A FRAMEWORK FOR ANALYZING DIGITAL PAYMENT AS A MULTI-SIDED PLATFORM: A STUDY OF THREE EUROPEAN NFC SOLUTIONS

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Abstract

Near Field Communication (NFC) is a promising digital payment technology that is expected to substitute cash. However, despite its potential, NFC-based payment has not reached mass adoption on the customer nor on the merchant side. This paper constructs a preliminary framework for studying digital payment systems and analyzing strategies of current market actors, such as banks, mobile network operators, and merchants. These market actors are identified as incumbents or contenders, and they are currently jockeying for digital payment platform leadership. We analyze three different contactless payment systems implemented or planned by different actors in the European market. When synthesizing our observations, we note that all three multi-sided platforms (MSP) can provide fully functional and technically solid NFC payment systems. All three platforms seek to gain a foothold by subsidizing NFC payment instruments to their existing customer base. In addition, they extend their existing platform with other contactless services, thereby transforming existing cards (SIM or debit) from single-purpose to multi-functional cards. Our research extends existing payment literature from the MSP perspective to accommodate technological developments, where technology (NFC) and platform design impact market actor strategies and complementary products.

Keywords: Payment, credit cards, multi-sided platforms, Near Field Communication (NFC), contactless payment, mobile payment, payment infrastructure.
1 Introduction

The next generation of new payment instruments is expected to replace cash\(^1\). One candidate that tries to tackle this topic is Near Field Communication (NFC), on which many players in the payment landscape are placing their bets. Through contactless cards, MicroSD cards and mobile phones, NFC is transforming traditional cards (SIM cards, debit cards or loyalty cards) from single-purpose to multi-functional cards that are also capable of hosting several other contactless applications (e.g., ticketing). However, there is a long journey to widespread use and adoption of contactless payment instruments. Payment cards are complex systems that need two sides, cardholders and merchants, in order to create a viable platform. Many technologies, e.g., the fax machine and email, are simpler: the more users, the greater the benefits (i.e., each adoption creates an externality to the others). In the case of payment cards the externalities are considered indirect. One client’s adoption of the payment card does not directly benefit any other client, because the receivers of the payment card are merchants, and not the other clients. Generally, orchestrating the successful implementation of a technology with indirect externalities can be more challenging than implementing a technology with direct network externalities; however, the rewards may be higher and the position easier to defend.

Payment systems have not received much attention in the past. Since 2002, however, scholars have emphasized considering payment systems with their corresponding payment cards as so-called two-sided platforms that need to attract both merchants and cardholders. Almost all papers point to network externalities (Rochet et al., 2002); multi-homing, i.e., carrying different payment cards (Chakravorti et al., 2004); and acknowledging the importance of getting both sides on board, where one side is mostly subsidized to create a successful payment card (Evans et al., 2005). Rochet and Tirole (2002, 2003a, 2003b, 2006) examined, in a series of research papers, payment cards as two-sided platforms or markets, where payment cards need to attract both merchants and cardholders to create membership and usage externalities. Wright (2004) describes two-sided platforms that are able to link two distinct types of groups, which obtain value from interacting with users from the other site on a common platform. Referring to payment cards schemes, he outlines that these platforms cater to cardholders and merchants, and that the conventional logic of one-sided markets is not a suitable approach to describe the payment card industry.

However, these papers do not consider recent technological developments in the payment landscape, particularly, how payment cards are transforming from a single-purpose card to a multi-functional card, thus evolving from a two-sided to a multi-sided platform. The strategic implications are: First, the NFC technology itself has impact on how contactless payments work in practice, enabling platform providers to include or exclude other market actors or services. Second, the platform usage (moderated or free) has a substantial effect on the diffusion of complementary products (e.g., apps that incorporate an element of payment) that are helping to fertilize the core platform. Third, current incumbents (e.g., banks) are leveraging their existing cardholder base to diffuse new NFC technologies (supply-push strategy), to create in rapid fashion an installed user base. To address the research gap, the following research question can be formulated: **How do incumbents and contenders engage themselves in providing the next generation digital payment platform and what strategies do they employ?** To answer the research question, we construct a framework that considers contactless payment cards as MSPs. The framework enables exploration of how market actors design their platforms, in order to gain leadership. To demonstrate the usefulness of this framework, we analyze current market actors, including banks, mobile network operators, and merchants, whom we have identified as either incumbents or contenders, and who are currently actively jockeying for NFC platform leadership. The contribution of this paper is twofold: First, the framework can be utilized to identify and develop digital payment platform strategies to increase adoption on the cardholder and merchant side. Second, learning from the NFC adoption as an example, we believe this framework is

\(^1\)http://www.zdnet.com/news/nfc-and-the-war-on-cash/6358558
also applicable beyond the payment domain in areas where digital technology is the platform enabler. Since we see a steady convergence of virtual and physical objects (e.g., Internet of Things), this framework can also provide a general understanding of how digital platforms, combined with a technology element (hardware or software) are designed to create network effects. The paper proceeds in the following manner: To develop the framework, in the next section we characterize payments, describe the NFC technology, define multi-sided platforms (MSP) and review the literature, to discover factors that have been identified as critical in the launch of innovative technology platforms. We also showcase how open and closed systems distribute complementary products. In section three we present our research method and discuss the consequences of the choices we make. In section four we present and analyze three different contactless payment systems planned or launched by different actors in the European market. We synthesize our findings in section five and finally, in section six, we draw some conclusions, discuss our limitations and propose promising areas for further research.

2 Digital Payment Framework

2.1 Payment and NFC

Payment is a process of transferring money from payer to payee that involves payment instruments, payment processing and payment settlement (Kokkola, 2012). For the purpose of this paper we define money as fiat money, issued by governments, that is by law enforced to be accepted as legal tender (Rollins, 2003). The earliest recorded use of fiat money that replaced coins was in the thirteenth century during the Yun Dynasty. Banknotes were, at that time, a new technology and to enforce their acceptance, rejections would be sentenced with decapitation (Wolman, 2012). Today, law enforcement regarding legal tender is less consequential, but the penalties for forging cash are still high compared to other offences. Currently, cash is under siege by digital money in the form of credit cards and many are jockeying for position in the race to provide consumers with the next digital payment system. The choice of technology in many digital payment systems is NFC technology, which, depending on its implementation, has some aspects that favor some market actors while excluding others. It is, therefore, relevant to understand how the technology operates and how it affects the race.

Near field communication (NFC) is a set of standards for radio signals to establish wirelessly a communication at a frequency of 13.56 MHz by bringing devices into close proximity, usually no more than a few centimeters. NFC chips are distinguished in two different ways: active NFC chips, i.e., powered through energy, are acting as a transceiver (e.g., smartphones or NFC readers), whereas passive NFC chips, such as NFC cards or tags, are charged with power through a magnetic field. Activated through the magnetic field, both types of NFC chips are able to transmit data wirelessly. In practice, payment is initiated when the customer in the store taps or waves the NFC in front of a reader, which charges the chip with electricity and emits a radio signal that initiates the payment transaction. An acoustic and visual signal often confirms and ends the transaction. NFC and its secure element, which stores sensitive data and applications, can be implemented in the following ways: on a SIM card provided by the mobile network operator (MNO), embedded in the handset and controlled by the manufacturer, and lastly, built into payment cards or MicroSD, which is the method preferred and offered by banks. Each of these options has its pros and cons, which have an impact on the control of contactless applications, strategies of market actors and consequently, on the diffusion of NFC payments in general. Additional complexity arises when multiple secure elements are attached and active, creating confusion at the NFC terminal over which payment application to access. Thus, one NFC chip has to be set as default and subsequently, only one payment application is permitted or prioritized2.


2.2 Digital Payment Framework

In this section, we present our “Digital Payment Framework”, which is a synthesis of related works and existing literature, which we have identified of being essential to create viable mobile payment platforms.

Traditionally, value creation has been achieved through a number of incremental steps from raw material to products and services (Porter, 1985). This worked well for industrial products, but recently, platforms that create value by facilitating interactions between different groups have created an interest as an analytical lens for understanding value creation. We adopt the notion by (Hagiu et al., 2011) and define a multisided platform (MSP) as “an organization that creates value primarily by enabling direct interactions between two (or more) distinct types of affiliated customers”. MSPs are either digital, such as search engines and operating systems, or physical, like shopping malls, game consoles or printed newspapers that are attracting at least two distinct groups, both of which have the demand to interact with each other. Search engines, for instance, join searchers and advertisers; meanwhile, shopping malls are connecting shoppers and merchants (Hagiu et al., 2011). The platform organization itself thereby acts as an intermediary, which can be operated either by one or more entities, which are called platform providers. The primary task of a platform is to coordinate and facilitate the direct interactions in a controlled manner, thereby providing the architecture and a set of rules for each participant. In general, the value of a MSP is highly dependent on the number of users on both sides (Eisenmann et al., 2006).

To describe the logic of new digital payment platforms, we adapted the framework by Hagiu and Wright (2011) that demonstrates the general logic of MSP, which we have extended to represent a digital payment ecosystem and we especially emphasize the technological solution.

![Digital Payment Ecosystem](image)

**Figure 1. Digital Payment Ecosystem**

**Direct Interaction** Direct interaction is the key criterion for classifying a platform as multi-sided. For instance, the music and movie store iTunes by Apple connects content providers (music and movies) with buyers. However, if one reads the terms of use, it is actually a direct commercial purchase contract with Apple and not with the studios; therefore, iTunes is acting solely as a re-seller platform and not as a MSP in this case. Contrary to the iTunes store, according to the terms of use, the Apple App Store is indeed a MSP, which enables a direct commercial interaction between software developers and the buyers. In consequence, to classify a platform as being multi-sided or not, the contract design that specifies the direct commercial relationships is an important aspect for the classification (Hagiu et al., 2011).

**Network Effects** Multi-sided platforms are characterized by network effects, which can further be distinguished as same-side network effects and cross-side network effects. Same-side network effects increase or decrease the value of one side of the platform. If we take game consoles as an example, users value a certain console if it has many users and a variety of games to offer, creating an incentive to exchange with other users, which is a positive same-side effect. For other platforms, however, a negative same-side effect can occur when there are too many of its own kind on a platform, making it unattractive to show affiliation. For example, sellers value marketplaces with fewer sellers in the same
manner that single men prefer dating clubs with fewer men, to avoid competition. Cross-side network effects are apparent when users value the other side of a platform, e.g., when advertisers are attracted by a much-visited online portal (positive cross-side effect), whereas too many ads create a negative effect on the reader side. To lower the hurdle for one side, most platform providers subsidize one side (subsidy side), to ensure that network effects have a chance to take effect. If a MSP has been able to create a strong installed user base, the money side gets mostly attracted to obtain value from these users (Eisenmann et al., 2006). As an example, Google has reshaped the entire online advertisement industry to offer highly contextual ads to searchers (subsidy side), where online advertisers (revenue side) are willing to pay premium prices for online clicks.

**Homing Costs** Homing costs are expenses (adoption, operation, opportunity costs) that arise when users are affiliated with a platform. Homing costs include any kind of investments/costs incurred due to platform affiliation. It basically consists of three cost components. First is upfront cost: search, initial investment and training. Second are on-going costs: membership fees, maintenance cost. Finally, exit costs include salvage value of hardware/software and termination costs. For instance, many computer users are able to use one operating system well (e.g., Windows), which requires from the individual user commitment and resources, in a timely as well as financial manner. In addition, homing costs differentiate in their value. Homing costs are low, if systems are convenient and easy to adopt and to use. Thus, the likelihood to multi-home different systems at the same time is given. For example, holding different payment cards is – for most individuals – a common issue, because the payment card in its current form is a standardized product that can be easily switched and adopted from various financial service providers, which thereby exhibits low homing costs (cf. Eisenmann et al., 2006).

**Switching Costs** Switching costs are high when users made significant and durable investments to a certain platform and into complementary assets (homing costs), thereby creating a hurdle to switching to an alternative platform. As a result, they are faced with a lock-in effect (Shapiro et al., 1999). For example, IT managers at large corporations think very carefully before they make the decision to switch to another IT system (cf. Damsgaard et al., 2010).

**Bundling and Envelopment** Platforms leaders shouldn’t rest on their achievements when the threat of being enveloped is evident. Platform owners can be *enveloped* when competitors enter (or sneak in) into their market and offer the same functionalities by bundling it with their existing products, and at the same time, having essentially the same customer relationship (Eisenmann et al., 2006). *Bundling* is a form of versioning where two or more single products or services are offered as a package (Shapiro et al., 1999). As an example, Netscape was once the dominant internet browser, but it has been enveloped through Microsoft’s Internet Explorer web browser, since Netscape users were also users of Microsoft’s Windows operating system. Microsoft sneaked in into the browser market by bundling Internet Explorer with its operating system. Nevertheless, standalone platform providers can strengthen their position, if they bundle their offer with other services, either to increase their value proposition or to act preemptively against competitors.

**Platform Design (Platform & Complementary Products)** To make sense of platform strategies and how complimentary products are distributed, we adopted the framework (figure 2) by Iyer and Henderson (2010), to analyze the logic of different types of platforms and the distribution of products (applications). *System development dimension (Y-axis)* MSPs can be characterized as being closed or open systems that determines the degree of involvement through third parties. Closed systems exclude third parties from any platform modification, where Apple serves a good example. The iOS by Apple is a *closed* mobile operating system, allowing – with its walled garden approach – control over every aspect on the mobile device, excluding thereby any third parties from platform development. On the contrary, Google’s Android mobile operating system is *open* source\(^3\), allowing third parties significant

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\(^3\) [http://source.android.com/about/index.html](http://source.android.com/about/index.html)
modifications. System usage dimension (X-axis) Systems differentiate as to how complementary software can integrate with the system. Software developers for Windows, for instance, don’t need the permission of Microsoft to build software using Windows, which represents the free approach. The moderated approach is accompanied by rules, where complimentary software is distributed in a controlled manner. The app development for iOS devices, serves an example that requires Apple’s permission to be on the platform. Through these two dimensions, we can derive four platform strategies (Figure 2). In general, moderated systems have the benefit of guaranteeing a unified user experience, whereas free systems offer greater variety.

<table>
<thead>
<tr>
<th>Development Platform Provider</th>
<th>Open</th>
<th>Closed</th>
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<tbody>
<tr>
<td></td>
<td>Open/Moderated</td>
<td>Closed/Moderated</td>
</tr>
<tr>
<td></td>
<td>Salesforce.com</td>
<td>Apple’s App store</td>
</tr>
<tr>
<td></td>
<td>Open/Free</td>
<td>Closed/Free</td>
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<tr>
<td></td>
<td>Linux</td>
<td>Windows</td>
</tr>
<tr>
<td>Moderate</td>
<td>Free</td>
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</table>

Figure 2. Platform Design: Open and Closed Systems

Technological Solution (Customer Ownership & Hardware) Different platform designs enable asserting different types of control on third parties and on their complementary products (see figure 2), which have also implications on end users. By controlling the customer relationships, platform providers can extract revenues (fees) and depending on the level of control, it can claim customer ownership. In addition, a protected hardware infrastructure can serve as a second defense and a second layer of control, to protect value creation. Payments, especially at the checkout counter are dominated by hardware, i.e. payment cards and terminals. This provides the payment platform provider a greater effect on control, excluding third parties and owning the customer by hindering alternatives. Furthermore, Hardware can be categorized into evolutionary or revolutionary products (cf. Shapiro et al., 1999). Evolutionary products offer a migration path to a new technology and at the same time backward compatibility to old systems. As an example, applications developed for Microsoft’s OS Windows 95 were also running on Windows 98 systems. Lastly, revolutionary products offer a better performance, however, representing a riskier approach, since the technology itself is in most cases not compatible with the old technology, thus with the existing user base. To understand platform logic of modern payment systems, the interplay of platform design and the technological solution (e.g. NFC payment cards) is relevant to assess the efficacy of modern payment platforms. In order to explore the aim of this paper, we tailored from the aforementioned theories a digital payment framework, to explain contemporary payments systems:

<table>
<thead>
<tr>
<th>Criteria: MSP</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td>Direct Interaction</td>
<td>Classifies a platform as being a Multi-Sided Platform.</td>
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<tr>
<td>Network Effects</td>
<td>Illustrates the attractiveness of a platform that can draw users, based on cross-side effects or same-side effects.</td>
</tr>
<tr>
<td>Homing Costs</td>
<td>Costs of adoption, which serves as an indicator for platform affiliation.</td>
</tr>
<tr>
<td>Switching Costs</td>
<td>Points to lock-in effects.</td>
</tr>
<tr>
<td>Bundling &amp; Envelopment</td>
<td>Threat of <em>envelopment</em> through prospective competitors who enter the payment market and have shared customer relationships. Platform owners can counteract <em>envelopment</em> through <em>bundling</em> to increase their value proposition.</td>
</tr>
<tr>
<td>Platform Design</td>
<td>Describes open and closed systems and how complementary products are distributed.</td>
</tr>
<tr>
<td>Technological Solution</td>
<td>The applied technology that determines customer ownership, accompanied through an evolutionary or revolutionary hardware strategy.</td>
</tr>
</tbody>
</table>

Table 1. The Digital Payment Framework
3 Research Method

In order to provide an answer to our research question, we perform a multiple case study in Europe. We apply the previously introduced digital payment framework as our analytical tool to identify and categorize similarities and differences among the cases. We adopt Romano et al.’s (2003) research methodology to analyze web-based qualitative data to make sense of the collected data. The method provides a structured approach to assess data, based on elicitation, reduction and visualization (Romano et al. 2003).

3.1 Data Collection and Analysis

We collected publicly available data from different online sources: press releases, online news and industry articles, interviews and speeches at conferences. The search was conducted through industry and technology online magazines, search engines and social media channels, while using certain keywords in the European NFC payment context: NFC payment (cards), NFC MicroSD cards, NFC phone payment, contactless payment, and NFC mobile payment, by limiting the time period from fall 2011 till end of March 2013. Online Industry and technology magazines were particularly useful, since they represent independent journalism, covering comprehensively about recent technological developments in the retail and payment area with in-depth background knowledge and analysis. Three different NFC payment actors prevailed through the data: banks, MNOs and merchants. From these market actors, three European companies stood out from the data collection, based on large media attention, being recent, visible, and more importantly, being market leaders in their sector, which have the size and potential to establish NFC payment platforms on a larger scale. We selected following companies to apply our framework: girogo (DE) representing the banks, Orange (FR) an MNO and the merchant Yapital (DE). The sample size (in total 51) is presented in table 2. The analysis were conducted in two stages: First, we performed a content analysis by coding and categorizing the unstructured data according to our framework. Secondly, after the categorization, we had in-depth discussions with the authors to interpret the findings until we reached consensus.

<table>
<thead>
<tr>
<th>Data Sources</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interview</td>
<td>Two transcribed interviews with Yapital’s CEO Nils Winkler, two interviews in video format.</td>
</tr>
<tr>
<td>Press releases</td>
<td>Yapital (4), Orange (2) and girogo (3)</td>
</tr>
<tr>
<td>Online Articles</td>
<td>Yapital (7), Orange (6) and girogo (23) (cisco.com, derhandel.de, entailment.de, geldkarte.de, nftimes.com, nfcworld.com, welt.de, or spiegel.de, techcrunch.com)</td>
</tr>
<tr>
<td>Local radio news</td>
<td>Two radio news and radio interview about girogo (DAS HITRADIO and ddp direct)</td>
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</tbody>
</table>

Table 2. Data sources for the analysis

4 Three NFC Payment Multi-sided Platforms

To demonstrate the usefulness of our digital payment framework, we will analyze three types of contactless payment platforms, which will serve for our cross-case analysis in the next section.

Banks – Saving Banks’ girogo

In April 2012 a German saving bank group (Sparkasse), in cooperation with a smaller partner, the cooperative banks (Volksbanken), started the initiative – girogo - to pilot test contactless payment cards in three cities: Hannover, Braunschweig, and Wolfsburg. The pilot project has equipped 1.5 million cardholders with NFC payment cards, enabling them to perform contactless payments. The existing debit card contains a built-in NFC prepaid card, where the NFC payment functionality is currently tied to this payment method. On the merchant side, the rollout was accompanied by several retail chains from different branches, ranging from gas stations to grocery stores, showing their commitment by installing compatible girogo NFC terminals (893 NFC Terminals as of August 2012), guaranteeing at launch girogo acceptance at selected stores. To incentivize the adoption of contactless payments on the merchant side, girogo fees are lower (max. 0.03 Euro) compared to the regular PIN
payment debit method. Besides the aforementioned pilot region, the Sparkassen group has teamed up with a number of soccer clubs, where *girogo* NFC cards function as member cards that grant entry to the stadiums, fostering the brand perception beyond the pilot region. The Sparkassen group, with its more than 50 million bank customers, is planning to finish the rollout by 2015, equipping 45 million Sparkassen cardholders with NFC payment cards. Other major German banks have not made the announcement that they will adopt the *girogo*, but they are following the development closely. It is worth noting that all German banks are indirectly involved in *girogo* through the umbrella organization Deutsche Kreditwirtschaft that pays the R&D costs, offering the possibility to join the *girogo* bandwagon if and when it starts rolling.

*MNO - Orange France*

In 2010, Orange, in cooperation with three other MNOs, launched an NFC multi-service pilot project called Cityzi. Initially rolled out in the city of Nice, the initiative enables subscribers with NFC handsets to make use of several contactless services, ranging from typical use cases such as ticketing to mobile payments. However, Orange announced in mid-2012 to rollout, parallel to the joint venture Cityzi, its own proprietary NFC scheme, having the aim to equip gradually its 27 million customers with new NFC SIM cards. So far, Orange is issuing approximately 5 million new and replacement postpaid SIM cards a year\(^4\), and could potentially create through its *supply-push strategy* a considerable NFC user base of 2.5 million Orange subscribers by the end of 2012. NFC service providers on the other hand, such as banks or public transport, have the option to offer their contactless services by placing their application on the NFC SIM card, which allows them to manage and update customer data wirelessly\(^5\). So far, Orange has not announced any partnerships with French banks, but since it is closely working with three French banks (BNP Paribas, Crédit Mutuel Group and Société Générale) in the pilot project Cityzi, the foundation is given. Currently, on the merchant side, 300,000 contactless payment terminals are installed\(^6\) million payment terminals in France, where every new POS terminal is going to support contactless payments\(^7\). Orange currently does not have its own payment system; rather, it considers itself an NFC service hub for different contactless services, where the business model is most likely based on rental or transactions fees.

*Merchants – Yapital*

In March 2012, OTTO, the second-largest online retailer after Amazon\(^8\), created buzz in the German media by rolling out its own payment system. Launching through its subsidiary Yapital, OTTO is planning to offer online as well as offline payment systems, based on NFC, QR codes and physical payment cards. According to Yapital they don’t have the intention to create a new online or mobile payment service; rather, they have the ambition to create a competitive and an overall new payment method for modern life\(^9\). Besides relying on its own commercial reach, the OTTO group is in talks with other retail partners to guarantee initial acceptance. Surprisingly, the OTTO group goes solely with Yapital, without any (platform) involvement of the other big retailers, which could foster the diffusion of Yapital payment cards.

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### Criteria: MSP

<table>
<thead>
<tr>
<th>Direct Interaction</th>
<th>Banks – girogo</th>
<th>MNO - Orange France</th>
<th>Merchants - Yapital</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Girogo</strong> fulfills the classification of a MSP, because it enables through its intermediaries (banks and acquirers) direct commercial interactions between cardholders and merchants.</td>
<td>Orange is a MSP that enables direct interactions between merchants and cardholders by being an NFC hub for French banks and to other contactless services.</td>
<td>It can be assumed that Yapital will fulfill the classification of a multi-sided platform, since the commercial relationship will be based between the merchant and the payer.</td>
<td></td>
</tr>
<tr>
<td><strong>Network Effects</strong></td>
<td>The Sparkassen group, which has launched girogo, created through their supply-push strategy a solid foundation for network cross-side effects by equipping cardholders (subsidy side) with new NFC prepaid cards, which created, on the merchant side (revenue side), an incentive to install new NFC terminals.</td>
<td>Through its supply-push strategy, Orange diffuses NFC through new and replacement SIM cards, where cardholders (subsidy side) can benefit from an existing NFC terminal infrastructure that was built up for Cityzi. From the merchant view (revenue side), it can be assumed that Orange’s NFC rollout could convince more merchants to install NFC terminals.</td>
<td>It is too early to judge about network effects since Yapital didn’t launch, but it could incentivize its payment system with a loyalty scheme across the OTTO group. Through the involvement of OTTO group guarantees the merchant side which create a sufficient installed base on the merchant side which could attract user on the customers’ side. From our sources it is not clear who will be provide revenue.</td>
</tr>
<tr>
<td><strong>Homing Costs</strong></td>
<td>Homing costs for current cardholders are low, since bank customers will receive a new girogo card. Contrary to cardholders, merchants have to cover costs by setting up new NFC terminals.</td>
<td>Orange subscribers have low homing costs, since every SIM card will have a compatible built-in NFC (evolution strategy). For merchants, costs are high since terminals need to be replaced.</td>
<td>From the cardholder perspective, Yapital has medium homing costs. For merchants, the initial rollout could be based on physical cards (smart chips with NFC) resulting in low homing costs.</td>
</tr>
<tr>
<td><strong>Switching Costs</strong></td>
<td>Cardholders and merchants are faced with significant switching costs. Cardholders have to cover termination costs by having the hassle of informing third parties that the account has changed. Most merchants are tied to contractual commitments, which is a high barrier to abandon current terminals.</td>
<td>Orange subscribers would have medium to high switching costs, due to contractual commitments, the lack of NFC functionality by other MNOs, or the lack of availability of the preferred NFC payment card. Merchants have to absorb high switching costs, due to acquirer contracts.</td>
<td>Cardholders could be faced with switching costs, if the loyalty program is tied to the Yapital payment card. The merchant side is still unclear.</td>
</tr>
<tr>
<td><strong>Bundling/Envelopment</strong></td>
<td>Bundling girogo with the existing debit card can be considered as a Trojan horse strategy. This approach illustrates clearly an evolution strategy that is based on technologies that are compatible with the old, but offering a superior service.</td>
<td>Bundling SIM cards with NFC payments increases the value proposition of Orange. Envelopment can occur when banks try to offer their own payment service through MicroSD cards or through embedded NFC chips.</td>
<td>Yapital is most likely going to bundle its payment service across the OTTO group, offering online shoppers incentives (e.g., discounts) to use a Yapital account for their online and offline purchases. Yapital could be enveloped through cloud-based wallet services that work on top of Yapital (e.g., Google Wallet).</td>
</tr>
<tr>
<td><strong>Platform Design</strong></td>
<td>The girogo platform is a closed and moderated platform. However, all German banks have the option to offer girogo due to the involvement of the association Deutsche Kreditwirtschaft.</td>
<td>Orange’s approach is a closed and moderated approach that requires a contractual agreement to put any NFC application on the secure element on the SIM card.</td>
<td>It can be assumed that the initial rollout of Yapital is going to be a closed and moderated system to guarantee a unified user experience.</td>
</tr>
<tr>
<td><strong>Technological Solution</strong></td>
<td>girogo is an NFC prepaid card that is owned and controlled by the German banking group; consequently, the customer ownership with its related revenues.</td>
<td>Orange’s NFC technology is SIM based and since they issued the cards, they own the customer relationship.</td>
<td>There is no information available as to how exactly the NFC is going to be implemented. If Yapital is issuing its own NFC payment cards, the customer ownership remains with them.</td>
</tr>
</tbody>
</table>

*Table 3: MSP Analysis of the Three NFC Multi-sided Payment Platforms*
5 Discussion

In this section we perform a cross-case analysis of the aforementioned actors. We use the previous analysis (table 3) that serves to identify similarities and differences among the actors.

Direct Interaction All three cases depict that NFC payment systems fulfill the criteria of MSP that enable direct commercial interactions between merchants and cardholders. In the case of Orange, the NFC SIM card goes beyond payment, where Orange has the aim to be the future platform for a potential comprehensive NFC ecosystem.

Network Effects The incumbent payment provider (girogo) and the two contenders (Orange & Yapital) leverage their existing installed user base or commercial reach to diffuse new NFC payment instruments, with the hope to create positive network effects on the merchant side. Yapital has to prove itself, but girogo and Orange demonstrate the efficacy of their supply-push strategy, by equipping every new debit card or SIM card with NFC functionality. Furthermore, Orange is piggybacking on the existing NFC terminal infrastructure made for Cityzi. However, the commercial launch by Orange also has consequences. Other MNOs are starting to launch their own proprietary NFC payment systems. For instance, the French MNO SFR partnered with MasterCard to rollout contactless prepaid cards, followed by NFC SIM cards in 201310.

Homing Costs In general, cardholders are faced with low homing costs, since they represent in all three studied cases the subsidy side, that are equipped with new NFC payment instruments at no costs. It can be noted that all actors follow an evolution strategy that provides a smooth migration path to a new platform characterized by compatibility and low switching costs, as seen by girogo and Orange (cf. Shapiro et al., 1999). Multi-homing different payment or SIM cards is, for most customers, unreasonable due to account or subscription fees. It can be assumed that Yapital cardholders will also have low homing costs. However, Yapital has to overcome the initial hurdle to build up a user base from scratch. On the other hand, through OTTO’s commercial reach, Yapital enjoys a comfortable starting position. From the merchant perspective, merchants have to cover initial high (multi) homing costs, since most deployed terminals lack NFC functionality. Thus, to accept contactless payments, they need either a hardware upgrade, an adapter plugged into the old payment terminal, or to multi-home a NFC terminal. For those merchants that have already an NFC terminal in use, they can reduce homing costs through a terminal software update. In addition, all contactless payment cards are backwards compatible (e.g., girogo), allowing payments with chip and PIN, punctuating again its evolutionary character that still provides access to a large and existing user base.

Switching Costs In general, bank and MNO customers have to bear high switching costs. For instance, girogo cardholders have to cover high switching costs, since the NFC payment method is bundled with their current debit card, which is in most cases linked to a bank account that primarily serves to receive paychecks or pay bills. Replacing the account would lead to significant termination costs, illustrating the control of banks to lock-in customers. Subscribers of MNOs, on the other hand, are bound due to mobile phone contracts. Assuming that SIM-based NFC payment gains momentum, the prospective MNO might lack bank agreements, and be unable to provide certain payment cards, illustrating potential disruption costs, i.e., for a period of time without any service (cf. Shapiro et al., 1999). However, MNOs have to create this value proposition in the first place. Lastly, payment cards issued by merchants, such as by Yapital, could lock in cardholders by bundling the payment card with loyalty programs. Assessing the situation of merchants, they are also faced with significant switching costs, since they are locked into their contractual commitments, deterring them from switching to another acquirer.

Bundling and Envelopment In all three cases, current and future contactless payment providers follow the strategy to bundle their existing platforms (e.g., debit card or SIM card) with NFC, adding further contactless applications (e.g., ticketing), or combining payment cards with a

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loyalty program (Yapital). Through these measures, platform owners are introducing new technologies and try to increase the value proposition and thus the adoption rate (cf. Dwivedi et al., 2009); moreover, it is in essence a preemptive action to protect their market position and to circumvent envelopment by competitors.

**Platform Design** According to our analysis, almost all payment actors follow a closed and moderated approach (see Figure 1); allowing acquirers and service providers to build certified terminals and NFC apps under a controlled manner (system usage dimension), where all platforms providers (e.g., Orange) control their proprietary closed system (system development dimension). It can be concluded that the application of a closed and moderated system approach guarantees a unified user experience and control about the distribution of applications. All these measures are helping to fertilize the core payment platform.

**Technological Solution** It is evident that NFC payment providers control the customer relationship. It enables them to carry out their control on further NFC services, hence potential revenue streams. Additionally, depending on which NFC solution is applied, it has profound implications on how tightly the control can be conducted, in order to exclude other NFC solutions. Girogo and Orange, for example, portray the control and ownership of customers, since they issue the NFC chips and control the secure element. On the other hand, the new market actor Yapital might have initial control while issuing its owns NFC payment cards, but if Yapital decides to extend its NFC payment platform on further devices, it is most likely depending on other actors, e.g., handset manufacturers. Even though the NFC solutions of banks and MNOs do not interfere with each other, i.e., contactless payment cards don’t involve mobile phones, they interfere, however, on the business level, since they try to envelop and compete for the same customers.

### 6 Conclusions

When synthesizing our observations and providing an answer to our research question, we can conclude that all three MSPs have the potential to provide fully functional and technically sound NFC payment systems. All three platform providers subsidize and leverage their existing customer base to diffuse NFC payments. They plan to bundle their platform with other contactless services, thereby transforming existing cards (SIM or debit) from single-purpose to multi-functional cards (i.e., being multi-sided). On the merchant side, acquirers are also contributing to the diffusion process, by offering payment terminals bundled with NFC. It can be noted that bundling is an effective (Trojan horse) strategy to diffuse new technologies to customers (cf. Shapiro et al., 1999). In addition, the strategy of bundling offers a higher value proposition, which is, in essence, a preemptive action to exclude other competitors from the value creation process. Parallel to that, the NFC technology itself serves as a technical and second barrier to exclude market actors from the expected value creation process. All players follow a closed and moderated platform approach that provides a unified user experience and control about the distribution of contactless applications, in other words, control over revenue streams. All three payment platforms are offered by incumbents, but from separate areas. Orange is the incumbent MNO, while OTTO is the incumbent retailer offering Yapital; both, however, act as contenders in the payment scenery. Only girogo is an offering from an incumbent in the payment area. For girogo they opt for an independent solution that can be implemented without the involvement of MNOs, because their solution does not involve the mobile phone itself, whereas Orange depends on financial institutions. Yapital’s case is not clear, since they did not launch. It can be anticipated that the girogo card, if successful, will find its way to the mobile phone as a sticker. The usefulness of our framework falls into three parts. First, it is a conceptual tool that builds on existing payment literature from the MSP perspective, to accommodate recent technological developments, where technology (NFC) and platform design impact market actor strategies and complementary products. Second, it identifies and assesses the efficacy of NFC payments systems as MSPs. Third it detects potential threats of envelopment through competitors who have relationships with the same customer. From the practitioner’s view, this framework is relevant to assess their current market position, which can be utilized to (re)design effective contactless payment platforms or other platforms based on cloud
computing and hardware. This paper has limitations, since we have only dealt with payment and used primary data based on secondary resources to illustrate the usefulness of the study framework. Its predictive power and verification is not a part of this research. For further research, the collection of firsthand data could be useful in order to validate the framework. It would also be interesting to analyze NFC payment systems by similar actors to find commonalities and differences.

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