

**THE MARKET THAT NEVER WAS:
TURF WARS AND FAILED ALLIANCES IN MOBILE PAYMENTS**

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Abstract

In this inductive multiple-case study set in the nascent market for mobile payments, we investigate how global firms from different industries attempt to define the architecture for a new market. We find that powerful players from different industries have difficulty in reaching agreement on the new market's architecture due to their history of dominance in their respective industries. This disagreement in turn leads to a weak compromise on market architecture and creates a vicious cycle of resource allocation deferment. We show that the nascent market is thus less likely to emerge despite country-level attempts at resolving these issues. Our findings contribute to resource dependence theory and to theories of market emergence, and lead to a deeper understanding of when and how markets fail to emerge.

Keywords: market emergence, market failure, market architecture, interfirm negotiation, resource dependence

THE MARKET THAT NEVER WAS: TURF WARS AND FAILED COALITIONS IN MOBILE PAYMENTS

“Mobile payments are the next big thing!” 2002

“By 2006, we should see commercialization.” 2004

“By 2008, we will have a very solid infrastructure” 2006

“Mobile payments is a market still half-baked...” 2009

“Shall we all just pack up and go home?” 2010

Early conceptions of markets in organizational theory largely treated markets as a default organizational form that would naturally occur in situations of low transaction costs among activities (Williamson, 1985). Over the last two decades, scholars have shifted away from this view of markets as a natural and almost inevitable form of organized economic exchange, towards a view of markets as complex institutions (Aldrich and Fiol, 1994; Fligstein, 2001) with particular architectures (Jacobides, 2005), networks of producers (White, 2002), and structure of beliefs (Porac, Thomas and Baden-Fuller, 1989). This has led to increased interest in understanding the processes through which markets emerge and become recognized as distinct (Jacobides, 2005; Granqvist, Grodal and Woolley, 2012; Ozcan and Eisenhardt, 2009; Santos and Eisenhardt, 2009; Navis and Glynn, 2010).

The view of markets as new categories suggests that markets are essentially representations of an economic space being recognized as distinct by relevant audiences (Porac *et al* 1989, Kennedy, 2008). In this view, markets emerge as a process of legitimation, involving identity formation and categorization mechanisms that are highly influenced by public statements and media coverage (Kennedy, 2008; Navis and Glynn, 2010). In contrast, the architectural view of markets suggests that new markets emerge out of interaction among various types of firms and organizations that allocate resources, define technologies, and create new structures for organized economic activity (Anderson and Tushman, 1990; Jacobides, 2005; Suárez, 2004; Van de Ven and Garud, 1993). The

existence of these two distinct views of the market emergence process suggest that markets have both cognitive and structural elements, and that entrepreneurs building new markets may need to operate on these two dimensions (Santos and Eisenhardt, 2009; Navis and Glynn, 2010).

Most studies in both traditions, however, have focused on empirical cases where the described process of legitimation and structuration of activities successfully led to the formation of a new market (Navis and Glynn, 2010), thus creating a selection bias in the literature (Aldrich and Fiol, 1994). Yet, as the starting quotes of this paper illustrate, market emergence can be a difficult process – for each market that becomes structured and accepted as distinct, there may be other promising markets that never emerge.

In this paper, we argue that new markets may fail to emerge if the market participants cannot agree on a market architecture, i.e. a division of labor that specifies their different roles and interdependencies in delivering value to customers in the new market (Jacobides, Knudsen, and Augier, 2006). Agreement on a market architecture may be a particularly difficult process when the nascent market emerges at the convergence of distinct industries that have been historically separate, such as the Internet at the convergence of computing and telecommunications (Santos and Eisenhardt, 2009), or mobile gaming at the convergence of video gaming and wireless communication (Ozcan and Eisenhardt, 2009). Markets emerging at the convergence of distinct industries require the collaboration of prominent firms who dominate their respective industries, but have little or no track record of inter-industry collaboration (Armstrong, 2006; Rochet and Tirole, 2006). Further complicating the process may be the emergence of the nascent market at a global level, as this may increase the prominent firms' perception of a high-stakes game and create difficulties in reaching an agreement.

To investigate when markets emerge versus fail under these challenging circumstances we explored the research question of *how prominent firms from distinct industries jointly attempt to define the architecture for a global nascent market*. We studied in real time, between 2006 and 2011, the mobile payment market, a nascent market emerging at the convergence of the global telecommunications and financial services industries. In 2006, this was a nascent market already benefiting from wide media coverage for over 5 years. The technology was available and there was strong global demand, as well as interest from prominent firms from different industries. Yet, as our initial interviews and observations showed, the market emergence was surprisingly slow at the global level and showed great variation at the local level.

Given the limited research on the topic, we used an inductive theory building approach with a multi-level design where we analyzed the interactions between country-level cases and the global-level nascent market for mobile payments. We collected and triangulated data from in-depth interviews, observations, and archival sources to capture detailed accounts of the interactions between different firms that were interested in the new market.

Our analysis suggest that, in markets at the convergence of distinct global industries, if the involved players have a history of dominance in their respective industries they are less likely to agree on a joint market architecture for the nascent global market, which can then lead to a vicious cycle of resource allocation deferment that will prevent market emergence. This happens because prominent firms who dominate these industries typically have different backgrounds, interests and conceptions for the new market (Armstrong, 2006; Rochet and Tirole, 2006) and thus face difficulties in reaching a global agreement. After such a blockage at the global level, market emergence at the local level may depend on the ability of prominent players to make strong resource commitments and internalize key interdependences. However, our data show that the longer the involved players from

distinct industries disagree about the market architecture, the more likely they are to invest in alternative architectures within their own industry, further inhibiting market emergence at the convergence of industries at both global and local levels.

A key contribution of our work is the extension of current theories of power to the case of interdependence among prominent firms from distinct industries. We show that, despite interdependence, firms may not agree to inter-industry cooperation and insist on solely dominating the nascent market. We suggest that a key factor causing this non-cooperative behavior is firms' different beliefs about relative bargaining power (Yildiz, 2003) based on a history of industry dominance. This leads to unsolvable disagreements and turf wars at the convergence of industries, where the battle among intra-industry coalitions prevents market emergence.

Overall, we contribute to a deeper understanding of why markets may not emerge, going beyond the traditional focus of the literature on the external validation of new market categories (Kennedy, 2008) and the convergence on dominant designs (e.g. Benner and Tripas, 2012; Suárez and Utterback, 1995). Specifically, we explore the important role that firms and managers need to play in setting up organizational and inter-organizational structures that become templates and enablers for new markets and industries. Our social and political framework helps explain why prominent and pro-active firms may fail to open up promising new markets at the convergence of their industries, despite having legitimacy, resources, available technology, and customer demand.

THEORETICAL BACKGROUND

Although markets are a fundamental element of modern economic systems, the process of market emergence and reasons for non-emergence are still not well understood (Navis and Glynn, 2010). We define a market as a structured context for exchange (Fligstein, 2001) in which resources are mobilized and organized by a set of producers to deliver a particular

offering that addresses needs and desires of a set of customers. We can thus speak of the market for cars which addresses the need for mobility, or the market for mobile phone payments that addresses users' desire to make fast and secure purchases with their phone. This perspective views markets as more than just a trading place - they are a type of institution that introduces stability and regularity into the behaviors of economic agents (Fligstein, 2001). In this sense, a market is distinct from an industry, although these two concepts often appear conflated in the literature. Industries can be defined as a collection of firms that are defined around products or services with vertical (i.e. value chain) or horizontal (i.e. complements or substitutes) links to one another (Porter, 1980, 1985). A market can emerge at the convergence of industries and firms that compose an industry can establish different markets. Questions then arise of when and how new markets emerge, and how they relate to an existing industry structure. These questions have been addressed in different research streams.

In organizational theory, nascent markets have been conceptualized as starting with high ambiguity (Aldrich and Fiol, 1994; Rindova and Fombrun, 1999) where product definitions are missing or unclear (Hargadon and Douglas, 2001; Santos and Eisenhardt, 2009), and firms lack a dominant logic to guide actions (Kaplan and Tripsas, 2008; Porac, Ventresca and Mishina, 2002). Thus, firms will initially focus on legitimating a new market category by relating the nascent market to existing institutions and developing shared meanings, using tools such as cognitive framing and collective action (e.g. social movements) (Granqvist *et al*, 2012; Gurses and Ozcan, 2014; Hargadon and Douglas, 2001; Rindova and Fombrun, 1999; Sine and David, 2003). After a threshold of legitimacy is achieved, players focus more on differentiating their organization and carving a viable niche (Navis and Glynn, 2010) by comparing themselves with other producers in the market and finding a stable position where they can survive and thrive (White 2001, 2002).

Another stream of literature, focused on industry evolution and dominant designs (e.g. Suárez and Utterback, 1995) views new market emergence as starting with a technological discontinuity that creates a period of ferment, eventually converging on a dominant design related to the product architecture, followed by a longer period of incremental innovations in which firms try to differentiate themselves along standardized criteria (Murmann and Frenken, 2006). The product innovation choices that firms make in the market ferment period have been shown to be linked to their prior industry affiliation and to imitation of industry peers (Benner and Tripsas, 2012). Early resource commitments seem important to establish a dominant design, in particular in the presence of network externalities (Arthur, 1989). However, first movers may lose standard wars to competing firms that create stronger coalitions (Cusumano, Mylonadis and Rosenbloom, 1992)

Going beyond the legitimation and technological convergence issues, which have been widely addressed in prior literature, we argue that the definition and enactment of a market architecture is one of the most important elements of the market emergence process – more than just a technical design, the market architecture is the “blueprint” for the interaction patterns through which firms share the risk, cost and profit of the nascent market.

How does a nascent market’s architecture come about? Studies show that different architectures may be viable at the emergence of a market (Anderson and Tushman, 1990; Jacobides *et al*, 2006; Rosenkopf and Tushman, 1998) and that firms will attempt to shape the market architecture in a way that favors their own position and thus increases their power in the new market (Ferraro and Gurses, 2009; Gawer and Cusumano, 2002; Ozcan and Eisenhardt, 2009; Santos and Eisenhardt, 2009). A stream of studies shows how firms can orchestrate a new market and gain power in it by collecting other firms around a “platform” (Gawer and Cusumano, 2002), through pricing (Rochet and Tirole, 2003; Caillaud and Jullien, 2003; Hagiu, 2004), treatment of intellectual property (“open” or

“proprietary”), and providing platform development tools (West and Dedrick, 2000; West, 2003; see Gawer and Henderson, 2007 for details). Other work from economics considers how firms that dominate one market can tie or bundle products between markets to dominate a nascent market (Carlton and Waldman, 2002). In strategy literature, scholars find that firms can influence the architecture of a nascent market directly as they try to reduce key dependencies and gain power through alliances with, and acquisition of buyers, suppliers, rivals, and complementers (Garud *et al*, 2002; Khazam and Mowery, 1994). In a recent study, Ozcan and Eisenhardt (2009) showed that entrepreneurial firms can shape the architecture of a nascent market by establishing early alliances with prominent firms that have not yet entered the market. Similarly, Santos and Eisenhardt (2009) found that firms proactively shape nascent markets through “market demarcating alliances” with prominent firms and acquisition of potential competitors.

These research findings suggest that the determination of a new market architecture cannot be isolated from the industry context in which the market originates. The industry context influences the profile of the players involved in the new market (individuals, new firms or established firms), their cognitions and beliefs (Benner and Tripsas, 2012), as well as the dynamics of their interaction in determining the market architecture (Ozcan and Eisenhardt, 2009; Rosenkopf and Tushman, 1998; Santos and Eisenhardt, 2009; Tee and Gawer, 2009). In particular, we distinguish cases of market emergence within the boundaries of an existing industry versus at the convergence of industries, and argue that market emergence can be particularly challenging at the convergence of industries.

New markets may emerge within the boundaries of an existing industry, often through disintermediation (Jacobides, 2005). Markets are more likely to emerge if organizations can decouple the tasks in different stages of the value chain (Thompson, 1967; Jacobides, 2005). The computer software market emerging within the PC industry

(Baldwin and Clark, 2000; Gawer and Cusumano, 2002), or mortgage banking emerging within the banking industry (Jacobides, 2005) are examples of markets emerging through such task-decoupling within an industry. If decoupling is not possible due to high interdependence of activities, firms are forced to coordinate internally through regular meetings or identity-based mechanisms that market-based relations normally lack (Kogut and Zander, 1996; Langlois, 2003). Markets can also emerge within existing industries through the interaction of lead-users (Rosenkopf and Tushman, 1998; Franke and Shah, 2003). In this case, the market emerges from a community of end-users where innovation-related assistance and information is exchanged for free (e.g. software development, specialized sports equipment or medical devices).

In contrast to market emergence within the boundaries of an existing industry, where interactions happen mostly among players who have established roles and a history of interaction (Jacobides, 2005), markets may also emerge at the convergence of industries, requiring the collaboration of prominent players coming from distinct industries. Examples are the emergence of the Internet at the convergence of computing and telecommunications (Santos and Eisenhardt, 2009), or mobile gaming where game developers and network providers need to agree on a market architecture to offer the service (Ozcan and Eisenhardt, 2009). Markets that emerge at the convergence of industries are typically characterized by high levels of interdependence among different types of firms, which makes even those firms with market dominance in one area dependent on other market players for success (Eisenmann, Parker and Alstynne, 2006; Evans, 2003; Gawer and Cusumano 2002; 2008; Rochet and Tirole, 2003; Tee and Gawer 2009).

Existing research on interdependence and collaboration suggests that interdependence increases parties' commitment to the relationship and consequently their orientation toward collaborative behavior (Gulati and Sytch, 2007; Kelley, 1979; Mizruchi,

1989; Uzzi, 1996; Uzzi and Gillespie, 2002; Zaheer and Venkatraman, 1995). Yet, we argue that this process of cross-industry collaboration can be challenging for various reasons. First, at the convergence of industries, firms that need to collaborate to define a division of labor (i.e. who does what) and a value appropriation system (i.e. who receives what) may come from distinct industries with little or no track record of collaboration among them (Armstrong, 2006; Rochet and Tirole, 2006). Studies on interfirm negotiation and collaboration show that firms that have worked together before are better at developing mutual trust (Gulati, 1995; Gulati and Wang, 2003; Kogut, 1989; Park and Kim, 1997) and resolving conflict (Kale, Singh and Perlmutter, 2000; Simonin, 1997). Second, firms from distinct industries may approach the new market with different views on how to divide the roles based on their past experience within their industry (Benner and Tripsas, 2012). This process can be even more challenging when the nascent market is born global, i.e. the market architecture is determined through the interaction among prominent firms with global presence, as this may increase the perception of a high-stakes game among these firms and create difficulties in reaching an agreement.

These arguments suggest that the determination of the market's architecture is a challenging process that is under-researched for global nascent markets at the convergence of distinct industries. In order to improve our understanding of market emergence versus failure under these challenging circumstances, we ask: *how do prominent firms from distinct industries jointly attempt to define the architecture for a nascent global market?* In our research question, we specify the “global” nature of the emerging market to rule out cases where a market is first pioneered in one country or region and then spreads to other parts of the world through isomorphic processes (DiMaggio and Powell, 1983). We thus focus on cases that involve an active definition of the new market's architecture by prominent global firms.

METHODOLOGY

Given the gap in understanding the development of market architectures at the convergence of industries, we used an inductive theory building approach with an embedded design. We embedded the analysis of the process of market emergence at a global level with multiple cases that examine the process at the local (country) level. The global and local levels of analysis are important because a nascent market being created by prominent firms that operate across multiple countries requires interaction among these firms at both a global level to define the market architecture and at a local level to enact it. Understanding the interaction between these two levels of analysis is critical to get a grip on the market emergence process, particularly for markets that are conceived globally, i.e. established by coalitions of powerful firms with global coverage. In addition, the multiple case design enables the induction of more accurate, generalizable and robust theory than do single-case studies that yield elaborate but also idiosyncratic accounts (Yin, 1984; Eisenhardt, 1989).

Setting: Our research setting is the global market that was in the process of emergence around a new service called “mobile payments” (e.g., paying for purchases using a mobile phone). This setting is attractive for our research for several reasons. First, this nascent market is at the convergence of two established but distinct global industries, namely telecommunications and financial services. As explained earlier, interdependence between prominent firms from distinct industries may make it particularly challenging for firms to agree on a market architecture. In addition, this market is potentially complex, with many different types of firms involved from both the telecommunications and financial industries (e.g. mobile operators, handset makers, banks, and credit card companies), as well as merchants, software developers and hardware makers which provide an essential part of the service (see Figure 1). This makes interfirm collaboration crucial for the development and

commercialization of the service, enabling us to observe interfirm relationships in a setting in which they are particularly important for market emergence. Finally, this setting is appropriate for the study because we had the opportunity to observe the nascent market before it emerged and therefore observe in real-time the factors that play a key role in emergence versus failure. Following Van de Ven (1992), we started our process study before the outcome was known and observed in real-time as the process unfolded in its natural setting.

-----INSERT FIGURE 1 ABOUT HERE-----

We followed the development of the mobile payment market between mid 2006 and mid 2011. We tracked activities both at the global level as well as in various geographic country cases in three continents (North America, Europe and Asia). Table 1 summarizes the data sources and provides a list of the countries for which interviews and observations were conducted. These countries were selected based on evidence of high activity in mobile payments (with potentially different market architectures), which the researchers identified during their data collection for the global market analysis. Studying the same market in multiple countries allowed a replication logic in which we treated the cases as a series of experiments, each serving to confirm or deny inferences drawn from the others (Yin, 1984).

-----INSERT TABLE 1 ABOUT HERE-----

Data Sources: We collected data from several sources: (1) in-depth semi-structured interviews; (2) observations at industry events; and (3) archival data including business publications, Internet sources, and corporate materials (see Table 1). The triangulation of data from multiple sources strengthens the robustness of the findings (Eisenhardt, 1989).

We started data collection with an exploratory phase in 2005 where we searched archival sources (online journals, press releases, etc.) in order to identify the firms that were interested in the nascent market, as well as the key industry and market events where

these firms interacted. During this phase, we discovered that mobile payment services were on the radar of many global firms. In order to observe the emergence of the market in real time, we started attending key conferences and events where we made observations and conducted a large percentage of our interviews. These events included industry-specific conferences in wireless communications (e.g. GSMA Conference) and banking (e.g. Cards and Payments Summit), as well as events that were focused on the emerging market (e.g. Mobile Payments Conference). The events were typically attended by global as well as regional players. Global players included mobile operators such as Vodafone or Telefonica; banks and credit card companies such as Barclay's or Visa; technology providers such as Phillips or Sony; and merchants such as Mc Donald's or Marks & Spencer. Regional players included mobile operators such as NTT DoCoMo (Japan) or Turkcell (Turkey); banks such as Rabobank (Netherlands) or People's Bank of China. Executives from these global and regional players typically came face to face in the mobile payments track within a larger conference or the main track of a smaller conference. In these tracks, a typical agenda would include presentations by key executives and panel discussions, where executives from different firms discussed the current state of the market. A third type of session was a "break-out" or "round-table" session where executives from different firms discussed a narrower topic related to the market such as "Role of the SIM card for Mobile Payments" or "Ensuring Security in Mobile Transactions". We found the break-out sessions and the Q&A period following presentations and panels particularly fruitful for understanding the current state of the market, as these were occasions when practical and urgent issues were discussed in an unstaged manner. Overall, we collected over 100 pages of notes and 20 hours of audio recordings from the industry events described above.

We used the conferences and events described above as our initial contact for interviews. Between June 2006 and June 2011, we conducted 65 interviews with 40 informants (Table 1). Our informants included executives from firms that actively participated in industry events and various pilot or commercial projects in the market, as well as industry analysts, reporters, and trade association members. The informants varied in their location and involvement. While certain executives (e.g., executives at the Visa Corporation, GSM Association and Nokia) were involved in mobile payment at the global scale, others (e.g., French supermarket chains, Dutch banks) were focused on providing payment solutions in their country. The interviews ranged from 60 to 150 minutes in length and were divided into three sections. In the first section, we asked short-answer questions about the firm's background and strategy. In the second section, we asked informants to describe the major events in their involvement with the nascent market in an open-ended format. In the third section, we asked open-ended questions about the current state of the market and asked them to draw the market network at the global and/or local scale on paper. This interview structure enabled the collection of specific and factual information (e.g., dates, events, specific negotiations for pilots) as well as more open-ended narratives. We followed a similar structure with industry experts and reporters, but focused on descriptions of events that informants considered key in the development of the market. Interviews were tape-recorded and transcribed, most within 24 hours.

We addressed potential shortcomings of our data collection method in various ways. For instance, we only observed interactions during industry events and did not participate in any closed-door formal negotiations. We addressed this issue by obtaining information about such negotiations through "event-tracking" in our interviews, where we put the informants back in the time frame of the events, and guided them forward to produce a

step-by-step chronology of how such negotiations unfolded (Eisenhardt, 1989). Another potential shortcoming is informant bias, which we addressed in the following ways. First, we collected interview data in several waves over 60 months. This enabled both real-time and retrospective longitudinal data. This combination is ideal, with the retrospective data enabling efficient data collection of more observations (thus enabling stronger grounding) and real-time data mitigating retrospective bias (Leonard-Barton, 1990). Second, we used interview techniques (e.g., “courtroom” questioning, event tracking, non-directive questioning) that prior research has shown to yield accurate information from informants (Eisenhardt, 1989). We also pressed informants to be specific when they were vague (e.g., asked for details when an informant termed the interaction as “unsuccessful”). Third, we relied on informants at multiple levels of hierarchy (e.g., CEO and VP levels) and in different functional areas. These diverse lenses improve the likelihood of obtaining a more complete, accurate picture. Finally, we complemented our interviews with archival data (e.g. analyst reports, business journals and internal sources), and observational data from various industry conferences. While no method is perfect, these measures helped us mitigate potential biases, and capture more detailed and accurate accounts of the interaction between different players at the emergence of a new market.

Data Analysis: We began by writing a global case history, as well as several country-level case histories including interview, observational, and archival data (Yin, 1994; Eisenhardt, 1989). We triangulated the data, emphasizing themes supported by different data collection methods and confirmed by several informants (Jick, 1979). The cases were about 15 to 40 pages, including quotes and timelines. We then began analyzing the global case and the multiple country cases. From the emerging themes, we formed tentative relationships between constructs, which we refined by revisiting each case. This iteration

between theory and data helped sharpen theoretical relationships between constructs, and underlying theoretical arguments (Eisenhardt, 1989). Given our focus on the process of market emergence, we also tracked event sequences in both the global case and the country cases. As the theoretical frame clarified, we related it to the extant literature to strengthen the internal validity of findings, sharpen construct definitions, and raise the generalizability of the emergent theory. We then engaged in repeated iterations among data, literature and theory until we had a strong match between theory and data. The result is a mid-range theory of market non-emergence that we present next.

FINDINGS

The market for mobile payments, defined as the payment of products or services based on functionalities of mobile phones, was inspired by innovations introduced in Japan in 1999. Japan's leading mobile operator, NTT DoCoMo, introduced a portal-based mobile service (i-mode) that allowed subscribers to monitor their bank accounts via mobile Internet and make bank transfers via text messaging. The success of this primitive financial service raised expectations about the potential for mobile payment services worldwide (see Appendix 1 for global market estimates). Very soon, potential market entrants were defining their positions and forming lobby groups. In November 2001, large financial institutions, including American Express, MasterCard and Visa, founded the Mobile Payment Forum to promote mobile payments. On the telecommunications side, the concept was being discussed by mobile operators at their industry association - GSMA.

One complication for the definition of a market architecture was that two different technologies could be used to provide mobile payment services. The first one, readily available, was text messaging ("SMS"), where the consumer sends a payment request to their mobile operator via SMS. The merchant involved is then informed of the payment

success and releases the item. The price of the item is added to the phone bill of the consumer. This architecture did not directly involve banks and had legal limitations on the amount that could be transacted, being used mostly for micro-payments. The second technology was Near Field Communication (NFC), which consisted of a set of standards for smartphones and similar devices to establish radio communication with each other. NFC worked with the help of a chip inside the mobile phone, which communicated with a reader at the point of sale within 20 centimeters. The reader would then be connected with a financial platform for payments, usually controlled by banks or credit card issuers. In other words, users of a mobile phone equipped with an NFC chip could hold their phone against an NFC-tagged supermarket checkout to pay for groceries or a smart poster to buy concert tickets.

All informants agreed that NFC technology was superior to SMS for mobile payments in terms of the speed, reliability and convenience. A mobile industry analyst explained:

“SMS requires a longer waiting time and is less reliable. Messages sometimes get lost or arrive late, and the merchant may have to wait for a long time to receive the confirmation before releasing the purchase.”

NFC technology was of great interest to firms in the electronics and mobile handset industries since an NFC-centered architecture would require new handsets, readers, and chips. This led to an alliance among Philips, Nokia, and Sony to advocate NFC for mobile payments, which they formalized under the non-profit NFC Forum in 2004. Other firms (e.g., MasterCard, Visa, Microsoft, Motorola, Samsung) soon joined as well. Though formed in 2004, it wasn't until 2006 that the forum announced the first set of global specifications for NFC tagged devices and smart posters. As NFC specifications were being defined, heated discussions began among global firms around market architecture.

Efforts to Define the Market Architecture: The nature of making mobile payments using NFC technology required the involvement of firms from different industries (e.g.

handset manufacturers, mobile operators, banks, payment providers, hardware and software providers) (see Figure 1). Among these firms, banks and mobile operators were two types of firms whose cooperation was crucial for market emergence because the end-user needed to have access to their bank account through their mobile service. Mobile operators were dependent on banks for two reasons. First, without access to their customer's existing bank accounts, mobile operators could not provide this service as most end-users preferred to use their existing bank account instead of opening new accounts. In addition, mobile operators lacked financial licenses to handle purchases larger than approximately \$20 (exact amount varied by country). In turn, banks needed mobile operators because the user's bank information and the payment software needed to be integrated into the mobile service of the user, which was controlled by the mobile operator. If the interdependence were just between firm types, one easy way to resolve it would have been for a prominent bank (or mobile operator) to collaborate with a smaller mobile operator (or bank). But in this market, interdependence went beyond firm types - it was industry-wide as most users preferred to link their current bank and mobile accounts, rather than opening a new account with a smaller bank or mobile operator for the sake of using a new service. It thus required prominent firms to collaborate at the industry-level.

This high interdependence between prominent banks and mobile operators provided a challenge in the definition of the market architecture, in particular because these parties came from distinct industries where they usually played a dominant role. As the market architecture discussions began at global forums, disagreement quickly emerged amongst these companies in two specific areas: ownership of the end-customer and the responsibility for securing the transaction. Below we discuss these disagreements.

Disagreement #1: Who owns the customer? The first contentious issue was who would “own” the end-customer. Both types of firms were used to being the point of contact with

their customers, monitoring and affecting customer behavior directly. Interviews showed that both parties were aware of their power within their industry and believed that the situation should be no different in the new market. A bank executive stated:

“Nobody is gonna take AT&T seriously if they start offering bank accounts. Customers will only believe this is legit if their bank, whom they trust, is in on it.”

A mobile operator executive, in turn, expressed their relative power as follows:

“The phone is now your computer, your car key, your remote control, and soon it’s gonna be your credit card, too. Our investment and leadership is crucial in making this happen.”

The question of who would own the end-customer arose early on, during the technical design of the NFC-mobile phone. Two possibilities existed for installing the NFC chip inside the phone. One was to place it inside the SIM card, which would give the SIM card provider, i.e. the mobile operator, a central role in the market architecture as it entailed the usage of the SIM card for storing financial data, as well as for including security elements. In other words, the mobile payment service would flow entirely through the mobile operator. A mobile operator executive said: *“This makes us the landlord of the NFC chip”*.

Banks had a lot to lose from this first option. A financial consultant explained:

“The financial industry is in a defensive position against this proposal. Until now, they owned their customer and whatever payments the customer was making. They have a lot to lose from sharing their card payment business with other players because cards are not just a source of revenue, but also a way to create loyalty and an opportunity to cross-sell products and services. So banks are not excited about opening their business to MNO’s”.

The second option involved the placement of the chip outside the SIM card. This would allow the financial institution to negotiate the relationship with the handset manufacturer directly and to continue to own the responsibility over financial transactions.

For banks, this also meant higher visibility. A bank executive explained:

“For banks, it’s important that every time you open your wallet, you see our logo on the card. With phones, this is a problem because carriers do not want to allow banks to brand themselves in the main screen of the phone. They are saying: “We will not allow the phone to look like a Nascar (with multiple vendor logos!)””

Interviews show that, similarly to banks, handset manufacturers also preferred the second option of having the NFC chip outside the SIM card because it gave them a greater role in the installation of the chip inside the phone, thus requiring a new wave of phones. The other players in the business ecosystem (e.g. merchants, point of sale hardware and payment software providers) were mostly indifferent about this decision.

From the first NFC Forum meetings in 2004 onwards, discussions continued on which architecture to implement. While mobile operators used the GSM Association to advance their preferences for the first option, banks used the Mobile Payment Forum to push for the second. Working with technology providers who were members of the NFC Forum (e.g., Gemalto, Nokia, Phillips NXP and Sony), mobile operators evaluated different ways of creating a SIM-based NFC technology. These discussions led to a delay of almost three years in defining the market architecture. Finally, in February 2007, a white paper, published by the GSMA, made an official recommendation that the NFC chip be planted *next to the* SIM card, with direct communication with the SIM. This model did not place the NFC chip inside the SIM card, but still gave control of the chip to the SIM and required a new wave of NFC-enabled phones, thus pleasing the handset manufacturers. The communication between the chip and the SIM would be enabled by a wire, thus the technology was called the “Single Wire Protocol” (SWP). The GSMA Association then sent this protocol to the European Telecommunications Standards Institute (ETSI) for standardization. An industry analyst explained the significance of this event:

“Other players in the industry all were members of different consortia, but they could not organize themselves like the GSMA to push their preferences forward. Those guys got it together and rushed to ETSI to fight their corner”.

At that time, a mobile operator executive explained their effort as follows:

“We have a long history of industry leadership and experience in bringing the latest and most innovative solutions to our mobile customers. We pride ourselves in being able to coordinate our partners in a harmony to orchestrate our customer solutions. With NFC, we have shown another example of such industry leadership to enable a new service.”

Banks were not supportive of this proposed market architecture, which they feared would give dominance to the mobile operators. At an industry conference at that time, a global bank executive publicly stated, *“Knowing and understanding our customer is always our number one priority. Doing business in any other way is unimaginable for us!”* while in an interview, the same individual stated: *“What they’re presenting is basically the same face, just with a different make-up.”* An industry analyst explained:

“Banks are approaching NFC from a defensive position, suspicious that mobile operators are seeking to cut in on their relationships with credit and debit card customers. They fear that in some cases, the telcos will try to snatch away the business for low-value payments now conducted in cash”.

Not deterred by the lack of support from banks, the GSM Association initiated the Pay-Buy-Mobile Program, which consisted of a set of trials using the single wire protocol. They made an official call for handset makers to join this program to *“avoid fragmenting the market”*. Handset manufacturers responded, but only slowly as they were not sure of the NFC’s market potential without the support of the banks. A handset executive explained: *“I wish that [banks and operators] could finally collaborate ‘cause then I would know that I am going to sell phones”*. The first NFC-enabled phone, Nokia 6212, was introduced globally in 2008 with a separate chip next to the SIM card in the phone. The first Nokia SWP phone was announced in April 2009 but Nokia continuously delayed its launch until it cancelled it in February 2010, citing the *“lack of support of the business ecosystem around NFC”*. Overall, almost ten years after the first discussions on mobile payments began, and five years after the technology became ready for deployment, the key players had not yet agreed on a market architecture due to disagreements on who would control the customer relationship.

Disagreement # 2: Who deals with transaction security? Disagreements also emerged between banks and mobile operators about security. While mobile operators preferred to use their existing security platform for NFC transactions, banks were used to security modules with a higher level of certification. An industry analyst explained:

“The big debate is really on the technical architecture. Banks want to enforce their high security measures, and mobile operators are resisting. Should [they] remove the certification constraints and use the SIM as it is, or should they push for a certified SIM?”

In the industry events we attended, the main argument pushed forward by banks was one of ensuring security. For instance, a bank VP explained: *“Our security preferences imply a set of logistical issues that the mobile operators are not prepared to deal with”*. Many informants outside of the banking industry, however, stated that part of banks’ resistance was “psychological”, i.e., they wanted to remain in control of the security issues. A mobile executive commented: *“Banks like to have control and thus face emotional problems putting applications on the neck of a telco”*. An analyst added:

“Banks have a hard time letting go. They are willing to settle for solutions where there is a separate security element in the handsets, but the governance of that security element is a big issue for them”.

A bank VP revealed that the problem might have been more than security indeed:

“We have worked with many merchants and technology providers in the past, all to the satisfaction of our customers. The key to doing this is applying the same level of scrutiny to every single service and treating it our own at every step”.

Unable to decide on the right level of security and who should be responsible for handling security issues, the parties continued the debates. In 2007, the same GSMA white paper that proposed the Single Wire Protocol also suggested bringing in a trusted third party to solve the security issue. A GSMA executive explained:

“A TSM (total service manager) is a trusted third party to act across service providers (banks, credit card providers, and operators) and to distribute and manage NFC services to operators’ customer base. This role can be performed by an operator as well, but it would probably be better with an independent third party that all parties can agree on”.

An analyst explained the role of the TSM from a different point of view:

“The bank doesn’t trust the operator; the operator doesn’t let the bank handle security. And neither the operator nor the bank can be the front desk for NFC because they would not accept each other, so a TSM could be the front / help desk”.

In the NFC conferences in 2007, GSMA’s proposal to invite a third party between banks and operators received positive feedback. Other parties were happy to finally have a

solution. A technology provider commented: *“I am relieved to see that [banks and operators] are finally agreeing on something. We’ve been waiting for this for years!”* But now, another difficult question arose: who would play the TSM role? It was important to both parties that the TSM would be “impartial”. An analyst explained: *“There needs to be a neutral platform where both telcos and banks have all their interests covered”*. From late 2007 on, key executives from banks and operators discussed the definition of the TSM role and the best candidates for it. First, they listened to presentations by various firms volunteering for the role, including prominent hardware and software providers, like Philips and Gemalto, and entrepreneurial ones, like CCV Holland and E-wallet. Follow-up interviews revealed that banks and operators were unable to agree on a neutral firm, and moved on to discussing the possibility of having a group of TSM’s. By late 2010, the parties had still not agreed. A handset manufacturer explained:

“I think the telcos and the banks are looking at this totally differently from the current ways of doing business...The market could develop faster if the banks and telcos just quit fussing about it and roll it out.”

In summary, we found that firms ran into two challenges in the development of the market architecture. First, banks and mobile operators could not agree on the architecture of the application, as putting the NFC chip inside (or outside) the SIM card gave power to the mobile operators (or to the banks), respectively. GSMA’s suggestion of a separate, but SIM-controlled chip gained acceptance from the players in the NFC Forum because it served their interests. But it faced resistance and mistrust from banks because it gave more power to the mobile operators. This difficulty was compounded with the discussion around security. Overall, mobile operators and banks could not successfully resolve their interdependency. Ironically, this forced compromises with third parties (handset manufacturers), which led to a proposed market architecture with even stronger interdependence amongst various players in a context of lower trust.

Our analysis thus suggests that when prominent players become interdependent for the development of a new market, they may fail to agree on a market architecture despite the considerable promise of the market and the availability of technical solutions. Our data suggest that this is more likely to occur if the firms come from distinct industries and have a history of dominance in their respective industry.

First, when firms from distinct industries become interdependent in a new market, their limited joint working experience causes them to be uninformed about their counterpart’s profile and approach to interfirm collaboration, which in turn becomes an obstacle in building mutual trust. We observed this mechanism particularly in the second disagreement described above. When it came to deciding who should handle transaction security, both parties faced difficulties trusting one another to handle this crucial matter.

Second, their history of dominance gives prominent firms a tendency to assume a position of high power and insist on dictating the market architecture. This interdependence between *prominent* firms from distinct industries became problematic as these were powerful firms with a history of dominance in their industry (see Table 2 for data on firm capitalization and market share ranking). Based on this history, both mobile operators and banks believed they had higher relative power in the relationship, just like they did in in their respective industries (see Table 3 for supporting quotes).

-----INSERT TABLE 2 ABOUT HERE-----

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This discrepancy in parties’ assessment of their relative power (a.k.a. “uncommon priors” in bargaining literature, Yildiz, 2003) led them to take a hard negotiation stand and fail to collaborate. Thus, we posit that when firms become interdependent at the convergence of distinct industries, their history of dominance and limited joint working experience can prevent the definition of a new market architecture.

Proposition 1: *Firms from distinct industries that become interdependent in a nascent global market have a lower likelihood of agreeing on a market architecture if they have a history of dominance in their respective industries.*

These disagreements had severe consequences for the emergence of the global market for mobile payments, as we explain in the next section.

Consequences of Disagreements on Global Market Architecture: By mid 2011, although the NFC technology had been available since 2004, and high customer interest in mobile NFC was documented globally (see Appendix 2 for supporting evidence), there was no large-scale commercialization of mobile payments at a global level. What dynamics of the market emergence process explain this outcome? We found that the continued disagreement of banks and mobile operators about the architecture for the nascent market made these prominent firms refrain from committing sizable resources to the nascent market. It also generated a vicious cycle of resource allocation deferment: the lack of willingness of the main parties to commit financial and human resources to developing and promoting mobile NFC products caused other players to also refrain from committing resources. For example, handset manufacturers decided not to start mass production of their NFC-capable handsets nor develop new ones until the market architecture was in place and agreed by both telcos and banks. In 2008, a handset executive confessed: *“Cell phone makers have been conservative about integrating NFC into handsets to date, given the uncertainties around the consumer application.”* In 2009, Nokia cancelled the development of the Nokia 6216, its first NFC single-wire protocol phone.

A 2009 industry report illustrated the disappointment in the market as follows:

“When NFC first emerged as a technology for mobile handsets in 2003, the ability to address extremely broad end-user markets with a simple end user interface was immediately recognized as a significant potential. But despite many trials involving many companies from multiple industries, only one NFC handset is commercially available.”

In 2010, the market players became hopeful again with the news that Apple would include an NFC chip in the iPhone 5, due in 2011. However, this hope was short-lived as Apple announced in mid 2011 that “the lack of a clear industry standard” dissuaded the company from launching NFC payments. Indeed, Apple’s iPhone 5, launched in the fall of 2012, was not NFC-compatible. The lack of investments in handsets in turn halted investments by other players. For example, large merchants postponed investments in the NFC architecture until they had large-scale commercialization prospect in sight.

Ironically, the (Single-Wire Protocol–SWP) market architecture that the telecom operators had proposed was designed with the goal of eliciting support from third party players, such as handset markets, electronic companies and merchants. It would make them indispensable to the architecture of the new market, thus giving them an opportunity to profit from the growth of the market. In reality, this dependence created a vicious cycle - mobile operators and banks became even less likely to agree on a market architecture due to what they perceived as lack of commitment from third parties. In turn, the longer mobile operators and banks delayed commercial projects of NFC mobile payment due to the lack of phones and terminals, the lower the handset-manufacturers and merchants put NFC devices on their priority list. We find that this vicious cycle of resource allocation prevented the emergence of the global market for mobile payments.

Proposition 2: *The higher the interdependence among players in the architecture for a nascent market, the more likely it is for disagreements among them to generate a vicious cycle of resource allocation deferment that prevents global market emergence.*

Consequences of Resource Allocation Deferment Amongst Global Market Players:

The vicious cycle of resource allocation deferment at the global level brought on two different responses from potential market players. The first was to attempt commercialization locally by seeking agreement among country-level players. The second

response was to abandon the NFC-centered market architecture completely and develop industry-centric alternatives. We found evidence for both types of responses around the world, and sometimes within the same country.

A) Local Players' Efforts to Commercialize NFC: The blockage in the global NFC mobile market, as described above, did not entirely prevent local market activity. Local players attempted commercialization by countering the two main issues preventing market emergence: interdependence of prominent players and the vicious cycle of resource allocation deferment. Given the interdependence between mobile operators and banks, acquisitions started to happen in some countries as prominent local mobile operators internalized the interdependence by acquiring banks to launch this service on their own (Table 4). We did not observe banks acquiring operators, as it was much more difficult for banks to replicate the operators' value chain, which had significant economies of scale.

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An example where the mobile operator recognized and solved the interdependence early on is Japan, where the dominant mobile operator, NTT DoCoMo, acquired in early 2005 a 34% share in Japan's second largest credit card provider, Sumitomo Mitsui. NTT DoCoMo then broke the vicious cycle of resource allocation deferment by taking a leadership position in building the technical infrastructure and market architecture. It first formed an alliance with Sony for a specialized NFC chip called FeliCa, and then another alliance with Japanese phone manufacturer Fujitsu for mobile phones compatible with the FeliCa chip. In late 2005, NTT DoCoMo and Sumitomo Mitsui launched a mobile credit card (ID Card). NTT DoCoMo also formed partnerships with McDonalds, department stores, and other merchants to diffuse the service all over Japan. In 2006, other Japanese mobile operators licensed the service from Sony and NTT DoCoMo, thus avoiding coalition wars. By mid 2010, Japan was the largest market in the world for NFC-based

mobile payments, with Fujitsu FeliCa phones reaching over 25% market share. But this number fell to 18% in 2011 with iPhone 4 taking the lead in handset sales.

The deployment of mobile payment services through internalization of the interdependence was emulated in other countries. In South Korea it also occurred through an acquisition - leading operator SK Telecom purchased a 49% stake in card issuer Hana in late 2009 and immediately launched the Hana SK mobile credit card with the Nokia 6212 NFC phone. However, Nokia discontinued this phone in 2010 and offered no replacement. SK responded by imitating NTT DoCommo and launching a market-specific NFC phone with Samsung. However, like in Japan, the success of this phone was curtailed by the fast growth of smartphone sales. A local analyst in South Korea explained: *“How many people would skip a smartphone purchase for a simple candy bar phone for the sake of NFC?”*

In Austria, the dominant mobile operator, Mobilkom Austria, already owned a bank (A1). In 2009, this operator launched a plastic Visa card that was linked to users' mobile account. Soon after, the operator announced intentions to embed the A1 Visa Card inside the mobile phone. However, by mid 2011 the service had not yet been launched. Similarly, in China, China Mobile acquired in June 2010 shares in a bank (SPD). In January 2011, the parties announced their intention to develop mobile wallet services. Yet, the service had not been launched as of mid 2011, when we stopped data collection.

In Malaysia, Visa brought together a local mobile operator and bank to commercialize NFC. The effort was successful and Malaysia became in 2009 the 2nd country in the world to launch a full NFC service, based on the Nokia 6212 handset. The cancellation of the phone in 2010 hindered further progress as no other NFC enabled phones were available.

As evident in the country cases above, prominent mobile operators solved their dependence on financial institutions by acquiring shares in a bank or credit card company and investing to build the market. Our data thus suggest that successful market emergence

at a local level requires both the internalization of interdependence and a strong resource commitment from a prominent firm to build a coalition of support for the local market.

Proposition 3: *Market emergence at a local level based on an architecture that is blocked at the global level depends on the ability of a prominent firm to make strong resource commitments and internalize the key interdependences.*

Among the country cases, Japan is noteworthy for its high market growth, primarily due to NTT DoCoMo's strong resource commitment and ability to organize the market. We believe that this ability may be partially due to the corporate structure in Japan where a structure of corporate cross-shareholdings makes it easier for one firm to organize the market architecture around itself (Dyer, 1996). In particular, NTT DoCoMo is part of the Nippon keiretsu, which placed the company in an advantageous position both for the purchase of shares in Japan's second largest credit card provider, Sumitomo Mitsui, as well as for reaching partnership agreements with Sony and Fujitsu. Similar types of cross-shareholding structures exist in South Korea and Malaysia, which are the only other countries that launched NFC mobile payments commercially.

It is also noteworthy that while local markets did emerge, the lack of globally available NFC phones was a serious shortcoming for the growth of these markets. Even in countries where the market emerged due to custom-made phones for the local market (e.g. Japan, South Korea), these phones had difficulty competing with the newest global smartphones that did not support NFC. Thus, the adoption of mobile payments remained comparatively low. Overall, our findings suggest that market solutions enabling local commercialization face growth challenges due to the resource allocation deferment at the global level. This effect is compounded by the global alternative solutions emerging within the anchor industries, which slow down the adoption of local market solutions.

Proposition 4: *Following the non-emergence of a global market at the convergence of industries, growth of local market solutions will be weaker the more the local market architecture competes with the global industries from which it converges.*

Finally, our data also revealed that local NFC initiatives that were promoted by players from outside the converging industries did not succeed. In the Netherlands, an entrepreneurial player, Payter, organized a pilot for mobile payments in 2007. After the successful pilot, however, it was forced to stop the efforts due to low resource commitment from prominent players. In Singapore, the government tried to organize the industry and establish a TSM to address the security concerns. However, despite the power of the Singaporean government, the plans were delayed due to lack of market infrastructure. The lack of commitment of prominent industry players to the NFC market architecture prevented the market from emerging and led to a search for alternative architectures.

B) Global Players' Search for Alternative Market Architectures: As the global NFC mobile market failed to emerge at the convergence of industries, different players tried to deliver mobile payments by devising an alternative architecture within their industry. We found evidence for different market architectures, each centered on a distinct type of player: banks, mobile operators, merchants and entrepreneurial firms. These architectures greatly lowered the interdependence among players and facilitated the emergence of alternative services for mobile payments. Table 5 provides a summary.

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Banks' Proposed Market Architecture - NFC Plastic Card: For banks, the easiest service they could offer without the mobile operators' involvement was the NFC plastic card. In 2007, Wells Fargo Bank issued the NFC plastic credit card in the US. Many American banks followed. In 2009, there were over 80 million contactless cards issued. Visa and MasterCard pioneered these wireless payment systems, and installed over 500,000 card readers in over 40,000 merchants. An executive from an NFC chip provider explained that the value proposition of this service was not as compelling as the NFC mobile architecture and that, for banks, this had always been the back-up option:

“Instead of signing the paper, you put your credit card close to the reader. It saves a bit of time in payments, but whether it is worth the effort is not clear...”

A bank executive explained: *“This is just something we do for our customers while we wait for NFC mobile to happen”*.

Operators’ Proposed Market Architecture - SMS Payments: While banks invested in NFC plastic cards, mobile operators found SMS payments to be a feasible solution that did not rely on the financial license from a bank. This technology was inferior to NFC in reliability, security, and speed. In addition, without a financial license, operators could only authorize purchases up to \$20 per month (exact number varied by country). However, many operators viewed this as a way of getting customers started in mobile payments. An executive explained: *“What are you going to do, wait around to see if there is agreement? We are trying to use the time to get started on mobile payment services already”*.

Thus, from 2007 onwards, several European and US operators (e.g. Sprint, Verizon, Vodafone, Telefonica, T-Mobile) launched SMS payment services. However, their desire to play the dominant role resurfaced when they collectively decided to take 40% revenue share from these services. An analyst explained:

“The high revenue-share percentages of carriers severely limit both the size of the market and the consumer adoption. Because only merchants with zero cost of goods can afford to pay such high fees, mobile payments today are limited to industries like online gaming and social networking.”

At the end of 2010, several of these operators announced plans to reduce their margin significantly to help increase SMS sales of physical goods. However, the margins had not been reduced as of mid 2011 when we stopped data collection.

Merchants’ Proposed Market Architecture - 2D Bar Codes: As banks and telecoms started deploying intra-industry solutions that were under their control, merchants started investing in their own solutions as well. In the US, coffee maker Starbucks initiated a 2D barcode service, where customers first downloaded a mobile application onto their phone

that produced and read barcodes, and then could make a payment by putting their phone on a scanner in the store. Starbucks first introduced this service in Seattle and Silicon Valley in 2009. In 2011, they rolled it out to all the 6,800 US stores and 1,000 concessions in Target stores. An industry analyst explained the merchants' point of view on 2D barcodes:

“NFC has been struggling for meaningful deployment for more than a few years and I think the time has passed. Merchants have embraced bar code technology where they can be in control of their own destiny and leverage it for other purposes.”

Entrepreneurs' Proposed Market Architecture - NFC Stickers: One of the simplest (and least durable) ways to bring NFC technology to mobile phones was to place an NFC sticker physically on the back of the phone. In the US, an entrepreneurial company, Twinlinx, created such a sticker - MyMax. In 2010, another entrepreneurial mobile payment service, Blaze Mastercard, gave users accounts to make mobile payments through an NFC sticker. We observed NFC stickers in other countries as well. In 2011, an entrepreneurial firm in Japan teamed up with mobile operator Softbank to introduce NFC stickers to attach to the iPhone 4. Around the same time, an entrepreneurial NFC sticker provider in the Netherlands, Multicard, formed an alliance with Rabobank and placed NFC stickers on ordinary phones. As it is apparent from these examples, the NFC sticker solution was initiated by various parties to overcome the worldwide lack of NFC-capable phones. Most informants we interviewed questioned the durability of this solution. A mobile operator executive wondered: *“How many people would actually put a sticker on the back of their phone and how long is that sticker going to last against all the rubbing?”*

To summarize, we observed that the longer the prominent firms from different industries disagreed on a global market architecture, the more each party invested in alternative market architectures to eliminate their dependence on players from the other industries. These market architectures enabled leading players to start an alternative market for mobile payments within their own industry without waiting for everyone to agree.

Proposition 5: *In nascent global markets at the convergence of industries, the longer the disagreement on a global market architecture, the more likely it is for firms to invest in alternative architectures within their own industry.*

Interestingly, the most successful commercialization cases for mobile payments occurred in developing countries through an SMS architecture driven by mobile operators. These local markets emerged because the banking system was very weak in these countries and many users had mobile phones but no bank accounts. Thus, interdependence between banks and mobile operators was not an issue. For example, M-PESA was launched in 2007 by Vodafone's subsidiary Safaricom in Kenya. It allows users to transfer money between mobile phones without a bank account. They simply open an account with Safaricom and bring cash to one of the 19,000 authorized M-PESA agents (typically small shopkeepers) who will credit the account and also allow withdrawals. M-PESA grew quickly, capturing 6.5 million subscribers by May 2009. It had over 14 million subscribers and transfers worth 15% of Kenya's monthly GDP by mid 2011. In 2010 and 2011, M-Pesa was also launched in Tanzania and South Africa by Vodacom, another subsidiary of Vodafone. This example shows that without the problem of interdependence among prominent firms from distinct industries, the market for mobile payments could have developed globally.

DISCUSSION

In this paper we explore *how prominent firms from distinct industries jointly attempt to define the architecture for a nascent global market*. Our theoretical framework shows how market emergence at the convergence of distinct industries may be blocked globally, despite the readiness of technology and proven consumer interest. This happens when interdependent players who are dominant in their respective industries are unable to agree on an architecture for the new market. This framework is summarized in Figure 2.

-----INSERT FIGURE 2 ABOUT HERE-----

Our in-depth field study shows that market emergence may be prevented due to a negative feedback loop of disagreements among potential market entrants from distinct industries, leading to other firms delaying investments. The resulting lack of market infrastructure in turn leads to lower willingness for key players to come to an agreement. This vicious cycle of “waiting around” leads to further delays and market failure. Thus, our study sheds light on the darker side of market creation and identifies conditions under which interaction among key players may inhibit the emergence of new markets.

Interestingly, the vicious cycle of resource allocation deferment that we identify is the opposite of the resource commitment process that happens in coalition wars for the establishment of a dominant design (Cusumano *et al*, 1992). In a coalition war, leading firms in different industries band together to promote a market architecture under their control, being sometimes opposed by another inter-industry coalition with an alternative architecture. Examples are Game Console Wars or the more recent iPhone vs. Android wars. This type of coalition war generally leads to a massive resource commitment process, as each coalition tries to establish its architecture as the dominant design. In industry turf wars, as the one we describe in this paper, the opposite seems to happen, with an intra-industry coalition opposing a similar coalition from another industry, whereas the new market can only emerge when they collaborate. These intra-industry coalitions may be motivated by the tendency of firms to imitate their peers in situations of ambiguity (White, 2001; Benner and Tripsas, 2012). The vicious cycle created by industry turf wars is an intriguing result that deserves further study and theorizing.

A key contribution of our work is to theories of power. Work in resource dependence theory focuses on firm-level strategies to gain control over the environment (Pfeffer & Salancik, 1978; Galaskiewicz, 1985; Miner *et al*, 1990) and suggests that interdependence increases parties’ orientation toward collaboration and conflict resolution (Gulati and

Sytch, 2007; Kelley, 1979; Mizruchi, 1989; Uzzi, 1996; Uzzi and Gillespie, 2002; Zaheer and Venkatraman, 1995). Our paper extends current theories of power to nascent global markets at the convergence of distinct industries. First, we show how, in such markets, interdependence requires prominent global firms from each industry to collaborate. In our case, the majority of consumers preferred to link their existing bank account and mobile service rather than opening a new account with a smaller bank or mobile operator for the new service. This created a situation of interdependence where each party needed not only a counterpart from the other industry, but a prominent one that could bring industry-level resources. This two-layered interdependence we observe emphasizes the importance of disentangling the notion of interdependence, as previously attempted by a few scholars (e.g. Casciaro and Piskorski, 2005; Gulati and Sytch, 2007). Second, we show that despite strong interdependence in the creation of the new market, prominent firms did not adopt the common logic of resource dependence to collaborate. Instead, they insisted on solely dominating the nascent market, which caused unsolvable disagreements and prevented market emergence. Several of our informants described this as “irrational” and “emotional”, suggesting the absence of cooperative behavior that resource dependence theory predicts. We suggest that a key factor causing this lack of cooperation was firms’ prior experience in owning the customer relationship, which they perceived as key to dominance in their traditional industry and were therefore unwilling to share. Overall, this finding contributes to theories of resource dependence by introducing parties’ past experience with asymmetric power relationships as a moderator to their ability to recognize and collaborate in situations of power symmetry.

Our multi-level qualitative approach also helps us contribute to market emergence literature by differentiating between global and local emergence and exploring the interaction between the two levels. First, we find that local players that tried to create the

market found themselves in competition with global players who had abandoned this market and were investing in alternative architectures. This finding brings the economics argument of scale advantage of global competitors (Levitt, 1983) back to the table to explain why local markets may not succeed in the face of disagreement among global players. It also shows the mechanisms through which powerful firms can become a roadblock to the reconstitution of market categories (Lounsbury and Rao, 2004). Second, by following global firms after their abandonment of the nascent market at the convergence of industries, we provide a more complete picture of how the markets that get subsequently formed based on intra-industry architectures interact with the development of the nascent market of focus. This raises the issue that market categories can be studied at multiple levels and suggests a deeper focus on the hierarchical structure of cognitions in an industry, as well as a stronger link between cognitions and power in market emergence processes (Porac, Thomas and Baden-Fuller, 2011).

This study also contributes to literature on entrepreneurship and market emergence. Our story is particularly intriguing compared to previous studies where entrepreneurial firms brought prominent players together for the creation of a new market (Ozcan and Eisenhardt, 2009; Santos and Eisenhardt, 2009). In these studies, the market players faced high ambiguity regarding the potential size of the market, which a third (entrepreneurial) party resolved by bringing prominent parties to commit resources into a specific market architecture. In contrast, the potential size of the nascent market in this study was already perceived to be very large, so prominent firms viewed their interaction with counterparts from other industries as high-stake, and insisted on a market architecture that favored their position. This difference in the perception and behavior of prominent firms made it difficult for entrepreneurial firms to play a key role in catalyzing market emergence. Ironically, this paper thus suggests that at the convergence of industries, strong legitimacy

and high-level of expectations for a nascent market may actually provoke non-emergence because prominent firms mainly focus on value capture and wish to become the bottleneck in the new market (Jacobides *et al*, 2006). When multiple prominent firms strive for this dominant position, it leads to conflicts on market architecture and to resource allocation deferment. This insight suggests that it may be difficult for promising markets to emerge at the convergence of industries, particularly when the stakes seem high, which creates an opportunity for entrepreneurial actors to be successful in opening niche markets that appear less promising, and are thus less threatening to the prominent firms (Santos and Eisenhardt, 2009). Our study thus addresses the call for more studies of markets that do not emerge (Navis and Glynn, 2010) and offers a novel explanation for the difficulty of prominent firms in innovating and opening new markets at the convergence of industries.

Finally, our findings on the disagreement between prominent firms show parallels to studies of bargaining in economic literature. The topic of “uncommon priors” (i.e. different beliefs about relative bargaining power, Yildiz, 2003) is a relatively underexplored topic in economics. In this study, we illustrate such a case where both bargaining parties believed that they had more power than their counterpart and could therefore impose complete ownership of the customer relationship in the new market. We show that this difference led to significant delays in the discussions and finally resulted in inferior market architectures dominating the market. Our findings confirm earlier predictions by Yildiz (2003) and Ali (2006) that “uncommon priors between bargaining parties may lead to delays in reaching an agreement”. We extend their predictions to the setting of market emergence and provide evidence for both the reasons and consequences of bargaining failure in the face of differing perceptions of relative bargaining power. In particular, we show that delays in reaching agreement can ultimately lead to complete breakdown of the market as firms “give up” and increase their investment in alternative market architectures.

Overall, we contribute to a deeper understanding of market non-emergence at the convergence of industries. The process we describe resonates with Van de Ven's dialectic theories, where individuals and organizations "exist in a pluralistic world of colliding events, forces, or contradictory values, which compete with each other for domination and control" (Van de Ven, 1992: 178). In our story, bank and telecom executives operate in a world of cognitive biases and competing logics. On the one hand, they find themselves dependent on other prominent firms to be successful in a new market. On the other hand, they still operate in their own industry, where they have a long history of dominance and an established way of doing things. We find that in this context, the logic of dominance, which the executives have been following within their industry, wins, causing executives to move away from the cooperative behavior that they could have gained much from.

CONCLUSION

This study contributes to our understanding of why markets may be delayed or fail to emerge at the convergence of industries. Our results show that firms from distinct industries have difficulty in reaching an agreement to launch a new market due to a history of dominance in their own industry and lack of joint collaboration experience. This lack of agreement in turns leads to a weak compromise on market architecture with unresolved interdependence. This creates a vicious cycle where other players hold off investments in market infrastructure and, in turn, the disagreeing parties lose incentive to work on an agreement because the market is not taking off. The nascent market is thus less likely to emerge despite country-level attempts at resolving these issues. It should be noted that while our findings are generalizable to nascent markets at the convergence of industries, our analysis is based on a single market. We advocate further studies on markets at the crossroads of industries to validate our findings and their generalizability.

In terms of contributions to practice, this study offers valuable insights for both executives and policy makers. For executives, this study is a stark reminder that defensive negotiating positions in interconnected worlds are likely to lead to market non-emergence and result in outcomes that serve no one. The challenge for prominent firms is to refrain from attempts to solely dominate the market and, instead, generate a mutually beneficial vision, as well as trust and clear roles in the ecosystem, allowing other prominent firms to co-create the market. For policy makers, these findings serve as a reminder that new markets can fail to emerge, despite the abundance of resources available from potential market entrants from adjacent industries, if these entrants start an inter-industry turf war. To ensure that new markets emerge at the convergence of industries, policy makers may be faced with the difficult decision of having to pick winners and thus allow dominance by one type of firm in the new market. An alternative to this would be to encourage market emergence by promoting an entrepreneurial environment where start-up firms can serve as bridges and connectors among prominent players from different industries. However, this approach is more likely to work in small niche markets rather than in large potential markets that prominent firms perceive as a high-stakes game.

We conclude with the note that understanding reasons for market non-emergence is just as important as studying market emergence. We posit that market non-emergence can be a story of too much power. During our data collection, an industry analyst once said: *“The failure of NFC to meet earlier expectations was not a technology issue but one of failed negotiations. This failure should be an embarrassment for all [parties] involved”*. Our findings are a step forward in identifying potential markets that are lost due to turf wars among prominent firms from different industries.

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Appendix 1: Estimations and Quotes about the Size of the Mobile Payment Market

Market Size Estimations for 2002-2009:

- “The size of the mobile payment market will grow to nearly 55 billion Euros in 2006 in Europe” (Mobile Payments report by Wireless World Forum, 2002).
- “In 2007, mobile payments will be \$ 5.5 billion market worldwide” (Yahoo News, 2004).
- “Mobile payments will exceed \$43 billion by 2009” (Juniper Research, 2006).

Market Size Estimations for 2010-2015:

- “We estimate total market for mobile payment growing to \$15.9 billion in 2011” (Juniper Research, 2008).
- “Worldwide market for mobile payments will grow to \$633.4 billion by 2012” (Generator Research 2008).
- “By 2013, M-payments will grow to \$15.3 billion worldwide” (IEMR, 2010)

Other Estimations for 2010-2015:

- “800 Million NFC chips will be shipped by 2015” (ABI Research, 2007).
- “785 Million NFC chips will be shipped by 2015” (IMS, 2009).
- “When NFC first emerged as a technology for mobile handsets in 2003, the ability to address extremely broad end-user markets with a simple end user interface was immediately recognized as a significant potential. But despite many trials involving many companies from multiple industries, only one NFC handset is commercially available” (Juniper Research, 2009).
- “300 Million NFC chips will be shipped by 2015” (ABI Research, 2010).
- “NFC has developed more slowly than anticipated, and will not offer viable solutions for at least six years” (ABI Research, 2010).
- “The NFC market has encountered a number of false dawns since its inception over six years ago” (Don Tait of 'NFC World 2010').

Appendix 2: Quotes on the Benefits of NFC Mobile Services to Various Parties

- “NFC mobile brings greater efficiency for business. It means increased liquidity and dynamic savings and rewards for consumers. For merchants, it provides cost reduction in payment processing and stronger customer loyalty. Finally, for carriers, it means increased revenue from new sources.” (Booz Allen Hamilton, 2006).
- “In Europe, 50% reduction of cash transactions will result in 10 Billion € annual savings for banks” (European Central Bank, 2007).
- “6 seconds saved on payment with NFC mobile equals a 1% increase in revenues” (Mc Donalds, 2007).
- “NFC trials show that end-users love it. They say it “simplifies day-to-day life”, “is intuitive and accessible to everyone”, “cleaner than coins and banknotes...”” (GSMA Association, 2007).
- “A 10% increase in electronic payment volumes liberates a 0.5% increase in consumer spending” (Nordea Bank, 2008).
- “An international survey shows that 77% of contactless owners across all three markets agreed or strongly agreed that contactless technology would ultimately become more commonplace than cash as a payment method” (Visa, 2008).
- “Over 90% of trialists said they found contactless mobile payment convenient, fast, and easy to use. In addition, 94% declared that they would recommend it to their friends and family. Merchants welcomed the possibility of offering to their customers an innovative payment solution, with over 80% saying they appreciated the speed and cutting-edge appeal of mobile contactless payment” (Orange Telecom, 2008).
- “83% of customers are very satisfied or quite satisfied with NFC mobile experience” (Mobilkom Austria, 2009).
- “Trials concluded that there is great customer demand and anticipation of NFC m-payment services and that the technology can meet the high expectations of customers for simplicity and convenience. The technology is quickly understood and its usage readily adopted by the customer. The trials even suggest that a higher volume of “impulse” transactions will be encouraged“ (Barclay’s Bank, 2009).

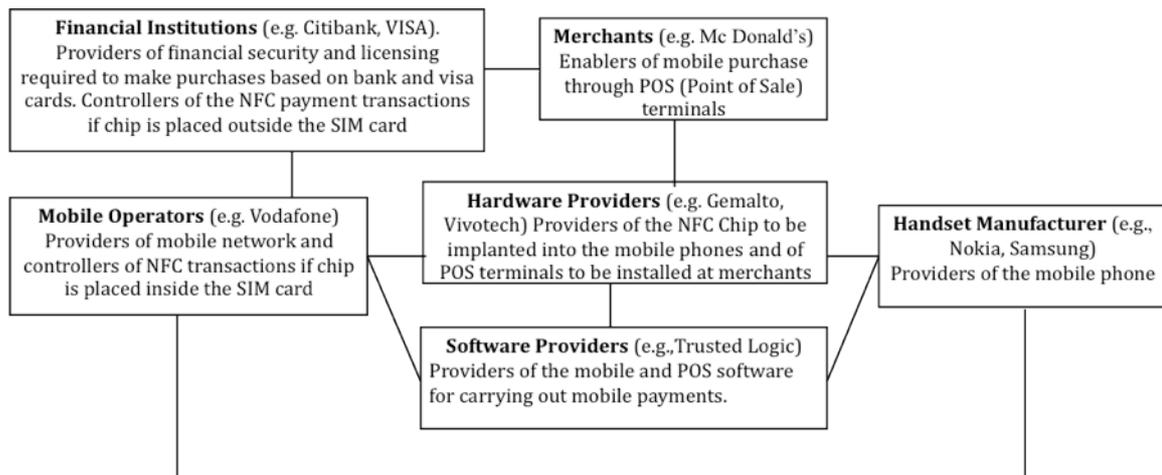


Figure 1: Types of players active in mobile payment services

Note to Figure 1: The nature of the activity, making NFC-based payments from a mobile phone, required several parties from distinct industries to be involved. First, mobile phone makers (e.g., Nokia) were needed for manufacturing NFC-compatible phones. Second, mobile operators (e.g., Vodafone, AT&T) needed to allow the mobile payment software as part of their wireless package. Third, banks and financial institutions (e.g., Bank of America, Visa, MasterCard) needed to provide access to the subscribers' financial account and provide the financial license to approve payments. Fourth, the NFC chip itself was needed from hardware providers (e.g., Phillips, Gemalto). Fifth, software to manage the financial account over the phone (e.g., E-wallet) was needed from software providers (e.g., Vivotech). Sixth, additional software was needed for downloading the users' personal data to each phone (Over the Air) and for ensuring security and privacy of each transaction (e.g., Giesecke and Devrient). Seventh, POS (Point of Sale) terminals needed to be provided by hardware providers (e.g., CCV Holland, Vivotech) in places where mobile NFC-payment would take place. Finally, merchants (e.g., 7-Eleven, Macy's, McDonalds) needed to allow NFC payments and install POS terminals in their stores. The commercialization of the NFC technology required these players to agree on a market architecture for role division and value appropriation.

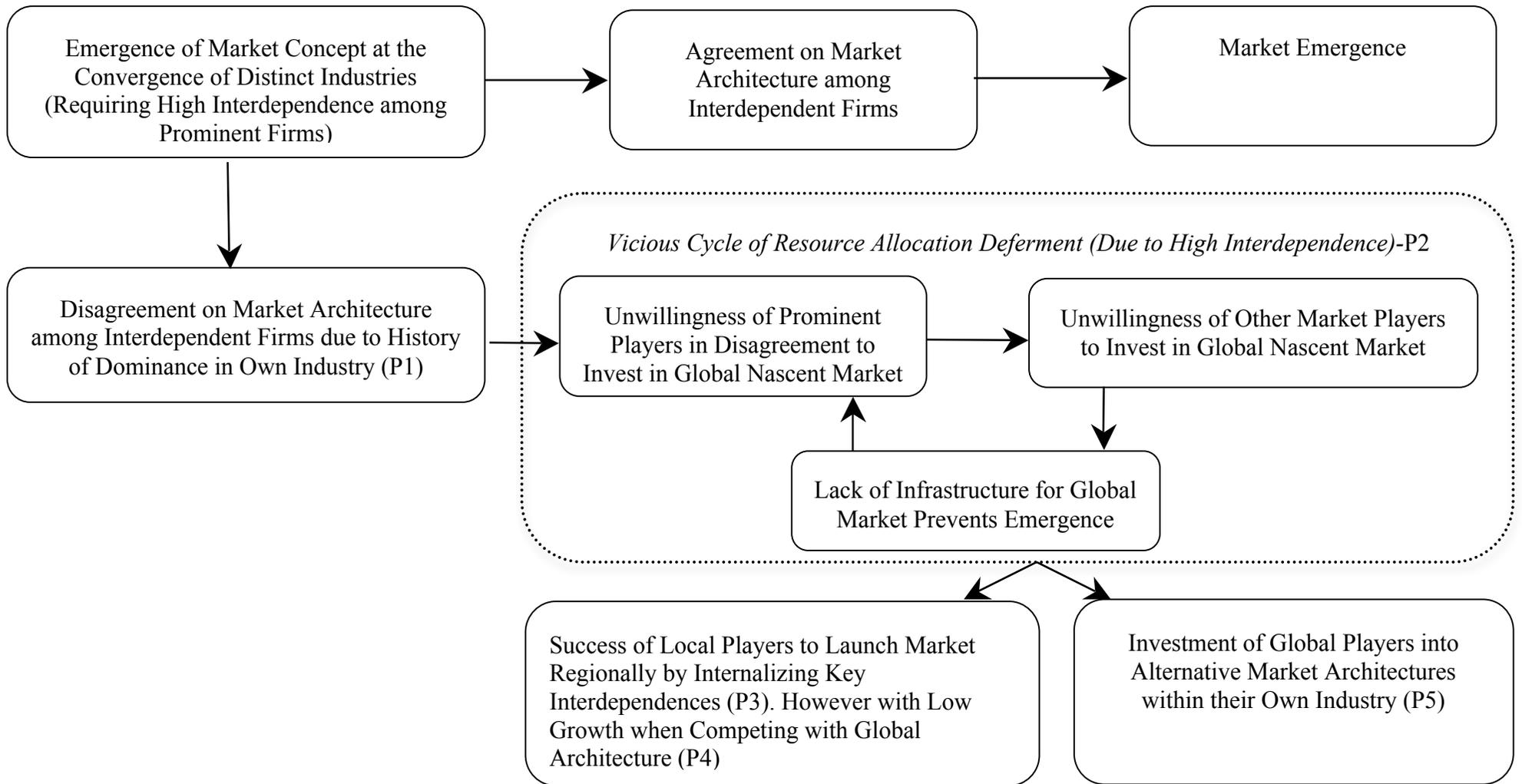


Figure 2: Proposed framework for market (non)emergence at the convergence of distinct industries

Period of Data Collection	June 2006-June 2011
Data Sources	Semi-structured interviews, business publications, Internet sources, corporate materials, observations at industry conferences and events
Total # Interviews conducted	65 interviews with 40 informants. # Informants with One Interview Conducted: 21 # Informants with Two Interviews Conducted: 13 # Informants with Three Interviews Conducted: 6 Time gap between repeated interviews: 6 months-2 years.
Type of Informants	Executives from various firms that were already active in the market (see Figure 1), industry analysts, reporters, and trade association members. Some informants were involved in mobile payments at the global scale, while others were focused on providing payment solutions in their local country.
Conferences attended for data collection (a total of over 100 pages of notes and 20 hours of audio recordings collected)	Cards and Payments Summit (Europe), EPCA Conference (Europe), GSM Conference (Asia, Europe, and US), Mobile Commerce Summit (US), NFC Forum (US), Mobile NFC Conference (Europe), Smart Card Conference (Europe)
Countries on which information was collected (chosen based on identification of high-level activity in early stages of data collection)	Austria, China, India, Japan, Kenya, Malaysia, Netherlands, Singapore, South Korea, United Kingdom, United States

Table 1: Overview of data collection

Firm	Market Cap	Market Share Ranking within Sector
Banks		
Bank of America	150 bil	# 2 in the US
Barclays	60 bil	# 7 worldwide
Citigroup	158 Bil	# 3 in the US
HSBC	205 bil	# 1 worldwide
Nordea	48 bil	# 1 in Sweden
Rabobank	35 bil	# 3 in the Netherlands
Credit Card Issuers		
American Express	86 bil	# 2 worldwide
Mastercard	72 bil	# 3 worldwide
Visa	123 bil	# 1 worldwide
Mobile Operators		
NTT DoCoMo	65 Bil	# 1 in Japan
Telefonica	59 Bil	# 5 worldwide
Telia Sonera	198 bil	# 1 in Finland and Sweden
Turkcell	13 bil	# 1 in Turkey
Vodafone	144 Bil	# 2 worldwide
Hardware Manufacturers		
Gemalto	8 bil	Top 5 worldwide in digital security
Motorola	16 Bil	Top 10 worldwide in electronics
Nokia	15 bil	# 2 worldwide in handsets
NXP Semiconductors	8 bil	Top 20 worldwide in semiconductors
Samsung	155 bil	# 1 worldwide in handsets, top 5 worldwide in electronics
Sony	22 bil	Top 5 worldwide in electronics
Merchants		
McDonalds	100 bil	# 1 worldwide in fast food restaurants
Starbucks	51 bil	# 1 worldwide in coffee stores

Table 2: Size and market share information for sample of firms observed in discussions

Informant Category	Informant Title	Quote
Mobile Operator	VP New Businesses, European Mobile Operator	<i>"We have a long history of industry leadership and experience in bringing the latest and most innovative solutions to our mobile customers. We pride ourselves in being able to coordinate our partners in a harmony to orchestrate our customer solutions. With NFC, we have shown another example of such industry leadership to enable a new service."</i>
	Director of Mobile Payments, European Mobile Operator	<i>"[A SIM-based NFC model] makes us the landlord of the NFC chip."</i>
	Senior Sales Associate, US Mobile Operator	<i>"They either don't need us or don't need this market. Because if they needed it, we would be talking right now."</i>
Third Party	VP New Technologies, Handset Manufacturer	<i>"I have been working with MNO's for years. It is safe to say that they are used to calling the shots."</i>
	Financial Consultant, US	<i>"The financial industry is in a defensive position against this proposal. Until now, they owned their customer and whatever payments the customer was making. They have a lot to lose from sharing their card payment business with other players because cards are not just a source of revenue, but also a way to create loyalty and an opportunity to cross-sell products and services. So banks are not excited about opening their business to MNO's"</i>
	Industry Analyst, Europe	<i>"Banks have a hard time letting go...Governance is a big issue for them".</i>
	Industry Analyst, US	<i>"The bank doesn't trust the operator; the operator doesn't let the bank handle security. And neither the operator nor the bank can be the front desk for NFC because they would not accept each other".</i>
	Director, New Solutions, US Mobile Operator	<i>"Banks like to have control and thus face emotional problems putting applications on the neck of a telco".</i>
	Director of Marketing, Handset Manufacturer	<i>"The market could develop faster if the banks and telcos just quit fussing about it and roll it out."</i>
Bank	Industry Analyst, Europe	<i>"Banks are approaching NFC from a defensive position, suspicious that mobile operators are seeking to cut in on their relationships with credit and debit card customers. They fear that in some cases, the telcos will try to snatch away the business for low-value payments now conducted in cash".</i>
	VP Technology, European Bank	<i>"The phone is now your computer, your car key, your remote control, and soon it's gonna be your credit card, too. Our investment and leadership is crucial in making this happen."</i>
	Director of New Payments, US Bank	<i>"Nobody is gonna take AT&T seriously if they start offering bank accounts. Customers will only believe this is legit if their bank, whom they trust, is in on it."</i>
	Associate Director of Mobile Payments, US Bank	<i>"Who would you trust with your digital money, your bank or your wireless carrier, who keeps charging you every time you go over your monthly plan?"</i>
	VP, European Bank	<i>"We have worked with many merchants and technology providers in the past, all to the satisfaction of our customers. The key to doing this is applying the same level of scrutiny to every single service and treating it our own at every step"</i>
VP Payments, US Bank	<i>"For banks, it's important that every time you open your wallet, you see our logo on the card. With phones, this is a problem because carriers do not want to allow banks to brand themselves in the main screen of the phone. They are saying: "We will not allow the phone to look like a Nascar (with multiple vendor logos)!""</i>	

Table 3: Positions of mobile operators and banks during discussions to define the NFC market architecture

Country	Year	Coalition Driver	Interdependence Resolution	Technological Solution	Results
Japan	2005	(Largest) Mobile Operator: NTT DoCoMo	Acquisition of credit card company (Sumitomo Mitsui) in 2005	Alliance w/ Sony to develop market-specific SIM-based (not Single Wire Protocol-SWP) phone. Plans to switch to international SWP phones announced in 2011.	Immediate success in 2005 caused rival mobile operators to license the technology and copy the service. By mid 2010, Fujitsu Felica phones had over 25% market share in Japan. But this number fell to 18% in 2011 with iPhone 4 taking the lead in sales in Japan.
South Korea	2009	(Largest) Mobile Operator: SK Telecom	Acquisition of Credit Card Company (Hana) in 2009	SIM-based (not SWP) Nokia 6212 Phone. This phone was discontinued in 2010. New market-specific SWP phone, Samsung SHW-A170K, was launched in Oct 2010.	1/3 of all merchants in South Korea have NFC readers installed. However, the discontinuation of the NFC phones slowed down the adoption.
Austria	2009	(Largest) Mobile Operator: Mobilkom	Intra-corporate coalition with already owned credit card company (A1)	NA	By mid 2011 the service had not yet been launched “due to lack of installed readers and NFC phones.”
Malaysia	2008	Third party: Global Financial Institution (VISA)	In 2008, Visa-initiated alliance between bank (Maybank), and largest operator (Maxis) in 2008	SIM-based (not SWP) with Nokia 6212 (Phone discontinued in 2010)	In 2009, Malaysia became the second country after Japan to officially launch. But “adoption was hindered by lack of NFC smartphones.”
Singapore	2008	Third party: Government	Government-based agency formed roundtable w/ banks and operators to enable NFC in retail and transit	NA	As of December 2010, commercialization was said to be dependent on successful infrastructure building in 2011.
China	2009	Third Party: Government	Alliance between state-owned operator and bank: China Unicom (2nd largest operator) and UnionPay in 2009	SIM-based market-specific service (not SWP)	China Unicom and UnionPay launched SIM-based NFC service in January 2011, so far only in the transportation system in Beijing.
	2010	(Largest) Mobile Operator: China Mobile	Acquisition of bank (SPD) by China Mobile in 2010	SIM-based (not SWP), market-specific “RF-SIM” service that works on most phones	At the end of 2010, the parties announced their intention to develop mobile wallet services together. The service was not yet launched by mid 2011.
Netherlands	2007	Third Party: Entrepreneurial Firm (Payter)	NFC software and hardware producer Payter organized operators, banks, and merchants to conduct a large pilot between August 2007 and December 2008.	SIM-based (not SWP) Nokia 6212 Phone. This phone was discontinued in 2010.	After pilot, Payter announced plans to roll out NFC in six Dutch cities by late 2009. But in November 2009, they announced they were closing down due to “inability to gain sufficient scale with the current level of support from the market”.

Table 4: Local attempts at establishing an NFC-based market architecture

Type of Alternative Technology	Driver of Attempt	Technological Solution	Start Year	Results
SMS Payments	Mobile Operators	The consumer sends a payment request to their mobile operator via SMS. The merchant involved is then informed of the payment success and releases the item. The price of the item is added to the phone bill of the consumer.	2007	<p>a) <u>Developed Countries</u>: Since 2007, entrepreneurial SMS mobile payment providers (e.g. Mobilcash and Zong) have deals with mobile operators (e.g. Sprint, Verizon, Vodafone, Telefonica, T-Mobile) in over 20 countries. However, most purchases are in virtual goods (e.g. online games or Facebook applications) as the operators take 40% of the revenue. Another important issue for the success of SMS mobile payments in the US versus Europe and Asia is the monthly spending limits set by the operator. Many US operators have a limit as low as \$20 per month per consumer. In contrast, most European and Asian carriers have much higher limits (\$815 in Norway), which significantly increases the usage.</p> <p>b) <u>Developing Countries</u>: In India, PayMate formed an alliance with Citibank. PayMate's business model takes operators out of the equation as it works with any phone or mobile operator. The transaction happens through SMS and goes to the consumer's monthly statement. In India, again, another entrepreneurial firm called mCheck launched mobile payment services in 2008 with a model that works with several banks and mobile operators. In 2010, mChek and Swayam Krishi Sangam NGO, an intermediary for banks, together launched a cash-free microfinance service for unbanked and under-banked customers. In Kenya, M-PESA was launched through Vodafone's Corporate Responsibility initiative in 2007. It reached 11 million clients in less than 3 years with money transfers equivalent to 15% of Kenya's GDP per year.</p>
NFC Plastic Cards	Banks	Instead of signing or punching in a code, the consumer waves plastic NFC card to the reader.	2007	In 2007, Wells Fargo Bank issued the NFC plastic credit card in the US. Many American banks followed. In 2009, there were over 80 million contactless cards issued. Visa and MasterCard pioneered these wireless payment systems, and installed over 500,000 card readers in over 40,000 merchants.
2D Bar Codes	Merchants	Customers load money to a merchant account online. Then they download a phone application. They can make payments by holding their phone to any barcode placed on a poster, magazine, or store countertop.	2009	Starbucks started testing the technology in 2009 with support from entrepreneurial firm Codilink. In April 2010, it announced the move from a trial at 16 stores to a "Grande" deployment in more than a thousand locations.
NFC Stickers	Various	The sticker contains a passive-mode NFC chip that allows payments without going through the phone.	2011	In the US, entrepreneurial NFC sticker makers such as TWINLINX and Blaze received media attention. In Europe, Rabobank, and NFC sticker provider Multicard, started providing the MiniTix service in the Netherlands. In Japan, the lack of NFC-capable smartphones (e.g. iPhone and Blackberry) led a Japanese mobile operator to provide NFC for iPhones. In January 2011, Japanese mobile network operator Softbank introduced NFC stickers that attach to the back of the iPhone 4 to enable the phone's users to make payments at the widely available NFC POS terminals in Japan.

Table 5: Alternative market architectures to eliminate interdependence