

Succeeding with contactless service innovations – strategic recommendations based on a comparative analysis of mobile business ecosystems in Norway

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**Succeeding with contactless service innovations – strategic recommendations
based on a comparative analysis of mobile business ecosystems in Norway**

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Abstract

Contactless communication technology in mobile phones (e.g. Near Field Communication) has a potential to simplify our everyday life by enabling services like mobile payment, ticketing, access keys and information sharing services. The recommendations in this paper are based on a comparative case study of previous mobile service ecosystems used in Norway. The findings of this study add insights into key success factors for the mobile network operator during the different business ecosystem evolutionary stages. The recommendations include the fact that mobile network operators can succeed in kick-starting contactless mobile payment services by taking a role as a trusted service manager, focusing on establishing the ecosystem and contactless payment service together with partners in the bank sector. Therefore, in an expansion phase the mobile network operator must open up for collaboration and connect with a portfolio of aggregators, merchants and third party niche players offering secure and high quality services and applications. The mobile network operator can establish contactless payment services as the market standard by creating barriers for competing payment service solutions.

Keywords: *Business Ecosystem, Mobile Network Operator, Trusted Service Manager, Mobile Service, Short Message Service (SMS), Near Field Communication (NFC), Keystone strategies, Evolutionary stages*

1. Introduction and background

Developing, and successfully commercializing products is a risky business, and even more so when products and provisioning are complex and networked. Therefore, growing number of companies rely on an innovation strategy collaborating and interacting with other firms. Ecosystem collaboration arises from the presence of flexible structures and complex networks, but also increases speed and commercial output as well as reduces cost and risk (Miles and Snow, 2002; Iansiti, 2005).

The research question in this paper is to identify which factors and mechanisms affect the success of mobile telecom services in an ecosystem innovation context. The paper describes and compares three cases. Two of them tell stories about Norwegian mobile network operators, and the incumbent Telenor's successful development and operation of SMS based service innovations in close collaboration with other ecosystem partners. The third case is an emerging mobile payment service based on the Near Field Communication technology in which Telenor has more recently been engaged. The latter is a more complex venture with respect to services, business model and ecosystem, but it still has many similarities with the SMS cases. We will provide recommendations for actions related to future development stages of the mobile payment venture, by extracting knowledge acquired from the success factors of the SMS cases.

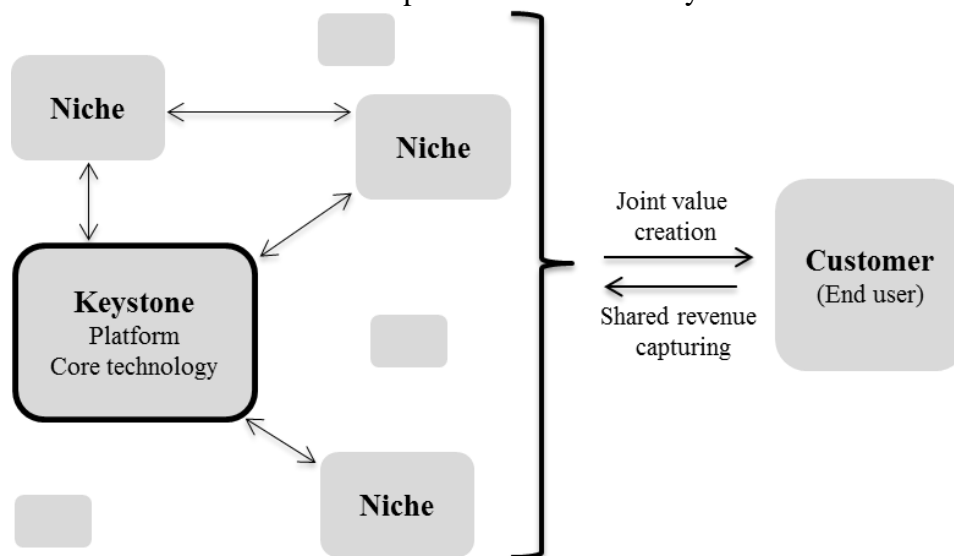
1.1 Business ecosystems in IT and Telecom industry

Collaboration with other industry actors is a requirement in the IT and Telecom industry. We see that mobile network operators are dependent on creating value for, and joining forces with, several other actors across many different industries thereby creating complex business networks. Iansiti (2005) argues that today hi-tech companies rely heavily on such networks. They look increasingly like biological ecosystem in which companies succeed and fail as a whole. Moore (1993) was a pioneer in explaining complex business relationships with the analogy of biological ecosystems, coining the concept of business ecosystems.

A business ecosystem describes a network of firms, which collectively produce a holistic, integrated technological system that creates value for end-users and customers (Adner, 2006; Ågerfalk and Fitzgerald, 2008; Bahrami and Evans, 1996; Basole, 2009; Lusch, 2011; Teece, 2007; Le and Tarafdar, 2009). The firms within this ecosystem share user focus, system vision and enabling technologies. They “co-evolve capabilities around a new innovation” by working both cooperatively and competitively in the creation of products and services (Moore, 1993; Bouncken and Kraus, 2013). Moreover, in this setting firms have to balance the tension between innovation capability and profit appropriability, “*the creation of innovations often requires openness, but the commercialization of innovation requires protection*” (Laursen and Salter, 2014, p. 867).

The evolvement of new services around a common technological platform that integrates and connects the ecosystem members is a typical characteristic of a business ecosystem, especially in high-tech industries (Iansiti and Levien, 2004a). An ecosystem is often characterized by one central actor with many smaller actors in the market surroundings. The large actor is called a keystone or a platform leader (Iansiti and Levien, 2004a; Gawer and Cusumano, 2002), and the smaller actors are often called niches or complementors. Figure 1 visualizes the joint value creation for the customer, and shared revenue captured by the ecosystem members - the keystone and niche players (Hallingby and Do, 2013).

Figure 1: Value creation and revenue capture in business ecosystems



The keystone has control of a core technology in the form of a platform that is critical for the value creation of the whole ecosystem. The niche players aim to develop specialized capabilities that differentiate them from other firms in the network. They represent the bulk of the ecosystem, and are responsible for most of the value creation and innovation. The role of a keystone is to regulate the overall function of the ecosystem and improve its health and performance. Consequently, its actions affect the success of all other members as well as its own (Makinen and Dedehayir, 2012).

Another key characteristic for a business ecosystem is that there are open interfaces towards the platform, making it easy to access and take advantage of this resource. Innovation based on the platform is not controlled by the keystone, but distributed among the actors. Thus, we can infer that factors that identify an emerging business ecosystem comes from the

existence of a core technology platform, the collaboration with other firms, and if, and how, easy it is to access the core technology platform for other actors.

The health of the ecosystem indicates its success. Ecosystem health can be measured by its degree of performance, robustness and niche creation (diversity) (Iansiti and Levien, 2004b; Iansiti and Richards, 2006). Performance is “*a network’s ability to consistently transform technology and other raw materials of innovation into lower costs and new products*” (Iansiti and Levien, 2014b, p. 3). It can be measured by return on invested capital, but also on labor productivity or by relating output to energy or materials, or other subjective measures (Franco, 2011). Sustainable performance is better indicated by following patterns over time.

Robustness is the ecosystem’s ability to survive disruptions such as unforeseen technology change. One measure can be the survival rate of ecosystem members, or the ability to recover after a disruption or downturn. Performance and robustness assess the status of existing firms. Further growth in a system is dependent on innovation; innovation comes from two core processes: variety creation and selection. Niche creation is signaling the ecosystem’s ability to produce variety, which in turn lead to selection, innovation and further growth. It can be measured by looking at the use of the core technology in new product and business combinations. Zhang and Liang (2011) measured the Monternet (a set of mobile services on top of a technology platform facilitated by China Mobile) ecosystem health using the following indicators: Robustness (number of ecosystem members), Productivity (profit margin of main ecosystem members or total sales of core products/services) and Innovation (ratio of revenue from new products/services to total revenue).

How we assess the status of the health of an ecosystem is affected by the stage in which the development finds itself. Moore (1993) argues that every business ecosystem develops in four distinct stages: 1) Birth, 2) Expansion, 3) Leadership and 4) Self-renewal. His focus is on the *keystone’s* managerial challenges concerning cooperation and competition that differ between these stages; implicitly the strategies he proposes are responses to the characteristics of the stage.

The Birth stage is characterized by lack of knowledge of the key technology and its possible applications, and limited use of it in new innovations among potential partners. The strategic focus needs to be on defining the value of a proposed new product or service, and the best form of delivering it. Cooperation is very important at this stage from a keystone’s perspective, as partnerships help deliver a full package of services to the consumer. The competitive challenges are here to protect ideas from others who might be working toward defining similar offers, hence tie up critical lead customers, key suppliers and important channels.

The Expansion stage is characterized by more requirements on financial incentives and growth opportunities for the actors involved in the ecosystem. Therefore, at this stage the strategic focus should be on stimulating the market demand and adoption, and expanding the market position in order to undermine competition. A keystone also needs to prepare for governance (Czakoń, 2009) and clear leadership of the platform (West and Wood, 2013) in the coming stage of the life cycle, preserving important relationships, and control over both consumers and core centers of innovation and value creation. Here, the challenges are to defeat alternative implementations of similar ideas, and ensure that the keystone’s approach is the market standard in its class.

Furthermore, in the Leadership stage the growth opportunities are widely recognized and models for sharing value creation and capturing established. The strategic focus is on continuing a compelling vision for the future that encourages suppliers and customers to work together to improve the complete offer. The challenge is to maintain strong bargaining power in relation to other players in the ecosystem, avoiding strong internal competition between the

ecosystem members. A central role in the ecosystem is attained through lock-in, making it expensive and risky to change to another platform, as they will then need to adapt to another keystone in addition to losing the original keystone's reach in the market.

The Self-renewal stage is characterized by mature business ecosystems being threatened by rising new ecosystems and innovations from environmental conditions such as regulations, buying patterns or macroeconomic conditions. It is through successive generations of innovation, high customer switching costs or micro-segmenting markets, that their loyalty will in turn buy the ecosystem time to incorporate the benefits of new, disrupting approaches (Moore, 1993).

2. Method

The research question we have focused on in this paper is: Which factors and mechanisms affect the success of the development of mobile service ecosystems? We address this question through a comparative case study approach (Yin, 2009). Our three cases are similar and drawn from the Norwegian market, however, please be aware that they are in different development phases. The two SMS based cases (Content Provider Access, and Application-to-Person) are in a mature ecosystem development stage, while the mobile payment case (NFC Valyou contactless payment) is newly launched, and in an initial development stage. The latter mobile payment case is the focal case, while the other SMS cases serve as comparative benchmarks. Data from the three cases were obtained by conducting interviews of selected ecosystem players, supported with secondary data sources, see Table 1 below.

Table 1: Data sources

Cases	Interviews	Secondary data
SMS Content Provider Access	<ul style="list-style-type: none"> • Telephone and face-to-face interviews (2010-2013) • Totally six employees from mobile operator and 3rd party content providers 	<ul style="list-style-type: none"> • Company web sites • Norwegian Communication Authority statistics • Accounting figures (www.proff.no)
SMS Application-to-Person	<ul style="list-style-type: none"> • Telephone interviews (2014) with mobile network operator • One employee from mobile operator with long time experience 	<ul style="list-style-type: none"> • Company web sites • Norwegian Comm. Authority statistics • Accounting figures (www.proff.no)
Mobile payment: NFC Valyou Contactless Payment	<ul style="list-style-type: none"> • Telephone and face-to-face interviews (2014) • Totally ten persons from mobile operator, bank, merchant, TSM Nordic and industry experts 	<ul style="list-style-type: none"> • Company web sites, • News articles and industry reports, blogs and market surveys

Semi-structured interviews were performed for all three cases (Lofland and Lofland, 1995). The interviewees were selected based on purposive sampling, better allowing the research questions to be answered (Bryman and Bell, 2011). All interviews were recorded and transcribed in full, and verified by the respective interviewee. Secondary data were collected in all three cases. Furthermore, for the two SMS cases, mobile network operator and third party providers' web sites were studied, sales volumes collected from the Norwegian Communication Authority, and corporate accounting figures from a public available web site. We also studied web-sites from mobile network operators, banks, the TSM Nordic Company, news articles, blogs, industry reports and market surveys regarding the mobile payment case.

The SMS Application-to-Person case is based on repeated interviews with one central person, supported by rich data on market figures, actors and from web-sites.

The dependent variable is the performance of the mobile service cases. Performance is indicated by ecosystem health – measured by productivity, innovation and robustness. These variables are explicitly used as categories in our comparison of the three cases (see Table 2) together with an assessment phase and status. The factors that may affect the health of the ecosystem are our independent variables. These are foremost descriptive categories that are inferred from the business ecosystem concepts described above: Core technology, Customer value proposition, Partaking actors, Third party innovation, Application programming interface, Aggregation across Mobile Network Operators, Partnership agreement and Price structure statements.

The data analysis is consistent with the framework for mobile service ecosystem health analysis suggested by (Zhang and Liang, 2011) and ecosystem development stage analysis (Moore, 1993), hence providing transferability to similar ecosystems. However, the nature of the long term relationship between mobile operators and domestic banks, and the role of the trusted service manager are expected to differ between markets thereby limiting the degree of transferability.

Time limitations required us to narrow down to the most relevant ecosystem members; for instance, not all third party stakeholders were interviewed in the mobile payment case. We interviewed several industry experts from different research institutions and a consulting company, trying to mitigate this issue, and to balance the perspectives of the interviewees with a direct connection to the ecosystem, as we believed them to be less prone to subjectivity and able to provide us with an unbiased perspective. Applying multiple data sources in this way corresponds to the triangulation principle described both by Yin (2009) and Bryman and Bell (2011). Complete records were kept through all stages of research strengthening the study's trustworthiness (Bryman and Bell, 2011) and enabling backwards tracing preserving the continuous chain of evidence (Yin, 2009).

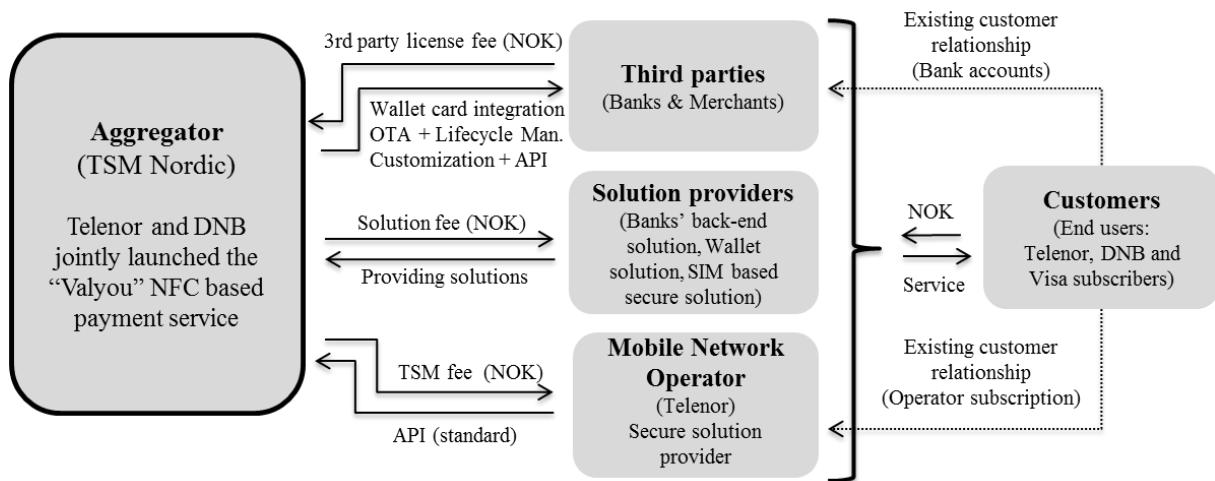
The case comparison shed light on specific market developments in Norway. It identifies key characteristics present in two successful mobile service ecosystems. This allows us to consider strategic actions taken from the ecosystem perspective, and suggest them for the emerging Norwegian mobile payment ecosystem. As such the results are applicable for other mobile service ecosystems in Norway. The applicability is however expected to decrease in other markets with other characteristics than the Norwegian, and for other ecosystems.

2. Case studies

2.1 Contactless mobile payment case

Contactless mobile payment is one of the most promising applications of NFC (Near Field Communication). Moreover, in this mobile payment ecosystem the End-user uses a chip or magnetic stripe based payment card issued by the bank to conduct a payment at a merchant for any goods or service. Vital parts of the ecosystem will remain more or less the same when contactless payment cards are introduced; the most significant change is that Point-of-Sales terminals must be exchanged or upgraded to support the contactless interface used by the contactless payment card. Figure 2 illustrates the structure of the future contactless payment business ecosystem. Here we focus on the most important roles and relationships among the network actors.

Figure 2: The Norwegian contactless mobile payment business ecosystem as of 2014



The customer has a subscription for their mobile with a Mobile Network Operator. The Aggregator serves as a Trusted Service Manager for contactless services, and connects all the different actors in the ecosystem together on a common technological platform. Third parties are service providers holding a customer relationship to Customer End-users. One additional role in this ecosystem is the Solution provider. This is actually several roles, or actors, required to run the functionality in the ecosystem; we will here mention the Wallet application, IT-systems, and the security solution on the SIM-card in the mobile. The Wallet provider develops and operates the required application that the Customer/End-user sees on the handset. The provider of the IT-systems develops and operates a banks' technical infrastructure and database systems.

The SIM based security solution is one way of providing the necessary security when using contactless ticketing or payment services (Coskun et al., 2013). Other competing security solutions such as Host Card Emulation coupled with tokenization also exist.

Valyou is a contactless mobile payment application and brand in the Norwegian market. Valyou was launched by a new aggregator – the Trusted Service Manager called *TSM Nordic* on October 3, 2014. *TSM Nordic* is a joint venture between the largest mobile operator and two largest banks in Norway (Telenor, DNB and Sparebank1group).

Valyou is a new attempt in a row of mobile payment initiatives by Telenor and DNB. The partners introduced a combined card and PKI solution to buy movie tickets over Internet in 1999, then in 2001 “Smartpay” enabled the user to buy goods and services using the mobile. Further, in 2003 they introduced uploading of pre-paid mobile subscription using Visa card (Sjursen, 2008). Moreover, the collaboration between Telenor, DNB and Visa resulted in the now successful Mobile BankID; piggybacking on the bank sectors widely adopted BankID. The number of customers using the BankID security token introduced in 2004 really took off in 2013 when all the Mobile Network Operators were on board. The Mobile BankID solution is now a part of a healthy ecosystem with a large user base counting (Eaton et. al, 2014).

Therefore, in the case of Valyou, the role of *TSM Nordic* is specifically important since the security solution is SIM based; this is the solution where the mobile operator is part of the revenue streams. This instance allows Third party service providers to install and manage their contactless payment applications on the SIM, on-line and over-the-air.

TSM Nordic's business model is to deliver effective payment transactions between Customers and Third parties. The Third party service providers pay a license fee to *TSM Nordic* for technical integration and installation, and over-the-air and life cycle management

of their applications on the SIM. *TSM Nordic* in return pays a fee to the Mobile Network Operators for using the SIM card for the security solution. Valyou is used by the End User/Customer to buy goods and services offered by the Third party service providers through their applications in the Valyou wallet. Customer experience affects the Third parties' willingness to pay, and is therefore crucial to *TSM Nordic*. End-to-end quality of the Valyou is currently ensured by *TSM Nordic's* tight coordination with the handling channels of the bank DNB and mobile operator Telenor; this is an integrated value creation network.

Banks and financial institutions are major Third parties in the Valyou ecosystem. They offer services to Customers, such as personal bank accounts, issuing the payment card and determining its terms of use. The DNB is the main initiating bank in Norway in the ecosystem through its involvement with *TSM Nordic*, and it will be offering cards through Valyou from the start.

The Merchant is the other major Third party. The Merchant is the physical location where the payment transactions take place. If a Merchant wants to offer contactless payment options to the Customer, then they need to upgrade the Point-Of-Sales terminal to support the contactless interface. It is also planned that Merchants can provide mobile services such as loyalty programs or advertising through Valyou. Valyou is now motivating large domestic merchants and retailers to upgrade their Point-Of-Sales terminals to support the contactless interface, and subsequently Valyou. However, only few and local Merchants have so far activated the necessary functionality, not the nationwide merchants like Norgesgruppen and Coop.

The Mobile Network Operators offer mobile subscriptions and handsets to the Customers and play an important role in the ecosystem. The operators' established mobile networks and infrastructure are used for over-the-air provisioning and life cycle management of the mobile payment applications. As such, the Mobile Network Operator is a technical enabler; a more active role is achieved when the SIM-card is used for security. Telenor is currently the only mobile operator active in the Valyou ecosystem in Norway. The current realization of secure solutions can be challenged by, for instance, Apple, who recently announced that they will partly support NFC technology in their handsets. Valyou embraces this development and thinks it will catalyze the adoption of their mobile payment service; however it challenges the role of the mobile operator (Bolstad og Jørgenrud, 2014).

2.2 SMS cases

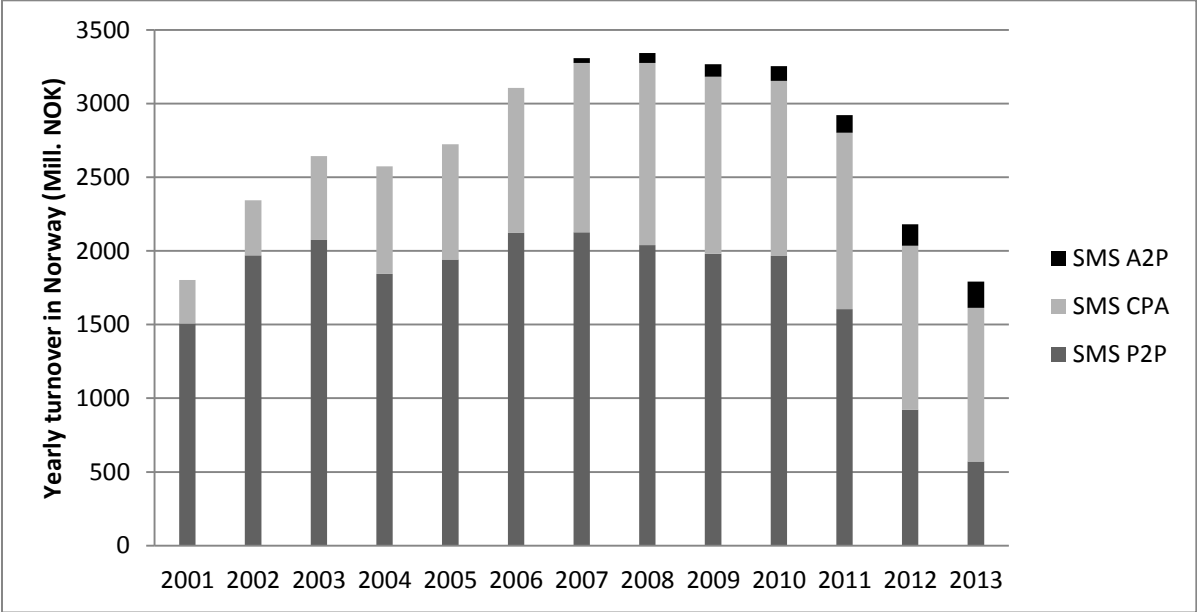
Short message services (SMS) is one of the core services of Mobile Network Operators. The person-to-person use of SMS has encountered stagnation in Norway (PTT, 2014), as well as worldwide (GSMA, 2014a). Other types of SMS solutions have continued to flourish, namely SMS Content Provider Access and SMS Application-to-Person. SMS Content Provider Access allows Third parties to sell content by using the billing system of the mobile operators. The introduction of SMS Application-to-Person in 2007 was directed towards the business market and their need to communicate with their customers.

The rise and fall of SMS applications is illustrated in Figure 3 (Telenor, 2009; PTT, 2014). SMS Content Provider Access turnover has fallen from 2008, but still generated more than 1 billion Norwegian Kroner (NOK) in 2013 of which 20-50% stays with the mobile operator. This is twice the SMS Person-to-Person traffic revenues. SMS Application-to-Person has grown steadily 20-30% per year, and constitutes in 2013 15% of the total 6 billion SMS messages, and more than 30%¹ of the total SMS Person-to-Person turnover.

¹ http://www.telenorfusion.no/sms_mms/ calculation based on SMS Application-to-Person prices. Last visited June 18, 2014

The introduction of the Apple iPhone in Norway in 2008 is recognized as causing the fall for SMS Content Provider Access. Content providers could now provide – and sell – their services to customers via App Store. According to GSMA (2014a) the smartphone penetration in Western Europe has grown from approximately 23% in 2008 to 70% in 2014. The main explanation for the decrease in direct revenues from SMS Person-to-Person is the many new rich and free messaging services with the smartphones.

Figure 3: Total revenues (Mill. Norwegian Kroner) from SMS Application to Person (A2P), SMS Content Provider Access (CPA) and SMS Person to Person (P2P)



Back in 2000 the introduction of SMS Content Provider Access soon led to a breakup of the Mobile Network Operators’ vertical control; it was opened up for service aggregators and third party content providers to take part in generating profit in the consumer (end-user) market. Moreover, at the peak in 2008 the incumbent mobile operator Telenor had direct agreements with more than 200 Third Parties; currently the number of core partners or aggregators is down to only five: Intelcom, Link mobility, Netsize, PS Wincom and 1881. These firms partner up with an, for us, unknown number of other parties. Core SMS Application-to-Person partners is also five: Intelcom, Link mobility, Linus PS Wincom and Systor Vest, with about 250 agreements in total. The ratio of revenues from Content Provider Access and Application-to-Person services compared to SMS Person-to-Person is growing, and this affects ecosystem innovation. The ratio in 2007 was 55%, and in 2013 the ratio had grown to as much as 214%, as illustrated in Figure 3.

Ecosystem profitability is very good for the majority of the partners connected to the SMS Content Provider Access and Application-to-Person. Financial data shows a return on total capital² mostly over 20%: Intelcom (8,8%), Link mobility (36%), PS WinCom (24,5%), 1881 (56,6%) Systor Vest (17,1%), Linus (46%), Netsize (NA).

Below we will describe the cases in more details, starting with SMS Application-to-Person which was introduced in 2007. The SMS Application-to-Person service provides the possibility of managing and sending large volumes of SMSs to many mobile devices. Typically, a firm or institution uses the service to manage direct communication with

² Return on total capital is a measure of the return an investment generates for those who contribute capital and signifies how effective a company turns capital into profits. A reasonable metric is 10-15%, and should exceed the interest rate the company pays for their debt.

customers about the status of products, services and support, e.g., the dentist reminds about appointments, airlines confirm purchases or inform on schedule, and local authorities confirm admission to a new school.

The SMS Application-to-Person ecosystem with roles and actors responsible for the services is quite complex, and has emerged through the years to its current form. It involves four important roles: Mobile Network Operator, Third party service provider, Customer (End User) and Aggregator. The value creation in the system is based on the Third party's need to communicate efficiently with its customers, and the ability of SMS to reach these customers broadly and efficiently. There are three large Mobile Network Operators in the Norwegian market (the incumbent Telenor, NetCom and Mobile Norway) – and several (15+) smaller virtual mobile network operators. There are a handful of larger Aggregators which fulfills two functions. An Aggregator: 1) *aggregates* the SMS Application-to-Person service across the Mobile Network Operators in the market; this means that it creates one single interface towards the third parties. 2) *integrates* the SMS Application-to-Person service into the Third party's operations; this can be a complex system integration or simpler web-based interfaces. The Mobile Network Operator provides SMS traffic to the Aggregators. Functional and scalable solutions constitute a large share of the value creation and also innovation for both the Aggregators and total market. This requires investments, competence and risk-taking that the Mobile Network Operators do not prioritize or have. Mobile Network Operators rely on aggregation partners to create the necessary variation and build new markets. Based on the Aggregator's effort, Third parties have been able to innovate more easily and increase the efficiency of their customer relationship with SMS solutions. The SMS Content Provider Access services experienced success in Norway from 2000 (Sjursen, 2008). Popular services such as alerts, ring tones and logos were developed with more than 200 Third parties.

The Content Provider Access model provides access to all mobile phone users in Norway due to a horizontal cooperation between the three largest Mobile Network Operators, and their virtual mobile operators (Nesse, 2008). Third parties were spurred to develop innovative services for the network operator's mobile phone subscribers by a transparent incentive based business model. The standardized business model was based on a yearly set-up fee for the Third party service providers connecting to the network, and monthly fees using short codes and revenue split per service³. This revenue sharing model was roughly 50-50% between the Mobile Network Operator and Third party provider for the less costly services, but the share increased to 80%-20% in favour of the Third party for the more expensive services. Innovation still occurs in SMS Content Provider Access although it is in a mature stage. The three Mobile Network Operators in Norway joined forces in 2013 in opening the SMS Content Provider Access also for physical goods and services. This enabled the Customer to, for instance, buy books, film or music on physical medium, food and drinks from vending machines. The rate of success is still not known.

3. Analysis and discussion

We will compare the three cases in this section: Valyou mobile payment, SMS Content Provider Access and SMS Application-to-Person. Table 2 summarizes the similarities and differences, seen from the perspective of a Mobile network operator. The table is divided in two. One part reports characteristics of an ecosystem that can affect its success, and thus affect the ecosystem health indicators. A second part reports an assessment of the stage of the ecosystem, and the health status. These are respectively those factors and mechanisms that we treat as the independent and dependent variables.

³ Telenor CPA revenue sharing model, last visited August 8, 2014 <http://telenorfusion.no/betaling/>

Table 2: Comparison of three ecosystem cases

Similarities and Differences	SMS Content Provider Access (2000 –tt)	SMS Application to Person (2007 – tt)	Valyou mobile payment (2014-tt)
<i>Descriptive categories</i>			
Core technology in case	SMS and billing	SMS	SIM based contactless payment
Customer value proposition (End-user or Third party)	End-user can effectively perform minor purchases	Third party can effectively communicate with End-user	Enables effective payment transactions between End-user and Third party
Partaking actors	All Mobile Network Operators + Many Aggregators Third parties/Merchants	All Mobile Network Operators + Many Aggregators Third parties/Merchants	One/few Mobile Network Operators/Banks + One Aggregator (Trusted Service Manager), Third parties/Merchants
Develop services and Third party Application Programming Interface	All Aggregators	All Aggregators	One Aggregator (Trusted Service Manager)
Integration towards Third parties	All Aggregators	All Aggregators	No integration
Aggregation across Mobile Network Operators	All Aggregators	All Aggregators	No aggregation
Partnership agreement	Regulated in contracts	Regulated in contracts	Regulated in contracts
Price structure statements	Cost and price structure per SMS	Cost and price structure per SMS	Fixed cost and value sharing between partners
<i>Assessment categories</i>			
Assessment of phase according to Moore	Self-renewal	Expanding	Birth
Assessment of status	Successful, now stagnating	Growing market	Forthcoming market, but uncertain future
Ecosystem Robustness (Number and variety of niche partners)	High Few Aggregators, 200+ 3 rd party providers	High Five Aggregators 1000+ 3 rd party providers	Low One Aggregator, TSM Nordic, Few Third parties
Ecosystem Productivity (Third parties return on capital)	High 30%+ return on capital (Aggregators)	High 25%+ return on capital (Aggregators)	Numbers not available
Ecosystem Innovation (% revenue share from new services)	High 50%+ revenue share from 2007	High 30%+ revenue share in 2013	Numbers not available

3.1 Case comparison

The similarities between the cases are that we can define them as ecosystems. They have facets of innovation involving a number of partners in the development and production of the services through a variety of collaborative and partnering activities. All three cases include the roles Mobile Network Operators, Aggregators and Third party (merchants or banks), although the number of actors varies. The Aggregators develop services and application programming interfaces towards the Third parties. More specifically for these ecosystems, all cases use technology from the Mobile Network Operators as their core platform.

The difference between the cases is defined by their specific market scope and development phase. The core technologies are not the same; Valyou is based on a novel technology compared to the SMS cases and with more complex service adoption and business model challenges. Furthermore, the SMS Content Provider Access and Application-to-Person cases have collaborated and shared the market with all relevant actors, while the Valyou ecosystem currently consists of one Aggregator and its owners. The Aggregator or keystone

role (Iansiti and Levien, 2004b) is central in all three cases; however, they are performed differently, and by a various number of stakeholders. Thus, in the SMS Content Provider Access and Application-to-Person cases we find up to ten different actors handling aggregation and integration in the Norwegian market, whereas for the Valyou case there is currently only one aggregator, the *TSM Nordic*.

There are a few of the elements in the two described SMS ecosystems that stand out as more important for their success. The Aggregator's independent role towards all the Mobile Network Operators and other players is especially important. First, being independent makes it easier to build trust. Second, the Aggregators are able to build an operation that can handle the scale of the markets for SMS Application-to-Person and Content Provider Access. This includes user friendly application programming interfaces (API), a dedicated salesforce and necessary customer support which the Mobile Network Operators struggle to prioritize. Third, the Mobile Network Operators recognize that the Aggregators must be able to profit from the resale of SMS. This gives them incentives to innovate and create the necessary variety for the market to develop. Fourth, there are some enabling factors in the Norwegian market which have to do with regulation and trust in relationships. The position of a mobile number as identification is quite strong and the numbers are available in public catalogues. End-users are also willing to give their mobile phone number to providers of products and services. Finally, the Aggregators can ensure that the business is run properly and in accordance with national laws and regulations.

The significance of the independent Aggregator role in the SMS Content Provider Access and Application-to-Person cases is supported by the findings of Ok et al. (2013). The business ecosystem perspective has been used to analyze several cases in the telecom sector (Ok et al., 2013; Zhang and Liang, 2011). Zhang and Liang (2011) describe the China Mobile's 3G ecosystem strategy. They apply Iansiti and Levien's (2004b) five strategic roles framework (Keystone, Landlord, Dominator, Niche and Commodity) to analyze success factors and problems in the implementation process of China Mobile's "Monternet" mobile internet service. The results indicate that a complete ecosystem can promote the development of mobile data services substantially when Mobile Network Operators collaborate closely with value-added service providers, content/application providers, equipment and device manufacturers, and other involved organizations. The Mobile Network Operators plays a keystone role in the Monternet case managing the entire value-chain, setting up proper value-sharing mechanism and partner selection schemes. The niche players' continuous innovations are important success factors for the health and value of the ecosystem. Information asymmetry can bring negative effects on the value-sharing schemes, hence it is important to improve the data transparency among the participants in the ecosystem, and ideally revenue should be shared among the participants in proportion to their contributions (Zhang and Liang, 2011).

Thus, it is a weakness that the Trusted Service Manager role – the Aggregator - in the Valyou case is not fully independent. Trust is critical when other actors invest in building the market; they rely on the capabilities of an Aggregator as a technical enabler, business broker, service provider or intermediary.

The two Mobile Network Operators (Telenor and NetCom) prevented billing frauds and customer complaints in the SMS cases. This was done partly by a jointly developed memo for ecosystem actors already from the start. The memo was a detailed guideline regarding which constraints they had for their marketing and billing activities, together with the set of national laws and regulation, later adopted by the Consumer Council of Norway (Forbrukerombudet, 2009). Additionally, the threshold (i.e fixed and variable costs) for connecting to the Content Provider Access platform was set high in order to avoid unserious service providers in the ecosystem. This is contradictory to that which was experienced with

the Monternet service in China, where in an early phase there were no strict regulation and selection of providers. This open mode resulted in fraud and a high number of customer complaints (Zhang and Liang, 2011).

Furthermore, Table 2 shows that the number of ecosystem members for SMS Content Provider Access and Application-to-Person is still large; however, it has decreased over time and this affects ecosystem robustness (Zhang and Liang, 2011). The return on capital and revenue share from new products is high, signalling high productivity and innovation. The viable ecosystems of SMS Content Provider Access and Application-to-person are contrasting the Valyou ecosystem with few members. This is partly due to the ecosystems being in different phases. Valyou is in an initial stage of the venture, and collaboration strategies need to be acted upon in the forthcoming ecosystem evolutionary stages, if Valyou is to move towards a healthier ecosystem (Iansiti and Levien, 2004b).

Valyou and the role of *TSM Nordic* differ in some respects from initiatives in other countries. De Reuver et al. (2014) analyze a failed collaboration between three major Dutch banks and three Dutch telecom operators (TRAVIK consortium). This Trusted Service Manager initiative started in 2009; after three years it terminated due to differing strategic objectives and interests, conflicts, lack of dependencies and governance issues. The stakeholders had different views on platform openness towards service providers/third parties, platform pricing and time horizons. Conflicts were related to different preferences on the location of the Secure Element. The banks feared that the Trusted Service Manager could reduce the entry barriers for telecom operators offering banking services and taking over the role as payment provider. The governance issues were caused by the lack of a leader: 1) driving the Trusted Service Manager initiative, 2) coordinating the TRAVIK network, and 3) managing the conflicts and specification of member benefits. There was neither a clear vision on how to govern the third party providers, nor were they clear on the extent to which they could use the infrastructure provided by the service platform.

Beyond the successful Near Field Communication payment service launched in Japan (Das, 2008) we also find similar payment services with a high degree of mobile network operator involvement launched in Europe (e.g Cityzi) and US (e.g Softcard). However, thorough descriptions of these cases are not published in scientific publications as far as we know, thus resulting in little insight into the service and ecosystem development as well as results.

So far DNB has acted as the major partnering bank in the *TSM Nordic* joint venture, and is the pilot user for the Valyou service. However, the joint venture has approached other national banks (Sparebank1group, Skandiabanken and Fana Sparebank) in order to learn about service needs and requirements, to extend the Customers base, and thereby motivate Third party merchants to enable new contactless Point-of-Sales terminals. The plan is to include these banks in the Valyou solution during 2015. According to Valyou, it has worked well to collaborate closely with one bank and have a looser relationship to others. This is in contrast to the Dutch case where all three banks were included simultaneously in the TRAVIK consortium.

The current core Valyou partners can take advantage of a long history of collaboration in previous attempts to launch mobile payment services in the Norwegian market. The current successful Mobile BankID (GSMA, 2014b) was partly due to BankID Norway's initiative towards the banks, encouraging them to adopt and market the Mobile BankID service, and later the broad adoption across Mobile Network Operators.

In sum, we find that the majority of the case differences are coherent with, and can be explained by, their various stages of an ecosystem evolution, described above according to Moore (1993). Hence, we argue that the Valyou can gain speed and traction following a

proposed strategy leaning on knowledge acquisition that the Mobile Network Operators have made in the SMS market.

3.2 Recommendations

Therefore, in Table 3 we suggest strategies for the *TSM Nordic* in the current Norwegian Valyou mobile payment ecosystem. In this case TSM Nordic is in a double role; it represents its owners as a keystone, but also pursues the role as Aggregator. This double role is part of the challenge that will be discussed below. The stages we introduce in Table 3 are not intended to be perceived as discrete time intervals, but will rather blur into one another. Yet, they have specific characteristics, and an Aggregator must overcome challenges in one evolutionary stage in order to enter successfully into the next. The Norwegian Valyou mobile payment case is currently in the birth phase. This is the most vulnerable and uncertain stage, since the Near Field Communication technology which it is based, has not gained sufficient foothold as the preferred alternative for mobile payment solutions in Norway. Neither has the additional Valyou service proven itself in the market. However, the ecosystem’s sustainability may increase through the stages if *TSM Nordic* follows our key strategy recommendations.

It is, however, necessary to consider the competition from other Near Field Communication services; this is a question of balancing the task of creating a market while simultaneously becoming the preferred ecosystem in this market. We provide three different types of strategy recommendations for *TSM Nordic* to balance the challenges: Customer Adoption (CA), Recruiting Merchants (RM) and Competition (CO). Generally speaking, we suggest that consumer adoption and recruiting merchants are important in the early phases; this implies that the critical success factor is to recruit users of the services. Worries for competing solutions can be taken into consideration only when the ecosystem reaches later stages.

Table 3: Recommended strategy for TSM Nordic - first three Valyou development stages

Stage 1 - Birth	Stage 2 – Expansion	Stage 3 – Leadership
Focus marketing directly to consumers reached through current partners rather than strategies towards competing actors (CA)	Coordinate marketing and branding with partners to build on their integrity and trust (CA)	Expand the payment service to include other credit and debit cards (CA)
Educate consumer and merchant staff and clarify benefits and actual security (CA)	Facilitate experience transfer and provide frameworks to simplify technical integration of additional banks (CA)	Activate new merchant segments, e.g., Access, Public services or Transportation like the public transportation sector (RM)
Coordinate POS upgrade initiatives with Europay, Mastercard, Visa and banks promoting contactless payment cards (RM)	Standardize business model and provide frameworks and developer tools to increase the service’ scalability (RM)	Assess synergies between services to increase lock-in effects and make Valyou an exclusive market place for customized offers (RM)
Subsidize important merchant segment leaders through free loyalty program integration or with a share of the ecosystem’s increased revenue (RM)	Focus service development on services that incentivize both consumers and merchants (RM)	Assess possibilities to exploit consumer purchase data in new service offers (RM)
Focus initial service developments on existing loyalty/bonus programs (RM)	Leverage local knowledge and expertise of partners to gain competitive advantages against international competition (CO)	Reinforce measures to create barriers for alternative payment service solutions, consolidation and commercialization (CO)

In Stage 1 – Birth – the main strategic 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 (Moore, 1993). The

goal is to resolve the chicken-and-egg paradox of customer adoption versus the activation of merchants and Third parties. Doing this as fast as possible is important to ensure Near Field Communication becoming the chosen technological alternative, and Valyou the preferred service for mobile payments in Norway. Some actors in the mobile payment ecosystem have more to gain by the Near Field Communication technology, and they will need to cooperate to provide incentives for those actors that do not directly benefit from implementing such technology. Furthermore, at this stage, it is more important to ensure cooperation and value co-creation and involvement among the key ecosystem actors than actively defeating the competition (Bouncken and Kraus, 2013).

TSM Nordic must at this stage coordinate the upgrade of Point-of-Sales terminals to Near Field Communication technology, along with ensuring focus on service innovation towards current Third party merchant bonus and loyalty programs. Furthermore, it is necessary to market these novel services to Customers/End-users, preferably through current partners along with training of Merchants the End-users and merchants. The recent announcement from Apple that their iPhone 6.0 is being Near Field Communication enabled could also stimulate the necessary replacement of Point-of-Sales terminals and contribute to an increase in the public awareness of the opportunities offered for service innovation by Near Field Communication technology. One way to solve the chicken-and-egg paradox is to focus marketing directly to Customers/End-users through current partners. A similar approach was successfully applied in the Mobile BankID case (Eaton et al., 2014); BankID Norway encouraged the banks to adopt and market this service themselves.

Incentive based revenue models also promoted involvement of ecosystem actors. The largest mobile network operator in Japan, NTT DoCoMo, experienced success launching their Near Field Communication Osaifu-Keitai mobile wallet service in 2004. This success was based on NTT's ability to strike reasonable deals with other service providers by renting out space on their SIM card to these players, hence balancing their revenues with the health of the entire ecosystem (Das, 2008). A key lesson learnt from the Dutch initiative was to strongly articulate the dependency towards merchant service providers (De Reuver et al., 2014).

For stage 2 – Expansion – the focus is substantial expansion to ensure a broad market position, and to maximize market reach. The fact that the ecosystem has evolved through Stage 1 is a proof of 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* will be able to connect to the Valyou platform.

Therefore, in order to grow sufficiently, scalability is critical, making standardization of processes an important focus. Standardizations for scale are also supported by Gawer and Cusamano (2014) who claim that modular platform architecture is important for effective platform leadership. Increasing the platform's scalability will also reduce the integration costs for new partners, and allow for Third party developers to cater to small merchants' needs; this will create the opportunity for new niches to connect to the platform, which according to Iansiti and Levien (2004a) is an important measure in ensuring an ecosystem's health. *TSM Nordic* should at this stage promote SIM-based Near Field Communication solutions, on which Valyou is based, to become the future market standard, thus keeping a competitive focus towards other upcoming payment solutions that use of other technological solutions such as BLE beacons or QR codes.

The Mobile Network Operator has had a keystone role in the SMS Content Provider Access and Application-to-Person cases. Indirectly they have also done this in the Valyou case through their partnership in *TSM Nordic* together with the banks; the lack of platform leadership and ecosystem governance was important for the failure in the Dutch case (de Reuver et al., 2014). Platform openness towards Third party providers was also a key success

factor from the SMS cases, lacking in the Dutch case. Based on these lessons learned, we recommend that *TSM Nordic* as a *keystone* in this stage develop a clear strategy on how to govern other Aggregators and Third party service providers; be generous towards their use of the infrastructure provided by the service platform. It is critical to allow and motivate a large number of providers and independent Aggregators for both trust building and variety creation in the market (Moore, 1993). Such an openness strategy will attract the necessary number of Third parties to connect to the platform and increase the commitments of these actors to future collective action (De Reuver et al., 2014). *TSM Nordic* will enhance the sustainability and health of the ecosystem by increasing the number of actors connected to the Valyou platform, and the number of services they provide to the Customer/End-user. This strategy also includes setting clear objectives on numbers of providers and aggregators that join the platform, the platform pricing and the service levels offered.

If the ecosystem enters into Stage 3 – Leadership – *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 and consolidate. Therefore, in order to ensure and maintain *TSM Nordic*'s position as the ecosystem keystone, continuous improvements of 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. A major obstacle to the development of *TSM Nordic* is that it is a currently controlled by one Mobile Network Operator. A key learning from the historic cases is that the Mobile Network Operators can better grow the market if they leave the Aggregator roles to other actors, and find a balance where risk and profits are shared between the roles resulting in clear platform leadership (West and Wood, 2013). Moreover, in the case of the NFC based mobile payment service Valyou, *TSM Nordic* may gain its owner (Mobile Network Operator) if it signals strongly an intention of future withdrawal, and openness to other Aggregators sharing the market.

4. Conclusion and further research

This paper describes three ecosystem based service cases in the mobile telecommunication industry and draws some conclusions about success factors. The two mature SMS cases (Content Provider Access and Application-to-Person) show us healthy ecosystems where the Mobile Network Operators successfully orchestrate the keystone role involving Aggregators and Third party service providers through an open platform and business model approach.

Based on this we provide a strategic recommendation for the Mobile Network Operators in the forthcoming market launch of the third case (NFC Valyou contactless payment): open up for more collaboration. More openness will lead to innovation and adoption in the early stages of the ecosystem, and robustness and productivity in the later. Currently the Mobile Network Operators pursue both aggregator and keystone strategy in a joint venture partnership with the major domestic bank, named *TSM Nordic*. However, the current ecosystem structure limits the reach of the Valyou payment services beyond the current Telecommunication and bank domains. The Mobile Network Operator should allow *TSM Nordic* to act independently and motivate for even more openness introducing additional banks, other Mobile Network Operators, Aggregators and Third party content providers and merchants to join the ecosystem. Performing this role clearly as a single keystone or aggregator is crucial for the future success of the NFC enabled Valyou service.

Our findings go beyond previous contributions on the strategies for introduction of contactless payment services in that it discusses the keystone strategy for the different stages

of the ecosystem development. Our study can also be seen as a continuance of the China Mobiles Monternet case and the Dutch TRAVIK consortium case with respect to the strategies recommended for both the Mobile Network Operator and the Trusted Service Manager roles achieving future success for their joint mobile service initiative.

Contactless payment services are still in a very early phase, and the successful adoption of the service in the market has yet to happen. It would be interesting to perform a longitudinal study of the Near Field Communication payment ecosystem and compare to actual development to the theoretical proposal. A subsequent study could be conducted with a specific consumer focus on how to maximize the adoption of the service, including further segmentation of different consumer groups. The current study relies on the conditions for the Norwegian market. However, the keystone strategy can also open up for expanding to new markets; here a more in-depth study of the characteristics of the specific Bank-Mobile Network Operator relationship in these markets is necessary.

References

- Adner, R. (2006) Match your innovation strategy to your innovation ecosystem. *Harvard Business Review*, 84, pp. 98-107+148.
- Ågerfalk, P. J. and Fitzgerald, B. (2008) Outsourcing to an unknown workforce: Exploring opensourcing as a global sourcing strategy. *MIS Quarterly: Management Information Systems*, 32, pp. 385-409.
- Bahrami, H. and Evans, S. (1996) Flexible re-cycling and high-technology entrepreneurship. *IEEE Engineering Management Review*, 24, pp. 64-80.
- Basole, R. C. (2009) Visualization of interfirm relations in a converging mobile ecosystem, *Journal of Information Technology*, 24, pp. 144-159
- Bolstad, J.T and Jørgenrud, M. (2014) Telenor fryder seg over Apple pay, Retrieved from <http://www.digi.no/930363/telenor-fryder-seg-over-apple-pay>, Sept. 15th 2014
- Bouncken, R. and Kraus, S. (2013) Innovation in Knowledge-intensive Industries: The Double- edged Sword of Coopetition, *Journal of Business Research*, 66, 10, pp. 2060-2070.
- Bryman, A. and Bell, E. (2011) *Business Research Methods 3rd Edition*, Oxford University Press
- Coskun, V., Ozdenizci, B. and Ok, K. (2013) A Survey on Near Field Communication (NFC) Technology, *Wireless personal communications*, 71, pp. 2259-2294.
- Czakon, W. (2009) The building blocks of a relational capability – evidence from the banking industry, *International Journal of Entrepreneurial Venturing*, Vol. 1, No. 2, pp. 131-145
- De Reuver, M, Verschuur, E., Nikayin, F., Cerpa, N. and Bouwman, H. (2014) Collective action for mobile payment platforms: A case study on collaboration issues between banks and telecom operators, *Electronic Commerce Research and Applications* Retrieved Oct 22nd, 2014
- Das, R. (2008) NFC-enabled phones and contactless smart cards 2008 - 2018, *Card Technology Today*, Vol. 20, Jul./Aug. 2008, pp. 11-13.
- Eaton, B, Hallingby, H.S, Nesse, P.J., and Hanseth, O. (2014) Achieving Payoff in an Industry Cloud Ecosystem at BankID, *MIS Quarterly Executive*, December, pp.223-235
- Forbrukerombudet (2009) Retningslinjer for mobile innholdstjenester, Retrieved from http://www.forbrukerombudet.no/asset/3160/1/3160_1.pdf, Nov. 25th 2014
- Franco, M. (2011) Performance in strategic alliances: an analysis of objective and subjective measures, *International Journal of Entrepreneurial Venturing*, 2011 Vol.3, No.1, pp. 84 - 100

- Gawer, A. and Cusumano, M. A. (2014) Industry Platforms and Ecosystem Innovation. *Journal of Product Innovation Management*, Vol. 21, 3 pp. 417-433
- Gawer, A., and Cusumano, M. A. (2002) *Platform leadership: How Intel, Microsoft and Cisco drive industry innovation*. Boston, Massachusetts: Harvard Business School Press.
- GSMA (2014a) Mobile Economy Europe 2013, Retrieved Sept.23rd 2014 from http://gsmamobileeconomyeurope.com/GSMA_MobileEconomyEurope_v9_WEB.pdf
- GSMA (2014b) Norwegian Mobile BankID, Reaching Scale through collaboration, Retrieved from <http://www.gsma.com/personaldata/wp-content/uploads/2014/02/Case-Study-on-Digital-Identity-Norwegian-Mobile-Bank-ID.pdf>, Sept.23rd 2014
- Hallingby H.S. and Do, V. T: (2013) Adaptation of ecosystem analysis to SIM and ID management, Telenor Research report #9.
- Iansiti, M., and Levien, R. (2004a) *The keystone advantage. What the new dynamics of Business ecosystems mean for strategy, innovation and sustainability*. USA: Harvard Business School press.
- Iansiti, M. and Levien, R. (2004b) Strategy as Ecology. *Harvard Business Review*, 82, pp. 68-78+126.
- Iansiti, M. (2005) Managing the Ecosystem. *Optimize*.4, No 2, February United Business Media LCC.
- Iansiti, M. and Richards, G. L. (2006) The information technology ecosystem: Structure, health, and performance. *Antitrust Bulletin*. Vol. 51, No. 1, Spring
- Laursen, K., and Salter, A. (2014) The paradox of openness: Appropriability, external search and collaboration. *Research Policy*, 43, pp. 867-878.
- Le, T. T. and Tarafdar, M. (2009) Business ecosystem perspective on value co-creation in the Web 2.0 era: implications for entrepreneurial opportunities, *International Journal of Entrepreneurial Venturing*, Vol.1, No.2, pp. 112 - 130
- Lofland, J. and Lofland, L. (1995) *Analyzing social setting, A Guide to Qualitative Observation and Analysis*. 3rd ed. Belmont, CA: Wadsworth
- Lusch, R. F. (2011) Reframing supply chain management: A service-dominant logic perspective. *Journal of Supply Chain Management*, 47, pp. 14-18.
- Makinen, S. J. and Dedehayir, O. (2012) Business ecosystem evolution and strategic considerations: A literature review. Engineering, Technology and Innovation (ICE), 18th International ICE Conference on, June 18th to 20th, pp.1-10.
- Miles, R. E. and Snow, C. C. (2002) Causes of failure in network organizations, In Faulkner, D. (ed) *Strategy: Critical Perspectives on Business and Management*, Vol IV, pp.193-214. Routledge
- Moore, J. F. (1993) Predators and prey: a new ecology of competition. *Harvard business review*, May-June,71,3, pp.75-86.
- Nesse, P.J. (2008) Open Service Innovation in telecom industry – case study of partnership models enabling 3rd party development of novel mobile services, Retrived March 20th 2014 from <http://www.icin.co.uk/files/2008papers/Session8A-2.pdf>
- Ok, K, Coskun, V., Ozdenizci, B. and Aydin, M.N. (2013): A Role-Based Service Level NFC Ecosystem Model, *Wireless Personal Communications*, February, Vol. 68, Issue 3, pp. 811-841
- PTT (2014) *Det norske markedet for elektroniske kommunikasjonstjenester 2013*. Lillesand: Post og Teletilsynet.
- Sjursen, H.: (2008) Collaboration between banks and operators for the provision of mobile banking and an assessment of future trends, *Journal of Telecommunications Management*, Vol 1 (3), pp. 32-36.
- Teece D. J. (2007) Explicating dynamic capabilities: The nature and micro foundations of

- sustainable enterprise performance. *Strategic Management Journal*, 28, pp. 1319-1350.
- Telenor (2009) *SMS Access and SMS Bedrift Whitepaper*. Retrieved June 17th 2014 from http://www.telenorfusion.no/Images/SMS%20Akses%20-%20whitepaper_tcm64-190816.pdf
- West, J. and Wood, D.(2013) Evolving an Open Ecosystem – the Rise and Fall of Symbian Platform, In Adner, R., Oxley J.E and Silvermann, B.S: *Collaboration and Competition in Business Ecosystems*, Advances in Strategic Management, Vol. 30, Emerald, pp. 27-67
- Yin, R. K. (2009) *Case study research: design and methods*, Sage Publications
- Zhang J. and Liang, X.J. (2011) Business ecosystem strategies of mobile network operators in the 3G era: The case of China Mobile; *Telecommunications Policy*, 35, pp. 156–171.