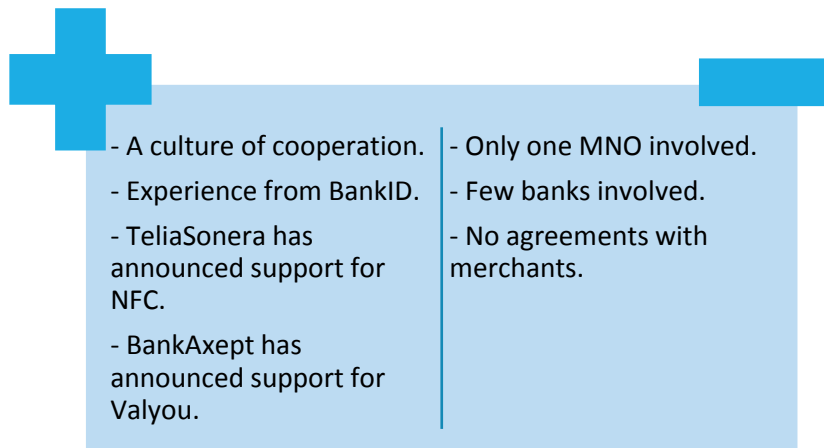
FIGURE 34: STRENGTHS AND WEAKNESSES OF NORWEGIAN PARTNERSHIPS AND COOPERATION

10.2.2.2 Hungary

One of the Hungarian strengths is that all the MNOs stand behind the initiative and cooperated from the beginning. In addition, the fact that the MNOs have experience of working together can simplify the cooperation regarding mobile payment. One the other hand, the MNOs have no previous experience from working with banks, which can be regarded as a weakness.

Another strength is the involvement of many actors from different industries. This means that many perspectives are taken into account and the service is likely to be of better quality. What might be a weakness associated with the same factor is that actors from different industries seem to be very different. Hence, the ecosystem becomes more complex and difficult to manage. The right balance between the actors is challenging to find, which may result in dominating actors and hence, not an optimal solution.

Figure 35 summarises the identified strengths and weaknesses of the Hungarian partnerships and cooperation.

- Cooperation between all MNOs.

- The MNOs have experience in cooperation.

- Actors from various industries involved.

- No experience from cooperation between banks and MNOs.

- The involved actors from different industries differ in many regards.
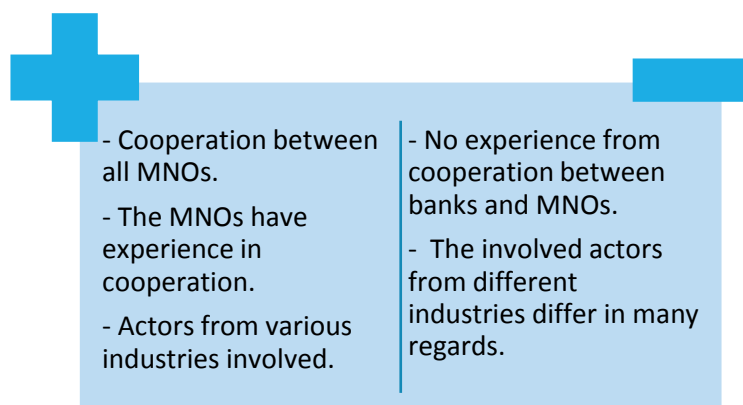
FIGURE 35: STRENGTHS AND WEAKNESSES OF HUNGARIAN PARTNERSHIPS AND COOPERATION

10.2.2.3 Serbia

What is Serbia's strength when it comes to NFC mobile payment initiatives and partnerships and cooperation is the acquiring of KBC Banka in 2013. Owning a bank gives Telenor Serbia more knowledge and expertise concerning the financial industry, in addition to greater influence and new opportunities regarding service offerings.

Considering weaknesses, the Serbian bank and telecom industries are very competitive. The actors are neither experienced nor positive towards cooperating with their competitors. To be able to initiate a NFC mobile payment service in Serbia it would be advantageous if the actors considered each other like potential partners instead of competitors.

Figure 36 summarises the identified strengths and weaknesses of the Serbian partnerships and cooperation.

- Telenor Serbia has acquired a bank.	- Competitive culture in bank and telecom industry.
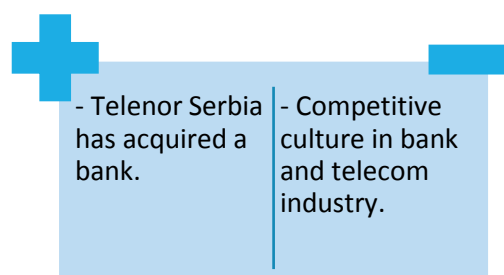
FIGURE 36: STRENGTHS AND WEAKNESSES OF SERBIAN PARTNERSHIPS AND COOPERATION

10.3 Pillar three: Technical solution

10.3.1 Comparison

Data is not collected about the detailed technical solutions of the Norwegian and Hungarian mobile wallet initiatives. What is known is that the initiatives are based on NFC technology. Furthermore, both initiatives use a SIM based SE solution. Representatives from Telenor in both of the countries suggest that this solution is the best and most secure solution available today. However, the fact that a MNO initiated both of the services can be considered a major reason why the SIM based SE solution was chosen in the first place. With another solution than the SIM based, the MNOs' role in the mobile payment ecosystem will be strongly reduced, if not completely removed. The Norwegian service has not foreclosed the opportunity to use a cloud-based solution although one of the owners is the MNO Telenor.

The Hungarian mobile wallet initially holds more functionalities than the Norwegian one, which only holds mobile payment functionality. This indicates that the Hungarian developers already have a solution for how to integrate different service providers.

Serbia has no initiative and therefore not a technical solution. The wait and see approach could make them better able to choose the optimal technical solution in a potential service in the future. In Rankovic's opinion, HCE is the new trend going to replace the SIM based model.

10.3.2 Strengths and weaknesses

10.3.2.1 Norway

One of the strengths of the Norwegian technical solution is that NFC technology has received a major upswing following the introduction of Apple Pay. Due to Apple's choice, NFC can in many ways be regarded as the default technology for mobile payment. This results in more awareness from all potential actors in the ecosystem, from consumers and merchants to service providers. On the other hand, NFC has a weakness concerning the need for availability of NFC ready mobile devices and POS terminals. However, this barrier is likely to be reduced by the NFC visibility and awareness created by Apple.

Another strength is the security and perceived security associated with the SIM based SE solution applied by Valyou. Transaction security is very important for the consumers and merchants, and a SE located on the SIM card is by many perceived as more secure than a SE in the cloud. The weakness of this solution is that banks might be sceptic about supporting it due to the less complex ecosystem involved with HCE. However, a cloud-based solution severely limits the MNOs role in the ecosystem and hence, is not welcomed by Valyou's biggest owner, Telenor.

Figure 37 summarises the identified strengths and weaknesses of the Norwegian technical solution.

- NFC upswing following the introduction of Apple Pay.	- Need for NFC ready SIM card and POS terminal.
- SIM based SE considered most secure.	- Banks reluctant to join SIM based solutions after the introduction of HCE.
	- Cloud-based solutions remove the major role of MNOs.
	- Difficult to change to HCE when Telenor is one of the owners.
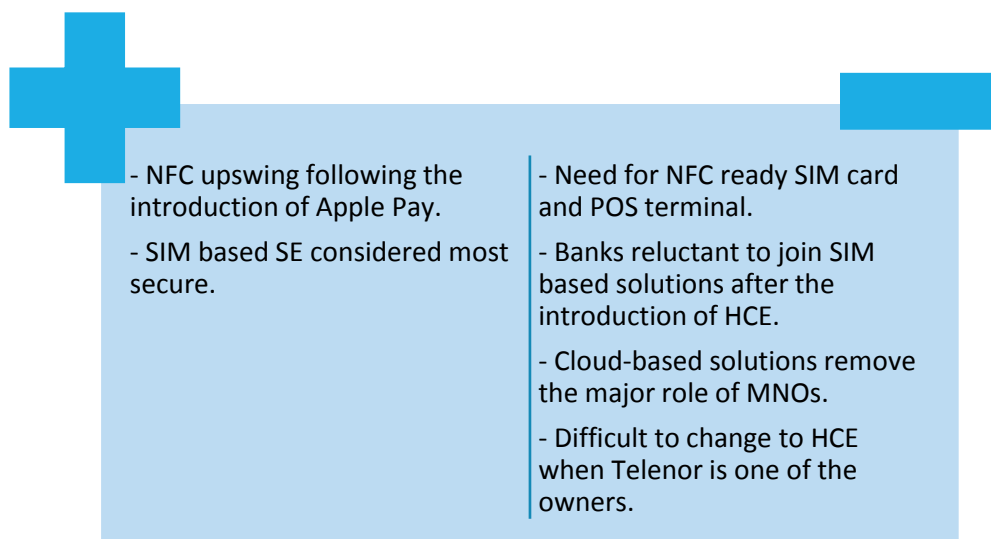
FIGURE 37: STRENGTHS AND WEAKNESSES OF THE TECHNICAL SOLUTION IN NORWAY

10.3.2.2 Hungary

As the Hungarian technical solution is mainly the same as the Norwegian one with NFC technology and a SIM based SE approach, the strengths and weaknesses regarding this pillar are the same. However, the Hungarian service is less flexible regarding changing the SE solution, as three out of the six founding members of the initiating association are MNOs. Therefore, it is unlikely that they are willing to accept a change to a HCE solution even though the market prefers this solution to a SIM based.

Figure 38 summarises the identified strengths and weaknesses of the Hungarian technical solution.

- NFC upswing following the introduction of Apple Pay. - SIM based SE considered most secure.	- Need for NFC ready SIM card and POS terminal. - Cloud-based solutions remove the major role of MNOs. - Low flexibility regarding changing the SE solution.
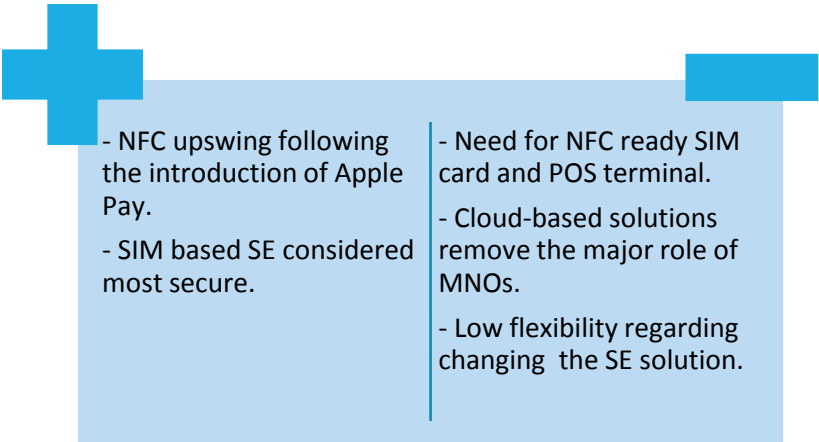
FIGURE 38: STRENGTHS AND WEAKNESSES OF THE TECHNICAL SOLUTION IN HUNGARY

10.3.2.3 Serbia

The strength associated with the Serbian situation is that they can wait and see what technical solution is preferred by the market and then choose this solution. The weakness of the approach is that the market changes rapidly and by waiting the opportunity to succeed with an initiative may pass by. This is especially relevant for MNOs because the SIM based technology seems to be the solution that benefits them the most and it is predicted by many that this solution will lose its strong position in the near future.

Figure 39 summarises the identified strengths and weaknesses of the Serbian technical solution.

-Opportunity to wait and see what technical solution is most successful.	- The market changes fast and by waiting you can miss your best opportunity.
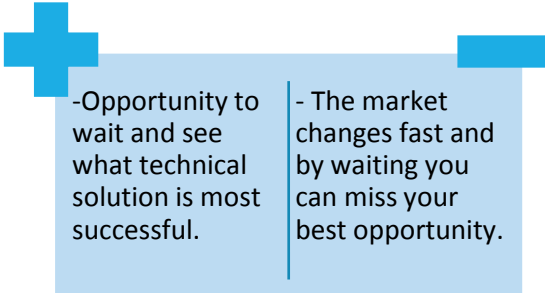
FIGURE 39: STRENGTHS AND WEAKNESSES OF THE TECHNICAL SOLUTION IN SERBIA

10.4 Pillar four: Implementation

10.4.1 Comparison

Serbia is excluded from this comparison as no NFC initiative is implemented in this country.

The visibility and awareness of the Norwegian mobile payment service is not strong. The main marketing channels are web pages and social media. The banks are primarily responsible for promoting the service to their customers but this promotion is limited as they wait for more merchants and BankAxept to support the service. Except from the contactless symbol on the contactless POS terminals in selected

stores, there is no NFC signage. NFC ready SIM cards are not automatically included when a Telenor customer buys a NFC ready smart phone. Hence, few consumers are actually aware of the service and even less educated about how to activate and use it. To get information about the service you have to seek it out on your own as there are few major marketing activities carried out.

The Hungarian situation seems to be a bit different. The fact that all three Hungarian MNOs are part of the service makes it easier increasing the awareness of the consumers. Additionally, one of the main aims of the Hungarian Mobile Wallet Association is to promote innovative NFC technology based mobile payment solutions, systems and services, raise the awareness, and educate the population and the potential contracting partners. Promotion and marketing activities are therefore emphasised, and a big part of the fees paid by the members is allocated to this work. External companies conduct the communication campaigns.

10.4.2 Strengths and weaknesses

10.4.2.1 Norway

There is a weakness with the implementation of Valyou concerning the visibility and awareness of the service among consumers and merchants. Few marketing channels are used and education efforts toward the consumers and merchants are low. The information of how to use Valyou is out there but you have to know that the service exists to find it. At this point in time, the service is not visible in the market. Another weakness is that people buying a NFC-enabled smart phone, is not automatically issued a NFC ready SIM card. This could be an effective way making the consumers aware of the service that is not yet implemented.

What is positive is the contactless symbols on the contactless POS terminals. They can raise the awareness of mobile payment due to customers' curiosity. However, for this to be successful, the staff in the store needs knowledge about the technology and service to inform the customers asking.

It is likely to believe that the involvement of TeliaSonera and BankAxept by the end of 2015 will increase the awareness of Valyou. The involved banks have communicated that they will increase their promotion efforts of the service when these two factors are settled.

Figure 40 summarises the identified strengths and weaknesses of the Norwegian implementation.

- Contactless sign on the contactless POS terminals.

- Involved banks are likely to increase their efforts to promote the service when more MNOs and BankAxept support the service.

- Low visibility and awareness among the consumers and merchants.

- Information only found if you are aware of the service.

- Few marketing channels.

- NFC ready SIM cards not automatically issued when buying a NFC ready smart phone.

FIGURE 40: STRENGTHS AND WEAKNESSES REGARDING THE NORWEGIAN IMPLEMENTATION

10.4.2.2 Hungary

There are many more strengths associated with the Hungarian implementation. The fact that all Hungarian MNOs are a part of the service makes it easier creating awareness around it as all mobile subscribers can be reached. Additionally, one of the main objectives of the Hungarian Mobile Wallet Association is to inform and educate the market about NFC mobile payment services. This results in big amounts of the membership fees going directly to marketing and communication campaigns conducted by external companies. The communication campaigns are directed towards both consumers and potential contracting partners.

Figure 41 summarises the identified strengths and weaknesses of the Hungarian implementation.

- All Hungarian MNOs part of the service.

- Raising awareness and education are among the main objectives of the association.

- Big part of membership fees allocated to communication campaigns.

FIGURE 41: STRENGTHS AND WEAKNESSES REGARDING THE HUNGARIAN IMPLEMENTATION

10.5 Pillar five: Timing and competition

10.5.1 Comparison

The establishment of the joint venture between Telenor and DNB in 2008 can be regarded as the official beginning of the Norwegian NFC initiative. Originally, a pilot

was planned already during 2009 but it was delayed until the summer of 2011. The NFC City project began in 2010 and ended with the launch of Valyou in November 2014. Both the pilot and the launch of Valyou were delayed. Technical problems were among the main reasons for the delays. At the time of Valyou's launch in November, only DNB and Telenor customers with a NFC ready Android device were able to use the service at the approximately 400 stores offering contactless POS terminals. Now, about 6 months after the commercialisation of Valyou, about 900 stores offer contactless POS terminals.

The Hungarian Mobile Wallet Association was established in July 2011 and a one-year pilot was launched just two years after. Magyar Telekom, the biggest of the three MNOs, launched their mobile wallet service at the same time as Valyou, in November 2014. Telenor and Vodafone are expected to launch their services during 2015. 40 % of the POS terminals in Hungary are now contactless and by the end of 2015, all POS terminals have to be contactless. At the time of Magyar Telekom's launch, 30 mobile devices supported the service.

In Serbia, it is made a decision that the market is not ready for a NFC mobile payment service yet. The penetration of smart phones and contactless POS terminals are low, and the usage of cash is extremely high.
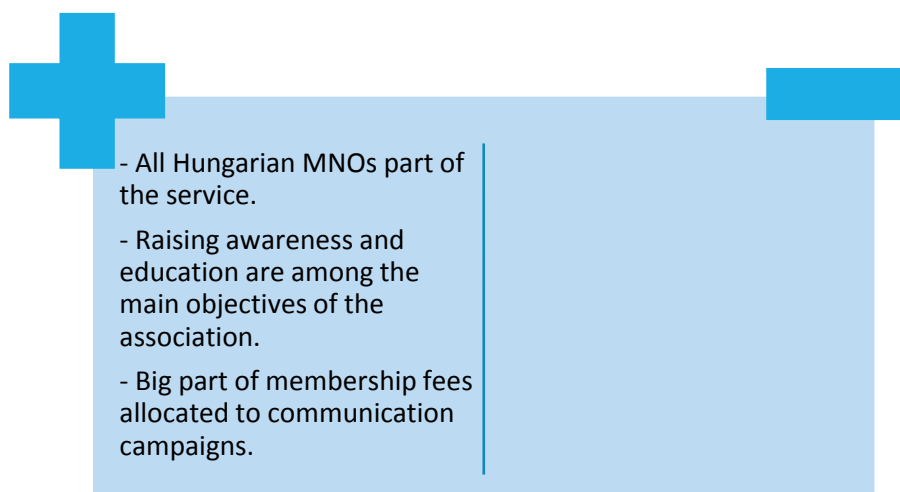
Both the Norwegian and Hungarian initiatives were first to market in their respective countries. Eika has announced the launch of Eika mobile wallet during the summer of 2015 but except from that, Valyou has no other domestic competitors. In Hungary, you may consider the mobile wallet services of the three MNOs as competitors but they are based on the same platform and the level of collaboration is high. If considering the Hungarian services as separate services, Magyar Telekom was first to market. There are currently no announced NFC initiatives in Serbia.

Despite low national competition, the initiatives might experience increased competition from powerful global actors such as Apple and Google. These competitors are in many ways more threatening than national initiatives in the long term. However, in the short term these global initiatives may increase the visibility and awareness of consumers and merchants towards NFC mobile payments.

10.5.2 Strengths and weaknesses

10.5.2.1 Norway

A strength of the timing of the Norwegian initiative is the thoroughly process carried out prior to the commercial launch. Technical solutions were tested and trialled and the market analysed. In addition, the introduction of NFC ready phones is rapidly increasing and can be used as an argument for suitable timing of the launch.

On the other hand, the distribution of POS terminals was very low at the time of the launch. Only 400 terminals were contactless, and 6 months later the number is still not higher than 900. One could argue that the contactless POS terminal penetration should have been higher at the time of the launch. Moreover, one could question the fact that the service does only include mobile payment functionality. If Valyou postponed their launch to integrate added functionality, the response among the consumers could have been higher.

However, more strengths of the timing are that Valyou was first to market, that there are few Norwegian competitors and that NFC mobile payment receives increased attention due to the introduction of Apple Pay. To provide a Norwegian mobile payment service at a time where Apple Pay and Google Wallet are only available in the US might be valuable as consumers can satisfy their curiosity with the Norwegian service. If they are happy with Valyou, the incentives to switch to other mobile payment services due to commercialisation of Apple Pay in Norway are reduced. At the same time, although the introduction of global actors may be beneficial for Valyou in the short term, they pose serious threat to the service in the longer term. Global OTT actors have capabilities and opportunities not available for small Norwegian actors.

Figure 42 summarises the identified strengths and weaknesses of the Norwegian timing and competition.

- Thouroughly process carried out before commercial launch.

- Number of NFC ready phones is rapidly increasing.

- Increased awareness due to Apple Pay.

- Few Norwegian competitors.

- First to market.

- Low distribution of contactless POS terminals at the time of launch.

- Limited growth in number of contactless POS terminals during the first 6 months.

- Only mobile payment functionality included.

- Future competition from global actors.

FIGURE 42: STRENGTHS AND WEAKNESSES OF THE TIMING AND COMPETITION IN NORWAY

10.5.2.2 Hungary

The strengths of the timing of the Hungarian initiative are the high distribution of contactless POS terminals and the legislation forcing rapid growth of contactless POS terminals. Moreover, the same strengths as presented for the Norwegian initiative are applicable also here. The number of NFC ready phones is rapidly increasing, the awareness among consumers is increased due to Apple Pay, and the Hungarian mobile payment competition is low.

However, the threat of competition from global actors is also relevant for the Hungarian initiative. In addition, the fact that cash is still a frequently used payment method in the country can result in the consumers and merchants being more sceptical towards such a service. The efforts to convince the consumers and merchants to use the service might therefore be more demanding.

Figure 43 summarises the identified strengths and weaknesses of the Hungarian timing and competition.

- High distribution of contactless POS terminals.

- Rapid increase in distribution of contactless POS terminals.

- Number of NFC ready phones is rapidly increasing.

- Increased awareness due to Apple Pay.

- Low Hungarian competition.

- Future competition from global actors.

- Cash is still a frequent used payment method by many Hungarians.

FIGURE 43: STRENGTHS AND WEAKNESSES OF THE TIMING AND COMPETITION IN HUNGARY

10.5.2.3 Serbia

Because Serbia has not started a NFC initiative, strengths and weaknesses of this decision are presented.

The strengths of the decision not to implement a NFC initiative are the lack of infrastructure, a high percentage of cash transactions, a competitive environment within the bank and telecom sector and a future threat from global actors. Because of these factors, it is unlikely that a NFC mobile payment service in Serbia would have succeeded.

On the other hand, as the time window for launching national SIM based SE solutions is shrinking, the decision not to initiate such a service now might result in the opportunity being lost.

Figure 44 summarises the identified strengths and weaknesses of the Serbian timing and competition.

- Lack of infrastructure.

- Extremely high usage of cash.

- A competitive bank and telecom environment.

- Future competition from global actors.

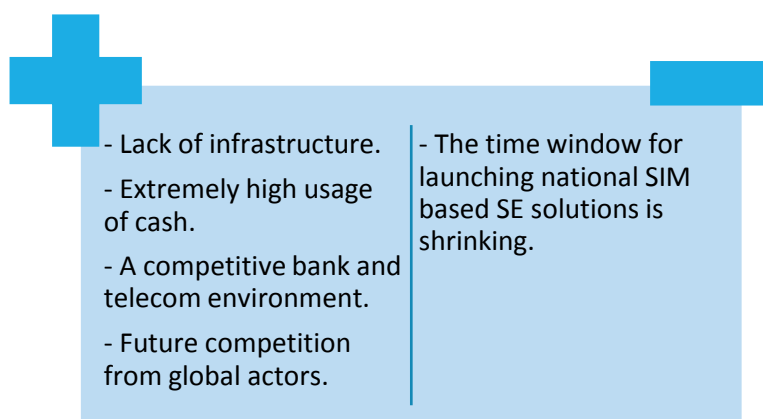- The time window for launching national SIM based SE solutions is shrinking.

FIGURE 44: STRENGTHS AND WEAKNESSES OF THE TIMING AND COMPETITION IN SERBIA

10.6 Pillar six: Regulation

10.6.1 Comparison

Based on the collected data there is no specific mobile payment regulation at the time being in the countries in focus. However, it is likely to believe that as mobile payments become more widespread, more regulations will be introduced. The European Commission (EC) is one potential regulator, which can influence the conditions for the mobile payment market in Europe. The proposed cap on interchange fees presented by EC affects the mobile payments market already. Existing players' willingness to share interchange revenues with new mobile payment players will be reduced (Ubaghs, 2013a). At the same time, a harmonisation of interchange rates across Europe can simplify the implementation of European-wide mobile payment services. Additionally, as a major revenue stream will decline, it is likely that issuers, schemes, and acquirers will be more eager to innovate and develop new sources of revenue.

Technical standards are issued from different actors such as GSMA, Global Platform and NFC Forum. Both the Norwegian and Hungarian initiatives comply with these standards. In addition, the EMV (EuroPay, MasterCard and VISA) standards are complied with.

The Hungarian Government is the only Government, which is involved with the contactless payment development by issuing legislation forcing all POS terminals to be contactless by 2016.

10.6.2 Strengths and weaknesses

The legislation concerning replacement of not contactless POS terminals by the Hungarian Government is a strength for the Hungarian initiative. However, except from this legislation posed by the Hungarian Government there are no differences concerning the regulative environment of the initiatives. Hence, identification of strengths and weaknesses of the regulative environment is combined for all three markets.

Currently there are no explicit regulations concerning the mobile payment market. This is a strength for the mobile payment initiators as they are not restricted in any ways. At the same time, the regulative future is unsecure. It is likely that the market will be regulated in the future, especially if the service becomes more popular. It might have negative consequences for existing mobile payment initiatives if the future brings new regulations they need to adhere.

A strength of the initiatives is that they comply with existing standards. The fact that the service comply with EMV standards results in end users being able to use the service at all EMV complying POS terminals all over the world. Technology related NFC standards are more challenging as they are many. More standards are likely to be presented in the future and it can be difficult for the actors to decide what standards to comply with.

Furthermore, as described in the comparison, the EC caps the interchange fee. There are both strengths and weaknesses associated with this legislation and which side will be dominant is difficult to predict.
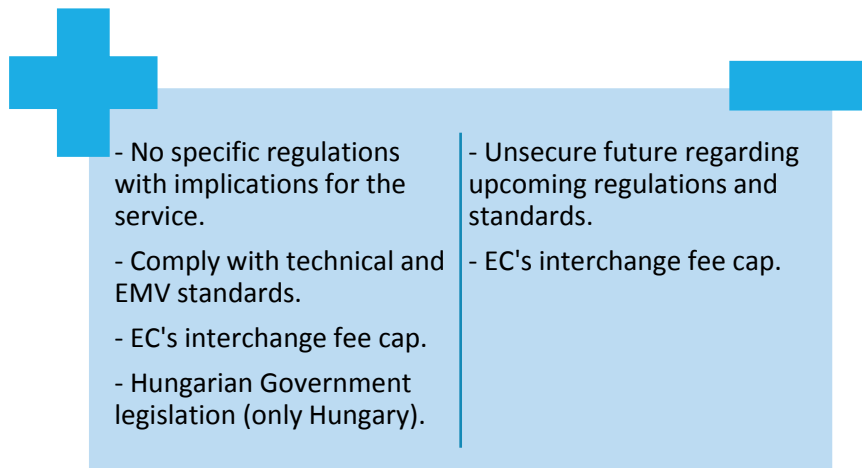
- No specific regulations with implications for the service.	- Unsecure future regarding upcoming regulations and standards.
- Comply with technical and EMV standards.	- EC's interchange fee cap.
- EC's interchange fee cap.	
- Hungarian Government legislation (only Hungary).	

FIGURE 45: STRENGTHS AND WEAKNESSES OF THE EUROPEAN REGULATIVE ENVIRONMENT

11 Answering RQ2

What NFC mobile payment initiatives have been carried out by Telenor in the three Telenor markets Norway, Hungary and Serbia, and what are the strengths and weaknesses of these markets/initiatives regarding mobile payment?

Of the three Telenor markets examined, a NFC mobile payment service is only initiated in two of them. Telenor Norway launched the mobile wallet Valyou together with DNB in November 2014, and Telenor Hungary has been involved in an initiative with the other Hungarian MNOs since 2011 and plans to launch their service during 2015. Telenor Serbia has acquired a bank and offers various financial services but has concluded that the Serbian market is not ready for an NFC mobile payment service at the moment.

Based on the key success factors identified in the theory section, the answer to RQ1, the interviews and additional discussions with Rankovic and Ubaghs, a framework for assessing NFC mobile payment services is developed. The framework consists of six pillars that influence the outcome of a NFC mobile payment initiative, infrastructure, partnerships and cooperation, implementation, technical solution, timing and competition and regulation. The three markets, including the two initiatives, are assessed by using this framework and the strengths and weaknesses associated with each pillar are presented.

Table 8 presents an overview of the strengths and weaknesses associated with the six pillars in Norway, Hungary and Serbia.

TABLE 8: OVERVIEW OF IDENTIFIED STRENGTHS AND WEAKNESSES

Country	Pillar #	Strengths	Weaknesses
Norway	1	- Mainly only SW update needed. - Payment cards dominate.	- Lack of contactless POS terminals. - Not iPhone compatible. - Consumers satisfied with current payment method.
	2	- Culture of cooperation. - Additional MNO and card scheme support in near future.	- Low involvement of MNOs and banks in the ecosystem. - No merchants in the ecosystem.
	3	- High perceived security.	- Require infrastructure investment. - Banks reluctant to SIM based solutions. - Less flexibility due to MNO-ownership.
	4	- Contactless POS terminals enhance visibility. - Banks to increase marketing efforts.	- Low visibility and awareness among consumers and merchants. - Few marketing channels. - Complex SIM-issuing process.
	5	- Thorough pre-launch process. - Few domestic competitors. - First to market.	- Only payment functionality included.
Hungary	1	- Contactless POS terminals by 2016. - High cash usage results in high customer value.	- Low smart phone penetration. - Consumers are comfortable using cash.
	2	- Strong MNO cooperation. - MNO cooperation experience. - High ecosystem involvement.	- Banks and MNOs have no collaboration experience. - Complex ecosystem.
	3	- High perceived security.	- Require infrastructure investment. - Banks reluctant to SIM based solutions. - Less flexibility due to MNO-involvement.
	4	- Focus on education and marketing.	
	5		- High cash usage.
	6	- Hungarian Government legislation.	
Serbia	1	- High cash usage results in high customer value. - Rollout of contactless payment cards.	- Low smart phone and contactless POS terminal penetration. - Consumers are comfortable using cash.
	2	- Bank owner.	- Bank and telecom industry very competitive.
	3	- Reduced risk – wait and see approach.	- Rapid technological development.
	4	NA	NA
	5	- Lack of infrastructure. - Competitive bank and telecom industry. - Expected global competition.	- Shrinking time window.
Common	1	- Growth of smart and NFC ready mobile devices.	
	3	- Increased global NFC publicity.	
	5	- Few domestic competitors.	- Increased global competition.
	6	- No current regulation. - Comply with technical and EMV standards. - EC's interchange cap.	- Unsecure future. - EC's interchange cap.

The overview illustrates that the markets and initiatives are different in many ways. However, some strengths and weaknesses are common for all three countries. This applies primarily to the pillar of regulation.

By examining the identified strengths and weaknesses at a high level, they all seem to impact the same issue, namely consumer adoption. After all, consumer adoption is what determines the success of an initiative, as the number of end users is critical for the revenue generation. Therefore, creating consumer value is extremely important to succeed. The strengths identified may therefore be seen as factors increasing this value, while the weaknesses can be seen as factors reducing or hindering this value. Figure 46 illustrates this relationship.

Identified strengths

Consumer value

Identified weaknesses
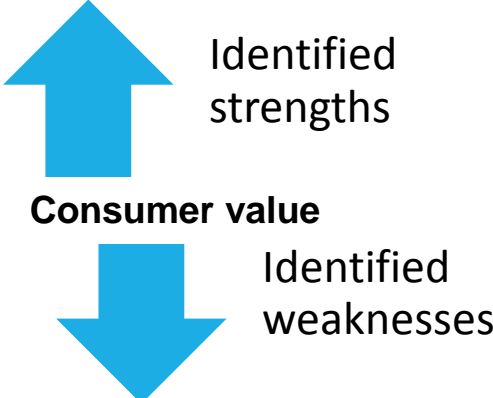
FIGURE 46: HIGH LEVEL PERSPECTIVE ON STRENGTHS AND WEAKNESSES

Part D: Recommendations for NFC Differentiation in Nordic/CEE Countries

This part aims to present recommendations related to Telenor's NFC mobile payment strategy in their markets in the Nordics and Central East Europe. The recommendations presented are based on the success factors from the theory section, the review of four selected mobile payment services and the strengths and weaknesses of the three cases from Norway, Hungary and Serbia assessed in the previous part.

As presented in the theory section, the success of the launch of a mobile payment service relies on both local economic and cultural factors (Carton and Dennehy, 2011). However, the recommendations presented in this chapter are supposed to be general recommendations to be followed by Telenor in all Nordics/CEE markets. Identified strengths and weaknesses across the markets and initiatives are set up against the theoretical success factors to propose recommendations with the objective of guiding Telenor's NFC strategy.

12 Recommendations

Six pillars influencing the outcome of a NFC initiative are identified, infrastructure, partnerships and cooperation, technical solution, implementation, timing and competition and regulation. The strengths and weaknesses identified for the six pillars in part C are presented in Table 9 and Table 11 respectively, and the stage(s) on which they are most relevant are indicated. The stages 1-5 refer to the diffusion stages by Ondrus et al. (2009) presented in the theory chapter. Stage 1 is to build an alliance between MNO and Financial institutions and so forth. Stage 5 represents the diffusion stage of dealing with regulatory issues although this work should be going on during all previous stages. The "pre" column indicates a stage prior to the diffusion stages when the market readiness is assessed. The strengths and weaknesses are coloured according to which pillar they belong, grey is infrastructure, red is partnerships and cooperation, light blue is technical solution, dark blue is implementation, purple is timing and competition and green is regulation.

TABLE 9: STRENGTHS ADDRESSED IN THE DIFFERENT STAGES

Country	Strengths	Pre	1	2	3	4	5
Norway	Mainly only SW update needed.	x		x			
	Payment cards dominate.	x					
	Culture of cooperation.		x	x			
	Additional MNO and card scheme support.			x	x		
	High perceived security.				x	x	
	Contactless POS terminals enhance visibility.	x					
	Banks to increase marketing efforts.				x		
	Thorough pre-launch process.	x		x			
	First to market.	x					
Hungary	Contactless POS terminals by 2016.	x		x	x		
	High cash usage results in high customer value.	x			x		
	Strong MNO cooperation.		x				
	MNO cooperation experience.	x	x				
	High ecosystem involvement.		x	x			
	High perceived security.					x	
	Focus on education and marketing.			x	x		
Serbia	High cash usage results in high customer value.	x			x		
	Rollout of contactless payment cards.	x					
	Bank owner.	x	x				
	Reduced risk – wait and see approach.	x					
	Lack of infrastructure.	x					
	Competitive bank and telecom industry.	x	x				
	Expected global competition.	x					
Common	Growth of smart and NFC ready devices.	x			x	x	
	Increased global NFC publicity.			x	x		
	Few domestic competitors.	x					
	No current regulation.	x	x		x		x
	Comply with technical and EMV standards.	x					x
	EC's interchange cap.	x	x	x	x	x	x

Table 10 provides a categorisation of the identified strengths according to the six stages and the six pillars. The categorisation illustrates that:

- Strengths related to pillar one is mainly relevant for the success of the pre-stage and stage 3.
- Strengths related to pillar two are mainly relevant for the success of stage 1 and 2.
- Strengths related to pillar three are mainly relevant for the success of stage 3 and 4.
- Strengths related to pillar four are mainly relevant for the success of the pre-stage and stage 2 and 3.
- Strengths related to pillar five are mainly relevant for the success of stage 1.
- Strengths related to pillar six are relevant for the success of all stages.

TABLE 10: CATEGORISATION OF STRENGTHS

	Pre-stage	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5	Total
Pillar 1	7	0	2	4	1	0	14
Pillar 2	2	5	3	1	0	0	11
Pillar 3	1	0	1	2	2	0	6
Pillar 4	2	0	2	2	0	0	6
Pillar 5	5	1	0	0	0	0	6
Pillar 6	3	2	1	2	1	3	12
Total	20	8	9	11	4	3	55

TABLE 11: WEAKNESSES ADDRESSED IN THE DIFFERENT STAGES

Country	Weaknesses	Pre	1	2	3	4	5
Norway	Lack of contactless POS terminals.	x		x			
	Not iPhone compatible.	x				x	
	Consumers satisfied with current payment method.				x		
	Low involvement of MNOs and banks in the ecosystem.		x	x			
	No merchants in the ecosystem.			x			
	Require infrastructure investment.	x					
	Banks reluctant to SIM based solutions.		x				
	Less flexibility due to MNO-ownership.					x	
	Low visibility and awareness among consumers and merchants.			x	x		
	Few marketing channels.				x		
	Complex SIM-issuing process.				x		
	Only payment functionality included.				x		
Hungary	Low smart phone penetration.	x					
	Consumers are comfortable using cash.				x		
	Banks and MNOs have no collaboration experience.		x				
	Complex ecosystem.			x		x	
	Require infrastructure investment.	x					
	Banks reluctant to SIM based solutions.		x				
	Less flexibility due to MNO-involvement.					x	
	High cash usage.				x		
Serbia	Low smart phone and contactless POS terminal penetration.	x		x			
	Consumers comfortable using cash.				x		
	Bank and telecom industry very competitive.		x				
	Rapid technological development.					x	
	Shrinking time window.	x					
Common	Unsecure future.	x	x	x	x	x	x
	EC's interchange cap.	x	x	x	x	x	x
	Increased global competition.	x	x	x	x	x	

Table 12 provides a categorisation of the identified weaknesses according to the six stages and the six pillars. The categorisation illustrates that:

- Weaknesses related to pillar one are mainly relevant for the success of the pre-stage and stage 3.
- Weaknesses related to pillar two are mainly relevant for the success of stage 1 and 2.
- Weaknesses related to pillar three are mainly relevant for the success of pre-stage and stage 1 and 4.
- Weaknesses related to pillar four are mainly relevant for the success of stage 3.
- Weaknesses related to pillar five are relevant for the success of all stages.
- Weaknesses related to pillar six are relevant for the success of all stages.

TABLE 12: CATEGORISATION OF WEAKNESSES

	Pre-stage	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5	Total
Pillar 1	4	0	2	3	1	0	10
Pillar 2	0	3	3	0	1	0	7
Pillar 3	2	2	0	0	3	0	7
Pillar 4	0	0	1	4	0	0	5
Pillar 5	2	1	1	2	1	0	7
Pillar 6	2	2	2	2	2	2	12
Total	10	8	9	11	8	2	48

It should be emphasised that the identified strengths and weaknesses related to the pre-stage is especially relevant for markets considering launching a NFC mobile payment service such as Serbia. In the pre-stage, the market readiness is assessed and if many weaknesses are identified, a mobile payment service is unlikely to be successful in this market even though there are strengths associated with the other stages.

12.1 Recommendations impacting pillar one: Infrastructure

The success factors presented in the theory associated with pillar one infrastructure are number of merchants involved; hence number of contactless POS terminals, NFC-enabled mobile devices, and the payment culture of the country in focus such as payment methods and contactless transactions. When the infrastructures of the three markets were assessed, strengths and weaknesses related to all of these success factors were identified.

Merchants

Both Norway and Serbia struggle with involving merchants, which lead to a low penetration of contactless POS terminals. Not only was the number of initial contactless POS terminal in Norway low, the growth during the first six months has not been satisfying. Hungary, on the other hand, has one of its strengths related to involved merchants much due to the legislation forced by the Government. Many sources, including SmartCardAlliance (2007), InnovisionResearch&Technology (2007b) and Zoller (2013) point out that a high number of involved merchants

improves an initiative's chances of success as it has a positive impact on the consumer adoption. This is also emphasised by the interviewees.

Education of merchants is necessary to increase their awareness and knowledge of NFC mobile payment services. As dialog and education of all merchants in a country is impossible to carry out, the leading merchants in terms of market share and innovativeness should be identified. Norgesgruppen is the Norwegian market leader in the grocery sector and tight communication with such firms should be prioritised. It is likely to believe that when leading merchants support NFC other merchants will follow.

To be able to increase merchants' incentives for supporting NFC services, mobile wallet providers should arrange workshops with identified key merchants to identify the barriers and benefits they associate with supporting NFC mobile payment. When insight into these barriers and benefits is obtained, the work of convincing the merchants is simplified. Additional efforts can be used to remove potential barriers and emphasise benefits in the communication towards the merchants to enhance their value proposition. It will be important to arrange separate workshops in different countries as cultural and local differences may lead to the existence of different barriers and benefits.

To increase the merchants' incentives for supporting NFC, loyalty programs and in-store experiences should be more emphasised by mobile wallet providers. As suggested by Ubaghs (2015) and NFC-Forum (2008), value-added services should be provided to increase customer value. Therefore, by prioritising including value-added services related to loyalty and in-store experiences, mobile wallet providers can potentially increase consumer and merchant value simultaneously. Merchant value is increased as loyalty programs entail higher customer loyalty, and in-store experience services can potentially increase the merchants' sales. The Hungarian initiative is an example of this as Super Shop, the biggest loyalty card provider, is one of the ecosystem actors. This might be one of the reasons for the high number of NFC supporting merchants in Hungary.

NFC enabled mobile devices
The lack of NFC enabled devices is a common issue for all NFC initiatives as it limits market reach. Serbia and Hungary do not only have a low number of NFC enabled devices but also a relatively low penetration of smart phones. Norway's biggest issue regarding mobile devices is related to the lack of NFC-support in iPhones, limiting the potential market reach severely as Apple holds a market share of about 30 %.

As the penetration of smart phones increases rapidly and NFC functionality now is a common function of new smart phone models from the big vendors, the issue of lacking NFC ready devices should not be a top priority. It is likely that the growth of these devices will continue without any specific actions from the mobile wallet providers. Although this issue should not be a top priority, it can be suggested that Telenor includes NFC functionality as part of their advertising for new NFC ready mobile devices. By doing this, you may achieve two things. Firstly, the consumer awareness of NFC is increased, and secondly, it can lead to higher customer

demand of NFC ready mobile devices, giving mobile vendors increased incentives for including NFC functionality in their new models.

Payment culture

Carton and Dennehy (2011) point out that the country-specific payment culture of consumers is influencing the success of the implementation of a mobile payment service. There is not necessarily an optimal payment culture for successfully implementing a mobile payment service. What is important is to adapt the implementation according to the payment culture of the market in focus. The approach of the mobile wallet service providers, especially the marketing efforts, should be adapted to meet the needs of the consumers.

This means that in a country such as Norway, with a majority of payment card payments, the customer value arises from other traits and functionalities than in countries like Serbia with a majority of cash payments. As discussed in section 10.1, less education of users is probably needed in countries with a high percentage of card payments because they are used to POS terminals. The only difference is that they pay by touching their phone to the terminal instead of swiping or inserting their payment card. The difference between physically handing the cashier some money and pay by your mobile phone is bigger, hence more thoroughly education must be emphasised for these users to feel comfortable using the new service.

However, as claimed by Ubaghs, education of users is crucial in all mobile payment service launches regardless of the payment culture. What is suggested here is that the approach to implementation and education take different forms depending on the existing habits of the users. Convenience and increased security can constitute the main value proposition towards cash extensive markets, whereas other value-adding functionalities should be emphasised in card extensive markets.

Furthermore, it is likely to believe that the payment culture of the country should be considered when deciding on the business model of a mobile payment service. An illustrative example is Google Wallet where the business model is proposed to be one of the main reasons for its failure. A business model based on data analytics to create personalised advertising makes many consumers sceptical. The interviewees from Serbia and Hungary, Rankovic and Berkes, mention that anonymity is among the reasons why cash is still widespread. This culture seems to be colliding with a service based on collecting as much data about the users as possible. Hence, the culture of the market must be analysed in detail to decide upon the most suitable business model for all actors.

Based on the above discussion, Table 13 presents the key recommendations associated with the first pillar, infrastructure.

Key recommendations: Infrastructure
- Educate merchants and communicate benefits and actual security.
- Arrange workshops for key merchants to identify barriers and benefits to be able to provide an adapted approach.
- Prioritise VAS related to loyalty programs and in-store experience to recruit merchants.
- Include NFC functionality as a part of the advertising for new NFC enabled mobile models to increase consumer awareness and vendors' incentives.
- Conduct education and marketing that is adapted to the payment culture of the country.
- The business model should take the payment culture of a market into account to ensure adaption to the consumers.

12.2 Recommendations impacting pillar two: Partnerships and Cooperation

Nearly all reviewed articles concerning success factors of mobile payment services mention cooperation as a key (Guaus et al., 2008, Tagawa, 2009, Ubaghs, 2014, SmartCardAlliance, 2007, GSMA, 2014). The interviewees confirm the importance of partnerships and cooperation when offering mobile payment services. Rankovic mentions the competitive bank and telecom sector in Serbia as one of the barriers of launching a successful NFC mobile payment service. At the same time, Gjersem emphasises that the culture of cooperation existing in the bank and telecom industry in Norway is one of the biggest strengths of the Norwegian initiative. However, Gjersem and Jensen propose lacking partnerships with more banks, merchants and MNOs among the explanations for low uptake of Valyou. Sapien (2015) claims that forming the appropriate strategic partnerships might be the difference between success and failure of an initiative. The assessment of the success of Apple Pay indicates that Apple's strong capability of creating valuable partnerships might be part of the explanation for their success (Heller, 2014).

It is one thing acknowledging the fact that well-functioning partnerships and cooperation are critical in mobile payment work, yet another thing is achieving it. Communication is key to ensure successful partnerships. Berkes pointed out that the beginning of the Hungarian initiative was all MNOs sitting down at a table to talk. Such communication is important to create the win-win relationships emphasised by NFC-Forum (2008) and SmartCardAlliance (2007). For the different actors to be happy, the business model of the service must adhere to this principle. The objective of developing a win-win business model is complicated by the fact that the ecosystem actors come from different industries and hence have different interests and objectives. Therefore, the process of developing a business model can be seen as one of the tasks influencing the success of cooperation the most. This view seems to be acknowledged by Rankovic who states that the problem of finding a suitable business model is among the main reasons for not launching a mobile payment service in Serbia.

Hence, it is highly recommended to conduct a meticulous process before deciding upon a business model to ensure that all actors are heard, and that the model

creating most value for all players is chosen. This usage of time is likely to be well spent, as it will be easier engaging all actors as they have self-interest in the service being successful. This recommendation is aimed at firms planning to offer a mobile payment service in the future but should also be noticed by providers of already launched services. The business model of a commercialised service should be continually evaluated to ensure that it offers a win-win situation for all actors. If a business model more beneficial than the current one is discovered, the business model should be considered changed to increase the service's likelihood of success. This recommendation can be reinforced by Gjersum's statement concerning the continually evaluation of Valyou's price structure to satisfy the involved ecosystem actors.

Furthermore, NFC-forum (2008) suggests that it is important to clearly specify the responsibilities of the different actors in the ecosystem. Munch-Ellingsen mentioned that this was one of the problems in the NFC City project. Telenor initially expected the service providers to develop their own services, but in the end, Telenor had to do all the work. This indicates weak communication and can result in involved actors being dissatisfied. Therefore, clearly specifying the involved ecosystem actors' responsibilities at an early stage is advantageous to avoid misunderstanding and negative surprises.

In addition to make sure the cooperation between the ecosystem actors are satisfying, it is also important to make sure the right actors are involved in the cooperation as emphasised in diffusion stage 1 and 2 proposed by Ondrus et al. (2009). Diffusion stage 1 includes building an alliance between MNO and financial institutions, while diffusion stage 2 includes involving the sellers and business intermediaries' side. One of the strengths identified of the Hungarian initiative is that all Hungarian MNOs are a part of it, contrary to the Norwegian initiative where there is currently only one MNO. Involving more MNOs in the ecosystem increases the market reach and publicity of the service and hence, most likely the chances of success. Rankovic presents the same view; services coming from a joint MNO initiative are most likely to succeed.

Therefore, what is recommended is for mobile payment service providers to strive for involving more MNOs in the initiative from the beginning. The method of doing this is once again about communication, in addition to education and a convincing value proposition. The first step is initiating a dialog. Then, the MNOs must be educated concerning the technology and security aspects. The MNOs' biggest concerns must be handled and a convincing value proposition presented. The development of this value proposition must be based on the findings of the dialog to ensure local adaption. The process of deciding on a win-win business model is also important for the involvement of more MNOs.

The recommendation of trying to involve more MNOs in an initiative is especially relevant for future services but existing services involving only one MNO could also benefit from this.

An overview of the key recommendations concerning pillar two, partnerships and cooperation, is included in Table 14.

Key recommendations: Partnerships and cooperation
- Spend time upfront and after the launch of the service to ensure a business model with a win-win situation for all parties.
- Prioritise communication and clearly specifying the responsibilities of the involved ecosystem actors at an early stage to avoid misunderstandings and surprises resulting in weakened partnerships.
- Strive to involve more MNOs in the initiative to increase market reach and publicity.

12.3 Recommendations impacting pillar three: Technical solution

InnovisionResearch&Technology (2007a) emphasises the importance of choosing the right technological solution for profitable businesses to be built around a technology. At the same time, Munch-Ellingsen remarks that history shows that it is not necessarily the best technological solution that wins. Furthermore, more of the interviewees believe that there will be a variation of different technological solutions in the mobile payment market in the near term. Ubaghs for instance, states that he does not see a consolidation to one dominating mobile proximity technology in the near term. However, what is clear is that the future of the mobile payment market is highly unsecure, especially regarding the technological solution. This uncertainty has been reinforced by the introduction of cloud-based solutions such as HCE.

As a way to mitigate this uncertainty, a flexible solution is recommended (GSMA, 2014, NFC-Forum, 2008, Ubaghs, 2015, Ubaghs, 2014). Flexibility can be offered through interoperability among different handsets, different enabling technologies, support of existing and future models, and accommodation of different service providers' strategies. By providing flexibility, the likelihood of success is increased through enhanced customer value and higher support among service providers. The offering of a flexible solution is resource demanding but might still be beneficial due to reduced risk and likelihood of failure.

It is evident from the interviews of the Telenor employees that a SIM based NFC solution is the preferred solution that is focused on. Zoller (2013) claims that MNOs are the service provider in the mobile proximity payment ecosystem that is most wedded to NFC and most unwilling to use alternatives as the SIM centric solution gives them control over service provisioning and revenues. However, the interviewees not employed by a MNO seem to place greater emphasis on the HCE solution. Rankovic from Telenor Banka thinks that the trend of SE embedded in the SIM is slowly fading and being replaced by HCE. Ubaghs points out the fact that many banks immediately terminated their ongoing discussions with MNOs regarding SIM based NFC mobile proximity payment services after Google announced their support for HCE. Gjersum admits that Valyou considers offering a HCE solution in the future if this is what the market wants, despite the fact that Telenor is one of their owners.

The unsecure future of the SIM based solution indicates that MNOs adopting this solution should tread carefully (Zoller, 2014d, Zoller, 2014a). It is therefore recommended that the MNOs are flexible concerning their price structure for SIM rental, as this is the main reason why service providers might prefer HCE to SIM SE. To keep the involved service providers satisfied, MNOs should endeavour flexibility in terms of service provisioning and commercial terms. As emphasised by more of the interviewees, the strength of the SIM based solution is that the perceived security of this solution is the highest. By emphasising this aspect and not being too aggressive with their rental fees, MNOs providing a SIM based solution can still succeed with their services, at least in the short and medium term.

In addition to treading carefully, it can prove beneficial for MNOs to assess other revenue generating opportunities associated with NFC mobile wallet services. By exploring alternatives not depending on a SIM based solution, MNOs can ensure a position in the mobile proximity payment market also in the long term. Examples of such revenue opportunities worth investigating are data analytics and personalised advertising.

Table 15 provides an overview of the key recommendations accumulated from the above discussion regarding technical solution.

TABLE 15: OVERVIEW OF KEY RECOMMENDATIONS REGARDING TECHNICAL SOLUTION

Key recommendations: Technical solution
- Seek to offer a flexible solution to mitigate the technology uncertainty in the mobile proximity payment market.
- MNOs offering SIM based services should be flexible in terms of price structure and commercial terms and emphasise the security aspect to compete with cloud based solutions.
- MNOs should seek other revenue opportunities in the mobile proximity payment market not associated with the SIM based solution to reduce risk and ensure a long term position in the market.

12.4 Recommendations impacting pillar four: Implementation

The chosen implementation of a mobile payment service is important to build consumer awareness and acceptance. Ubaghs uses the failed service of Orange UK to point to how low dedication and poor implementation may result in an unsuccessful service. The service was okay in itself but due to poor advertising, most consumers had no clue the service even existed. The same issue has been discussed in the assessment of the degree of success of Google Wallet and Apple Pay. Heller (2014) emphasises Apple's ability to create visibility and awareness of their products and services. They have talented marketing teams highly successful in creating buzz around new Apple offerings. Google Wallet, on the other hand, has struggled achieving consumer awareness. Although offering a mobile payment service many years before Apple, it seems like more of the consumers are aware Apple Pay than Google Wallet.

Concerning the investigated Telenor case units, one might point to the same issue in the Hungarian and Norwegian initiatives. One of the core tasks of the Hungarian Mobile Wallet Association is to create awareness of NFC mobile wallets and to

educate the market concerning such services. A big amount of the resources sponsored by the founding members is used to communication and marketing campaigns developed by external marketing companies. On the contrary, the awareness of Valyou is considered quite low in the Norwegian market. The banks are mainly responsible for promoting the service but the marketing efforts are limited in pending of inclusion of more MNOs and BankAxept. The main marketing channels used by Valyou is a web page and social media, this severely limits the market reach of the advertising.

Hence, it is recommended making education and marketing one of the main priorities to create consumer awareness. Marketing the value of the offered service to achieve consumer and merchant adoption is crucial. To be able to improve the awareness and adoption, the marketing must communicate adequate value for the consumers, as suggested in diffusion stage 3 by Ondrus et al. (2009). As previously suggested, this can include offering added value services in addition to mobile payment. Moreover, SmartCardAlliance (2007) emphasises requirements such as speed, convenience and security, and GSMA (2014) outlines ease-of-use, a view confirmed by SmartCardAlliance (2007) suggesting that mechanisms of a service must be easy to acquire, use and manage. Berkes also acknowledges the importance of oversimplified processes. He thinks that the customer is not willing to go the extra mile to use NFC services; hence, all potential barriers for using a service should be removed. One of these barriers could be to upload your payment cards to the mobile wallet. As previously mentioned, this is among the strengths of Apple Pay. The users of Apple Pay avoid the barrier of uploading their payment cards because most payment cards are already stored in iTunes.

Additionally to communicating adequate value to consumers, applying various marketing channels is also recommended. The marketing channels used by Valyou today, which are mainly web pages and social media, almost demand that the consumers must actively seek the information to find it. Hence, by using additional marketing channels like television, the visibility of the service can be improved. In addition, the marketing reaches more customer segments than the web-based marketing, which can be valuable for the consumer uptake.

The issuance of NFC ready SIM cards is another barrier of the SIM based mobile payment service. Gjersum confirms that this process limits the activations of Valyou. As a way to mitigate this issue, NFC ready SIM cards could be implemented as the standard among Telenor subscribers. Hence, Telenor could issue new NFC ready SIM cards to all their subscribers requesting a new SIM card in the same way as DNB customers received contactless and chip-based payment cards. It would be especially important automatically issuing NFC ready SIM cards to subscribers acquiring a NFC ready mobile device. By automatically issuing a NFC ready SIM card two goals are achieved. First, the barrier of ordering a new SIM card associated with activation of a mobile payment service is avoided. Secondly, an information note could be included with the new SIM card for advertising and education purposes to increase consumer awareness.

Table 16 presents the key recommendations discussed concerning the pillar of implementation.

TABLE 16: OVERVIEW OF KEY RECOMMENDATIONS REGARDING IMPLEMENTATION

Key recommendations: Implementation
- Prioritise marketing and education to increase awareness and adoption.
- Use more marketing channels to improve market reach and consumer uptake.
- Automatically issue NFC ready SIM cards when a new SIM card is requested to remove an adoption barrier and increase awareness.
- Ensure that subscribers acquiring a NFC ready device automatically receive a NFC ready SIM card.

12.5 Recommendations impacting pillar five: Timing and Competition

As emphasised by Sapien (2015), an initiative's success depends on the ability to catching the wave at the right time. However, the challenge lies in identifying what is the right time, as pointed out by Munch-Ellingsen. According to Ubaghs, the payment market is funny one because it is global but also local at the same time. This means that both global and local factors should be taken into account when identifying the right time to launch a mobile payment solution. SmartCardAlliance (2007) suggests that it is important to measure the market readiness before launching a service. Existing infrastructure is one of the aspects affecting the readiness of the market. Rankovic presents the lack of readiness of the Serbian market as one of the reasons for not launching a NFC mobile payment service. Specific factors he points at are low usage of payment cards, few contactless POS terminals and a lack of standards regarding POS terminals.

It is likely to believe that various factors of the market impact when a mobile payment service should be launched. Simultaneously, Ubaghs thinks that the window for a MNO to launch a mobile wallet is getting tight because of the entrance of high profile actors such as Apple, Google and Samsung. This dilemma is recognised from the assessment of the Serbian market. Many aspects of the Serbian market support the decision of not launching a service. On the other hand, if not launching a Serbian mobile payment service in the near future, the opportunity can be lost as global actors might dominate the market. Hence, Telenor runs the risk of missing out on a revenue generating opportunity.

To minimise this risk it is recommended that Telenor should develop a generic scheme for assessing a market's potential within mobile proximity payment. This form can be used as a decision tool by Telenor to simplify the decision whether to launch such a service. Using this tool increases the likelihood of landing on the best decision and potentially identifying the right timing. It should be emphasised that extensive work and usage of resources are needed to develop this tool in an accurate way. However, if succeeding in developing such a tool it can prove highly advantageous for Telenor's future NFC mobile payment strategy. The work of identifying factors to be included in the decision tool can find inspiration in the pre-interview scheme

included in the appendix. However, more investigation should be conducted to include all relevant factors and decide upon the appropriate metrics.

Competition is a factor that should be considered to be included as a part of the decision tool. Both national and global competition should be examined. Ubaghs and Jensen point to the fact that the introduction of powerful global actors is likely to be a threat for smaller country-based services. At the same time, it is evident that the launch of global mobile payment services like Apple Pay may increase the awareness of NFC services altogether, hence resulting in improved acceptance among the actors of the mobile payment ecosystem. Gjersum and Berkes share this view. They believe that the introduction of more NFC services results in higher focus on NFC, which positively influences their service.

What is important to remember when the local and global NFC mobile payment competition increases is to position your service in the market. Providing a service that offers something different or meeting other consumer needs than the competing services can be valuable. However, this point in time marks a distinction regarding mobile payment and differentiation. As long as there are relatively few services offered in each market, NFC mobile payment may be used by firms such as MNOs to differentiate themselves from competitors. However, as the competition increases and more services are available in the market, mobile payment may no longer be used as a differentiator itself. Then, differentiation between the various mobile payment services should be pursued instead. This aspect is touched upon by Gjersum who mentions that Valyou now try to find a position in the Norwegian market that complements Apple Pay.

Finding an appropriate way to position your service is not easy. Hence, mobile wallet providers should start thinking of a desirable positioning within the market today to be prepared for the future global competition.

The key recommendations presented regarding timing and competition are presented in Table 17.

TABLE 17: OVERVIEW OF KEY RECOMMENDATIONS REGARDING TIMING AND COMPETITION

Key recommendations: Timing and competition
- Develop a generic decision tool to be used within Telenor to decide whether a mobile proximity payment solution should be launched in a specific market.
- Search for an appropriate position of your service in the market to prepare for future global competition.

12.6 Recommendations impacting pillar six: Regulation

According to the diffusion stages framework by Ondrus et al. (2009), dealing with regulatory issues is important in the mobile payment market and should be dealt with during all the other diffusion stages. Jensen, Ubaghs, Berkes and Rankovic also discuss regulatory issues related to mobile payment services and they support the view that regulatory issues influence the mobile payment market.

Any direct global or European mobile payment regulations are not detected during this study. However, directives developed by the European Commission are likely to treat this topic in the near future as mobile payment services become more widespread and common. Hence, the future regulatory mobile payment environment is quite unsecure.

Although not directly concerning mobile payments, EC's directive concerning reduced interchange fees is likely to affect the mobile payment market as payment cards are still the primary method of funding most forms of mobile payments. Jensen emphasises that a reduction in interchange fees will reduce the potential revenues generated from payment card transactions. Ubaghs (2013a) thinks that the cap on the interchange fees is likely to result in a disappearance of the mobile payment model based on a cut of interchange revenue. Hence, this directive will have an impact on the potential business models of mobile payment and the consequences are recommended to be assessed by providers of potential mobile payment services.

Regarding local regulation, the legislation forced by the Hungarian Government regarding contactless POS terminals is the only local relevant regulation identified in the case markets. This legislation might be the main reason why the contactless POS terminal penetration is big in Hungary compared to the other markets investigated.

Due to the potential impact of future regulation on a mobile payment service, it is recommended to be proactive and pay great attention to the regulators to be prepared for future changes to the regulatory environment. Lobbying might be a smart move to influence future regulation to be beneficial for the interests of the firm.

Technological standardisation is a highly discussed topic in the mobile payment market. As a result of a complex ecosystem with actors from different industries holding different interests, agreeing on a common mobile payment standard has been impossible. Therefore, the market sees an existence of many competing standards. Many of the interviewees point out that this situation is difficult to deal with when developing a mobile payment service. Following common technological standards and EMV standards are strived for in both initiatives. GSMA (2014) acknowledges following industry standards and specifications in their report discussing emerging best practices for MNOs in digital commerce. Therefore, for both existing and emerging mobile payment services, industry standards should be followed to achieve consistency and interoperability that further increases the service's chances of success.

Furthermore, regarding standardisation, Ubaghs suggests keeping an eye on the development of the technical standards around tokenization. Apple Pay uses tokenization and he thinks that this technology will be more widespread in the future.

The key recommendations suggested regarding the sixth pillar regulation, are included in Table 18.

Key recommendations: Regulation
- Pay great attention to regulators to be proactive and prepared for changes to the regulatory environment.
- Conduct lobbying to influence regulators in a way beneficial for the firm.
- Follow industry standards to achieve consistency and interoperability.

13 Answering RQ3

What recommendations regarding NFC mobile payment should Telenor follow in the Nordic/CEE countries to succeed in using NFC mobile payment as a source for differentiation?

In part D, RQ3 is answered by utilising all previous parts of this study. Arguments are developed by pointing to theory, assessment of selected NFC services and the six interviews.

The assessment of the three units of analysis in Part C resulted in a list of identified strengths and weaknesses regarding each of the markets. The strengths and weaknesses were categorised according to the six pillars that are all affecting the outcome of a NFC mobile payment initiative. To bring further value into the discussion, the diffusion stages developed by Ondrus et al. (2009) were introduced, in addition to a pre-stage measuring the readiness of the market. Each of the strengths and weaknesses were examined to decide which stages were most affected by it. This categorisation process showed that all stages were in one way or another, related to one or more of the identified strengths and weaknesses. Hence, by suggesting recommendations associated with each of the six pillars it is likely to believe that all stages can be improved.

A number of recommendations were proposed regarding each pillar. The key recommendations are presented in Table 19 . The second column of the table includes the stages that the recommendations impact. From the information in the table, it is evident that by following the proposed recommendations, Telenor has the opportunity to improve all of the stages.

TABLE 19: OVERVIEW OF KEY RECOMMENDATIONS

Key recommendations	Implications for
Pillar 1: Infrastructure	
1. Educate merchants and communicate benefits and actual security. 2. Arrange workshops for key merchants to identify barriers and benefits to be able to provide an adapted approach. 3. Prioritise VAS related to loyalty programs and in-store experience to recruit merchants. 4. Include NFC functionality as a part of the advertising for new NFC enabled mobile models to increase consumer awareness and vendors' incentives. 5. Conduct education and marketing that is adapted to the payment culture of the country. 6. The business model should take the payment culture of a market into account to ensure adaption to the consumers.	Pre-stage Stage 2 Stage 3
Pillar 2: Partnerships and cooperation	
1. Spend time upfront and after the launch of the service to ensure a business model with a win-win situation for all parties. 2. Prioritise communication and clearly specifying the responsibilities of the involved ecosystem actors at an early stage to avoid misunderstandings and surprises resulting in weakened partnerships. 3. Strive to involve more MNOs in the initiative to increase market reach and publicity.	Stage 1 Stage 2
Pillar 3: Technical solution	
1. Seek to offer a flexible solution to mitigate the technology uncertainty in the mobile proximity payment market. 2. MNOs offering SIM based services should be flexible in terms of price structure and commercial terms and emphasise the security aspect to compete with cloud based solutions. 3. MNOs should seek other revenue opportunities in the mobile proximity payment market not associated with the SIM based solution to reduce risk and ensure a long term position in the market.	All stages
Pillar 4: Implementation	
1. Prioritise marketing and education to increase awareness and adoption. 2. Use more marketing channels to improve market reach and consumer uptake. 3. Automatically issue NFC ready SIM cards when a new SIM card is requested to remove an adoption barrier and increase awareness. 4. Ensure that subscribers acquiring a NFC ready device automatically receive a NFC ready SIM card.	Pre-stage Stage 2 Stage 3
Pillar 5: Timing and cooperation	
1. Develop a generic decision tool to be used within Telenor to decide whether a mobile proximity payment solution should be launched in a specific market. 2. Search for an appropriate position of your service in the market to prepare for future global competition.	Pre-stage Stage 3
Pillar 6: Regulation	
1. Pay great attention to regulators to be proactive and prepared for changes to the regulatory environment. 2. Conduct lobbying to influence regulators in a way beneficial for the firm. 3. Follow industry standards to achieve consistency and interoperability.	All stages

Using NFC mobile payment as a source of differentiation might be beneficial if following these recommendations. However, as previously mentioned Telenor should be aware of and prepare for the future competition from global actors. The introduction of more NFC mobile payment services results in a shift regarding the view on the differentiation strategy. With increased competition, simply offering a NFC mobile payment service is not enough to achieve differentiation. The service should optimally hold a unique position in the mind of the consumers. Hence, as NFC

mobile payment services become more widespread it is still possible to use NFC as part of a differentiation strategy. However, the implementation of the differentiation strategy should be changed to place more emphasis on what distinguishes Telenor's services from the competitors'.

Part E: Concluding Chapter

14 Conclusion

"Describe selected NFC mobile payment services offered worldwide and examine their level of success and success factors. Assess different Telenor markets within the Nordics and Central East Europe in terms of NFC mobile payment and identify the strengths and weaknesses of the investigated markets and initiatives. Propose recommendations to be followed by Telenor based on the identified strengths and weaknesses to guide their NFC strategy and use of NFC mobile payment as a source of differentiation."

This master thesis has explored selected NFC mobile payment initiatives and markets, and how Telenor can use NFC mobile payment as a strategy and source of differentiation to mitigate falling revenues. By utilising relevant literature and conducting six interviews with industry experts and representatives from Valyou, Telenor Norge, Telenor Serbia and Telenor Banka, a number of strengths and weaknesses are identified associated with NFC mobile payment in Norway, Hungary and Serbia. Recommendations are proposed, based on the identified strengths and weaknesses to guide Telenor in their NFC mobile payment strategy and increase their chances of launching successful mobile payment services.

Four selected launched NFC mobile payment services are described and evaluated. Two of the services are considered successful, one is considered a failure and one is recently launched and difficult to categorise according to its success. Key success factors presented in the theory section are applied to explain the different levels of success. Cooperation and partnerships, creating consumer value, the technical solution, available contactless POS terminals, flexibility and timing are among the factors considered to be influencing the level of success of the four selected services.

A framework is developed to assess the three Telenor markets and initiatives. Six pillars are identified to influence the outcome of a NFC mobile payment service, 1) infrastructure, 2) partnerships and cooperation, 3) technical solution, 4) implementation, 5) timing and competition and 6) regulation. The data collected in the interviews concerning the three markets are compared and analysed according to the six pillars resulting in a list of identified strengths and weaknesses.

The identified strengths and weaknesses are categorised according to their relevance for the stages consisting of a pre-stage and the diffusion stages suggested by Ondrus et al. (2009). The categorisation shows that all stages are affected by some of the strengths and weaknesses. Hence, for Telenor to improve their activity associated with each stage, several recommendations related to each of the six pillars are suggested. Although covering many aspects of mobile payment, most of the recommendations turn out to be related to the overall goal of creating consumer value to increase consumer adoption. Merchant adoption and available NFC ready POS terminals are among the factors strongly affecting the consumer value, hence recommendations increasing this availability are suggested.

Carried out right, NFC mobile payment can make out a potential differentiator for Telenor, as many of the identified differentiation sources are apparent. However, it should be noticed that such a service is not suitable for all markets. Telenor should follow the proposed recommendations to determine the appropriate markets for using NFC mobile payment as a differentiator and successfully implementing a service. Moreover, as mobile payment services are becoming more widespread, a shift in the differentiation strategy must be carried out to ensure the service still represents a differentiator despite increased competition.

15 Implications

15.1 Implications for Telenor and managers

As this study is written with the objective of guiding Telenor in their strategy regarding NFC services, its implications are first and foremost for Telenor employees in the Nordics and CEE. Telenor managers and strategists in their work of developing a strategy for NFC services can use the findings of this study. The study can be valuable both in developing a strategy for a new NFC service in one of the Telenor markets but also to update and enhance the current strategy of a launched service to increase its chances of success. Additionally, the study may be used by Telenor managers to educate their employees about NFC, its uses and success factors. By educating employees, they are better equipped to make the most appropriate decisions. Furthermore, the study can encourage cross-country dialog and cooperation between the different Telenor markets for experience, knowledge and information sharing.

15.2 Implications for theory

Moreover, implications for theory are apparent. The interview objects confirm many of the presented success factors in the theory section. The interviewees touch upon all of the theoretical success factors but most weight is placed upon cooperation, infrastructure, in terms of NFC ready devices and POS terminals, creating consumer value for customer adoption and timing and market readiness. Although none of the assessed initiatives has proven successful yet, the interview objects are persons with much experience and knowledge regarding the topic; hence, their confirmations strengthen the theory. In addition to strengthening existing theory, findings of the study may also supplement existing theory. The six pillars framework developed as a part of this research, may be a valuable tool to be used in future research of this topic. The six pillars framework can potentially have implications for more than mobile payment theory. The fact that the framework is developed in a general way may result in the framework being applicable to more technological initiatives than mobile payment. Hence, the six pillars framework can have implications for the assessment of various technological initiatives in the future.

15.3 Implications for policy makers

As regulation and standardisation issues make out an important part of this study, implications for policy makers exist. First and foremost, the study can give policy makers insight concerning the consequences of potential legislation, especially from the perspective of the MNOs. Such insight is valuable as it can result in more well

though decisions aiming to benefit most actors. The findings also treat the aspects concerning predictability regarding regulation. As the findings of this study illustrate, policy makers being open and transparent in their work can benefit the actors of the mobile payment ecosystem due to predictability. Government policy makers reading this study can gain a better overview of the current situation and use this to assess whether they should involve in the market by issuing legislation.

Finally, existing and potential actors of the NFC ecosystem such as service providers can improve their insight and knowledge regarding NFC mobile payment from a MNO's perspective. The result might be improved chances of success with mobile payment and NFC due to more qualified decisions.

16 Further Research

This study has presented NFC technology and proposed several recommendations for Telenor to follow based on an assessment of selected Telenor markets and NFC initiatives within the Nordics and Central East Europe. Throughout the study, several interesting topics are uncovered but due to time constraints and scope restrictions, they could not be followed up. This section presents some of the topics uncovered, which should be assessed and investigated further in subsequent research.

Among the most interesting topics treated briefly in this study are the factors influencing the merchant and consumer adoption. This is a topic already investigated to some extent. However, more detailed and thorough research is needed for mobile wallet providers to use the best approach to involve merchants and consumers. Zoller (2014j) emphasised the need for market segmentation. Therefore, research treating consumer adaption with focus on segmentation of the market is highly relevant. Investigating the adoption factors of different segments may help mobile wallet providers to choose the most appropriate marketing channels to reach the most profitable market segments and hence, receive more value for the invested resources. Performing an investigation of the consumers' value associated with different value-added services would be another suggestion for future research. This might help the service wallet providers to prioritise including those services of most value for the consumers, hence enhancing the consumer adoption.

Moreover, HCE and other proximity mobile payment technologies should be further investigated to assess the actual security and compare them with NFC. Such a comparison could be valuable for MNOs in their efforts to convince service providers supporting their SIM based solutions but also for service providers to gain insight in the actual pros and cons of NFC compared to other available technologies. This insight could be beneficial for both parties when deciding on their future mobile payment strategy.

Due to time constraints, the geographical scope of this research is limited to Telenor markets in the Nordics and CEE. It could be advantageous for Telenor to conduct further research including more countries to detect potentially markets also in Asia.

A more detailed examination regarding future regulation affecting mobile payment should be carried out. Regulation can be introduced at a global and local level, and

both levels should be looked into to be proactive and avoid surprises. In addition to just identifying potential future regulations, the consequences of these regulations should be explored as well.

Another interesting topic to be further examined is the transferability of the six pillars framework to initiatives involving other technological innovations. The six pillars framework is designed specifically in this study to analyse NFC initiatives based on presented theory and collected data. However, the generality of the pillars indicates that the framework might also be valuable for analysing other technology-based initiatives.

Finally, further research treating the same topic is recommended in the future to confirm the findings of this study. The mobile payment market evolves quickly and a future assessment may be valuable to consider whether the findings are still relevant or should be changed due to a changing environment. Such an assessment would also be beneficial in the sense of validating or rejecting the success factors proposed in this study.

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APPENDIX

Appendix A: Interview Guide

Topic	Questions
Personal	What is your name, background and current position?
Pre-interview scheme	Can you confirm or correct the information on the pre-issued fact sheet concerning the NFC initiatives? Can you comment on the payment method distribution?
Telenor NFC initiatives – General	Who initiated the mobile payment process? What is the background of the initiative? Who are the drivers of the initiative? Who are their counterforces, both inside Telenor and external? Can you briefly explain the initiative's process from idea to now? What are the biggest challenges from Telenor's point of view, both today and in the future? How would you characterize the existing and future competition of the NFC mobile payment initiative in your country?
Telenor NFC initiatives – Technology	How would you rank the NFC technology used in the initiative, compared to other mobile payment technologies such as BLE, QR code and HCE, according to the following factors: - *Ease of use.* This criterion refers to "the degree to which a person believes that using a particular system would be free of effort". - *Cost.* It regroups direct costs (e.g. cost of the technology, cost of implementation) and indirect costs (e.g. infrastructure operation and maintenance). - *Reliability.* The purchase process should be flawless as it involves a financial transaction. - *User/Market Acceptance.* This criterion represent the degree to which the user and the different stakeholders are already consenting to accept a technology for payments. - *Security.* Implicit security features (e.g. embedded encryption) and ease of securing the technology. - *Flexibility.* Degree to which the technology can be adapted in many different applications. - *Value proposition improvement.* Improvement in value a technology could bring to the customer. - *Maturity.* Development state of the technology. - *Speed.* Implicit speed of the technology for payments. - *Scalability.* Ability to grow. Usability in small and large environment.
Telenor NFC initiatives – Requirements	What are required for a NFC mobile payment initiative to be implemented in general? Are there any local requirements for NFC mobile payment implementation in your country?
Telenor NFC initiatives – Business Model	What is the status of the initiative's business model?
Telenor NFC initiatives – Ecosystem	What are the key actors necessary for a NFC-based mobile payment initiative to succeed? How is the ecosystem organised and financed? What is the most challenging part of being part of a complex ecosystem?
Telenor NFC initiatives – Strategies	Based on your current experience, would you recommend any changes to the initiative process carried out? Can you point out some key success metrics for a NFC-based mobile payment initiative? What strategies do you advice MNOs to follow in NFC mobile payment initiatives when in the different evolutionary stages of a business ecosystem (birth, expansion, leadership, self-renewal)?
Other	Are there any other important aspects you feel should be covered?

Appendix B: Pre-interview scheme

Environment

Macro factors	Country X
Population	
Mobile subscribers	
Penetration rate	
Smartphone penetration	
# POS terminals	
# NFC capable POS terminals	
Payment method distribution	
Banks	
Banking association	
MNOs	
Other NFC mobile wallet initiatives	
Regulation	

Initiative

Name		
Type	Pilot	Official launch
When		
Where		
Functionality		
Involved ecosystem actors		

Appendix B1: Pre-interview scheme Hungary

Environment

Macro factors	Hungary
Population	9.9 million
Mobile subscribers	11.5 million
Penetration rate	115 %
Smartphone penetration	36 %[15]
# POS terminals	Approx. 91 000[16] (2013)
# NFC capable POS terminals	Approx. 38 000[17] (November 2014)
Payment method distribution	Card payments: 34 %[18]
Banks	Approx. 40 OTP Bank: 25 % K&H Bank: 9 % Erste Postabank: 9 % MKB Bank: 8 % Many small banks: 49 %
Banking association	The Hungarian Banking Association (A Magyar Bankszövetség)
MNOs	T-mobile (Magyar Telekom): 46% Telenor: (30% Vodafone: 24%
Other NFC mobile wallet initiatives	Magyar Telecom launched MobilTárca in November 2014
Regulation	There are no particular institutions regulating service of m-payments in the CEE. Legislation by Hungarian Government forcing all POS terminals to be replaced by contactless POS terminals by 2016.

Initiative

Name	Hungarian Mobile Wallet Trial	?
Type	Pilot	Official launch
When	July 2013 - July 2014	During 2015
Where	Nationwide Hungary	Nationwide Hungary
Functionality	Payment, loyalty. February 2014: access sports facilities and public transport one city	Payment, loyalty
Involved ecosystem actors	• Magyar Telekom (MNO) • Vodafone Hungary (MNO) • Telenor Hungary (MNO) • Club Recreation Hungary (sport facilities) • InterTicket Hungary (ticketing) • SuperShop Hungary (loyalty scheme operator) • OTP Hungary (Bank) • MasterCard Hungary	

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[15] TELLER, S. 11th November 2014 2014. *Global smartphone penetration 2014*. Available from: https://ondeviceresearch.com/blog/global-smartphone-penetration-2014 [Accessed April 29th 2015].
[16] ECB. 2014c. *Statistical Data Warehouse - Quick View* [Online]. European Central Bank. Available: http://sdw.ecb.europa.eu/quickview.do?SERIES_KEY=169.PSS.A.HU.S102.I00.I200.NT.X0.20.Z0Z.Z [Accessed May 26th 2015].
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[18] ECB 2014a. Payment Statistics. European Central Bank.

Appendix B2: Pre-interview scheme Serbia

Environment

Macro factors	Serbia
Population	7.1 million
Mobile subscribers	9.2 million
Penetration rate	129 %
Smartphone penetration	36 %[4]
# POS terminals	Approx. 63.000[19] (2013)
# NFC capable POS terminals	1-3 %
Payment method distribution	Cash: Approx. 80 %[9]
Banks	Approx. 30[12] Banca Intesa (14.5 %) Komercijalna banka (10.8 %) Unicredit bank (7.8 %)
Banking association	Association of Serbian Banks
MNOs	3 mt:s: 53 % Telenor: 31 % Vip: 16 %
Other NFC mobile wallet initiatives	Pilot in May 2012 with Telekom Srbija and Banca Intesa
Regulation	There are no particular institutions regulating service of m-payments in the CEE region

Initiative to be

Name	**?**
Type	? (Pilot or commercial launch)
When	?
Where	Serbia
Functionality	?
Involved ecosystem actors	?

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[19] NATIONALBANKOFSERBIA 2013. Payment Card Market in Serbia. Kiev: National Payment Card Center.

Appendix B3: Pre-interview scheme Norway

Environment

Macro factors	Norway
Population	**5.2 million**
Mobile subscribers	5.3 million
Penetration rate	111 %
Smartphone penetration	80 %
# POS terminals	Approx. 140 000[20] (2012)
# NFC capable POS terminals	900
Payment method distribution	Cash payment 6 %[11] Card payment 94 %
Banks	Approx. 100[13] (2014) DNB: 45 % Nordea: 11 % Danske Bank: 5 %
Banking association	Finance Norway (Finans Norge)
MNOs	Telenor: 51 % TeliaSonera (NetCom & Tele2): 37 % Network Norway: 9 % Ventelo: 2 % TDC: 1 %
Other NFC mobile wallet initiatives	Eika mobile wallet (June 2015)
Regulation	?

Initiatives

	NFC City	Valyou
Name		
Type	**Pilot**	**Official launch**
When	2010-mid 2014	November 2014
Where	Tromsø and Oslo	Norway
Functionality	Payment, access, transport ticketing	Payment, more?
Involved ecosystem actors	• Telenor (MNO) • DNB (Bank) • Doorstep (JV of DNB and Telenor) • FARA (electronic transport ticketing system integrator) • National Institute for Consumer Research (SIFO - Statens Institutt for forbruksforskning) • Troms County Council (public transport) • University of Tromsø	• Telenor (MNO) • Djuice • DnB • Sparebank 1 • Visa Europe • Gemalto (TSM) • Toro (mobile wallet framework) • UL (safety) • Giesecke & Devrient (SIM and SmartTrust)

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[20] NB 2013. Årsrapport om betalingssystem. Noregs Bank.

Appendix C: Comparison table of selected mobile payment services

TABLE 20: COMPARISON OF THE FOUR SELECTED MOBILE PAYMENT SERVICES

Points of Comparison	Cep-T Cüzdan	MyWallet	Google Wallet	Apple Pay
Offered functionality	- Payment - Ticketing - Loyalty programs	- Payment - Coupons	- Payment - Loyalty cards - Coupons	- Payment (remote and proximity) - Loyalty cards, coupons, rewards, and tickets (Passbook)
Announced future offered services	- Access cards	- Membership cards - Event- and transit ticketing	- Store tickets - Transit passes - Other items usually found in a conventional wallet	
Business Model	- SIM-rental	- SIM-rental	- Advertising - Top up fee for debit card to wallet transactions	- Per-transaction fee
Initial contactless POS terminals	- 50.000 contactless POS terminals[21]	- 35.000 contactless POS terminals[22] - 1.000 in the city of Bonn	- 120.000 contactless POS terminals[23]	- 220.000 contactless POS terminals[24]
National NFC Competition	- Currently none - Expected: Vodafone	11 pilots and launches described by GSMA	Isis mobile wallet, Apple Pay, Starbucks, PayPass wallet	Isis mobile wallet, Google Wallet, Starbucks, PayPass wallet
Key ecosystem actors	- Turkcell (MNO) - Yapi Credi Bank MasterCard - Plastkart (card manufacturing company) - Akbank (bank)	- Deutsche Telekom (MNO) - Giesecke & Devrient (TSM) - MasterCard - Click - Buy International - Hit (supermarket) - Edeka (supermarket)	- Google - MasterCard - Citi - First Data - Sprint	- Apple
Available devices initially	All NFC-enabled phones	18	1	2
Preparation	- 2008: pilot with Garanti Bank - 2009: Pilot with Akbank	- MyWallet Payments Wallet pilot in 2013	- Trial started in May 2011	

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[21] GSMA 2012a. Turkcell Cep-T turns the phone in your pocket into your wallet. London.

[22] SAHOTA, D. 2014. *Deutsche Telekom launches mobile wallet* [Online]. Telecoms.com. Available: http://telecoms.com/257592/deutsche-telekom-launches-mobile-wallet/ [Accessed February 24th 2015].

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Appendix D: List of abbreviations

BLE: Bluetooth Low Energy

CEE: Central East Europe

EMV: Europay, MasterCard and Visa

GSMA: Global System for Mobile Communications Association

HCE: Host Card Emulation

HCI: Host Controller Interface

MNO: Mobile Network Operator

NFC: Near Field Communication

OTA: Over the Air

P2P: Peer-to-Peer

POS: Point of Sale

QR: Quick Response

RFID: Radio Frequency Identification

RFQ: Request for Quotation

SE: Secure Element

SIM: Subscriber Identity Module

TSM: Trusted Service Manager

UICC: Universal Integrated Circuit Card

VAS: Value Added Services