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Supply and demand sides of mobile payment: A comparative analysis of successful mobile payment adoption in developed and developing countries

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Supply and demand sides of mobile payment: A comparative analysis of successful mobile payment adoption in developed and developing countries

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Abstract

Mobile payment services are experiencing the fastest growth compared to other payment methods, mainly due to the ever-increasing popularity of smartphones in recent years. Even though the technology has been available for more than a decade, mobile payment has been adopted into widespread usage only in some countries, including Japan, South Korea, Kenya and the Philippines. Nonetheless, other parts of the world appear to be catching up fast and it is important for both public and private sectors to understand the determinants of mobile payment adoption. This study investigates the drivers of mobile payment adoption in the past decade through comparative studies of both developed and developing countries. Conceptual frameworks, including the network effects and broadband ecosystem, are also applied to support the analysis offered in this paper. Moreover, this study explores the similarities and differences between the above mentioned countries and why they have been more successful in adopting the mobile payment technology compared to other states, such as the US and European countries.

The key finding is that a successful and widespread adoption of mobile payment requires strongly growing demand and ready availability of infrastructure and technology on the supply side. The rapidly growing popularity of smartphones fueled the demand side by making the new payment technology reachable by large groups of consumers. Nevertheless, the use of mobile payment could not be significantly increased without an introduction of killer applications in each country or region. This is where the regulators in both financial and telecommunication sectors play a crucial role. A good combination of regulation and/or policy on the supply and demand sides is a way forward.

Keywords: mobile payment, broadband ecosystem, adoption

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² The information and views set out in this paper are those of the authors and do not necessarily reflect the official opinion of the Office of the National Broadcasting and Telecommunications Commission.

1. Introduction

In the past few years, mobile payment has become an alternative mean of payment to cash, credit and debit card payments. Mobile payment applications have been becoming increasingly popular in several countries, e.g. Swish in Sweden, MobilePay in Denmark, Samsung Pay in South Korea and Apple Pay in many other countries. Mobile payment services show the fastest growth in comparison to other types of payments, which is due mainly to the explosive growth in smartphone usage in recent years. Statista (2016) has forecasted the volume of mobile payment transactions worldwide to grow from 450 billion USD to 1,080 billion USD within four years from 2015 to 2019. Mobile payments offer a number of benefits which facilitate economic, social and cultural aspects of consumers' lives. For example, the technology can reduce costs and save time for both public and private sectors. Even though mobile payment has only become the fastest growing payment methods in recent years, it has been around for more than a decade. Furthermore, in the first decade of the 2000s, mobile payment was widely successful only in some countries while adoption elsewhere appeared to be slow. In spite of efforts being made in the US and the EU, the most successful countries in terms of mobile payment adoption were Japan and South Korea among the developed economies, and Kenya and the Philippines among the developing economies. Nonetheless, with other countries catching up fast and the use of mobile payment becoming more common nowadays, it is important for both public and private sectors to understand the determinants of mobile payment adoption. From the regulator and policy maker perspective, understanding the key drivers of mobile payment adoption is crucial for bridging the inequality gap between adopters and non-adopters, leading to narrowing of the digital and social divide. On the other hand, mobile network operators, banks and over-the-top operators are likely to benefit from the knowledge of factors behind mobile payment acceptance which should enhance their marketing strategies and ultimately increase their competitiveness and corporate performance. Therefore, this study aims to advance the understanding of the determinants of mobile payment adoption through comparative studies of a sample of developed and developing countries, namely Japan, South Korea, Kenya and the Philippines. Conceptual frameworks, such as the network effects and broadband ecosystem, are applied to support the discussion in this paper. Moreover, this study explores the similarities and differences between the sample countries and how they have contributed to the successful adoption of the mobile payment technology, before comparing and contrasting these characteristics with those of other countries, in particular the US and EU member states.

There are seven sections in this paper. This section presents the importance and objectives of the study. Following this section, Section 2 provides more background on the mobile payment technology and its development while Section 3 summarizes previous literature on the topic. Section 4 presents two conceptual frameworks; the network effects and broadband ecosystem, which are then used to support the analysis in latter sections. Section 5 shows four comparative successful cases of mobile payment adoption. Then, Section 6 analyses and compares the similarities and differences in the factors which drive mobile payment adoption

in different countries. Lastly, Section 7 concludes and summarizes the findings of this study and suggests both theoretical and practical implications.

2. Overview of mobile payments and its development

Mobile payments refer to payments for which the payment data are commenced, communicated and/or verified via mobile phones or similar devices, such as tablets and phablets³ (EC, 2012). Although occasionally this term might be mixed with internet payments (e-payments), mobile money and/or mobile wallet, this study follows the definition proposed by the European Commission (EC, 2012) and focuses only on transactions fitting the above description. According to EPRS (2015), there are four main mobile payment methods which include (i) direct mobile phone monthly billing, (ii) premium SMS, (iii) mobile internet payment (through credit/debit card or third party such as PayPal, Google Wallet or other mobile money wallet) and (iv) using the near field communication (NFC) technology⁴. In general, the former three methods are categorized as remote mobile payments, while using the NFC technology is considered as a proximity payment. The benefits of mobile payments include savings of time and costs to both users and providers as well as enabling users to more conveniently track their transaction history. On the macroeconomic level, according to BCG (2011), the mobile payment technology has the potential to create more business, raise entrepreneurship and employment, and consequently strengthen country's economy. Furthermore, its introduction could improve financial inclusion by giving access to financial services to those who cannot access traditional banks, which may appear particularly important in underdeveloped and developing countries.

The first introduction of mobile payment was in Helsinki, Finland in 1997. Two Coca Cola vending machines which were able to receive mobile payment through SMS were launched (Dahlberg et al., 2015). Although the mobile payment technology had been first introduced before 2000, its use in the first years was limited due to a number of reasons, which were unique across countries. Unsurprisingly, Japan and South Korea, the two countries leading in mobile technologies, were early adopters of mobile payment. Later on, around the mid to late 2000s, mobile payment became broadly used, particularly for money transfers, in developing countries such as Kenya and the Philippines (Bradford and Hayashi, 2007 and Chopra et al., 2013). In contrast, the pre-smartphone era attempts to introduce mobile payment in the US and several European countries were somewhat unsuccessful (Ondrus and Pigneur, 2007). One of the main reasons for the limited use of mobile payment in these countries was the presence of well developed banking and financial sectors which were largely able to satisfy populations' financial transaction needs. Besides using cash, most citizens could also conduct payment through credit and debit cards; hence, the advantages of using mobile over card payment might have been not very obvious to consumers in those countries during the 2000s. Figure 1, which presents the number of mobile payment users in different world regions from 2009 to 2015, shows that most users of the technology lived in Asia and Africa, with North

³ Phablet is a type of a smartphone with a screen bigger than in a normal smartphone, but smaller than in a tablet.

⁴ Near Field Communication (NFC) technology is a method of data transfer which enables two devices to communicate directly with each other; for example, contactless payment via a smartphone.

America and Europe initially left far behind. However, the rapidly increasing popularity of smartphones around the world, particularly in the US and Western Europe (see Figure 2), accelerated the dynamic growth of mobile payment in all regions in the following years. As shown by Figure 2, the rising of smartphone penetration in the US and Western Europe has already passed 50% penetration in their regions in 2015. As a result, it can also be seen from Figure 1 that the number of mobile payment users in North America and Europe has been rising sharply since 2010 and North America appears on the path to match the number of mobile payment users in Africa in the next few years. Nonetheless, the popularity of mobile payment in Asia has been growing even further and its position as a leader is not threatened.

The main reason behind this surge in the mobile payment usage is the convergence of technologies in both telecommunications and financial sectors around the world in which banks have increased the use of mobile channels to communicate with customers and, at the same time, mobile operators have begun to provide financial services such as mobile wallets. While mobile banking allows consumers to access services offered by their banks, a mobile wallet enables those who cannot access a bank to make payment/transfer transactions. In addition, some content providers launched their own mobile payment services leading to a rise in competition in the mobile payment market; examples include Google Wallet, Apple Pay and PayPal.Me.

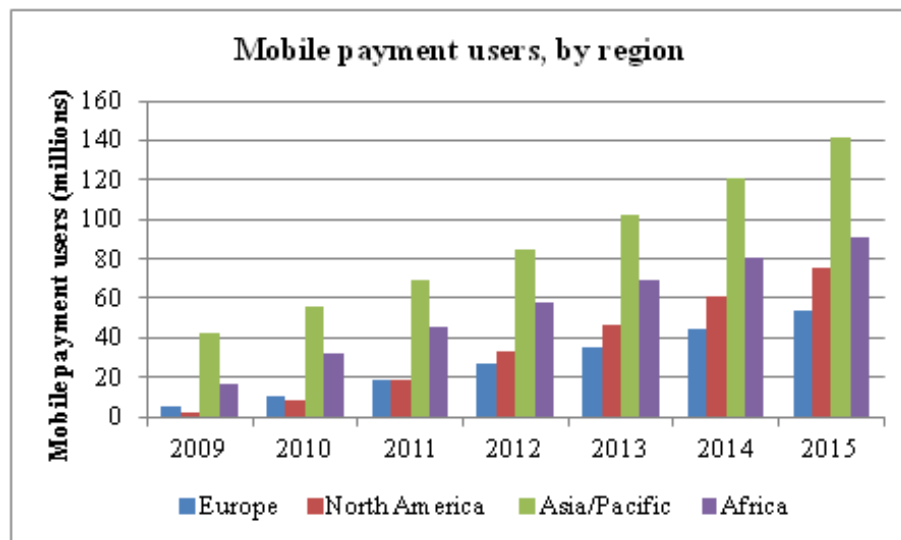


Figure 1 Number of mobile payment users, by region from 2009-2015
(Source: Statista (2016) Retrieved 22 July 2016)

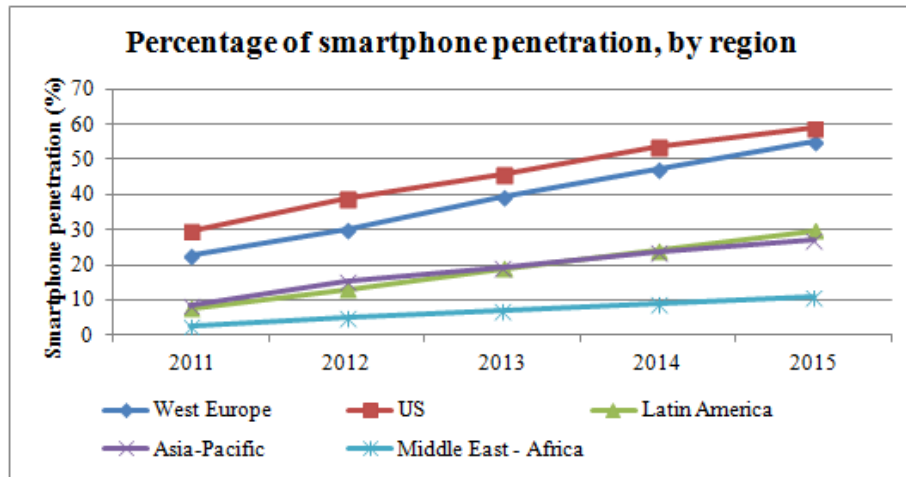


Figure 2 Percentage of smartphone penetration, by region from 2011-2015
(Source: Statista (2016) Retrieved 23 November 2016)

3. Literature on mobile payment

Seminal research on the adoption of mobile payment appeared as early as 1999, for example, Peirce and O'Mahony (1999), and the topic has become hotly debated in the years since then. Most studies focus on consumer acceptance. For example, Pousttchi (2003) identified three main categories of factors affecting consumers' decision to use mobile payment; costs, security and convenience. These three conditions vary depending on the individual's preferences. The author also suggested that mobile payment could go very far if it had low costs, was secure and easy to use. Similarly, Dahlberg et al. (2003) also explored conditions facilitating the use of mobile payment by consumers. The authors conducted two rounds of focus group interviews and applied the technology acceptance model (TAM)⁵. They then concluded that, in the case of the mobile payment acceptance, trust should be added to TAM along with the original factors, i.e. perceived usefulness and perceived ease of use. After that, a number of other studies applied TAM as their base theoretical framework and developed additional conditions to improve the explanations for the mobile payment adoption. For example, Zmijewska et al. (2004) applied TAM and proposed a set of acceptance factors to be extended to six factors which were perceived ease of use, perceived usefulness, perceived mobility, perceived cost, perceived trust and perceived expressiveness. Pousttchi and Wiedemann (2007) extended TAM by combining it with the task-technology fit model⁶. While the authors' findings supported the importance of the perceived ease of use, perceived usefulness and task-technology fit for adopting mobile payment, they did not agree with previous literature and rejected the security aspects as a main driver behind the adoption of mobile payment. Extending the TAM framework, Schierz et al. (2010) suggested that compatibility, mobility, and subjective norm were important factors for consumers' decisions to adopt mobile payment. More recently, Cobanoglu et al. (2015) expanded the TAM framework with additional determinants to investigate mobile payment acceptance in the hospitality industry. The authors mentioned that the compatibility with lifestyle is the most

⁵ See Davis (1989) for further reading on TAM.

⁶ The task-technology fit is a model proposing that the use of technology gives positive effects when it matches with required tasks.

significant factor for adopting mobile payment in the studied sector, along with its perceived usefulness, subjective norm and the previous experiences with mobile payment services. Surprisingly, the authors found that perceived ease of use is not a significant factor, which is in opposition to most studies. Thus, although there have been numerous studies on the use of mobile payment based on the TAM framework, the researchers have often found contradicting results and failed to reach concrete conclusions.

In addition to the TAM theoretical framework, other conceptual approaches, such as a case or multi-case study in selected countries, have been used to research the mobile payment adoption mechanisms. For example, Bradford and Hayashi (2007) analysed the developments in mobile payment adoption in the US by drawing comparisons with the two leading countries in mobile payment, Japan and South Korea. Similarly, Miao and Jayakar (2016) used Japan and South Korea as their reference to analyse how mobile payment in China might evolve in the near future. On the other hand, Mas and Radcliffe (2010) chose a developing country, Kenya, for their case study of the mobile payment adoption. Furthermore, there were studies pointing out the main reasons why mobile payment could not globally take off in the 2000s. Both Ozcan and Santos (2015) and de Reuver et al. (2015) suggested that disagreements between market players, particularly telecommunications operators and banks, were one of the main reasons. Unlike most innovations whose early adopters tend to be concentrated in developed countries, the early success of mobile payment was more egalitarian and came from a handful of both developed and developing countries. This poses a unique opportunity for researchers to analyse similarities and differences across these countries and how they affected the adoption of the mobile payment technology. In addition, a better understanding of these factors in the most successful adopters may help to explain the mechanisms of adoption and increasing popularity of mobile payment in other countries in the recent years. To fill these research gaps, this study has chosen four countries, two developed countries; Japan and South Korea, and two developing ones; Kenya and the Philippines, as a sample for a comparative case study. The ensuing sections analyse the drivers of successful adoption of mobile payment in the four sample countries from the supply and demand perspective.

4. Relevant conceptual frameworks

Mobile payment can be categorised as a mobile application which, just like other "apps", requires access to mobile internet and associated network infrastructure. The intricate relationship among mobile applications, mobile internet and mobile network infrastructure is discussed in Kongaut and Bohlin (2015) who propose two conceptual frameworks: the network effects and broadband ecosystem. These two concepts, which form the basis of this study's conceptual framework, are briefly explained below.

4.1 Network effect

Like most telecommunication services, mobile payment has positive externalities called *network effects*. According to Easley and Kleinberg (2010), when technologies or innovations have been adopted, direct-benefit or network effects arise as communications or interactions

among users multiply. For example, the value of traditional telephone voice service depends on the number of users. The higher the number of telephone users, the more benefit the service can provide to each user since a user can widely communicate and reach more users. This concept also applies to social network applications which rely on user interaction, such as Facebook, Twitter and WhatsApp. The mobile payment technology is also subject to this kind of effects which can be further split into direct and indirect network effects⁷. For the direct effect, the more users of a mobile payment service, the more interaction nodes among users can arise and consequently the service should have higher value to participants. For example, consumers who send money to others should extract greater benefits as the number of service subscribers increases and money can be sent to or received from a larger number of individuals. Also when considering trade transactions, the more sellers who accept mobile payment, the more purchasers should mobile payment attract, and vice versa. The indirect effect is linked to the fact that any mobile payment service is a part of a broader technological ecosystem (see Section 4.2) and an increase in its use leads to an increase in the demand for complementary goods and services, such as mobile internet and physical network infrastructure. An increased usage of mobile applications requires more bandwidth and faster speed; hence, a higher number of mobile payment users, or any other mobile service, results in a need for more resilient mobile network infrastructure which ensures adequate coverage, reliability and speed for its subscribers. In a similar way, faster network speed and better coverage are expected to lead to a more widespread and sophisticated usage of mobile payment (Kongaut and Bohlin, 2015).

4.2 Broadband ecosystem

In general, the term ‘broadband ecosystem’ refers to the relationships among different layers and players in the broadband market. Several organisations have defined the concept of broadband ecosystem (see FCC, 2010, Raja et al., 2010 and KPMG, 2012 for their respective definitions). While the definitions differ in detail, they all agree that the broadband ecosystem consists of the relationships among four elements; (i) network infrastructure, (ii) services (including devices), (iii) content and applications, and (iv) users. This study follows the World Bank’s concept of broadband ecosystem proposed by Raja et al. (2010). It also considers both fixed and mobile broadband as parts of the broadband ecosystem. Based on Raja et al. (2010) and Kongaut and Bohlin (2015), Figure 3 presents the framework of broadband ecosystem and the location of mobile payment in this ecosystem.

⁷ A similar classification has been proposed by Atkinson (2007) and FSR (2011) in their work on broadband service.

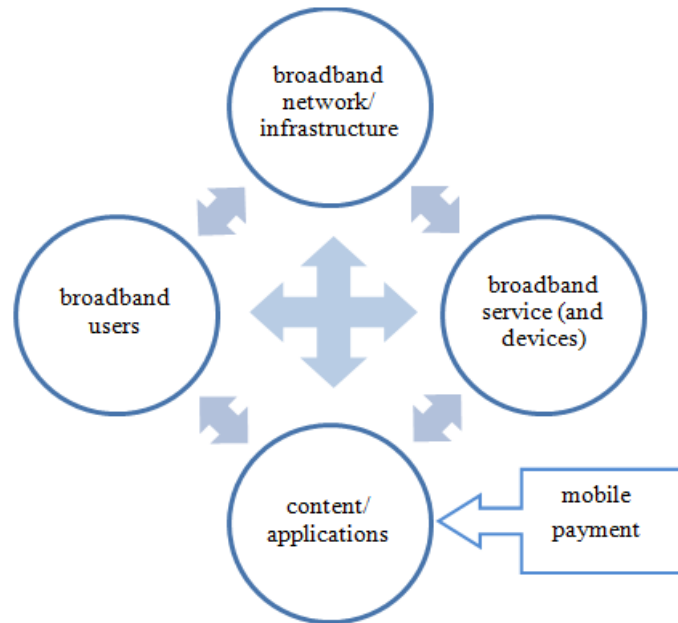


Figure 3 Mobile payment in broadband ecosystem
 (Source: adapted from Raja et al., 2010, and Kongaut and Bohlin, 2015)

Figure 3 shows six two-way relationships between each pair of the four market layers in the broadband ecosystem⁸. Regarding to a relationship between applications and users, applications (in this paper – mobile payment) can be considered as a supply side of a relationship. On the other hand, the relationship between applications and broadband services (or broadband network), the content/applications layer can be seen as a demand side. Thus, the growth of mobile payment depends on other layers, in particular the availability and condition of broadband network, broadband services and users. At the same time, a rise in mobile payment can have an effect on broadband adoption as well as the development of broadband services and broadband infrastructure. According to the Federal Reserve System (2015), in the recent years, mobile payment has been increasingly used through mobile applications, such as mobile banking and mobile wallet, which belong to the content/applications layer in Figure 3. For example, in the US, the most common mobile payment of smartphone users is through mobile applications. Also, in 2014, almost 40% of mobile phone users who have a bank account have used mobile banking, compared to 29% in 2012. Furthermore, Figure 4 presents the numbers of mobile payment and worldwide internet users from 2010-2015 (the number of mobile payment users are only accumulated from four main regions which include Europe, North America, Asia/Pacific and Africa). Figure 4 implies that both the number of internet users and mobile payment users exhibit an upward trend and are likely to be correlated. It can be seen that the number of mobile payment users have risen at a faster pace than the number of internet users. The direction of these changes may support the two-way relationship concept of broadband ecosystem where changes (growth) in respective layers mutually reinforce each other. Thus, the concept of broadband ecosystem is crucial for enabling greater understanding of the mechanisms driving mobile

⁸ Further reading on the six two-way relationships of an ICT ecosystem can be found in Fransman (2007).

payment adoption and illustrating how a policy directed at only one layer is likely to affect other layers as well.

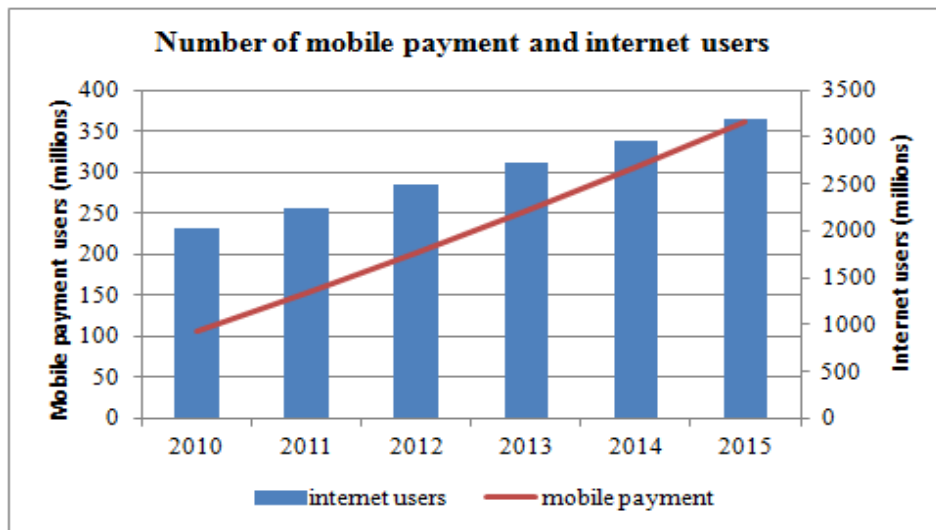


Figure 4 Numbers of mobile payment and mobile internet users from 2010-2015 (millions)
 (Source: Statista (2016) and Internetlivestats (2016) Retrieved 25 December 2016)

5. The success of mobile payment in developed and developing countries

5.1 Case 1: Japan (developed country)

Japan is often used as an example of a leading country in innovation, technology and telecommunications. Mobile payment is not an exception. The service was introduced in 1999 with the launch of i-mode mobile internet service by NTT DoCoMo, a dominant mobile operator in Japan. Within a few years, i-mode attracted over 38 million subscribers, accounting for 60 percent of the Japanese mobile internet market. I-mode offered several services related to mobile payment including mobile banking, ticket booking and mobile commerce (Mitsuyama, 2003). In 2004, NTT DoCoMo repeated the success of i-mode by introducing a contactless chip called FeliCa which enabled mobile phones to securely store and handle several important pieces of data; for example, personal identification, bank account data and travel card information. FeliCa appeared to be very successful also thanks to its speed - the time required to perform a single transaction is only about 0.1 second (Sony, 2014). In addition, the development of FeliCa allowed mobile phones to perform mobile payments using the NFC technology and act as a substitute for the traditional methods of payment such as cash, debit and credit cards. A mobile device with a built-in FeliCa contactless chip is called “Osaifu-Keitai” in Japanese which means a wallet mobile. Osaifu-Keitai can be used on terminals equipped with NFC readers located in vending machines, retail stores and on public transportation. As a result of the FeliCa development, mobile payment, particularly proximity payment, has become widely adopted in Japan (Bradford and Hayashi, 2007). For example, the number of mobile devices equipped with the NFC technology sold in 2009 exceeded 60 million units. In addition, subscribers of the iD service, a dominating mobile payment service offered by NTT DoCoMo, exceeded 15 million before the end of 2010 (Gibney et al., 2015).

However, according to the forecast by Analysys Mason (2016), while the overall number of mobile payment users in Japan is expected to gradually increase by 2020, the use of FeliCa is likely to decline. One of the reasons is that consumers are likely to turn to mobile payment applications on their smartphones, such as Google Wallet and Apple Pay, instead. Since the early 2010s, the smartphone usage has been explosively rising globally. The presence of two big international companies, Apple and Google, in Japan has significantly threatened the use of Osaifu-Keitai. Nevertheless, Japan has remained to be one of the leaders in mobile payment usage. This is helped by Japan's very well-developed financial sector as well as mobile networks and infrastructure which constitute the key factors of the supply side of mobile payment services. Given the strength of the supply side, Japan has a potential for rapid and significant increases in the mobile payment usage in the future when demand intensifies.

5.2 Case 2: South Korea (developed country)

In contrast to Japan, the early attempts of introducing mobile payment services by mobile operators and banks in Korea around late 2002 were not successful. One of the reasons for this early failure was a lack of reasonable cooperation between financial institutions and mobile operators (Miao and Jayakar, 2016). Instead, the early drivers for mobile payment in South Korea were payment service providers, for example Danal, Mobilians, Infohub and Inicis (KPMG, 2007). The South Korean appetite for and attitude towards new technologies, hence the demand side, played a key role in the expansion of the country's mobile payment services. This was helped by the popularity of South Korean films, dramas, music and in particular online games, which are highly susceptible to digital payment methods. For example, approximately 17 million Koreans (out of 48 million) played computer games in 2007 (Kalning, 2007). Such a large number of players was likely to generate high demand for content downloads from the online game providers, for example new characters, features and accessories. These, along with internet time top-ups, contributed to an increase in the demand for mobile payment at the start. For example, Danal, a payment gateway service provider, had a strategy targeting groups of young internet users and online gamers who were unlikely to possess a credit card and needed some other means of payment to purchase online content (KPMG, 2007). In an attempt to compete with payment gateway service providers, Korean mobile operators, such as SK Telecom, KT Freetel and LG Telecom, started to develop and reintroduce mobile payment services by partnering with credit card companies in 2007 and 2008 (KPMG, 2007). This time, the cooperation between mobile operators and financial service providers resolved some of the problems observed in the early 2000s (KPMG, 2007 and Miao and Jayakar, 2016) and the adoption of mobile payment in South Korea began to grow rapidly. Already in 2009 many goods and services were being purchased with mobile payment, including transportation, games, music, newspapers and gym memberships, just to name a few. In 2009, there were more than four million users who have regularly used various mobile payment services (Gibney et al., 2015). The Korean mobile payment market is much more competitive than its Japanese counterpart. While Japan's market is dominated by iD service from NTT DoCoMo, there are not only mobile operators (SK Telecom, KT Freetel

and LG Telecom) but also payment gateway service providers (such as Danal, Mobilans, Infohub and Inicis) competing in the Korean mobile payment market.

Furthermore, in the current smartphone era, there are several applications facilitating mobile payment. The three biggest mobile payment applications in South Korea include Kakao⁹ Pay, Naver¹⁰ Pay and Samsung Pay which have approximately 7 million, 4.5 million and 2.5 million users respectively (Korea Joongang Daily, 2016). Given the continuous development of both the NFC technology and mobile payment applications, well-developed network infrastructure, competitive market as well as Koreans' high demand for novelty and modern technology, there is no surprise that South Korea is one of the countries leading in the adoption of mobile payment services and this trend is likely to carry on into the future.

5.3 Case 3: Kenya (developing country)

Mobile payment in Kenya, in particular the M-PESA service, has been widely cited as an example of a successful mobile payment adoption. M-PESA was commercially launched in 2007 by Safaricom, a leading mobile operator in Kenya, and was first intended to facilitate person-to-person/peer-to-peer (P2P) payments (Mas and Radcliffe, 2010). The service allows customers to use their mobile phones to transfer money between users and purchase mobile airtime. Ensuing developments enabled M-PESA to process bill payments, for example electricity bills, and access some banking services, including loan repayments and money withdrawal (Mas and Radcliffe, 2010). Since the introduction of M-PESA, the access to financial services in Kenya has been rapidly improving. Data gathered by GSMA (2015) shows that the number of bankable population, those who can access financial services, rose from only 26% in 2006 to 67% in 2013. This was, at least partly, possible thanks to the consistently growing number of M-PESA's users which reached 9 million within the first three years of its introduction and continued to grow to 25 million subscribers worldwide, of which 19 million reside in Kenya, at the end of March 2016 (Mas and Radcliffe, 2010 and Ochieng, 2016). In addition, the popularity of M-PESA is not only evident through the high volume of transactions and subscriber numbers, but also through the average value of daily transactions which stood at approximately 140 million Euros per day in 2016 (Ochieng, 2016). The success of M-PESA in Kenya came from several factors, including positive attitudes among its users. According to the survey conducted in autumn 2008, more than 95% of them perceived the service as faster, cheaper, more convenient and less risky than available alternatives (Mas and Radcliffe, 2010). Also, Mas and Radcliffe (2010) categorised the drivers of M-PESA's success into three main perspectives; (i) market conditions, (ii) characteristics of the M-PESA product, and (iii) Safaricom's business strategy. Firstly, the market conditions in Kenya were ripe for a successful introduction of a mobile payment service. According to The Economist (2013), a large portion of the Kenyan population works in urban areas but then regularly send money back to their families in rural areas, where access to traditional banking is limited. This created a strong demand for the new service

⁹ Kakao is an internet operator in South Korea who owns Kakao talk, an instant message application, which is used by more than 90% of South Korean smartphone users (Park et al., 2015).

¹⁰ Naver is an internet content operator who owns an online search engine used by most South Koreans (Kwak, 2015).

which allowed for funds to be transferred in real time to any corner of the country with mobile network coverage. Thus, the introduction of M-PESA also affected the supply side which, after being marked by low accessibility to financial services, finally could offer a product available to much larger pockets of population throughout Kenya. In addition, the characteristics and functionality of M-PESA are simple and transparent; for example, the very simple user interface makes it easy and free to subscribe to the service and then deposit funds free of charge (Mas and Radcliffe, 2010). This simplicity reduced barriers of entry to consumers, enabling even those with low digital literacy skills to take advantage of the service, and thus stimulated the adoption rates throughout Kenya. Lastly, the Safaricom's management of M-PESA and supportive institutional framework were crucial for the service's swift launch onto the mass market and capitalising on the market exposure. For example, according to Mas and Radcliffe (2010), the Central Bank of Kenya played an important role by finding some extra flexibility in the banking regulations and allowing for the business model brought about by M-PESA. At the same time, Safaricom was effective at providing adequate liquidity management and launching a successful marketing strategy which included large scale distribution channels and simple but effective messages to consumers (such as "send money home").

While M-PESA has been greatly successful over the last decade, as of 2014, there are still about 25% of bankable population who cannot reach the service (GSMA, 2015). Hence, there is still room for both the regulators and private sector in Kenya for further development in the offered mobile payment services. This could include stimulating competition, reducing fees, fostering interoperability, introducing new services, new market players as well as continuously upgrading technologies. According to GSMA (2015), Kenya is aiming to transform mobile financial services to digital financial services which ultimately are expected to convert Kenya into a cashless economy. This latter goal may be not that far in the future since Kenya is ranked the first for the 'consumer readiness' component in the mobile payment readiness index (MasterCard, 2012)¹¹.

5.4 Case 4: The Philippines (developing country)

The two main mobile payment services in the Philippines are G-Cash from Globe Telecom and Smart Money from Smart Communications, introduced in 2004 and 2001 respectively (Chopra et al., 2013, and GSMA, 2012). Both services can be used for money transfers, airtime purchases, online shopping, salary, loan, and retail payments. Nevertheless, the early adoption of mobile payment in the Philippines was rather slow. One of the obstacles was the different regulations for banks and non-bank financial operators. This changed in 2009 when the Bangko Sentral ng Pilipinas (Central Bank of the Philippines; BSP) introduced regulations specific to e-money and e-money providers¹². The new regulations levelled the playing field by reducing the banks' monopoly and allowing the non-bank providers, such as mobile operators, to offer several financial services. Importantly, the non-bank agents were allowed to provide cash-in and cash-out services (GSMA, 2012). Similarly as in Kenya, the

¹¹ For more information on the mobile readiness index; see <https://mobilereadiness.mastercard.com/the-index/>.

¹² For more information on BSP e-money regulation see BSP Circular no. 649 in 2009, <http://www.bsp.gov.ph/downloads/regulations/attachments/2009/c649.pdf>.

introduction of mobile payment services has been very important for the financial inclusion as the distribution of these agents is more widespread than the distribution of bank branches. Importantly, this new regulation provides more certainty to the mobile payment market (GSMA, 2012 and 2014) which fosters investment and growth as illustrated by the ensuing sharp rise in the mobile payment usage in the Philippines. According to GSMA (2014), as of 2011, there were almost 10 million e-wallet subscribers and the value of transactions was about 13 billion USD in that year. It is also interesting that the early adopters of mobile payment in the Philippines were heavy SMS users (GSMA, 2012). In addition to the efforts by BSP in 2009, other factors contributing to the success of mobile payment include suitable market characteristics and strategies of mobile operators, Globe Telecom and Smart Communications. Firstly, similarly to Kenya, the demand for transferring money in the Philippines is greatly increased by large migration of workers from rural to urban areas (two out of three Filipino population live in the urban area) who regularly send money back home to their families (GSMA, 2012). In addition, as of 2014, as much as 70% of Philippine population remained unbanked and 34% of municipalities did not have a bank branch (GSMA, 2014). Thus, with the lack of good access to traditional banks and high penetration of mobile connection, with around 98% penetration in 2011 and 116% penetration in 2014 (GSMA, 2014), mobile payment encountered a ripe market in which it could be treated as a good substitute for financial services. Secondly, according to GSMA (2012), the marketing strategies and position of mobile operators have significantly contributed to the rise in mobile payment. For example, G-Cash and Smart Money applications have been embedded in SIM cards issued by each mobile operator to support consumers who want to experience mobile payment immediately. Furthermore, both mobile operators have run extensive marketing campaigns, including advertisement via billboards, points of sale, radio, SMS, travelling staff and other activities to raise consumer awareness of the mobile payment services (GSMA, 2012).

Even though there have been impressive increases in mobile payment adoption since 2009, in comparison to Kenya, there are still many steps to go for the Philippines. First is the flexibility of the registration process. The non-bank agents, unlike in Kenya, cannot perform the registration process by themselves. Particularly, Smart Money users need to register at the Smart Wireless Centre with a valid ID and this process may take up to seven days. Another possible improvement is to simplify the complicated rules for agents applying for a license to provide the service, which currently hinder growth in the number of non-bank agents. Nevertheless, these complex steps and stringent rules were forced by an exogenous factor. Namely, the Philippines were on the watchlist for money laundering and terrorism financing; hence, the regulators needed to set stricter regulations to meet their international obligations and comply with the rules required by inter-governmental bodies for countering money laundering and terrorism financing (GSMA, 2012, and Chopra et al., 2013).

6. Discussion

Different factors influence different outcomes of mobile payment adoption in each country. In the four cases in Section 5, there are similarities and differences which drive adoption of the technology in question. To facilitate the discussion, this section divides determinants of

mobile payment adoption into supply and demand categories. Understanding the supply and demand factors is critical to both regulators and businesses in order to make informed policy decisions as well as develop effective and efficient marketing strategies. In this case, it is interesting that the mobile payment technology was initially successful in both developed and developing countries, not only developed countries as was the case with adoption of many other innovations.

6.1 Supply side

The supply side of mobile payment services is determined by broadband services, broadband infrastructure as well as payment equipment and infrastructure (in the case of NFC mobile payment). From the four successful countries discussed in the previous section, Japan shows the most strength on the supply side. The well developed financial sector, development of i-mode and the FeliCa contactless chip jointly contributed to creating a strong basis for the supply of mobile payment in several sectors, including transportation. Later, in the smartphone era, the widespread coverage of and access to mobile broadband in Japan was bound to boost the availability of mobile payment services even further. Meantime, in Korea the initial growth in the use of mobile payment could largely be contributed to a push from the demand side. Nevertheless, the role of the supply side in the Korean case should not be underestimated as massive gains were achieved with the introduction of NFC mobile payment, which not only required appropriate technology but also a degree of cooperation between mobile operators and financial companies on the supply side. Undoubtedly, the success of mobile payment in these two developed countries was driven by the widespread coverage of mobile broadband and competitive markets for mobile payment applications. On the other hand, the success in developing countries such as Kenya and the Philippines was driven by the lack of adequate supply of banking and financial services, and unsatiated demand in this area. In this situation, a mobile phone has become an alternative means of accessing financial services and a substitute to bank branches whose numbers are very limited. For example, Kenyan M-PESA's consumers perceived the service to be faster, less expensive, more user-friendly and more secure than other alternatives (Mas and Radcliffe, 2010). Based on experience from the two developed countries, the supply-side factors which drive mobile payment include well-developed payment infrastructure, good cooperation between mobile and financial operators, and high coverage of mobile broadband. In developing countries, the important factor appears to be the ability to use a mobile phone for transferring money between users, or substitutability to more traditional means of conducting financial transaction which are often marked by low accessibility.

6.2 Demand side

The demand side of mobile payment services comprises of their users. Factors affecting the decision to use mobile payment are numerous, including consumer characteristics, attitudes towards services as well as their service literacy. Undoubtedly, these attitudes are also influenced by the perceived transaction security. In Japan, the use of mobile payment took off faster than in the US or the EU because the Japanese had been familiar with payment through their mobile phone since the introduction of i-mode in 1999. Consequently, the adoption of

mobile devices equipped with the NFC technology had been rapidly growing after the launch of Osai-fu-Keitai by NTT DoCoMo. The influences from demand side were even clearer in South Korea where the popularity of online gaming facilitated payment gateway service providers to serve mobile payment for gamers. The demand for in-game purchasing indirectly motivated mobile operators to compete in the mobile payment market. In addition, the South Korean “smartphone generation” and its attitudes towards technology and innovation along with the demand for Korean online entertainment are seen to have greatly increased the use of mobile payment applications such as Kakao Pay, Naver Pay as well as Samsung Pay. Also in the developing countries, namely Kenya and the Philippines, the demand side has played a significant role in the adoption of mobile payment. What these two countries have in common is very high demand for money transfers from urban workers to their families in more remote areas. As discussed in Section 5, in both countries large fractions of the working-age group migrate for work to the capital or other big cities and then support their families by sending money back home. Where this substantial demand has been faced with the lack of adequate access to banking, mobile payment has become an attractive option thanks to its accessibility based on a much greater mobile service penetration. To summarise, the factors which have driven mobile payment adoption from the demand side in Japan and South Korea are lifestyle and attitudes towards this technology. In the developing countries, it has been the demand for transferring money back to families which could not have been satisfied by often difficult to access and expensive traditional banking services.

6.3 Putting demand and supply sides together

A good mix of demand and supply leads to greater adoption

As mentioned in Sections 6.1 and 6.2, the four countries exhibit different strengths in both supply and demand sides that foster widespread mobile payment adoption. According to Mas and Radcliffe (2010), a greater adoption of mobile payment services requires overcoming the chicken-and-egg trap. For example, if no one wants to use mobile payment, it is difficult to stimulate the supply side to provide services. At the same time, if there is no service available, it is difficult to persuade users to use mobile payment. Therefore, the supply (services) and the demand (users) need to be promoted simultaneously. Section 5 presented the strengths which contributed to overcoming the chicken-and-egg trap by the four studied countries; these factors are summarised in Table 1.

Table 1 The strengths of supply and demand sides in the four case studies

Country	Supply side	Demand side
Japan	<ul style="list-style-type: none"> - Introduction of the FeliCa contactless chip in mobile devices - Wide availability of NFC readers - Extensive coverage of mobile broadband 	<ul style="list-style-type: none"> - Consumers were used to paying with mobile phones since the development of i-mode - Habits of using NFC mobile payment throughout public transport system
South Korea	<ul style="list-style-type: none"> - The entry of payment gateway service providers creates more competition in the mobile payment market - Extensive coverage of mobile broadband 	<ul style="list-style-type: none"> - The popularity of online gaming generates the demand for in-game purchases - South Korean innovative culture and attitudes towards technology
Kenya	<ul style="list-style-type: none"> - The transparency, simplicity and large scale of the M-PESA distribution channel (and the lack of viable substitutes) - Regulatory environment allowing more flexibility than in the general banking rules 	<ul style="list-style-type: none"> - High demand for money transfers - Consumer attitudes towards mobile payment and realisation that it is faster, cheaper, more convenient and more secure than other available options
Philippines	<ul style="list-style-type: none"> - Regulator allows non-bank operators to provide cash-in and cash-out services (poor availability of substitute products) - Mobile agents are more widely distributed than bank branches 	<ul style="list-style-type: none"> - High demand for money transfers - The SMS culture in the Philippines makes transition to using mobile payment services easier

Source: Compiled by the authors

Table 1 shows that all four countries have a good combination of supply and demand factors which have ultimately stimulated greater mobile payment adoption than in other countries and regions. While the appetite for innovation and well-developed infrastructure have fostered mobile payment in Japan and South Korea, the lack of substitute services is what has driven the adoption in Kenya and the Philippines. In addition, the latter two countries have benefited from policy makers and regulatory environment being more supportive than in other developing countries. As shown in Section 4.2, each layer of the broadband ecosystem framework is interlinked with other layers. Thus, measures aimed at stimulating greater adoption of mobile payment through external factors such as policy and regulation may directly affect only one layer, but the arising indirect effects are likely to spill onto the other layers (Fransman, 2007). Hence, appropriate policies, either on demand or supply side, can multiply through the network effects and promote greater mobile payment adoption. In addition, the timing of policy is also crucial. The success of a demand side policy depends on the supply as well. The demand side policy is more effective when the supply has been developed to some critical point (Belloc et al., 2012).

Why are the US and the EU lagging behind in adopting mobile payment?

As discussed in Sections 6.1 and 6.2, lifestyles and attitudes towards mobile payment as well as lack of substitute services or products are the main factors that have driven the adoption of mobile payment in the four most successful countries. The US and the EU, however, have been much slower in their moves towards mobile payment (see Figure 1). The main reason is that neither the US nor the EU had an evident market gap in money transfer and payment services prior to the smartphone era. In both continents, the use of credit and debit cards as

well as access to bank branches have been so far convenient and reliable. Therefore, there has been no urgent unmet need that mobile payment could satisfy, as it was in the case of Kenya and the Philippines, and most payment needs of consumers have been met by convenient card payments. In some of those countries, particularly in the Scandinavian region, the use of card payment has surpassed the use of cash (Danish Payments Council, 2016). Electronic data capture (EDC) machines (card swipe machines) and contactless smart cards have been already widely used in Europe and the US as well as in Japan and South Korea. However, mobile payment in Japan and South Korea has been also long-established due to its early introduction coupling with the use of NFC mobile payment on public transit system. Consumers in Japan and South Korea therefore only see mobile payment as another mean of payment while consumers in Europe or the US are likely to see mobile payment as a new way of payment in comparison to credit/debit card method. Hence, it is not surprising that consumers in Europe and the US are more skeptical to the benefits of mobile payment than those in Japan and South Korea (Hayashi, 2012).

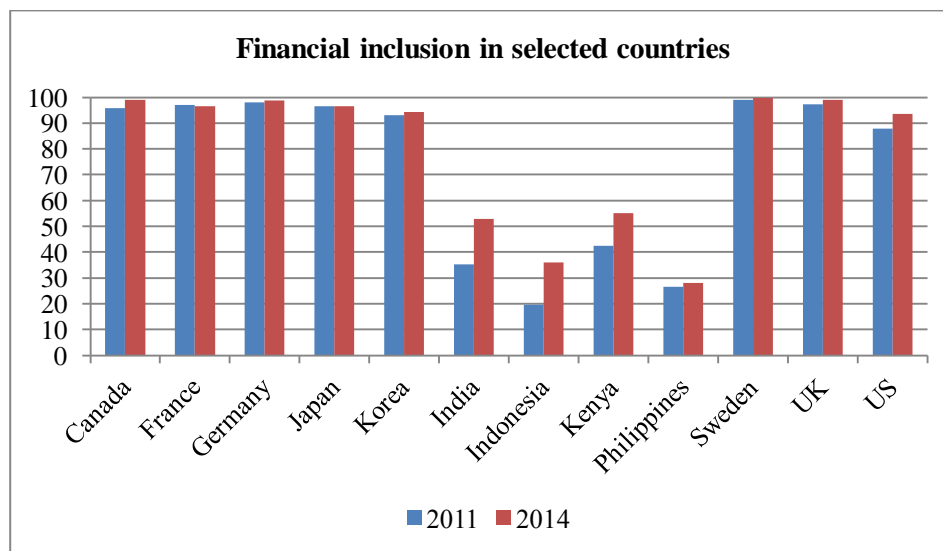


Figure 5 Percentage of citizens who have account at financial institution (financial inclusion) in 2011 and 2014 from selected countries (Source: World Bank Group (2014) Retrieved 28 October 2016)

Furthermore, the US and the EU have been marked by high rates of financial inclusion, compared to countries in other world regions (with the exceptions of Japan and South Korea). This is evident from Figure 5 which presents percentage share of population with an account at a financial institution in twelve chosen countries from North America, Europe, Africa and Asia. The data from the World Bank Group (2014) indicates that the rates of financial inclusion in most North American and EU countries surpassed 90% in 2011. Thus, poor access to financial services, the factor that has driven the adoption of mobile payment in Kenya and the Philippines, has not been present in those countries. Even before the arrival of a smartphone the consumers in the US and the EU had little incentive to adopt mobile payment for transferring money because everything could have been done through an accessible network of financial institutions.

The role of smartphones in stimulating mobile payment adoption around the world

Following the implementation of 3G and 4G-LTE technology worldwide, data transmission speeds have significantly increased and a smartphone has turned to be a multimedia device comparable with a personal computer. As a result, more content and applications, including mobile payment, could be accessed through mobile broadband services. At the same time, on the demand side, the high market penetration of smartphones has meant that a large number of consumers used mobile broadband services and developed a sense of online security and digital literacy required for using mobile payment. The arrival of a smartphone had an impact on the six factors crucial for accepting the use of mobile payment discussed in Section 3, which include perceived ease of use, perceived usefulness, perceived mobility, perceived cost, perceived trust and perceived expressiveness. For example, when it comes to the perceived ease of use, a mobile payment via a smartphone is easier than when using earlier generation tools. This means that a smartphone has made mobile payment accessible to more people from different age, income and education groups, not only early adopters as was the case at the earlier stage. Importantly, smartphone is a portable device which means that mobile payment can be used anytime and anywhere as long as there is mobile broadband coverage, which gives it an advantage over more traditional internet transactions on fixed broadband. For example, consumers in Sweden had used mainly credit or debit cards for their electronic transactions before the arrival of the smartphone. Nevertheless, this started changing with the smart devices becoming increasingly popular and the number of mobile payment users in Sweden has been increasing at an impressive rate. One of the main contributors to this success is the killer application¹³ *Swish* which was jointly developed by main Swedish banks. Swish is used for real time money transfers from one bank to another. As of June 2016, almost 50% of the Swedish population were using the service (Henley, 2016). In many countries, several smartphone applications are being developed and launched each day; therefore, one could expect that many countries will have their killer applications for mobile payment in the near future.

7. Conclusion

While Japan and South Korea are leading in the usage of NFC mobile payment, Kenya and the Philippines are leading in mobile wallet style of payment. Two conceptual frameworks; the network effects and the broadband ecosystem, have supported the discussion of determinants of success in the four analysed countries. The key to a successful, widespread embrace of the mobile payment technology is simultaneous existence of sufficient demand, or willingness of consumers to use it, and supply, including relevant infrastructure, to support and feed this demand. The explosive rise of a smartphone has stimulated global use of mobile payment as the service could be easier reached by consumers, leading to a boost in both the demand for and supply of the payment method. Nevertheless, the use of mobile payment is unlikely to be significantly increased without an introduction of killer applications. Some countries have found their killer applications, for example M-PESA in Kenya, Kakao Pay in

¹³ A killer application is software, a program or application which makes consumers decide to use particular services.

South Korea, Swish in Sweden and MobilePay in Denmark. However, there are many countries where killer applications are still to be introduced. This is where both financial and telecommunications regulators have a crucial role to play. As seen in the cases of Kenya and the Philippines, flexible regulation can facilitate the growth of mobile payment. On the other hand, too strict regulation could lead to opposite results. For example, in India only banks with license are allowed to provide mobile financial services while non-banks are prohibited from supplying mobile money (Gibney et al., 2015). Consequently, mobile payment in India has so far been at an infant stage. Although the broadband ecosystem framework indicates that appropriate regulation can be pushed through any layer of the ecosystem, the lesson from the four studied countries is that a good combination of regulations or policies applied to supply and/or demand sides (dependent on a country's conditions) is the best way forward.

This study is not free from limitations. It is based only on conceptual frameworks and four country-level comparative studies as examples; hence, there is still a need for empirical, quantitative research to validate its findings. For instance, this study's conclusions on determinants of the mobile payment adoption are based mainly on previous literature and evidence from the four case studies. Future research should be aimed at quantitatively verifying whether statistical evidence is consistent with the findings from this study and how well they could be generalised to a larger sample of countries. Finally, this study offers an analytical framework which can be adopted and expanded to study adoption of new technologies and innovations. For example, studies of adoption of digital currencies, a technology which is still at an infant stage, could benefit from the proposed framework and drawing parallels with mobile payment because this new technology is currently where mobile payment was before the smartphone's arrival.

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