

Challenges and Opportunities of Mobile Payments Innovations

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Abstract

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Innovation in financial services is a major trend on the sector and the payments industry is no exception to that. New ways of paying, as mobile payments, are emerging and changing the payments market. Non-financial institutions are entering the market through the provision of mobile payments, threatening the dominant position banks hold in the industry. This thesis aim is to analyze mobile payments as a service innovation, primarily through the spectrum of banks as old incumbents in this market. To understand the traits and main characteristics of these products, as well as how innovation in mobile payments is changing or even creating a new market.

The results of the study suggest that we are facing a radical innovation, according to the Gallouj and Weinstein (1997) modes and models of innovation, as there is a completely new system behind mobile payments services. This innovation is assuming different forms and is still hard to infer if mobile payments are creating a new market, as these kind of services are still majorly seen by experts in the area, who were interviewed for this study, as a complement to other ways of paying, regardless of being a complete new system with different competences needed for operating. With regard to the new and different providers of these services operating in the market, it was found that they can be segmented into three clusters with different characteristics: Banks, which are the traditional incumbents of this market; Mobile Network Operators & Manufacturers, which are extremely focused on technology and data; Others, which include companies from other sectors, fintechs or other startups, characterized by being very innovative and flexible. These new services come with new market dynamics involving companies that traditionally were not associated with the provision of financial services, and threatening the relevance banks used to have in the payments industry.

Resumo

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Palavras-chave: Payments, Mobile, Innovation, Pagamentos, Móveis, Inovação

A inovação nos serviços financeiros é uma tendência geral do sector e a área dos pagamentos não é exceção. A área financeira dos pagamentos tem sofrido enormes mudanças, o que está a ter implicações nos mercados financeiros, e em particular nos serviços de pagamentos. Várias instituições não financeiras estão a entrar no mercado através da criação de novos serviços de pagamentos móveis, ameaçando a posição dominante que os bancos possuíam na área. Esta tese tem como objetivo analisar os pagamentos móveis enquanto uma inovação em serviços, focando principalmente a perspetiva dos bancos que tradicionalmente possuíam uma posição dominante neste mercado. A tese pretende entender e discutir as principais características destes produtos inovadores de pagamentos móveis, bem como se estes novos serviços estão a mudar ou mesmo a criar um novo mercado.

Os resultados deste estudo sugerem que estamos perante uma inovação radical, pois de acordo com os modos e modelos de inovação de Gallouj e Weinstein (1997), os serviços de pagamentos móveis são um novo sistema de pagamentos. Esta inovação tem assumido diferentes formas, havendo ainda um elevado grau de ambiguidade quanto à sua capacidade de geração de um novo mercado, já que este tipo de serviços são considerados por especialistas da área, que foram entrevistados no âmbito deste estudo, como um complemento a outros métodos de pagamento. Isto, apesar de se tratar de um sistema novo com diferentes competências necessárias à sua execução e utilização. O estudo conclui que os fornecedores destes serviços podem ser segmentados em três *clusters* com diferentes características: Bancos, os tradicionais incumbentes deste mercado; Fabricantes e Operadores de redes móveis, que são extremamente focados em tecnologia e data; Outros, incluindo empresas de outros sectores, fintechs e outras start-ups, caracterizados por serem extremamente inovadores e flexíveis. O estudo evidencia que estes novos serviços de pagamentos trazem novas dinâmicas ao mercado envolvendo empresas que tradicionalmente não estariam associados à prestação de serviços financeiros, o que ameaça a relevância dos bancos no sector dos pagamentos.

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1. Introduction

1.1 Scope

The services sector is increasingly characterized by its innovative potential. Service providers are constantly trying to develop new types of services, with the goal of increasing the quality of their product or of becoming more cost efficient. Innovation is nowadays seen as one of the main drivers of development and success for all kind of organizations.

Financial services are no exception to this innovation wave. The banking industry is extremely competitive and technological driven. Therefore, in the last 30 years while keeping up with an ongoing technological revolution, financial services have witnessed some dramatic changes (Frame and White, 2014). As a matter of fact, this exponential technology progress, together with frequent changes in the nature of client's demand and the systemic growth of global competition, are the reasons for a strong and much accentuated rhythm of change through all society aspects and sectors (Johanessen *et al.*, 2001).

The way we do our payments and carry money, during these decades, is an example of a dramatic change in the way we behave in a financial context. Once, and not that long ago, it was not uncommon to carry several thousand of a certain currency amount in cash to travel, to do a payment or simply to your home, where you could store it safely. Times changed, and now is common to see people carrying no cash or coins at all. Gradually, in countries with strong and consistent banking sectors, individuals started using banks, and their physical (plastic) cards to move money.

Recently, new digital ways of doing a payment as through the use of bracelets or mobile apps, have also been emerging. In fact, according to a report on digital payments by The Boston Consulting Group, in 2015 already eight percent of the overall global retail payments market was covered by digital payments. This is expected to grow to a value between eighteen to twenty-four percent by 2020 (Alpesh *et al.*, 2016).

Innovation by new entrants and incumbents is disrupting and changing the market, competition between banks and also other institutions (nonbanks) providing financial services is fierce. Most of the new entrants are already technology giants or fintech start-ups. These new players are now threatening the traditional power of banks and their market share (Niederhorn *et al.*, 2015). To adapt and stay relevant, retail banks need new strategies and operating models. To

create and offer a wider and innovative range of financial products and services for its customers and to conquer new ones.

It is also important to refer that, as in other sectors, customers of financial services and products, are also more exigent and informed. They are less tolerant to inefficiencies and can easily search for a product/service that best suits their needs. Personalization of the services, and matching them to the client needs, are nowadays very important. Besides that, and due to an increasing competitive environment on this market, customers are very influenced by new and different valid alternatives and by the quality of the service they need.

This increasingly never-ending high flow of information and knowledge, maintains markets in endless movements, and compels companies to focus on being more innovative in a way to create and maintain competitive advantages (Johannessen, et al., 2001). This is very visible in all economic sectors, including the financial one.

1.2 Aim

This dissertation focus on mobile payments, and necessarily also on the payments industry. Mobile payments are a new form of payment innovation that intends to replace other payment means of our quotidian life, namely cash usage in restaurants, stores or other commerce facilities. It is a service based on a novel technology that also intends to replace not only the usage of cash but also of plastic physical payment cards. It is a recent innovation, expected to become increasingly more relevant in our society. According to Capgemini and BNP Paribas World Payments Report (2017) in 2015 there were 49.5 Billion mobile payment transactions compared to 24.6 Billion transactions in 2013, this is an indicator of the fast growth we have been witnessing in recent years of mobile payments.

In this thesis there will be a focus on mobile payments itself as a service innovation. In fact, mobile payments services are extremely complex and in order to make that innovation clearer and to understand it in a better way, we will compare it and analyse it according to two models of innovation in services.

First Gallouj and Weinstein (1997) model will be used to formalize the service in question, which helps to define its characteristics and the competences needed for its provision and usage. According to their work, it will also be possible to identify the types of innovation that are present in mobile payments innovative platforms. Gallouj and Weinstein (1997) conceptualization was chosen for this analysis due to its fundamental importance for the study

of innovation in services, as it helps to understand them better and also to scrutinize the traits of the innovation in question.

The analysis of this innovation will be done also through the use of a study developed by Berry, Shankar, Parish, Cadwallader and Dotzel (2006) on market creating service innovations. Analysing if there is indeed a strategic vision in the mobile payments industry capable of generating new markets. Understanding this is extremely relevant, as it is strongly debatable the usage and relevance of these new payment systems, which inevitably will reflect on this innovation capability of generating new markets.

Is important to enhance that this industry is extremely complex, as there are several and very different providers and stakeholders with different duties, goals and responsibilities. An industry traditionally dominated by banks, is nowadays on constant change, with new entrants from different sectors of activity also getting involved in this business, forcing banks to necessarily re-invent themselves in order to maintain their relevance in the sector. Incumbents from retail industry, fintechs and technological startups are all contributing for the reshaping of this industry. In this research it is also desirable to analyze the existing main providers of mobile payments. Conceptualizing them and aggregating them into several cluster or groups enabling a better understanding of how this service innovation is reshaping the industry.

As old incumbents in the payment industry, we will focus this service innovation analysis on a bank perspective, as it may be interesting to understand they behavior regarding this new system and ecosystem, as they face new competitors across all areas of mobile commerce and payments. Also banks are still one of the most relevant and important players and providers within the mobile payments industry.

1.3 Methodology

The analyses mentioned before on the section 1.2, were made possible by an extensive research and inquiry of the existing literature, by interviewing experts involved in this area and finally by my own experience doing an internship in a Bank highly involved in mobile payments.

The interviews in question were done to experts working in the mobile payments area, who worked in companies dominating their specific payments national market. Those were open interviews with the duration of around two hours, focused on gathering information about mobile payments innovative characteristics, traits and its market usage and potential. They were also intended to have a better understanding of the mobile payments ecosystem environment,

namely the dynamics between the providers. The guide for the interviews is available for consultation in the final chapter of this thesis, 7. Appendix.

Besides the interviews, the analyses in question also include a reflection based on my own experience and knowledge of the area, developed while doing an internship in CaixaBank Payments. CaixaBank is the leading bank in Spain, and one of the worldwide leaders, regarding mobile payments and digital banking (Bueno, 2018), where I had the opportunity to be involved in different cashless and mobile payments projects.

1.4 Structure

I will therefore start by reviewing service and innovation concepts, as well as relating them both. Also reviewing some considerations from the whole banking industry and financial services, its innovative trends and evolution. After there will be a focus and review of the payments sector itself. Analyzing its evolution and the role it had on financial innovation. Following the review of the payments medium sector, there will be a focus on mobile payments, to better understand the role this sector has as a leader in the payments industry innovation, as well as overall in financial services innovation. Having in mind the importance of the financial sector for the economy, other financial innovations will be reviewed, as well as the effect they may have on the economy and society as a whole.

After the review of the previous concepts, there will be a focus on analyzing on a detailed and thorough way mobile payments itself. One analysis will be made regarding the service itself and its innovative trends and types. Then there will be an analysis on the capability and the extent to which providers of this service are being able to expand their markets, or even create and reach new ones through their mobile payments innovations and strategies. Finally, the last analysis will focus on the providers of mobile payments and on grouping them in a comprehensive way into 3 different clusters, with different traits and opportunities, according to their original sector of activity.

By the end of this thesis it is important to emphasize the importance of mobile payments innovations and what are the main trends characterizing them. It should also be clear what are mobile payments and what kind of service or products can be considered a mobile payment. Ending with some opportunities and threats of this specific sector, as those are essential to understand the possible potentiality of these mobile payments services to become the future leading payment system in the western and developed societies.

2. Literature Review

In this chapter there are definitions of some important terms, as well as some of the main trends and evolution of financial services. A broad, holistic and historic approach to the sector is presented, to clarify and contextualize key topics.

Finance is a broad area, with a large influence and impact on society. We will focus on concepts regarding the innovation in financial services, with special interest on payment systems.

2.1 The emergence of innovation in services

It is important to clarify what is and what may be considered a service, as there may be different approaches and definitions. According to Grönroos (2007) a service is an activity or set of activities with a more or less intangible nature, with the goal of providing solutions to customer needs. He also states that those activities usually take place in the interaction between the customer and the service provider. In the end, we can say that those interactions are what separates services from physical products.

Adding to that, Vargo and Lusch (2004a) focus the service concept on competences, like skills and/or knowledge. Through them we can say that a service is the application of those competences in a specialized way, through different activities or processes for the benefit of another entity or the entity itself, in case of a self-service. Their idea of service also focuses on specialization of knowledge and skills; this is very evident in financial services where there is a presence of highly skilled jobs.

The definition of a service may be non-consensual due to its broad and universal concept and usage. Nevertheless, there are some service characteristics that have general acceptance from different scholars (Lovelock and Gummenson, 2004; Vargo and Lusch, 2004a)b) and 2008). These characteristics, are therefore used to describe some of the services main features. The first characteristic is the intangibility of the production process outcome, as most services lack the palpable quality of a physical good. Heterogeneity is another feature, due to the usual inability to standardize the output of a service, when compared to a physical product. The fact that most services require a simultaneous interaction between the producer and consumer for the service to be provided, bring us to another characteristic, inseparability. Inseparability is related to the fact that services are produced and consumed at the same time. Finally, perishability is the last of the four characteristics I want to highlight. This last trait, is related to

the inability to inventory services, when compared to goods. As services are intangible, generally they cannot be produced at one point in time, inventoried and sold later.

The fast technological revolution we have been witnessing, allied with an increasing globalization intensifying the international competition, and more mature expectations from clients, have been generating new challenges for service providers (Jaw et al., 2010). In order to adapt to a new and more challenging reality, the sector have been increasingly using new technologies and undergoing the development of complex systems and processes with impact on research and development (Rubalcaba, 2011).

In fact, innovation has been also used to describe processes of R&D. Nevertheless, the term innovation has a broad range of meanings. And in reality, it may include R&D related activities and also non-related R&D activities. Innovation may refer to new products, new processes or even new organizational methods that add value to activities and to the service or product provision (Gallagher, 2011). Innovation in services can be seen as a process that brings value to different stakeholders, as clients, employers, partners or communities (Ostrom et al., 2010).

According to Gallagher (2011), innovation in service companies is usually not made on a systematic process, instead a lot of times it consists on a set of spontaneous ideas developed internally in order to meet the clients' necessities in real time. Also, according to Sundbo and Gallouj (1998) innovation is changing a business through the addition of a new element or through a reproducible blend of already existing elements.

As sustained by Jaw et al. (2010), innovation can be divided and identified within two different spectrums. Innovation in the output as the creation of a new successful product, or innovation in the input as investing in R&D and other innovation efforts. Until recently, research on innovation was focused on products, mainly industrial ones, neglecting for example innovation processes that occurred on the development of new services (Droege, 2009). This can be related to the incapacity of measuring the services output, which according to Gallouj and Savona (2009), is a result of the intangible nature of services, which makes hard to do a correct evaluation of the productivity and innovation in services.

When compared to the industrial sector, innovation in service activities show some different structural patterns, as for example the low number of patents of R&D and the high degree of heterogeneity of innovative behavior within each sector (Rubalcaba et al., 2011). In fact, due to its intangible nature, innovation in services are more difficult to protect through intellectual

property rights, as a patent, than industrial or tangible products (Agarwal et al., 2003; Lyons et al., 2007). This makes imitation of innovations in services done by competitors much easier. Another reason for this is that in services there are a lot of process innovations, which is hard to prove that is a distinct process from all other, and therefore harder to obtain a patent on it. And as mentioned before, the fact that service companies offer intangible outputs, sometimes with more visibility, makes innovations on those products very hard to protect and vulnerable to imitation (Gallagher, 2011).

Also innovation in services is less oriented to financial results when compared to the physical goods sector, since results related to the capacity of answering and meeting customers' expectations and necessities are considered more relevant than financial results in the services industry (Rubalcaba, 2011). Other interesting key phenomenon in these kind of innovations is that a lot of times, that innovation changes the roles of stakeholders and their patterns of relationship, whether they are suppliers, partners or even consumers of those services. Innovation in services may require complex adjustments from people, technologies, information and processes.

It also requires new concepts, approaches and new techniques that recognize the interdependency and linkage between consumers and the service provider (Ostrom, 2010). This linkage between consumers and providers of the service is very evident on services where there is co-production, which happens when there is an extensive and balanced interaction (essentially operational) and involvement of the customer in the service provision (Gallouj and Weinstein, 1997).

Gallouj and Weinstein (1997) developed a general formalization of a service, essential to understand and analyze a service innovation. According to their model, the general form of a service provision is based on a set of characteristics and competences. After identifying those components of the service Gallouj and Weinstein (1997) were able to highlight different types of possible and non-exclusive innovations existing in services. The types of innovation identified were:

- a) Radical innovation – Creation of a totally new product;
- b) Improvement innovation – Improving specific characteristics of the service;
- c) Incremental innovation – Addition or substitution of certain characteristics;
- d) Ad hoc innovation – Innovation tailored on specific users' needs;

- e) Recombinative innovation – New combinations of various already existing characteristics;
- f) Formalisation innovation – Based on the standardization of characteristics.

Berry et al. (2006) also developed a very interesting study on service innovations. Their extensive research enabled the development of a matrix that offers a strategic vision about innovations in services that may create new markets. They also manage to identify several core drivers of success for a service innovation to create those new markets: a) Scalable business model; b) Comprehensive customer-experience management; c) Investment in employee performance; d) Continuous operational innovation; e) Brand differentiation; f) Innovation champion; g) Superior customer benefit; h) Affordability; i) Continuous strategic innovation.

Gallouj and Weinstein (1997) and Berry et al. (2006) models are very important for understanding the types of innovation that may exist, and the potential or capacity of those innovations in creating new markets and generating long term profits for companies. Therefore, those models will be analyzed in more detail, when discussing and comparing them with mobile payments as a service innovation in chapter 3.

In conclusion, innovation is a broad concept, which involves every necessary activity to provide value to customers and to obtain positive returns. It can also be described as a mindset or an attitude which enables companies to see and create the future (Pervaiz, 1998).

2.2 Financial services and the banking industry

Financial services are known for having extremely high informational content and for being extremely capital intensive services. Initially it is important to define what Financial Services are. Asmundson (2017), an economist from the International Monetary Fund (IMF), makes a difference between financial goods and financial services. The financial service is the process where consumers and businesses acquire the financial good, such as a loan or an insurance. According to that, a financial services relates to the transaction required to obtain the financial good. In the end, these notions of financial services and goods blend together, as they are inseparable concepts.

The Financial sector as a whole covers numerous types of transactions in different areas as real estate, consumer finance, banking, and insurance. As said before, this thesis will focus on financial services provided by the commercial banking sector, as they are usually also the providers of payments systems, in which we will focus. According to Asmundson (2017), this

services may be related to accepting deposits and making loans, administering payment systems, trade, issue securities and manage assets. It is also important to refer that due to diversification of operations, now is not uncommon to see banks also providing financial services they would historically not provide, as insurances. Today, we have banks as part of global financial institutions engaging in a wide variety of financial activities.

According to Merton (1992), the primary function of a financial system is to provide and facilitate the allocation of economic resources, spatially and across time, in an environment with recurrent uncertainty. This function includes a broad range of activities, transferring resources from savers to borrowers, or facilitating a medium of exchange (payments systems) are some of them. In the end, finance is a major developer and promoter of virtually all production activity and much of the consumption activity (Frame and White, 2014).

The provision of better financial services has also other positive effects in society. They boost and facilitate more saving and investment, as well as more productive and efficient investment decisions. Several authors discussed these positive effects of financial services and financial innovation, which make this sector even more relevant and valuable for an economy (e.g. Miller, 1986 & 1992; Merton, 1992 & 1995; Tufano, 2003; Allen, 2012).

Financial services may be provided by the Banking Industry to both final consumers and other firms (B2C & B2B). Studying this industry is extremely relevant, due to its importance for the global economy and also for the normal functioning of society as a whole. According to Investopedia's *The Industry Handbook: The Banking Industry*, Financial institutions have a major importance for our economy due to the fact that they provide liquidity, transfer risk, facilitate money transaction and provide financial information for individuals, businesses and other institutions as a Government. We can also say that it is an industry serving as an intermediary between who wants to save money and who wants to borrow it, allowing to put the money on a more productive use (Asmundson, 2017).

Also, as reported by Forbes in their list of world's biggest companies, "The World's Largest Public Companies" (2018), it is possible to see that seven of the top ten companies are banks. Four of them, are the state-backed Chinese Banks ICBC, China Construction Bank, Agricultural Bank of China and the Bank of China. The other three from the United States being JPMorgan Chase, Wells Fargo and Bank of America. European banks are also present on this list, as the French BNP Paribas or the Spanish Santander, still located on the top thirty-five companies of

this list. This may be also an indicator of the sector strength and influence on global economy that the Banking Industry has.

The Banking Industry may be broken down into four different subsectors. Usually banks are also divided by these four different Banking operational areas. There is Corporate Banking, which is focused on providing financial services and products only to other businesses. Investment Banking, like Corporate Banking, is also focused on B2B, creating capital for other companies, entities or even governments. They are therefore, not focused on providing services to individuals. Additionally, there is the Asset Management sector, also known as Wealth Management, which refers to financial services companies that do an active management of a large investment portfolio from high-net individuals or institutions (Bessis, 2015).

Finally, but also a very important area of Banking visible to the majority of the common citizens of developed countries, is the Retail Banking. This sector focus on providing financial services to private and final clients, as well as small and medium-sized enterprises. Retail banking provides financial services for families and small businesses. The three most important functions are credit, deposit, and money management. Retail Banks and the activities driven by them, are essential for the smooth functioning of an economy, as they provide credit and deposit functions and also they ensure provisions for smooth payment systems (Amadeo, 2018).

It is also important to explain the preference of focus of this analysis on developed countries or major countries with emerging economies, as China. These countries have a more mature banking industry, and probably more advanced financial markets, which make them have an extensive and interesting background on financial innovation. This happens due to these countries sophisticated telecom sector, better infrastructures, high skilled labor, and a general focus on innovation and technology.

2.3 Financial Innovations

The second half of the last century was marked by fast economic growth, and therefore an increase in financial intermediation activities. This in line with radical technological changes related to telecommunications and data processing enhanced a period of financial innovations never seen before, due to the importance of financial innovation and its dissemination for economic growth. New and different bank products, services, processes and organizational forms have emerged during that period.

First, it is important to have a clear idea of what may be considered a financial innovation. According to Frame and White (2014) a financial innovation may be something new that reduces costs or risks, or that provides an improved product, service or instrument in order to better satisfy the demand and needs of the participants in the financial system. Obviously, besides new final outputs or processes, new intermediate products or services used by banks, may also be considered a financial innovation, as they may also be part of a new financial product or process.

2.3.1 Payments Sector as a Propeller of Innovation in Financial Services

In this chapter I will go through several specific financial innovations, focused on the payments sector. Trying to interpret and analyze those financial innovations in a logical and chronological order, which sometimes is hard due to the fact that a lot of those innovations took some time to mature or ended up blending each other and blurring its chronological order and logic.

Besides economic growth and new technological developments, other factors fueled the financial innovation in these last decades. Changing business practices and the way that customers and banks interact, as well as advances in information, communication and systems played also an important role in driving these financial innovations (Liu, Kauffman and Ma, 2015).

The payments sector and its ecosystem have been changing and evolving a lot, mainly in these last two decades when some payments innovation have been maturing and new ones have been appearing. This is enabled by the emergence of new payments-enabling technologies as instant payments or blockchain technology, an ever-changing regulatory environment and the development of FinTechs operating in the sector. This amount of change and the multiple number of stakeholders involved in the payments ecosystem is also generating some lack of harmonization and standardization, which are slowing the ecosystem development. This ecosystem development represents some threats to banks (from FinTechs or other sector companies as Apple, Amazon or Google, that are incumbents in their original sector), but also represent new opportunities for banks as corporations are increasingly turning to their banking partners for help in providing new services to their clients, as for example cashless solutions. Regarding these recent evolutions and changes on this market, the future about payments ecosystems is still not clear. (Capgemini and BNP Paribas, 2017)

Recent financial services innovation was strongly connected with better, easier and upgraded account access and payment methods, being more convenient and efficient for the customer needs (Frame and White, 2014). During the 1950s and the 1960s, due to a fast economic growth, there is an increase in the demand for processing payments and handling other intermediation-related activities, as well as other financial instruments. During these years arises the **credit card** concept. Initially it was a popular card and payment method in the HoReCa, travel and entertainment sectors, which required payment in full, month by month, for its use (MacDonald and Tompkins, 2017). The Bank of America issues in 1958 the first all-purpose credit card, BankAmericard, designed for general use (Simon, 2007). Later, in 1975, VISA was created, which is known today as one of the leader credit card associations and transaction processors. Nowadays, they provide not only credit, but also debit and prepaid branded card products to financial institutions (Liu, Kauffman and Ma, 2015).

This made way for an era marked by electronic payments, done mainly through a payment card network. The 1960s and 1970s are also characterized by a considerable computer automation of products and processes. This automation of processes led to a much efficient and effective sector (Liu, Kauffman and Ma, 2015). This shift on the financial services industry and on the payments system was verified not only through the credit card innovation, but also through other innovations, other financial products and services that we will explain next.

Better and easier access to bank accounts was provided through the **Automated Teller Machines** (ATMs), which are today present in any urbanized region. ATMs appeared in the 1970s but were diffused extremely rapidly through the 1980s, which facilitated a lot the access to a bank account and its funds through an ATM card (Frame and White, 2014). Eventually those cards were replaced by the debit cards.

During the 1980s and 1990s **debit cards** appeared and became a very popular item in anybody's wallet. These cards, still with an extremely high usage nowadays, provide ATM access (bank account funds access) and the ability to make payments through one's bank account. It is possible to say that debit cards are a "pay-now" mechanism, where transactions may be checked instantaneously through online methods, as the usage of a PIN code, or in the future through offline methods, as a signature (Frame and White, 2014). Users typically have the choice to choose one of those methods. According to a press release from the European Central Bank (2017), in 2016 direct debit payments accounted for 20% of all transactions in European Union

(EU) member states, which demonstrates how relevant debit cards are still today, as they are obvious facilitators of direct debit transactions and payments.

Not as popular as credit or debit cards, **prepaid cards** still have become present pretty much all-over in these last decades, and in today's society. Contrary to credit cards that might be called "pay-later" cards, or debit cards also known as "pay-now" cards, prepaid cards may be named "pay-early" cards, in which cardholders set aside funds in those cards for future use and payments (Frame and White, 2014). Recently, prepaid cards have been involved in some polemics and discussion related to its usage for malign or illegal purposes. Namely its connections to the financing of terrorist cells and operations in Europe (Guarascio, 2016). Also the potential usage of these cards for money laundering schemes have been under discussion, as well as its ability to access cash at ATMs almost and practically anonymously which is considered to be a big vulnerability of these cards to illicit activities (Sienkiewicz, 2007).

According to Frame and White (2014) prepaid cards can be stuck into two types of systems. There are the ones in "closed" systems, which may be a retailer-specific gift card, cards used within a mass transport system or a card used for payments in a cashless event or enclosure, as a university campus, a football stadium, or a music festival. The author also notes the cards involved in an "open" system, these may be payment network branded cards (as Visa or Mastercard) which are of general acceptance. Due to its general use and acceptance, these last cards are more similar to traditional debit and credit cards. Related to the "open" system cards there are two types of cards. Payroll cards, used mainly between unbanked employers and employees due to its lower transaction costs (McGrath, 2005). The other cards are the general spending reloadable cards, usually available through grocery stores and convenience stores, used a lot by immigrants for remittances, by travelers, or by parents who give them to their sons (Frame and White, 2014).

During the 1990s arises one of the main financial innovation to date. **Online banking**, is not exactly a payment method innovation, is a broad term used to describe a wide set of services available through internet, on a computer or a smartphone. It allows to originate payments using "electronic bill payment", and also allows people to remotely access and monitor accounts (Frame and White, 2014). Online banking indeed helped and boosted a payment systems innovative revolution but considering it a payment innovation itself may be a mistake, as you cannot use it in commercial establishments to exchange value for goods or services.

The first bank websites were released in 1995 (DeYoung, 2005) and during that decade, the exponential adoption of internet by households made these online banking services explode. In fact, according to DeYoung (2005), by 2002 almost half of the US banks operated transactional websites. During the 2000s it took place the widespread adoption of internet banking and the rise of online payment services, which further stimulated online banking.

There is not a consensus about online banking performance and effectiveness. Nevertheless, online banking is associated with lower costs and higher profitability in certain European major economies, as is the case of Spain (Hernando and Nieto, 2007) and Italy (Ciciretti, Hasan and Zazzara, 2009). Hernando and Nieto (2007), also concluded that internet should be a complement to a physical bank and not a substitute of it and its branches. Relating to its usage, there is evidence that younger people and those with experience in remote banking technologies are more likely to adopt and use online banking services (Bauer and Hein, 2006).

2.3.2 Introduction to Mobile Payments as the Main Innovation Trend in Payments

As seen from the Credit, Debit or Prepaid cards, and also from online banking, the payments sector in general has been a melting pot of innovation within the financial industry, namely in propelling a wave of innovation in financial services never seen before. Probably, the most important innovations in this sector are related to mobile payments. Mobile payments are revolutionizing the industry, and are the main trend in this sector since the entry on the 21st century. Which perhaps, makes it the most relevant innovation in technological terms during these last years in the Financial Services sector. This innovation itself, have been indicated as a solution to facilitate micro-payments, and to provide an alternative for the diminishing use of cash at point of sale or service (Begonha et al., 2002; Coursaris and Hassanein, 2002)

According to Karnouskos (2004), it is considered a mobile payment if the payment itself is done using some kind of mobile device for the exchange of financial value for goods. Mallat (2007), define mobile payments on a similar way, as a payment transaction which is conducted by the use of a mobile device, in which money or funds are transferred from a payer to a receiver via an intermediary or directly. More recently, mobile payments have been also defined as a kind of payment transaction processing where there is the use of mobile communication techniques simultaneously with mobile devices for initiation, permission, or execution of a payment operation (Goeke and Pousttchi, 2010)

At this moment it is also important to make a distinction between mobile banking services and mobile payments. Mobile banking services, or also commonly known as online banking, as it was specified before, it refers to the banks' own services and systems available online, for the banks' own customers. On the other hand, mobile payments are a completely new payment service offered to retail market, characterized by several unique and significant characteristics. First, there are two demanding and very different group of adopters and clients of mobile payment services, which are the consumers and merchants. Secondly, there is a large number of providers, such as banks, telecom operators and manufacturers, and other technology based companies, fiercely competing in the provision of this new payment service. Finally, there is also several challenges within this service, regarding the standardization and compatibility of different payment systems (Mallat, 2007)

Mobile payments are also revolutionizing the payments ecosystem, and banks providing retail services have to adapt fast to this changes in order to maintain competitive and relevant in the market. Banks as incumbents in this sector always had a comfortable dominant position. This is changing, as there are new players entering the market and providing the same services of banks in a different way. Since the 1990s we have been watching to tremendous waves of innovation in the development of payments technologies and solutions. More recently, companies like Google, PayPal or Apple, which are non-bank companies who have recently entered the industry as financial intermediaries bringing with them new mobile payments technologies and services into the marketplace (Liu, Kauffman and Ma, 2015).

In reality, the stakeholders involved in mobile payments can be classified in four different groups, the technology producers, the mobile payment service providers, and the merchants and consumers, the actors who decide whether to adopt or not these services (Ondrus and Lyytinen, 2011). There are plenty of stakeholders, which contribute for the complexity of the ecosystem of mobile payments. Some of the actors that interact in the provision of this service are mobile network operators, banks and other financial institutions, device manufacturers, software developers, customers, merchants and also regulation institutions (van der Heijden, 2002; Karnouskos, 2004; Au and Kauffman, 2008).

Due to recent technological advances, it is plausible to predict that in the future there will be no physical wallets, only digital ones incorporated in certain devices, as a smartphone or different wearables (bracelets, watches, etc.). This may be supported by nowadays customers' cashless payment service demand (Liu, Kauffman and Ma, 2015). Young generations tend to prefer the

use of cards or mobile devices for payments in their day-to-day life, as going to a restaurant, a supermarket, a club, a music festival, a sports event, a thematic park, etc. Actually, there are prior studies suggesting a general consumer interest towards using mobile payment applications (Dewan & Chen, 2005; Kreyer et al., 2003). Today, people see mobile phones almost as an extent of their body, without it is almost impossible to live, we rely on them not only for communication, but also for mobility, music, photographs, information consultancy, among others. Very probably that dependence will also fully extend to the daily payments that can be done through a smartphone. In fact, the development of mobile payment and cashless solutions, is based on the proliferation of mobile telecommunications technology, wide use of mobile phones, and the success of early mobile content and services (Mallat, 2007).

According Pandy and Crowe (2014) mobile payments are a new form of value transfer, similar to other payment instruments, but very dependent on advancements of mobile phones features, and also on advancements of the tokenization of consumer's financial credentials for user's safety, and protecting customers from fraud and other kind of disruptions. Frauds, and other kind of data breaches and information safety were some of the reasons that were holding back mobile payments technology in this recent years. Tokenization of financial credentials helps fight that lack of trust that might be holding back some customers from using this technology in these last decades.

Tokenization is an important feature, which protects the Primary Account Number (PAN). It is a feature and process of mobile payments developed recently, that gives more safety and helps build trust to clients and users, by randomly generating a substitute value to replace sensitive information (as the PAN). Tokenization replaces sensitive payment credentials, such as a bank account and credit or debit card numbers, making the financial transaction safer (Liu, Kauffman and Ma, 2015).

Technology wise, mobile payments were enhanced by generalized Near Field Communication (NFC), representing the recent business model innovations of Google Wallet and Softcard (which both consisting now of Google Pay) or Apple Pay (Contini et al. 2011). NFC was what allowed to do payments in stores or restaurants with credit or debit card credentials stored on smartphones, using mobile wallets (as Apple Pay or Google Wallet).

Perhaps viewed as the next revolution in payments, essential to maintain and support not only e-commerce but also physical retail stores and commerce, mobile payments still involve a lot

of uncertainties for being the leading payment method of the future. Changing consumer demand and expectations as well as technological risks, are some of the main uncertainties regarding investment and adoption decision-making for the necessary technology for mobile payments (Kauffman, Liu and Ma, 2013). In the end, it is a very recent technology and service, which might take a few more years to mature on the market. In fact, mobile payments appeared for the first time in 1997, still in the non-smartphone era, but one of the most known mobile payments service as Apple Pay, was only released as recently as 2014 (Liu, Kauffman and Ma, 2015).

In addition, the payments ecosystem (namely the mobile one) is at this moment extremely complex, spanning multiple sectors, as the banking one, telecoms, retailing and of course, the payments sector (Liu, Kauffman and Ma, 2015). For customers to be able to pay with their smartphone, through mobile payments, first mobile network operators and mobile device manufacturers must equip the phone with a Secure Element or a Host Card Emulation chip, that enables NFC transactions, for the safety of its memory and of the execution of operations. Merchants should have NFC-enabled point-of-sale (POS) terminals. Banks issue the specialized debit, credit or prepaid cards and control the payment terminals. There are also the Trusted Service Managers and gateway service providers, that secure, transmit and process the transactions, they also may provide other services to merchants and customers (De Reuver et al., 2015).

For the sake of convenience, in this dissertation we will focus our analysis on mobile payments that are done with mobile phones. In fact, there are authors that disregard other possible forms of mobile payments done with other devices, and solely focus on mobile payments done through the use of a mobile phone (Apanasevic et al., 2014; Ondrus, Lyytinen and Pigneur, 2009). In fact, the main providers of mobile payments and mobile/digital wallets, regarding the number of users, are not banks but other technology or information based companies. As of August 2017, WeChat Pay and Alipay operating in Chinese market were the providers with more users, with around 600 million and 400 million respectively. By that date Apple Pay had around 87 million users, Samsung Pay 34 million users and Android Pay (now called Google Pay after merge with Google Wallet) with around 24 million users (Statista, 2018).

A lot of banks have been also operating in these areas in two different non-excludable ways. By partnering with those providers mentioned in the previous paragraph in order to facilitate and make possible the usage of their physical cards as digital cards in those exogenous digital

wallets. Or by developing their own digital wallets, as is the case of JP Morgan Chase with the Chase Pay platform, being the leading digital wallet in terms of users developed by a bank, with 28 million users. (Statista, 2018)

There is still a lot of research to do on this topic. Mobile payments technologies are just starting to mature now, and we will possibly witness them going mainstream in developed countries. It will be very interesting to analyze in a close future if mobile payments will be favored over card payments. Or even if mobile phone banking will outpace internet. As stated in the Introduction, in this dissertation we also aim to evaluate and access those mobile payments potentialities as becoming the main medium of pay system.

2.3.3 Other Financial Innovations

Besides innovations mentioned in the previous sections, related to payment systems, there were during these last decades much more innovations in other fields of the financial industry. Here we address and give a general overview on some of them, relevant to understand the dimension of innovations in this industry, and its recent path besides the payments evolution.

Financial markets also witnessed some revolutionary innovations and changes on the way they operate. During the 1980 the computer technology arrived to trading, and we witnessed the emergence of computer-assisted program trading. In the 1990s there was a boom in e-brokerage, and the eradication of the floor trading (Gastineau, 1991).

Also, after the 1987 stock market crash, there was an introduction of some technology based innovations in the financial risk management systems as value-at-risk (VAR) and risk-adjusted return on capital (RAROC), in order to reduce another risk of crash (e.g. Fama, 1998; Saita, 2007).

More recently, since the late 2000s, new and revolutionary concepts and innovations have also been appearing in Finance. High-frequency trading, crowdfunding, peer-to-peer online lending and bitcoin being the ones shaping the new high technology landscape of financial services up to today (e.g. Aldridge, 2013; Herzenstein et al., 2008).

A disruptive technology as internet and its democratization to people in developed countries, during the 1990s, made way also for new types of innovations and organizations on the banking sector, through organizational innovation or as sustained by Gallouj and Weinstein (1997)

formalization innovation. Internet-only and internet-primary banks emerged through the USA and Europe.

Most of these banks in the US have disappeared almost as fast as they appeared, or established also a physical presence as a supplement. One of the reasons that may explain the failure of most of these kind of banks in the USA, may be related to the fact that almost all internet-only or internet-primary European banks were and still are affiliated with existing financial institutions, as is the case with ActivoBank in Portugal a subsidiary of Millennium BCP, a major Portuguese bank. Actually, European internet banks have already demonstrated technology based scale economies (Delgado, Hernando, and Nieto, 2007).

Even more recently, in this last decade, we have been observing another major organizational change and innovation in the sector, related with the democratization of not only internet, but also phones. ImaginBank is an interesting case of a phone exclusive bank in Spain. In fact, it is the Spanish first bank designed to operate only through a mobile application, therefore through a phone (Saborit, 2016). Nevertheless, it is important to refer that this bank belongs to an already existing bank, CaixaBank which has a broad and extensive physical presence through all of Spain. It is an intelligent move by the bank, a strategy to position themselves on the emerging millennial generation and to compete with international fintechs, with similar value propositions and business models, focused on mobile payments and mobile accounts, as is the case of Revolut.

2.3.4 Effects of Financial Innovation

Until this point, we have been focusing mainly on the positive effects of financial services and innovations for the economy and society. According to Frame and White (2014) a financial innovation may reduce costs or risks, or add value to a product or service, better satisfying the needs of financial system participants. This notion is important to understand the positive effects that innovation in this sector may bring to society, having in mind the important role finance has in an economy and economic growth (Levine, 1997).

Overall production and consumption are facilitated by finance, so improvements in finance will have positive ramifications throughout an economy (Frame and White, 2014). Financial innovations may also boost and encourage savings and investments, and foster more productive and better investment decisions, among other positive effects of financial innovations discussed

by a considerable number of authors (e.g. van Horne, 1985; Miller, 1986 and 1992; Merton, 1992 and 1995; Tufano, 2003; Allen, 2012).

Nevertheless, there are several financial innovations that have been connected to financial instability, malpractices and crisis. In fact, the 2008 Nobel Prize winner Paul Krugman (2007) accused recent innovations of spreading confusion, enticing investors to take more risk than they realized. Adding that those financial innovations were wrongly advertised as making investments safer and spreading the investors' risk. Paul Volcker (2009) mentioned two financial innovations, credit-default swaps and collateralized debt obligations, as responsible for bringing us close to financial disaster.

These two last opinions, highlight the possibility that not all financial innovations are creating value for the economy and society, or that not all those innovations are successful. There can be failures, and when those failures happen in extensively diffused innovations they can be costly (Lerner and Tufano, 2011). Also, innovation in financial services have led to changes on the financial markets and their institutions (Merton, 1995).

As sustained by a cross-country analysis from Beck et al. (2012), financial innovation encourages and helps enhancing capital allocation efficiency and economic growth. But, this comes with a cost, due to the increasing risk taking financial innovation attitude, bank profits are more volatile and fragile. In the end, financial innovation is associated with a higher but volatile economic growth (Beck et al., 2012).

3. Analysis of Mobile Payments as a Service Innovation

As stated before we will focus on mobile payments done with mobile phones. Usually these payments are done through the use of a specific software, or a specific mobile app, installed in a smartphone. There are two distinct types of platforms that may be used for this purpose. In order to facilitate the analysis of the innovation of this service, it is important to make the distinction between those types of mobile apps that can be used for mobile payments.

The most common type of apps used in Europe are the **generic digital wallets**. In these kind of software, it is possible for the customer to store a credit, debit or prepaid card in digital format, and have it accessible in the mobile phone to do payments wherever they want, if the merchant has an NFC-enabled point-of-sale. It is also interesting to realize that Apple Pay, Samsung Pay or Google Pay are some of the most famous generic “pay” digital wallets and are not provided and managed by banks, but by incumbents from technology industries. Nevertheless, some

banks as ING, CaixaBank, Nordea or BBVA have also been developing their own generic digital wallets available for their customers. Also banks have to partner with those technology incumbents in order to make their cards compatible with those generic wallets and also by allowing other functionalities through their apps, as peer-to-peer transferences and administration functionalities of their digital cards, as blocking or activating cards.

Besides generic digital wallets, there are also other kind of **cashless solutions** provided for certain companies, events or venues. This kind of solutions have different systems and software. Usually in Europe these products are developed by banks, with the help of software development companies, for some of their partners (clients) which may be a company from a wide variety of areas who has the need for these kind of mobile payment solutions. Essentially, those non-financial companies wish to integrate in their apps (or create a new one) a form of digital wallet, provided by the bank. The payment system may vary, but in Europe is very common to use a digital prepaid card which is integrated in the specific digital wallet for use within the institution's enclosure, event or venue. Another format of this systems, very popular in China, is doing the payments transactions through the utilization of QR codes with that purpose. This kind of apps and cashless solutions may be provided by retailers (online or non-online), sport institutions and venues (as a stadium or a ski resort), leisure compounds (as a music festival or a thematic park), etc. There are a lot of possibilities in this sector, and the market is evolving fast, with constant new cashless solutions arising frequently.

3.1 Characteristics of the Service and Modes of Innovation

3.1.1 Formalization of Mobile Payments Services

Having the distinction done in the previous paragraphs clear, it is now possible to analyze which modes and models of innovation are present on mobile payments. With that purpose, it is first important to adapt mobile payments services to the general formalization of a product done by Gallouj and Weinstein (1997), which was also based on Saviotti and Metcalfe's (1984) framework on the technological phenomena for the construction of a general description of innovation for mobile payment.

As said before in the section 2.1 of the Literature Review, the model elaborated by them, states that the general form of a service provision is based on a set of characteristics and competences, outlined in Figure 1. The service final characteristics or use characteristics of a good (represented as vector Y in Figure 1) are the characteristics visible to the final consumers or

users of that service. There is also a set of technical characteristics (represented as vector X in Figure 1), internal to the service provision which enable its provision. For sake of convenience, these technical characteristics are considered the same as process characteristics by Gallouj and Weinstein (1997). These internal technical characteristics are codified routines of competences, or organizational competences independent of individuals. They may be tangible or intangible and back office or front office technical characteristics.

Regarding the competences considered in this general form of service provision, there are two different types of competences. First there are the competences of the service provider (represented as vector C in Figure 1), which are inherent to each individual working for the service provision. They are individual competences, not easily transferable and inseparable from those individuals. They also may be competences intrinsic to a delimited group of people working for the service provider. Besides those competences of the service provider, generally there are also needed competences of the client (represented as vector C' in Figure 1) in order to enable the provision of the service. These competences reflect the customers' capacity to absorb and assimilate new competences for utilizing the service, which nowadays is very relatable to the technological competence of the client.

A lot of times there is a strong service relationship between the competences of the service provider and clients, this is very present on products where there is co-production. According to Gallouj and Weinstein (1997), there is co-production of a service when there is an extensive and balanced interaction (essentially operational) and involvement of the customer in the service provision. This co-production relationship is represented by the combination of vectors C and C' in the scheme of a general form of a service represented on Figure 1. Also, highly complementary combinations of both type of competences may generate cases of high customer lock-in or dependency, this is common on the field of computer and highly technological services.

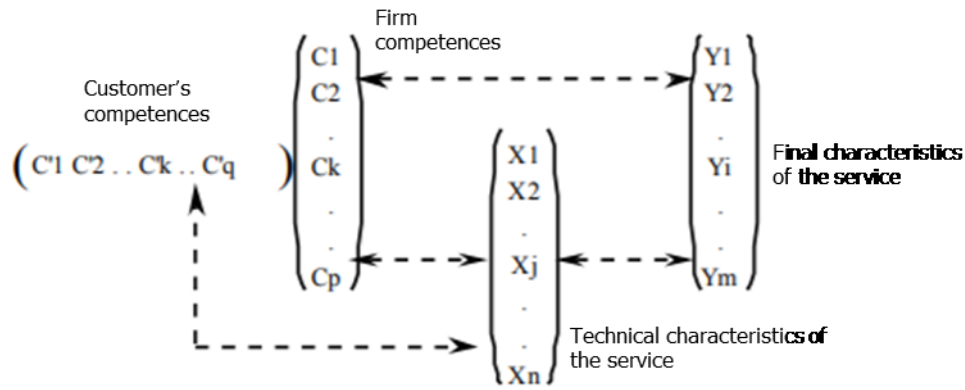


Figure 1 - General Form of a Service (Adapted from: Gallouj and Weinstein, 1997)

There are indeed a set of complex relationships and process for the provision of a service that need to be taken into account. Some services, completely intangible ones, may not require technical characteristics for the service provision and only the direct mobilization of competences, which is not the case of mobile payments. Indeed, for mobile payment services to work there are a set of technical characteristics needed for the service provision, mainly technological ones. This service needs the utilization of technical characteristics based on competences for the proper service final characteristics to be provisioned to the customer. Therefore, each technical characteristic mobilizes competences in certain situations.

In mobile payments the technical characteristics are essentially information technology ones. Needed for the development of software, like mobile phone apps or platforms, and also NFC technology. This technological characteristics and issues were very mentioned in the interviews due to its importance and also as a reason for mobile payments services lack of maturity in European markets. Interviewees referred that only recently there has been a stabilization of the technology used. Initially, in Europe, during the beginning of this decade mobile payments appeared using a SIM based solution, which involved banks and Mobile Network Operators (MNOs). According to the interviewees this solution failed due to the declination of this model by banks, which considered that MNOs had an intrusive strategy, trying to enter the financial industry and the market of banks. In the end, banks changed to the adoption of Host Card Emulation (HCE) technology which allows transactions through NFC. This technology facilitates the ease of the payment, as the POS terminal only needs to be NFC-enabled, which is the same as for contactless payment cards. This new technology was enabled by mobile network manufacturers instead of operators, which explains nowadays dominant position of

manufacturers and mobile operator system providers as Apple, Samsung or Google on the mobile payments sector.

There is also the need for general payment systems expertise and knowledge, which is an intangible technical characteristic. Besides that, for mobile payments provision, banks or other institutions who provide it also should have marketing and sales expertise in order to commercialize these kind of solutions and penetrate the market. A strategic mind-set is also another important technical characteristic, mainly for banks that are focused on developing cashless solutions for other institutions. This is important, as banks should assess in which partners should they invest in these kind of cashless and mobile payments projects and when.

Regarding the use characteristics (final characteristics) of mobile payments provision, as explained before, they are more commonly provided through a mobile phone platform. Mobile payments focus on providing convenience and comfort as final characteristics to its users. Also providing for its customers a payment solution with high liquidity and divisibility. Indeed, with mobile payments there is no need to carry a physical wallet with coins, cards and cash in general. Nevertheless, a big obstacle to this is the need to carry physical ID cards or other kind of cards as driving licenses. During the interviews, this was noted as a major problem by the experts working in this area. In fact, it is only possible to leave the wallet home and only use a mobile phone for purchases when it is also possible to carry all the reminiscent cards we usually carry on our wallet in a digital format in our personal mobile device. Nevertheless, interviewees think that in medium-short term (2 to 5 years) that will start to happen, and this will probably generate a revolution in the payments sector, increasing drastically the use of mobile payments. One of the interviewees even referred that there are already several possible safe technologies that may be used for generating digital IDs, as is the case of blockchain technology.

Competences of workers should and usually are very technology and digitally oriented. Having technological or innovation training and capabilities. Also, who develops these kind of products usually have a vision for a cashless and digital future, which is something intrinsic to individuals and referred by the interviewees as very important, as these solutions have been developed from scratch. For cashless solutions that are developed by financial institutions to other companies, their partners, it is also very important the interaction between the employees and the partners. The professional and social competences that enable the leveraging of those partnership relations are therefore also very important for the successful provision of mobile payments.

These competences depend a lot from bank to bank, as they are competences intrinsic to the people who work directly on the development of those cashless solutions.

Competences of clients in these kind of technological and software based services are also important, as in order to use them they need a certain level of information technology skills and capabilities, and knowledge regarding the use of a mobile phone and exploring its capacities. In the payments sector, this was not required at all before the existence of mobile payments with the use of cash or even payment cards. This issue was also very mentioned during the interviews, as experts working on the area think that the level of usage nowadays is also limited by a lack of education on mobile payments. Instead people are educated to use cash or payment cards, indeed it also took time for educating consumers to the use of payment cards and now there is the same struggle with using your mobile phone for payments. Also was referred that people may be afraid of using it, or associate more safety risks with paying with this kind of device in opposition to other forms of payment. In the end, interviewees considered that people are still being educated about mobile payments. According to them this also explain why today mobile payments are more popular among millennials or “techy people”.

Mobile payments characteristics and competences that mobilizes are indeed different from previous payments solutions. This leads to different modes and models of innovation that will be analyzed in the following section.

3.1.2 Modes and Models of Innovation in Mobile Payments

After the service formalization done by Gallouj and Weinstein (1997), they were able to identify different types of innovation. As uncovered before, in the section 2.1 of the Literature Review, there may be radical innovation, improvement innovation, incremental innovation, ad hoc innovation, recombinative innovation and formalisation innovation. With the previous formalization of mobile payments services through the optics of banks as providers of that service, we can now identify several forms of innovations involved in this service.

First is important to denote that it can be considered that there is presence of incremental and improvement innovation. Incremental due to the addition of IT technical characteristics to the provision process, and also due to the substitution of an important use characteristic of this service, as is the usage of an app or software as enabler of the payment, instead of previous usage of cash or a payment card. Improvement innovation due to the fact that there is the improving of certain characteristics and also competences, namely IT competences which are

needed for the provision of this product when compared with the provision of cards as a medium of pay.

Nevertheless, more than incremental or improvement innovation, there is evidence of radical innovation. This is because mobile payments correspond to a new system of payments, where some of the new characteristics introduced to this service have no connection to the previous ones. Also, there is a set of new competences needed of the providers, described in the previous section, that are a novelty for the payments sector. Clients' competences are also renewed, and there is a need to teach and educate clients on adoption and usage of mobile payments, due to its new technological and final characteristics, highly IT intensive. In the end, there is clear evidence of radical innovation, as a new payments system is introduced to the market.

According to the interviews, mobile payments brought a change of paradigm to the payments business model. This completely new system, removes some relevance from banks, as mobile phone operators and manufacturers benefit from the huge amount of data they process from their clients, as well as having technological advantage as mobile payments platform providers. This allied with low economic benefits from providing payment services due to low interchange fees, is encouraging and directing banks to focus much more on providing financial added value services complementary to the payments operations instead of providing the mobile wallet itself. Using mobile phones, which nowadays are very smart personal devices, for payment activities makes much easier for banks to provide complementary financial services to their customers, as the option to do payments with installments or provide an insurance at a distance of a "click". Also invoices can be managed better and mobile payments easily enable the prediction of behavior and even payments, facilitating customers' life and offering added value to them. Easily offering customers solutions that allows them to keep up with all their payments. These new payments systems may in fact make life easier for customers, facilitating their own financial management through putting payments on the center of client's daily decision making. In fact, a lot of services can be provided and performed very easily through these platforms, at distance of a click or even using our voice or fingertips (biometrics), representing a huge market opportunity for banks. Nevertheless, this is still on an early stage, and probably in the following years there will be an exponential increase of value added services available through the use of mobile services.

As said before, at the moment, this new product is still on maturation phase, and therefore there is also evidence of ad hoc innovation. Due to the fact that banks are trying to perfection their

products and cashless solutions, trying to increase the number of adopters and users. For that there is a cumulative learning process, where banks try to create interactive solutions for their clients. This is very evident on the case when banks develop cashless solutions for their partners, usually companies or other institutions, who are eager on having in their own app, a method of mobile payments. Those cashless solutions have to be produced in accordance to the partner (client) needs, and therefore there is an interactive construction of a solution between the provider and client. These apps or software developed with this purpose, are fully customized innovations, as it may depend a lot on the type of partner it is and the industry he is at (it may be a retailer, a leisure provider, a sporting club, a music festival promoter, etc.). It is possible to visualize this innovation process in a simple way below.

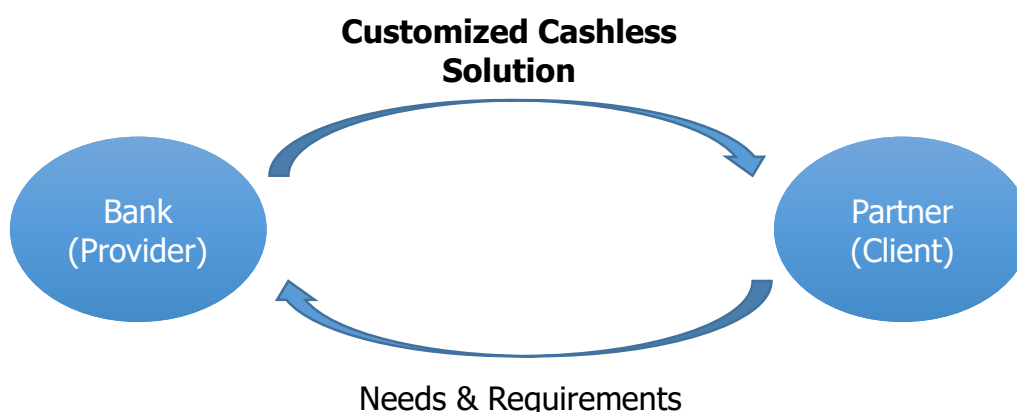


Figure 2 – Adhoc Innovation scheme, representing the interactive innovation process for the creation of specific cashless solutions

Also, in this kind of solutions provided by banks to its partners (clients), it is also used a lot of times a set of new combinations of final characteristics in order to meet the partner needs. This is called recombinative innovation, which is not that common, but depending on the partner's needs, banks may use it as a form of creating a new solution for them, using and recombining already previous apps and software combinations, re-utilizing certain elements and components of them. It is a low cost innovation process with no need of prototype perfection or intensive research. Nevertheless, it is hard to protect those innovations, as they may be imitated and replicable relatively in an easy way.

Finally, regarding formalization innovation, according to interviewees there have been an increasing standardization of this service. Nevertheless, due to its early stage it is still in a mutation and transformation phase. In fact, not all mobile payments characteristics are still

specified, there has been constant change, addition or substitution of characteristics to the service, making its characteristics still a bit hazy.

3.2 Creating New Markets through Service Innovation

As disclosed in the chapter 2.1 of the Literature Review, Berry, Shankar, Parish, Cadwallader and Dotzel (2006) have conducted a study and extensive research that enabled the development of a matrix that offers a strategic vision about service innovations that may create new markets (matrix in Figure 3). Within this same research, they also managed to determine nine central and essential drivers of success for a service innovation to create new markets.

In this analysis we will focus on this taxonomy of service innovation and adapt it to mobile payments, to understand where that innovation fits in the matrix developed by Berry et al. (2006) and if the providers of mobile payments are indeed being able to create a new market and exploiting all the drivers for market-creating service innovations. Berry et al. (2006) study focus on companies that develop a service that creates new or reshapes markets, making the company enjoy unforeseen sustainable profits. Therefore, for our analysis it is important to have in mind which are the main providers of the service we are analyzing. As explained before in the chapter 2.3.2 “Introduction to Mobile Payments as the Main Innovation Trend in Payments” the main providers at the moment are Banks, information based companies as Google or technology based manufacturers as Apple or Samsung. Also, it is important to denote that there are numerous Fintechs and companies from other sectors, appearing with relative regularity with new products to the payments market.

Initially, it is important to define what market-creating service innovations are. The authors define it

“as an idea for a performance enhancement that customers perceive as offering a new benefit of sufficient appeal that it dramatically influences their behavior, as well as the behavior of competing companies” (Berry et al., 2016, p.56).

For market-creating innovation services, there are two possible types of new benefits created that are identified by the authors. One of the benefit offered by the innovation may be a new core benefit of the service, or a new delivery benefit that revolutionizes customer access to the core benefit. Besides the type of benefit offered, the matrix designed by the authors of the study in question, also makes reference to the degree of service separability. This second dimension makes the distinction to whether it is a service that must be produced and consumed simultaneously (inseparable service) or if it that is not necessary (separable service).

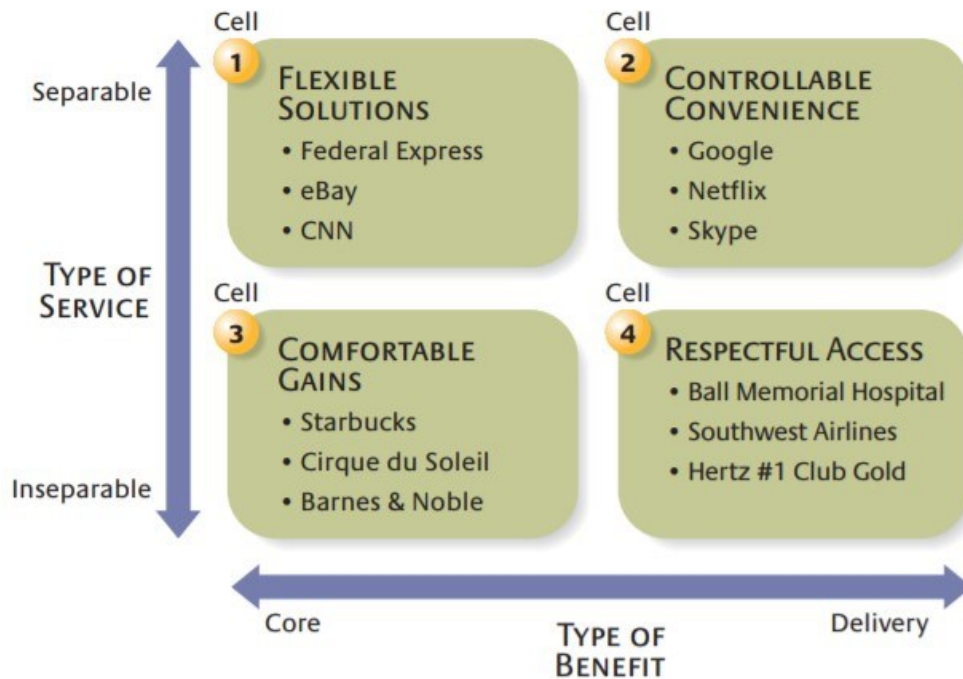


Figure 3 – The Four Types of Market Creating Service Innovations (Source: Berry et. al, 2006)

As you can see from the matrix in Figure 3 there are four different cells or quadrants in which managers can target innovations, which represent four different approaches to market-creating service innovations:

- **Flexible Solutions** – The cell refers to an innovation that offer a new core benefit and that can be consumed in a different time and place of production (separable service). These innovations end customers' constraints of time and place, focusing on a fundamental service benefit that may be experienced separately from the provider.
- **Controllable Convenience** – Here market-creating service innovations are separable and are done through new delivery benefits that offer controllable convenience. Essentially a service can be used more easily, through creative service system design and technology application. Customers are in control of how they access a desired service.
- **Comfortable Gains** – Which describe inseparable service innovations that offer a new core benefit. Providing comfortable gains to its customers, through a new distinctive experiences.
- **Respectful Access** – In this quadrant, customers are offered a new delivery benefit innovation, and the service production and consumption are inseparable. The key for

innovation in this cell is to show respect for customers' time and physical presence in using the service, by fundamentally enhancing the ease with which the customers can experience an inseparable service.

A reasoned analysis of these concepts, which are extensively explained by the authors, together with the knowledge provided until this point in this thesis about mobile payments services, make us arrive to the conclusion that mobile payments are included in the Controllable Convenience cell. In fact, either in the form of generic digital wallets or in the form of cashless solutions explained in the beginning of chapter 3, both type of mobile payments are separable services that offer a new type of delivery benefit.

Those mobile payments platforms are developed beforehand and made available for customer use whenever they need. Therefore, this is not a service that must be consumed at time and place of production as the service is already available for independent self-use; so this service can be consumed separately from its production.

The providers of mobile payments platforms, as Apple, Google, or numerous banks, didn't invent the core benefit of providing alternative electronic means of payments, this already existed and in different forms, like payment cards. In mobile payments, the market-creating service innovation is the availability and convenience of using a mobile phone for general daily payments, with no need to carry a physical wallet with cards and cash, or pocket change. Besides that, there are a set of complement services to the core payment service, as paying in instalments or contracting an insurance, which can be very easily contracted and provided to clients using their mobile for payments. Indeed, it is an innovation that intends to reshape the world of payments, using a delivery innovation to offer the benefit of mobile payments, making them easier and more convenient. Customers are more in control of how they access and use this service, as now besides having a different payment option with added value, these kind of platform also offers other characteristics not available before, as instant balance account consulting or peer-to-peer money transferences. This innovation enables customers to reach and use a payment service more easily, as well as other complementary services.

In the study done by Berry et al. (2016), the authors managed to come across nine factors that determine success or failure of a market-creating innovation. Those drivers are always exploited by the most innovative companies. The drivers of successful service innovations were identified

in the chapter 2.1 of the Literature Review, here we will try to analyze if they are verifiable in mobile payment services innovations.

- a) Scalable business model – A successful innovation should be scalable through production economies and distribution benefits. This may be hard in the case of service innovations that are primarily people-intensive and thus harder to scale, this is not the case of mobile payments as they are more capital and technology intensive. In fact, mobile payments cashless solutions provided by a bank to a specific partner, can be easily scalable and reproduced for the creation of other cashless solutions for numerous partners of the bank at a minimum cost. Being the industry highly capital intensive, as most financial industries, it facilitates the scalability of the service innovations and a long-term perspective profitability.
- b) Comprehensive customer-experience management – Usually services have many “touch points” with the consumer or discrete experiences that contribute for a total experience directly influencing customer’s assessment of quality and value of the service in question. This is very relevant for mobile payments, where customers need to continuously interact with a mobile app in order to use its capabilities, as doing payments or other potential services those platforms may provide. In the case of inseparable services, customer experience is critical due to the fact that there is a visit of the customer to the service provider “factory” where he probably interacts directly with its employees or facilities. This does not happen on mobile payments, a separable service where the client interacts at his own will with an app to use the required service. Nevertheless, due to increasing competition in the sector, a lot of attention has been given to customer experience on the use of different payment systems as well as overall in the retail financial sector, where a lot of institutions are aiming on the achievement of a competitive advantage through overall customer satisfaction. In fact, from the interviews it was clear that banks and other providers are trying to leverage all the possible touch points they have with their clients through having a better customer experience, being today one of the main focus of the industry suppliers.
- c) Investment in employee performance – In general, the authors of the study in question also discovered that the providers of successful service innovations invest a lot and continuously on employees’ willingness and capability to perform at consistent high levels. This is very evident in companies like Google and Apple, highly dependent on

technology to stay ahead and also providers of mobile payments, that invest aggressively on its employees' performance, and on having the best technical talent available. Also providers of mobile payments from the financial sector, as banks, are indeed increasingly concerned about their employees. Banks are doing an effort to increase investments in their employees' performance and quality, in order to compete with companies as Apple or Google which are famous for having excellent employee conditions.

- d) Continuous operational innovation – Operational innovation is important, as it is difficult for imitators to catch up with service innovators that are continually improving their operations. Mobile payments provision is complex, involving a lot of procedures and stake holders, usually an operational-intensive sector where only companies with access to cutting edge technologies and talent can compete.
- e) Brand differentiation – Brand is an important success driver for a market-creating service innovation, because of the importance to build strong and trusted brands in which customers can connect with. A trusted brand that reduces perceived risk of usage is especially important in the financial industry, and also more specifically on payments services. Therefore, communicating a consistent message of trust and reliability is something important for the providers of these kind of services, which banks and premium brands as Apple try to maintain.
- f) Innovation champion – For these kind of innovations, it is important to have an innovation champion that leads the transformation, a mobilizer of resources, a master persuader and a doer, who can imagine possibilities and envision the future. On an organizational level, there are plenty of innovation champions within the payments industry, mainly technology and information based companies like Apple or Google that also provide mobile payment services and that lead transformation of ideas into market realities in different sectors. Nevertheless, according to interviewees, an increasing number of companies operating in the payments industry as CaixaBank, BBVA, N26 or Visa are also becoming innovation leaders in their segments and regarding mobile payments, pushing the transformation to electronic payments in European markets.
- g) Superior customer benefit – In order to create a new market, service innovations must have a clear offer and better solution to a problem of sufficient importance to stimulate customers to try that product. Mobile payments are a recent innovation, and only very

recently is possible to see a relevant number of consumers and merchants using them in developed countries. In the case of Spain for example, by January 2017 mobile payments were used by around 0,5 million consumers; this value rose to about 3,5 million users by April 2018 (CaixaBank available data). Nevertheless, it is possible to verify that they allow customers to save time and effort. In fact, mobile payments are a more convenient way of paying, which makes obsolete the need to carry a wallet with cash or payment cards inside, nevertheless as mentioned in 3.1.1 Formalization of Mobile Payments Services, according to the interviewees this is still dependent of the emergence of a digital ID. Those payment apps also make obsolete the need to go to a bank branch to manage your account and cards, or to transfer money, which also saves effort, time and money to customers. Finally, as mentioned in 3.1.2 Modes and Models of Innovation in Mobile Payments and stated by interviewees, it is a product that enhances a lot of complementary value added services, which also add a lot of value and bring novel benefits to the core payment service.

- h) Affordability – Market-creating innovations also require an emphasis on cost efficiency, maintaining the service affordable for the customers. In mobile payments this is visible through two different dimensions. First, they make obsolete the use of physical payment cards, putting an end to the cost of manufacturing and stamping, and making way for cards only on digital format with lower annual fees. On the other hand, the cost structure and efficiency also benefits from the easy replicability and scalability of doing mobile payments cashless solutions for different partners.
- i) Continuous strategic innovation – Continuous strategic innovation is something that should be intrinsic in companies who want to create new markets through service innovation. Incumbents and entrants of technology and information sectors are very conscious of this, and highly incentivize innovation from managers, employees, even customers or other partner companies. Nevertheless, the banking sector only recently is “awakening” for this phenomena and have been adapting their organizational structure to facilitate this strategic innovation mindset within banks. This is a very important trait of this sector and there have been different initiatives from different stakeholders of this industry for implementing a continuous innovation strategy and culture. In Barcelona for example, it was created in 2017 a payments innovation hub, between different global partners operating on mobile payments, as CaixaBank, Global Payments, Visa and Samsung (Clemente, 2017).

Mobile payments are still on a maturing phase and at this point is hard to access if this new service will be able to create a new market and if all of the success drivers are being followed by all the sector which is providing these services. The fact that there are numerous and very different companies providing this service, using different technologies also poses further obstacles to this analysis. Some providers use QR codes as mobile payment enabler and some others use NFC, there is still not a standard worldwide service provided in a homogeneous way. The technologies used are different and much diffused through the companies operating in the market, hindering a customized product and technology for mobile payments provision, and leading to a product yet far from a stable phase.

Nevertheless, it is possible to recognize that there is a lot of potential on this innovation for creating new markets, as it is a service with high degree of separability providing a new delivery benefit that revolutionizes customers' access to the core benefit of a payment service. Besides concluding that this service innovation is included in the Controllable Convenience cell of the matrix developed by Berry et al. (2016), it is also possible to conclude that different success drivers have been followed by the sector providing this service. Scalability of the business model, affordability, brand differentiation, being innovation champions and a continuous strategic innovation are some of the drivers clearly followed by companies operating this service. Nevertheless, some other drivers are not so clear if they are being followed or not by most of the providers. The fact that this service is on constant change and adaption to new technologies and needs make this analysis very hard to do and sometimes a bit unclear. Existence of several providers from different industries, contributes for the difficulty of this analysis, as some companies of the payments sector may follow or not those drivers of success, while for other providers may be unclear.

4. Analysis of Mobile Payments Providers Dynamics in Developed Countries

At the moment it is possible to realize that there are several mobile payments providers, from different sectors and with different roles in the provision of this service. This makes it hard to understand the dynamics between the providers and who they indeed are. In this chapter we will go through the providers, analysing their role and what differentiates each other. This analysis was made possible by the systematization of all the information specified until now and also, as in chapter 3, by the interviews made to experts working in the area as well as through my own experience doing an internship in a European bank and provider of mobile payments.

Initially we will cluster the providers in three different groups conceptualized below, in table 1, with examples. We will analyse each cluster, and describe the characteristics that differentiate one from another as well as traits connecting each other. The three groups are very distinct and all have their specific traits.

Cluster of Providers	Mobile Network Operators & Manufacturers (MNO&M)	Banks	Others (Retailers, Fintechs, etc.)
Examples of Providers	Apple Google (Android) Samsung	BBVA CaixaBank N26	Amazon Pay-pal Walmart
Providers Main Traits	Rich in behavioural data and technology	Specialised on financial services	Innovative and flexible

Table 1 – Mobile payments providers

The MNO&M are the ones leading the market at the moment, therefore we will start by considering that cluster. In fact, MNO&S are leading the mobile payments market as digital wallet providers. As showed in 2.3.2 Introduction to Mobile Payments as the Main Innovation Trend in Payments, some of the most used digital wallets are Apple Pay, Samsung Pay and Google Pay (formerly Android Pay). These platforms make possible that people store their plastic payment cards in a digital format on their phone, and therefore using the phone to pay. Apple, Google and Samsung all benefit from huge behavioural data they own of their clients. They also benefit a lot from being the main enablers of most of the technology being used for NFC (contactless) transactions through mobile phones. This two factors give these companies an advantage on this market when compared to the other clusters.

Nevertheless, this companies still not offer any other financial service, so banks are still needed in this environment as providers of financial services, and as issuers of digital enabled payment cards. Also, most small merchants need banks to provide them NFC or contactless enabled POS terminals, so that they can accept payments with phones or with plastic cards. These factors still give banks a position of extremely importance within this industry. A lot of banks also are trying to compete with the digital wallets mentioned before, by offering their own products for their clients. But the interviewees recognized it was hard for banks to compete with MNO&S on the provision of digital wallets. So they suggested that, besides provisioning their own mobile payments solutions, banks should also focus on partnering with MNO&M still

maintaining their dominant position as financial services providers and focusing on supplying MNO&M with value added services complementary to the mobile payment itself, as mentioned in 3.1.2. Modes and Models of Innovation.

Finally, the third cluster includes all the other different providers trying to offer mobile payments products. These other providers include incumbents from different industries eager to start offering financial services, as well as Fintechs or other startups that also desire to enter some financial service industries as is the case of payments. Companies in this cluster, usually have a very flexible and innovative culture.

As it is possible to see, it is an exciting environment with a lot of different players. Banks that once had a complete dominance on the provision of financial services, namely on payment services, now see their position threatened by the other two clusters. In fact, according to all interviewees, there is the possibility that in the near future companies from those clusters, as Google or Amazon, try in fact to provide a broader range of financial services (as credit or payment in installments) and scaling their business model also to the banking sector. Nevertheless, it is important to keep in mind that a move like this from one of those companies is also very risky, as at the moment they do not possess the knowledge and skills on financial services that banks do. Also they would have much more limitations imposed by regulators that they may now easily avoid as only providers of digital wallets for mobile payments. Additionally, a move like that would demand an organizational adaptation from those companies, as they would need more experts on financial areas as risk assessment areas, financial operations, fraud and money laundering, payment card issuance, etc.

The companies given as example in table 1 from the MNO&M cluster are also very international companies. That is also an important factor for their dominative position as mobile payments providers, as in order to use it you only need to have a mobile phone from that brand or operated with their system. In contrary, banks are usually limited by territorial laws and regulations, therefore restricting their operations to certain territories. This gives a relevant advantage to companies as Google, Apple or Samsung that operate in most developed countries.

This very dynamic market is in constant change, and banks have to become more flexible and innovative to counter the threats to their dominance in the financial services sector. All the experts in this area that were interviewed suggested that banks need also to open their ecosystem and cannot stay alone in the payments industry. Creating their own digital wallets may be a way

of keeping up with the market dynamics. Nevertheless, partnering with other companies offering digital wallets, as Apple or Samsung, is also essential for banks to maintain their relevance in the sector. However, when partnering with companies with other mobile payment products, banks should be careful and try to maintain the financial data of their customers as well as the financial knowledge of their employees within the bank, as that is a key competitive advantage that grants banks their relevant position on the payments industry. They suggested also that banks should have special divisions, similar to Fintechs, focused on innovation and technology that may give banks extra flexibility. Additionally, as said before it is also of extreme importance that banks start focusing both on leveraging their partners from different industries by providing them with their own mobile payments solution, as well as upselling their clients by providing them complementary added value services to the payment itself. Re-inventing their strategy according in this way will empower banks and probably help them preserve their relevance in the industry.

5. Conclusion

In this final chapter we will do an overview of all the information analysed until now and access its implications for managers and companies operating in the mobile payments industry, more precisely the implications for the banking sector. We will also access the limitations of this dissertation and leave some suggestions for future studies on mobile payments.

5.1 Conclusions and implications

During this study there were identified several threats to mobile payments products success. This should be considered by the industry managers as they may have an important role on the sector development. Probably the main threat identified is related to the lack of standardization of mobile payment products. Different providers use different product designs and use different technologies according to their goals, the country they operate and the regulation in force. Mobile payment platforms also have different functionalities according to different providers. NFC or contactless technology is becoming norm in developed countries, mainly in Europe where contactless plastic cards have extremely high acceptance rates all over Europe. Nevertheless, these products are still very heterogeneous, as well as the providers, which come from different sectors and contexts. This makes very hard to predict what will happen in the mobile payments sector in the following years, and how the product and market will evolve. This lack of standardization also makes harder to educate people and society on mobile payments, which is another restraint to this innovation.

Another major constraint today to mobile payments identified during this dissertation is the lack of existence of a digital ID, which makes harder for customers to leave their wallet at home and just carry their phones for payments. Nevertheless, this could change soon, as technologies as blockchain already enable these kind of innovations. Onboarding plastic cards on digital wallets is a process that may also discourage the usage of mobile payments. Additionally, as said before it is hard to change habits and also to educate people on these services, so there may be also a lot of people that still view these services with less trust than the previously existing payment methods, and are therefore scared to use it due to not being familiar with these technological devices and products.

Also during the dissertation there were identified several opportunities generated from the usage of mobile payments that may be explored by banks and other providers of financial services. One of those key opportunities is the data available from the customers. In fact, some providers already possess a lot of behavioural data from their customers. Banks do not own as much behavioural data when compared to other providers as Google or Apple, nevertheless they do own financial data of their customers that companies as Google or Apple do not have access to. This is a point of major importance, as access to behavioural and financial data together represent an enormous opportunity for the industry and for the product short term development and evolution. Additionally, there is also another major opportunity identified during this these. The usage of mobile payments not only enhances the availability of behavioural and financial data, but also makes possible and very easy for providers (namely banks, as the main providers of financial services) to upsell clients, by offering complementary services to the payment itself.

Also it is possible to conclude that mobile payments represent a radical innovation, having in mind the new or different product characteristics and competences for its provision and usage. In fact, it is a new payment system, also with different opportunities and threats to its general usage. Nevertheless, it is still ambiguous if this new service is creating a new market, as all the interviewees were sceptical to this idea and to the idea that these cashless payment services are substituting altogether the existing and more common payment methods (cash and plastic cards). They saw mobile payment products more as a complement to nowadays payments methods and as being a service with extremely high potential of generating a new market, replacing the previous one. Therefore, today it still isn't visible such a radical change on the market as compared to the product itself and its traits.

In the end, it is possible to conclude that the future of these mobile payments services are still unexpected but very exciting. As there are tremendous opportunities for the development of these product, as well as a few risks and threats to a more universal usage, that should be addressed in a near future by their providers. There is also the certainty that these products are changing the market, with new players from other sectors providing mobile payments services and entering and changing the payments industry for good.

5.2 Limitations

Several limitations to the study and analysis of mobile payments as a service innovation were already mentioned during the dissertation, namely the amount of diversity that there is between products offering the same service. There is a wide variety and heterogeneity of products and providers offering the same service but with minor differences regarding the platform design and its capabilities, which makes hard to conceptualize this service.

Another limitation of this study is the fact that the interviewees were all experts working in mobile payments area from the banking sector. There are experts working in companies from other sectors that may have a different view on the topic.

Finally, the payments industry (namely within the mobile payments area) has an environment that is changing very fast and constantly. This makes not only the environment and the industry very hard to predict, but also the product itself. This may be a limitation to this study and something that make mobile payments especially hard to study. As what is today considered mobile payments in a short term period, as two years, may be seen as a completely different product or service by providers of this service as well as academics studying it and its implications.

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7. Appendix

Interview Guide

Introduction

Interview for my thesis. Can I record it?

It is about mobile payments as a service innovation. Namely an innovation on payment systems.

I have been doing an analysis, comparing existing literature on innovation with mobile payments.

- analyzing what kind of innovation is present
- analyzing the market and who are the providers
- capacity of this innovation to generate new markets, and being disruptive.

We also want to access what are the implications for managers. Mainly of companies operating in this market, as banks, which are now on a completely different payments environment, with retailers, mobile manufacturers and other fintechns and e-commerce companies operating as providers of mobile payment services.

Questions (adaptable to interviewees' area of expertise)

I. Business Model & Innovation

1. What do you consider as the main traits of innovation in m-payments?

- a) Characteristics
 - i. Final / usage – characteristics seen by client and that provide direct added value for them
2. What are the main differences to existing payments business models (cards & cash)?
Is it a new business model?
 - i. Technical characteristics – intrinsic to providing the service to customer (all providers need)
- b) Which competences are necessary
 - i. Provider – the ones intrinsic to each provider (what within this sector may be a differentiator)
 - ii. Client – the ones needed by the client so that they can enjoy the product
3. Innovation wise – what is/are the main innovation(s) or area of innovations
 - i. Radical innovation
 - ii. New business model (radical innovation)
 - iii. Improvement – better characteristics
 - iv. Incremental – new characteristics added and some removed
 - v. Ad hoc innovation
 - vi. Recombinative innovation
 - vii. Formalization innovation (is there a standardization of the service characteristics)
4. Main advantages of m-payments/cashless solutions?
 - a) For customers – what is the value added (compared to cash / payment cards)?
 - i. Is there a superior customer benefit of usage (save time and effort)?
 - b) For providers – banks (how banks are involved in this technological trend and/or why should they be involved) – what comparative advantages do they bring?

II. Market

5. How do you see today the usage of m-payments?
 - a) Level of usage (may be in relative terms)
 - b) Maturity of the innovation and technology
6. Have m-payments created a new market or will they be able to. Why or why not?
 - a) New delivery benefit of the core benefit?

7. What future do you see for this innovation?
 - a) How do you see the usage of m-payments in the future? Maturity and usage wise
8. Who is leading the market?
 - a) Banks vs Fintechs vs other non-financial institutions (Apple, Google, Samsung, Qwant, Amazon, etc.) Why?
 - i. Radical innovation?
 - ii. Access to final customers
 - iii. Network effects
 - iv. More cost efficiency
 - v. Superior quality
 - vi. Etc.
 - b) What are the main characteristics of the relation and the dynamics between those providers mentioned in the point above?
 - c) Are there innovation “champs” / leaders?
 - i. Individually vs organizational level
 - d) Brand differentiation is relevant?
 - i. why / examples & trust / risk issues
 - e) Continuous strategic innovation is relevant for this service provision? Are banks focusing on this? (How, comparatively, how important it is)

III. Profitability

9. Are they more cost effective? (Affordability issues for customer and also providers)
 - a) Physical cards vs digital cards
 - b) Developing the app
 - c) Replicability of the app to other partners needing cashless solutions (Scalability of the business model)
10. Rentability
 - a) Physical cards vs Digital cards (M-payments) vs Withdrawing cash e.g.

IV. Other specific questions (depending also on interviewee area)

11. What is the formal or usual procedure for the development of a cashless solution for a partner? Examples.

- a) Differences to regular mobile payments
 - i. (relatable with questions 1 and 2)
- 12. Customer experience
 - a) Touch points (customer x provider)
 - b) Importance (having in mind that it is a separable service)
 - c) Is it a differentiator for customers' usage (why & how)?
- 13. Are there any other factors not mentioned before you consider relevant for the success or failure of mobile payments (now or in the future)?
- 14. Which factors from the ones stated before do you consider the most relevant for the success or failure of mobile payments?