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An Analytical Framework for an M-payment Ecosystem: a Merchants' Perspective

Jie Guo
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Abstract: *In comparison to the rapid adoption and growth of mobile technologies worldwide, mobile payment service are being adopted at a slower pace than anticipated. One of the interesting characteristics of the Chinese market, for both academicians and practitioners, is that, although m-payment evolved from the convergence of payment and telecommunication industries (traditionally dominated by state-owned enterprises in China), it was private, third party payment companies that developed m-payment platforms, which gained a competitive edge over state-owned enterprises. While standardization, regulation and policy play an important role in stimulating the Chinese m-payment market, these factors alone are not sufficient to establish a sustainable two-sided market and generate a critical mass of merchants and end-users. Although merchants play a crucial role in the m-payment ecosystem, there is a lack of insight into merchant behavior, and their interaction with other actors in the m-payment ecosystem. In this study, we propose a framework for the analyses of the m-payment ecosystem. Starting from a set of propositions, we conducted in-depth interviews to analyze the multifaceted nature of the Chinese m-payment market. We identified the connection between the adoption process and the business ecosystem configurations. The proposed framework can be used as a basis for future studies of complex business ecosystems.*

Keywords: *mobile payment, business ecosystem, merchants, adoption, acceptance, analytical framework*

1 Introduction

The development of mobile payment (m-payment) varies from country to country in terms of maturity and penetration. In most developed Western markets, adoption rates are marginal. A few applications are being used extensively (e.g., remittance, ticketing and vending) in some developing regions/countries (e.g. Philippines and Kenya) or Eastern economies (e.g. Japan and South Korea). The low adoption rates in western economies can be traced back to several factors, including the availability of many payment alternatives, the dominance of conservative banks, due to regulation regarding bank licenses, a lack of innovative capabilities and strategic behavior, especially from MNOs, in m-payment consortia (De Reuver et al, forthcoming), and a lack of interoperable m-payment platforms, which increases costs and efforts regarding adoption for both merchants and consumers. Although m-payment has been pushed by service providers, including third party payment (TPP) providers, mobile network operators (MNOs), financial institutions and over-the-top (OTT) providers, it is a complex system that requires the involvement of at least two sides (merchants and end-users) to create a viable platform. Based on the lessons from other countries, the question arises what factors play a role in creating a viable m-payment platform in the increasingly converged and liberalized Chinese payment market, which is a result of recent rapid changes related to mobile technology, market conditions and regulations (Xia, 2011).

China has the world's largest mobile subscriber base: the number of mobile subscribers in China reached 1,198 million as of August 2013 (MobiThinking, 2013). 3G is also developing robustly in China and the number of 3G users reached over 300 million (Millward, 2013). At the same time 4G has already been rolled out and will further boost the growth of mobile internet usage. In light of these and other recent

developments, e.g. the large number of mobile subscribers and mobile internet users and a total of 3.694 billion issued bankcards (The People's Bank of China, 2013), it is evident that there is a huge market and growth potential in China. Although all the potential key actors in an m-payment ecosystem have strong market positions in their respective industries in China including MNOs (i.e. China Mobile, ranked No.1 in the world), handset manufacturers (such as HuaWei), financial institutions/banks (China Unionpay, the second-largest payment network in terms of transactions processed (Wu, 2012)), TPP providers (such as Alipay, subsidiary of Alibaba, one of the world's biggest Internet retail network), etc., a nationwide m-payment scheme has not yet been implemented. However, several m-payment platforms managed to acquire a large customer base in different regions of China, while the overall value of the m-payment market is increasing (iResearch, 2015). As an important prerequisite of the rollout process, regulatory authorities and key players are currently in the process of finalizing standards and regulations for the future rollouts of m-payment.

Although the current situation in China is favorable to the development of m-payment, several challenges, still remain, most importantly in relation to the multi-side market characteristic of m-payment platforms (Campbell-Kelly, Garcia-Swartz, Lam, & Yang, 2014). The 'start-up' problem of multi-sided platforms often must contend with the familiar chicken-and-egg problem, which states that one side of a platform receives value only if it is also true for the participants on the other side of the platform (Gawer, 2009, p.99). M-payment platforms are crucial to the interactions between merchants and end-users. M-payment platforms have long faced the chicken-and-egg adoption problem involving these two groups (Leinonen, 2009). Merchants are hesitant to invest in m-payment solutions without assurance of consumer adoption, while consumers will not adopt without being sure that merchant will make the necessary investment.

Although there is extensive research into the adoption of m-payments by consumers (Dahlberg, Mallat, Ondrus, & Zmijewska, 2008), the same cannot be said about the merchants involved, especially with regard to on their position in the m-payment ecosystem. The few existing studies focus on explaining the adoption behavior of merchants, based on, among other things, merchants attitudes and behavioral intention, assessment of consumer behavior, technology related issues and organizational conditions, without paying specific attention to their position in the m-payment business ecosystem. In this study, we focus on the dynamics of the relationship between merchants and end-users from a holistic perspective. The focus of this article takes into consideration multiple other actors in the m-payment ecosystem, since all the participants have to build the platform collectively to provide m-payment solutions to merchants and end-users. As such, the aim of this paper is *to study: (i) which factors influence merchants as crucial actors within the m-payment ecosystem to adopt m-payment platforms; (ii) how those factors are interrelated; and (iii) how the decision process of merchants leading to the adoption or rejection of m-payment evolves*. Building on insights from business ecosystem concepts, an analytical framework is developed to identify factors influencing merchants' acceptance of m-payments by considering the ecosystem as a whole and adopting a qualitative approach, e.g. in-depth interviews with experts and managers from carefully selected merchants in China.

The paper is structured as follows. Section 2 presents a literature review of research into m-payment from a merchant perspective. Section 3 describes the research framework, which is designed to analyze merchants' adoption of m-payment platforms in the business ecosystem, including a motivation, discussion and explanation of the three tiers of the framework. Section 4 discusses the methodology and background of data collection and analysis, with the results being presented in Section 5. Section 6 contains the discussions and conclusions.

2 Literature review

Based on an overview of definitions as used in m-payment studies (Pousttchi, 2003; Karnouskos, 2004; Au & Kauffman, 2008; Ondrus & Pigneur, 2005; Dahlberg et al., 2008; Dennehy & Sammon, 2015), there are two core elements that stand-out: (i) the emphasis on the mobile devices used to realize the payment and (ii) the function of payments, i.e. the transfer of monetary value. The main differences lies in the technology being used (wireless or other communication technologies) to realize m-payment and the phase in which the payment process is described (initiation, authorization and confirmation). We propose the following

definition: *m-payment is a transaction of a monetary value for services or products with a mobile device (such as mobile phones, smartphone, tablet, or any wireless enabled device or card) for the initiation, authorization and confirmation of payment processes, using wireless and/or other communication technologies.*

Based on a literature review, 188 papers were identified on m-payment between 2007 and 2014 (Ondrus, Guo, & Dahlberg, forthcoming), with a main focus on technological and consumer-related aspects, which is consistent with the earlier findings by Dahlberg et al. (2008). The focus of academic research has not changed significantly since 2008, although a growing number of articles analyze m-payments from an ecosystem perspective. While there are numerous studies from the customer perspective (adoption-theory-based articles, such as by Liébana-Cabanilla, Sánchez-Fernández, and Muñoz-Leiva (2014)), most articles that adopt an ecosystem perspective focus on m-payment providers, such as MNO's or banks (Gaur & Ondrus, 2012), while little attention is paid to the adoption behavior and role in the m-payment eco-system of merchants. In the last 15 years, only five papers focus on the merchant adoption side, with a main focus on the European markets, and not one article has been published on this issue since 2010. The concepts that explain merchants' adoption of m-payment discussed in these papers are listed in Table 1. Van der Heijden (2002) examined the early implementation success of m-payment systems. Mallet and Tuunainen (2005) utilized the diffusion of innovation theory to identify and analyze drivers and barriers of merchant adoption of m-payment in Finland, while Teo, Fraunholz, and Unnithan (2005) conducted similar research in Australia. Based on the findings of their paper from 2005, Mallet and Tuunainen (2008) proposed a conceptual framework that includes prerequisites, drivers and barriers to influence merchant adoption of m-payments, based on interviews and surveys in Finland, while Lai and Chuah (2010) examined the industry-wide view of the major concepts that explain retail merchant adoption in Hong Kong. Most of these papers employed qualitative methods due to the novelty of the topic and the lack of prior research. Most concepts are based on DOI theory (Rogers, 1995) determined by independent variables such as individual (merchant) characteristics, internal organizational structural characteristics, and external characteristics of the organization (Table 1).

Table 1 Merchants' adoption of m-payment concepts as discussed in literature

Concepts	Van der Heijden, 2002	Mallet & Tuunainen, 2005	Mallet & Tuunainen, 2008	Teo et al., 2005	Lai & Chuah, 2010
Ease of use	x			x	
Perceived risk	x				x
Trust		x	x		
Potential increase in impulse purchases			x	x	
Security	x	x		x	x
User experience	x		x		x
Costs	x	x	x	x	
Relative advantages		x	x		x
Compatibility		x	x		x
Standardizations		x	x		x
Complexity		x	x	x	x
Monopoly				x	
Managerial willingness					x
Technology maturity			x		
Network externality	x				
Organizational enablers					x
Competitive forces					x

However, little attention has been paid to the dual role merchants play in the m-payment ecosystem. In most studies, they are mainly seen as a group of users who adopt an m-payment services or platform as offered by providers. However merchants are also required to consider the factors related to multi-sided markets, i.e. technology-push vis-a-vis consumer demand and they also have to balance the (possibly) conflicting requirements of these two roles, the dynamic interplay on an organizational level (i.e.

organizational power and control, competitive strength and strategic orientations) with their environmental position (i.e. m-payment ecosystem factors).

3 Theoretical foundation and research framework

Based on Peltoniemi (2006), in the following a business ecosystem is considered as a set of interconnected and interdependent organizations that compete and cooperate with each other in a dynamic structure that evolves and develops over time). It is important to identify the structure of the business ecosystem and the cooperative and competing roles of the different actors involved. In this study, the widely cited approach proposed by Moore (1993, 1996) and Lansiti and Levien (2004a, 2004b) is adopted, who argue that a business ecosystem includes the suppliers, customers, distributors, competitors and companies that contribute indirectly, as well as entities that have a less immediate but powerful influences on an organization's business, such as regulatory institutions and media agencies. As was recently pointed out by Hedman and Henningsson (2015) and De Reuver, Verschuur, Nikayin, Cerpa, and Bouwman (forthcoming), to understand the (lack of) diffusion of m-payment services, it is not enough to look at the individual stakeholders, but one has to consider the complex set of relationships that shape the evolution of the entire ecosystem, which is why the article is focused on the m-payment ecosystem as a whole, with special attention to the role of merchants (Fig. 1). As a consequence of the converged and socio-technical nature of the m-payment service, the m-payment ecosystem was brought into existence through the convergence of security, mobile and card technologies and actors in the mobile telecommunication ecosystems. Within the ecosystem, three tiers (groups of actors in the ecosystem) are defined from the perspective of the merchants. The circle of 'core business' (Tier-1) includes merchants as the core contributors, m-payment platform as a distribution channel, and end-users. The circle of 'extended network' includes 'core business' and Tier-2 (m-payment platform providers and suppliers of merchants). The circle of 'business ecosystem' includes the 'extended tier-3 network' (competing organizations, trade associations, labor unions, consumer organizations, government agencies and other regulatory/standard bodies).

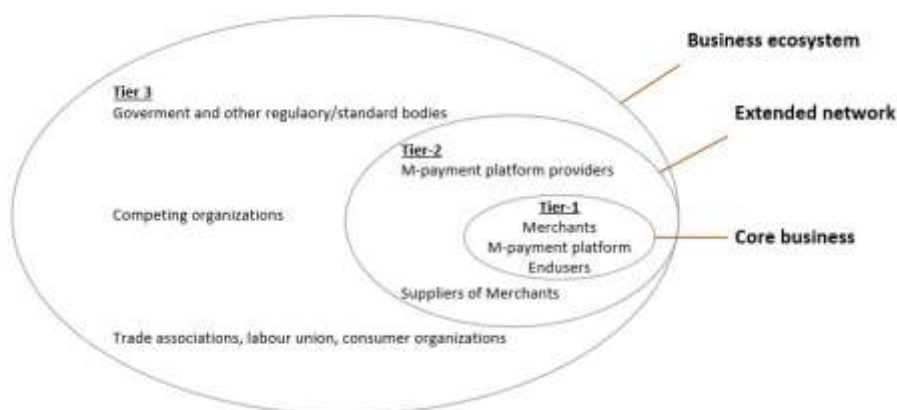


Fig. 1 The m-payment ecosystem from the merchants' perspective

The roles of different actors, as seen from a merchant perspective are shown in Fig. 2. Merchants offer a payment channel provided by m-payment platform providers for end-users to use, while government and other regulatory bodies, trade associations, labor unions, consumer organizations are governance associations that guide the development of rules and regulations in the market.

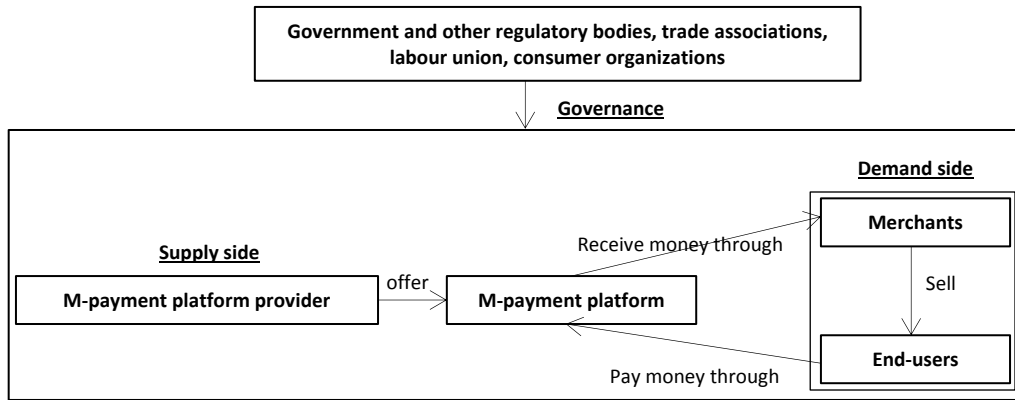


Fig. 2 The roles of different actors in m-payment ecosystem from merchants' perspective

In developing the framework in more detail, we rely on two theoretical perspectives are considered and relied on: contingency and configuration theory. Contingency theory (Lawrence & Lorsch, 1967; Thompson, 1967) states that there is no single best way to design an organization (or eco-system), and that the optimal course of action depends upon the internal and external situation (context). With m-payment as an innovation, and merchants as the unit of analysis (organizational level), contingency theory can be used to shed light on merchants' adoption of m-payment. In contrast to contingency theories, which only represent traditional bivariate relationships involving unidirectional causations, configuration theory represents non-linear synergistic effects and higher-order interactions, for instance network externalities (Meyer, Tsui, and Hinings, 1993). As shown in Fig. 1, end-user demand factors and provider supply factors can be identified as elements to form conditions relevant to merchants. In the following, each factor within the three circles will be explained in greater details. The three circles define the scope and boundary of this study.

3.1 Tier-1: Core business

The core business part (Tier-1) of the model contains merchants, m-payment platform and end-users.

3.1.1 Merchants

Internal organizational factors (strategy, resources, and capabilities) have an effect on a merchant's decision whether or not to adopt an innovation (Damanpour, 1991). The merchant's strategic position in the economic marketplace should be taken into account when trying to understand their m-payment adoption process. Within an m-payment ecosystem, merchants are supposed to acquire knowledge about their partners, including their resources, needs, capabilities, strategies and other relationships, by exchanging information within the network. Accordingly, critical internal and external resources are necessary for an organization to position itself in the market place as well as in the business ecosystem. In addition, the external resources also affect the organizations' competitive advantage, and further help them in their strategic choices. Therefore, both the Resource Based View (RBV) (Wernerfelt, 1984; Barney, 2001), and the Resource Dependence Theory (RDT) proposed by Pfeffer and Salancik (1978) are relevant. While RBV focuses on internal resources and capabilities, RTD argues that organizations strive to acquire and sustain resources from their external environment and attempt to change their dependence relationships by minimizing their own dependence or by increasing the dependence of other organizations. RBV and RTD can be used to identify the resources that affect an organization's competitive advantage when the market or network changes, as the dynamics of dependence relationships also change the internal resource configurations of organizations over time. Identifying and classifying the internal and external resource configurations according to the actual situation of an organization can help merchants determine their strategic position, which in turn determines their decision whether or not to adopt m-payment and what type of m-payment platforms to adopt.

Alternatively the Value-Discipline Model (VDP) proposed by Treacy and Wiersema (1993) postulates three different value disciplines on which an organization can focus: (i) operational excellence (providing products or services with competitive prices and minimal inconvenience), (ii) customer intimacy (building long-term customer loyalty) and (iii) product leadership (providing leading-edge products or services). Although we do not necessarily agree with Treacy and Wiersema (see Versteeg & Bouwman, 2006), they state that organizations cannot be perfect in all three disciplines as the resource configurations that lead to excellence in any one discipline are incompatible with the others. In other words, organizations focus on one of the three value disciplines, while trying to meet industry standards in the other two.

If a merchant adopts a strategy of operation excellence in the case of m-payment, the perceived costs of m-payment are very high based on their own resource configurations e.g. infrastructure, human resources and financial resources. In this case, the merchants in question may not adopt m-payment because the aim is to minimize costs. If a merchant adopts a strategy of customer intimacy, the merchant will adopt m-payment with the aim of serving its customers and realizing long-term customer loyalty. When a strategy of product leadership is adopted, innovative merchants are more likely to adopt m-payment in order to keep up-to-date with products or services. Based on these observations, the following propositions can be formulated:

P1: The internal and external resource configurations of merchants determine their willingness to implement an m-payment platform.

P2a: The internal and external resource configurations of merchants determine their strategic position.

P2b: Merchants with a strategy of customer intimacy or of product leadership are more likely to adopt m-payment.

Moreover, organizational and strategic leadership research postulates that organizational capabilities are heavily influenced by managers (Elenkov, Judge, and Wright, 2005). According to studies regarding managerial issues in the adoption of innovation by organizations (Damanpour & Schneider, 2006, 2009), managers perform strategic actions differently by interpreting environmental changes in different ways i.e. as a threat or an opportunity, which in turn affects the adoption of the innovation, in this case m-payment.

P3: Management support for m-payment will increase the rate of merchants' adoption of m-payment.

3.1.2 M-payment platform technology characteristics

Earlier studies have confirmed the importance of technological factors in merchants' adoption of m-payments (Van der Heijden, 2002; Teo et al., 2005). Earlier studies into this area have examined the five innovation attributes (relative advantage, complexity, compatibility, trialability and observability (Rogers, 1995). The service offering and the value that is created are dependent on technical functionalities (Bouwman, De Vos, & Haaker, 2008). It is important from this perspective to understand what the m-payment platform technology characteristics are that help create added value to merchants and end-users. In addition to ease-of-use, security, privacy and trust play a crucial role in the success of m-payment adoption (Chen, 2008). As it was pointed out by Dahlberg et al. (2008), technology-focused articles make up a significant portion of m-payment research, with a predominant focus on security issues, which to some extent, is also reflected in the adoption studies from the customer perspective (Thakur & Srivastava, 2014). The main security elements include confidentiality, authentication, authorization, accountability, integrity, availability, and non-repudiation (Hu, Lee, & Kou, 2005, p.15). From the perspective of technology, security risks, such as secure commercial information exchange and safe electronic financial transactions over mobile networks, need to be controlled, and privacy has to be guaranteed (Bouwman et al., 2008). At the same time, an interoperable system can ensure that m-payments can be used at any participating merchant's location. Moreover, the acceptance of services significantly depends on the extent to which merchants can use existing infrastructures and platforms, because that can reduce costs and reinforce customer lock-in. Therefore, the assumption is that, if an m-payment platform offers the identified prerequisites (ease of use, security and privacy components, as well as compatibility), merchants are more likely to adopt an m-payment platform.

P4: If an m-payment can guarantee ease of use, security and privacy issues, and technological compatibility, that will increase the rate of merchants' adoption of m-payment.

3.1.3 End-users

An m-payment platform typically functions as a market that depends on the interaction and synchronization of the adoption by the supply (merchants) and demand (customers) side. M-payment platforms are therefore a typical example of at least a two-sided, but more likely a multi-sided platform (Campbell-Kelly et al., 2014), which has been defined as *"an organization that creates value primarily by enabling direct interactions between two (or more) distinct types of affiliated customers"* (Hagiu and Wright, 2011).

There are only a handful of studies that look at customers and merchants at the same time, focusing on network effects (Au & Kauffman, 2008, Kazan & Damsgaard, 2013). Cross-side network effects influence the adoption behavior of the two distinct groups. Same-side network effects occur when a user's benefits from using a technology increase with the number of other users employing the same technology (Katz & Shapiro, 1992; Shapiro & Varian, 1998). For instance, this means that when joining an m-payment platform, consumers take the number of other consumers adopting m-payments into account. Cross-side network effects are the key aspect of multi-sided platforms. A basic observation regarding cross-platform network effects is that the value of the platform is zero for either side if the other side stays out. As such, adoption and demand on the part of consumers and merchants are closely interrelated. As a result, it is important for the merchants to be sure that m-payments have a large customer base and vice versa. Allen (1988) refers to this as critical mass effect: merchants will not adopt the system unless there are enough users. Similarly, consumers will not adopt the system unless there are enough merchants. Therefore, reaching a sufficiently broad initial adopter base of both consumers and merchants is a critical success factor for m-payments.

P5a: The same-side network effects of either end-users or merchants influence merchant adoption of m-payment.

P5b: The cross-side network effects of end-users and merchants influence merchant adoption of m-payment.

Following this reasoning, it is crucial to understand the main factors that affect the adoption of m-payment by end-users, because that is conditional to adoption on the part of merchants, and vice versa. With regard to the end-users of m-payments, there are several issues to consider. The positive effects of consumer readiness have been identified in a number of studies (i.e., Ho & Ko, 2008; Liljander, Gillberg, Gummerus, & Riel, 2006). For instance, customer readiness can include role clarity, intrinsic and extrinsic motivation, and self-efficacy (Meuter, Bitner, Ostrom, & Brown, 2005). Consequently, our assumption is that, if there is a high level of consumer readiness with regard to m-payment, merchants are more likely to adopt m-payment as well.

P6: Higher level of consumer readiness will increase the rate of merchants' adoption of m-payment.

3.2 Extended network

The extended network in our model consists of 'core business' (Tier-1) and m-payment platforms providers, suppliers of complementary products and/or services to merchants (Tier-2).

3.2.1 M-payment platform providers

To solve the problem discussed above, Evans (2003) suggests that the investment and pricing strategy of the providers can be used to get both merchants and end-users on board. Platform providers typically charge one side (money side) and subsidize the other (subsidy side), the goal being to generate cross-side network effects and reach critical mass: if subsidy-side users are attracted in sufficient numbers, money-side users will pay generously to reach them; if there are enough money-side users, subsidy-side users will sign up in greater numbers (Eisenmann, Parker, & Van Alstyne, 2006). In addition, platform providers can subsidize

both sides in the early phase in order to ignite the platform. For example, subsidizing one or even both sides (end-users and merchants) helps m-payment platforms generate the necessary critical mass.

P7: Developing pricing strategy by cross-subsidizing to merchants and end-users will increase the rate of merchants adopting m-payment.

Moreover, m-payment as a service is conspicuously subject to both merchant and end-user satisfaction. Since satisfaction is a function of expectation, service performance or customer satisfaction can be enhanced by managing expectations (Tien, Krishnamurthy, & Yasar, 2004). To reach a critical mass, proper expectation management provides a potential solution to the critical mass problem by supporting a shared expectations that others will join (Schneider, Charon, Miles, Thomas, & Vedel, 1991). Consequently, Frambach, Barkema, Nooteboom, and Wedel (1998) have pointed out that marketing activities can significantly affect the likelihood of merchants adopting innovation. There are three main marketing variables (targeting, communication, risk reduction) that can facilitate the organizational adoption of innovation (Frambach and Schillewaert, 2002).

P8: The marketing strategies of m-payment platform providers designed to promote m-payment platform (such as targeting, communication, and risk reduction) will persuade more merchants to adopt m-payment.

Platform openness plays a crucial role in creating and maintaining platforms. Openness refers to the “easing of restrictions on the use, development, and commercialization of a technology” (Boudreau, 2010). Eisenmann, Parker, and Van Alstyne (2008) argues that platform openness is determined by the extent to which participation is unrestricted on multiple levels, comprising demand-side users, supply-side users (application developer), platform providers, and platform sponsor levels. A platform can be seen to be open to the extent that: “(i) restrictions are not placed on participation in its development, commercialization or use; and (ii) any restrictions—for example, requirements to conform with technical standards or pay licensing fees—are reasonable and non-discriminatory, that is, they are applied uniformly to all potential platform participants” (Eisenmann et al., 2008, p.131). Two different types of openness can be considered: (i) ecosystem openness (the degree to which other actors can join the platform and provide additional services); and (ii) technical openness (the extent to which complementary providers can access the core functionalities). The level of openness of a platform can reduce switching costs for merchants and end-users (and eliminate lock-in concerns), and at the same time increase competition (Gawer, 2009, p.131). From a merchant’s perspective, if an m-payment platform has more options to support services or can accept cards from competing systems, the merchant is more likely to adopt. That is to say, the platform allows other actors to join the platform and provide services to merchants on one the hand, while the platform at the same time allows other actors access to the core functionalities. In addition, if merchants can access core function of the m-payment platform, such as consumer profiles, which can guide further market strategies, they are more likely to adopt. In other words, if an m-payment platform has a higher degree of ecosystem and technical openness, merchants are more likely to adopt.

P9: A higher degree of m-payment platform openness (ecosystem openness and/or technical openness) towards complementary providers and/or merchants will increase the rate of merchants’ adoption of m-payment.

3.2.2 Suppliers of merchants

Suppliers of merchants are considered the merchants’ vertical partners. Iacovou, Benbasat, and Dexter (1995) include the trading partners in the external task environmental context as a critical factor of inter-organizational system adoption. A number of studies have determined that partner readiness can significantly increase the rate of adoption (Zhu, Dong, Xu, & Kraemer, 2006; Barua, Konana, Whinston, & Yin, 2004). Organizations are more likely to adopt a new technology if their powerful or larger trading partners also have adopted that technology. Based on existing literature, partner readiness can be defined as the degree to which trading partners in the value network have certain systems in place (Iacovou et al.,

1995). In the case of m-payment, a merchant's use of m-payment may be affected by the readiness of its partners to adopt.

P 10: Partner readiness to adopt will increase the rate of merchants' adoption of m-payment.

3.3 Business ecosystem

In addition to the previously discussed actors in the 'extended network', the outer circle of the business ecosystem consists of government and other regulatory/standard bodies, competing organizations, trade associations, labour unions and consumer organizations (Tier-3).

Broadly speaking, standard bodies refer to public/private, domestic/international organizations that propose, develop, establish, monitor, coordinate and/or produce technical standards that can be de jure or de facto standards. These organizations as well as governmental, trade and bank associations, labor unions and consumer organizations, regulate and govern m-payment technology, as well as payment policy, data and consumer protection. Therefore, technology standardizations and institutional pressure are considered to be relevant conditional factors.

M-payment technology evolved from early SMS-based and WAP-based payment methods to NFC (Near Field Communication) technology (Global, 2013). In 1999, the first major mobile commerce platforms were launched in Japan (iMode) and the Philippines (Smart Money). In 2002, the European Telecom Standards Institute (ETSI) developed official industry standards for mobile commerce (Global, 2013). In 2005, Nokia launched the world's first NFC enabled phone, which opened the way for contactless payments (Global, 2013). There is a widespread heterogeneity of technologies for m-payment that are developed and used independently at the same time. Kadhiwal and Zulfiquar (2007) argue that the slow adoption rate of m-payment is due to a lack of common standards and inconsistency of systems. Although various groups have been formed to create standardized solutions for m-payments, actors with heterogeneous interests create complexities in the standard-setting processes. Therefore, a standard interface would be necessary to ensure ease of use and commonality of experience, which are important features that drive the adoption of a new technology. It is crucial to find common approaches at a national and international levels as compatible m-payment standards should be developed and implemented by the actors involved.

P 11: A lack of standardization or of a dominant broadly accepted standard will slow the rate of merchants' adoption of m-payment.

The recent rapid developments in the IT industry and available mobile services put significant pressure on policy-makers. Generally speaking, policy-makers take the innovation and investment potential in the industry into consideration, together with the technological developments. When policy supports innovations, then the entire ecosystem benefits, which in turn will influence the merchants. As Bauer (2014) pointed out, it is not realistic to assume that policies change continuously and dynamically as a reaction to developments in areas of the m-payment ecosystem. Policy-makers also have to consider the stability of the system. Additionally, frequent changes in regulations and policies would require stakeholders to adapt to new rules continuously, which can potentially involve large investments and other disadvantages. Considering these observations, policy-makers face several challenges that need to be considered, and stakeholders in the m-payment ecosystem also need to be aware of the type of policy and regulatory practices affecting their business. From a policy-maker's perspective, the most important issue is to adjust their practices to the dynamic and interrelated ecosystem structure that exists around most of the modern, rapidly changing digital services, in order not to slow down the innovation potential. As such, policy and regulation affect the ecosystem on two levels that can stimulate or slow down developments. Firstly, policies can enable or hinder companies to create m-payment solutions. For example, as a result of regulations making it difficult for mobile network operators to obtain a bank license, mobile network operators are limited in their choice of m-payment service. Policies can change the incentives of players to invest and innovate in m-payments. Secondly, regulations can help in the diffusion process of the m-payment innovation and facilitate the continuous development and investments by closely following the

recent technological developments and creating appropriate regulations and policies. Both levels affect the entire industry, especially the m-payment providers, who can see the policy and regulatory environment as an enabler of or a barrier to innovation. Indirectly, this will influence merchants' adoption by creating a feeling of uncertainty, reflecting the fact that merchants by and large can only respond to the actions of m-payment providers, who in turn are constrained by regulations and policy changes. A number of studies have demonstrated that institutional pressure can influence the adoption of innovation by organizations (Teo, Wei, & Benbasat, 2003; Gibbs and Kraemer, 2004). Within the m-payment ecosystem, different actors originating from different industries need policy-makers to pay more attention to interdependencies in the information and communication industries, as innovation and investment have to be facilitated by regulation and policy (Bauer, 2014).

The mechanism available to institutions, can strongly affect managerial decisions to take a certain action or adopt an innovation. DiMaggio and Powell (1983) proposed three institutional mechanisms: coercive, mimetic and normative. Coercive pressure refers to a set of formal or informal forces from other organizations, regulators and policy-makers on which merchants depend. In this study, these are identified as laws, regulations and policies issued by governments to exert pressure. Mimetic pressure refers to the adoption of a practice or innovation by imitating the actions of other structurally equivalent organizations; the main reason behind this is that it can reduce uncertainty. Normative pressure refers to dyadic inter-organizational relationships where organizations share some information, rules and value among firm-supplier and firm-customer as well as through professional, trade, business and other key organizations. Rather than making a purely internally driven decision to adopt m-payment, merchants are likely to be induced m-payment by external isomorphic pressures from platform providers, government bodies, trade associations, consulting companies, business media and other stakeholder groups (e.g., customers and suppliers).

P 12: A higher level of institutional pressure will increase the rate of merchants' adoption of m-payment.

To substantiate the propositions developed from literature and theories, a qualitative study has been conducted to gain insight into the nature and form of the phenomena discussed in this paper, and to validate the propositions and develop the explanations in greater detail (Seale, Gobo, Gubrium, & Silverman, 2004).

4 Methodology

4.1 Data collection and analysis

Research design

The research is based on in-depth interviews, which provide the most direct, research focused interaction between researcher and participant (Rubin & Rubin, 2011). The process included the following main steps: designing the interview protocol, conducting interviews, analysing data and interpreting the findings.

During the design of the interview protocol, the questions for the semi-structured interviews were formulated in accordance with the research objectives and propositions. The questions were formulated in English and then translated into Chinese by a native Chinese researcher, after which another researcher translated it back into English to ensure consistency. According to the propositions, the questions were divided among several subjects: interviewee and company details, description of the reasons to adopt/to abandon/intention to adopt/no intention to adopt m-payment services, details regarding the chosen m-payment platform, details regarding cooperating and competing organizations, and a description of the Chinese market, including the adoption process and user feedback, as well as the (perception of) the institutional and regulatory environment.

Prior to the interviews, a pilot test was performed among employees from one company, after which the wording of some questions was changed. The semi-structured interviews were performed in Chinese. The

interviews were conducted with managers from twelve merchants who are working in or with e-commerce centres in their companies. The interviews were conducted in person and, on average, lasted one to two hours. Afterwards, the interviews were summarized and validated by the interviewees.

Data collection

A purposive sampling method, as proposed by Seale et al. (2004) was followed in the study. The interviewees were selected because they have characteristics that enable a detailed exploration and understanding of the research objectives. When selecting merchants, six state-owned enterprises (SOE) and six non state-owned enterprises were included, looking at also the differences in m-payment adoption (adopt, intention to, no intention), the size of organizations (small, medium and big), different industries (service and retail) (Table 2). The names of companies and applications are not disclosed, to ensure full cooperation from the interviewees. The data collection took place between January 1, 2014 and February 25, 2014. In addition to the interviews, publicly available information was collected from official websites of different companies, the People's Bank of China, General Office of the State Council, Ministry of Commerce, National Development and Reform Commission, and China Banking Regulatory Commission.

Table 2 Description of interviewee's background

	Ownership	Position	The No. of employee	Industry	Status	Platform type
1	Private company	Owner	≤ 20	Retail industry 1	Adopt	Third party platform
2	Public company	General manager	10000	Service industry 1	Adopt	Own platform
3	Private company	General manager	≤ 20	Service industry 2	Adopt	Third party platform
4	State owned company	Marketing director	200	Service industry 3	Adopt	Third party platform
5	Private company	Owner	≤ 20	Retail industry 2	Adopt and abandoned	Operator platform
6	Joint venture company	Planning director	2000	Retail industry 3	Intention to use	Third party platform
7	State owned company	IT manager	4000	Service industry 4	Intention to use	Bank platform
8	State owned company	General manager	10000	Retail industry 4	No intention to use	-
9	Private company	Owner	≤ 20	Service industry 5	No intention to use	-
10	State owned company	Marketing director	4000	Service industry 6	No intention to use	-
11	State owned company	Project manager	3000	Retail industry 5	No intention to use	-
12	State owned company	General manager	4000	Service industry 7	No intention to use	-

Data analysis

With regard to data analysis and interpretation of the interview findings, all the interviews were summarized, interpreted and tabulated from the transcripts according to the research question topics. If anything remained unclear and/or more information was needed, respondents were contacted at a later date for additional questions. Data analysis was performed in an iterative way. Memos were written throughout the interview and analysis process. After all the interviews were transcribed, a software package for qualitative data analysis, QSR NVivo, was used. By creating an initial hierarchy of categories and subcategories based on the propositions, the interviews were analysed and coded at sentence level. The authors then discussed the coding until consensus was reached. With the help of QSR NVivo, six central themes were identified: organizational internal and external factors, demand factors, technology characteristics, network effects, m-payment platform providers' factors and market environmental factors. Subsequently, the data was analysed again to create the relationships between the categories. Finally, in the theoretical coding phase, the categories were connected together.

4.2 Research context and background information

M-payment was introduced in the Chinese market over a decade ago. In 2002, China Mobile rolled out a micro-payment service based on carrier bills; users could purchase products or services via their mobile subscription by sending SMS (short message service) from a mobile phone. Currently, the main stakeholders of m-payment in China include financial intuitions (banks/China Unionpay), MNOs, and third party payment (TPP) providers. While financial institutions and MNOs are generally State Owned Enterprises, TPP providers are non-state-owned, private enterprises. In China, four different mobile payment models can be identified: (i) MNO centric; (ii) financial institution centric; (iii) TPP provider centric or merchants' platforms;

and (iv) m-payment models based on the collaboration between financial institutions and MNOs. The overall revenue of Chinese m-payment market reached 151.14 billion Yuan, with a yearly growth rate of 89.2% in 2012, and it is expected to achieve 1,358.34 billion Yuan in 2016 (iResearch, 2013a). According to iResearch (2013a), the top three providers in the Chinese m-payment market in the first quarter of 2013 are: TPP provider Alipay (Mobile App) is ranked first with market share of 68%, followed by China Unionpay (Mobile App) with 8%, and TPP provider Tenpay (Mobile App) with 7%. Although TPP providers dominate the online m-payment market, offline payment is dominated by POS (point-of-sale) payments, which are provided by financial institutions. Currently, China Unionpay is modifying the POS machines to accept NFC m-payment which will be their dominant service to compete with TPP's. At the end of 2013, Alipay m-payment service was rebranded as Alipay Wallet. Alipay Wallet does not only function as an m-payment service but it can amongst others be used for financial management and daily transactions, e-loyalty programs, e-ticketing, scanning-to-compare prices, credit card management, bookkeeping, and real-time information on stocks,

The institutional environment for m-payment is fairly complex (Xia, 2012). A number of government agencies, including the Ministry of Industry and Information Technology (MIIT), the People's Bank of China (PBC) and China Banking Regulatory Commission (CRBT), are involved in the development of regulation, policies, standards and industry specifications. Relevant regulations and standards for m-payment are listed in Table 3. Although some policies and regulations are in place, there are no clearly set rules for market access, while technical standards are not harmonized. The first important step in the regulation process took place during 2010, when non-financial organizations (for example MNO's and third party payment providers) were granted the right to be involved in financial business areas and provide various services, such as m-payments. Previously, non-financial organizations (most importantly MNO's) provided some limited m-payment services with only possibility for micro-payments. The new regulations in 2010 dramatically changed the roles and capabilities of potential actors of an m-payment ecosystem. In the next important step, the technological standards were established by the Bank of China for m-payment services, including security, infrastructure, equipment and m-payment applications. The currently ongoing initiative is part of a general regulation package targeting electronic commerce which started in December of 2013 with a planned finish in the end of 2015. As part of this regulation draft, the role of financial third party payment providers will be established. It is important to point out that, as it has been observed by Jakobs (2014), technical standards are created in China with always keeping in mind the potential for research and development, which is very crucial in case of services such as m-payment. Even if the standards are not harmonized, the existing ones facilitate the development of innovative services.

Table 3 Regulatory interventions for non-financial-institution Payment Services (adapted from iResearch, 2013b)

Date	Regulations
June 2010	Regulation on Payment Service of Non-financial-institution payment Companies
September 2010	Detailed Rules for the Implementation of Regulation on Payment Service of Non-financial-institution payment Companies
May 2011 to September 2012	Regulations on Prepaid Card ¹ Service of Payment Organizations
January 2012	Regulation on Online Payment Service of Payment Organizations
December 2012	Technical Specifications of Mobile Payment of Financial Products
December 2013 – End of 2015	E- commerce (Third-party Payment) Draft Regulations

To understand the demand-side of the m-payment market, a useful starting point can be to take a brief look at the general development of the ICT sector in China. An important indicator of ICT diffusion is the penetration rate of Internet use, and in particular 3G services. Li and Shiu (2012) have analyzed the process of Internet diffusion in China, and observe a high level of digital divide in the country, with the eastern regions characterized by a much higher level of Internet penetration. Similar observations are made by Lim et al. (2012), focusing specifically on 3G services. This general difference among regions in the access to and use of ICT has to be taken into account when analyzing the diffusion of m-payment services. It shows that traditional goals, such as universality of access, affordable prices and reliability continue to be important

¹ Prepaid cards shall mean the cards issued for profit in forms such as cards and passwords by adopting technologies such as magnetic stripes or chips, with a prepaid value used for purchasing commodities or services outside the issuing agency (The People's Bank of China, 2010).

However, there is an increasing need with regard to supporting investment and innovation (Bauer, 2014). Policy can affect developments in either a positive or a negative way. For example, in 2014, the People's Bank of China ordered the temporary halt of virtual credit cards and QR payment systems (Rabinovitch, 2014), which, at least temporarily, have a negative impact on the innovation potential of the m-payment ecosystem as a whole, not only from the bank's perspective.

5 Results

The most important observation reflected in all the interviews is that the factors involved in the three tiers of the m-payment ecosystem are interdependent. In their adoption decision, merchants first consider factors from the core Tier-1 eco-system and from the broader eco-system. Decisions are typically made from the inside out. If the merchants do not see relevant value creation opportunities, they will not consider adoption based on factors external to the core business. More specifically, if their internal resource configurations do not (or only partly) support the implementation of m-payment, merchants will still not adopt, even though external resource from the ecosystem could provide the needed support. As for the merchants who decide to adopt m-payment platform, based on contingency with their core resources and capabilities, they continue the assessment before making the final decision by considering the tier-2 and tier-3 factors. In the following section, the concepts and actors identified in the proposed framework will be looked at.

5.1 Tier-1: Core business

5.1.1 Merchants

The capabilities and resources of merchants

Most of the interviewees mention the importance of resource configurations. The differences between the group who adopted m-payment and the group with no intention to adopt relate to two main factors: (i) whether the internal resource configurations are suitable for m-payment, and (ii) whether the merchants can gain external resources from their network partners such as m-payment providers.

Existing infrastructures, financial resources and human resources are essential factors with regard to the adoption of m-payment. All the merchants that adopted an m-payment mentioned that they own the infrastructure, for instance POS machine or Wi-Fi to support m-payment (with the security issues mainly being controlled by m-payment providers). Financial resources mainly include the costs of software, hardware and advertising on the part of the merchants themselves, or cross-subsidization from m-payment providers. Human resources include experience with similar systems, staff capabilities (professional team and relevant competencies), and staff training support from m-payment providers. It is an advantage to have a professional team to develop the m-payment platform, and support and train internal staff, or to have providers offer this training service.

"We have experience in online payment. In addition, we have a technical team to support m-payment implementation. The costs are acceptable for a company like ours. We would like to invest in this innovative technology to keep our leading position." (Service industry 1)

"As a partner of XX (an m-payment provider), they compensate us, if we offer lower prices for customers to buy products by using m-payment. In addition, this m-payment provider regularly organizes training courses on m-payment implementation, advertising, and maintenance for merchants to join." (Retail industry 2)

As for the merchants that have no intention to use an m-payment, the underlying reasons are: (i) a lack of existing infrastructure, not sufficient financial and human resources to support the system, (ii) the size of the company, i.e. too small, and 3) the extent to which m-payment matches the company's culture and structure.

"Our structure and system determine that it is difficult to build anything new without a tedious process." (Service industry 6)

Comparing the results from the two merchants group, one can conclude that the existing infrastructure, the financial strength and the cross-subsidization by m-payment providers, and proper human resources either from inside the company or in the form of support from m-payment providers, reduce the costs involved in adopting an m-payment platform, and further help the merchants acquire the ability to implement the platform. This means that the first proposition is supported.

P1: Internal and external resource configurations of merchants determine their willingness to implement an m-payment platform (supported).

Strategic orientation of merchants

Another important decision factor is the fit of m-payment to organizational strategies. The findings show that merchants that have adopted or intend to use m-payment platform are more focused on strategies such as product leadership and/or customer intimacy. Companies that focus on product leadership, see m-payment as an innovative payment method, so they adopt it accordingly. When a company focuses on customer intimacy, meaning that they always put the customers' needs first, they adopt. When a company focuses on operational excellence, the aim is to minimize costs, and if m-payment can help save costs through low investment, the company will also adopt. However, most of the merchants interviewed see m-payment as costly and requiring increased efforts in terms of employee training. So merchants are waiting for the costs to decrease.

"Innovation is an important tradition in our company. We have to keep our reputation in the industry, and we are eager to capture the market share in advance" (Service industry 1).

"We take customers' convenience as our priority, and we try our best to achieve that mission. Moreover, we always aim to keep our leading position within the industry" (Retail industry 3).

"We cancelled e-commerce centre, mainly because of financial issues. We do not want to invest so much money as it cannot increase our operating efficiency. As a SOE, we would like to hold a wait and see attitude" (Retail industry 5).

Based on these findings, the second proposition is supported.

P2: The merchants with a strategy focus of customer intimacy or product leadership are more likely to adopt m-payment (supported).

Management support

The knowledge and characteristics of top managers are also significant. They may initially want to adopt m-payment platform, but their attitude can change when there are conflicts with department managers. They become hesitant and finally give up on the original idea. This sequence of events was mainly observed in SOEs.

"As for m-payment, the sales department was very active, while the finance department was against it. The finance department reasoned that the m-payment system is difficult to make compatible with their existing finance system. It will consume a lot of money and human efforts to solve this incompatibility problem. As we are a SOE, the culture and attitude are quite conventional; nobody wants to take full responsibility, so the board meeting rejected this idea" (Service industry 6).

This pattern is confirmed in all the interviewees with SOEs who mentioned cultural and structural issues as a barrier. The culture and structure in SOEs can be interpreted as follows. Firstly, the large number of decision-making groups (the board and the party committee) may sometime have conflicts of interest: while the board represents the interests of the company, the party committee also has to consider more generic societal benefits. Secondly, the strict and long hierarchy in SOEs reduces the speed of decision-making processes. Third, the culture of Guanxi, in this case maintaining a good relationship with leaders and subordinates without offending anybody, obstructs innovations.

Consequently, P3 can be revised and refined into P3a and P3b:

P3a: *Managerial issues (top managers' knowledge, attitude, lack of consensus within different departments) will influence merchants' adoption of m-payment (supported).*

P3b: *The down-side of the culture and organizational structure of Chinese SOEs is a barrier to the adoption of m-payment (supported).*

5.1.2 M-payment platform technological characteristics

Across all interviews, compatibility and security are the two main technological characteristics that influence merchants' adoption of m-payment. In addition, perceived security depends on previous experiences and trust in m-payment platform providers. Additionally, ease of use is a condition sine qua non for m-payment. A majority of the interviewees pointed out, that end-users are mainly concerned with privacy issues and that trust is an important issue for consumers and merchants alike. Merchants that adopted or intend to use m-payment platform stated that compatibility with their existing systems/business is the most important reason, as it saves them the efforts of having to build a new system and train staff. Meanwhile, adopters mentioned the following advantages: m-payment platform is easy to use, convenient and fast, usable anytime-anywhere and secure, while merchants with no intention to use perceived m-payment platform as not easy to use, not compatible and not secure. The interviews suggest that perceived compatibility (both technology and business) is related to organizational resource configurations. When the merchants acquire the resource configurations necessary to support the new m-payment system, or the providers can provide those resources, it is easier to adopt.

"This platform is compatible with our existing system and business, which is easy to fit into our financial management system." (Service industry 3)

"We do not have a professional team or any talents to support an m-payment platform, and we do not know the whole process, how it works together with our normal financial system." (Service industry 5)

As for security issues, the reputation of the providers and the trust built in long-term relationship can ensure that the m-payment is secure.

"According to our collaboration experience with this provider on online payment, we never had any serious security issues. We trust them and willing to continue the collaboration on m-payment." (Retail industry 1)

"Bank's platform would be our choice if we are going to adopt m-payment, because we believe their profession in security issues." (Service industry 4)

Based on these findings, P4 is refined as follows:

P4a: *Compatibility in relation to the adoption of m-payment is mediated by the resource configurations of an organization (supported).*

P4b: *A high level of compatibility will increase the rate of merchants adopting m-payment (supported).*

P4c: *Perceived security in relation to adoption of m-payment is mediated by trust (supported).*

P4d: *Perceived security in relation to the adoption of m-payment is mediated by trust (supported).*

5.1.3 End-users

The most important reason for merchants to adopt m-payment related to customers is critical mass and consumer readiness. Critical mass is defined as *"a small segment of the population that choose to make big contributions to the collective action, while the majority does little or nothing"* (Oliver, Marwell, & Teixeira, 1985, p.524). In the present context, critical mass is achieved by a certain amount of people using the m-payment platform so that the rate of adoption of m-payment takes off. It is difficult to measure or even to estimate the exact number of users required for achieving critical mass on advance, but it is possible to

predict whether the critical mass will be reached or not. The interviewees expected that there will be more and more customers using m-payment. One reason is that customer segments that have already adopted m-payment give positive feedback. Moreover, interviewees highlighted that they select TPP platforms that already have a large customer base. Some merchants adopted m-payment because they are influenced by other merchants.

“Our customer segments mainly consist of young customers and business people. Nowadays, more and more young people and business customers use it, so we will continue use m-payment and improve user experience.” (Service industry 1)

Merchants with no intention to use m-payment are mainly concerned with the lack of critical mass. The interviewees stated that customer segments adopting m-payments do not fit their own marketing strategy. For example, one interviewee, representing a big shopping mall with strong financial resources, indicated that

“Our customer segments almost cover all the ages, but young segments are not the majority who are the main users of m-payment. But, we probably will begin with some fashion shop like coffee shop, cinema, etc. that own mainly young customer segments.” (Retail industry 3)

“Our customers mainly consist of female elderly who are not so interested in new technology such as m-payment. They probably will use it when majority of people will use it.” (Retail industry 5)

In other words, the combination of the merchant's own customer base and other merchants in the shopping mall yields an insufficiently large number of potential end-users to create enough perceived critical mass. M-payment platforms rely on same-side and cross-side network effects to attract both groups (merchants and end-users), otherwise the service cannot take off. The described same-side and cross-side network effects as seen by the interviewees are potential sources of achieving a critical mass, which in turn persuades merchants to adopt m-payment.

P5a: The same-side network effects of either consumers or merchants influence merchant adoption of m-payment (supported).

P5b: The cross-side network effects of consumers and merchants influence merchant adoption of m-payment (supported).

Consumer readiness relates to positive feedback from customers, consumers purchases at fragmented times, change in consumer habits and an increase of impulse purchases. The merchants would adopt when they perceive their customers as being ready to adopt m-payment.

“Many customers use fragmented time to purchase products with m-payment. If they cannot pay at the time when they see the products, they would not buy them afterwards in most cases. The convenience of m-payment increases the impulse purchases.” (Retail industry 1)

“Young and fashionable people like to try new things, and they learn quickly. Their consumer habits change very fast. The feedback from these customers is very positive.” (Service industry 2).

The proposition with regard to consumer readiness is supported.

P6: Higher level of consumer readiness positively influences merchants to adopt m-payment (supported).

The relationships of the factors, as coded and analysed, at the core business level influencing merchants' adoption of m-payment at the core business levels are summarized in Fig. 3.

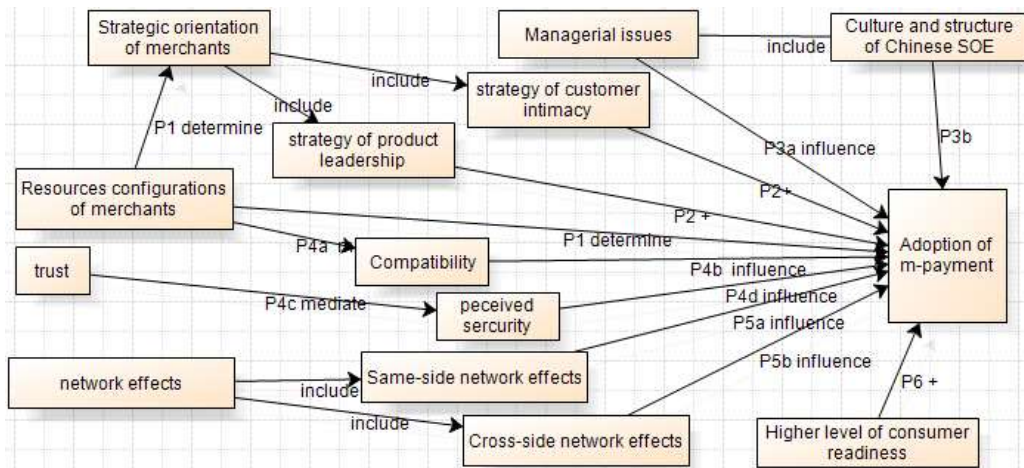


Fig. 3 Factors related to adoption of merchants of adoption as relevant to Tier-1 of the business ecosystem

5.2 Extended network

5.2.1 M-payment platform providers

Interviewees mention four different types of platforms, i.e. a bank platform, an operator platform, TPP platform and merchant's own platform. The platform based on the collaboration between banks and MNOs is still in its early stages of development. One reason to adopt a particular platform is related to providers' promotion strategies, i.e. pricing, marketing, reputation and the existence of a long-term open relation. M-payment platform providers use pricing strategy to subsidize merchants, end-users or both to promote their platforms. For example, if end-users use m-payment in some cinemas, coffee shops or fast food restaurants that collaborate with the platform, then they can get free services or food. As in the case of merchants, platform providers can follow subsidizing strategy by offering lower commission fee or compensation on discounts to promote the services.

"The consumers can buy our products with some discounts (5% to 60%) by using m-payment. We can get the discount money back from m-payment providers. No only there is no loss, but also there is an increase of our sales because of discount." (Retail industry 2)

"The transaction fee normally is lower than for credit/debit cards. This TPP platform promotes free transaction fee, if consumers use m-payment instead of other payment solutions." (Retail industry 1)

Because same-side and cross-side subsidization is a well-known and frequently used technique to increase adoption, the next proposition is confirmed.

P7: Providing pricing strategy by cross-subsidizing to merchants and end-users will increase the rate of merchants' adoption of m-payment (supported).

In addition to striving for an optimal pricing strategy, m-payment platform providers also make a marketing effort to attract merchants and end-users. They target specific customer segments to promote acceptance in the market. For instance, providers target places with micro-payment services, where young and fashionable people like to go. They advertise the m-payment platform on social networks such as Sina Weibo and Wechat. At the same time, providers try to reduce merchants' risk by reducing the investment necessary for implementing and maintaining m-payment.

"We made a deal with the m-payment platform provider that they have to teach our receptionists how to install and use it. They also provide technical support if needed, with first three times free." (Service industry 3)

"They post a lot of information such as how to use m-payment, security issues, and also discount information that the end-users can use their m-payment platform to get discount in some collaborated

merchants' location. This also helps us to advertise our brand and reach more customers." (Service industry 2)

The next proposition is also supported.

P8: The marketing strategies of m-payment platform providers to promote m-payment platform (such as targeting, communication, and risk reduction) will increase the rate of merchants' adoption of m-payment (supported).

Clearly, the third party payment (TPP) platform, i.e. Alibaba and its subsidiary Alipay, dominates the market, even the merchants with no intention to use m-payment indicate they would choose the TPP platform if they had to choose a provider. The TPP platform is a mobile app with an integrated service that allows consumers to purchase products and services in brick and mortar or online shops with credit/debit cards, gift cards and discount coupons via smartphones, as well as transfer money and pay bills.

"We chose this m-payment platform because it has the largest market share, and can cover all kinds of credit/debit cards from different banks. Compared to bank platform that always only allows its own credit/debit card, this platform is more convenient." (Service industry 3)

"We can advertise our services and provide coupons on this m-payment platform for end-users. The online discount information or coupons that consumer bought leads them coming to our physical store. It can increase our sales." (Service industry 2)

The TPP platform makes it possible for both merchants and banks to access the core functions through APIs (Application Programming Interface) (*technical openness*). Compared to other platforms, this platform also supports a wide range of bankcards (*ecosystem openness*), resulting in greater convenience for merchants and consumers. Merchants can offer coupons via the platform. Online advertisements or the online purchase of coupons increases the sales of the physical stores. This is known as online to offline (O2O) service. As for providers and merchants, one of the attractive features of O2O is the promotional effect and traceable transaction for each purchase. Customers purchase coupons via the m-payment platform, and use them in the physical store. Some interviewees also pointed out the presence of offline to online effects. For example, customers, while shopping in the physical stores, before paying the bill, access the m-payment platform to purchase coupons online and then use the coupons in the physical stores while they pay.

In addition, based on a long-time experience with online payments and as a leading Chinese e-commerce provider, the TPP platform possesses the advantages of a large customer base and a positive reputation and brand. Its well-known reputation stimulates the cross-platform network effect, as more and more people use their m-payment platform. This means that the next proposition is also confirmed.

P9: Higher degree of m-payment platform openness (ecosystem openness and/or technical openness) to complementary providers/merchants will increase the rate of merchants' adoption of m-payment (supported).

5.2.2 Suppliers of merchants

For merchants that adopted and later abandoned m-payment, a powerful trading partner can be the main reason behind the decision to adopt. Actually this merchant adopted an operator platform in 2006. The merchant and the MNO have a long-term relationship, on which the merchant relies heavily. Later, in 2012, the merchant abandoned the m-payment platform because the MNO started to cooperate with a financial institution to provide NFC m-payment, which in the initial stage required the merchant to implement new infrastructure, such as a POS machine, NFC-based phones and SIM cards. In other words, the merchant adopted the m-payment platform in the beginning because of powerful trading partners, and later abandoned the platform to wait for the new solution that would be mature enough.

“We have cooperated with them for a long time, so we are willing to continue this cooperation. We adopt m-payment service provided by them as soon as they had this service.” (Retail industry 2)

The relevance of the readiness of a trading partner can only be observed in this specific case. It may be because, in m-payment context, it is not about communication technologies that are depended on other vertical partners. However, in cases where the merchants depend on a powerful partner, they are forced to adopt. Hence, P10 is reformulated as:

P 10: *The readiness of a powerful partner to adopt and use m-payment will increase the rate of merchants’ adoption of m-payment (supported).*

The relationships of the factors influencing merchants’ adoption of m-payment in Tier-2 are summarized in Fig. 4.

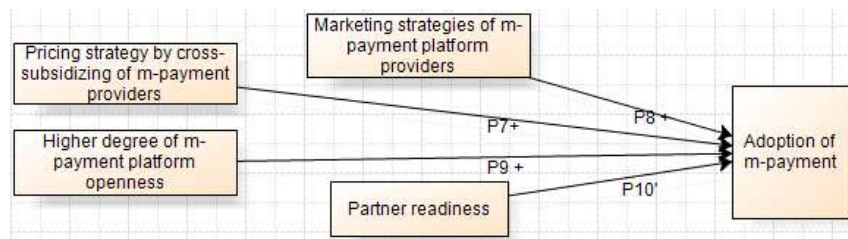


Fig. 4 Factors related to adoption of merchants of adoption as relevant for Tier-2 of the business ecosystem

5.3 Business ecosystem

In the outer circle of the eco-system, the focus is on technological factors in the organization’s environment (hardware, common standards, and network environment), overall market forces (market trends, initial stage, high penetration of smartphone usage, high penetration of e-commerce), and institutional arrangements (regulations and policy).

All the interviewees highlighted two factors: market maturity and standardization. There are several m-payment technologies currently available and running independently at the same time. Especially the merchants with no intention to use m-payment cited a lack of standardization as a barrier, because there is no standard interface to ensure ease of use and commonality of experience.

“Even if we only consider operator’s platform, there are at least three different technical interfaces. If we have to serve all the customers of all the three big operators, we have to install three different systems, which cause too much trouble for ourselves.” (Service industry 5)

“The different m-payment platforms need us to develop different interface to connect to our own financial system. However, considering the efforts what we have to spend and the profits, it is not worth to do it now. We would probably adopt an m-payment platform which can have a standard interface.” (Service industry 6)

P 11: *A lack of standardization will slow the rate of merchants’ adoption of m-payment (supported).*

On the other hand, most interviewees mentioned that regulations and policy need to be improved, but it is not their main concern presently, it is more of a crucial issue for m-payment platform providers.

Only the interviewee from Service industry 1, which developed an m-payment platform by itself, stated that:

“M-payment is still in its infancy, technologically and in terms of regulations and policy. We believe that the technologies can grow fast. The regulations and policy probably will grow slowly, as so many different industries are involved. We hope there will be more regulations and policy to support it.”

This may imply that the institutional pressure is more related to m-platform providers than to merchants, because platform providers are afraid of changes in government policies, laws and regulations as they can result in increasing costs. In addition, it is interesting that the interviewees mentioned that the imperfection of Chinese credit system leads to slow rate of adoption. A culture of making use of credit facilities, versus debit, needs a long time to cultivate. In other words, with a more firmly established credit system, merchants are more likely to adopt m-payment, and they also expect that more end-users will adopt. Many interviewees stated opinions similar to the following one:

“Both organizations and individuals have a lack of credit. We have a vulnerable credit system. Especially when the provided service is related to the financial system, people have more doubts. More than 90% of mobile phone users have received fraudulent short messages, so many users are skeptical about m-payment. We hope the credit system will improve and that more end-users trust the system as well as the providers, in which case then more merchants would probably use it.” (Retail industry 4)

So if the institutional environment is supportive, stimulating innovation and removing regulatory or institutional barriers, one can expect a positive effect on the merchant side.

P 12: A higher level of institutional pressure positively influences merchants to adopt m-payment (partly supported).

All the interviewees stated that China's m-payment development is still in its infancy, facing challenges such as a lack of standards and policies, which increases uncertainty. The overall penetration of m-payment is still relatively low. A majority of m-payment services is still in an experimental stage, without a mature business model. Some merchants see this initial stage as an opportunity, while others see it as a challenge. Moreover, overall market forces were mentioned as being one of the most important factors to consider. However, market forces are perceived in different ways: some merchants forecast very high demand regarding m-payment and predict that the technological environment will become mature enough very soon, while others anticipate a lack of demand and expect that it will take a long time before maturity will be reached. Consequently, we nuance the original proposition by stressing positive vis-à-vis negative perceptions.

P13: Positive perceived market opportunity will increase the rate of merchants' adoption of m-payment (supported).

The relationships of the factors influencing merchants' adoption of m-payment in Tier-3 are summarized in Fig. 5.



Fig. 5 Factors related to adoption of merchants of adoption as relevant to Tier-3 of the business ecosystem

6 Discussion and conclusion

The present study yielded several important findings, which are summarized in Table 4. First of all, all the identified factors in the m-payment ecosystem from a merchant's perspective can be divided into five categories: (1) organizational factors (resource configurations, strategy orientations, managerial issues); (2) technology factors (compatibility, perceived security, trust); (3) demand factors (consumer readiness, critical mass); (4) interorganizational factors (marketing strategies, platform openness, partner readiness); (5) environmental factors (intuitional pressure, market opportunity). Thirteen elements were identified as playing an important role in merchants' adoption of m-payment (see Table 4). Although these elements are each important individually in the decision by merchants whether or not to adopt m-payment, the analysis

indicates that it is the configurations of these interdependent elements, clustered together, that informs the decision.

All five identified categories have an influence on merchants' adoption of m-payment platform. The configuration perspective is a contribution to the m-payment adoption research domain, which typically investigates the linear effects of organizational, technology or environmental perspectives in literature. Configuration theory describes multidimensional constellations of conceptually distinct elements or traits that commonly occur together and form an integrative and meaningful whole (Meyer, et al., 1993; Miller, 1987). The configuration approach that is applied explains how an m-payment ecosystem could work as a result of the interaction of its thirteen constituent elements. According to the configuration approach, these different elements are in essence interdependent and cluster systematically to emerge as meaningful holistic constellation of an m-payment ecosystem (Meyer et al., 1993).

Table 4 Summary of themes and cases

Themes		adopted and continue using m-payment	adopted and abandoned m-payment	have intention to adopt	with no intention to use
Organizational factors	Resource configurations	Sufficient internal and external resources	Internal resource and sufficient support from external resources	Some internal resources but not sufficient	No basic resources from both internal and external resources
	Strategy orientations	Focus on customer intimacy or product leadership	Not so important as the provider invest the costs	Customer intimacy	Some do not fit into their strategies, while others are affected mainly by SOEs specific culture and structure issue
	Management support	Full support from management	Full support from management	Working on it	No support from management level
Technology factors	Technological characteristics	High level of compatibility with existing system, high level of perceived security and trust	High level of perceived security and trust	Perceived compatibility is not high, but can be improved. High level of perceived security and trust.	Low level of compatibility with existing system, low level of perceived security
Demand factors	Critical mass	High level of perceived critical mass as m-payment matches customer needs	Low level of perceived critical mass as m-payment only suitable for a minority of potential customers	Perceived critical mass will grow in a long run, but not at present	
	Customer readiness	The merchants' customers fit into the m-payment customer segments	A minority of the merchant's customer segment is ready	The merchants' customer readiness is limited in a small group which takes time to cultivate the behaviour	Low level of customer readiness
Interorganizational factors	Pricing strategy	M-payment providers provide subsidization strategy on either end-users or merchants	M-payment providers provide subsidization strategy on both merchants and end-users		
	Marketing strategy	M-payment providers help to reduce risks and advertisement	M-payment providers full support on reducing risks and advertising		
	Platform openness	Higher degree of m-payment platform openness	Limited m-payment platform openness		
	Partner readiness	Not important	Powerful partner (the power led this merchant to adopt and to abandon m-payment)	Not important	Not important
Environmental factors	Standardization	Lack of standardization	Lack of standardization	Lack of standardization	Lack of standardization
	Market opportunity	High level of perceived market opportunity	High level of perceived market opportunity	High level of perceived market opportunity	Low level of perceived market opportunity
	Institutional pressure	Low level of institutional pressure	Low level of institutional pressure	Low level of institutional pressure	Low level of institutional pressure

Moreover, all elements are interrelated, as can be seen in Figs. 3, 4, and 5. As a result, one can bridge the gap between the resource configurations and strategy orientations to technology factors, demand factors

and environmental factors. As m-payment platforms are typical multisided platforms, platform openness and network effects play an important role in the m-payment ecosystem. Organizational factors from the merchants' side and demand factors from the end-users' side can reinforce each other as a result of network effects through the m-payment platform. The strategies (pricing and marketing) of providers can also facilitate m-payment adoption. In the m-payment research domain, the interplay of different actors is crucial for merchants to turn innovation into value. The identified interrelationships provide insights into the theory of adoption by explaining why a merchant would (not) adopt m-payment. From a practical point of view, it provides an indication to m-payment platform providers as well as regulatory bodies on how to facilitate merchants in adopting m-payment.

The observations discussed above have other important implications for policy-makers. In contrast to the traditional policy-making practices and theories on regulation, which emphasize the focus on a static equilibrium framework, the complex set of interdependencies in ecosystems surrounding digital services, and specifically m-payments, require alternative approaches. In other words, in the m-payment ecosystem, public policy-makers should consider the interplay among players and, confirming the observations by Bauer (2014), we observed three specific areas that require more focus: (i) a thorough understanding of the effects of structural forms of regulations and policies, (ii) considering all the important stakeholders within the multisided-market structure, and (iii) a clearer view of the potential costs as the consequence of regulatory and policy changes, for actors. The overall goal would be for regulations and policies to enable the actors involved to negotiate and reach efficient coordination concerning m-payment service themselves. While this is of crucial importance to every actor in the m-payment ecosystem, it is currently recognized mainly by the service providers (as it is confirmed to be the most important challenge facing by companies in an industry report by Deloitte (2012)). As merchants are affected only indirectly through the actions of service providers, they do not consider it a major issue at this point in time.

With regard to the adoption of m-payment, the decision-making process starts at the core business level, and then moves via the extended network to the outer ring of the business ecosystem. Moreover, the relevant factors at the core business level are the most important factors to merchants in their decision whether or not to adopt an m-payment platform. In other words, if a merchant decides not to adopt m-payment, the essential barriers can be found at the core business level. If a merchant has the intention to adopt but only in the future, the barriers probably are located outside the core business level. This provides an answer to the third research question. When facing the decision whether or not to adopt an m-payment platform, merchants first of all consider the relevant factors at the core business level. It is only when this level has been satisfied that the decision process will begin to involve factors related to the extended network level. While the core business-related factors establish the intention to adopt m-payment, issues regarding the extended network can delay the implementation or even cause the merchants to abandon the plan. After considering the extended network factors, the decision-making process moves on to the business ecosystem level. At this level there are no prerequisites but facilitators for merchants to adopt m-payment. In other words, the merchants who decided to adopt m-payment platform, even facing imperfect conditions in the outside circle of the business ecosystem, perceive more opportunities than the others. In the view of non-adopters, if the core business level factors are not satisfied, the perceived value of other factors is very low. Based on our findings, it is not recommended to classify factors simply as drivers or barriers, because the effect of a factor very much depends on the resource configurations and the interactions with other factors that can position it as either a driver or a barrier.

Finally, the finding that most of the merchants adopted or intend to use a TPP platform, like Alipay, is consistent with the findings by iResearch (2013b) that TPP platforms have occupied more than a 60% market share in China. The number of private TPP providers developing m-payment platforms is growing and they have managed to gain a competitive edge over platform of financial institutions and/or MNOs. This can be explained as follows. Firstly, a majority of Chinese financial institutions and all MNOs as SOEs are monopolies in their own market, and they intend to extend their leading status in the m-payment industry, which has made them overconfident with regard to their bargaining power in the m-payment market. Secondly, both MNO-centric and financial institution-centric models offer limited m-payment scenarios with non-

interoperable m-payment solutions. For instance, because MNOs focus on micropayments within their own customers, China Mobile customers cannot use m-payment platform to pay for services or products provided by China Unicom or China Telecom, and vice versa. Financial institutions are mainly interested in macro-payments, although they also provide micro-payment solutions, but different banks may have different standards and system interfaces, which poses a barrier to cross-bank m-payment service operations. In contrast, TPP providers offer both micro- and macro-payments with a more interoperable platform by supporting a wide range of mobile networks and bank accounts.

Thirdly, as a subsidiary of e-commerce giant Alibaba Group Holding Ltd, to use Alipay is compulsory and the only way to pay on Taobao and Tmall, a similar situation that can be compared to the relationship between eBay and Paypal. Therefore, Alipay accumulates a large customer base as Taobao and Tmall, China's largest retail platform for businesses and consumers dominate China's online retail marketplace. When Alipay launched its mobile m-payment application, many users switched from its online payment service to m-payment. Moreover, thanks to the positive reputation of its online payment system, the company provided a starting point for its m-payment expansion. Recently, Alipay and Walmart announced that in selected Walmart stores, Alipay Wallet will be available as a possible payment method (Xinhua, 2015). For Alipay, it can mean a significant addition to the already existing user base of 270 million people, and in general pave the way for further development in the TPP m-payment platforms compared to the annual transaction volume 7 trillion yuan in 2014 (iResearch2015). Fourthly, TPP has been expanding the payment service from online (physical or virtual goods) sales to the offline world and service sector, and vice versa. For example, Alipay Wallet now supports payments for taxis and public transportation, and is available as a payment method at vending machines, convenience stores, department stores, pharmacies, hospitals and parking lots. The emerging O2O service increases sales for the physical stores with traceable records, while increasing the potential application scenarios. On the other hand, trust and reputation are transferred from online payment to m-payment of the same brand.

This study has several theoretical implications. First of all, unlike many prior studies, which attempted to extend conventional DOI models to examine the organizational adoption of new information and communication technologies, we developed and validated a business ecosystem model starting from the perspective of merchants. Secondly, we provide an analytical multi-level framework that helps analyze the interdependent factors within the model. Thirdly, we contribute to the m-payment adoption research domain from a configuration perspective by investigating the non-linear interactions between different elements in the m-payment ecosystem.

The practical implications of our study indicate that m-payment providers should pay close attention to multi-level issues and the complexity merchants have to deal with in their decision-making process. This study provides one explanation regarding the large market share of TPP providers in China: their m-payment platform requires low investments in terms of implementation and maintenance, due to subsidization mechanisms, and does not require a significant technical infrastructure development on the part of a merchant. In addition, the large customer base of the m-payment platforms of TPP providers can also match the different customer segments of different merchants. Moreover, the relatively interoperable interface of TPP m-payment platforms also provides an important advantage, as it offers a technological solution that can accept every majority bankcard from different card systems and mobile phones from different MNOs.

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