NTNU – Trondheim
Norwegian University of
Science and Technology

Analysis of the Norwegian NFC Mobile Payment Business Ecosystem

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Submission date: June 2014
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NTNU
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- uttak av masteroppgave

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Oppstartsdato	Innleveringsfrist
15. jan 2014	**11. jun 2014**
Oppgavens (foreløpige) tittel	
Analysis of the Norwegian NFC Mobile Payment Ecosystem	
Oppgavetekst/Problembeskrivelse Describe the construction of the current Norwegian NFC mobile payment ecosystem with respect to member and their roles, functions, relations, technology platforms and business models. Assess what key issues and challenges are most important to solve in order to achieve a sustainable ecosystem/business model that can successfully implement NFC based mobile payment in Norway. Discuss different future ecosystem directions and scenarios, and recommend potential strategic options for Telenor and TSM Nordic.	
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Merknader	
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Partene er gjort kjent med avtalens vilkår, samt kapitlene i studiehåndboken om generelle regler og aktuell studieplan for masterstudiet.

Trondheim,
09.05.2014
Sted og dato

Eskil G. Iversen
Student

Hovedveileder

Originalen lagres i NTNUs elektroniske arkiv. Kopi av avtalen sendes til instituttet og studenten.

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Studieprogram	Hovedprofil
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Hovedveileder ved institutt	Medveileder(e) ved institutt
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Merknader	
1 uke ekstra p.g.a påske.	

Side **1** av **2**

4. Underskrift

Student: Jeg erklærer herved at jeg har satt meg inn i gjeldende bestemmelser for mastergradsstudiet og at jeg oppfyller kravene for adgang til å påbegynne oppgaven, herunder eventuelle praksiskrav.

Partene er gjort kjent med avtalens vilkår, samt kapitlene i studiehåndboken om generelle regler og aktuell studieplan for masterstudiet.

Trondheim 09.05.14
Sted og dato

Student **Hovedveileder**

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Etternavn, fornavn	Fødselsdato
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3. Masteroppgave

Oppgavens (foreløpige) tittel
Analysis of the Norwegian NFC Mobile Payment Ecosystem

4. Bedømmelse

Kandidatene skal ha *individuell* bedømmelse
Kandidatene skal ha *felles* bedømmelse ☒

Trondheim, 09.05.2014
Sted og dato

Erlend G. Evensen
Erlend Glück Evensen

Hovedveileder

Joachim Kähler
Joachim Kähler

Originalen oppbevares på instituttet.

Side **1** av **1**

NTNU

Fastsatt av Rektor 20.01.2012

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Avtale mellom

Student: JOACHIM KÅHLER	født: 07.09.89
EILEND GLÜCK EVENSEN	06.04.86
Veileder ved NTNU: PER JOHNY NESSE	
Bedrift/ekstern virksomhet: TELENOR	

og

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om bruk og utnyttelse av resultater fra masteroppgave/prosjektoppgave.

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Prosjektoppgave	

(sett kryss)

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TELENOR

bedrift/ekstern virksomhet

NTNU 2012-01-20

26.02.14 – 11.06.14

startdato – sluttdato

Oppgavens tittel er:

ANALYSIS OF THE NORWEGIAN NFC MOBILE PAYMENT ECOSYSTEM

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Oppgaven skal være undergitt utsatt offentliggjøring i

ett år	
to år	
tre år	X

(sett kryss bak antall år hvis dette punktet er aktuelt)

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[1] Lov av 17. april 1970 om retten til oppfinnelser som er gjort av arbeidstakere http://www.lovdata.no/all/hl-19700417-021.html
[2] Veiledning til NTNUs standardavtale om masteroppgave/prosjektoppgave i samarbeid med bedrift http://www.ntnu.no/studier/standardavtaler

Selv om oppgaven er undergitt utsatt offentliggjøring, skal bedriften legge til rette for at studenten kan benytte hele eller deler av oppgaven i forbindelse med jobbsøknader samt videreføring i et doktorgradsarbeid.

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Trondheim 10/6-2014	Joachim Kähler	Eivind G. Brevik
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Analysis of the Norwegian NFC Mobile Payment Business Ecosystem

PROBLEM DESCRIPTION

Describe the construction of the current Norwegian NFC mobile payment business ecosystem with respect to its members and their roles, functions, relations, technology platforms and business models. Assess what key challenges are most important for TSM Nordic to solve in establishing a sustainable business ecosystem and model in order to implement NFC based mobile payment in Norway. Assess the future development of this ecosystem, and recommend strategic measures for TSM Nordic to meet the identified challenges.

PREFACE

This master thesis has been written during the spring of 2014 and finalizes a five-year Master of Science program with the Department of Industrial Economics and Technology Management at the Norwegian University of Science and Technology, NTNU. The thesis is a continuation of our pre-diploma report on business ecosystem theory, and is part of our academic specialization within the field of Strategy and International Business Development.

The main goals of the thesis are to explore the Norwegian NFC mobile payment business ecosystem and to identify challenges for the company TSM Nordic in successfully implementing an NFC based mobile payment service in Norway. Through the perspective of business ecosystem theory this study also aims to assess the future development of the ecosystem and to propose strategic options for TSM Nordic to meet the identified challenges. The thesis has an academic approach, but is also written to provide TSM Nordic employees with useful insights into their evolving business environment.

We would like to extend our special gratitude to all contributors who have given of their time and shared their knowledge with us in the interviews. We are truly grateful for their cooperation, and this study could not have been carried out without them. We would also like to thank our academic supervisor Per Jonny Nesse and his two colleagues at Telenor, Sigmund Akselsen and Arne Munch-Ellingsen, for their guidance throughout the course of writing this master thesis. Our gratitude also goes out to Anders Kofod-Petersen for taking the time to discuss when we needed concepts clarified. Finally, our friends and families deserve our appreciation for their continuous support and care during this period, and for feedback on several of our drafts.

EXECUTIVE SUMMARY

Near Field Communication (NFC) has for a long time been assumed to become the technology that would finally bring mobile payment services to consumers on a large scale. However, a broad adoption of such services still remains to be seen. In Norway, the most prominent bank and mobile network operator created the joint venture TSM Nordic with the purpose of releasing the mobile payment wallet application, Valyou.

This payment service solution requires the establishment of a new payment ecosystem, based on the existing payment and mobile network infrastructure. The inclusion of new actors, and changing the roles of the existing ones, have made this introduction process and the resulting ecosystem both complex and challenging. After many years of testing and development, Valyou will finally be released in 2014.

This master thesis describes this business environment and its involved actors from a business ecosystem perspective. Building on a series of interviews and reviews of relevant literature, the study assesses challenges for TSM Nordic in making this ecosystem sustainable and suggests how this development can be approached.

THE NORWEGIAN NFC MOBILE PAYMENT BUSINESS ECOSYSTEM

The analysis of the conceptual mobile payment business ecosystem identifies 13 roles needed in any NFC based mobile payment ecosystem. Furthermore, the Norwegian actors within each role are presented. As the value creation in the ecosystem is proportional to the number of consumers adopting and using the mobile payment service, the four roles with direct ties to the consumer were assessed to be key roles. These are:

1) *TSM,* 2) *bank,* 3) *mobile network operator* (MNO) and 4) *merchant*

The other involved roles are equally important for the ecosystem to be fully functional, and serve as enablers for the services.

CHALLENGES IN ESTABLISHING A SUSTAINABLE ECOSYSTEM

With the basis in the described ecosystem, this report assesses the challenges of enhancing its sustainability. The findings in the study indicate that the main issue in establishing a sustainable Norwegian mobile payment business ecosystem is the chicken-and-egg paradox relating to merchant recruitment and consumer adoption being paralyzed by each other's hesitance to join the ecosystem. Related to this circular key issue, other challenges are also identified, and this can be summarized as follows:

1) **Consumer adoption** poses a challenge because of:
   - An insufficient amount of merchants having activated the necessary infrastructure
   - Limited market reach caused by only partial participation among banks and MNOs in addition to handsets not supporting NFC technology
   - An unclear value proposition towards the consumer

2) **Recruitment of merchants** is challenging because of:
   - Insufficient demand among consumers to use the service
   - A weak value proposition and lack of monetary incentives to activate point-of-sale terminals to enable NFC payments
   - Expensive payment schemes needed for NFC payment transactions which reduce merchants' profit margins
   - Integration with existing loyalty programs not having been undertaken, making merchants unable to offer their established programs
   - Infrastructure investments needed to support NFC payment

THE ECOSYSTEM DEVELOPMENT AND STRATEGY FOR TSM NORDIC

The report includes a discussion of the ecosystem's possible development, and presents it as a set of evolutionary stages along with strategic recommendations for TSM Nordic to meet the identified challenges. Three evolutionary stages are discussed, and the Norwegian NFC mobile payment business ecosystem is found to currently be in its first stage of the evolution, namely the birth stage. From here, the ecosystem will either:

1) Evolve through the stages according to our assessment
2) Remain in its current stage if challenges are not resolved in a satisfactory manner, consequently making it unable to reach the next stage
3) Dissolve and cease to exist if implementation of the service fails, or if competing solutions gain a strong enough market position

In order to ensure the realization of scenario 1), and thereby enhance the sustainability of the ecosystem, the following key recommendations are presented:

- TSM Nordic should adopt a keystone strategy and aim to maximize the amount of ecosystem actors connected to the Valyou platform.
- Incentives for all actors to partake in the ecosystem should be continuously improved.
- Barriers against competing mobile payment solutions should be created.

SAMMENDRAG

Near Field Communication (NFC) har lenge vært antatt å være den teknologien som vil bringe mobile betalingsløsninger til markedet i stor skala. Imidlertid har en bred innføring av slike tjenester enda ikke funnet sted. I Norge har markedets største bank og mobilnettoperatør sammen opprettet selskapet TSM Nordic med det formål å innføre den mobile lommebokapplikasjonen Valyou.

Innføringen av denne betalingsløsningen krever etablering av et nytt betalingsøkosystem som baserer seg på eksisterende infrastruktur for betaling og mobile nettverk. Inntreden av nye aktører i økosystemet, samt endringer av de eksisterende aktørenes roller, har medført at denne introduksjonsprosessen og det resulterende økosystemet er blitt både kompleks og utfordrende. Etter mange års testing og utvikling vil dog Valyou-tjenesten bli lansert i 2014.

Denne masteroppgaven beskriver dette forretningsmiljøet og de involverte aktørene gjennom et forretningsøkosystem (business ecosystem) perspektiv. Basert på en rekke gjennomførte intervjuer samt en gjennomgang av relevant litteratur, gjør denne studien rede for utfordringer for TSM Nordic knyttet til å gjøre dette økosystemet bærekraftig, og anbefaler hvordan økosystemets utvikling best kan imøtekommes.

DET NORSKE FORRETNINGSØKOSYSTEMET FOR MOBILBETALING MED NFC

Analysen av et konseptuelt økosystem for mobile betalingsløsninger identifiserer 13 nødvendige roller i ethvert slikt økosystem. I tillegg blir de norske aktørene som innehar de ulike rollene presentert. Ettersom verdiskapningen i økosystemet er proporsjonal med antallet forbrukere som bruker tjenesten, anses de fire ulike rollene som har en direkte relasjon til forbrukeren å være nøkkelroller. Disse er:

1) *TSM* 2) *bank* 3) *mobilnettoperatør* (MNO) og 4) *kjøpmann*

De øvrige involverte aktørene er like viktige for at økosystemet skal kunne fungere og fungerer som muliggjørere for tjenestene.

UTFORDRINGER VED ETABLERINGEN AV ET BÆREKRAFTIG ØKOSYSTEM

Med basis i det beskrevne økosystemet gjør denne rapporten rede for utfordringer knyttet til å styrke dets bærekraftighet. Funnene i studiet indikerer at den største utfordringen i etableringen av et bærekraftig økosystem er et høna-eller-egget paradoks. Både rekruttering av kjøpmenn og utbredelse blant forbrukere lammes av begge parters tilbakeholdenhet. Andre utfordringer relatert til dette nøkkelproblemet som biter seg selv i halen, er også identifisert og kan oppsummeres som følger:

1) **Utbredelse blant forbrukere** er utfordrende på grunn av:
   - At en utilstrekkelig mengde kjøpmenn har aktivert den nødvendige infrastrukturen
   - Begrenset rekkevidde i markedet grunnet kun delvis deltakelse blant banker og MNO'er, i tillegg til mobiltelefoner som ikke støtter NFC-teknologi
   - Et utydelig verdiforslag mot forbrukeren

2) **Rekruttering av kjøpmenn** er utfordrende på grunn av:
   - Manglende etterspørsel blant forbrukere for å benytte tjenesten
   - Et svakt verdiforslag og manglende monetære insentiver for å aktivere betalingsterminaler til å støtte NFC-betalinger
   - Dyre betalingsystemer benyttet i NFC betalingstransaksjoner som reduserer kjøpmennenes profittmarginer
   - Integrering med eksisterende lojalitetsprogrammer har ikke blitt utført og gjør at kjøpmenn ikke kan tilby sine etablerte programmer
   - Investeringer i ny infrastruktur som støtter NFC-betalinger

ØKOSYSTEMETS UTVIKLING OG STRATEGI FOR TSM NORDIC

Rapporten inneholder en diskusjon rundt økosystemets mulige utvikling, og presenterer denne som et sett evolusjonære stadier sammen med strategiske anbefalinger for TSM Nordic for å imøtekomme de identifiserte utfordringene. Tre evolusjonære stadier er diskutert, og det nåværende økosystemet befinner seg i det første stadiet i evolusjonen, det såkalte fødestadiet. Herfra vil økosystemet enten:

1. Utvikle seg gjennom stadiene i henhold til vår vurdering
2. Forbli i det nåværende stadiet hvis utfordringer ikke imøtekommes på en tilfredsstillende måte, noe som vil gjøre det ute av stand til å nå det neste stadiet
3. Oppløses og opphøre å eksistere hvis implementering av tjenesten feiler eller hvis konkurrerende løsninger får en sterk nok posisjon i markedet

For å sikre realisering av scenario 1), og dermed styrke økosystemets bærekraftighet, presenteres følgende anbefalinger:

- TSM Nordic bør innføre en keystone-strategi og etterstrebe å maksimere antallet aktører i økosystemet knyttet til Valyou-platformen.
- Insentiver for aktørers deltakelse i økosystemet bør kontinuerlig forbedres.
- Barrierer mot konkurrerende løsninger bør etableres.

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1 INTRODUCTION

In the last decade there have been great changes within the payment service industries, both when it comes to shopping patterns, new sales channels and methods of payment. However, when it comes to the latter, the changes have not been as substantial as industry and technology experts predicted they would be, and many believe the greatest change remains to be seen. The trend and development of services being integrated into the mobile phone, together with the fact that it is becoming an increasingly important part of everyday life, is creating the belief that future payment services will be based on our handsets.

The most prominent solution in this respect is Near Field Communication (NFC) mobile payment. As a ready technology, it has for years been seen as the natural successor of payment cards. However, new ways of offering payment services have opened up for new actors, competing with established ones within the payment industry over a central position in the new ecosystem. This power struggle has for many years hindered the broad introduction of NFC services.

The creation of the company TSM Nordic is DNB and Telenor's (Norway's biggest bank and MNO) joint effort to introduce and commercialize an NFC-based mobile payment service. The aim is for TSM Nordic to become a neutral platform and intermediary, a trusted service manager (TSM), which includes all Norwegian banks and MNOs in a shared mobile phone application. However, achieving a sustainable ecosystem is not straightforward. There are still several challenges to overcome.

This study takes on an exploratory approach, aiming to uncover the main challenges remaining for TSM Nordic in successfully implementing a mobile payment service, and understanding the environment in which they have to operate. Investigating this from a business ecosystem perspective, we believe that this report can provide TSM Nordic with valuable insight into how and in what order to approach these challenges. The report may also be useful for any actor involved in the evolving ecosystem wishing to attain a clearer picture of the ecosystem he is a part of.

1.1 SCOPE OF RESEARCH AND RESEARCH QUESTIONS

Mobile commerce has seen a comprehensive development and growth in the last years, and an increasing number of users are using their handsets for financial services and to pay for goods and services. The evolution so far has been most prominent within online payment and mobile banking, but NFC also enables the handset as a proximity solution for payment at physical user places and merchants. Alongside a focus on the Norwegian market in specific, this is the general area of research in this master thesis, resulting in the Norwegian NFC mobile payment business ecosystem (NNFCMPBE).

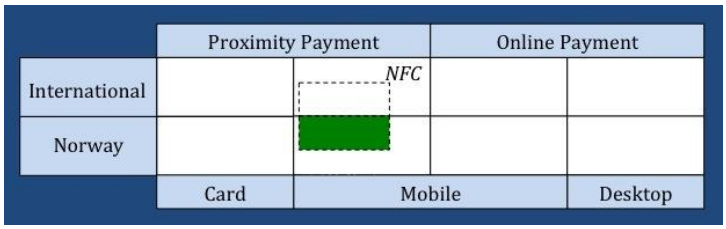


Figure 1: Scope of research

The choice of TSM Nordic as the case company

TSM Nordic was chosen as the case company due to the current situation of it being the leading mobile payment initiative in the Norwegian market. To further determine the appropriate scope and to answer our problem definition most efficiently, we also formulated three research questions which will be presented below.

The perspective taken in this study is TSM Nordic as an actor offering a mobile payment service to the consumer, by providing a handset platform application, or wallet application, through which third party service providers, e.g. banks, can offer their services and emulated payment cards to the market. For a more thorough description of the actual service, Valyou, see Appendix A.2.

The key aspect of focus is payment services based on NFC technology, but the successful implementation of such a service and the sustainability of the ecosystem cannot be satisfactory analyzed by isolating one technology, or mobile payment service alone. Therefore, other technologies and services are investigated in order to gain a more holistic understanding of what factors impact TSM Nordic's success the most.

Similar to our pre-diploma project, the work with this master thesis has been conducted in cooperation with Telenor, and the selection of a case relevant to them followed naturally. Since the majority of Telenor's activities relating to NFC are separated into the joint venture with DNB, TSM Nordic was the logical choice as a case company. This paper will assess TSM Nordic as an independent company, focusing only on the commercial ties to Telenor and DNB, and not their interest as owners. As this was decided upon as the final scope, some

minor alterations to the initial problem description were made, which is described in Appendix A.3.

The background for our theoretical foundation is our preliminary pre-diploma work, which consisted of a literature review of business ecosystem theory, and how the concept can be used in business strategy. Business ecosystem theory provides a framework to understand the main implications for complex and structured business networks, and the interests of different stakeholders, making it very appropriate when aiming to understand the challenges in commercializing NFC mobile payment services on the Norwegian market.

Three research questions to guide our research

Based on the context of this research and the scope explained above, we developed three research questions to guide us in finding satisfactory and relevant answers to our problem description:

RQ1: What does the Norwegian NFC mobile payment business ecosystem look like today?

RQ2: What are the key challenges for TSM Nordic to solve in establishing a sustainable business ecosystem and model in order to successfully implement NFC-based mobile payment in Norway?

RQ3: How will the ecosystem develop, and how can TSM Nordic meet the identified challenges?

Research question 1 focuses on understanding and describing the current environment, and is meant as a starting point for answering the problem statement. When the structure is understood, we can move on to assessing research question 2 and identify the current challenges in the ecosystem. Providing clarity in potential challenges is seen as a prerequisite for being able to suggest future actions for TSM Nordic, making them the most able to create a sustainable ecosystem, and thus answering research question 3.

Required insights needed to answer research questions

In order to have a thorough discussion, it is necessary to start by understanding the NFC technology and terminology. Secondly, insight regarding the Norwegian NFC mobile payment business ecosystem and TSM Nordic's intended business model is seen as essential. Lastly, factors influencing the development of this ecosystem and interests of the different actors involved are important to address. In order to answer our research questions, four required insights are identified and formulated:

1. To understand the ***technology*** enabling NFC mobile payment
2. To understand the ***structure*** of and necessary ***roles*** in an NFC mobile payment business ecosystem.
3. To identify the actual ***members*** of the Norwegian NFC mobile payment business ecosystem and their relations.
4. To identify ***factors*** influencing the development of the Norwegian NFC mobile payment business ecosystem.

The structure is summarized in Figure 2, and the chapters addressing these insights and their related questions are further explained in the following section.

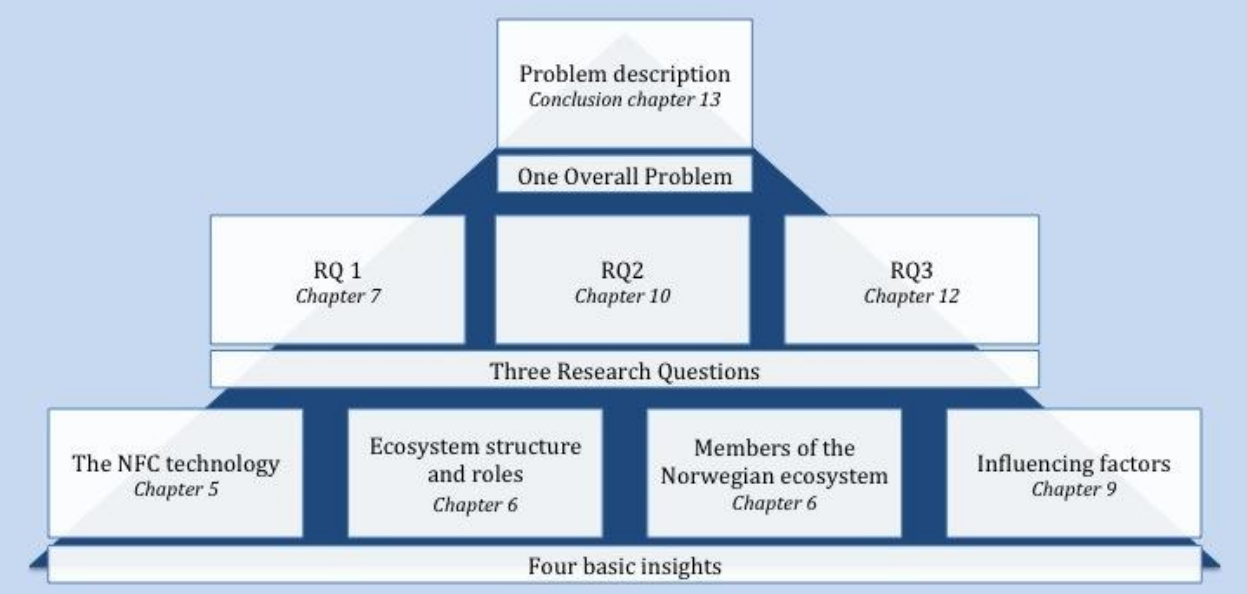


Figure 2: Structure of the report

1.2 GUIDE TO THE READER

The structure of this report is divided into five parts, as shown in Figure 3.

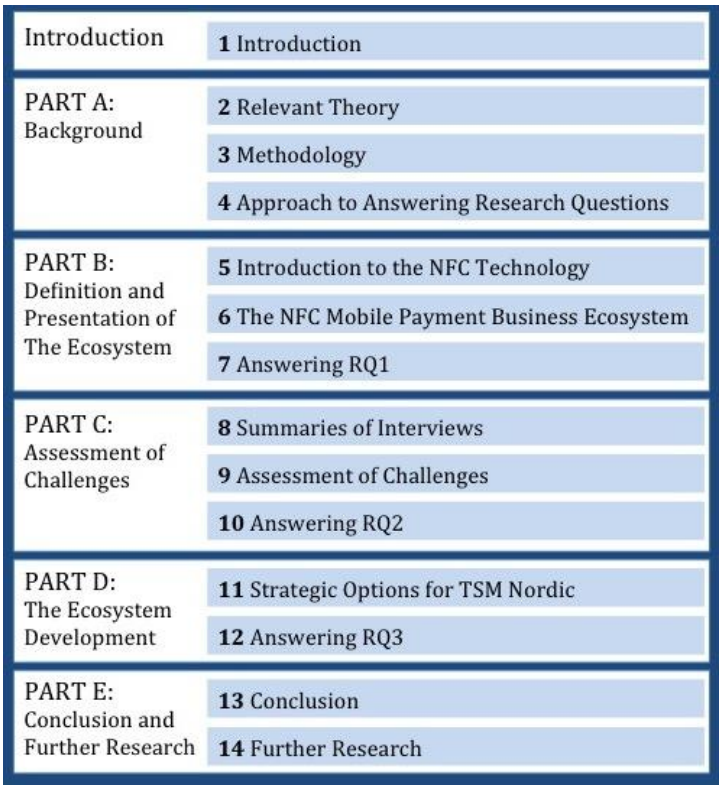


Figure 3: Structure of the report

The first part of the paper introduces the relevant theory and presents the research methodology used in this master thesis as a foundation for the assessment done in the subsequent parts. This part is particularly relevant for other academics, but can be reviewed by all readers to obtain a better understanding of how we have conducted our work. Chapter 4 explains how the theory and methodology will be used in answering the research questions.

Part B aims to describe the current state of the NNFCMPBE and thereby answer the first of our research questions. The information is tightly connected to the first three required insights described above. Chapter 5 explains the basics of NFC technology and functionality. Following this, a conceptual presentation of an NFC-based mobile payment ecosystem is done Chapter 6, which goes on to explain the current NNFCMPBE with the current actors operating within it and their relations. Chapter 7 sums up and answers RQ1.

Part C seeks to answer RQ2. Chapter 8 presents a synthesis of the conducted interviews, which our findings to a large degree are based upon. Chapter 9 includes our assessment of the ecosystem to identify challenges to answer RQ2, which is concluded in Chapter 10.

Part D has the objective to answer to RQ3. Based on a framework from business ecosystem literature, Chapter 11 discusses the phases of the future evolution of the NNFCMPBE and TSM Nordic's strategic options within each of these. Chapter 12 presents a summary of this discussion and answers RQ3.

The final part of the report concludes our problem statement, and proposes areas of future research.

In the appendixes, we have enclosed a list of abbreviations used in the report (A.1), a quick introduction to TSM Nordic's payment service, Valyou, and its intended use (A.2), an explanation of the changes done to our initial problem definition (A.3) and the interview template used in our conducted interviews (A.4).

1.3 LIMITATIONS OF THE REPORT

The main limitation of this report is our own possible subjectivity, affecting the interpretation, assessment and presentation of the empirical data. We have mitigated this through having cross-examined each other's work, cross-referencing the interview findings and utilization of secondary data like academic literature and practitioner reports. In addition, all interview summaries went through a verification process by the respective interviewee. Lastly, the discussions have actively been based on accepted frameworks and literature to an as large degree as possible.

These measures may not have eliminated all subjectivity. However, the presentation of facts and the following argumentation has been made as explicit and transparent as we have seen practically possible. Given that the presented findings are in no way definite, and the main focus of the report has been to generate insights and suggestions for further research, we believe the report contributes to the exploratory research conducted on NFC mobile payment.

A further discussion of the report's methodology and its limitations is included in Chapter 3.

Part A
Background

This part will present the theory,
frameworks and methodology
utilized in the rest of the report

Chapter 2 | Literature Review
Chapter 3 | Methodology
Chapter 4 | Approach to Answering Research Questions

2 RELEVANT THEORY

This chapter aims to introduce the theoretical concepts and perspectives that have been used as a foundation for the research and subsequent analysis in this master thesis. First, a brief explanation of the choice of theory is provided, followed by a presentation of the identified theory, with a focus on the concepts and terminology used in this report. Before each theory we briefly discuss the relevance to our case.

In addition to the fundamental managerial literature utilized, research literature related to the specific topic of mobile payment services has also been scrutinized. In these papers, several frameworks to analyze such services and their environment are presented, and we have chosen to adapt one proposed framework to assist our research. We will also present this framework in this section, and explain the alterations we have made to make it even more appropriate for our research perspective.

2.1 DECIDING ON RELEVANT LITERATURE

As this master thesis is intended to be a continuation of the work conducted in our pre-diploma work, which was a comprehensive literature review of business ecosystem literature, the use of this perspective followed naturally. Together with our supervisor, the case has been chosen, in part, to fit this perspective and for it to provide value within the selected field of research.

Other relevant theories to further complement the chosen primary perspective have been sought through different sources. A list of potential theoretical approaches was made, and the final topics were decided upon in collaboration with our supervisor and two internal Telenor employees with extensive practical and theoretical experience within NFC mobile payment.

2.2 BUSINESS ECOSYSTEM

Relevance

Today we see an increasingly competitive and global business environment that has pushed organizations toward a variety of more flexible structures and networks (Miles and Snow, 2002) leading the focus of competitive advantage to shift from a single enterprise operation to a more holistic view of the environment.

As we will see, this is also the case for NFC mobile payment, where TSM Nordic is dependent on creating value for, and joining forces with several other actors across many different

industries, creating a complex network. Marco Iansiti (2005) argues that smart companies these days rely heavily on such networks, and that they look increasingly like a biological ecosystem, in which companies succeed and fail as a whole.

Business ecosystem theory provides a framework to understand the main implications about complex and structured networks and covers the collective interests of different stakeholders with the aim of deploying and commercializing NFC mobile payment services in the Norwegian market.

Another central aspect of the business ecosystem theory is the different roles companies take, and the keystone role specifically. As we will show, analyzing TSM Nordic from a keystone actor perspective is both relevant and valuable. Therefore, our aim in the next sections is to define and explain some of the most relevant terms and concepts used within the business ecosystem literature. This will equip the reader with a greater understanding of the terminology used in later chapters.

Definition of a Business Ecosystem

Introducing the concept of business ecosystems in 1993, Moore was the pioneer within explaining complex business relationships with the analogy of biological ecosystems. In several articles and his book "The Death of Competition: Leadership and Strategy in the Age

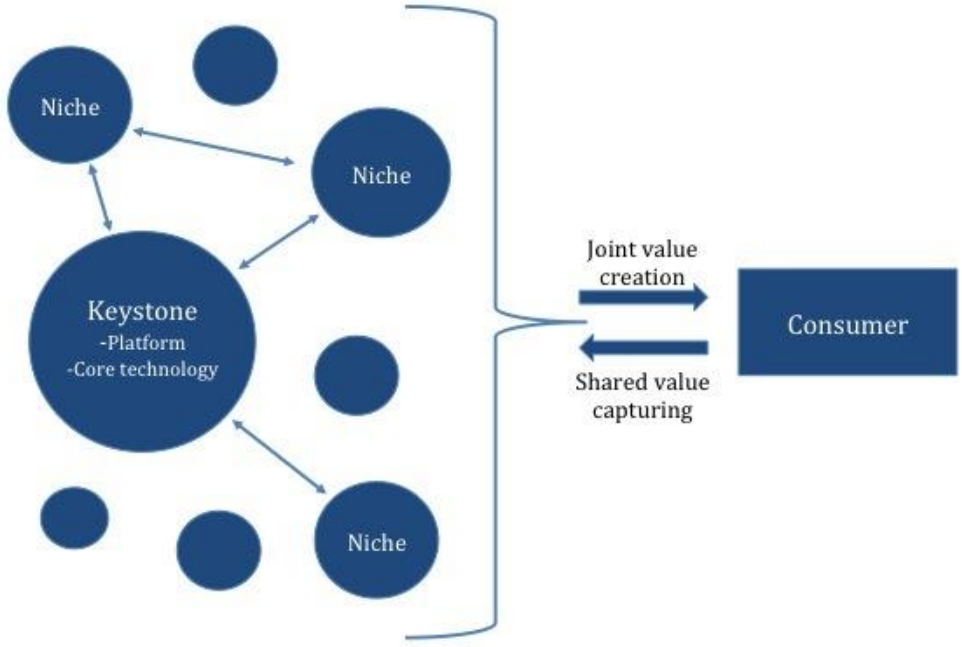


Figure 4: Value creation and capturing in business ecosystems

of Business Ecosystems" (1996), Moore argues that modern business has become so complex, that a new framework is needed to understand it.

A business ecosystem describes the network of firms, which collectively produce a holistic, integrated technological system that creates value for end users and consumers (Ågerfalk and Fitzgerald, 2008, Bahrami and Evans, 1996, Basole, 2009, Lusch, 2011, Teece, 2007) . The organizations within this system shares a common customer focus, system vision and enabling technologies, and "co-evolve capabilities around a new innovation" by working both cooperatively and competitively in the creation of products and services (Moore, 1993). A typical characteristic of a business ecosystem, especially in high-tech industries, is its evolvement around a common technological platform integrating and connecting the ecosystem members to each other (Iansiti and Levien, 2004). From here on out in the report, business ecosystem and ecosystem will be used interchangeably. Figure 4 visualizes the joint value creation and shared capturing, in a business ecosystem (Do and Hallingby, 2013).

Business ecosystems comprise complementors and system integrators, but also distributors, advertisers, finance providers, universities and research institutions, regulatory authorities and standard-setting bodies (Adner and Kapoor, 2010, Iyer and Davenport, 2008, Li, 2009, Meyer et al., 2005, Pierce, 2009, Whitley and Darking, 2006, Zacharakis et al., 2003) Competitors that share either product or service attributes, business processes, organizational arrangements or suppliers are also seen as part of a company's business ecosystem. It is also important to note that in the framework of business ecosystem, the ecosystem is not isolated within one industry, but may cross over different ones (Makinen and Dedehayir, 2012).

Members and Roles

Keystone

Actors in a business ecosystem are generally seen to take one of three roles. Arguably the most significant member of an ecosystem is the keystone (Iansiti and Levien, 2004). The keystone may also be referred to as platform leader (Gawer and Cusumano, 2013) or ecosystem leader (Moore, 1993), and can be identified by being the node with the highest number of connections to other actors in the ecosystem. Its role is to regulate the overall function of the ecosystem and improve its health and performance (Iansiti and Levien, 2004). As a consequence, its actions influence the success of all other members as well as its own (Makinen and Dedehayir, 2012).

Even though keystones exert substantial power within a given ecosystem and command a greater share of the overall profits (Moore, 1993), they represent only a small population of organizations in that ecosystem (Iansiti and Levien, 2004). As the keystone's platform governance strategy influences the evolution of the entire ecosystem, the central theme is to what degree decision-making and control (or coordination) the platform leaders should relinquish to other members of the same ecosystem (Tiwana et al., 2010)

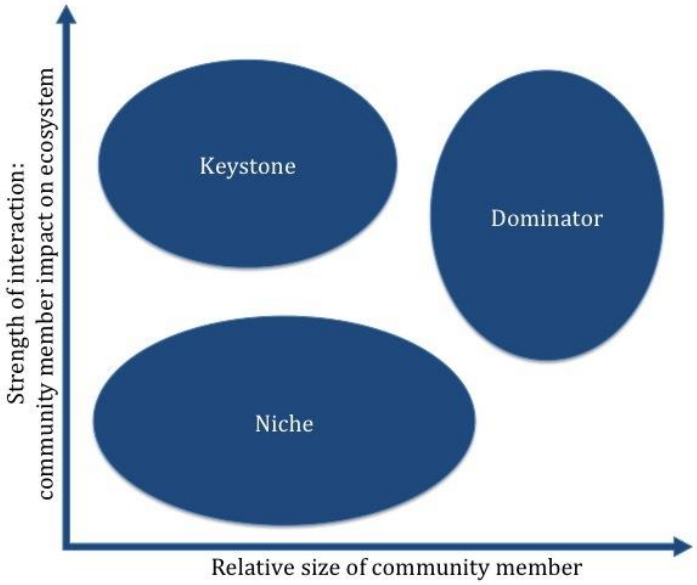


Figure 5: Characteristics of ecosystem roles

A successful keystone aims to provide a platform, which other members of the ecosystem can utilize in developing their own offerings (Iansiti and Levien, 2004). As an extension of this, another important component of the keystone strategy is the creation of value, and in turn, the sharing of the created value with other members in the ecosystem. By both creating and sharing value, the keystone is able to subscribe and retain other firms to the ecosystem. This is vital for continued ecosystem development (Moore, 1993). Another important objective of keystones is to provide a stable and predictable operation within the ecosystem (Iansiti and Levien, 2004). In summary, the responsibility of the keystone, or ecosystem leader, is according to Moore (1993) and Iansiti and Levien (2004) to ensure a sustainable ecosystem by:

- Regulating the overall function of and provide a stable and predictable operation within the ecosystem.
- Ensuring ecosystem productivity to provide revenue for all involved ecosystem members.
- Enhancing ecosystem robustness to protect the ecosystem from competing and potentially disruptive solutions.
- Encourage niche creation, by stimulating third party service providers to offer services through the common platform.
- Sharing the joint value creation to subscribe and retain other actors to the ecosystem.

Niche player

A keystone is supported by niche players, who aim to develop specialized capabilities that differentiate them from other firms in the network. When allowed to thrive, niche players represent the bulk of the ecosystem and are responsible for most of the value creation and innovation (Iansiti and Levien, 2004). The role of niche players in the ecosystem often makes them "complementors" (i.e. complementary organizations) who help the platform leader expand the realms of its application (Gawer and Cusumano, 2013). By leveraging complementary resources and the keystone platform, the niche player can focus fully on enhancing their narrow domain of expertise.

Dominators

Keystones exercise their power over an ecosystem in an indirect manner. Dominators on the other hand, aim to exploit a critical position to either take over the network, or more insidiously, drain value from it. The opportunity to develop a well-functioning ecosystem diminishes if the dominator is able to control a significant portion of the firm network. This can be done through vertical and horizontal integration, which is known as a physical dominator. Then, there is the value dominator, or "landlord", who has little direct control over its ecosystem and creating little, if any, value. But by sucking most of the value created by others, there is too little left to sustain the ecosystem, which will then collapse, bringing the dominator down with it (Iansiti and Levien, 2004).

The Health of a Business Ecosystem

The health of a business ecosystem lies in its ability to continually create opportunities for those who depend upon it. There are three critical measures of health (Iansiti and Levien, 2004):

Productivity

A business ecosystem's productivity is measured by how effective it converts technology and other raw materials of innovation into lower costs and new products.

Robustness

Robustness is the ability to survive disruptions and unforeseen changes. The greater a buffer an ecosystem has against external shocks, the more robust it is, thereby increasing its predictability (Iansiti and Levien, 2004).

Niche creation

From the ecological literature, we know the importance of an ecosystem exhibiting variety. In the business ecosystem setting this means its ability to create new, valuable functions and meaningful diversity that create real value (Iansiti and Levien, 2004).

Business Ecosystem Evolutionary Stages

A business ecosystem is as a dynamic system, constantly evolving with the business surroundings. Moore (1993) argues that every business ecosystem develops in four distinct stages: Birth, expansion, leadership and self-renewal – or, if not the last stage, death. The stages may blur together, with managerial challenges of one stage cropping up in another. However, the duality that results from both cooperation and competition between actors in a network remains from stage to stage (Moore, 1993).

Stage 1: Birth

During the first stage, the focus of business needs to be on defining the value of a proposed new product or service, and the best form of delivering it. The winner of Stage 1 is often the entrepreneur who best defines and implements this value proposition.

From a keystone's perspective, cooperation is very important at this stage as partnerships help delivering a full package of services to the consumer. Attracting important follower companies is also important to prevent them from potentially spending their resources to support a competing actor or ecosystem.

In this first stage, Moore claims that established companies are often better off waiting to see how the new market sorts itself out. "The iterative process of trying out innovative ideas and discovering which solutions are attractive to consumers is hard to accomplish in a traditional corporate culture". During Stage 1, an entrepreneur is much better fitted for this diverse experimentation, through which the market can ultimately adopt the most suitable solution. Established companies can subsequently endorse this success, and enter in the expansion stage of the life cycle by appropriating the developmental work of others" (Moore, 1993).

Stage 2: Expansion

In the second stage, business ecosystems expand their territories often resulting in battles over market shares with rival ecosystems. According to Moore (1993) there are two conditions that are necessary for Stage 2 expansion: "(1) a business concept that a large number of customers will value, and (2) the potential to scale up the concept to reach this broad market." This is the stage where large established companies can enter and contribute with large-scale production and sales, including marketing and distribution, marginalizing smaller actors in the process.

Generally, Stage 2 focuses on substantial expansion to undermine competition and ensure a broad market position. Stimulating the market demand is one of the top priorities for management during this stage, without exceeding your capability to meet it. A Keystone also needs to prepare for governance and leadership into the coming stage of the life cycle. This includes preserving important relationships and control over both consumers and core centers of innovation and value creation.

Table 1: The evolutionary stages of a business ecosystem

Stages	Cooperative challenges	Competitive challenges
Birth	Work with customers and suppliers to define a new value proposition around a seed innovation.	Protect your ideas from others who might be working toward defining similar offers. Tie up critical lead customers, key suppliers and important channels.
Expansion	Bring the new offer to a large market by working with suppliers and partners to scale up supply and to achieve maximum market coverage.	Defeat alternative implementations of similar ideas. Ensure that your approach is the market standard in its class through dominating key market segments.
Leadership	Provide a compelling vision for the future that encourages suppliers and customers to work together to continue improving the complete offer.	Maintain strong bargaining power in relation to other players in the ecosystem, including key customers and valued suppliers.
Self-renewal	Work with innovators to bring new ideas to the existing ecosystem.	Maintain high barriers to entry to prevent innovators from building alternative ecosystems. Maintain high customer switching costs in order to buy time to incorporate new ideas into your own products and services.

Stage 3: Leadership

In Stage 3, the ecosystem shows strong enough growth and lucrativeness to be worth fighting over. Secondly, the structure of the value-adding components and processes central to the ecosystem are becoming relatively stable.

These two conditions can indicate an upcoming leadership struggle, as the above-mentioned stability allows actors to target specific elements of value in the ecosystem, and compete to provide them. It also encourages companies to expand within the ecosystem and integrate both vertically and horizontally in the value chain, which reduces the ecosystem's dependency on its original leader.

Bargaining power in this stage comes from providing something the ecosystem needs, and securing to be the only practical source for it. It is a matter of continuous value creation and innovation to ensure the expansion and performance of the ecosystem, and without it power will shift between players in the system (Moore, 1993). A central role in the ecosystem is attained through lock-in by securing the investments made by others who have followed the evolution of the ecosystem. Hence, making it both expensive and risky for them to change to another platform, as they will need to adapt to another keystone in addition to losing the original keystone's reach in the market.

Stage 4: Self-Renewal

Stage 4 is identified by mature business ecosystems being threatened by rising new ecosystems and innovations. Threats can also come from environmental conditions such as regulations, buying patterns or macroeconomic conditions. Typically, these two events tend to reinforce each other, as an altered environment is easier to penetrate for new ecosystems. Leading successive generations of innovation is crucial to an ecosystem's long-term success and its ability to renew itself. Designing longevity into an ecosystem can be helpful in managing the self-renewal process. By micro-segmenting markets during the expansion and leadership stages companies can create close, supportive ties with customers. Their loyalty will in turn buy the ecosystem time to incorporate the benefits of new, disrupting approaches (Moore, 1993).

Characteristics of Actors' Behavior in a Business Ecosystem

It is important to notice that the idea of developing new business ecosystems can be seductive. It is easy to overestimate the potential for value creation, with the reasoning that so many actors are combining capabilities. In addition, it is also easy to underestimate the challenges. This can partly be explained by the fact that the responsibility of addressing them is often put on the other actors, not the individual organization (Adner, 2006).

In the ecosystem, an organization faces the choice between taking an active or passive role in guiding the ecosystem's development. As leader, you will have a greater chance to tailor the development to favor your own strengths. At the same time, being a leader carries its own risks. It often involves large resource investments over a long period of time before you

find out whether the service will succeed. Taking a passive role also requires some active decisions, namely which leadership candidates to follow, how aggressively to commit, and how to defend your turf (Adner, 2006).

In the end, the success of any ecosystem is determined by the customers' approval and acceptance. As they are the ones that eventually buy the final product, they are the key element to the existence of the business ecosystem. For new inventions, contrary to existing products, the business ecosystem tends to demand more of participating stakeholders. "Successful innovation requires tracking of your partners and potential adopters as closely as you track your own development process" (Adner, 2006). The more partners and suppliers that must adopt an innovation before the end users can adopt it – the greater the challenges of establishing a successful ecosystem. Being first to market, only matters if your partners are ready when you arrive (Adner, 2006).

In the theory of business ecosystem there are several examples of basic challenges and issues that need to be addressed to achieve a sustainable business ecosystem. Many of these examples are also highly relevant for the NFC business ecosystem. Moore (2006) believes the conventional hierarchical firm does not effectively address the breadth and importance of inter-firm relationships. Companies participating in cooperation for NFC mobile payment, thus stand to gain from understanding the dynamics of a business ecosystem, due to the complexity of the NFC ecosystem. Cooperation amongst different stakeholders is seen as essential for the success of NFC based mobile payment (Coskun et al., 2013b).

2.3 TWO-SIDED MARKETS

Relevance

Two-sided markets are defined as markets in which one or several platforms enable interactions between end-users, and try to engage two or multiple sides of the market by appropriately charging each side (Rochet and Tirole, 2004). The theoretic field discusses strategies for such platforms, with a particular focus on pricing strategies. Theoretical findings also have important implications for how to approach and market services in such markets.

Characteristics of Two-Sided Markets

With two-sided markets, it is easier to find examples than to generalize about them. However, Evans and Passel (2009) proposes three characteristics that seem common to all cases:

- There must be distinct classes of consumers demanding complementary goods
- The value of the service to consumers on one side of the market depends on the number and quality of consumers on the other side
- The network economies associated with having more participants on both sides of the market could not be realized without an intermediary

A simple illustrative example of how successful platforms spur into a virtuous cycle is the X-Box. More demand from one user group spurs more from the other. The more video games developers create for the Microsft X-Box platform, the more players buy the latest X-Box. At the same time, the more players using the X-Box, the more developers are willing to pay Microsoft a licensing fee to produce new games, and as user groups grow, margins increase.

Strategies for Two-sided Markets

For this theory to be valuable to our research, it needs to provide some advice on how to mitigate or at least anticipate issues and challenges that arise in such a situation as described above. The example above is the dream scenario for any platform provider, but there is also the risk of seizing a platform opportunity and not being able to attract the initial users for either side. Master the challenges connected to a two-sided platform, and one will gain a head start on the competition (Eisenmann et al., 2006).

As Eisenmann, Parker and Alstyne (2006) propose, there are three important concepts to understand and master before deciding upon a two-sided market strategy:

Get pricing right

The pricing structure for those participating in your platform is crucial in order to ensure that incentives to participate are present. There are especially two interesting aspects to this concept (Eisenmann et al., 2006):

- **Subsidize quality- and price-sensitive users** – Some users may even expect something for free, and putting a price on it would drastically reduce the number of users, leading to less reason for participating in the platform for the paying users
- **Secure "marquee" users' exclusive participation in your platform** – Marquee users are typical market leaders, early adaptors and the kind of users that paves the way for adoption of additional user groups. By incentivizing the marquee users, you can grow and expand your platform.

Cope with winner-take-all competition

The prospect of high margins in two-sided markets can make several actors want to be the *only* platform provider. This is dealt with in two ways (Eisenmann et al., 2006):

- **Decide whether the two-sided market in question will eventually be served by a single platform** – The answer to this is "yes" if the use of more than one comparable platform will be costly to users, and if special features do not increase value to some users
- **Decide whether to share the single platform or fight for proprietary control –** Sharing may be the only option if you do not have the resources and relationships to compete for control. Sharing can also mean expanding the market size

Avoid envelopment

Envelopment in this context refers to a different platform with overlapping user groups "swallowing" your platform by offering the same or similar feature within its own. To avoid this, Eisenmann (2006) says you can either change your business model, or find a "big brother" with whom you have converging interests and who can in some way make it difficult for the aggressive platform to go through with its intentions.

2.4 THEORETICAL FRAMEWORK FOR DATA COLLECTION AND ANALYSIS

Original Framework

During our preliminary work with planning the data collection process, we saw a need for a tool aiding us in systematically identifying, classifying and exploring current topics relevant to our problem definition and research questions. It was also important to ensure that we thematically covered all interesting aspects, challenges and influencing factors in an as comprehensive and conceptually sound manner as possible, to ensure a high level credibility in the findings.

In order to supplement business ecosystem theory we draw on the framework of the categorical model presented in Dahlberg et al.'s paper (Dahlberg et al., 2008) on their research on the mobile payment industry, due to its fit to our master thesis.

The framework applies two guiding theories, the first being Porter's five forces model (Porter, 2008). The primary actors in the mobile payments service ecosystem are the service providers and their customers. Various parties assuming these roles in the market include consumers, merchants, financial institutions and telecom operators. Additional parties, typically handset manufacturers and software developers may also be involved. The power and interests of these parties impact how technologies and other resources are orchestrated into the mobile payment services, and how these services are offered to and used by the market (Dahlberg et al., 2008).

Porter's model describes both the key role of a mobile payment service provider, and other market factors. The model applies insights from organizational industry theory to analyze the competitive environment on the level of business units (Dahlberg et al., 2008).

The second theory that constitutes Dahlberg et al.'s framework is generic contingency theory (Lawrence and Lorsch, 1967, Perrow, 1967, Thompson, 2011).In addition to the competitive forces within the mobile payment ecosystem, other factors are believed to impact this market as well, such as technology and standards, regulatory activities and legislation, commercial payment habits, or economical infrastructures. These contingency factors influence the performance of the mobile payment service, but are beyond the influence and control of the business units covered in Porter's model (Dahlberg et al., 2008), thus creating the environment that a business is operating within.

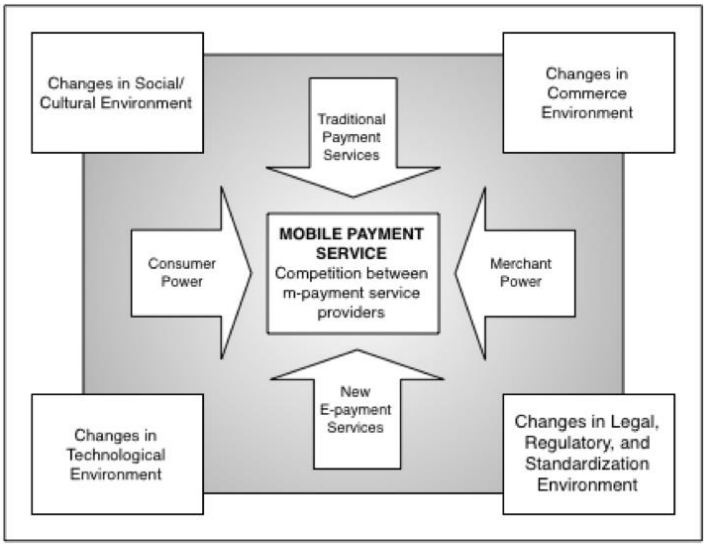


Figure 6: Dahlberg et al.'s framework

Contingency theory emphasizes the importance of environmental influences, especially technology, on the management of organizations. Other typical contingency factors include cultural, social and economic factors. As both finance and telecommunication are strongly regulated industries, it is also natural to include factors such as jurisdiction, regulation and standardization (Dahlberg et al., 2008).

Final Framework

As TSM Nordic is the case company and main unit of analysis in this master thesis, we decided to do some minor alterations to the framework, in order get an even better fit to our scope. First, our framework centers the case company alone, in order to emphasize the focus on TSM Nordic as a specific entity, rather than just being one contributor in a categorical group of actors, and how it is affected by the environment. All other influencing and contributing factors are separated into the two facets surrounding the case company.

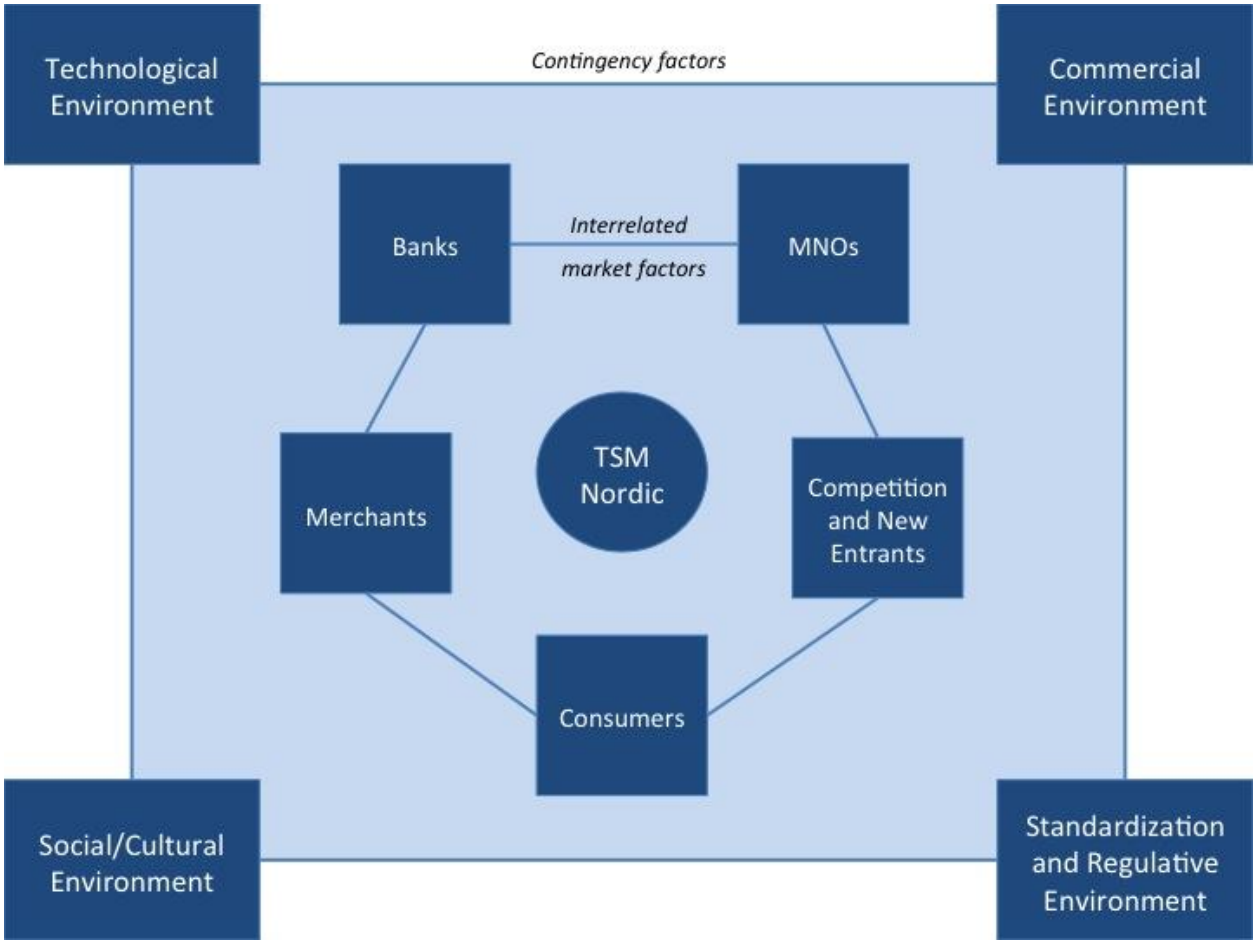


Figure 7: Proposed assessment framework

Secondly, as opposed to Porter's view of the market factors, the inner facet of the framework, as isolated entities and competitive forces vying for a power balance in their own favor, we see the market factors through the business ecosystem perspective as interacting entities that co-evolve and jointly create value for the consumers, in addition to the consumers themselves. This is the relevant scope of our thesis, and as such we focus on the market factors in the model on the ecosystem members and roles most relevant for the current NNFCMPBE and their interrelations. It is also important to notice that we will explain the ecosystem in greater detail and elaborate on all contributing actors and their roles in Chapter 6.

The contingency factors we leave uphold as intended in the original framework, with the aim to describe the environment surrounding the NNFCMPBE. The broad perspective of

contingency theory coincides very well with Moore's view of a business ecosystem. A further definition of each contingency factor will be presented alongside its assessment in Part C.

Dahlberg et al. argues that their framework is useful for three specific reasons, which we also believe to apply for our modified model: 1) it has basis in guiding theories, is conceptually sound, and draws on previous research, 2) it helps to bring clarity to the multiple topics and to the vague, conflicting terminology present in professional and academic mobile payment literature, and 3) it visualizes clearly what factors impact the mobile payment ecosystem and service development (Dahlberg et al., 2008).

A further explanation of how we use this framework is presented in the introduction of the assessment in Part C, Chapter 9.

3 METHODOLOGY

This chapter aims to present and evaluate the methodology of the report. Based on the methodology frameworks presented by Yin (2009) and Bryman and Bell (2011), the presentation is divided into four parts; research strategy, research design, data collection and data analysis, as shown in Figure 8. The last part of the chapter is dedicated to an evaluation of the methodology and limitations of the research presented in this paper.

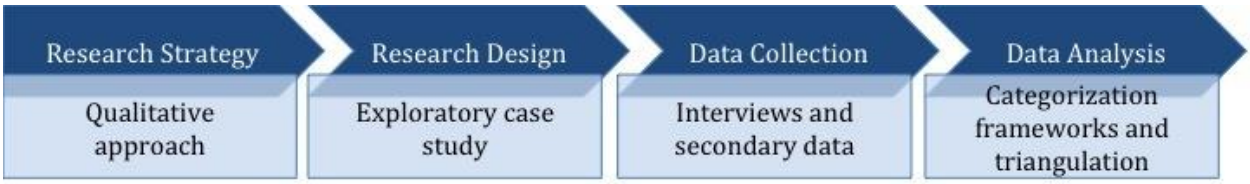


Figure 8: Overview of the methodology in the report

3.1 RESEARCH STRATEGY

A qualitative approach

In business and management research strategy, one commonly distinguishes between quantitative and qualitative research (Bryman and Bell, 2011). Given this thesis' problem definition and scope of research, and partly the time constraint it has been written under, a qualitative research strategy is suggested. This manner of approach supports the need for an in-depth understanding of the field of research. It also allows for several perspectives on our research questions to be captured and provides a better context to the data of analysis.

By choosing a qualitative strategy both the research design and the methods for data collection are affected. Among other things, this allows for the use of a case study, which will later be argued is the preferred approach. Whereas quantitative research calls for structured approaches such as surveys, interviews in qualitative research are commonly more semi-structured. This will be further described in the following sections.

3.2 RESEARCH DESIGN

An exploratory case study of TSM Nordic

Brymann & Bell (2011) defines research design as "a framework for the collection and analysis of the data". This means that it is the structure by which the execution of data collection and following analysis is conducted.

Exploratory Research Method

A study can be said to be of a certain nature; exploratory, descriptive or causal (explanatory) (Babbie, 2013, Yin, 2009). As presented in section 1.1, this study presents three research questions, all in a "what" or "how" form, for which Babbie (2013) argues that an exploratory study may be an appropriate approach, where the goal is to develop hypotheses and potential propositions for further inquiry. An exploratory approach is suitable when the researchers are initially inexperienced on the topic, or the subject is relatively new (Babbie, 2013).

The perspective taken in this thesis is based on our pre-diploma work (Glück and Kähler, 2013), an extensive literature review of business ecosystem theory, aiming to identify frameworks helping businesses in decision and strategy making in their business environment. However, the lack of previous knowledge in regards to NFC provides a solid argument for additional exploration of the subject. The chosen methodological approach is, nonetheless, familiar to us from our pre-diploma work, and hopefully, this thesis can serve as a starting point for subsequent research on the studied topics.

TSM Nordic Selected as Case Company

In this thesis' problem description one of the aims is to understand the structure and necessary roles in an NFC ecosystem. To get such qualitative insight, there are according to Yin (2009) five kinds of research: experiments, surveys, archival analysis, history and case study. Further, following Yin's guidance, a case study was decided upon as being most appropriate because of the context-sensitivity of the data and the focus on contemporary events.

As this work, and our pre-diploma work, has been conducted in cooperation with Telenor, the selection of a case relevant to them followed naturally. Since the majority of Telenor's activities relating to NFC have been separated into the joint venture with DNB, TSM Nordic, this was a logical choice as the case company.

Unit of Analysis

In order to ensure that the research questions are not too indistinct, establishing a well-defined and appropriate unit of analysis is important. Especially, it contributes to forming the scope of the data collection, as well as helping to separate data concerning the subject of the case study from contextual data (Yin, 2009).

As introduced in section 1.1, TSM Nordic is the chosen unit of this analysis, and the data collection is limited to cover the Norwegian market and the NNFCMPBE in particular.

3.3 DATA COLLECTION

Interviews and documentation as main sources

According to Yin (2009), a strategy for collecting relevant data should be defined. Our initial data was identified through reviewing academic literature covering NFC mobile payment services in general, as well as utilizing knowledge concerning business ecosystems primarily acquired through our pre-diploma research. Furthermore, we were provided additional academic literature and several practitioner reports by our academic supervisor and two of his colleagues with extensive experience within NFC and mobile payment services. Lastly, we utilized an extensive literature review of NFC technology (Coskun et al., 2013b) to ensure that we did not miss central contributions to the field.

Due to the current state of the development of NFC-based mobile payment services, and this thesis' scope focusing particularly on TSM Nordic and the NNFCMPBE, we were also required to generate primary data through interviews to acquire the necessary insights to be able to answer our research questions. Interviews have therefore been conducted with both TSM Nordic, DNB and Telenor employees, as well as employees from other external parties.

Interviews

As a qualitative approach was chosen, semi-structured interviews were decided upon as the most appropriate method to attain the required insights. The flexibility that follows from this approach allows the interviewees to speak freely and elaborate on details and areas of their expertise, which could disclose valuable insights and aspects unfamiliar to us.

The conducted interviews were quite extensive, covering topics of the NNFCMPBE corresponding to our research questions and the three required insights described in section 1.1. In order to cover all interesting aspects in an as comprehensive manner as possible, an interview question template was created based on the framework presented in section 2.4. However, the phrasing, timing and focus of the questions were adapted to each individual interviewee, and continuously supplemented throughout the interview process based on newly attained knowledge and our increased understanding of the subject. Lofland and Lofland (1995) recommend such an ongoing process in the exploratory research, as it increases awareness of emerging topics and allows for more direct and in-depth questioning in the following interviews. The interviews are presented in greater detail in Chapter 8.

Sampling of participants

The interviewees were selected based on purposive sampling, which is "the sampling conducted with reference to the goals of the research, so that units of analysis are selected in terms of criteria that will allow the research questions to be answered" (Bryman and Bell,

2011). The sampling was based on two initial interviews with industry experts suggested to us by our supervisor, who then gave us a list of names with potential candidates within the NNFCMPBE. Because of time limitations, the list was narrowed down to cover employees from companies most central to our scope, and based on our understanding of the potential value of the interviewees' contribution to the research questions.

To ensure a broad perspective in the discussion, additional interviews with industry experts from research institutions and a consulting company was conducted. The choice to include these additional interviewees was based on their position, technical expertise and relevance to the NNFCMPBE. Table 2 presents the selected interviewees.

Table 2: Sampling of interview participants

Name	Company	Position
Abraham Gúzman Salvador	TSM Nordic	Product Manager
Per Arvid Gjersum	TSM Nordic	Key Account Manager
Arne Munch-Ellingsen	Telenor	Senior Researcher
Lena Langrød	Telenor	Business Developer
Bent Bentsen	DNB	Senior Advisor
Kristian Klavenes	NorgesGruppen	Marketing Director in Value-Adding Services
Thomas Normann	MeaWallet	Technical Sales and Business Developer
Steinar Brede	Sintef	Senior Research Scientist, Software Engineering
Alexander Lujit	UL	Business Development Manager, Transaction Security

Telephone interviewees

Due to both time and resource limitations, all but two interviews were conducted over the phone, as the interviewees were in different locations within a large geographical area. Bryman and Bell (2011) claims that the answers received through telephone interviews are essentially equal to in person interviews. Although with some initial skepticism, we found them to provide very acceptable results, even though the task of asking questions clearly, appropriate follow-up questions, and expressing agreement or confusion was found somewhat more challenging than in an in-person interview.

Extraction of relevant data from the interviews

To ensure that all relevant information was extracted from the interviews, our theoretical framework was utilized in a collection and categorizing process. First, all interviews were transcribed in full. One of us thereafter extracted all the information he found relevant under each of the categories in the framework. To maintain inter-observer consistency, the other repeated this procedure, to make sure everything of interest was extracted. When this two-step process was completed, a summary of each individual interview was written.

Procedure to ensure data quality in the interviews

To strengthen the quality of our data and findings for the subsequent analysis, and thereby enhance the credibility of our work, the processing of the interviews was done in three steps: (1) on permission by the interviewees, all interviews were recorded, (2) the interviews were transcribed in full, (3) a summary of each individual interview was sent to the respective interviewee for verification. The summaries were based on the interviews' most interesting outcomes and the information to be used in the subsequent parts of this thesis. The goal of this process was to ensure the accuracy of our findings by correcting potential misinterpretations and allowing the interviewee to provide additional input if necessary, thus increasing the quality of the data.

Figure 9: Interview synthesis and verification process

Secondary data

In addition to the interviews, several sources of secondary data have been used throughout the research process. Both prior to the interviews, to better understand the context of the research, and during the interview and analysis process, to guide the understanding of the gathered data and supply additional information on topics not sufficiently covered through the primary data collection.

Academic literature and research was used particularly to build the theoretical foundation and background for this research. The main purpose of these sources was to build a basis and initial knowledge to better approach our own empirical research. Sources include books and research papers as well as our own pre-diploma literature review.

Academic literature was also reviewed to give us a fundamental understanding of the NFC technology and ecosystem, and the actors within it, both conceptually, as well as specifically for the Norwegian market. Two master theses written on behalf of Telenor, researching the NNFCMPBE were particularly helpful (Salvador, 2013, Ulvedal, 2013). In addition to the previously mentioned literature review of the NFC technology (Coskun et al., 2013b), other research and conference papers covering different areas of the development of NFC were identified through available databases and provided by our supervisor's colleagues in Telenor.

Written sources from industry practitioners have also been included in our research. In addition to news articles and blogs found through web searches, white papers from various institutions, consultant reports and market surveys were discovered through our preliminary research or recommended by the interviewees.

Table 3: Utilized secondary data sources

Academic Literature	Practitioner Literature
• Literature reviews • Books • Research and conference papers • Previous master theses • Pre-diploma study	• White papers • Consulting firm reports • Market surveys • News articles

3.4 DATA ANALYSIS

Conceptual Models, Categorization Frameworks and Triangulation

The characteristics of qualitative research cause several challenges in the data analysis process. Available methods include several techniques, from complex mathematical models and recognizing repeated statements to more pragmatic tactics, the latter being the chosen method for this research, based on the proposed framework presented in section 2.4. Furthermore, in the process of synthesizing the interview findings in the assessment of the main challenges in establishing a sustainable ecosystem, and its future development, secondary sources were utilized in order to strengthen the credibility and reliability of this thesis. The results are therefore based on arguments from the interview findings and secondary sources, as well as our own subsequent assessment. Applying multiple data sources in this way corresponds to the triangulation principle described both by Yin (2009)

and Bryman and Bell (2011). In the coming sections, we explain our data analysis and its application on our work in further detail.

Description of the Norwegian NFC mobile payment business ecosystem

The first analysis to be performed in this research is the description of the current NNFCMPBE. Seeing this descriptive part of the thesis as a prerequisite for the further analysis, we decided to develop a conceptual model of a general NFC mobile payment business ecosystem presenting all necessary roles and functions in such an ecosystem. This work was based on academic literature and practitioner reports. Subsequently, this model was used to identify the actors in the Norwegian market holding the presented positions. This analysis was based on the previous academic study conducted by Salvador (2013) and the findings in our own interviews.

Applying framework to organize and compare data

The proposed framework based on the work of Dahlberg et al. (2008) was applied to identify and categorize all the relevant information obtained through the interviews. This provided a great overview of the findings and allowed for easy comparison of the different interviewees' perspectives on the different topics. Furthermore, the framework also provided an overall structure for the subsequent analysis and presentation of the identified challenges in Part C of this thesis.

Triangulation used when assessing main challenges and future ecosystem development

Building on the identified and depictured model of the NNFCMPBE, the subsequent analysis in Part C assesses what main challenges remain to make this a viable and sustainable ecosystem. First step in this analysis was to apply the categorical framework to establish distinct and collective areas under which all challenges could be represented. Following this, information relating to the impact of the identified challenges from the main interviews was extracted and a preliminary assessment developed. The relevant findings from the interviews were verified, and in accordance with the triangulation principle, secondary data was consulted to supplement and increase the reliability of the findings.

The triangulation principle is also followed in our assessment of the future development of the NNFCMPBE and TSM Nordic's strategic options. This assessment is based on established management theories and academic research and frameworks from business ecosystem theory, as well as the empirical findings from this research and our own assessment of these.

3.5 Evaluation of Approach and Methodology

In evaluating the approach and methodology of this research, we apply four criteria presented by Bryman and Bell (2011) for the level of trustworthiness of qualitative business research.

Confirmability

Confirmability concerns the objectivity of the research. Although total objectivity is not possible in qualitative research, following this criterion can enhance the credibility of the research.

Inter-observance consistency to reduce risk of our own subjectivity

The process of categorizing the extensive amounts of information gathered through the interviews and the identification of specific challenges was necessarily influenced by our subjective assessments, as the research covers interrelated topics with complex challenges and issues, making it difficult to separate them into discrete subtopics.

To increase the confirmability of our thesis, inter-observance consistency has been applied in the process of analyzing the empirical data. This contributes to an increased confirmability by minimizing each of our personal opinions and theoretical predispositions that might affect the findings throughout the research (Bryman and Bell, 2011).

Credibility

Credibility relates to the integrity of the research and entails how realistic and plausible the findings in the study are.

Triangulation as a key principal for ensuring credibility

Bryman and Bell (2011) point to that the possibility of multiple interpretations and descriptions of the same topics might contribute to decrease the credibility of the research. Conflicting and differing statements and explanations occurred on several occasions throughout our interview process. As described above, triangulation was used as a mean to mitigate this issue and to increase the credibility by including and cross-referencing both secondary data and interview findings. However, our assessment also includes findings from statements made by certain interviewees on specific topics that were neither discussed with other interviewees nor covered in the secondary data. As such, triangulation was not possible and findings based on single sources of information might occur and thereby contribute to reduce the credibility of our research.

Interview validation to ensure correspondence between findings and empirical data

In accordance with Bryman and Bell (2011), the described process of submitting the interview summaries to the respective interviewees for validation and potential correction ensures conformity between the interviewee's actual perspective and the findings used in the research. This is the second method used in our research in an attempt to further ensure the confirmability of our work.

Risk of interviewees being influenced by subjectivity and own interest

In the same way as we are influenced by subjectivity, the interviewees may also be influenced by personal predispositions or circumstantial matters deflecting their objectivity. For example, the interviewed TSM Nordic employees may have had self-interest in promoting the positive aspects of the service, neglecting the challenges relating to the other members of the ecosystem. Such aspects influencing the credibility are tried mitigated by the abovementioned methods of interview validation and triangulation.

Transferability

The transferability of a specific research study describes its usefulness and validity to another context and the applicability of the findings in a subsequent or parallel study.

Scope limited to the Norwegian NFC mobile payment business ecosystem

The scope of this research is limited to the NNFCMPBE. Consequently, its transferability to ecosystems in other markets is questionable and depending on a great number of factors. However, Dahlberg et al. (2008) claim that mobile payment services differ between markets in a systematic manner, and as such, the actual transferability of this research could be an interesting topic to investigate in a subsequent study.

The scope of this research also only covers NFC as an enabling technology for mobile payment services. This also limits the transferability of the study as ecosystems and solutions based on other technologies might look entirely different. We do however look at other technologies in this study, although not in as much detail, and only through the perspective of being potential threats to NFC.

The third aspect relating to the transferability is that we only cover one specific TSM, namely TSM Nordic, and present a strategic approach for them to take a role in the emerging ecosystem. As we will see, TSMs can differ in several ways, which could be another limitation to the transferability. Finally, as the ecosystem is in an early and immature phase, the transferability may only be valid for a short period of time. However, reasoning for all our findings and recommended strategic options are included, and could be modified to provide

useful guidance and insights for other companies and services both in the Norwegian and foreign markets.

Dependability

The research's dependability entails the consistency of the results. According to Bryman and Bell (2011) the study's trustworthiness can be strengthened by keeping complete records throughout all stages of the research. Yin (2009) explains how this enables backward tracing of the evidentiary process by sustaining and preserving the continuous chain of evidence.

Complete documentation of entire process, including recordings and transcripts

To ensure that this thesis can be adequately reviewed in relation to its dependability, we have provided a rich problem description, we describe the theory and frameworks used in our assessments, summaries of all interviews are presented and citations to both primary and secondary data sources are made whenever necessary. We have not, however, included the full recordings and transcripts of the interviews. This is due to practical reasons, but all can be made available upon request.

Limitations of Methodology and Approach

In this section, we will explain the main limitations to this research. We also want to stress that whenever possible, we have tried to mitigate these limitations to the best of our abilities, by applying the method mentioned in the previous sections.

Time and resources limiting data collection

The fact that this research has been conducted exclusively by the two of us over a time period of approximately four months has been a limiting factor for the time available to conduct interviews and other research. Hence, we had to do a selection process and reduce the number of empirical data sources, and include only the actors with the highest relevancy to our scope. Furthermore, the interviews were conducted within a time frame of 1-1,5 hours, which imposed an additional time constraint resulting in the potential loss of valuable information, as we were not always able to cover all areas of the research framework in a substantial and satisfactory manner.

Distribution of the sampling group

As already mentioned, time limitations required us to narrow down to the most relevant members of the NNFCMPBE, including TSM Nordic, Telenor and DNB. Furthermore, we were only able to interview one actor representing the merchants, and several other third party stakeholders, such as the acquirers and the payment schemes, were not included at all. This unbalanced distribution of the sampling group might have affected our perception and

findings and led to important information not being revealed. Trying to mitigate this issue, and to balance the perspectives of the interviewees with a direct connection to the ecosystem, we decided to interview several industry experts from different research institutions and a consulting company, as we believed them to be less prone to subjectivity and able to provide us with an unbiased perspective.

Transferability of secondary data sources

The degree to which the secondary data sources were adaptable to our specific scope, their transferability, was varying and in some cases a limiting factor. Few sources of data were found to have the same exact scope of the NNFCMPBE and TSM Nordic's strategic options in its future development, which is quit understandable. Additionally, the NNFCMPBE is generally covered to a very small extent in the literature, which have required us to evaluate the applicability of research papers and general reports, such as white papers, often being conceptual or related to other markets. We have tried to mitigate this issue by using several sources of information, and especially by leveraging the findings from our primary data sources.

4 Approach to Answering Research Questions

This chapter's goal is clarify the connection between the theory and methodology, and the proposed research questions. The three research questions will be answered individually in the next three parts of this thesis, before we make a final conclusion to our problem description. The research questions are however interconnected, which will be explained in this section.

Approach to Answering Research Question 1

Introducing the NFC technology

The first chapter in Part B aims to introduce the NFC technology, the first required insight. Understanding the technology is a necessary precondition both to be able to define the ecosystem and the actors within it, as well as to understand the implications of the different challenges identified in the subsequent analysis. This presentation is based on academic literature and research including an extensive literature review on the technology (Coskun et al., 2013b).

Defining a conceptual ecosystem

The second required insight is to understand the structure of and necessary roles in a general NFC mobile payment business ecosystem. Based on additional academic literature and several industry practitioner reports and white papers, we will present a conceptual model of such an ecosystem, explaining each actor's role and function in the ecosystem.

Describing the current Norwegian ecosystem

Based on the conceptual model, the second chapter in Part B also aims to identify the currently active members of the evolving NNFCMPBE and their relations. As we describe each involved role in the conceptual ecosystem, we also identify the actual actors and companies holding these roles in the NNFCMPBE. This assessment is based on a previous academic research study conducted on behalf of Telenor (Salvador, 2013) and findings in our own interviews. Part B is summed up with a presentation of the current NNFCMPBE, and the subsequent parts of this report will build on this understanding of the ecosystem.

Approach to Answering Research Question 2

In Part C, we apply the proposed framework presented in section 2.4 to assess the NNFCMPBE in order to understand its current situation and identify the challenges related to its development and sustainability. The framework is utilized to structure and present the empirical findings of the analysis. The data sources used in this assessment is primarily the

interviews, with additions from academic and practitioner literature including research and white papers, news articles, reports and surveys.

The first chapter in Part C presents a summary of each conducted interview, and is followed by a presentation of the financial aspects of TSM Nordic's intended business model to provide the reader with a better understanding of their motivation for establishing the ecosystem.

The following sections include the actual assessment of the challenges. As described in Figure 10, this is done in two parts;

1) We start by assessing the outer facet of the framework, the contingency factors, to understand the underlying preconditions, current status of and relevant trends for NFC mobile payment. Explicit challenges resulting from these factors will be discussed as we assess the inner facet of the framework, under each respective ecosystem actor being affected by these conditions.

2) As we assess the inner facet, the value proposition of TSM Nordic's business model towards each group of actors is presented in order to provide an understanding of these actors' motivation for, and challenges in joining the ecosystem. The identified challenges relating to each group of actors are then presented.

We answer RQ2 by summarizing these challenges and present how they are related.

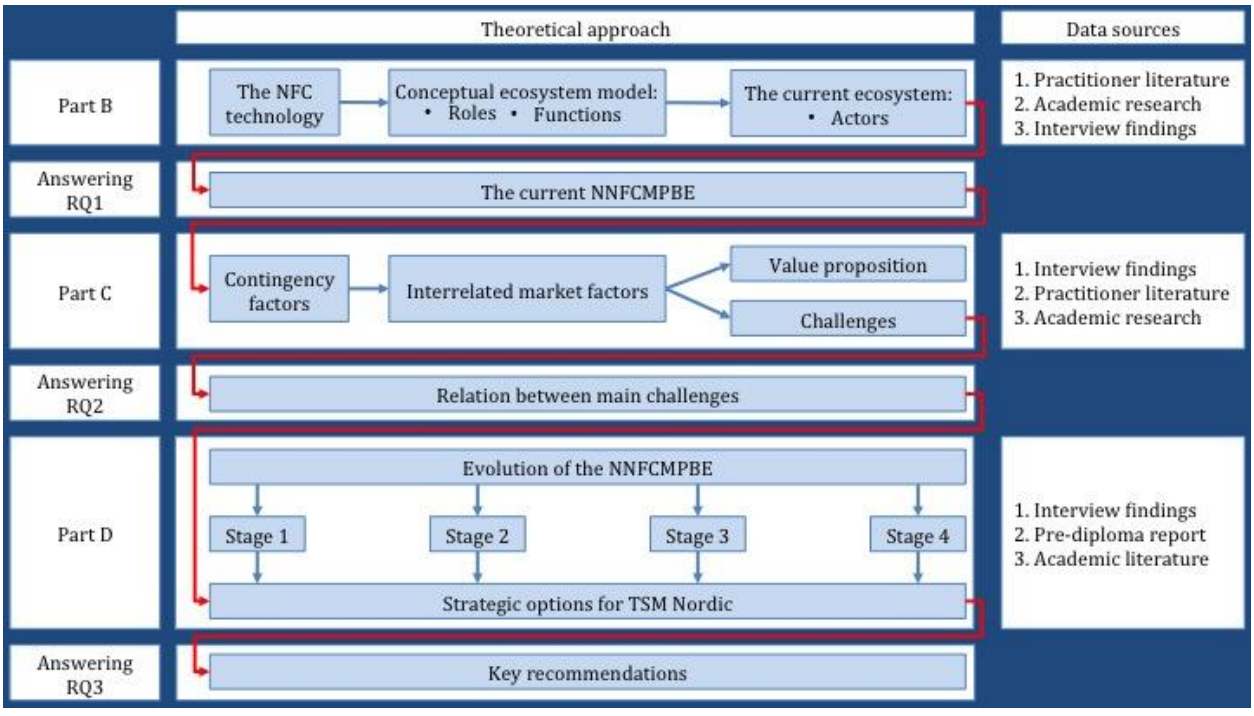


Figure 10: Approach to answering research questions

Approach to Answering Research Question 3

Part D aims to answer the final research question. In order to define a strategy for TSM Nordic, the first section aims to assess their position in the ecosystem, and place it within existing business ecosystem theory.

The assessment of the NNFCMPBE's future development is based on the theoretical framework of a business ecosystem's evolutionary stages presented in section 2.2. As we address each of these stages, we recommend strategic measures for TSM Nordic to address and mitigate the challenges identified in Part C. The proposed strategy is based on the chosen framework's theoretical propositions, the discussions in our interviews as well as other theoretical perspectives identified in our pre-diploma work of reviewing business ecosystem literature.

We answer RQ3 by summarizing the assessment of the evolutionary stages, and present our key recommendations to meet the identified challenges and thus enhance the sustainability of the ecosystem.

Part B
Definition and Presentation of the Ecosystem

This part presents an introduction to
NFC technology, and the Norwegian NFC
mobile payment business ecosystem.

Chapter 5 | Introduction to NFC Technology
Chapter 6 | The Norwegian NFC Mobile Payment Ecosystem
Chapter 7 | Answering Research Question 1

5 INTRODUCTION TO NFC TECHNOLOGY

Near Field Communication (NFC) is a short-range wireless communication technology that was developed by Sony and Phillips in 2002 (Coskun et al., 2013b). The NFC standard covers communication protocols and data exchange formats based on existing radio frequency identification (RFID) technology, and is designed to operate over short distances (approx. 4 cm). NFC has a maximum communication speed of 424 kbps (NFC Forum, 2014) and enables simple and secure two-way interactions between electronic devices for a wide range of applications, including mobile payment, ticketing, loyalty programs, ID and access control applications as well as data and information exchange and sharing.

5.1 RFID AND PREVIOUS NFC EVOLVEMENT

The RFID technology is based on a system that allows for contactless transfer of data with the usage of radio frequency and magnetic fields (Coskun et al., 2013b). NFC was developed with the basis in RFID technology, for contactless communication. The ECMA International (European Computer Manufacturer Association) adopted the technology as a standard the same year, with the International Organization for Standardization (ISO) and International Electro-technical Commission (IEC) following in 2003 (Coskun et al., 2013b).

One of the first organizations that worked to implement NFC into mobile devices was the NFC Forum, which was established by Nokia, Phillips and Sony in 2004. The purpose of the organization was to enable the use of touch-based interactions in consumer electronics, mobile devices, PCs and smart objects (NFC Forum, 2004). As mobile phones became more and more common, the main motivation for NFC technology was the integration of personal and private information, such as storing of credit card data (Coskun et al., 2013a).

5.2 NFC ESSENTIALS

The communication occurs between two compatible devices and relies on inductive coupling between the transmitting and the receiving end. The two communicating parts are categorized as initiator and target devices, where the initiator is the device that initiates and guides the data exchange process between the parties. The target device responds to the request made by the initiator (Coskun et al., 2013b). Coskun et al. (2013b) defines three types of devices in NFC communication; the mobile handset, the tag and the reader, where the handset is a smartphone with embedded NFC technology. The tag is an RFID tag without an integrated power source, coming in various forms and models, which are all compatible with other NFC devices. In order for the tag to work, it has to be preprogrammed with data that the NFC reader then can receive (Coskun et al., 2013b). The NFC reader is a device that

is capable of transferring data with an NFC components, such as a merchants point-of-sale (PoS) terminal.

Furthermore, Coskun et al. (2013b) state that the NFC protocol distinguishes between active and passive modes of operation. In the active communication mode both devices use their own energy to generate their own RF field, to transmit the data. In the passive communication mode only the initiator generates the RF field while the target device makes use of the energy that is created by the active device. An important property is the automated pairing capability of the NFC devices when in close proximity of another NFC device, which automatically will launch an installed application when it finds a matching pair. The necessity of close proximity between the NFC devices makes the data signal hard to intercept by other sources.

NFC technology operates in three different operating scenarios (Table 4): reader/writer, peer-to-peer and card emulation modes where communication occurs between an NFC handset on one side, and an NFC tag, an NFC handset and an NFC reader on the other side respectively (Madlmayr et al., 2008). It is especially worth noticing that as the handset is in passive mode in the card emulation scenario, it can still be used in a payment transaction even if the handset is turned off.

Table 4: Interaction styles of NFC devices

Operating mode	Initiator device	Target Device
Reader/Writer	NFC handset (active)	NFC Tag (passive)
Peer-to-peer	NFC handset (active)	NFC Handset (active)
Card emulation	NFC reader (active)	NFC handset (passive)

5.3 NFC MOBILE ARCHITECTURE

NFC technology integrated (NFC enabled) mobile devices typically consists of integrated circuits such as a secure element (SE) and an NFC communication interface. The secure element is in short where all the service related information is stored, and will be presented in greater detail in the section below. The interface has a contactless, analogue/digital front-end, an integrated circuit called NFC controller to enable the NFC transactions, and an NFC antenna. A handset may contain several secure elements, which are connected to the NFC controller either through the Single Wire Protocol (SWP) or NFC Wired Interface (NFC-WI). The SE can be accessed and controlled from the host controller (internally) as well as from an RF field (externally). The Host Controller Interface (HCI) creates a bridge between the NFC controller and the host controller. The operating modes of the NFC controller are set by the host controller. HCI processes the data that is sent and received, and establishes the connection between the NFC controller and the secure element. This is shown in Figure 11 (Coskun et al., 2013b).

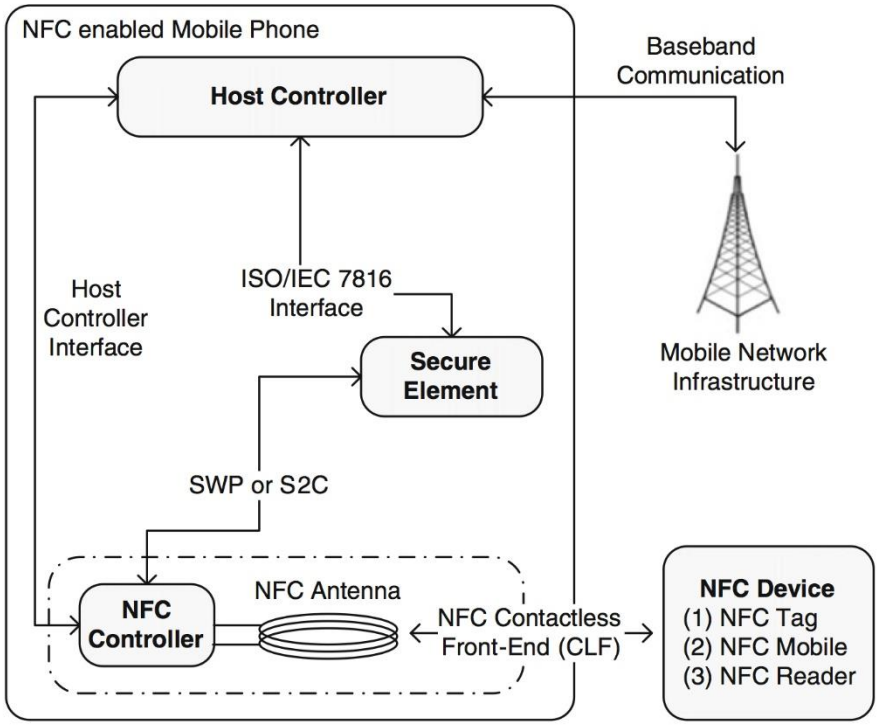


Figure 11: General architecture of NFC enabled handsets

5.4 SECURE ELEMENT

Since NFC technology enables various contactless ticketing, payment and other similar applications, storing and managing valuable and private information in the secure area on the handset is a requirement for NFC based systems. Without this, data could be transmitted by GSM or another interface to a third party with the intention of misusing it. To protect against this is the main purpose of a secure element (SE), which is done by executing and saving NFC applications in the SE's memory (Coskun et al., 2013b). SE is a combination of hardware, software, interfaces and protocols embedded in the mobile handset that enables secure storage. The emulated payment cards are placed within the SE, which is the part that is connected to the NFC module (Coskun et al., 2013b).

Various SE alternatives have been developed in the market to enable financial institutions and other companies to offer secure NFC enabled services and empower the NFC technology take-off. The most relevant SE solutions are presented in the table below.

Table 5: Options for secure elements

SE Option	Description
Embedded SE	A hardware SE integrated in the mobile handset, which cannot be removed[1]
Stickers and casings	An external *SE* allowing handsets without NFC capability to perform NFC services[2]. Essentially a passive NFC tag attached to the handset.
SMC	Secure memory cards provide high-level security, with removable property and a large capacity memory, an SMC can host a large number of applications[1]
SIM	A generic multi-application platform and ideal environment for NFC applications that are personal, secure, portable and easily managed remotely via over-the-air (OTA) technology[3]
SE in the Cloud	Allows secure information to be stored in the cloud, rather than on physical hardware, communicates with the NFC module[4], but requires online connection

[1] Coskun et al., 2013b
[2] Mobey Forum, 2011
[3] Mobey Forum, 2010
[4] Pourghomi and Ghinea, 2013

Over-The-Air Technology

OTA technology contributes flexibility to the NFC-based system's adaptability to dynamic environments (Alimi and Pasquet, 2009). It enables loading and installation of new NFC applications on SEs – especially on SIM cards, and leverages the mobile phone wireless network. The process of loading the payment application or wallet onto the phone, and the personalization of the application is referred to as OTA provisioning (Smart Card Alliance, 2011). The processes of remote activation and deactivation of SEs and the emulated cards, remote service management, keeping record of which applications that are activated and other online services are named life cycle services or management. Currently, most MNOs are capable of providing OTA solutions using their current technology infrastructure (Smart Card Alliance, 2011).

5.5 Host Card Emulation

In 2013, Google introduced the latest version of its mobile operating system, Android 4.4 KitKat, which included a new NFC feature: host-based card emulation (HCE). HCE has garnered quite some attention in the NFC and mobile payment industry, because it opens up the possibility to perform NFC card emulation without using an SE in the handset. This solution currently only works on Android devices, but may accelerate the introduction of NFC services because it provides an optional more-simple-but-less-secure way to provide an NFC card emulation service (Pourghomi and Ghinea, 2013, UL, 2014).

HCE Technical Functionality

As discussed above, regular NFC card emulation is routed to an SE for security functions. The Android HCE changes this as it allows that commands in card emulation mode can be routed to an HCE service on the host CPU, shown in the Figure 12. The figure also shows that this is optional, as it remains possible to still route commands on card emulation mode to an SE as well.

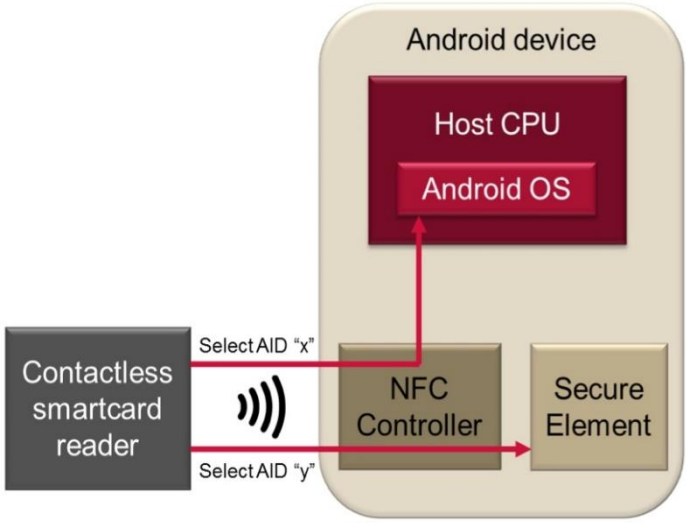


Figure 12: Android operating with both SE-based and host-based card emulation

HCE offers the same advantage as SE-based NFC services in that it can run in the background without any user interface. This is a neutral fit for many HCE

applications like loyalty or transit cards, with which the user shouldn't need to launch the app to use it. Instead, tapping the device against the NFC reader starts the correct service (if not already running) and executes the transaction in the background. The user is free to launch additional interfaces from the service if needed (Android, 2014).

6 THE NFC MOBILE PAYMENT BUSINESS ECOSYSTEM

6.1 THE CONCEPTUAL ECOSYSTEM

In the evolving NFC mobile payment business ecosystem, there can be a potentially wide range of contributing actors and stakeholders, with a varying degree of involvement, depending of what technology is used, and what services are provided. Hence, in this chapter we start by describing the ecosystem on a conceptual level, to present and include all possible and potential actors and their functions. Secondly, we will transfer this on to the actual Norwegian ecosystem and the actual companies and institutions that hold these positions.

Our presentation of the ecosystem, its actors and their roles is primarily based on existing literature such as academic papers and practitioner reports (Forbrukerrådet, 2014, Mobey Forum, 2011, Salvador, 2013). To further understand how this transfers to the current Norwegian ecosystem, and the actual companies operating in the environment, our second source of information is the in-depth explanations and descriptions made in the interviews that will be presented in Part C.

In describing the NFC mobile payment ecosystem, we start by describing the already existing and established payment card ecosystem, which contactless[1] and NFC payment also will be based upon.

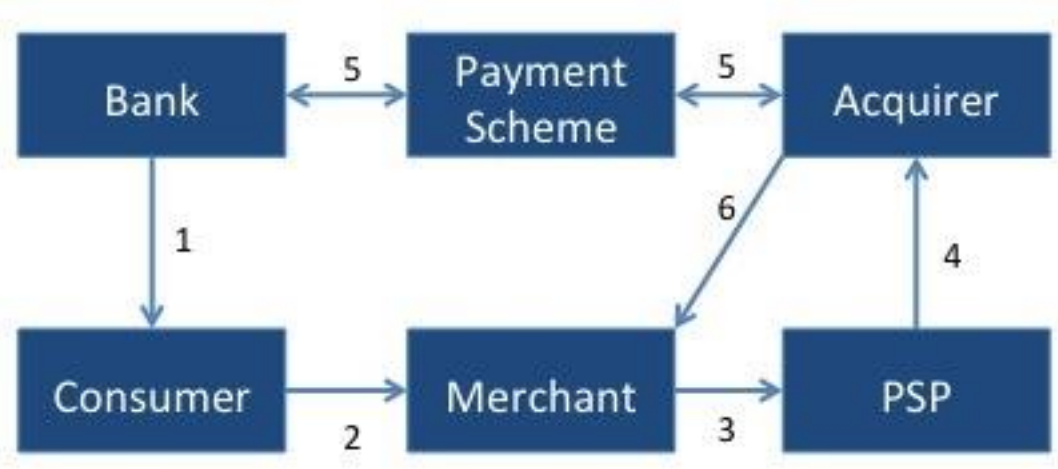


Figure 13: The commercial payment infrastructure

[1] Contactless payment cards use the same technology as mobile NFC and enable the tapping functionality also for physical payment cards.

In Figure 13, the consumer uses a payment card issued by the bank (1) to conduct a payment (2) at a merchant for any goods or service. This payment is done on a PoS-terminal (3) provided and operated by a payment service provider (PSP), which forwards the payment and transaction information to an acquirer (4). The acquirer is a financial institution that has made an agreement with the merchant to handle their payment transactions, and processes the transaction and clears it with the consumer's bank through a payment scheme (5), and ensures that the merchant receives his or her payment (6).

With the exception of the PoS-terminals needing to be exchanged or upgraded to support NFC technology, this part of the ecosystem (the back-end payment transaction infrastructure) will remain more or less the same as it is today, and will subsequently in this report mainly be discussed as part of the commercial environment in Part C (section 9.2).

Combined with the remaining part of the ecosystem, which mainly encompasses actors and operations relating to the mobile handset and network, we can present the entire NFC mobile payment ecosystem as shown in Figure 14.

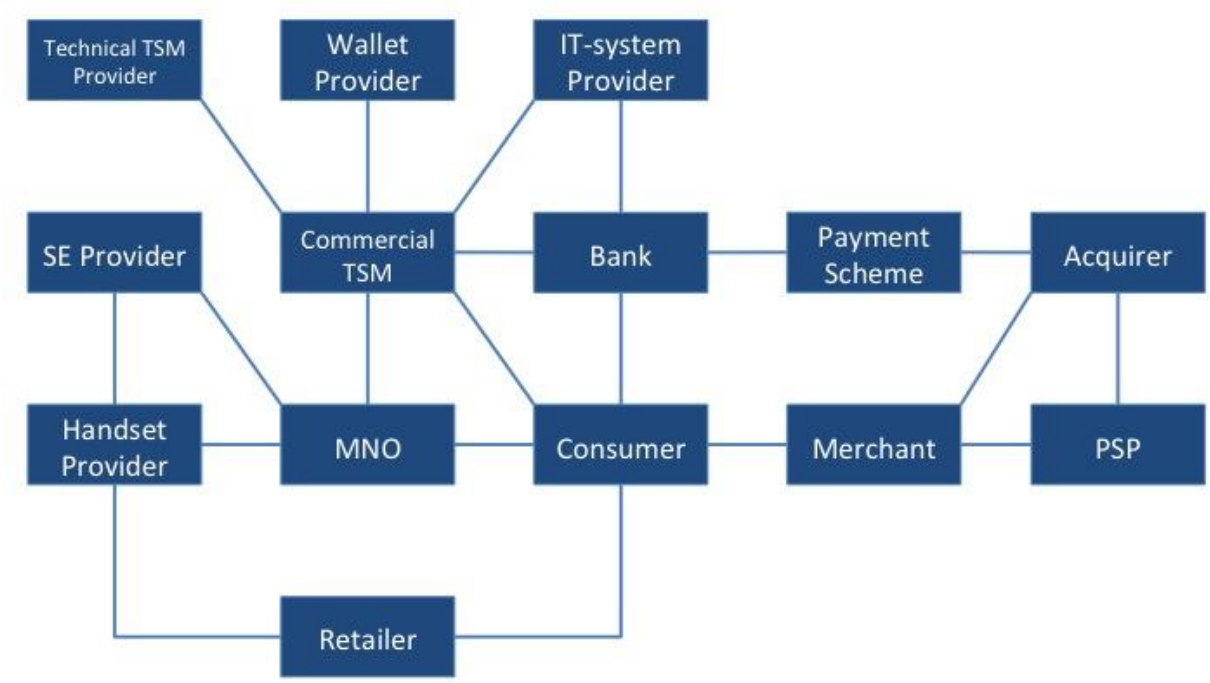


Figure 14: The conceptual NFC mobile payment business ecosystem

In this model, the consumer has a subscription with a mobile network operator (MNO), for a mobile handset bought at a retailer or through a subsidized offer from the MNOs. Depending on the chosen technology, a secure element (SE) provider supplies either the handset provider (embedded SE) or the MNO (SIM card). The Trusted Service Manager (TSM) serves as an enabler that connects all the different actors in the ecosystem together on a common technological platform. The final actors in the ecosystem are the wallet provider, which develops the front-end handset application, and the IT-systems provider that develops and operates the banks' technical infrastructure and database systems.

The handset retailer presented separately in the model is in reality just a regular merchant, and any matter relating to this type of actor will subsequently be discussed under merchants.

6.2 THE ECOSYSTEM ACTORS

Consumer

The consumer as an end-user is a vital part of any business ecosystem. The consumer owns the payment card and the handset in which the card is emulated. The consumer initiates service requests and payment transactions with the merchant, and by making use of NFC mobile payment services they generate revenue for other members of the ecosystem.

To be a part of the ecosystem, the consumer must have a relationship or a service agreement with the following actors in the ecosystem:

- Bank
- MNO
- Merchant (per transaction)
- TSM

TSM

As mentioned above, the TSM is a new ecosystem member, functioning as an enabler connecting the other actors together. The TSM is an independent, trusted party that facilitates the OTA provisioning and secure life cycle management of the NFC mobile payment services. The basic role of the TSM is twofold. First and foremost, it is "to help service providers securely distribute and manage contactless services for their customers using the networks of MNOs" (Gemalto, 2008). This includes integrating operations of the MNOs and the service providers, server operations and ensuring end-to-end security, and to provide OTA services such as activation/deactivation of emulated payment cards. To do this, a technical back-end TSM infrastructure or platform is needed, provided by a technical TSM provider.

The second part of the role is to act as a commercial intermediary that "facilitates contractual arrangements and other aspects of ongoing business relationships between the service providers such as banks and mobile operators" (Gemalto, 2008). Depending on the business model, a third and optional role of the commercial TSM is to offer the actual wallet application with the emulated payment cards to the consumer, i.e. the handset user interface. Alternatively, this is done the by the service providers (e.g. a bank) themselves, or a third-party wallet provider. So in short, The TSM is both a technical enabler, a business broker as well as a service provider or intermediary.

To be part of the ecosystem, the commercial TSM needs to establish a relationship to the following actors.

- Bank (and their IT-systems operator)
- MNO
- SE provider
- Technical TSM provider
- Consumer

It is worth mentioning that if a TSM chooses to develop value-adding services such as loyalty program applications (widgets inside the wallet) or advertising services, they would also need to establish relationships with the merchants wanting these services. Furthermore, the TSM also needs to establish a relationship with a wallet provider, to develop the handset application, but for simplicity we will consider this operation subject to the commercial TSM.

TSMs in the Norwegian Ecosystem

The most established TSM in the Norwegian ecosystem is the case company of this master thesis, *TSM Nordic*. The company will launch their service, Valyou, during 2014. Valyou is explained in detail in the Appendix A.2.

MeaWallet is the second Norwegian company developing a TSM framework and a mobile wallet solution. As far as mobile payment goes, they have currently no agreements in the Norwegian ecosystem, and focus mainly on other countries in the European market and USA. In the Norwegian home market, they have chosen to focus on developing access and loyalty services.

Initiative X is a third TSM initiative. The initiative is still confidential, and we were asked by the interviewees not to mention the actual companies involved. The service is still under development, but is indented to be a payment and wallet application provided by an alliance group of smaller local banks, together with a PSP currently active in the Norwegian market.

Bank (Card Issuer)

The bank is a financial institution offering services to the consumer. This includes providing personal bank accounts, issuing the payment card and determining its terms of use. As such, the bank is a service provider, and throughout existing literature referred to in a number of different terms, also including card issuer and mobile contactless payment application service provider (Mobey Forum, 2011), the latter not to be confused with the payment service provider (PSP) which will be explained later in this section.

To be part of the NFCMPBE, the bank needs to establish a relationship to the:

- Consumer
- Payment scheme
- Acquirer (directly or through payment scheme)
- TSM (to provide the SE and life cycle management of the emulated card)

Additionally, the bank needs relations with an IT-company to develop and operate their back-end systems, but because of the scope of this master thesis, these will from here on be seen as part of the bank.

Banks in the Norwegian Ecosystem

DNB is the main initiating bank in the ecosystem through its involvement with TSM Nordic, and will be offering their cards through Valyou as of the launch. TSM Nordic has also made agreements with the following banks to offer emulated cards through their service within 2014/2015: *Sparebank1, Skandiabanken, Re:member,Fana Sparebank,* and *Ya Bank* (Valyou, 2014a).

Evry is the IT-systems provider that has been working with the integration of the banks' back-end systems towards TSM Nordic.

Merchant

The merchant is in this report, as is often the case in a mobile payment context, defined as a physical location where transactions can be conducted. If a merchant wants to offer NFC payment options to the consumer, he needs to upgrade the PoS-terminal, which is provided and often leased by the PSP, to support the contactless technology. Hence, the merchant can also be seen as a user in the ecosystem. Finally, a merchant can also provide mobile services like loyalty programs or advertising through the wallet.

For a merchant to be part of the NFCMPBE, it needs relations with the following actors:

- PSP (for providing and operating the PoS-terminal)
- Acquirer (for payment transaction handling)

- Consumer (per transaction)
- TSM (to provide above mentioned services)

Merchants in the Norwegian Ecosystem

TSM Nordic has made an agreement with Norway's largest retailer, *NorgesGruppen*, which has upgraded all its PoS-terminals to support NFC technology. (Bentsen, Gjersum, Salvador). However, *Deli Deluca* is the only part of the group that has activated the NFC functionality so far. Additionally, both *McDonalds* and *Starbuck* will accept contactless mobile payment as of the product launch, along with a number of smaller local merchants in the larger cities and in Oslo Airport (Valyou, 2014b).

MNO

The MNO offers mobile subscriptions and handsets to the consumer and plays an important role in the ecosystem because OTA provisioning and life cycle management of the mobile payment applications are done using the MNO's established mobile networks and infrastructure. As such, the MNO is a technical enabler of telecommunication and data transfer. However, this does not ensure the MNO an active role in mobile payment beyond providing the necessary infrastructure. A more active role is achieved when the SIM-card, which is provided by an MNO, is used as the SE, which is the situation in Norway. When this is the case, the MNO can rent out secure space on the SIM-card to the service providers, either directly, or through a TSM.

To be part of the NFCMPBE, the MNO needs to establish a relationship with the following:

- TSM (or directly with the bank)
- Consumer
- Handset provider
- SE-provider (SIM)

MNOs in the Norwegian Ecosystem

Telenor is currently the only MNO active in the NNFCMPBE. However, TSM Nordic is also in dialogue with both *Tele 2* and *Netcom*.

Secure Element Provider

The SE-provider manufactures the SE used to store sensitive information, and depending on the technology, supplies either the handset provider (embedded SE) or the MNO (SIM-card). The SE-provider can also develop and provide OTA and technical TSM functionality around their SE, as is the case in the Norwegian ecosystem.

To be part of the ecosystem, the SE-provider needs to establish relations with the following:

- TSM (as technical TSM provider)
- MNO (as SIM-provider)
- Handset provider (to provide embedded SEs for the handset)

SE Providers in the Norwegian Ecosystem

As the TSM-solutions in the NNFCMPBE so far are based on the SIM-card for the SE, the active SE-provider for TSM Nordic is *Gemalto*, which delivers NFC-enabled SIM-cards to Telenor, as well as the technical TSM platform and OTA functionality for TSM Nordic. *G&D* and *Obertür* are two similar SIM-manufacturers active in the Norwegian mobile market.

Handset Provider

The handset provider's role in the ecosystem is to manufacture and provide NFC-enabled handsets to the consumer. It can in some cases also act as the SE-provider, e.g. in an embedded-SE or HCE solution. To simplify the presentation of the ecosystem, the handset provider's role also includes the handset operating system (OS) providers, which would include additional actors such as Google and their Android OS.

To be part of the ecosystem, the handset provider needs relations with:

- MNO
- Merchants (for additional sale of handsets)
- SE provider (for embedded SE solutions)

Handset Providers in the Norwegian Ecosystem

By cross-referencing TNS Gallup's survey on the market share of different handsets in the Norwegian market (TNS Gallup, 2014) with NFC World's list of NFC compatible handsets (NFC World, 2014), these are the handset providers for the NNFCMPBE: *Samsung, Nokia, Sony, HTC,* and *LG*. It is worth noticing that the market leader *Apple* (35% market share) does not support NFC technology in any of their handsets (TNS Gallup, 2014).

Payment Scheme

A payment scheme provides a network infrastructure to standardize and handle payment transaction agreements between the acquirer and the consumer's bank. The schemes set the transaction costs (from merchant to acquirer), which include the interchange fees (from acquirer to card issuer), establish certification and technical policies for the involved parties, and provide a common standard for payment cards and PoS-terminals for authenticating transactions.

The payment schemes are part of the ecosystem through their relations with:

- Acquirer
- Bank
- PSP

Payment Schemes in the Norwegian Ecosystem

There are two payment schemes supporting NFC in Norway. *Visa* and *Mastercard*, who in addition to allowing emulating the cards on a mobile handset also offer contactless payment cards (i.e. plastic smart cards, based on the same technology) (MasterCard, 2014, Visa, 2014).

Payment Service Provider (PSP)

The PSP provides the NFC-enabled PoS-terminals and software to handle payment transactions for the merchant. As the merchant itself is not allowed to access sensitive payment card information, the PSP sends the card and transaction information and the authorization request to the acquirer, which is done through the payment schemes' established protocols and procedures.

The PSP's role in the ecosystem is connected to the following:

- Merchant
- Acquirer
- Payment scheme

PSPs in the Norwegian Ecosystem

There are three PSP's in Norway providing PoS-termninals. *Nets, Point* and *Payex*. Both Nets and Point provide NFC-enabled terminals, whereas Payex' terminals are not yet NFC-approved (Gjersum).

Acquirer

The acquirer is a third party financial institution that has made an agreement with the merchant to handle their payment transactions. The acquirer receives the authorization request from the PSP and initiates a clearing and settlement process with the cardholder's bank through a payment scheme, to ensure the merchant receives the payment. The acquirer also pays an interchange fee to the cardholder's bank.

The acquirer has relations with the following ecosystem actors:

- Merchant
- PSP
- Payment scheme
- Consumers bank (through the payment scheme)

Acquirers in the Norwegian Ecosystem

The main acquirers of Visa and Mastercard transactions in Norway are: *Nordea, SEB, Handelsbanken, Elavon, Teller* (wholly-owned subsidiary of Nets) and *Swedbank* (Gjersum).

6.3 THE NORWEGIAN NFC MOBILE PAYMENT BUSINESS ECOSYSTEM

After presenting the composition of a conceptual NFC payment ecosystem and assessing what Norwegian actors hold the different roles, we can move on to presenting the structure of the Norwegian NFC mobile payment business ecosystem (NNFCMPBE). The NNFCMPBE can be viewed as a network of actors, where the different roles in the ecosystem are presented in the different clusters of actors. As can be seen from the figure below, the structure resembles the conceptual ecosystem presented in section 6.1.

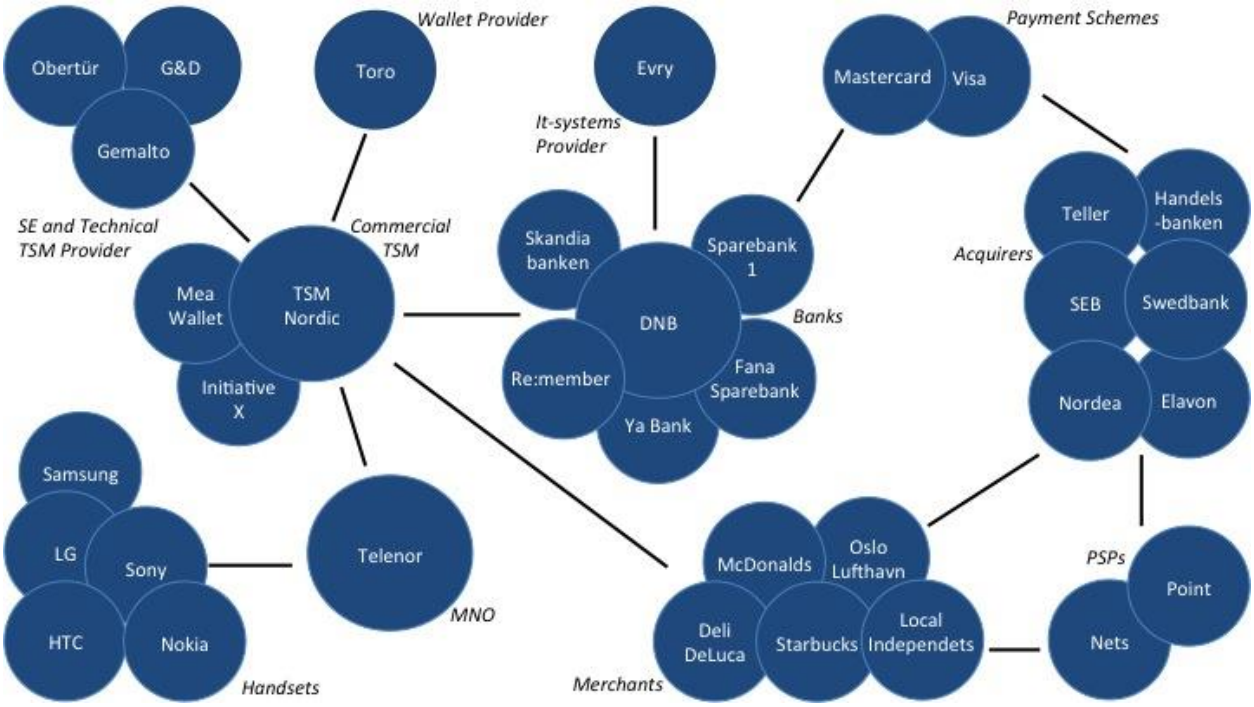


Figure 15: The Norwegian NFC mobile payment business ecosystem

Figure 15 displays the active stakeholders in the ecosystem. In order to have been included, the company must either have an active agreement with TSM Nordic or another company working towards the establishment of the NNFCMPBE, or be implicitly involved trough existing payment processes. The presentation does not include potential new actors considering joining the ecosystem, such as additional MNOs, banks and merchants. The merchants presented have currently activated their PoS terminals and are ready to accept the service. However, there are several other merchants with NFC enabled terminals that has not yet been activated. The reasons for this, and the challenges connected to it will be presented in Part C.

7 ANSWERING RESEARCH QUESTION 1

In order to build the necessary foundation for our subsequent assessments, and to answer our problem definition, this chapter aims to answer our first research question:

RQ1: What does the Norwegian NFC mobile payment business ecosystem look like today?

To answer this question in a satisfactory manner, an understanding of the NFC technology was seen as a necessary precondition. Based on academic papers and research, we have introduced the technology and presented its relevant characteristics for the subsequent parts of this thesis.

Secondly, we needed to understand the structure of, and required roles, in a general NFC mobile payment business ecosystem. This insight was also attained by reviewing existing literature, and we have presented a conceptual model of such an ecosystem in Figure 14. The ecosystem is based on the already established payment card ecosystem and the back-end payment transaction infrastructure. In addition the ecosystem also encompasses roles and operations relating to the handset and mobile network, and finally it introduces a new set of roles relating to the TSM.

Finally, we have identified the active members of the evolving Norwegian NFC mobile payment business ecosystem (NNFCMPBE). This is presented in Figure 15, and the assessment is based on previous research as well as the findings in our interviews. In addition to TSM Nordic, there are three main groups of key actors that have a direct relationship with the consumer; the banks, the MNOs and the merchants. These are also the actors with the closest ties to TSM Nordic's business model and the Valyou service. The remaining actors are however equally important for the ecosystem to be fully functional, and accordingly serve as enablers for the service.

The subsequent parts of this report will build on this understanding of the NNFCMPBE, as we assess the challenges relating to its development and sustainability, and finally as we present our strategic recommendations for TSM Nordic going forward.

Part C
Assessment of Challenges

This part includes the summaries of the conducted
interviews and presents the assessment
to identify challenges for TSM Nordic

Chapter 8 | Summary of Interviews
Chapter 9 | Assessment of Challenges
Chapter 10 | Answering Research Question 2

8 SUMMARIES OF INTERVIEWS

This chapter will provide a summary of the in-depth interviews conducted throughout our research process, with representatives from key stakeholders and industry experts in the NNFCMPBE.

The interviewees were contacted by email invitation, and each interview was planned according to their availability. All interviews lasted between 60 and 90 minutes, and were recorded on both of our mobile phones, after confirmed approval from the interviewees. In total, we conducted nine interviews, seven of them being telephone interviews, two of them in-person. All interviews took place during March 2014.

Based on our acquired understanding of the ecosystem, it was important for us to try to cover as many perspectives as possible from different contributing ecosystem actors, as their opinions and impressions of different topics might vary. Because of limitations such as time constraints, we were not able to conduct interviews with members of every single ecosystem entity, and decided to focus on the key ecosystem roles with representatives from companies that are already active in the ecosystem. Secondly, we decided to interview industry experts from a research institution and a consulting company, hoping that they might provide a broader and less biased perspective. In Figure 16 we provide a visualization of the ecosystem roles covered in the interviews, where a green box indicates that a representative for this role has been interviewed.

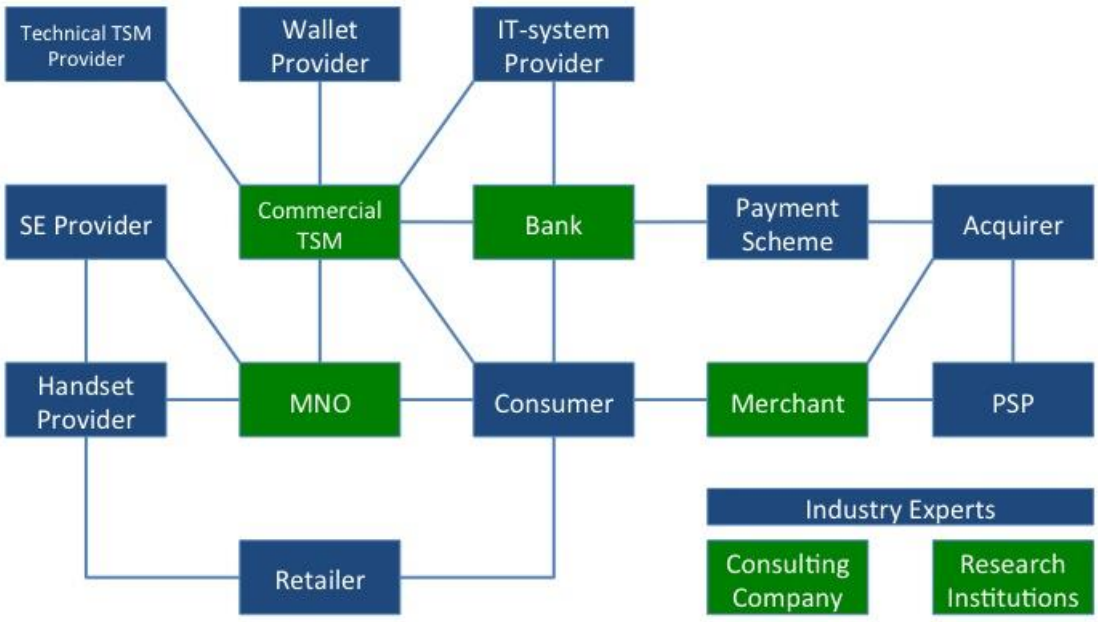


Figure 16: Ecosystem roles covered in the interviews

Although all the participants were interviewed using a pre-made interview template (Appendix A.4) based on the proposed framework presented in section 2.4, the topics covered in the interviews and their focus varied substantially. We conducted the interviews in a semi-structured manner, allowing the participants to speak freely, hence allowing for the discussion to revolve around their main areas of interest and expertise. Even though some topics were discussed in much greater detail than others, the interview template was fully utilized in every interview as a way to ensure that we covered all relevant topics.

To ensure agreement on a proper and correct rendition of the conversation, a summary of the interview transcript was sent to the respective interviewee for verification and approval, as described in section 3.3. The following summaries are utterly shortened versions of these, and are meant to give an overall impression and synthesis of the main messages communicated throughout the interviews. They do not cover everything discussed during the interviews, leaving us with more data material than what is presented her. Instead, they are meant to provide the reader with the most relevant information and insights utilized in the study's subsequent analysis.

8.1 INTERVIEWS

Abraham Gúzman Salvador
Company: TSM Nordic **Position:** Product Manager Telephone interview, March 3rd 2014

As product manager, Salvador is in charge of developing Valyou, and responsible for managing the partnerships with the involved developers. Prior to his engagement in TSM Nordic, Salvador was working within different business units in Telenor financial services, developing services for the payment and transport industry.

TSM Nordic

Valyou's main goal is to introduce mobile payments in Norway. The first service will be enveloping payment cards, which will be provided by DNB to begin with. Secondly, the plan is to introduce loyalty programs in the wallet, followed by a third phase exploring different services for transport applications, in addition to peer-to-peer transfers and digital receipts. The goal is to enrich the app beyond payment, by providing additional content and information that creates value to the end user.

In addition to developing the umbrella wallet, TSM Nordic wishes to provide a framework for third party service providers such as banks and merchants, so they can develop their own

widgets inside the wallet and push their own brand stronger, but for now, TSM Nordic is developing the services on behalf of the banks.

Salvador explains that the service will be free of charge to the end users. Towards the banks, the initial value proposal is time-to-market, as TSM Nordic is planning to launch the service during 2014. A fully supported service that already is partnering with many of the key players in the Norwegian market, following the latest technological standards and regulations. The initial business model is to rent out space on the SIM-based secure elements to the banks, to host the emulated payment cards.

Competition and new entrants

On the topic of competition, Salvador mentions a new wallet provider, MeaWallet, as well as a cooperative initiative between an alliance group of smaller local banks and a payment service provider (called Initiative X in this thesis), which plan to develop their own payment application. He also explains how there will be some sort of connection between the services, and that this will be the final ecosystem when it comes to TSM providers.

Regarding actors like Google and Paypal, Salvador does not see them as a current threat. He acknowledges Paypal as pretty dominant in online commerce and remote payments, but does not see the threat in proximity or in-store payments. Specifically, he points to the service not being integrated with the Norwegian infrastructure in terms of PoS and cash registers.

MNOs

Salvador elaborates on how other MNOs like Tele2 are stalling to see if NFC is going to fly before deciding to invest in the service. Additionally, as they need to align their development with the parent company in Sweden, their involvement will take a lot of time. Another challenge in recruiting the MNOs is that the price for the NFC-enabled SIM-cards is still very expensive.

Banks

The banks' technical issues are one of the main challenges in commercializing the service. Not only do they need to connect to the TSM, but they also need to upgrade their back-end systems, the host, the connectivity with their personalization systems and even the pin-management. The banks also need to change card issuance system that can create accounts almost real-time, which, all of it combined, becomes very costly.

Merchants

Regarding the merchants' involvement, Salvador focuses on the importance of including the big merchant groups like NorgesGruppen, and how it is both difficult and crucial to manage to integrate these actors in the service.

Consumer

The only subject covered regarding the consumers and user adoption was the topic of security. TSM Nordic is very concerned with communicating the fact that the mobile wallet will be equally secure as a regular payment card, but that there is skepticism in the market that needs to be addressed. It is a matter of explaining and making the end-user understand how the service works, and establish a good support system.

Technological environment

Salvador confirms how adoption of Apple users is a crucial topic on the agenda. TSM Nordic is working on how to develop an iOS version of their service, and admits he is a bit skeptical to the available solutions today. He says that these options can work as bridging technologies in helping to create awareness for the NFC services, and loyalty programs are possible to develop within the app. Right now TSM Nordic is weighing their options, and awaits to see what Apple will include in the next handset release.

Regarding HCE, Salvador focuses on the possibilities to use the technology for non-sensitive services like loyalty, and sees it as an element to push the MNOs to lower the prices on the SIM.

Standardization and regulative environment

An interesting regulatory aspect is that Visa has not approved HCE for the European payment market, and hence is not a threat to the payment solution. For the SIM based SE, the standardization for payment is ready, and the next relevant thing will be GSMA to develop final standards for loyalty programs.

Commercial environment

Salvador explains how Bank Axept's lacking involvement in the NFC development could be an issue. He explains how that is one of the reasons why it is difficult to engage merchant, as both Visa and Mastercard are more expensive because of their interchange fees. For now, TSM Nordic will go for Visa and Mastercard, and will try to find a good business proposition towards the merchants.

Per Arvid Gjersum
Company: TSM Nordic
Position: Key Account Manager
In-person interview, March 27th 2014

Gjersum's involvement with TSM Nordic started with the Tap2Pay project, where he was responsible for the merchant sites. Prior to the project, Gjersum has been working several years in both banking (DNB) and with payment schemes (American Express).

TSM Nordic

Gemalto is TSM Nordic's provider of technical TSM functionality, which consists of a server in two interconnected parts – one for the banks, and one for the MNOs, so whenever a new bank connects to the bank-TSM, you can immediately ensure access to all the possible MNOs on the other side, and vice versa. Gjersum says that payment will be released as the foundation of the service, but that it is depending on value-adding services such as loyalty to become sustainable and truly interesting for the consumer. He also confirms that as the third step, TSM Nordic will consider incorporating both transport and access control applications in the wallet, the latter probably focusing on the business market. Hence, the basic business model is renting out space on the SIM to the card issuers, with additional revenue coming form developing advertising and loyalty program widgets. Apart from OTA-management of the emulated cards, the actual payment transaction is not part of TSM Nordics operations.

Competition and new entrants

Gjersum welcomes all possible competition, as it will contribute to increased market awareness of NFC and mobile payment services in general. However, he believes that alternative solutions like mCash using QR-codes will not be successful as they are not build on the merchants' already existing payment infrastructure, but rather have a shot in the consumer P2P market, as a solution to transfer money between handsets. The reuse of existing infrastructure is where Valyou has a competitive advantage, as nothing changes in the back-end payment transaction system.

MNOs

Telenor owns 51% of TSM Nordic. As such, they are very vigilant about having all wallet services stored on the SIM, which is their source of income in the business model. Gjersum points to the fact that only the payment applications with sensitive information need the security provided by the SIM, and that other services such as loyalty programs could be stored directly in the application software, and thus become cheaper for the merchants. There are plans to bring in new partners and investors to signal to the rest of the market that TSM Nordic is not an exclusive Telenor-DNB relationship. This will make it easier to

negotiate with the MNOs, and TSM Nordic is already in a dialogue with both Netcom and Tele2. They have assessed the implications of integrating towards the TSM, but at the same time clearly stated that they will be late followers.

Banks

In a discussion about BankAxept, Gjersum points out that the banks have priced today's solution too low, and that they loose money for every transaction that runs through the system. The banks acquirer the BankAxept transactions themselves, and pay Nets to operate the system. This cost is higher than the banks' transaction revenue from the merchants, and hence an incentive for the banks to use Visa or MasterCard instead, and consequently also NFC.

Merchants

Engaging enough merchants is according to Gjersum the main success criteria for the commercialization of Valyou, with the main challenge being the BankAxept issue. As of yet, the situation in Norway is still that TSM Nordic has to actively promote contactless payment to recruit new merchants, alongside the payment schemes who also want to promote it because of their plans to release contactless plastic smart cards in Norway.

Consumers

Initially, the consumer will need to be a customer at both the right bank and the right MNO. As more and more of these actors will join the service, the remaining restriction of market reach is the availability of enabled handsets, where Apple is the main challenge. Gjersum stresses that they cannot ignore 35% of the market, and that they plan to have a solution for iPhone users within 2014. This is utterly supported by his opinion of adolescents, where the prevalence of iPhone is high, being typical early adaptors and a primary market segment for the service.

Technological environment

Regarding possible solutions to mitigate the iPhone issue, neither of these will provide the same security as a SIM solution, but the most important thing is to be able to reproduce the same end-user experience offered for other, NFC-enabled handsets. He believes the sticker to be the better alternative, as one cannot expect all iPhone users to be willing to put one exact casing on their handset. However, the sticker will demand both a cloud based SE-solution as well as an entirely new distribution system, as the sticker will need to be personalized for each individual user.

Commercial environment

Regarding Visa and MasterCard being more expensive than BankAxept for the merchants, Gjersum refers to the European Commission's proposal to reduce the interchange fee, which is half of the transaction cost. This will consequently reduce the acquirers' commission fee and make it cheaper for the merchants. In the end, Gjersum says, this is a volume game, and if all transactions were moved over to Visa and MasterCard, their interchange fees and transaction costs would sink.

As both Visa and MasterCard plan to launch contactless plastic payment cards that are based on NFC technology and demand the same PoS-upgrades as mobile NFC, this will help pushing the merchants to embrace the new technology. In addition to merchants such as NorgesGruppen already requesting new PoS-terminals, all new terminals being deployed by both Nets and Point are NFC-enabled, and between them they have 70-80% market share. Only terminals provided by PayEx are not approved yet, but they will come in 2015.

Arne Munch-Ellingsen
Company: Telenor
Position: Senior Researcher
Telephone interview, March 17th 2014

Munch-Ellingsen is involved with NFC through the NFC City project, a user-led innovation project partly funded by The Research Council of Norway. The project is managed by Telenor and includes 7 partners: Telenor, DNB, TSM Nordic, FARA, National Institute for Consumer Research (SIFO), Troms City Council and the University of Tromsø. Its objective is to promote development and use of services for information exchange, access, ticketing and payment through new applications of mobile and NFC technologies.

TSM Nordic

Munch-Ellingsen focuses on the importance of Valyou being technology-agnostic in relation to the consumer's choice of handset. Regarding the service' value proposition towards the different actors in the ecosystem, his opinion is that this is rather limited, but recognizes that it is about a simpler, more convenient solution for end-users.

Seeing as the consumers are not the customers of the service, in the sense that they're not the ones paying for it, Valyou needs a value proposition towards other third parties as well.

Competition and new entrants

Being first mover in the market is an important factor that will influence both what service and technology will become dominant. The question is whether TSM Nordic is able to conquer the market before other actors enter. This is also a matter of the additional investments being done in the ecosystem. If the banks and merchants decide to go for this solution, it will contribute to NFC's footing, and prevent adoption of other technologies. The most pressing matter on this subject being the replacement of the PoS-terminals. Also the technical integration towards the banks is a costly operation, but Evry has already done extensive work on this front.

Unlike other TSM-actors entering the ecosystem, TSM Nordic has a clear advantage in being a solid actor supported and owned by serious and renowned companies and brands with established integrity in the market.

Banks

An obvious benefit for the banks as service providers is that mobile payment solutions are not just an additional cost, but rather it will replace todays manual card distribution system, which is costly in itself. Nonetheless, at least in a transition period, the customer would still need their physical cards as well, as not all shops and PoS-terminals accept NFC.

Consumers

As far as the actual wallet solution goes, Munch-Ellingsen is skeptical as to whether the consumers will adapt this way of using mobile services. They are used to each individual service provider offering discrete applications for their own services, and organizing them in folders in their own manner, in a way making their own wallets. And if HCE becomes available for payment services, there is nothing standing in the way of banks offering card emulation within their own, existing applications.

Technological environment

Munch-Ellingsen's opinion is that for the time being, it is rather uncertain what technology will prevail in the mobile payment industry. In discussing the position of BLE, he refers to the US market, where small and medium enterprises, to a much larger extent than in Norway, use PoS systems based on i.e. iPads, rather than the terminals that are normal in Europe, which means that they already have the infrastructure in place to adopt BLE and beacon solutions.

However, actors that have started to consider BLE, maybe Apple in particular, does not necessarily plan to use it for the actual payment transaction. It is more of a holistic and fully integrated in-store user experience – something more than payment, that follows the user

before, throughout and even after the visit inside the actual store. So one might imagine some sort of co-existence between the two technologies, supplementing each other.

Regarding HCE, Munch's general opinion is that it opens the NFC market up for any actor who wants to develop an NFC service, not being dependent on access to a local SE. A weakness if it is connected to a cloud SE is that the consumer would have to be online in order to perform a payment transaction.

Standardization and regulative environment

There are uncertainties regarding whether payment schemes like Visa and Mastercard will approve new technical solutions like HCE for payment services. In his opinion, it is a matter of Visa's own risk assessment, and not any governmental or regulatory decisions. He argues that it is just a matter of time before it will happen, as there probably will be developed secure solutions for HCE as well to meet the necessary demands, potentially also hybrid solutions where an HCE-application can communicate with an SE. And in that case, HCE will be able to challenge the established SIM-actors in the ecosystem, and so it would be beneficial for TSM Nordic to consider options for HCE as well.

Lena Langrød
Company: Telenor
Position: Business Developer
Telephone interview, March 21st 2014

Langrød's involvement with NFC payment dates back to the Tap2Pay project that was initiated in 2010, where she was a part of the management group whose responsibility was to carry out the test project to evaluate its viability in the market. The project was conducted in cooperation with Visa, MasterCard and a number of selected merchants in the Oslo area, and approx. 200 users. The project results showed great enthusiasm from both consumers and merchants, which resulted in the conclusion to continue both Telenor's and DNB's commitment to NFC, and start the development of a strategy to implement NFC. Since then, Langrød has been project manager for developing the Valyou wallet-application as well as a roadmap for the rollout of Valyou through 2014, before she went back to Telenor Norway in January 2014, where she now has the responsibility for Valyou from Telenor's side.

TSM Nordic

Regarding the wallet solution, Langrød agrees to the notion of it being perceived as just a portal to other applications - an app-store for payment applications. However, she explains that the intention is that the user will not have to worry about opening any apps at all and

just needs to tap the phone. In addition, the rationale of the wallet being a secure area speaks in favor of providing a good user experience through the user being able to gather all sensitive information and valuables in one place. The fact that the increased opportunities in managing the life cycle of the emulated payment card enables changing the cards cvv2-code for every transaction will make it even more secure than a regular plastic card.

MNOs

From Telenor's perspective, they are now in the process of planning how to market Valyou. This depends on what merchants will be ready to accept the service, as well as what banks will be providing their services through the wallet. As Telenor already has a number of ready handsets in their network and knows what customers they can offer the service to, the challenge lies in identifying what users also have an account with the right bank, as only DNB cards will be ready from the beginning. As such, a grand announcement of the service to all of Norway might not be the smartest move, but rather focus on including more banks and ensuring that the merchants enable the PoS-terminals. She describes the situation as a chicken-and-egg situation as there is a need to involve several different actors at the same time, but that this will resolve itself as soon as all the technical issues are resolved and potential service providers actually are able to see how they can benefit using the service.

Langrød also stresses the importance of recruiting additional MNOs, as Telenor only reaches 50% of the market. And even though being first mover on the market can provide opportunities to gain new customers, the benefits of paving the way will not make up for having to take the entire investment cost themselves. Gaining total market acceptance for NFC-services is more important than stealing a few customers from the competing MNOs.

The value proposition of NFC services towards the MNOs is the opportunity to sell storage space on the SIM, as a subcontractor to the TSM. However, Langrød also confirms that replacing all existing SIM-cards with new NFC-enabled ones will be a large investment for the MNOs, but furthermore that at least Telenor has committed to do so.

Consumers

When asked about the challenges of attaining a sustainable mobile payment ecosystem, Langrød focuses on the importance of offering an attractive service to the consumer. Payment alone will be exciting the first times the user taps the phone, but after a while, he will demand something more – "the unique shopping experience", meaning services related to what he is buying, payment efficiency as well as information relating to before- and after-purchase activities. The user also want's the service to be relevant to who he is, and not who

wants to reach him, in terms of content such as loyalty and advertising. This is both crucial and attractive to the service providers as well, and something Valyou is attending to.

Technological environment

TSM Nordic wants to offer the service to iPhone-users as well, without having found a good solution yet. As far as choice of technology goes is not really important, as long as it can provide a seamless service to the consumer through a manageable value chain for TSM Nordic, meaning to remain a certain degree of control of the involved parties, to be able to ensure the quality of service (QoS). And even though Telenor wishes to focus as much as possible of the NFC efforts on a SIM-based solution, they realize the need to explore other options to reach e.g. the iPhone users.

When speaking of how new technologies can lead to paradigm shifts and several new entrants will fight for new positions, Langrød believes that one technology will build the market, being SIM-based NFC, but that other technologies can follow and supplement and improve certain areas of different services. Regarding HCE, she says that it will still need some one responsible of keeping the value chain, coordinate the back-end structure and attend to customer needs and the life cycle management of the services, so it will not necessarily be any cheaper for the service providers.

Bent Bentsen
Company: DNB
Position: Senior Advisor
Telephone interview, March 18th 2014

Bentsen is managing mobile infrastructure matters at DNB. He has been working with the implementation of new technologies in DNBs services, and has been engaged in a number of projects in cooperation with different MNOs, such as BankID and the Valyou (Tap2Pay) project. He has also been general manager at TSM Nordic since the beginning in 2008 until 2013. Today, his involvement with Valyou concerns the technical design of the TSM solution, alongside the responsibility for the interface and technical processes towards DNB.

Competition and new entrants

On the question of competitive threats, Bentsen sees the basic challenge as whether NFC as technology will prevail. There are other initiatives focusing on technologies like QR codes and beacons, but as for Norway, the banks are mainly focusing on NFC. The reason for this being that NFC forms within the banks' established framework for card issuance and the merchants' payment networks. Therefore, alongside the possibilities for promotion and

building value through the virtual cards, the banks see it as a much better fit than other evolving initiatives in the mobile payment industry, and believe that solutions like NFC and Valyou can provide a stronger interface towards the consumer and make the bank more visible in the user experience.

Regarding competition from large international actors like Apple and Google, the banks do not have any incentives to involve these actors in the local market, as the banks might become negligible actors playing on others' terms, not being heard when it comes to how things will be organized. Furthermore, mobile payment services are very dependent on the regional and local markets, so it will be challenging for these large, international companies to compete with Norwegian actors who know the market better.

MNOs

The major challenge for the MNOs is to convey added value beyond offering the infrastructure enabling SMS, voice, NFC and data transfer. They have few other value-adding services, hence differentiation between the MNOs are almost non-existent.

An incentive for the MNOs is that as more and more services attached to the SIM become available, one of the main hypotheses is that this might help reduce churn, raising the threshold for consumer to change network operator. So there might be a brief first mover advantage, before the service becomes a commodity.

Banks

One of the main challenges in establishing a stable ecosystem around Valyou is the integration towards and development of the banks' technological back-end systems. This includes both the change from traditional plastic cards being ordered and issued in batches from the producer to a virtual real-time operation, and the fact that emulated cards have a different and more dynamic process of life cycle management.

In the long term, the banks' goal is to replace the plastic cards completely, but Bentsen has a vigilant opinion of this being a slow-moving evolution. The plastic cards will live a long time yet, but as the new platforms and architectures become more standardized and well established, the evolution will gain momentum. This transformation will not lead to any significant cost reductions though, as the cost of issuing physical cards will be replaced by the cost of renting space on the SIM-card.

Merchants

There are two challenging aspects of including the merchants in the ecosystem. The first being hardware, and the need to install new NFC enabled PoS-terminals. This has however

proved to be less of a challenge than first anticipated, as most new terminals being installed in the Norwegian market are compatible. NorgesGruppen has already changed all of theirs, and Bentsen believes other merchants will follow as soon as they start to realize the value proposal of making low-value payment transactions as easy and efficient as possible.

The other challenge is related to the national payment scheme, BankAxept, which has no interchange fees or extra costs for the merchants. This system does not support contactless functionality, so Valyou has to be based on Visa or MasterCard, which is considerably costlier. Hence, it will be a trade-off between increased simplicity and convenience for the consumer and increased costs by moving a larger share of the transactions over to the latter payment schemes.

When the loyalty program services are introduced, this will utterly enable the merchant to increase their customer experience, through positioning the mobile device in a comprehensive shopping experience in that there are so many different interaction opportunities, where payment is only a closing factor. These loyalty programs can have different features, like 1) the customer collecting points to collect at a later time, like Trumf or Coop. 2) Coffee-cards and such – get the fifth for free. 3) Coupons, distributing targeted advertising that triggers the consumer to go to the store and redeem the offer, and profit from additional sales of other goods and services.

Commercial environment

There is currently a discussion going on between the banks owning BankAxept about whether to further develop the system or not. A new system will probably not entail upholding today's low cost level. Today, the banks take all the transaction costs of BankAxept themselves, where as systems like Visa and Mastercard allocates these costs between different actors, including the merchants. Furthermore, Bentsen refers to recent regulations made by the European Commission making the cost of accepting Visa and MasterCard lower for the merchants in the future. Hence, in relation to the additional costs for the banks to further develop BankAxept, it is implicit that its current business model will not be continued, and conclusively that it will not differ that much between what scheme the merchants use.

Kristian Klavenes

Company: NorgesGruppen
Position: Marketing Director in Value-Adding Services
Telephone interview, March 25th 2014

NorgesGruppen is Norway's largest retailer, with approx. 40% market share in the grocery retail sector. Their core business is retail and wholesale operations for consumer products with main focus on grocery and convenience stores. Klavenes works in a centralized unit within NorgesGruppen, focusing on value-adding services and initiatives across their different brands, and was involved in the Tap2Pay project with both Deli DeLuca and Kaffebrenneriet. He also has a background from both a payment service provider as well as within the banking industry.

TSM Nordic

NorgesGruppen is very interested in adopting Valyou, but their main concern about the service and contactless payment in general is that it does not support their loyalty program Trumf - a system to collect bonus points in their stores and used in 40% of their total sales in the grocery segment. The problem is related to a technical matter as the system is registered to the customer's bank account number with BankAxept, rather than the Visa or MasterCard card number, which contactless payment transactions is based on.

He also point to the fact that Valyou neither will be released with ready solutions for any other existing loyalty programs, exclusively focusing on payment, which implies that for any loyalty program connected to the bank accounts through the payment card and BankAxept, the consumer will have to go back to bringing their physical loyalty cards.

Merchants

Klavenes' opinion of the service's value proposal towards the merchants is the ability to accommodate the consumers' wishes to use a mobile payment solution, and to keep up with technological trends. As far as the added value of potential user profiling through the new services goes, Klavenes says that they already have a pretty good idea about the general buying behavior through purchase data and the Trumf system. What they need is a solution to increase service sales within convenience, where there is not enough consumers or money involved for such a large overarching loyalty program like Trumf.

Consumers

Klavenes tells us that so far, NorgesGruppen has not been addressed by any consumers asking to use contactless payment, and he is rather skeptical to Valyou's value proposal towards the consumer in general, even though he recognizes both a fun factor as well as the convenience aspect of the service.

He also stresses the importance of including as many banks and MNOs as possible, to reach out to the entire market. He draws the parallel to BankID to demonstrate how time demanding it can be to commercialize such a service unless you engage these companies from the beginning, to ensure a wide enough consumer base and share investment costs between additional actors. However, he says that he believes TSM Nordic to be well on their way to recruit several of these actors, and comments briefly on that the perhaps largest challenge in ensuring a wide consumer base is Apple's lacking NFC-compatibility.

Commercial environment

Klavenes confirms that NorgesGruppen already have replaced all their PoS-terminals to support NFC, and furthermore that this is not an as expensive process as one might believe, as NorgesGruppen does not own, but rather just rent the terminals from the PSPs. However, the terminals are not yet activated. For that, they want to await the final solution and business proposal from TSM Nordic, as there is no real monetary incentive yet, as well as the need to find a solution for the Trumf issue first.

Furthermore, he tells us that NorgesGruppen today has 5% of their transactions on credit card based solutions like Visa, MasterCard, Diners and AmEx, and that they pay twice as much in transaction costs to Teller for these services, as they pay the banks for using BankAxept. If all transactions were to go through Visa and MasterCard instead, NorgesGruppen is looking at increased costs in the area of NOK 300-500 mill, which would have to be resolved through surcharges – either charging the consumer for the transactions, or increasing prices on their goods and services.

As the banks recently sold Nets to international investors, there is a chance of BankAxept being closed down, as its operator might disappear, as well as the banks no longer owning them. Thus, the banks have even less of an incentive to keep the system alive and might switch to more profitable solutions like Visa and MasterCard.

Thomas Normann
Company: MeaWallet
Position: Technical Sales and Business Developer
Telephone interview, March 20th 2014

As a student from the Norwegian University of Science and Technology with a degree within communication technology, Normann has worked for MeaWallet (previously TrustNordics) since he graduated in 2012. His main areas of responsibility have been business development, technical and sales.

Competition and new entrants

Normann says that TSM Nordic has done a good job in educating the market, and compared to other European countries, Norway is in the forefront. However, competitors can also benefit from the market being educated, and he believes that the mobile wallet market is most likely to be dominated by two or three large actors, not just the one.

MeaWallet started as a commercial TSM broker in 2011, but invested in developing a mobile wallet solution in 2012, making the value proposition more of a complete product offering. Offering both the necessary framework, and a wallet gave a lot more traction in the market. This was followed by the purchase of TSM software and MeaWallet is now a complete system with a handset application, servers and back-end systems.

Normann continues to explain how MeaWallet relates to the traditional TSM infrastructure. Theoretically, MeaWallet could cooperate with TSM Nordic to offer a combined set of services in each of their wallets, through TSM-to-TSM connections. If two wallets are connected to the same technical TSM hub, they will most likely move towards sharing their services and offering a broader span of these.

Normann continues by explaining how he believes there is too much focus on payment as a service for wallet solutions. He says MeaWallet is going to focus on less secure services, like loyalty. This requires less simultaneous action by several big and not so agile stakeholders, less changes in consumer habits, and will be easier bringing to the market. Another possible service is access. Normann sees this as a low-hanging fruit, as very little technical integration would be needed to move an access card to the handset, but access to a SE would be necessary. This is why they are talking to Telenor and TelieSonera about renting SIM-space, but the profitability in access cards is much less than for payment cards, so the price for renting space on the SIM-card should reflect this.

Regarding mCash, Normann believes the service is too narrow to succeed, but if they get enough users, they will have a lot of power towards both banks and merchants. Their main

issue is, however, that they have to implement a new infrastructure of QR codes from the ground up. This is the reason for slow adoption in Norway, and it also makes it hard to replicate when entering new markets.

MNOs

Talking about the MNO's role, Normann points out how these actors are looking for new revenue streams, much because they are becoming more and more a infrastructure supplier, instead of a provider of value-adding services. NFC has for some time been seen as a way to change this, and for the MNOs to take a central role in a whole new ecosystem where they control the SE, and therefore can charge almost what they want, which he believes is partly the reason for NFC's slow adoption.

Merchants

Normann stresses the fact that NFC transactions have to be processed through Visa or Mastercard. He continues to argue how NFC may make the merchants appear more innovative and increase their shopping experience for the consumer, but that these benefits are very hard to quantify, and as the transaction costs are substantially higher for the merchant, they are not profiting on this from a monetary point of view. He continues to explain how once BankAxept creates an NFC-scheme, the incentives for the merchants to join the ecosystem increase, similar to what will happen if Visa and Mastercard lower their interchange fees.

Consumers

When asked what remains to get this ecosystem properly established, Normann says that the key success factor is the user adoption. If enough users are engaged, including more merchants will be easy. This will in turn make it attractive to yet more consumers. As one of the key elements in the sustainability of this ecosystem is user demand, Normann believes that the service needs to create value for the consumer from day one, and all skepticism concerning use and security must be eliminated before its introduction.

Technological environment

Normann explains how EMVCo is announcing a new standard or specification concerning what is known as tokens. This standard makes a cryptogram which pre-approves payments up to a specified amount through the cloud. Such a service would require the user to download tokens when he is online, but that the payment can happen offline. Accordingly, once the SE becomes obsolete, the data could just as easily be transferred through BLE. However, in the Norwegian market, NFC enabled terminals are already established to a great

degree, which may indicate a bigger feasibility of NFC payments. In other countries however, the much cheaper BLE beacons has an advantage.

Steinar Brede
Company: Sintef **Position:** Senior Research Scientist, Software Engineering Trondheim, March 20th 2014

Brede is currently working for a company called SimLink, a developer company owned by Sintef and Telenor working on combining SIM-technology and BLE communication. Brede has previously worked for Telenor, and has extensive experience within communication security technology.

TSM Nordic

Brede is mainly concerned with the technological aspects of the service, and when considering the different possible options for TSM Nordic, he is positive to and stresses the importance of how TSM Nordic should consider different solutions including both HCE and BLE as well as QR codes, should these turn out to be the dominant solutions being picked up in the market.

Brede's general concern about the adoption of the Valyou service is to a large degree related to the investments required by both the banks and the MNOs, in addition to the issue of increased transaction costs for the merchants by having to use Visa or MasterCard. Overall, if it gets too complicated who can use the service and not, depending on type of phone, type of SIM, the right bank and a particular application, in addition to a limited set of user places, then TSM Nordic will really have issues in getting consumers to adopt the service. Hence, full market reach is key, and the main focus for TSM Nordic should be to start with involving the other MNOs. He continues to explain how them taking a strong role in the ecosystem is beneficial, due to their extensive knowledge of and reach in the local market.

Competition and new entrants

Brede tells us about the iBeacon, and how Apple are signaling that they are moving away from the traditional shopping experience and the approach of trying to mimic the current way of paying with cash or card, through providing a richer shopping experience. This is also the situation with PayPal, who also tries to increase its share and control over payment transaction, and Brede points to how they already have a large installed user base in Norway, but currently, this is primarily for online payments for international transactions. However, Brede believes that once an NFC ecosystem is established and in use, it can resist most

potential newcomers using different technologies. Furthermore, he believes that this can be achieved by leveraging the strong market power of TSM Nordic's main parters and force the service to the market. TSM Nordic can then focus on lowering costs and pressure the prices should a new actor try to enter the market, something he describes as a classical first mover advantage.

Banks

Brede explains the rationale behind the interchange fee, and how the banks have usually been paid for taking the risk of guaranteeing a payment transaction. As this is being done online and real-time these days, there is in theory no longer a reason to support the transaction cost, as there is no longer any risk connected to the process. Furthermore, he tells us how he believes the interest shown in payment from actors like Apple, Google and PayPal, or Telenor for that matter, is a sign that in a 10-15 year period, the banks are not the ones controlling payment transactions anymore, and that more progressive companies will have taken over.

Furthermore, Brede finds it strange how not more attention has been given to enable NFC with BankAxept. He argues that even though the banks might have incentives to move away from the current model, entirely basing the new solution on the Visa scheme is risky, as it might prove hard to exclude them on a later stage, when more banks are involved and a potential new BankAxept model is ready.

Consumers

Brede expresses some doubts related to the value proposition of Valyou towards the consumer. He exemplifies this with how NSB, Ruter and SAS all have their own payment applications already, to which he does not see what Valyou can add.

When asked about his thoughts on Apple not supporting NFC, Brede is somewhat pessimistic. As iPhone has a 35% handset market share, this is currently a very limiting factor to the over all market reach potential of Valyou. The main point for user adoption, he says, is that the transition cannot be too extensive or demand too much of the consumer. Thus, reducing the consumer's perceived switching costs. This is why NFC enabled casings probably is not the right solution to including Apple users, as he sees it as a too big of a change in the consumer's existing user habit.

Technological environment

Bree explains that NFC is intended to work in one of two ways, either controlled by an SE on the SIM-card, or by an embedded SE in the phone. When asked about how HCE fits into the equation, he believes it to be a diversion of the security question, and that it is a serious issue

to move secure applications away from a hardware SE, although he acknowledges that a lot of other security developers rely on cloud solutions.

He continues to explain that this to some degree comes down to costs. For a cloud solution, the security key is hidden in the software, making it vulnerable for attacks. This forces you to continuously develop and defend it. This continuous battle is costly, and is a problem automatically solved if you rely upon hardware security. Thus, he believes TSM Nordic's chosen SIM solution to be the best solution, security wise.

Regarding HCE, Brede worries that it might destroy the overall image of NFC as a secure technology for payment and ticketing. With anybody being able to develop a HCE application, NFC risk being associated with games and other frivolous applications, thus marginalizing the MNOs main value proposition in the long run, that is being a provider of trust, with a closed system that consumer can have complete confidence in.

Alexander Lujit
Company: UL **Position:** Business Development Manager, Transaction Security Telephone interview, March 19th 2014

UL is an international consulting company providing advisory services, with m-Commerce being one of their main markets. Lujit's current role is consulting business developer for the mobile services UL is involved in, both from the banking as well as from the MNOs perspective. UL has been engaged with TSM Nordic since the Tap2Pay pilot program, and their involvement has included everything from the initial workshops to the development of the business case, product definition and design, technical development and testing, as well as marketing and procedural management.

TSM Nordic

On the subject of TSM Nordic's value proposition, Lujit argues that the general trends in the market are moving towards the mobile phone. Both banks and MNOs recognize this, and see new emerging solutions entering the market – one of them being the replacement and enrichment of the traditional wallet. The proposition towards both the banks and MNOs are the ability to create new services that benefits the end-user.

One of the most important aspects of TSM Nordic's business model is their aim to combine multiple banks with multiple MNOs, and create one standardized platform, which he believes to be crucial for its success. This is also a quite unique solution, as they have both a bank and

an MNO as owners, and wallet solutions in other markets tend to be more MNO-centric. From implementation perspective it is really difficult to have many different solutions in the market, as well as from a user acceptance point of view. Additionally, as the infrastructure is quite expensive, this business model helps sharing the investment costs, and could potentially help both banks and MNOs to reach new customers.

Competition and new entrants

Competition from large over-the-top players like Google and Apple with their iTunes Store is potential threats to the ecosystem. Their advantage is an already large installed user base. Their main challenge is the necessity to cooperate with local actors, and for now, it is looking great for TSM Nordic, Lujit says, although adding that TSM Nordic needs to focus on engaging the remaining MNOs to be able to reach the entire market.

MNOs

Regarding the MNOs' motivation for engaging in the mobile payment ecosystem, Lujit points to how service providers like Skype and WhatsApp are eating away at the traditional communication services, and that MNOs see the mobile commerce/payment market as a solution to avoid becoming just a supplier of technological infrastructure, in an opportunity to create value-adding services.

Banks

Lujit explains how the banks' incentive to engage in the evolvement of mobile payment solutions is caused by their wish to increase the interaction with their customers, in addition to the threat of being replaced by other actors. As more actors become able to issue payment cards and handle transactions, service innovation is crucial for the banks in keeping their customers.

One of the challenges in commercializing NFC payment services is the need for large companies that aren't used to cooperate, now need to start doing so. Banks and MNO's are coming from completely different worlds, and have different ideas about value creation, innovation and risk focus. For example, in product development, MNOs can simply try out a new application in the market and see what the customer feedback is. For banks, their services are much more sensitive in terms of security.

Merchants

Lujit sees the involvement of the merchant as a crucial success factor for the ecosystem. The development has so far been driven by banks and MNOs, but the merchants need to be involved as these are the actors that will enable and promote the new method of paying.

Loyalty programs and advertising possibilities are mentioned as main incentives, as well as attracting more customers and simplifying and streamlining the payment process.

Technological environment

As a secure element, Lujit believes the SIM to be the better alternative, at least in the short to medium term, because it provides a local security area on the handset enabling local identification of the user, without having to be online. He mentions embedded SEs in the handsets as a viable alternative to the SIM, but that there is no apparent reason for the service providers to demand a shift to an embedded SE-solution, so there is no immediate threat. He believes that the future discussion will not be whether the SIM and the SE will be replaced or not, but rather how solutions like HCE can enable less secure services such as loyalty. However, the more services that stay on the SIM, the more beneficial it will be for TSM Nordic, or at least for the MNOs.

In relation to BLE, NFC has the big advantage that it is close distance communication, and that it is already installed in many contactless interfaces. It is also already accepted by the payment schemes. For BLE this is different, BLE is long distance and most people now look into BLE for promotional and advertising services. Although it is possible to make payments with BLE, it needs a different payment set-up, which is unusual in Europe, demanding investments in new infrastructure. BLE is not necessarily a direct competitor, however, since iPhone currently doesn't support NFC, a lot of people are looking into it.

9 ASSESSMENT OF CHALLENGES

The second goal of this master thesis is to uncover what challenges are most important for TSM Nordic to solve in establishing a sustainable business ecosystem and model, in order to successfully implement NFC-based mobile payment in Norway.

A business model describes the rationale of how a company creates, delivers and captures value (Osterwalder and Pigneur, 2002). Osterwalder and Pigneur propose basing an analysis and description of a business model on four elements; 1) the *market*, 2) the service's *value proposition*, 3) the *infrastructure* and 4) the *financial aspects* covering costs and revenues.

To identify the different challenges, we base our assessment on the abovementioned understanding of a business model. We will start by addressing the financial aspects of TSM Nordic's intended business model in terms of costs and revenues. This will provide the reader with a better understanding of TSM Nordic's motivation for driving the establishment of the ecosystem.

In the subsequent assessment, we will address the first three elements presented above by applying the proposed framework, as shown in Figure 17.

We start by assessing the outer facet of the framework, the contingency factors, which will include the *infrastructure* element. Understanding the underlying preconditions, current status and relevant trends for NFC mobile payment is essential in order to understand the environment in which TSM Nordic has to operate. The contingency factors may create challenging conditions for TSM Nordic, and explicit challenges resulting from such conditions will be discussed as we assess the inner facet of the framework, under each respective ecosystem actor being affected by these conditions.

The inner facet concerns what we have defined as the interrelated market factors, and what Osterwalder and Pigneur (2002) refers to as the *market;* the key actors in the ecosystem and their interrelations. In order to properly understand these actors' motivation for, and challenges with joining the ecosystem, the *value proposition* of TSM Nordic's business model towards each group of key actors is presented (minus the competitors). Key challenges related to each group of actors are then identified.

The assessment is based on findings in the conducted interviews. As previously mentioned, the summaries of these presented in the previous chapter are meant to give an impression of the discussion, but are no extensive record of all the topics covered. Arguments and opinions not present in the summaries may therefore still be used in the following sections.

Additionally, other empirical data from secondary sources are utilized in the assessment to support and supplement our findings.

Hence, the following assessment constitutes of three parts:

- Section 9.1 presents the financial aspects of TSM Nordic's intended business model
- Section 9.2 assesses the contingency factors to describe the environment
- Section 9.3 assesses the interrelated market factors, including a presentation of the value proposition towards each group of actors and their related challenges

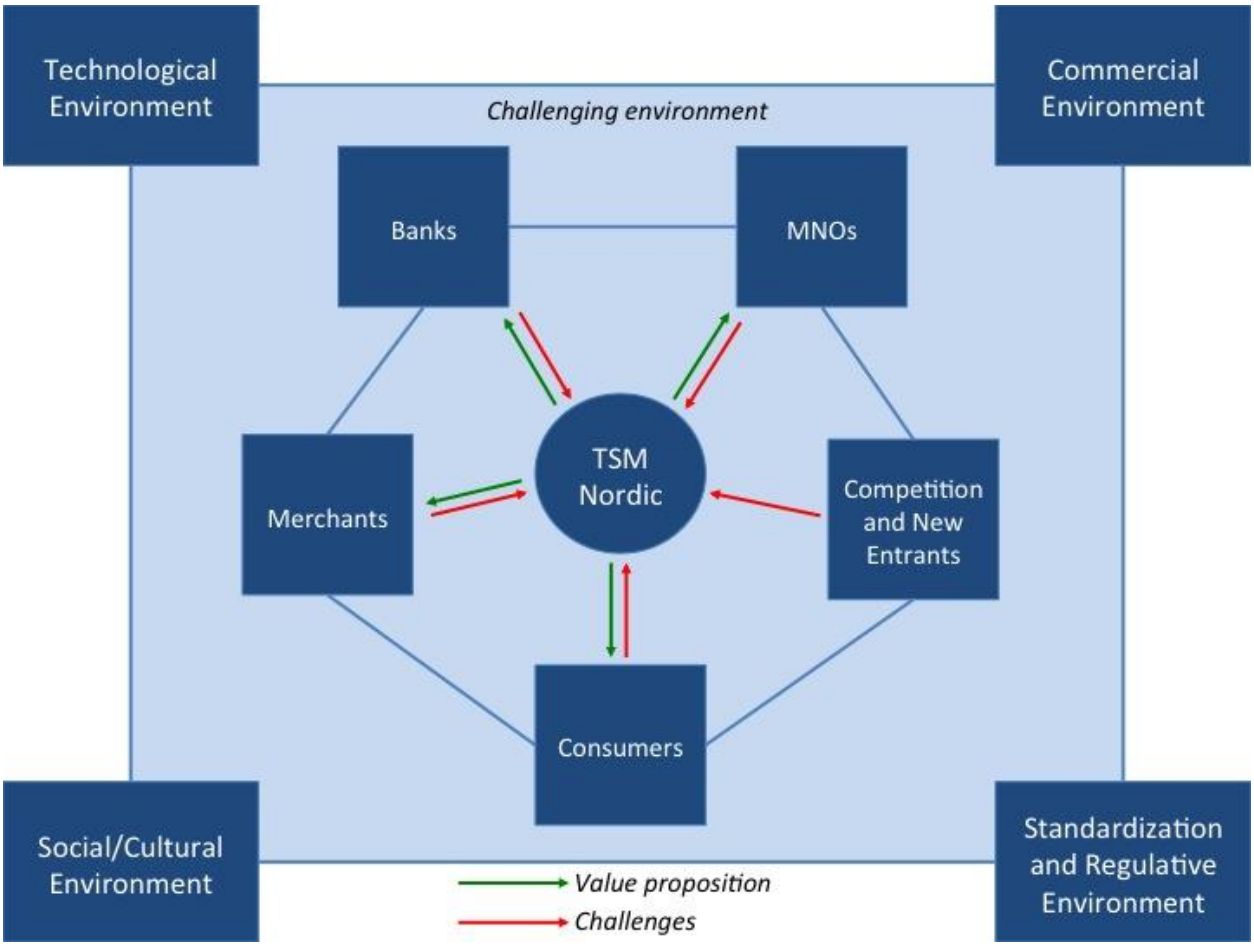


Figure 17: Application of proposed assessment framework

9.1 FINANCIAL ASPECTS OF TSM NORDIC'S BUSINESS MODEL

Before assessing the different contingency and interrelated market factors, we will present the financial aspects of TSM Nordic's intended business model, and include a brief discussion of revenue streams and costs, which believe this will provide the reader with a better understanding of the subsequent discussions.

Revenue generation

The technical role of a TSM has been explained in section 6.2. In this section we focus on which monetary transactions TSM Nordic are connected to. The company will initially have three sources of income. First, service providers will pay an on-boarding fee for technical integration and for their card being placed in the wallet (Gjersum). Second, service providers will pay for the rent of space on the SIM cards that TSM Nordic rents from the MNOs. This payment is currently a fixed cost per card per year. Third, TSM Nordic will receive fees from the same service providers for providing OTA and life cycle management of the services (Bentsen, Langrød, Salvador).

For the time being, payment is the only service TSM Nordic can support, making banks the only service providers involved (Lujit). This is also believed to become the main source of revenue. At the time, all cards will have to be emulated on a SIM card.

Being able to support loyalty programs is the next goal for TSM Nordic, after establishing the payment service (Salvador). The business model will most likely vary from company to company, but TSM Nordic will in most cases facilitate loyalty cards and advertising and take a share of the revenue created (Gjersum). This would entail all sorts of loyalty, which according to Bentsen can be divided into three groups:

- Bonus programs (Trumf etc.),
- Reward cards (get the 5th coffee for free)
- Targeted marketing (customized coupons and personal offers etc.)

Because the business model for loyalty is not developed yet, it is hard to say how large a monetary contribution it will make. Beyond this, TSM Nordic intends to extend the supported services to include P2P payment, transport and ticketing, access and key cards and digital receipts in the years to come.

The Valyou service will be offered to the consumer for free. The paying customers of TSM Nordic will therefore be all the third party service providers. However, the user experience for the consumers are crucial for TSM Nordic, as this impacts the service providers

willingness to pay for TSM Nordic's services (Brede, Langrød, Salvador). This value chain makes TSM Nordic overall responsible for the end-to-end quality of the service.

Costs

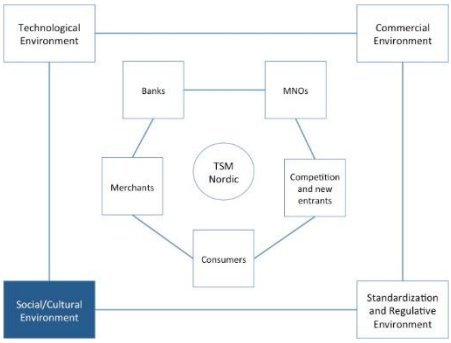
On the cost side for TSM Nordic, the main cost stems from paying MNOs rent for the SIM space. There will also be costs associated with the actual OTA provisioning and life cycle management, customer support, and the establishment and link-building to new service providers, MNOs, and merchants (Gjersum, Mobey Forum, 2011). An overview of both operating and capital expenditures is shown in the table below (Gjersum, Langrød, Salvador, Mobey Forum, 2011).

Table 6: TSM Nordic's revenues and expenditures

TSM Nordic	
Revenue Streams	• Rent for SIM space from service providers • OTA provisioning and life cycle management fees • One time on-boarding fee from service providers
Operating expenditures	• Rent for SIM space to MNOs • Fee to technical TSM - Gemalto • Customer support infrastructure
Capital expenditures	• Recruiting additional service providers, MNOs and merchants • Purchase of wallet solution from Toro • Establishing OTA infrastructure

9.2 CONTINGENCY FACTORS

Social and Cultural Environment



The social and cultural environment affects the way people behave, including consumption habits, buying behavior and because of this, also their need for new payment services. Therefore, changes and trends within this environment are important to comprehend when trying to understand the potential demand for a new payment service (Dahlberg et al., 2008).

As mobile payment is an area which currently receives much attention, there are many reports aiming to describe trends that may impact the mobile payment market in general, and NFC services particularly. Industry consultants, like Lujit, are observing these trends and sums them up in one statement: ”Everything is moving to mobile”.

Mobile devices have become central to the private and business life of today’s society. A mobile device user is already able to use the handset to (BearingPoint, 2012):

- Create documents, presentations etc. (a business device)
- Listen to music, play games, take pictures and record videos and memos
- Check email, access the internet
- Communicate with friends through web applications
- Access target-oriented information through installed applications
- Trigger financial events (online purchasing, transport etc.)

As a result, the number of mobile handsets and their data traffic is growing. To put the situation in perspective, 60% of consumers globally are expected to be using mobile banking to some extent by 2015 (Capgemini, 2012b).

Norway is quite distinctive in some defining ways when it comes to payment services and adopted technology. Among other things, the smart phone is highly prevalent compared to other countries, with 79% of Norwegians owning a smart phone (TNS Gallup, 2014). With a continuously growing mass of smart phones owners, more people will be able to use a mobile payment service, like Valyou.

The growth of mobile commerce in Norway is also a trend that indicates the increasing comfort consumers have in using the handset for new services. The most prominent users of mobile commerce are consumers between the age of 18 and 34. This new generation of

consumers has a need for, and has almost come to expect, simplification and seamlessness of services. 30% of all consumers have conducted a transaction on a mobile device at least once in 2013, and 50% of the traffic on a sample of Norwegian leading online retailers are through mobile platforms (Forbrukerrådet, 2014).

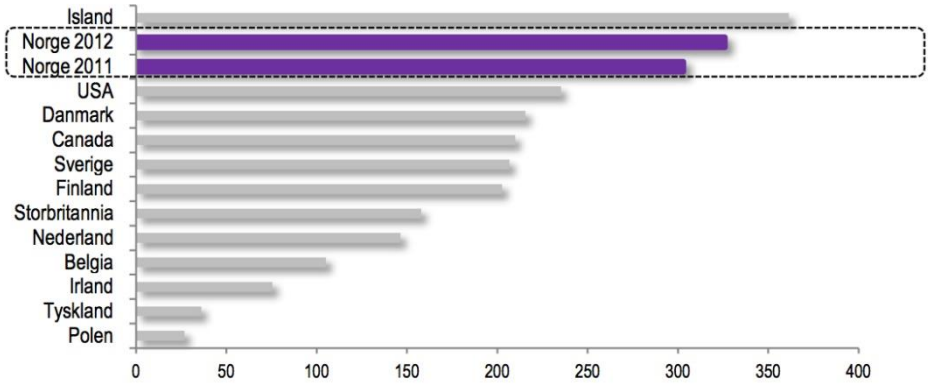
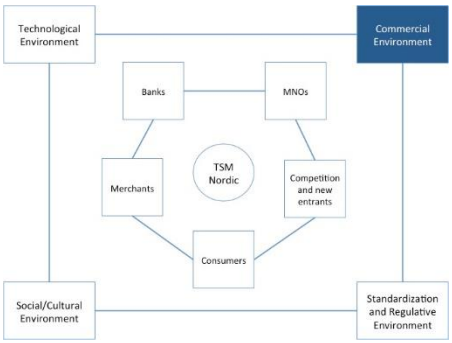


Figure 18: Number of card transactions per inhabitant per year

The Norwegian market distinguishes itself when it comes to the use of payment cards. Norway is one of the most payment card using countries in the world as can be seen in Figure 18 (Skjetne, 2014). As most cards in Norway are co-branded with Visa, the number of transactions conducted with a Visa card can be compared to other countries as an indication of payment card use. This is three times higher in Norway than the European average (TU, 2014).

There are indications that the Norwegian consumer is ready for this kind of solution. The pilot for Valyou, Tap2Pay, showed that 97% of the participants said they would use such a service if it became commercially available. The pilot was conducted among 163 participant, whereof 56 where ambassadors for the service (Evjemo et al., 2011).

Commercial Environment and Infrastructure



The current commercial environment includes factors such as development of the Internet and mobile networks into commercial channels and increasing automation and self-service orientation of payment services. Underlying this is the financial, telecommunication and ICT infrastructures and markets within the studied environment (Dahlberg et al., 2008), in our case the NNFCMPBE.

World trends

Currently, only 2,1% of Norwegian consumers are conducting proximity payments with their handsets (Skjetne, 2014). However, Capgemini analysts estimated a 53% growth in mobile payments worldwide in 2013 (Capgemini, 2012a), and Visa estimates that 50% of their transactions will be mobile by 2020 (Mobilen.no, 2012).

According to Open Mobile Media, an increasing number of merchants are turning to mobile commerce as a means of competing with online retailers. They continue to argue that the growth of online retailers therefore could be a driver of mobile payments (Open Mobile Media, 2014a). Juniper Research (2011) estimated an increase in use of mobile ticketing, with half a billion people expected to use such services by 2015.

The GSMA[1] illustrates the changes in digital commerce and payment services that we are currently experiencing, as seen in Figure 19 (Booz&Co, 2011).

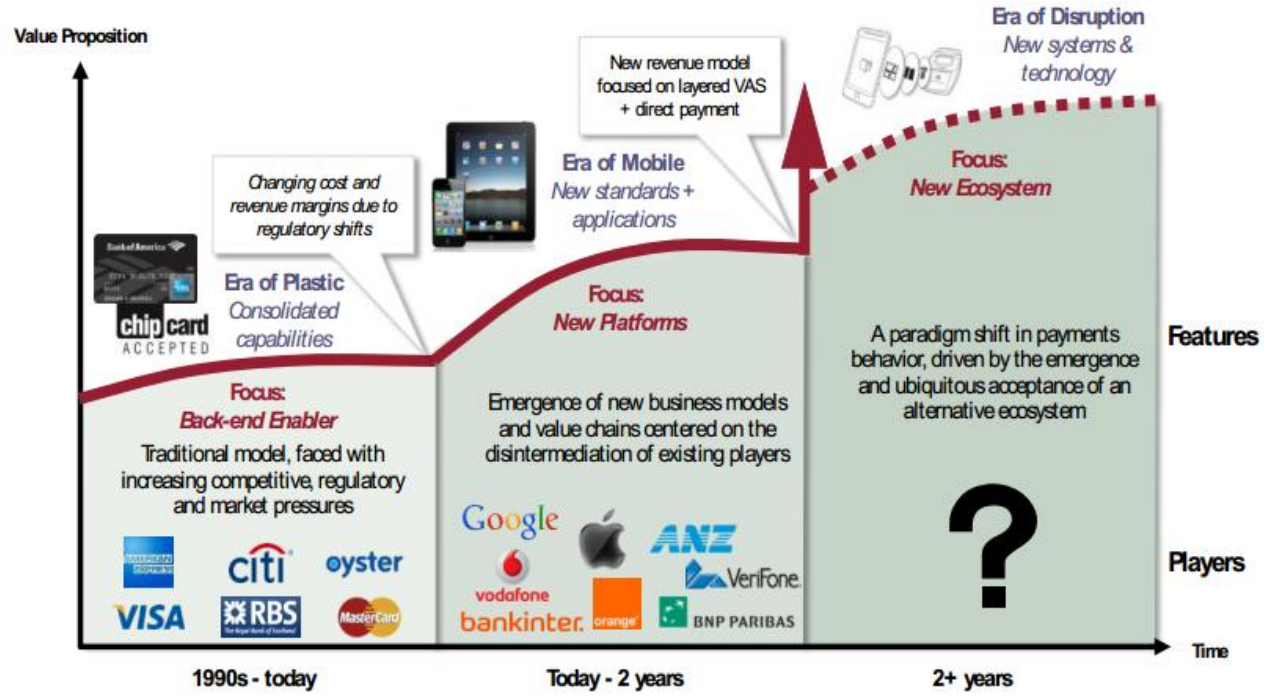


Figure 19: Changes in digital commerce and payment services

[1] The GSM Association consists of mobile operators and related companies devoted to supporting the standardization, deployment and promotion of the GSM mobile telephone system

Commercial roles

In a global context, MNOs are taking central roles in the development of mobile payment solutions. One main motivation for MNOs has been to ensure that the SIM-card becomes the standard for NFC payments, which they control themselves (Schamberger et al., 2013). The motivation for MNOs to take this role will be more thoroughly presented in section 9.3 on MNOs. Although the majority of main initiatives around the world have bilateral relationships between MNOs and Banks (NFC Times, 2014), it is foreseen that once the basic infrastructure is in place, an entirely new group of actors will enter the market (Salvador, 2013).

The involvement of MNOs can be seen in e.g. Japan, currently the country with the most developed mobile payment services and infrastructure (BearingPoint, 2012). Here, NTT DoCoMo, the most predominant MNO in the country has been a key driving force (NFC Times, 2011). Likewise, GSMA officially pronounced in 2011 that they would support the SIM-based solution for NFC payments (GSMA, 2011). If we look to the United States, the same trend is visible, where the main actors promoting NFC the most are the three main MNOs, AT&T, T-Mobile and Verizon. Together, these actors have created the joint venture, ISIS, a mobile payment service based on NFC.

Infrastructure

The success of the introduction of any payment service is closely related to its required infrastructure in the market (Dahlberg et al., 2008). For NFC, the necessary payment related infrastructure is, to a large degree, already in place, as it relies on the existing systems for smart cards (Gjersum). In addition, the SIM based SE solution requires a mobile network on which OTA provisioning can be done. The Norwegian mobile networks are fully capable of this (Langrød). Lastly, the banks need to develop back-end solutions to integrate with the new service.

Terminals

As Norway, together with Iceland, are the most prominent countries when it comes to payment cards use (Skjetne, 2014), virtually every merchant has a PoS terminal which accepts payment cards. Many of these have NFC functionality already, only needing a software update to be activated. This is in particular the case for NorgesGruppen's terminals, which have all been upgraded to support NFC (Klavenes).

Additionally, all new PoS terminals being installed in the market by the PSPs Nets and Point have NFC functionality, and PayEx's will too from the beginning of 2015 (Gjersum). Together with the already existing NFC enabled terminals in the market, this gives NFC a general great

coverage in the market, and a major advantage over competing mobile payment solutions (Klavenes). By 2017, 78% of all PoS terminals in Europe are predicted to be NFC enabled (Open Mobile Media, 2014b).

OTA infrastructure

To be able to conduct OTA provisioning and life cycle management of the emulated cards on the SIM card, one relies on the MNO's already existing wireless network (Smart Card Alliance, 2011). This is one of the benefits of choosing the SIM card solution and an explanation to why MNOs where chosen as the preferred solution by the payment schemes in their driving towards implementation of mobile payments (Schamberger et al., 2013).

Bank's back-end systems

On the banking side of TSM Nordic's required infrastructure, banks get their payment cards emulated onto the SIM card. This changes both the card issuance and the life cycle management processes for the banks. In order to integrate their necessary process with TSM Nordic and NFC payment, quite extensive technological changes are required to the their back-end systems. As will be discussed more thoroughly in section 9.3 on banks, this means a large investment for banks wishing to offer their services through Valyou (Bentsen).

Payment Schemes

The widespread use of payment cards in Norway is dominated by three payment schemes. The national payment scheme BankAxept makes up for approximately 90% of all payment card transactions, with Visa and Mastercard making up for most of the remaining market (Gjersum, Skjetne, 2014). BankAxept is owned by Finance Norway[1] (FNO) (Skjetne, 2014), and differ substantially from Visa and MasterCard in its business model.

The current cost for a merchant to process a payment transaction through Visa or Mastercard lies between 0,8 and 2,5% of the transaction amount, whereas BankAxept costs between 0,1 and 0,2 NOK per transaction (Salvador, Normann). Although many cards are co-branded with both Visa and BankAxept, the "prioritization rule" ensures that BankAxept is chosen at terminals that accept both schemes (Skjetne, 2014), and is accordingly a very beneficial solution for the merchants.

Because BankAxept is operated without an interchange fee, the entire cost of operating the scheme is currently being covered by the Norwegian banks, and is therefore not a profitable solution for them. On the other hand, if a transaction is processed through Visa or

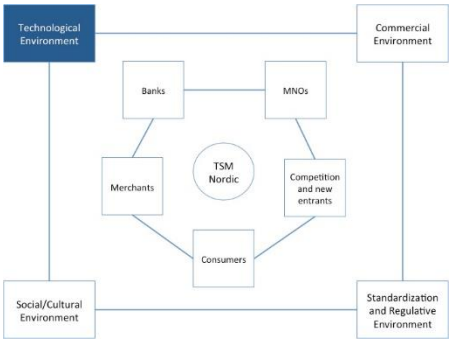
[1] Norwegian Financial Services Association, owners of the BankAxept payment scheme

Mastercard, the banks receive an interchange fee, a part of the transaction cost paid by the merchant, and is thus much more profitable (Bentsen).

When it comes to mobile NFC and contactless payments, only Visa and Mastercard have systems to support this. Accordingly, a merchant accepting a purchase with NFC, instead of a BankAxept payment card, is charged with a higher transaction cost, and gives a greater share of the profits to e.g. Visa and the card-issuing bank (Klavenes), as explained above. This creates a barrier for the merchants to accept and enable NFC payments, and will be further discussed in section 9.3 on merchants.

In the future, BankAxept may be developed to support NFC. FNO are planning to restructure the scheme and its business model towards 2020, as "the lack of direct income leads to the value of the current model appearing unclear to the banks" (Skjetne, 2014) – which indirectly entails that a new BankAxept model would be more expensive for the merchants (Bentsen). Bentsen also points to how developing such a new system will incur substantial investment costs, which utterly supports the notion of the new system's increased transaction costs compared to the current solution if the banks are to earn back the investment.

Technological Environment



In 2012, a survey among European top-executives within the m-commerce industry was conducted (Open Mobile Media, 2014a), indicating that two thirds of the participants believed NFC to be the dominant technology for mobile payments in the coming years.

NFC has become a mature standard (Langrød, Juntunen et al., 2010, Madlmayr et al., 2008, Schamberger et al., 2013), and Schamberger et al. (2013) further states: "From a technical point of view, there are no issues that prevent services that are based on NFC from being rolled out". Several trials have already been established and conducted around the world (Evjemo et al., 2011, Madlmayr et al., 2008).

However, there have not been any large commercial initiatives or mass rollouts yet, and through our research we realized that several diverging technological alternatives has emerged, fragmenting the market and blurring the vision of today's options and the future development of mobile payment.

The Open Mobile Media whitepaper on mobile payments (Open Mobile Media, 2014a) states: "There have been many triggers for NFC's loss of favor over the last year or two. One of the early influences might have been Apple's decision not to include NFC in its devises. Since

then, Apple has launched iBeacon, Google's Android HCE has been asserting its presence, PayPal has introduces its Beacon, and Bluetooth technology has re-emerged as a contender with Bluetooth Low Energy (BLE) after being dismissed as a strong candidate."

As no single technical solution isolated and explicitly stands out as the better alternative, this can result in potential ecosystem actors and decision makers being hesitant to invest in, decide on and opt for one specific solution. This is largely based on the fear of another competing solution entering on a later stage and trumps the market, which in turn prevents broad user adoption as there is no one-size-fits-all mobile payment method available (Open Mobile Media, 2014a).

Through our research we have tried to shed light on how the various technological directions might affect the NNFCMPBE, its actors and their roles, and what opportunities they may provide going forward. To better understand NFC's position, its strengths and weaknesses in relation to the alternatives, and whether the solution being wagered in the Norwegian ecosystem today will be sustainable, we have tried to identify these issues and illustrate the actual problems and concerns. We address the contingency factors in our framework relating to the technological environment, which according to Dahlberg et al. (2008) consists of "wireless and other related technologies which are used to develop mobile payment services".

During our research and data collection process, we were able to determine three separate aspects of concern relating to the technological environment, which will be presented in the following sections.

Skepticism towards NFC versus other technologies

As mentioned above, the emergence of competing technologies enabling mobile payments has left the market questioning the position and future of NFC. Specifically, this relates to Android's HCE, Bluetooth Low Energy (BLE) with its beacons and how they compare to NFC and QR codes. As HCE is a substitute for the SE rather than a separate technology from NFC, this will be discussed separately later in this section.

Bluetooth Low Energy in relation to NFC

Companies including both Paypal and Apple have announced BLE services like the Paypal Beacon (Paypal, 2014), and iBeacon (Apple, 2013), to enable customers to check into stores automatically, provide indoor mapping and related services. When a customer enters inside a merchant's "digital fence", his handset synchronizes with applications that show inventory, floor plans, discounts and pre-ordered items (Open Mobile Media, 2014a).

Although there are no final BLE proximity payment solution to substitute i.e. smart cards on the market yet, we will in this section explain and compare BLE technology in relation to NFC as data transfer technology in a payment transaction context.

BLE and NFC are both short-range wireless data transfer technologies, even though the range at which BLE operates is much longer: tens of meters compared to a few centimeters for NFC. Because of the longer range and low power beacons, BLE is ideally used for position information about a device in relation to its surroundings (e.g. mapping) (UL, 2013).

According to UL (2013) BLE has one main advantage over NFC in a strict payment transaction context, namely payment freedom. BLE enables connection to a PoS terminal or the cloud from anywhere within the beacon's reach, and thus enabling the customer to pay anywhere they want and avoid waiting in lines. Additionally, if it were to include automated connection and a pre-authorized payment transaction, hands free payments would be possible.

Secondly, as several of the interviewees pointed out, Apple does support BLE, but has currently not enabled NFC in their handsets (Bentsen, Brede, Gjersum, Langrød, Salvador). This issue will be further discussed in the next section.

In comparison, UL (2013) mentions four advantages NFC has over BLE:

- *Security:* The short distance requirement of NFC provides added visual security as the PoS is within the customer's sight. Secondly, spying on and interfering with sensitive data is easier with BLE because of the wide distance range.
- *Card emulation*: To process emulated card transactions, BLE will need both hardware and software that both complies with and is certified by the payment schemes. Considering the potential security issues mentioned above, this might be difficult to obtain.
- *Interoperability*: NFC is already compatible with existing contactless payment transaction systems, whereas BLE operates on a different radio frequency. Hence, NFC infrastructure with certified hardware and software is already available on the market and in place in an increasing number of user places.
- *Customer identification:* NFC links the merchant and customer together with a single tap, whilst BLE requires an additional step to select the right device (and customer). In addition to being time-consuming, if this process is done manually, it could be prone to human error.

These conditions were also confirmed by several of our interviewees (Bentsen, Gjersum, Langrød, Lujit, Munch-Ellingsen, Salvador). As previously mentioned, the payment infrastructure needed to adopt NFC services is to a great extent already in place (Gjersum,

Lujit, Munch-Ellingsen). BLE would therefore be a more suitable solution for markets like the USA where alternative payment solution such as cashier systems based on e.g. iPads or personal computers are much more common. (Klavenes, Munch-Ellingsen). And finally, the fact that BLE cannot be used in passive mode requires the handset to be turned on, and hence cannot be used if the handset should run out of power (Lujit).

However, our interviews revealed that BLE still might serve a purpose in the Norwegian market because of the value-adding services enabled through the wider distance range, such as in-store mapping or advertising, as a "more of a holistic or complete, fully integrated in-store user experience – something more than just payment, that follows the user before, throughout and even after the visit inside the actual store." (Munch-Ellingsen). And as such, BLE will not necessarily be a direct competitor to NFC in the Norwegian mobile payment market, but rather a supplement people are looking into for promotional and advertising services (Lujit).

QR Codes

Identified in the Open Mobile Media Survey (2014a) as another important method/technology for mobile payment, QR codes, or two-dimensional bar codes have also gained some attention in the evolving market.

Smart Card Alliance (2011) refers to the Starbucks implementation as the so far most established solution to explain how such a solution can work: "The implementation is a closed system implementation; it applies to one merchant only, and allows the consumer to execute a payment on a proprietary system. The bar code is scanned at the PoS and the customer's Starbucks Card account is charged accordingly. The bar code does not implement any type of dynamic data technology as part of the transaction authentication process". This description is a typical closed-loop transaction where the consumer needs a separate credit account for that specific service, to which funds are added from the consumer's regular bank account in a separate transaction process.

An open QR payment solution is also possible, where a third party service provider issues unique QR codes to merchants, and provides a handset application to the consumer, which is used to scan the QR code at the PoS (Mobilen.no, 2013). Similar to an online payment service, the consumer registers his payment card credentials in the application, and confirms the transaction on the handset when the service provider links the scanned QR code to the pending payment transaction information sent from that merchant's corresponding PoS. The PoS only needs a software update to enable the service (Munch-Ellingsen, Döderlein, 2014). This transaction requires, however, the handset to be both turned on, as well as connected

to the Internet, as compared to NFC which only requires the PoS terminal to be connected. As such, QR codes are a method to provide a proximity solution to online payment services. Its immediate advantage over NFC is that the application is available on all handsets.

Handset availability

Earlier academic research implies that the lacking availability of NFC-enabled handsets has been one of the main reasons for the technology's slow adoption (Madlmayr et al., 2008). However, this seems no longer to be the case (Brede). According to NFC World (2013), over 285 million NFC-enabled handsets were shipped in 2013, and Strategy Analytics predicts that one-third of all handsets being sold globally in 2014 will support NFC (Mobile Payments Today, 2014).

The continuously updated list of NFC-enabled handset models provided by NFC World (2014) includes all handset providers present in the Norwegian market, identified by TNS Gallup (2014), except for Apple. So far, Apple has not enabled NFC in any of their handsets, which could limit user adoption in Norway seeing as they have a 35% market share (TNS Gallup, 2014). This represents a barrier when it comes to the availability of enabled handsets (Bentsen, Brede, Langrød, Lujit, Normann, Salvador).

As there are speculations and rumors about Apple including NFC in their next release (Techcrunch, 2014), this problem might resolve itself in the future. However, as no one is able to talk to Apple about their intentions to confirm any future development (Gjersum, Salvador), other possibilities are being discussed as well.

There are two possible options for enabling NFC payment with an iPhone today (Salvador):

- *Sticker* with a passive NFC tag to attach on the handset surface.
- *Casing* with a passive NFC tag to holster the handset.

Both solutions will allow the consumer to transmit payment credentials to the PoS terminal, and will essentially act as a plastic contactless payment card in terms of functionality, data personalization and security (Smart Card Alliance, 2011). However, as opposed to an integrated SE (e.g. the SIM), such an external device would only be able to support one single payment card. Smart Card Alliance (2011) presents the following benefits and challenges for external devices (Table 7).

Table 7: Benefits and challenges of external NFC devices

Benefits	Challenge
Deployment can move more quickly, because availability of the devise is not tied to the availability of handsets and OTA provisioning services.	Non-integrated solutions can provide more options for distribution, but may add more complexity for supply chain deployment (e.g. inventory, supplier management).
Issuers can leverage the existing provisioning infrastructure for personalization and delivery of the device.	Non-integrated solutions may not provide a handset user interface, and thereby no wallet functionality to embrace value-adding services.
The payment networks and growing infrastructure for card-based contactless payments can be leveraged.	The performance of non-integrated solutions can be affected by the physical phone design (e.g. phones with metal bodies).
	External devices are typically from a single issuer, providing less flexibility for the consumer.

Several of the interviewees expressed concern regarding how to adopt Apple users (Gjersum, Langrød, Salvador). Neither the casing nor the sticker seem like viable long-term solutions to provide the same user experience that other handset users are being offered, which is the essential goal of TSM Nordic (Langrød), but an external device might serve its purpose as a temporary bridging solution, helping to create awareness of the service in the short- to medium term (Salvador).

Emergence of HCE

As presented in section 5.4, several of the reviewed academic papers focus on the many available options for the choice in different SEs. Depending on what SE is chosen, the responsibility of secure storage and the associated revenue will accrue to different members of the ecosystem (e.g. the MNO in a SIM based solution). The NNFCMPBE has already to a great extent established the SIM as the main solution or platform for the SE, supported by a number of key ecosystem members (Langrød). The emergence of another integrated SE solution is therefore rather unlikely, as no other (key) ecosystem actors has any particular incentive to promote another solution (Lujit). However, as mentioned above, the emergence

of Google Android's HCE has recently attained a lot of attention, as it might relinquish the need for a hardware SE altogether.

Our research revealed that as of yet, how to do practical implementations using HCE is still unclear (Bentsen), but the general discussion seems to revolve around HCE being as secure as integrated hardware SEs, considering it stores sensitive information in software (Bentsen, Brede, Langrød, Lujit, Munch-Ellingsen, Normann, Salvador).

UL's (2014) analysis of the security aspects of HCE provides useful insight on the topic: " In HCE, communication always passes through the Android OS. This provides basic security measures (for instance by running each application in its own "sandbox" which prevents it from accessing data from any other application). These basic security features, however, are lost when a handset is rooted. Rooting is the process of allowing users of handsets to attain privileged control, e.g. become a super-user." Furthermore, they have identified three different ways in which this introduces security risks that are not present in SE based NFC services:

- Access to sensitive information such as card information or payment credentials stored in the application becomes available when the user roots the device.
- Malicious software applications could occur, rooting the device to exploit the attained information.
- In case the device is stolen or lost, a malicious third party user might root the handset or access its memory from another device. Equal to the malware, the user can gain access to sensitive information and use it to conduct fraudulent payments.

Due to these potential security risks, HCE is not yet approved by EMVCo[1], and will have to go through several time-consuming security approval steps before potentially enabling contactless payment applications (Salvador). The guidelines from the EMVCo state that it is a mandatory requirement that the payment application must be stored and executed within an approved SE (UL, 2014). That being said, both Visa and MasterCard have recently stated that they support HCE and are working on standard-making initiatives (Mobile World, 2014).

Through our interviews, we were able to shed additional light on how HCE can affect the ecosystem.

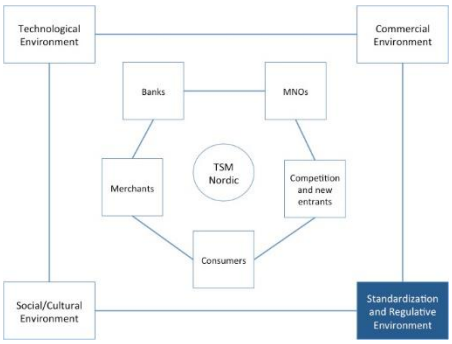
- It can provide great value to service providers that do not require the same level of security as payment services, such as loyalty programs, as no SE storage space is necessary and hence reduce costs (Lujit, Salvador).

[1] Organization founded by Europay, Mastercard and Visa to ensure interoperability of payment transactions. Manages EMV specifications.

- HCE might challenge the position of the MNO through forcing them to lower the prices on storage (Salvador), or as the SIM eventually might become redundant (Normann).
- HCE might also challenge the position of the TSM, as Google offer tools to the service providers to develop their own NFC applications (Normann), and thereby bypass the TSM.

However, Langrød points out that even if HCE should relinquish the the need for a hardware SE, someone still needs to manage the payment service value chain, ensuring end-to-end QoS and attend to customer needs and the life cycle management of the services. Thus, HCE will not necessarily be any cheaper for service providers (Langrød).

Standardization and Regulative Environment



According to Dahlberg et al. (2008), including contingency factors like regulation and standardization is natural when assessing mobile payment services, because financial services and telecommunication are among the most regulated industries, and the use of standards is characteristic to telecommunication. These factors and requirements may both drive and impede the development and adoption of a technology or service, and trigger needs for new or enhanced solutions.

Standards

Earlier research on mobile payment services concluded that the market was at a pre-standardization phase where no collective standards had been agreed upon (Dahlberg et al., 2008). However, there has been an extensive development in the later years and NFC in particular has eventually become a mature standards-based technology (Langrød, Juntunen et al., 2010, Schamberger et al., 2013). According to Smart Card Alliance (2011) NFC-enabled devices are governed by standards in the International Organization for Standardization (ISO), the European Telecommunications Standards Institute (ETSI) and the European Computer Manufacturers Association (ECMA) as well as by specifications published by the NFC Forum. This is significant in a mobile payment context as it allows for compatibility with existing contactless payment scheme-branded cards (EMV) and device interface protocols such as the Single Wire Protocol (SWP) used to connect the SIM to the NFC chip in the handset (GSMA, 2014a).

Hence, for a SIM based contactless mobile solution with emulated payment cards like Valyou, the standardization process is completed and approved and certified by EMVCo (Bentsen,

Salvador, Smart Card Alliance, 2011). However, as previously mentioned, EMVCo is also working on standards for competing solutions such as HCE (Normann, Mobile World, 2014).

Furthermore, no standards for other NFC services than payment have yet been developed (Salvador). This entails that there is no common or established structure for developing and offering value-adding services such as loyalty programs or advertising content. GSMA is currently working on its development, as the lack of such a standard makes it difficult to implement solutions that work across the entire ecosystem, which is crucial for services like Valyou trying to be a de-facto open standard platform with the objective of including as many different service providers as possible. (Salvador).

Regulation

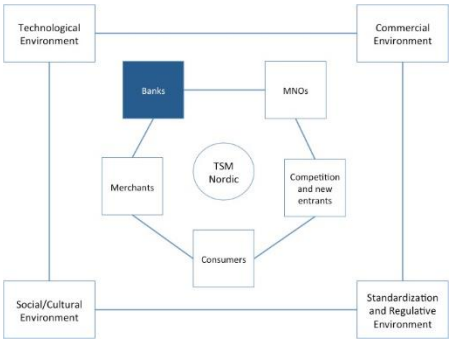
Through our interview sessions we realized that the most pressing discussions regarding regulations were related to the payment schemes. Merchants are skeptical to Valyou and contactless payments in general (both emulated cards on NFC handsets and the schemes' own contactless payment cards) because they would need to convert from processing payment transactions through BankAxept, which is operated without interchange fee, to Visa or MasterCard (Bentsen, Gjersum, Klavenes, Langrød). However, the European Commission has proposed a new directive on payment services and regulation of interchange fees (Skjetne, 2014). This entails that:

1. For cross-border transactions there will be a maximum interchange fee of 0,2% for debit card transactions, and 0,3% for credit card transaction (this took effect in September 2013).
2. The same rates will be imposed on domestic transactions within a period of two years.

As the proposed rate limits are significantly lower than today's domestic rates of 0,8-2,5% (Normann), this might make it easier to incentivize the merchants to adopt payment schemes such as Visa or MasterCard (Bentsen, Gjersum).

9.3 INTERRELATED MARKET FACTORS

Banks



The growing focus on mobile payment has attracted new actors that wish to take a role in the emerging payment ecosystem (Brede, BearingPoint, 2012). As the banks naturally wish to have an equally central role in the new payment ecosystem as in the old one, action on their part is a wise defensive tactic to drive the ecosystem in a wanted direction (Munch-Ellingsen, BearingPoint, 2012). This is much of the reason for why DNB has been such a strong driving force in the Norwegian ecosystem (Bentsen).

As NFC forms within the banks' established framework for card issuance, and the merchants' already established infrastructure, it is in many ways an evolution of their existing business model. This is one of the key factors why Norwegian banks mainly focus on NFC based payment solutions (Bentsen, Salvador).

The banks have a crucial role in TSM Nordic's business model, in which the unsatisfactory inclusion of enough banks is believed to mean an unsustainable ecosystem (Gjersum, Langrød, Salvador). The more banks offering their services through TSM Nordic, the more consumers are reached, again determining the amount of cards being emulated which increase TSM Nordic's revenue. Gjersum tells us that Valyou currently have pending final agreements with banks covering approximately 70% of the market.

Normann predicts that each bank will initially connect its services to *one* TSM, but says that at some point in the future TSMs will integrate, making it possible to access a bank's services through other wallets solutions than the one initially connected to the bank. For the time being, however, banks will be able to offer their services either through *one* wallet, or by developing their own payment service. In this regard, Salvador mentions time-to-market as an initial value proposition specifically from TSM Nordic, for the banks to reach the market faster than upcoming competitors, and to potentially attract new customers.

Value Proposition

In addition to the drivers resulting from market dynamics, our research has aimed to identify the explicit value proposition from TSM Nordic's business model towards the banks. This is presented in Table 8

Table 8: TSM Nordic's value proposition towards banks

Value Proposition
• **Increased revenue from schemes**[1]   ○ The only enabled payment scheme for Valyou is Visa, which leads to substantial higher transaction revenue than BankAxept
• **Closer interaction with customers and better service offer**[2]   ○ The wallet functionality makes a bank's brand visible in the wallet. As the wallet represents a new communication channel with the consumer, new value-adding services can be added to extend brand further
• **Increased security**[3]   ○ For every payment transaction the cvv2[4] code on the emulated card changes, ensuring greater security and protection against fraud than smart cards, reducing banks' risks
• **Increased market share**[5]   ○ The first movers among the banks may see an increase of new customers, especially among young people and early adaptors

Challenges

As one of the main driving actors in the NNFCMPBE are the banks, one of the key aspects for TSM Nordic in attaining a sustainable ecosystem lies in getting a large number of banks onboard, offering their services through the platform, as explained above. As mentioned, TSM Nordic has pending deals covering the majority of the bank market (Gjersum), suggesting that the inclusion of banks is not a key challenge. This does not mean it cannot be improved. Through our interviews, we have identified one main barrier for banks' entering the NNFCMPBE.

[1] Bentsen, Skjetne, 2014
[2] Smart Card Alliance, 2011
[3] Langrød
[4] The payment schemes have different names for their card security code (csc). As Valyou will only be offered with a Visa debet card, Visa's name for the csc is used, namely "card verification value" (cvv)
[5] BearingPoint, 2012

Increased Costs of Operation and Integration

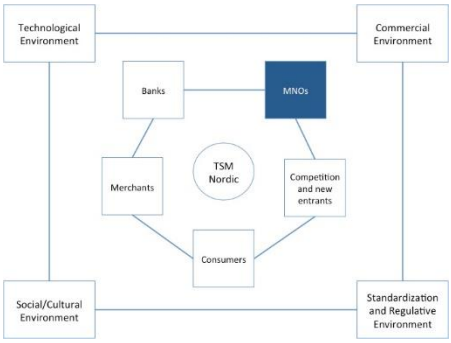
In our interview with Bentsen, he points to the cost for the banks in joining the ecosystem. These new costs are primarily coming from three sources:

- *Rent for placing a payment card on the SIM card:* This will be a yearly fee, in addition to a one-time onboarding fee
- *Investment needed to upgrade the back-end infrastructure:* This entails changes in issuance procedures and IT systems integrated with TSM Nordic
- *Life cycle management processes changes*: These costs result both from the changes in processes, and the processes being more expensive, seeing that provisioning and life cycle management needs to be instant.

Evry has developed a back-end system for DNB already, and Bentsen emphasizes how this reduces the barrier for other banks, as Evry now can use much of the same solution towards these, making it less expensive for followers. Bentsen also explains how the dynamic service environment has proved to be more demanding and comprehensive than expected, mainly because services are required to be conducted in real time, such as card assistance (Bentsen).

A positive aspect for the banks in the long term might be saved costs if the physical payment cards are completely replaced. There are substantial costs related to this manual distribution system. However, the replacement process is believed to be slow, and as mobile payment will just be a supplement to plastic payment cards in the beginning (Bentsen), thereby leaving the banks with no savings, only extra costs, as both systems need to operate in parallel.

MNO



As mentioned in the assessment of the commercial environment, MNOs have become active in the payment ecosystem. Since MNOs started focusing on such services, they have been the most active player in developing mobile payment services. This can be explained to a large degree by the fact that MNOs see an opportunity to utilize their existing infrastructure to become an active stakeholder in the emerging payment ecosystem, establishing a new source of revenue (BearingPoint, 2012).

As several different mobile payment solutions are emerging, it is important for the MNOs that the SIM is chosen as the SE. Langrød claims that mobile payment is coming in one form or another, and if the MNOs are not quick enough to take a role in the emerging ecosystem,

someone else will. The main asset of the MNO is the SIM and as soon as services are no longer installed here, the MNO will go back to solely being a provider of infrastructure. Ensuring a broad market acceptance of NFC is therefore more important than attaining new customers as first mover MNO. This is much of the reason why Telenor is taking the cost of being a driver and investing so heavily in the NNFCMPBE (Langrød).

In our discussion with the interviewees concerning the value proposition for MNOs, the added revenue stream (Langrød, Munch-Ellingsen, Salvador, BearingPoint, 2012, Mobey Forum, 2011, Smart Card Alliance, 2011) and potential for value-adding services were mentioned the most (Lujit, Salvador, Smart Card Alliance, 2011). One may see the same effect with NFC payment as one did with a previous cooperative service between MNOs and banks, BankID, namely customers preferring Telenor because of the service (Bentsen, Salvador, GSMA, 2014b). The Norwegian telecom-market is very competitive, with most services being commodities, making it hard to differentiate from other actors. A first mover within mobile payment may provide a chance to differentiate nonetheless (Bentsen). Although, Normann mentions how he believes NFC payment also will become a commodity offered by all the MNOs in the long term.

Additionally, Lujit points out how services like Skype and WhatsApp are eating away at the traditional telecommunication services, and that MNOs see payment as one of the solutions to this erosion. Salvador goes even further and says that he does not believe that just being a supplier of SIM space is a sustainable role for the MNO because of the potential entry of other SE solutions. Normann on the other hand believes the SIM SE will be important for a long time still, as it provides superior security to other SE solutions considered in the NNFCMPBE.

Value proposition

The specific aspects an MNO stands to benefit from joining the NNFCMPBE through TSM Nordic's business model is presented in Table 9.

Table 9: TSM Nordic's value proposition towards MNOs

Value Proposition
• **New revenue streams**[1]   ○ Generated from the rent from the TSM for the SIM space and fees for OTA provisioning
• **New channel to offer value-adding services**[2]   ○ As the wallet is a new way to communicate with customers, this can provide a way to offer value-adding services to the consumer, both payment related and in other areas of consumer's need and lifestyle
• **Increase in adjacent services**[3]   ○ The use of mobile payment may result in increased traffic from services such as SMS and data roaming
• **Reduction in churn of customers for first movers**[4]   ○ With the placement of the payment card on the SIM card, it becomes more troublesome to change MNO subscription
• **New customers and increased market share for first movers**[5]   ○ Especially the first movers among the MNOs may see an increase of new customers, especially among young people and early adaptors

Challenges

Although MNOs may be the actor that stands to benefit the most from the establishment of the NNFCMPBE, Telenor is currently the only participator. The inclusion of more MNOs is crucial in order to reach all consumers (Gjersum), and thereby increasing the attractiveness for other service providers and merchants to join the ecosystem. Hence, this is another main challenge for the establishment of a sustainable NNFCMPBE.

[1] Langrød, Munch-Ellingsen, BearingPoint, 2012, Mobey Forum, 2011, Salvador, 2013, SmartCard Alliance, 2011
[2] BearingPoint 2012, Mobey Forum 2011, Salvador, 2013, Smart Card Alliance, 2011
[3] Mobey Forum, 2011
[4] Bentsen, BearingPoint, 2012, Mobey Forum, 2011
[5] BearingPoint, 2012

This challenge is being dealt with as Gjersum tells us there are talks to get additional owners for TSM Nordic, primarily to send a signal to other potential actors that this is not an exclusive DNB and Telenor project.

Telenor has approximately 50% market share, and TSM Nordic is therefore not dependent on the joint effort in the initial launch, but several of our interviewees agreed that the sustainability of the ecosystem is dependent on including other MNOs in the long term (Brede, Gjersum, Salvador). When it comes to MNOs, the main challenge is therefore for TSM Nordic to recruit them to the platform, and our research has identified two subsequent challenges in doing this.

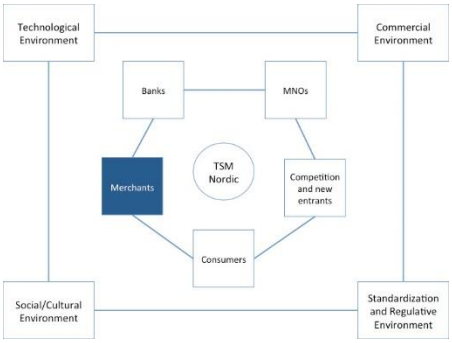
New SIM cards are expensive for MNOs

NFC enabled SIM cards are currently more expensive than the regular ones being used today. Due to its immaturity and low production volumes, the SIM providers, such as Gemalto, are charging the MNOs more for these new SIM cards. These costs are passed on down the value chain, leading to TSM Nordic having to increase their price towards the service providers. Langrød believes this only to be an initial problem, and that the price of the new SIM cards will fall substantially when volumes increase. As Gemalto is also provider of technical TSM services, increased activity and revenue from these services might serve as an additional incentive for them to lower the SIM prices to stimulate adoption among the MNOs (Salvador).

MNOs wanting to be late followers limit market reach

Through our interviews we uncovered that, apart from Telenor, the MNOs in the Norwegian market wish to see the NNFCMPBE take off before they join the ecosystem (Gjersum, Salvador). Gjersum informs us that Tele 2 explicitly said they wanted to be a late follower, but that TSM Nordic has a constructive dialogue with both Tele2 and Netcom, and both companies have assessed the integration efforts needed towards TSM Nordic. Nevertheless, as service providers and merchants are incentivized by reaching an as broad market as possible, the reluctance from the MNOs also increases the merchants' hesitance (Klavenes). Salvador elaborates on the MNOs and mentions the fact that both Tele2 and TelieSonera are Swedish, makes the decision process utterly slower and more complicated.

Merchants



The merchants play a crucial role in the ecosystem. Without the merchants embracing contactless or NFC technology, and installing the necessary infrastructure, the consumer will not get the opportunity to use their NFC mobile payment service, and thus removing its livelihood (Gjersum, Salvador).

Payment services within physical retail have not seen the same degree of change as the online payment services, even though a comprehensive process of upgrading the PoS-terminal as a consequence of chip smart cards being introduced has been undertaken the last couple of years (Forbrukerrådet, 2014).

The fact that both Visa and MasterCard now are introducing and promoting their contactless payment cards is believed to contribute to propelling the merchants replacing or upgrading their PoS terminals to support NFC solutions. DNB estimates they will issue 400 000 contactless cards in 2014, and two million in 2015 (Gjersum). Partly because of this, an increasing number of merchants are already showing an interest and have started replacing and enabling the terminals, as well as the PSPs own initiatives to do so (Gjersum, Langrød).

NorgesGruppen, which makes up for close to 40% of the Norwegian grocery market, has already replaced all of their PoS terminals, but has not yet activated the NFC functionality. (Klavenes).

In the same way as within e-commerce, the physical retailers are trying to utilize the information they have to establish a one-to-one dialogue with the customer. Loyalty programs are an instrument with this purpose, and are used frequently in today's marketing efforts (Forbrukerrådet, 2014). Salvado believes combining such services with NFC payment services in a wallet like Valyou, allows for synergy effects previously not possible.

Klavenes, however, states that NorgesGruppen already has a good idea when it comes to the buying behavior of customers through purchase data and their existing loyalty system, Trumf. He calls for a solution that increases service sales within convenience, such as coffee cards or specific offers. This would provide the group with access to a consumer segment they otherwise would not reach, and he stresses that he is very positive to be involved in such a solution.

TSM Nordic's market adoption strategy is currently aimed towards traditional merchants like grocery and convenience stores (Salvador). These are identified as places where consumers conduct purchases close to daily, and are therefore ideal in order to change the habit towards a mobile solution (Gjersum). Another characteristic worth noticing for these high frequency merchants, are low profit margins, and Norwegian grocery stores have traditionally had a profit margin of 3-4% (Vagstad, 2013).

Value Proposition

As with the other key actors in the NNFCMPBE, we wish to present the value proposition for merchants in joining and becoming a part of this ecosystem. A great part of this relates to services connected to loyalty and advertising.

Table 10: TSM Nordic's value proposition towards merchants

Value Proposition
• **Faster transaction times and throughput at check-out** [1]   ○ Especially on low value purchases with no PIN required (see Appendix for specification on the Valyou application)
• **Increased brand presence and awareness**[2]   ○ Mobile payment applications allow the merchant to reach the customer through a new channel
• **Customer acquisition**[3]   ○ Being a first mover with mobile payment may lead to the acquisition of new customers, mainly because the merchant will be perceived as innovative and because there is a fun factor to the payment process in the beginning
• **Customer information and data collection**[4]   ○ The wallet could be set to gather user data (habits, behavior etc.), making it possible to create personalized content and offers

[1] BearingPoint, 2012, Open Mobile Media, 2014, Smart Card Alliance, 2011
[2] Bentsen, Smart Card Alliance, 2011
[3] Bentsen, Klavenes, Langrød, OpenMobile Media, 2014
[4] Open Mobile Media, 2014

- **Enhanced loyalty programs and promotion effectiveness**[1]
  - Increased convenience can lead to overall increased use of loyalty programs
  - These programs can be enhanced through real-time and location-based offers and targeted marketing

Challenges

The greatest challenge for TSM Nordic in establishing the NNFCMPBE is to induce merchants to allow consumers to pay with Valyou. This requires a PoS replacement or update. To get merchants to do this is challenging for several reasons, which we will present below. However, the main reason for this challenge is the lack of a distinct and monetary value proposition (Klavenes, Munch-Ellingsen, Normann). In the following, we present the identified challenges to overcome in order for the merchants to find it beneficial to join.

Weak value proposition towards the merchants

Even though Open Mobile Media (2014a) claims that "there is little doubt that effective mobile payment systems, like good marketing to consumers, can turn into extra profits for the merchants", this increased capitalization can be difficult to quantify (Normann). Klavenes believes that the merchant's main motivation is related to the point of customer convenience and satisfaction through meeting the consumer's demand to use a mobile payment solution. However, as of now, this demand is not present (Klavenes). Conclusively, the lacking of a distinct monetary value proposition is a challenge in involving the merchants.

NFC requires expensive payment schemes

The second and perhaps greatest barrier for the merchants (Bentsen, Gjersum, Munch-Ellingsen) is the fact that NFC and contactless payment transactions have to process through Visa or MasterCard, which because of interchange fees impose a higher transaction cost and are considerably more expensive for the merchants than BankAxept. As such the merchants benefit from staying with BankAxept and not enabling NFC and contactless payments. Especially, this creates a barrier for low-margin segments such as grocery retailers. To exemplify, NorgesGruppen has calculated that their additional cost, should all BankAxept transactions become Visa transactions instead, would be between NOK 300 and 500 million yearly (Klavenes). It is important to mention, however, that both Visa and Mastercard will become substantially cheaper in the coming years because of the previously mentioned EU regulations. In addition, as Bentsen states that if a new BankAxept model is to be developed,

[1] Gjersum, BearingPoint, 2012, Open Mobile Media, 2014, Smart Card Alliance, 2011

its increased transaction costs will utterly reduce the differences between the schemes. Both these changes will reduce the merchants' barriers to join the ecosystem, but seeing as they will not occur for some years yet, they will not have any immediate impact.

Insufficient consumer demand to use the service

The merchant's role can be seen as both an enabler and a user of the service, and eventually as a service provider offering value-adding services such as loyalty programs, marketing applications and targeted advertising. The situation of both merchants and consumers being users is paralyzing the adoption of mobile payment services by a chicken-and-egg paradox as merchants are hesitant to invest in mobile channels without assurance of consumer adoption, and consumers cannot use platforms that merchants have not yet implemented (Mondato, 2014). Klavenes pointed to the fact that should a large enough customer base wish to pay with mobile solutions, they would have to implement it, but as of now this is not the case. This situation may however change in the near future because of banks increased issuing of contactless cards (Gjersum), which will incrementally accommodate the chicken-and-egg situation and increase customer demand (Bentsen, Gjersum, Langrød).

Infrastructure investments

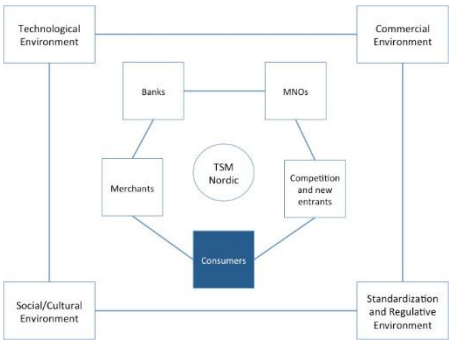
Replacing PoS terminals to be contactless and NFC compatible requires commitment and a new investment from the merchants (Mobey Forum, 2011). However, specifically for the Norwegian market, this challenge might not be as extensive as initially believed, considering that several of the larger retailers only rent their terminals from the PSPs and that they can easily be replaced by newer models (Gjersum, Klavenes). Additionally, most new terminals being installed by the PSPs today are NFC compatible (Gjersum). It is, however, an expense, especially for retailers owning their own terminals, and a job that needs to be done. Therefore, as long as the monetization happens elsewhere in the ecosystem, the merchants do not see this investment as their responsibility (Klavenes).

Integration issues with existing loyalty programs

Another issue revealed through our research is the problem of integrating the new payment service with the merchants' existing loyalty programs (Klavenes). A specific example was presented by Klavenes regarding their Trumf program used in 40% of their total sales in retail. As the system is registered to each customer's individual bank account number, it is not compatible with any contactless or NFC payment services whose transactions are based on the payment card number instead. To make this compatible with NFC or contactless payment, investment is needed on the merchants' part. This is the main reason why

NorgesGruppen is reluctant to activate their PoS terminals (Klavenes), but could also be an issue that needs to be resolved to engage other merchants with similar programs.

Consumers



As consumers are the ones placing demand on the mobile payment service, they drive its success (Dahlberg et al., 2008), and thereby the success of the ecosystem as a whole. It is therefore important to remember that the payment service must offer the best possible user experience, both when it comes to use and installation (Munch-Ellingsen, Telenor Hungary, 2014). As the consumer demand basically determines the size of the business for all other actors in the ecosystem, it is implicit that the more consumers one can reach and involve, the better.

The consumer adoption may be sped up by the entry of contactless payment cards. As some Norwegian banks are already issuing them, contactless cards will soon become standard (Gjersum). This is believed to work as a bridging technology making consumers more comfortable with the habit of contactless payment (Gjersum, Smart Card Alliance, 2011). Additionally, the contactless cards require the same kind of PoS terminals as the mobile NFC solution does, meaning the adoption of contactless payment cards will directly increase the demand for PoS terminals with NFC functionality. Furthermore, as EMV are pushing contactless payment cards worldwide, the consumer will be able to use an NFC mobile payment service at an increasing number of merchants also outside of Norway (Bentsen).

Value proposition

As the consumers' adoption of NFC payment services is crucial for the successful establishment of the NNFCMPBE, TSM Nordic's value proposition towards them is essential to understand, and is presented in Table 11.

Table 11: TSM Nordic's value proposition towards consumers

Value Proposition

• **Increased convenience and simplicity**[1]
  ○ Moving wallet into the handset lets the consumer leave the payment and loyalty cards at home, only having to bring the handset
  ○ The tapping makes the transaction process faster than with today's payment cards, especially for purchases without a PIN code
  ○ Dynamic life cycle management of payment cards

• **Enriching the traditional wallet with new services**[2]
  ○ Loyalty (savings) – simplification of loyalty program handling
  ○ P2P payment and digital receipts (simplified logistics)
  ○ Customized/personalized content and offers (convenience)
  ○ Fun factor

• **Increased payment security**[3]   ○ The payment solution is more secure than magnetic stripe technology because of dynamic cryptogram technology. As it generates a new card security code for every transaction, it can also be considered more secure than a smart card

Challenges

As we brought forward in the section about social trends, consumers are increasingly more comfortable with the mobile phone fulfilling an increasing number of functions. However, BearingPoint questions whether this necessarily means they are ready to abandon the wallet and rely primarily on their handset for the important task of handling their payments, as this is currently more a lifestyle or leisure tool (BearingPoint, 2012). Below we present the challenges for the consumer to adopt the payment service.

Unclear value proposition towards the consumer

Several of the interviewees pointed out that the value proposition towards the consumer is perceived to be weak or unclear. Even though the service will be convenient, the time saved during a purchase and the idea to leave the physical cards behind, may not be enough to change consumer habits (Klavenes, Lujit, Munch). Both Klavenes and Langrød considered it to be a fun factor connected to the use of the payment service in the beginning, but that this

[1] Lujit, Munch-Ellinsen, Salvador, Smart Card Alliance, 2011
[2] Gjersum, Klavenes, Langrød, Salvador
[3] Langrød, Smart Card Alliance, 2011

would fade quickly. Langrød expressed the importance of being able to offer additional services after this. Providing the "unique shopping experience" with services related to what she is buying, payment efficiency, and after purchase activities relevant to who she is, and not who wants to reach her is both crucial and attractive for both consumer and merchant (Langrød).

Langrød also mentions the Norwegian consumers' concern about security issues with the service. This was one of the findings after conducting the NFC pilot Tap2Pay as well(Evjemo et al., 2011). However, Langrød explains that the solution in some ways is even more secure than a regular smart card, partly because of the generation of a new cvv2 code for every transaction. The consumers are also expressing concerns of how losing their phone would imply also losing the wallet. To this, Gjersum point to the study that shows consumers become aware of the loss of their phone more than twice as fast than when they lose their wallet (Gjersum). Additionally, having one wallet provider managing all a consumer's cards makes the issuing process of the lost cards much easier than with a regular wallet. Because of these facts, Salvador believes the main challenge related to security is to communicate the actual security of the service and educating the consumer on these points (Salvador).

Hence, this challenge is two-fold. First, it is a question of whether the value proposition of the service is in itself enough to change consumer habits, and secondly, a matter of making the consumer aware of its actual benefits.

Insufficient number of available merchants and user places

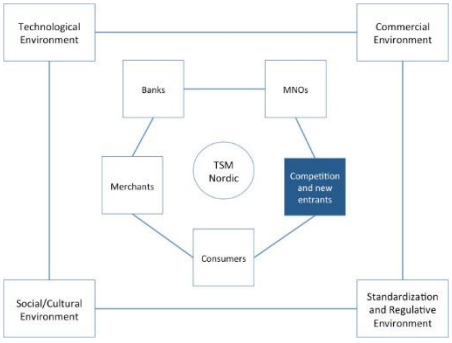
Another challenge related to the consumer is the number of merchants and user places offering this payment method. A payment service will not be relevant to the consumer if few merchants accept it (Gjersum, Munch-Ellingsen). As discussed above in the merchant section, the required infrastructure is not made available by the merchants, because they do not see consumers demanding it (Klavenes). The challenge is that a large number of consumers will not try Valyou, or demand to pay with it, if few user places are accepting it. This chicken-and-egg situation may be incrementally solved by the issuance of contactless cards as discussed, but this will take time and is accordingly a challenge for fast market adoption.

Insufficient market reach

As the service is only available for the consumer with the right bank and MNO, the potential user mass is limited until more MNOs and banks join the ecosystem. This is proving to be both challenging and a time consuming process (Gjersum). Another limitation for consumer adoption is the previously discussed matter of Apple not supporting NFC, and iPhone users

are therefore currently excluded from using the service. Klavenes believes this to be the biggest challenge for TSM Nordic to reach a wide enough consumer base (Klavenes), although TSM Nordic is working on finding a solution (Gjersum, Salvador, Mobilen.no, 2014).

Competition and New Entrants



The competitive situation for and within the NNFCMPBE is at present day rather uncertain as mobile proximity payment services in general still have not gained a substantial foothold in the market. Several actors are developing different solutions based on different technologies, some of which are international. This adds to the uncertainty, as it is unclear whether they will offer their services in the Norwegian market at all. Nevertheless, we have identified a number of potential new entrants that can challenge TSM Nordic and compete for a share of the mobile proximity payment market.

Potential competitors

Initiative X

Through our interviews we discovered that there is another Norwegian initiative to develop a mobile wallet payment solution. Initiative X is an alliance group of smaller local banks planning an NFC mobile payment service application and a TSM in cooperation with a PSP and another MNO (Bentsen, Gjersum, Salvador). It is, however, not clear whether this will be a strict payment application or a wallet solution offering value-adding services, functioning as an intermediary and integrating with third-party actors like merchants and other banks.

MeaWallet

MeaWallet is the second Norwegian initiative identified through our research. MeaWallet is both a TSM and a wallet service provider, similar to Valyou. Our interview with their business developer Thomas Normann revealed, however, that they will be focusing their efforts towards mobile payment in other European markets, establishing relationship with foreign banks and MNOs. For the Norwegian home-market MeaWallet will be focusing on developing merchant loyalty programs and potential closed loop payment services such as gift cards, to potentially leverage these merchant relations to payment service providers like banks on a later stage (Normann). MeaWallet plans to release the service in the summer of 2014.

mCash

The third identified Norwegian mobile proximity payment service is mCash. mCash is based on QR codes and is already an available payment method at selected retailers, including both grocery and convenience chains. The service is ultimately a online payment service, which allows the consumer to pay by scanning the unique QR code at the merchant's PoS. mCash registers the consumers' transactions and purchase information, and offers the merchants enhanced and targeted loyalty programs enabled through customer identification. The service requires a software update in the PoS, as well as merchants having to install the QR codes. mCash has also enabled P2P payment transactions between its consumers (mCash, 2014).

Apple iBeacon

As mentioned in the assessment of the technological environment in chapter 9.2 Apple is releasing its iBeacon, based on BLE technology. The iBeacon will provide a richer and more integrated shopping experience with extensive marketing features, but whether it will offer a specific service to facilitate proximity payments is uncertain (Brede, Munch-Ellingsen, Salvador). However, seeing as they already have access to a large number of credit card numbers through their iTunes Store, they might be a potential threat (Gjersum, Lujit).

PayPal Beacon

PayPal is a dominant actor in international online commerce and remote payment, and represents 18% of total e-commerce world wide (Statistic Brain, 2014). They are now also entering the proximity payment business by offering the PayPal beacon – a USB stick that is connected to the merchant's PoS and communicates with the consumer's handset through BLE. In addition to marketing features Paypal's beacon also has a proximity payment service (Paypal, 2014).

Google Wallet

Google Wallet is a wallet application for Android handsets offering loyalty services from different US-based merchants. The application also supports NFC payments, either by an emulated EMV card, or through a closed-loop solution, but is only available on selected devices with an embedded SE to users in the US. The closed-loop "Google Wallet Balance" is a credit account stored in the application that the user can transfer money to from their regular bank accounts (Google, 2014)

Challenges

As initially mentioned, it is rather uncertain to what extent some of these services will be available in the Norwegian market, and the interviewees have very differing perceptions of

how the services will influence and potentially threaten the NNFCMPBE. Even if potential competition does not impose any current or direct challenges for TSM Nordic in establishing a sustainable ecosystem, we have identified that upcoming threats can occur on two levels. The first being actors offering competing NFC services, and the second being competitors using alternative technologies, such as BLE.

Threats from competing NFC services

Regarding both MeaWallet and banks developing their own wallet solution like Initiative X, their back-end TSM will have to connect to TSM Nordic to reach Telenor subscribers with a Telenor SIM card (Gjersum). As several TSMs and wallet solutions become available in the market, with their own and differing portfolio of service providers, these TSMs would potentially be connected and integrated with each other to reach the other TSMs' customers, and ensure a broader market reach all together (Gjersum, Normann). This is also supported by the research done in the preliminary pilot testing of Tap2Pay, showing that the consumers prefer one wallet to gather all their cards, rather than several independent applications and services (Langrød, Evjemo et al., 2011).

This would lead to mobile wallets becoming a commodity, and thus moving the competition from a matter of what services are provided to a matter of user preferences regarding the wallet front-end user interface and the TSM's branding (Normann). Additionally, if HCE eventually becomes certified and approved by the payment schemes, this might enable individual banks to bypass the TSM and develop their own NFC proximity payment services within their own handset applications (Munch-Ellingsen, Normann).

Threats from different technological solutions

The fact that large international actors like Apple and PayPal already have a large installed consumer base could allow them to quickly adopt users and capture significant market shares (Lujit). On the other hand, it is argued that Norwegian banks do not have any incentives to involve these actors in the local market, as the banks might become negligible actors playing on others' terms (Bentsen). Local actors will also benefit by knowing the local and regional markets better, and through that offer better and more tailored services and customer support (Bentsen, Langrød).

The positive side of several actors, such as mCash, entering the market is that they contribute to increased consumer awareness and market acceptance of mobile payment services in general (Gjersum). Langrød's opinion is that one technology and service will build the market, being NFC and Valyou, and that others can follow to differentiate and specialize value-adding services on top of that solution when the market is established (Langrød).

Others see a first mover advantage as a way to create effective barriers to block additional entrants (Brede). This is supported by the fact that the first mover will have a great impact on what technology gets chosen and picked up by the market (Munch-Ellingsen). As the different competing services are based on different technologies, the first mover can utterly secure its position through lock-in of other ecosystem actors, e.g. through the investments being done by both banks and MNOs as well as merchants in upgrading the infrastructure and marketing efforts (Langrød, Munch-Ellingsen).

10 ANSWERING RESEARCH QUESTION 2

In this part of the master thesis we have applied the framework presented in chapter 2.4 to aid us in answering our second research question:

RQ2: What are the key challenges for TSM Nordic to solve in establishing a sustainable business ecosystem and model in order to successfully implement NFC-based mobile payment in Norway?

Through our assessment, we have realized that the main challenge for TSM Nordic in establishing a sustainable ecosystem is the inclusion of other ecosystem members, and ensuring participation from enough actors to make it attractive for yet other actors to join. There are four main groups of ecosystem actors that need to be involved to activate the market, and these are 1) the consumers, 2) the merchants, 3) the banks and 4) the MNOs. The potential width of TSM Nordic's market position is directly depending on the proportion of activated actors within each of these groups.

Subsequently, we have identified 13 challenges related to the inclusion of the mentioned actors, as well as the aspects of competition, which are presented in the following table.

Table 12: Main challenges in establishing a sustainable NNFCMPBE

Actors	Identified challenges
Banks	• Increased costs of operation and integration
MNOs	• MNOs wanting to be late followers limit market reach • New SIM cards are expensive for the MNOs
Merchants	• Weak value proposition towards the merchants • NFC requires expensive payment schemes • Insufficient consumer demand to use the service • Infrastructure investments • Integration issues with existing loyalty programs
Consumers	• Unclear value proposition towards the consumers • Insufficient number of available merchants and user places • Insufficient market reach (MNOs, banks, handsets)
Competition	• Threats from competing NFC services • Threats from different technological solutions

The value generated in the ecosystem is ultimately a result of the number of consumers using the service. TSM Nordic's revenues are directly proportional to the total number of cards being emulated in the wallet, the banks will increase their revenue if a larger part of the transactions are processed through Visa instead of BankAxept, and the MNOs are offered a brand new source of income through the SIM rent. Hence, TSM Nordic, the banks and the MNOs all have clearly defined monetary incentives to reach as large a market as possible.

However, the consumer adoption is in turn depending on the number of available user places and activated merchants, and is paralyzed by their hesitance to invest in the new service. The merchants lack a distinct monetary incentive to join the ecosystem, mainly caused by the increased transaction costs to the banks. And until there is a strong enough demand among the consumers to use the service, the merchants do not want to take this cost, and do not consider it beneficial to enable the service.

Consequently, the main challenge revolves around solving the issue of the chicken-and-egg paradox of consumer adoption versus the involvement and activation of merchants and user locations, and is visualized in the figure below.

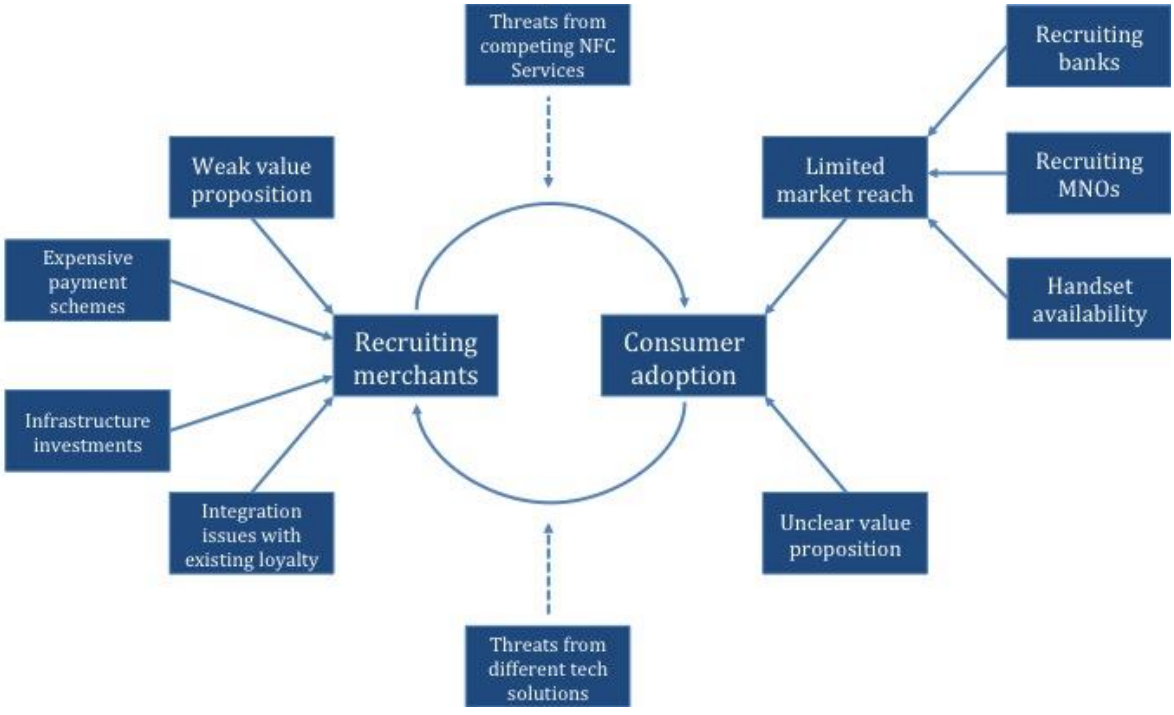


Figure 20: Visualization of challenges relating to chicken-and-egg paradox

As Figure 20 shows, the identified challenges are complex and interrelated, and the over-all challenge of consumer adoption is interconnected with a number of subsequent challenges. For instance, the potential number of consumers being able to use the service is limited by its market reach, which in turn is limited by three factors; the market share of the activated banks and MNOs, as well as the share of NFC enabled handsets in the market. Potential threats from competing services and solutions will also affect the consumer adoption. We will address the presented challenges in the next part of this thesis, as we assess the future development of the NNFCMPBE and TSM Nordic's strategic options within it.

Part D
The Ecosystem Development

Building on the challenges identified in Part C this part will discuss the development of the Norwegian NFC mobile payment business ecosystem and present strategic recommendations for TSM Nordic

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Chapter 11 | Keystone Strategy for TSM Nordic
Chapter 12 | Answering Research Question 3

11 KEYSTONE STRATEGY FOR TSM NORDIC

This chapter aims to assess the future development of the NNFCMPBE and provide a strategy for TSM Nordic to meet the challenges identified in Part C.

In order to define a strategy for TSM Nordic we start by assessing their position and the role of the TSM in the ecosystem, and place it within existing business ecosystem theory to build a foundation for the arguments in the subsequent discussion.

Secondly, we will apply a framework developed by James Moore (1993) to assist us in systematically understanding and anticipating the development of the NNFCMPBE. Additionally, using the framework we will suggest how to solve the main challenges of commercializing Valyou and attaining a sustainable NNFCMPBE.

Finally, we will conclude this chapter by presenting key recommendations and measures to meet the different challenges in each stage.

11.1 IDENTIFYING TSM NORDIC AS A KEYSTONE ACTOR

Due to the complexity and diversity of the NNFCMPBE, several actors can be seen as a keystone, in that they are a platform provider. Both the handset, the SIM card, the technical TSM and the wallet application are in their own way an enabling platform for a mobile NFC payment service. In order to determine what actor has the greatest potential to succeed as the common aggregator and keystone actor, Iansiti and Levien (2004) suggest identifying the hub of the ecosystem – the node with the highest number of connections (relations) to other ecosystem actors. Through our research we have, in the case of the NNFCMPBE, identified this to be TSM Nordic.

Furthermore, Iansiti and Levien (2004) claim that the ecosystem strategy most suitable for a certain company is primarily governed by its own goals and what kind of company it aims to be, and that a successful keystone aims to provide a platform, which other members of the ecosystem can utilize in developing their own offerings. In our interview with Salvador, he states that TSM Nordic aims to be an umbrella platform and a cluster and enabler for third party mobile payment service providers, with the goal to decrease the complexity involved in the coordination and integration of new ecosystem members. In fact, their entire business model is based on being an enabler and intermediary of third party service providers. All of which are characteristics by a typical keystone role.

Finally, Iansiti and Levien (2004) state that a keystone strategy is most effective when a business is at the center of a complex network of asset-sharing relationships, and the

environment having a high level of innovation and turbulence. The ecosystem evolving around Valyou is undoubtedly characterized by a high degree of innovation as most actors are developing new solutions to fit to the technological model being developed by TSM Nordic. Additionally, coordinating several actors from different industries such as banks, merchants and MNOs, with diverging goals and incentives, on both a business level as well as on a technical level, induce a high level of turbulence. Accordingly, it is reasonable for TSM Nordic to assume the role of a keystone in the NNFCMPBE.

11.2 Developing a Keystone Strategy: Applying the Framework of a Business Ecosystem's Evolutionary Stages

According to both Moore (Moore, 1993) and Iansiti and Levien (2004), the overall responsibility of the keystone is to ensure the sustainability of the ecosystem. TSM Nordic needs to be a strong actor who can motivate, incentivize and force other actors in the ecosystem, and involve both the demand and supply side of the market. To help us assess the development of the NNFCMPBE, and thereby also shape the keystone strategy of TSM Nordic, we apply the business ecosystem evolutionary stages model (Moore, 1993) presented in section 2.2.

The framework was chosen through a process of reviewing our pre-diploma work (Glück and Kähler, 2013). This report consisted of an extensive literature review of business ecosystem theory, aiming to identify frameworks helping businesses in decision and strategy making in their business environment. Moore's model was found to have a very good fit to our current scope of assessing the future development of the ecosystem, and will assist us in systematically understanding the strategic logic of change, and help us to anticipate how the challenges identified in Part C should be managed and prioritized.

We will use this life cycle perspective and address each evolutionary stage separately to assess the challenges identified in Part C in accordance with Moore's framework. This will help us understand and structure the challenges in a time perspective and better understand what needs to be focused on and when. Doing this, we will identify strategic options for TSM Nordic to ensure the expansion of the NNFCMPBE and its evolution through the stages, subsequently enhancing its sustainability. In addition to Moore's framework, we will also include aspects of other theoretical perspectives identified in our pre-diploma project, to substantiate and support our argumentation in the assessment. Finally, as the identified challenges contain elements characteristic for both disruptive and two-sided markets, aspects of these theoretical approaches will also be included for additional insight in the

discussion.

The discussion in each stage will follow the structure of the challenges as presented in the conclusion of Part C, under the three areas of consumer adoption, the involvement of merchants and the competitive scene. However, it is worth noticing that according to Moore (1993), the evolutionary stages might blur together, with the challenges of one stage often cropping up in another. This is also the case in our study, and different aspects of the same challenges will be addressed in several stages.

Finally, as the scope of this thesis is to identify challenges for TSM Nordic in establishing a sustainable ecosystem, and due to the current situation of the NNFCMPBE, this assessment will mainly focus on the first two stages in the model as these are closest in time, and therefore more relevant. Some aspects of the identified challenges will also be discussed in Stage 3, whereas Stage 4 will only be briefly accounted for. Table 13 presents an overview of what challenges will be addressed in each stage.

Table 13: Challenges addressed in the different stages

Challenges	**Stages**		
	Stage 1	**Stage 2**	**Stage 3**
Consumer adoption			
Limited market reach	✓	✓	✗
-Recruiting banks	✓	✓	✗
-Recruiting MNOs	✓	✓	✗
-Handset availability	✗	✓	✗
Unclear value proposition	✓	✓	✓
Recruiting merchants			
Weak value proposition	✓	✓	✓
Expensive payment schemes	✓	✓	✓
Infrastructure investments	✓	✗	✗
Integration issues with existing loyalty	✓	✗	✗
Competition			
Threats from competing NFC services	✗	✓	✓
Threats from different technological solutions	✗	✓	✓

11.3 STAGE 1: BIRTH

During the first stage, TSM Nordic needs to focus on defining the value of the proposed service. According to Moore, the winner of Stage 1 is often the company that best defines and implements this value proposition. TSM Nordic is already well on their way, but our research revealed that there are still uncertainties related to several actors' perception of the value proposition of Valyou, specifically the merchants and the consumers.

In the perspective of TSM Nordic as a keystone, focusing on cooperation is very important at this stage to form the partnerships necessary to be able to deliver the services inside Valyou. Actively preventing competition should not be the focus at this initial stage, beyond tying up and ensuring key partnerships and important channels such as banks and merchants, and thus preventing them from investing in alternative and competing solutions.

As the service has not been launched yet, but many partnerships have been, and continuously are being, formed, the current state of the NNFCMPBE as described in Part B, indicates that the ecosystem has evolved well into this first stage, and TSM Nordic is in the midst of solving the challenges Moore (1993) describes as characteristic for this stage:

Table 14: Challenges in Stage 1

Cooperative challenge	Competitive challenge
"Work with customers and suppliers to define a new value proposition around a seed innovation."	"Protect your ideas from others who might be working toward defining similar offers. Tie up critical lead customers, key suppliers and important channels."

Consumer Adoption

As we concluded in Part C, consumer adoption is crucial to the establishment of a sustainable ecosystem. Dahlberg et al. (2008) claims that there are five factors especially important for the consumer adoption of a new mobile payment solution; ease of use, trust and security, usefulness, cost and compatibility in the market. Through our research, we have gained insight into how these parameters relate to Valyou. In the following we will discuss the relevant parameters together with the identified challenges.

Market Reach

Banks and MNOs

TSM Nordic is already tying up several key partners as payment service providers, with 70% market reach through the involved banks (Gjersum). However, on the MNO side, only Telenor is onboard (50% of the market). Both Tele2 and Netcom have explicitly said that they want to be late followers, which is in accordance with how Moore states established companies will benefit by waiting out the initial stage of the evolution and adopt the final and most suitable and successful solution. This will in Valyou's case be when all development and testing have been concluded, and the service shows promise in being adopted by consumers.

Continuous effort and dialogue should therefore be directed towards hesitant actors, so they can be included as soon as the service proves itself. However, the initial focus should be on bringing the service to the consumers reached through the current partners. If one can provide these with a good service and prove the business model to be profitable, the hesitant actors are likely to follow. This recommendation is supported by Christensen et al.'s theory (2003) on disruptive business models.

Due to the initially limited market reach, TSM Nordic needs to focus marketing efforts directly to the current partners' customers only, specifically through the channels of Telenor and DNB. A nationwide marketing campaign is not advisable, as a majority of consumers will still not be able to use the service in this stage. Additionally, the requirements of a consumer for him or her to be able to use the service, as presented in Appendix A.2, is important to clarify, to avoid frustration connected to the Valyou brand.

Value proposition towards consumer

As we realized through our research, one of the challenges connected to the value proposition was the communication of the actual benefits of the service, as these might not be immediately recognized by the consumer. Additionally, concerns regarding the security of the service need to be addressed, seeing how these are mostly unjustified.

Immediate efforts should therefore be made towards educating and enlightening the consumer about the benefits and security of Valyou, through the above-mentioned channels of current partners. As the initial launch of the service may unveil technical issues or other problems in use, customer support from TSM Nordic must be well established and available. Merchant staff must also be educated to assist the use of Valyou.

Finally, the consumer should not at any point be charged for using the service. As they are used to payment services being free, at least for all practical purposes, they are a typical example of user groups that will drastically pull back from the platform should they be asked to pay. It is therefore in TSM Nordic's interest to maintain the business model of having other ecosystem actors such as banks and MNOs subsidize the platform for the consumer (Eisenmann et al., 2006).

Recruiting Merchants

In Stage 1, the focus of merchant recruitment needs to be directed towards key segments and tying up lead actors within them. Key merchant segments are characterized by high volume and frequent payment transactions and broad market reach (Salvador), such as grocery-, convenience- and foodservice chains within fast moving consumer goods (FMCG). In addition to Moore, two-sided market theory also points to the importance of including key partnerships, or marquee users, which are typical market leaders that pave the way for adoption of additional user groups (Eisenmann et al., 2006). By incentivizing the marquee users, others will follow, and the platform can be expanded.

In the case of merchants, one needs to identify segment leaders in terms of market share and innovativeness. TSM Nordic has already engaged Deli DeLuca through NorgesGruppen (convenience), as well as both Starbucks and McDonalds (foodservice). As NorgesGruppen is established as a first mover for services also within the grocery segment (Klavenes), this relation should be exploited to activate the first grocery retailers. This would subsequently provide arguments and incentives to recruit following and competing companies in the same segment.

Value proposition towards merchants

From a merchant's perspective we have identified two reasons to join the NNFCMPBE and enable their infrastructure to accept NFC payment services. The first one is complying with consumers' wish to pay with such a service, should this group grow large enough. The second is the aspect of simplifying and improving loyalty and advertising services. As the consumers' demand initially will be negligible, and TSM Nordic has not yet fully developed their business model for loyalty services, the value proposition towards the merchants in Stage 1 is very weak.

As the ecosystem will not move past this point because of the chicken-and-egg situation, additional incentives for the merchants needs to be created. According to two-sided market theory, each side in such a market should be charged appropriately, subsidizing one side if necessary (Eisenmann et al., 2006, Rochet and Tirole, 2004). Thus, by subsidizing merchants

one can kick-start and create supply in the two-sided market (Ondrus et al., 2009), evolving the ecosystem into Stage 2. This should in accordance with Moore, only be done for the key merchants, and will be discussed in the following sections.

As the rest of the ecosystem stands to benefit from this kick-start, it stands to reason that these actors can share the potential subsidizing costs. In Stage 1, this will probably be DNB and Telenor. We find support for this way of thinking from Zhang and Liang (2011) who emphasizes the importance of proper and fair value sharing schemes. Gawer and Cusamano (2013), argues that a keystone should develop a collective ecosystem mindset, and this way of working together and sharing the costs is a step in that direction. This becomes easier if TSM Nordic clarifies the mutually enhancing business model, and points to the benefits for the different actors (Gawer and Cusumano, 2013).

Integration with existing loyalty

As TSM Nordic has several options to develop value-adding services for the consumer, initial efforts should be directed at developing services that also incentivize the merchants, and reduce their barriers of entry. The first step in developing these services should be to integrate the already existing loyalty programs that are essential for key merchants, especially bonus programs which are directly connected to the transaction (such as Trumf and Coop). By doing this, TSM Nordic will mitigate some of the merchants' concerns and resistance to activate their PoS terminals (Klavenes). As a way of subsidizing marquee users, these integration costs should be shared or covered by TSM Nordic and other actors in the ecosystem, as mentioned above.

Infrastructure Investments

Regarding available PoS terminals, our research revealed that this is not as extensive an issue as initially believed. The PSPs are distributing NFC-enabled devices on their own initiative, in addition to the fact that merchants primarily rent their terminals and easily can renew their leasing deals (Klavenes). However, recruiting efforts should be coordinated in cooperation with EMV and banks promoting contactless payment cards, to ensure efforts to install enabled terminals are made towards the same merchant segments, and key actors within these.

Payment Schemes

As discussed in sections 9.2 and 9.3, Valyou payment transactions will be processed through Visa, resulting in higher transaction costs and lower profit margins for the merchants.

It is natural to assume that merchants wish to uphold or increase their current profit level. To be able to do this at the same time as they accept payment with Valyou, they have two

choices. Their first option is to surcharge the consumer the increased transaction cost, shifting the transaction cost upon the customer. However, this is neither desired nor plausible. Valyou is only a valid option for the consumer as long as it as cheap as existing solutions, and a surcharge would mean Valyou would become more expensive than a BankAxept card. Secondly, it is not plausible as there are directives from the European Commision against such surcharges (Klavenes).

The second option to maintain profits is then to gradually increase prices, without a direct surcharge. This would, however, affect the consumer in the same way, but this way the consumer would be paying for Valyou indirectly, and without knowing. These disadvantages for the merchants actually increase with consumer adoption, making them the only actor not directly benefiting from increased adoption.

The payment scheme situation is therefore another argument for subsidizing the merchants, especially in the early stage until a broader consumer adoption of NFC and contactless cards can ensure the merchants continued cooperation. One way of doing this could be the banks sharing some of the increased transaction revenue with the merchants, modifying the proposed business model of Visa.

Table 15: Key recommendations for Stage 1

Key Recommendations for Stage 1
• Focus marketing directly to consumers reached through current partners
• Educate consumers and merchant staff and clarify benefits and actual security
• Focus on tying up market leaders within key retail segments
• Subsidize important merchant segment leaders through free loyalty program integration or with a share of the ecosystem's increased revenue
• Focus initial service developments on existing loyalty programs
• Coordinate initiatives to upgrade PoS terminals with EMV and banks promoting contactless payment cards.

11.4 Stage 2: Expansion

The focus of TSM Nordic in Stage 2 is substantial expansion to ensure a broad market position and to undermine competition from rival actors or ecosystems. TSM Nordic and the NNFCMPBE are on the verge of entering into this expansion stage, where the keystone also needs to prepare for governance and leadership into the coming stages of the life cycle. This

includes preserving important relationships and control over both consumers and core centers of innovation and value creation. The secured involvement of key merchants and first movers in target segments such as FMCG is especially crucial in order to attain the majority of followers in the same segments to provide the consumer with a sufficient number of user places.

The emergence of one standardized platform governed by a common enabler and keystone is important to simplify user adoption, and to share investment and operational costs between all involved parties, instead of each actor developing their own service application. Additionally, the Norwegian market in itself is rather small, which means that a new payment solution must be available to all consumers in order to get merchants to invest in it (Forbrukerrådet, 2014).

As the NNFCMPBE enters into the expansion stage, we might also see the emergence of HCE. Although HCE will not initially be certified by EMVCo for payment services, TSM Nordic is wise to be as tech-neutral as possible. They can benefit from assessing how to implement HCE for other purposes, specifically for non-sensitive services that do not require the same degree of security, e.g. loyalty programs and promotion services.

Thus, both elements of competition and cooperation are important in this stage, and Moore (1993) sums up the following challenges for the expansion stage:

Table 16: Challenges in Stage 2

Cooperative challenge	Competitive challenge
"Bring the offer to a large market by working with suppliers and partners to scale up supply and achieve maximum market coverage."	"Defeat alternative implementations of similar ideas. Ensure that your approach is the market standard in its class through dominating key market segments."

Consumer Adoption

Consumer adoption is the main focus in the expansion stage and should be devoted full attention and allocation of resources. An increased consumer base will put pressure on merchants in addition to create barriers against competition. Accordingly, the market reach needs to be broadened to provide the potential to scale up the service to the entire market.

Market Reach

Assuming the consumer's choice of mobile subscription, bank and handset is independent and equally distributed, a simplified equation of TSM Nordic's maximum market reach can be presented as the product of each contributor's market reach. This would be the product of the three limiting factors; market share of involved MNOs, market share of involved banks, and market share of handsets supporting NFC, and is presented as follows:

$$MNO\ Market\ Reach\ \times Bank\ Market\ Reach\ \times\ Handset\ Availability = Total\ Market\ Reach$$

Currently, TSM Nordic has agreements with banks covering 70% of the market. As Telenor is the only MNO involved, the MNO market reach is equal to their market share of 50%. Finally, the actual share of NFC enabled handsets is not as clear. According to NFC World (NFC World, 2014), all the handset providers present in the Norwegian market (TNS Gallup, 2014) have enabled most of their new models to support NFC, apart from Apple, who has a market share of 35%. As a rough estimate, if we assume all other handsets to support NFC, the maximum market reach through available handsets will be 65%. The actual reach will probably be substantially lower, but will increase as older models are continuously substituted, and smart phone distribution increase. Accordingly, this gives TSM Nordic a current maximal market reach of:

$$0{,}5\ \times 0{,}7 \times 0{,}65 = 0.2275$$

As the MNOs' reach or possibly the handset availability are the most limiting factors, these should be the main areas of focus in the expansion stage to secure a broad market reach.

MNOs

In order to maximize the market reach in this stage, the most limiting factor should receive the greatest focus. If the market reach through MNOs is the most constraining factor, recruiting additional MNOs should be top priority in expanding Valyou's market reach. If initiatives in Stage 1 succeed, Valyou will gain traction and increase demand in the market. The increased volume will alongside standardization of the production process subsequently contribute to SIM providers lowering their prices towards the MNOs (Gjersum, Langrød), and is believed to entice the remaining MNOs. The task of recruiting additional MNOs may also prove to be easier in this stage since, according to Moore (1993), established companies are expected to join when initial development and trials are completed, and the final solution has proven itself in the market and is ready to be adopted.

Banks

Even though the market reach through the already involved banks is substantial, inclusion of the remaining banks is still important. As one of the main barriers of entry for the banks is the development of new back-end technical systems (Bentsen), TSM Nordic should explore how the work already done by Evry for DNB can be used to provide a simpler entry for new banks. Other banks cooperating with Evry will benefit from their experience through the concluded integration for DNB. For banks using other IT-system providers, TSM Nordic should ensure experience transfer in cooperation with Evry and provide implementation frameworks or best practice transfers.

Handset Availability

The upper limit of 65% market reach through supporting handsets in the Norwegian market is the second constraining factor for reaching full market potential. Should Apple continue to refuse support for NFC, a separate solution for iPhones needs to be developed. However, it is important to notice that an NFC smart sticker, the most viable short-term solution identified in our research, will not have the full wallet functionality of Valyou, and will in reality be more like a contactless card attached to the handset.

The value in this for TSM Nordic is primarily connected to changing consumer behavior, getting more people tapping their phones, as a way of payment, which will increase the pressure on merchants to accept this form of payment. It will also be a bridging solution, should Apple choose to include NFC in their future models. The issuance of the stickers can be done through the banks existing card issuance systems.

We advise TSM Nordic to see to existing solutions in other markets for best practice implementations in combining solution for NFC enabled handsets and iPhones like a recent service from The Commonwealth Bank of Australia (Mobile Payments Today, 2013). Due to the uncertainty of the development of iPhones and the possible inclusion of NFC technology, a watcher-position in relation to upcoming iPhone releases is advisable in order to prepare for further implementation as soon as possible.

Value proposition towards consumer

In Stage 2, the service needs to be past the stage of trial and development, and it is important that the consumer experience is optimized. If the service offered upon extensive rollout to the market is experienced as inadequate, TSM Nordic risks the threat of consumers starting to use it but then dismissing it before it has been able to show its full potential. Making consumers resume an already dismissed service can be very difficult (Munch-Ellingsen), and technical usability is therefore crucial at this stage.

As the results from the Tap2Pay project showed low acceptance of technical problems among the consumers (Evjemo et al., 2011), focus upon introduction needs to be directed at making the main service, the payment transaction, and its user experience seamless. Adoption to consumers' needs and enriching the service portfolio will follow in the later stages when the main service offering is accepted.

In our interviews, we have encountered differing opinions on what additional services are needed to make the ecosystem sustainable. Salvador believes that NFC mobile payment is a natural evolution of the existing payment card infrastructure, and will be sustainable in itself. On the other hand, Langrød expresses her view as the payment service dying quickly without the inclusion of loyalty services. It is hard to say which of these views may prove to be correct, but there is little doubt that an increase in the number of services connected to the platform will strengthen both the business model and the sustainability of the platform (Gawer and Cusumano, 2013).

The expansion in Stage 2 will require substantial marketing efforts. TSM Nordic can benefit greatly by coordinating the marketing with the established marketing and nationwide distribution channels of both Telenor and the involved banks. This co-branding will contribute to further mitigate consumers' concerns about security by building on their brands' established integrity, trust and familiarity. Furthermore, it is important to utilize the opportunity to brand the service on two levels - both the Valyou brand as a wallet, as well as each individual service providers' brand inside it. This intensified marketing can also help put pressure on the remaining MNOs and banks, as the participating partners will encourage their customers to change their subscription to an MNO, or open an account with a bank that supports NFC.

Recruiting Merchants

Successful recruitment of key merchants in Stage 1 is crucial in order to be able to expand to full market potential in Stage 2. In order to dominate certain key segments, the focus during expansion should be to involve follower companies within segments already activated through their key actor or market leader in Stage 1. Parallel to this, TSM Nordic should expand further into new retail segments with as high volume and user frequency as possible to make NFC mobile payment an increasing part in consumer life. These could be segments such as apparel and sporting goods or gas stations.

Value proposition towards merchants

When the integration of the most essential existing loyalty programs is completed, TSM Nordic should start developing a framework for easy implementation of new loyalty

programs to streamline onboarding of new merchants. As the inclusion of merchants escalates, TSM Nordic's processes needs to be standardized in order to increase the service' scalability and provide merchants with the services they want to offer without having to go through TSM Nordic. Developer tools and standardized frameworks can allow individual merchants to create and manage their own loyalty and marketing services. This will again result in a better and broader offer towards the customer, and further increase consumer adoption. Moore (1993) also emphasizes the scalability of a service, and states that it is one of the key conditions to ensure a broad market reach in this stage.

Such standardizations are also supported by Gawer and Cusamano (2013) who say the development of a modular platform architecture is important for effective platform leadership. Increasing the business model's scalability will also reduce the integration costs for new partners, and will also allow for third party developers to cater to small merchants' needs, creating the opportunity for new niches to connect to the platform, which according to Iansiti and Levien (2004), is an important measure to ensure an ecosystem's health.

Payment Schemes

As the EMV interchange fees will be significantly lowered during the next two years (from 0,8-2,5% to 0,2%), and thereby reduce the merchants' barriers to accept NFC payments. Additionally, the potential development of a new BankAxept solution will by all indications lead to an increase in its the transaction costs. The reduced gap between the different schemes needs to be communicated clearly to hesitant merchants, to make them aware of this change, which consequently will reduce their barriers to activate their terminals.

Competition

During the expansion stage, Moore claims that the most important competitive challenge is to defeat alternative implementations of similar ideas and ensuring that your approach becomes the market standard. In relation to the NNFCMPBE, this is a matter of establishing NFC as the technology of choice over alternatives such as BLE or QR codes.

Threats from competing NFC services

At this stage, the issue is not to defeat other actors developing a NFC payment service. On the contrary, other NFC services will assist in creating market awareness and demand for the service (Gjersum). Additionally, a certain degree of competition is necessary to stimulate development and subsequently ensure increased QoS.

As revealed in the interviews, MeaWallet has a different strategy than TSM Nordic, aiming directly towards loyalty and access services, which are less expensive to offer than payment services because of lower security requirements and need for data storage. This can potentially become a classical disruption scenario where MeaWallet starts by controlling the low-end segments of the service offering, which often constitutes the larger share of the market (Christensen et al., 2003), and then improve and broaden the offer. If MeaWallet subsequently starts to offer payment services, they can leverage their already installed userbase from the loyalty and access segments, and potentially become a threat to TSM Nordic.

Without any further assessment, disruption theory proposes several measures to create barriers to such disruptions (Wessel and Christensen, 2012). However, Wessel and Christensen claims that the effectiveness of such measures increases the earlier one recognizes the potential threat, and TSM Nordic should therefore pay close attention to MeaWallet and other companies in mobile segments closely related to payment aiming at seemingly unimportant segment, and take appropriate defensive action should one of these services rapidly start to increase their market share.

Threats from different technological solutions

It is hard to anticipate if and how international actors with payment services based on other technologies will enter. The Norwegian payment infrastructure is almost exclusively based on PoS terminals that are in the process of being upgraded to being NFC compatible. This is in itself an extensive barrier of entry for services based on alternative solutions such as BLE that needs an entirely different infrastructure.

However, if an international actor like Apple or PayPal should enter the Norwegian market, TSM Nordic should focus on leveraging the local knowledge and expertise of the partnering banks and MNOs. This can provide competitive advantages through adjusting customer support and customizing service offerings to better fit the Norwegian market and consumer needs. Furthermore, the integrity of, and consumers' trust in Norwegian banks and MNOs should be leveraged to undermine the entrance of foreign actors that has yet to prove themselves as payment providers.

As consumers do not frequently change their payment habits or methods, the greatest barrier against other technological solutions is, however, created by ensuring fast and broad consumer adoption of NFC. Thus, it becomes a matter of being first to market and what solution gets the initial strongest footing.

Table 17: Key recommendations for Stage 2

Key Recommendations for Stage 2
• Leverage economies of scale to recruit additional MNOs
• Explore existing solutions for best practice implementation of an iPhone NFC-sticker solution
• Facilitate experience transfer and provide frameworks to simplify technical integration of additional banks
• Coordinate marketing and branding with partners to build on their integrity and trust
• Focus merchant recruitment efforts on followers in already activated key segments
• Focus service development on services that incentivize both consumers and merchants
• Standardize business model and provide frameworks and developer tools to increase the service' scalability
• Communicate reduced cost differences between the schemes to the merchants
• Leverage local knowledge and expertise of partners to gain competitive advantages against international competition

11.5 Stage 3: Leadership

In Stage 3 the ecosystem becomes more structured, and the value-adding components and processes central to the ecosystem are becoming relatively stable (Moore, 1993). Struggles of ecosystem leadership might arise with actors looking to integrate both vertically and horizontally in the value chain to expand their operations, which consequently reduces the ecosystem's dependency on its original leader. Specifically, if HCE becomes certified for payment transactions, one could expect a scenario where banks will bypass TSM Nordic and develop payment services within their own applications, as the need for secure space on the SIM card erodes.

This divergence fractions the ecosystem and might result in lower QoS and user experience if the ecosystem loses the central entity and intermediary that controls the value chain and ensures the end-to-end QoS (Langrød).

To mitigate such challenges, TSM Nordic needs to strengthen its position as keystone. And bargaining power in this stage comes from providing something the ecosystem needs, and making sure to be the best or only practical source for it. It is a matter of continuous value creation and innovation to ensure the expansion and increased performance of the ecosystem, and without it power will shift between players in the system (Moore, 1993).

TSM Nordic can strengthen its position by securing further investments from the actors already involved. Making the banks, MNOs and merchants actively participate in the further development of the ecosystem will create ownership and commitment, and exploiting synergies between the actors' different services within Valyou can create additional lock-ins. Hence, making it both unattractive and expensive as well as risky for them to change to another platform, as they will need to adapt to another solution, or develop their own, in addition to losing the original keystone's established reach in the market.

Moore (1993) summarizes the important challenges of the leadership stage as follows:

Table 18: Challenges in Stage 3

Cooperative challenge	Competitive challenge
"Provide a compelling vision for the future that encourages suppliers and customers to work together to continue improving the complete offer."	"Maintaining strong bargaining power in relation to other players in the ecosystem, including key customers and valued suppliers."

Consumer Adoption

Value proposition towards the consumer

As the focus in Stage 2 is to develop the value-adding services that incentivize both the merchants and consumer, TSM Nordic can in this stage start to develop services that have a more direct focus on the consumer to improve the complete offer. Personalized content like shopping lists and digital receipts and P2P payment transfers are natural to begin with as these are services and applications that are still related to payment.

The payment product spectrum should also be expanded in this stage. As the initial solution will only be offered with a Visa debit card, increasing the offering by including other debit and credit card providers is a necessary step on the way to provide the same freedom of choice as a traditional wallet, and making it redundant.

Non-payment related services should also be developed, such as secure storage for emulated access cards, personal identification and driver licenses. First after the inclusion of all these services, the vision of leaving the whole wallet behind can be realized, which will increase the consumers' dependency on the service. Additionally, it will attract additional consumers

not incentivized by the payment offering. And finally, it will allow for additional connectors to the platform, increasing its modularity by including actors from previously unconnected ecosystems, such as access system providers.

Recruiting Merchants

In the leadership stage, Valyou will be established within key segments like retail and FMCG. The next step will be to activate new segments that might differ from the retail industry in terms of implementation. The public transportation sector is a very interesting segment because of high user frequency, but demands substantial work with technical integration (Salvador). An assessment of how integration towards such different segments could be implemented should therefore be commenced early in the leadership stage, and activation of these segments should follow to strengthen the leadership position.

Value proposition towards merchants

According to Moore, value-adding services central to the ecosystem have started to stabilize in Stage 3. However, continuous improvement and innovation is necessary to ensure the merchants' commitment to and investments in the ecosystem.

As a wider range of services become available, TSM Nordic can start assessing synergies between them to increase lock-in effects by connecting service providers to each other inside the wallet. Combining different services within the wallet can make Valyou an exclusive market place for customized offers and thus provide a more holistic user experience. Synergies towards other parts of m-commerce should also be assessed, for instance by including online coupon services such as Groupon or Let's Deal that still has a relation to merchants and thus proximity payment.

When the consumer base increases, TSM Nordic needs to assess how additional marketing and promotion functionality can be implemented, to enhance the business model through providing consumer data for targeting purposes. This will further improve the advertising services offered to merchants and can potentially be the basis for new services.

Payment schemes

As discussed, initiatives have been started to develop a new BankAxept solution. With a leadership role in the new payment ecosystem, TSM Nordic should consider taking an active role in the development of this new model. Although Visa will have become cheaper in this stage, efforts should be made to assess if a model can be created that will benefit the key actors to an even greater extent, as it is a keystone's responsibility to ensure fair value sharing schemes (Zhang and Liang, 2011). TSM Nordic should argue for business models that lower costs to the greatest degree, and has the fairest distribution of transaction revenues.

This will help TSM Nordic build a reputation as a neutral industry broker, which is important to ensure a strong keystone role, and thus the long-term sustainability of the ecosystem (Gawer and Cusumano, 2013).

Competition

In the long-term perspective, Moore states that the competitive challenge in Stage 3 is a matter of maintaining bargaining power and creating lock-ins and barriers of entry, including securing service providers' investments and increasing switching costs.

Threats from competing NFC services

Two-sided market theory states that the question of whether a two-sided market will be served by one or more platforms can be determined by whether it will be more costly for users to use several platforms (Eisenmann et al., 2006). For the consumer, this will not be the case. For the service providers it depends on the final business model, but assuming the majority of costs will come from the rent of a card per year, a service provider will not risk higher costs by serving half of their customers through one wallet, and the other half through another. Hence, one may assume that there will be several wallet platforms co-existing in the future NNFCMPBE.

Several sources have indicated that one may see a consolidation between different wallets (Normann, UL, 2012), as other established actors like Initiative X, MeaWallet and potentially also Google Wallet expands and build new relations in the NNFCMPBE. This commoditization can subsequently lead to wallets sharing each other's service providers, connecting all TSMs to each other (Normann) and thus provide all services to all MNO subscribers through any wallet. This will in turn leave the competition to a matter of consumer preferences of the wallets brand and interface.

Bargaining power in a situation like this is then determined by the number of consumers choosing your wallet, and the number of service providers one TSM can offer to the other TSMs. Should TSM Nordic attain the dominant wallet position, controlling the majority of the service providers, such a consolidation may not be optimal and should be prevented, thus maintaining bargaining power through exclusive access to consumers and service providers.

Relation to banks

The increasing volumes of SIM cards and the emergence of HCE are both factors that could lower the banks' costs of renting secure space for their services. TSM Nordic needs to keep stimulating and incentivizing the banks, ensuring their continuous investments by developing more attractive and profitable business models to avoid them creating their own payment applications with HCE solutions, should it be certified for payment transactions.

However, developing a new payment application and establishing new systems for life cycle management is costly. Therefore, TSM Nordic needs to ensure that these switching costs exceed the costs of Valyou's business model, in addition to leverage wallet functionality and synergies with other service providers as well as the already installed consumer base. TSM Nordic can also include HCE in Valyou to emulate the banks' payment cards, if this proves to be more reasonable than renting SIM space.

Relation to MNOs

When NFC-enabled SIM cards are widely available in the market, this will ensure MNOs' commitment to the NNFCMPBE and serve as a lock-in. In order to achieve bargaining power to lower the prices TSM Nordic pays for SIM rental, the use of HCE to develop new services should be leveraged, both for storing non-sensitive services and potentially also emulated payment cards.

Threats from different technological solutions

The efforts done in Stage 2 towards establishing NFC as the market standard and create barriers for alternative solutions needs to be maintained and amplified. Established PoS infrastructure, established partners' local knowledge, trust and integrity, Valyou's installed consumer base, established value-adding services and the synergies between them as well as dominance in key merchant segments, are all factors that create lock-ins and increase switching costs. These should all be reinforced in the leadership stage to shield the NNFCMPBE from actors like Apple and PayPal.

Table 19: Key recommendations for Stage 3

Key Recommendations for Stage 3
• Develop payment related services such as personalized content and P2P services
• Expand the payment service to include other credit and debit card
• Develop necessary non-payment related services to realize the vision of leaving the traditional wallet behind
• Activate new merchant segments like the public transportation sector.
• Assess possibilities to exploit consumer purchase data in new service offers
• Assess synergies between services to increase lock-in effects and make Valyou an exclusive market place for customized offers.
• Take an active role in the development of the new BankAxept
• Consider efforts to prevent wallet consolidation and commoditization
• Leverage HCE against the MNOs to lower rental prices on SIM space.
• Reinforce measures to create barriers for alternative payment service solutions

11.6 Stage 4: Self-Renewal

Stage 4 is identified by mature business ecosystems being threatened by rising new ecosystems and innovations, and is thus outside the scope of this master thesis as the NNFCMPBE is merely at its birth stage.

However, there are characteristics and challenges related to this stage that also could be important for TSM Nordic to have in mind in the earlier stages of the evolution. Moore explains how leading successive generations of innovation is crucial to an ecosystem's long-term success and its ability to renew itself. Designing longevity into an ecosystem can be helpful in managing the self-renewal process. By micro-segmenting markets during the expansion and leadership stages TSM Nordic can create close, supportive ties with key partners and customers. Their loyalty will in turn buy the ecosystem time to incorporate the benefits of new, disrupting approaches (Moore, 1993), and thus support the need for a strong focus on recruiting merchants and securing maximum market reach through banks and MNOs in the earlier stages. Furthermore, Moore states that the main focus of an ecosystem in the self-renewal stage should be to:

Table 20: Challenges in Stage 4

Cooperative challenge	Competitive challenge
"Work with innovators to bring new ideas to the existing ecosystem."	"Maintain high barriers to entry to prevent innovators from building alternative ecosystems. Maintain high customer switching costs in order to buy time to incorporate new ideas into your own products and services."

The fact that the NNFCMPBE is subject to potentially disruptive forces by alternative implementations of e.g. BLE or QR codes makes these challenges relevant also for the current state of the NNFCMPBE, and Moore (1993) explains three methods for preventing disruption;

- Seek to slow the growth of the new ecosystem,
- Try to incorporate the new innovations into your own ecosystem
- Fundamentally restructure the ecosystem to cope with a new reality.

In our assessment of the keystone strategy of TSM Nordic and their options, we have focused on this first point as a defensive tactic to defeat competition. Due to the immature state of the current NNFCMPBE, it is difficult foreseeing the actual evolution of the different technological alternatives, and methods like 2) and 3) might be more suitable if the development changes and e.g. BLE achieves the stronger foothold.

12 ANSWERING RESEARCH QUESTION 3

In this part we have aimed to answer our final research question:

RQ3: How will the ecosystem develop, and how can TSM Nordic meet the identified challenges?

In answering this question, we have applied a framework modeling the evolution of the NNFCMPBE in four separate stages to assess its future development. We have based our assessment on the current situation of the NNFCMPBE and the challenges identified in Part C of this thesis. Through the perspective of business ecosystem theory, we have identified TSM Nordic as a potential keystone actor. We argue why they can benefit from following such a strategy and presents several strategic recommendations for them to meet the challenges of implementing an NFC based mobile payment service and establishing a sustainable ecosystem around it.

The presented stages are not intended to be perceived as discrete time intervals, but will rather blur into one another. Yet, they have very differing characteristics, and to be able to enter into the next evolutionary stage, several challenges in the current stage need to be overcome.

The current situation of the NNFCMPBE indicates that the ecosystem is in the first stage of its evolution, namely the birth stage. From here, there are three possible future directions, as can be seen in Figure 21:

1) The ecosystem will evolve through the stages according to our assessment,
2) The ecosystem will remain in its current stage if challenges are not resolved in a satisfactory manner, consequently making it unable to reach the next stage, or
3) The ecosystem will dissolve and cease to exist if implementation of the service fails or if competing technological solutions gain a strong enough market position.

It is, however, possible that other competing NFC services, like Initiative X or MeaWallet, will drive the evolution of the ecosystem, also without the involvement of TSM Nordic.

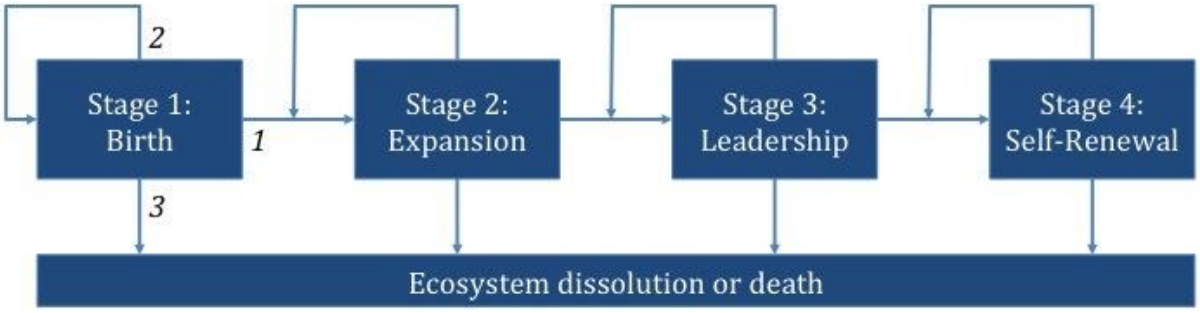

Figure 21: Potential future directions for the NNFCMPBE

The NNFCMPBE is currently at its most vulnerable and least secure stage, as the NFC technology has yet not gained sufficient foothold as the preferred alternative for mobile payment solutions in Norway. Neither has the Valyou service proven itself in the market. The ecosystem's sustainability will increase as the ecosystem evolves through the presented stages, which are briefly summarized in the following, along with the key recommendations for TSM Nordic to ensure this evolution.

Stage 1

In Stage 1, the main objective is to establish the ecosystem and launch the Valyou service, defining the value proposition for the participating actors, and improving it for the ones not sufficiently incentivized to bring the ecosystem forward. The goal is to resolve the chicken-and-egg paradox of consumer adoption versus the activation of merchants. Doing this as fast as possible is important to ensure NFC becoming the chosen technological alternative for mobile payments in Norway. As some actors in the NNFCMPBE have more to gain from NFC being the chosen technology, they need to cooperate to provide incentives for the actors that do not directly benefit from implementing the new solution. In this stage, ensuring cooperation between and involvement of key ecosystem actors is more important than actively defeating the competition.

Stage 2

The focus in the second stage is substantial expansion to ensure a broad market position, and to maximize market reach. The fact that the ecosystem has evolved through Stage 1 will be a proof to the viability of the service, and inclusion of additional partners may therefore prove not to be as difficult in Stage 2. The basis for becoming a dominant keystone is created in this stage, and is measured by the amount of ecosystem actors TSM Nordic is able to

connect to the Valyou platform. In order to grow sufficiently, scalability is critical, making standardization of processes an important focus. TSM Nordic also needs to ensure that the SIM-based NFC solution becomes the market standard, thus keeping the competitive focus on excluding different technological solutions such as Apple and BLE beacons or mCash and QR codes.

Stage 3

If the ecosystem enters into Stage 3, TSM Nordic will have attained a leadership role in the ecosystem and secured a dominant and broad market position. The ecosystem will have stabilized, but competition between internal ecosystem actors might arise as they start to integrate along the value chain. To ensure and maintain TSM Nordic's position as the ecosystem keystone, continuous improvements to the value proposition towards other ecosystem members are essential. Additionally, lock-in measures for important actors, and barriers against competition, should be enforced and new ones implemented.

Table 21 presents our key recommendations in order to ensure the described evolution through the stages, and to overcome the discussed challenges.

Table 21: Key recommendations for all stages

Stage 1	Stage 2	Stage 3
Consumer Adoption		
1) Focus marketing directly to consumers reached through current partners	1) Coordinate marketing and branding with partners to build on their integrity and trust	1) Leverage HCE against the MNOs to lower rental prices on SIM space
2) Educate consumer and merchant staff and clarify benefits and actual security	2) Facilitate experience transfer and provide frameworks to simplify technical integration of additional banks	2) Develop payment related services such as personalized content and P2P services.
	3) Leverage economies of scale to recruit additional MNOs	3) Expand the payment service to include other credit and debit cards

	4) Explore existing solutions for best practice implementation of an iPhone NFC-sticker solution	4) Develop necessary non-payment related services to realize the vision of leaving the traditional wallet behind
Recruiting merchants		
1) Focus on tying up market leaders within key retail segments	1) Focus recruitment efforts of merchants on followers to dominate already activated key segments	1) Activate new merchant segments like the public transportation sector
2) Focus initial service developments on existing bonus programs	2) Focus service development on services that incentivize both consumers and merchants	2) Assess possibilities to exploit consumer purchase data in new service offers
3) Coordinate initiatives to upgrade PoS terminals with EMV and banks promoting contactless payment cards.	3) Standardize business model and provide frameworks and developer tools to increase the service' scalability	3) Assess synergies between services to increase lock-in effects and make Valyou an exclusive market place for customized offers.
4) Subsidize important merchant segment leaders through free loyalty program integration or with a share of the ecosystem's increased revenue	4) Communicate reduced cost differences between the schemes to the merchants	4) Take an active role in the development of the new BankAxept
Competition		
	1) Leverage local knowledge and expertise of partners to gain competitive advantages against international competition	1) Consider efforts to prevent wallet consolidation and commoditization
		2) Reinforce measures to create barriers for alternative payment service solutions

Part E
Conclusion and Further Research

Based on the answers to our research questions,
we conclude our problem description and
propose topics for future research

Chapter 13 | Conclusion
Chapter 14 | Further Research

13 CONCLUSION

This master thesis has explored the Norwegian NFC mobile payment business ecosystem (NNFCMPBE) and how TSM Nordic can enhance its sustainability. Through conducting a series of interviews with people within TSM Nordic, Telenor, DNB, NorgesGruppen, UL, MeaWallet and Sintef, and utilizing relevant literature, challenges for TSM Nordic in introducing its mobile payment wallet service, Valyou, have been identified, and strategic recommendations to mitigate these challenges have been assessed.

The research performed on the NNFCMPBE covered its members and their environment, in addition to value the proposition towards, and challenges for, key actors in joining the ecosystem. This research formed the basic ecosystem context when assessing TSM Nordic's key challenges. The main finding in this assessment is how the further development of the ecosystem depends on resolving a chicken-and-egg situation of consumer adoption of the service, versus the involvement of merchants to activate the necessary payment infrastructure. The other identified challenges are all related to this core problem, and need to be resolved for the NNFCMPE to evolve into a more sustainable stage.

The subsequent challenges related to consumer adoption are twofold. The first is the current limited market reach of the service, a consequence of only partial participation among Norwegian banks and MNOs, in addition to the limited availability of handsets supporting NFC technology. The second challenge is an initially unclear value proposition from TSM Nordic to the consumer.

Additionally, we have assessed the ecosystem's future development and how TSM Nordic can meet the identified challenges. By pursuing a keystone strategy TSM Nordic may exploit its value creation possibilities, and manage challenges in an optimal manner. Going through possible stages of the ecosystem's evolution, key recommendations for each stage is presented with the basis in business ecosystem and keystone strategy literature.

Recurring in all of the stages is the focus on continuously improving the incentives for the different actors to partake in the ecosystem. By increasing the number of actors connected to the Valyou platform, and the number of services they provide to the consumer, TSM Nordic will enhance the sustainability of the ecosystem. Ongoing innovation and clear communication is key success factors in order to implement this strategy successfully.

14 FURTHER RESEARCH

In this thesis, we have conducted a qualitative and exploratory research study to obtain insight into the Norwegian NFC mobile payment business ecosystem. Through our research process, we have identified several interesting topics that have not been included in this report, or only been addressed in brief. Some of these topics were not included as they did not match the scope of this research, whilst others have been left out because of limitations such as time constraints.

In this section, we present topics related to our study that should be further assessed and investigated in any subsequent research. We also propose supplementing our research with different research methods in order to further validate our findings and possibly to improve the utilized framework.

14.1 OPPORTUNITIES FOR TSM NORDIC IN OTHER MARKETS

The scope of this study was limited to covering the Norwegian market and ecosystem. However, the topic of TSM Nordic's possibilities to offer their service in other geographical markets appeared several times throughout our interview discussions.

Several of the interviewees pointed to the necessity of focusing efforts and resources on creating and establishing one success in the home-market before expanding and introducing it in the next. However, the extensive TSM-functionality and supporting operating systems being built demands a bigger market than the Norwegian one alone in order to earn back the investments made. Additionally, the general immaturity of mobile payment solutions on a global level could imply that there is great potential for a service like Valyou in other markets as well.

Further research on this topic should assess the transferability of the findings in this study to other markets. For a study researching TSM Nordic's potential entry into a new market, we propose applying the framework presented in section 2.4, to assess the market and identify and uncover what challenges this could incur. Dahlberg et al. (2008) argues especially for the contingency approach's usefulness as mobile payment services differ between markets in a systematic manner, due to differences in technological infrastructure, regulations, laws or habits. Specifically, assessing the prevalence of both smart phone and payment card use as well as the distribution of the necessary PoS infrastructure is important.

In selecting what markets to assess, we suggest considering markets where TSM Nordic's main partners are already operative. This can contribute to streamlining the potential introduction of the service, by taking advantage of these actors' local market knowledge and

already installed user base. Both Telenor and Gemalto have well-established operations in a large number of countries, but the banks operate primarily in their domestic market. Our research revealed that the history of collaboration between the Norwegian banks and MNO's is one of the main contributing factors to the relatively fast development of such a service, compared to other markets. Accordingly, characteristics of the relationships between banks and MNOs in the relevant markets should be taken into consideration.

14.2 The Development of a New National Payment Scheme

Our research revealed that one of the main challenges in including the merchants in the NNFCMPBE is caused by them having to process the payment transactions through Visa, as BankAxept does not currently support NFC. Findings in our research indicate that BankAxept will undergo several changes in the coming years, and that the banks' proactive involvement in the NNFCMPBE is caused by a wish to move away from the current BankAxept model. Further investigation into the matter revealed that FNO, who owns the payment scheme, is planning to develop a new model, NyBax. This development, however, is not commenced, and there is currently a lot of uncertainty related to its progression.

Further research to assist this development is necessary to assess the possible design of a new model. This should include reviewing different business model options and the optimal allocation of the transaction revenues and costs between the involved parties. Such a study should pay special attention to both national and international regulations and legislations. In particular, the upcoming regulations from the European Commission on the payment schemes' interchange fees will influence and have an impact on the design of this model.

14.3 Further Analysis of the NNFCMPBE

As we concluded in Part D of this thesis, the NNFCMPBE is still in a very early phase, and the successful adoption of the service in the market has yet to happen.

Regarding the definition of key merchant segments and who needs to be involved in the ecosystem, this research relied heavily on the statements of the interviewees. Although evaluation criteria such as high volumes, frequent consumer activity and broad market reach were highlighted, a more thorough segmentation should be conducted to reveal where the service would have its greatest potential for adoption.

Due to the nature of our scope, aiming to cover and assess the entire ecosystem, the chosen theoretical approach of business ecosystems was not meant to focus exclusively on the topic of consumer adoption from a product specific perspective. A subsequent study should be

conducted with a specific consumer focus on how to maximize the adoption of the service, and include a further segmentation of different consumer groups. This research should also further analyze the different possibilities for value-adding services, to determine what services have the greatest demand in the market, among both consumers and merchants, and hence should be prioritized in the service' further development. There are several interesting theoretical approaches to consider for such a study, including the technology acceptance model (TAM) (Davis, 1989), diffusion of innovations (Rogers, 2010) or the multi-attribute models (Bettman et al., 1975).

Because of the scope of this research, and as explained in the methodology chapter, we have applied a qualitative approach to the investigated topics. This approach does not ensure statistical significance of our findings, and a subsequent study and analysis of the NNFCMPBE should apply quantitative methods in order to verify our results.

A longitudinal study on the NNFCMPBE should also be performed to assess the validity of the evolutionary stages model utilized in Part D of this thesis. Our assessment of the future development of the NNFCMPBE is strictly based on theoretical foundations, and a longitudinal study of the NNFCMPBE could assess its actual development's correspondence to the theoretical proposal.

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APPENDIX

Appendix 1 | List of Abbreviations
Appendix 2 | The Valyou Application
Appendix 3 | Initial and Final Problem Description
Appendix 4 | Interview Templates

A.1 List of Abbreviations

BLE	Bluetooth Low Energy
EMV	Europay, Mastercard and Visa
FMCG	Fast Moving Consumer Goods
GSM	Global System for Mobile Communications
HCE	Host Card Emulation
LCM	Life Cycle Management
MNO	Mobile Network Operator
NFC	Near Field Communication
NNFCMPBE	Norwegian NFC Mobile Payment Business Ecosystem
OTA	Over the Air
P2P	Peer-to-Peer
PoS	Point of Sale
QoS	Quality of Service
QR	Quick Response
RFID	Radio Frequency Identifiaction
SE	Secure Element
SIM	Subscriber Identity Module
SWP	Single Wire Protocol
TSM	Trusted Service Manager

A.2 THE VALYOU APPLICATION

In this section we wish to make it clear how TSM Nordic's service Valyou is intended. We describe the requirements needed to be able to use the service, and its intended use in a payment transaction.

Getting started

Valyou is a mobile wallet, a smart phone application, and the user interface the consumer uses when paying with TSM Nordics chosen solution of NFC mobile payment. The service has not yet been launched, but is planned for 2014. The mobile wallet is free for the consumer, and is downloaded from the Google Play-store as a regular application. Once installed on the handset, the consumer can choose to download and register a payment card from his bank within the application (card emulation), which is directly connected to the bank account like a regular payment card. Initially, this will only be possible with a Visa payment card. The handset can then be used to conduct payment transactions at all PoS terminals activated to support NFC functionality.

Requirements of the user

The following banks will in 2014 and 2015 allow purchases with Valyou: DNB, Sparebank1, SkandiaBanken, remember, Fana Sparebank, YA Bank. The consumer will also need to have a handsets with NFC capability. Lastly, he or she needs a mobile subscription with a MNO that offers NFC SIM cards and has an agreement with TSM Nordic. Currently, Telenor is the only one in the Norwegian market doing so.

Requirements of the user	
1) NFC capable handset	Most new Android handsets
2) NFC SIM card	Currently only offered by Telenor
3) Account with Participating Bank	DNB, Sparebank1, SkandiaBanken, Re:member, Fana Sparebank, YA Bank

Purchasing process

When in the store, there are two scenarios for the actual payment transaction process.

Case 1: Payment with the default card

When standing at the PoS terminal at check out, ready to perform the purchase, instead of putting the payment card into the PoS and typing the PIN, the consumer simply holds his or her handset next to the PoS, and the payment will be processed, and funds withdrawn from

the bank account connected to the card set as default. The payment will be initiated automatically, with no need to open the application, or do anything apart from taking the phone from the pocket. For transaction amounts over 200 NOK, one will also have to enter a PIN-code on the PoS. As a security measure, the PIN also needs to be entered for every additional purchase after a daily limit of 600 NOK is reached. In the case of theft, the involved banks have agreed to cover this amount if it should be used before the emulated card or handset gets locked.

Case 2: With another card in the mobile wallet

If the consumer has several emulated payment cards in the wallet application, and wishes to conduct a purchase with a card that is not set as the default, the consumer will have to open the Valyou application and select that card. Once selected, the process is identical to the one explained above.

Case 1: Purchase with default card	Case 2: Purchase with other card
• Hold phone next to PoS terminal • Type PIN on PoS terminal, if needed	• Open Valyou application • Choose payment card • Hold phone next to PoS terminal • Type PIN on PoS terminal, if needed

If the handset is turned off or runs out of battery, a purchase will still be possible, but only with the default card. The handset will then function as a contactless payment card, and transactions can be performed as described above.

A.3 INITIAL AND FINAL PROBLEM FORMULATION

As the work with this master thesis has been conducted in cooperation with Telenor, the selection of a case study relevant to them was a natural choice, and our initial problem description was formulated as the following.

Initial problem description:

"Describe the construction of the current Norwegian NFC mobile payment ecosystem with respect to members and their roles, functions, relations, technology platforms and business models. Assess what key issues and challenges are most important to solve in order to achieve a sustainable ecosystem/business model that can successfully implement NFC based mobile payment in Norway. Discuss different future ecosystem directions and scenarios, and recommend potential strategic options for Telenor and TSM Nordic."

As we realized in further defining the scope of our analysis that the majority of Telenor's current activities relating to NFC are separated into the joint venture with DNB, we wanted to assess TSM Nordic in an objective manner, as an independent case company, focusing only on the commercial ties to Telenor and DNB, and not their interests as owners. In accordance with our supervisor, Per Jonny Nesse, we made some minor alterations to the initial problem description and tailored it to fit the final scope of the selected case company more precisely. Accordingly, our final problem description reads as follows.

Final problem description:

"Describe the construction of the current Norwegian NFC mobile payment business ecosystem with respect to its members and their roles, functions, relations, technology platforms and business models. Assess what key challenges are most important for TSM Nordic to solve in establishing a sustainable business ecosystem and model in order to implement NFC based mobile payment in Norway. Assess the future development of this ecosystem, and recommend strategic measures for TSM Nordic to meet the identified challenges."

A.4 Interview Template

This is the initial template used as a basis for all interviews and a starting point for the discussions. Going through each area of the template ensured that we covered all topics of the assessment framework presented in section 2.4. The timing and phrasing of the different questions were adapted to each interview to best fit the ongoing discussion.

Theme	Question
Personal	What is your background and current position?
NNFCMPBE	Who do you consider to be the key actors in the Norwegian NFC mobile payment business ecosystem?
	Who are the newest members in the ecosystem?
	What actors remain to include to make the ecosystem sustainable?
	Where does the value creation and profitability occur?
TSM Nordic	What do you consider to be TSM Nordic's value proposition towards the other actors in the ecosystem?
	What are the main challenges in establishing the ecosystem and commercializing the service?
	How can TSM Nordic mitigate these challenges?
Key Actors	What do you see as the main incentives and challenges for the following actors to join the ecosystem? • Banks • MNOs • Merchants • Consumers
Competition	What actors do you consider to be the main competitors for TSM Nordic?
	What are your thoughts about the fact that competition could come from large international actors like Apple, PayPal and Google?
Social Environment	How does the Norwegian market differ socially and culturally from other markets?

	Are there any benefits of introducing the service in Norway?
Commercial Environment	What commercial trends do you consider to have the greatest impact on the development of mobile payment services?
Technological Environment	What do you consider to be the viable options for different secure element solutions today?
	How will the emergence of technologies like HCE and BLE affect the development of the NNFCMPBE?
	How will the fact that Apple has not included NFC in their iPhones affect the ecosystem?
Standardization and Regulative Environment	Are there any standards or regulations that will affect the development of the ecosystem?
Other	Are there any other important aspects you feel we should cover?