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Conference Paper

Analyzing the business model for mobile payment from banks' perspective: An empirical study

24th European Regional Conference of the International Telecommunication Society, Florence, Italy, 20-23 October 2013

Provided in Cooperation with:
International Telecommunications Society (ITS)

Analyzing the Business Model for Mobile Payment from Banks' Perspective:

An Empirical Study

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Abstract: The increasing number of smart phones presents a significant opportunity for the development of m-payment services. Despite the predicted success of m-payment, the market remains immature in most countries. This can be explained by the lack of agreement on standards and business models for all stakeholders in m-payment ecosystem. In this paper, the STOF business model framework is employed to analyze m-payment services from the point of view of one of the key players in the ecosystem i.e., banks. We apply Analytic Hierarchy Process (AHP) method to analyze the critical design issues for four domains of the STOF model. The results of the analysis show that service domain is the most important, followed by technology, organization and finance domains. Security related issues are found to be the most important by bank representatives. The future research can be extended to the m-payment ecosystem by collecting data from different actors from the ecosystem.

Keywords: mobile payment, business model, STOF, AHP

1   Introduction

The number of mobile devices in use far exceeds any other technical devices that could be used to provide services to consumers. This offers lucrative opportunities to merchants and service providers. Mobile payment (m-payment), as one of the key transactional services, attracts massive attention, and it has already been predicted to have a bright future as mobile commerce have become increasingly popular in developing economies [1]. Both researchers and practitioners have voted m-payments as the top mobile application or service category for more than a decade.

However, this promising service is still marginally adopted and being used for only few applications (e.g., ticketing and vending) in a few regions/countries (e.g., Japan, Philippines, and Kenya) with limited success. Mobile network operators play particularly a central role in the m-payment ecosystem i.e. in Japan. In addition, Google as an over the top (OTT) service provider has already entered to the payment industry and has provided Google Wallet in 2011, incorporating with different stakeholders such as Citi bank as the issuing bank, MasterCard as the initial payment

network, and Sprint as the first mobile carrier[1]. Moreover, PayPal in e-commerce business will also launch m-payment service in Europe in 2013[2].

The rapid developments in technological and web-based applications are confronting traditional banks with major challenges. For banks, m-payment as a strategic opportunity represents not only a defensive competence against new entrants, but also a growth prospect to convert cash into electronic transactions. Banks have a vital role to play in the m-payment ecosystem for three main reasons. Firstly, banks have been in control of the financial transactions for a long time [2], [3], so they have the loyalty and trust of end users. This core strength sets them apart from the other actors and will help them to have a key role in providing m-payment services. Secondly, banks have experience in risk management [4]. In other words, they provide mature management at data security, brand equity and reliability, access to risk management, own a large customer base and have strong customer loyalty. Thirdly, from the customers' perspective, they are more incline to perform their banking transactions through the banks' mobile financial services. Undoubtedly, one can argue that banks should have a seat at the m-payment services table. There exist some banks/financial institutions that have already begin to provide m-payment services to their customers. For instance, Chinese payment network operator *UnionPay* incorporating with China Mobile, the world's largest mobile network operator, have started to promote m-payment solutions since February 2013 [5].

As an example of multi-sided platform-based services, m-payment ecosystem is extremely complex due to the multiple interdependent firms involved with interrelated products. This complexity may also cause misalignments among the stakeholders. The evolving development of m-payment ecosystem includes stakeholders from different industries with different incentives and prerequisites. The providers consist of stakeholders such as banks/financial institutions, payment service providers, mobile network operators, mobile device manufacturers and other service or product related participants. However, the lack of a clear business case for all stakeholders and agreement on standards and business models are tremendously hindering the uptake of the services [6].

In order to manage profitable m-payment services, collective action and collaboration, specifically for designing a viable business model, between the major actors involved in the m-payment ecosystem are required. Most academic literature, if not all, has predominantly focused on the technological and consumer aspects of m-payment. Therefore, a research that specifically focuses on designing an appropriate business model for m-payment is strongly needed. Thus, this study aims to provide a holistic view of the business model for m-payment from a bank's perspective. The intention to focus on banks is due to the important role that banks play in the m-payment ecosystem. By making use of the STOF model [7] as the research framework and Analytic Hierarchy Process (AHP) as the research approach, we strive to analyze which domain of STOF model (service, technology, organization and finance) is more important, and highlight the most

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[1] http://www.google.fi/wallet/
[2] http://www.reuters.com/article/2013/02/22/us-paypal-europe-idUSBRE91L00620130222

important components within each domain. As often banks' top managers are involved in making strategic decisions toward their offered services and value propositions, AHP is an appropriate method to help elicit the most important components of a business model. The current research objective is to provide insights into m-payment deployment.

The paper is organized as follows: Section 2 presents a literature review on m-payment service and business models. Section 3 describes the theoretical framework for our study. In Section 4 we describe the methodology used to collect data. In section 5, we analyze and discuss the results followed by the conclusion and future research in section 6.

2   Literature Review

2.1 M-payment related work

In the existing literature various definitions of m-payment are provided with some distinct similarities and differences. M-payment has been identified as the natural evolution of electronic payments which provides feasible and convenient mobile commerce transactions [8]. One definition can be based on the identification of the mobile device as the key characteristic which distinguishes m-payments from other forms of payment. Some of the prior studies have focused on mobile phones [9], while some consider the entire class of mobile communication devices [10]. Mobile handheld devices include mobile phones, PDAs and wireless tablets that can be connected to mobile telecommunications networks and make it possible for payments to be made [11]. With regard to the functionality of m-payments, all definitions refer to transferring the monetary values. The differences are mostly related to the phases of the payment process which are considered to be part of the m-payment. Henkel [9] in his definition of m-payment refers to the authorization and initiation of the payment process. Dahlberg et al. [1] define m-payment as the execution of the payment. This study adopts the definition by Au and Kauffman [3] that m-payment is any payment in which a mobile device is utilized to initiate, authorize, and confirm an exchange of financial value in return for goods or services by availing of wireless and other communication technologies.

Dahlberg et al. [1] classify 73 publications related to m-payment. Most published papers are concerned with technical issues (29) and consumer-centric research (20) whereas only five papers focus on the m-payment market and providers. Other articles are distributed among legal, regulatory, standards, and commercial concerns. It is clear that the provider-centric m-payment has not been given sufficient attention and thus it is necessary to have more studies in that perspective. Oh et al. [12] point out that research on e-payment services from different stakeholders' perspectives is of utmost importance to get a better comprehension of the diffusion process. As one of the few examples, Au and Kauffman [3] discuss m-payment from different stakeholders' perspectives (including consumers, merchants and providers) using network externalities theory to identify some important directions for research.

2.2 Business model related work

Zott et al. [13], reviewing 103 articles on business models, found that there is no agreement on the definition of business model, so researchers always adopt definitions that fit the context of their studies and these definitions are difficult to make consistent with each other. Despite conceptual differences from one research to another, there are some themes in common. Researchers agree that the business model is a new topic of analysis, which emphasizes a system-level, holistic approach to explaining the activities of a focal firm and its partners for both value creation and value capture. The distinction between the value creation and the value capture is clarified in [14]. Value constitutes of use value and exchange value. Use value refers to the subjective and individual specific evaluation of consumption benefits by consumers, while exchange value refers to price when the exchange of the good takes place. Value capture is defined as "the realization of exchange value by economic actors (firms, customers, resource suppliers, employees)" [14]. In other words, the aim of creating value for most companies is to capture the value and make a profit.

Business models have mainly been utilized to explain the use of information technology in e-business or m-commerce organizations [7,15], strategic issues (such as value creation, competitive advantage, and firm performance) [16] and innovation and technology management [17]. As this study focuses on m-commerce, we adopt the definition by Timmers [15] that business model is "an architecture for the product, service and information flows, including a description of the various business actors and their roles, a description of the potential benefits for the various business actors, and a description of the sources of revenues," which focuses on explaining business model for e-business.

A few prior studies attempt to systematically analyze m-payment using business models. Pousttchi et al. [18] develop an m-payment business model framework applying business model ontology. They use case study to analyze 27 different m-payment procedures. Ruijun et al. [19] analyze and compare the advantages and disadvantages of various techniques based on four mobile business models of m-payment services with some typical examples implemented in China. Moreover, a framework of four contingency (social/cultural, commercial, technical, and legal/regulatory/standards) and five competitive factors (consumer power, merchant power, traditional payment services, new e-payment services, and m-payment service providers) provides a "big picture" illustrating how the various perspectives fit together in [1]. However, there is a lack of detailed constructs to build an m-payment business model. In order to have a better understanding of the future development of m-payment service, this study analyzes the components of the business model empirically by using the STOF model from the perspective of the bank.

3 Theoretical framework for the study

The STOF model (Service, Technology, Organization and Finance) of Bouwman et al. [7] is a framework for designing viable business models for electronic services and focusing on mobile services. It provides a systematic approach to identify critical issues related to services provided by

interrelated organizations. The framework emphasizes the importance of a holistic view on designing business models for mobile services, and it prevents the costs of investing in services of wrong business models at an early stage. The STOF model consists of four interrelated domains: Service, Technology, Organization, and Finance. The four domains are closely related to each other (i.e., trade-offs in one domain have a direct relation to trade-offs in another domain) so we analyze them by using critical design issues.

In the following we will describe how the STOF model can be used to analyze m-payment services from banks' perspective in two steps. Firstly, we identify the most important barriers and drivers of m-payment from the bank's perspective. Secondly, we fit these components into the STOF model for evaluating and examining its appropriateness.

It is important to identify some of the most important factors which significantly influence consumers and merchants' adoption decision of m-payment services. It is has been argued that convenience and ease of use have significantly positive influence on consumers adopting m-payment services [20-21]. Moreover, speed of transaction and compatibility are considered to be the most important added values for m-payment service [21]. Furthermore, security, privacy and trust are playing crucial role in the success of m-payment adoption [21-22]. Business research in [23-24] shows that security and privacy are the greatest impediment, while convenience and accessibility are the greatest drivers. Therefore, the service providers should guarantee the security, safeguard privacy and enhance educating the technology to improve consumers' reliability. Meanwhile, the players should also make m-payment services convenient and accessible, easy to use and fast. In the following sections we describe the four domains of STOF model in more details.

3.1 Service domain

The Service domain, concentrating on customer value, is a description of the service offering, value proposition (added value of the service offering) and the market segment at which the offering is targeted [25]. Here we analyze which characteristics of m-payment services create value to consumers, and what aspects of consumer technology acceptance should be managed by banks when understanding consumer value perceptions. Critical design issues in the service domain include targeting, creating value elements, branding and customer retention.

Targeting: It is an important issue in almost every case to choose a profitable target group. Strategy Analytics reports[3] that the number of active smartphone users around the world has topped 1 billion in Q3 2012, which shows the potential for banks to acquire new customers such as under-banked or young people with mobile devices.

Creating value elements: Formulating a compelling value proposition for end users is very important for service providers. As mentioned in the previous part, convenience, ease of use, speed and accessibility are the main drivers. Convenience and speed are heavily based on the technical capabilities.

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[3]http://blogs.strategyanalytics.com/WDS/post/2012/10/17/Worldwide-Smartphone-Population-Tops-1-Billion-in-Q3-2012.aspx

Branding: The recognition of the brand by the target group is an important decision parameter. Brands are used for several purposes, such as increasing the visibility of the service in the market and to communicate trustworthiness.

Customer retention: Banks should be aware of the customers demand to keep the loyalty of the existing customers. Banks might be forced to develop m-payment services to protect their market, and prevent the customer churn due to the threat of new entrants such as PayPal or Google.

Table 1 Components in service domain

Service	Definition	Critical design issues
Extend market to new segments	The potential for banks to acquire new customers such as under-banked or young customers	Targeting
Speed in transaction	The presumed value proposition rests on the convenience and speed of payments.	Creating value elements
Avoiding security and fraud problem	Banks should be concerned about fraud, security and risk management	Branding
Innovative payment experience	The new added value services enhance the loyalty of existing customers	Customer retention

3.2 Technology domain

The Technology domain describes the technical functionality required to realize the service offering, it analyzes concepts including security, quality of service, system integration, accessibility for customers and management of user profiles [7].

Security: The implementation of security has a significant effect on the trust of end-users. When designing the service, the balance between ease of use (access to the service) and privacy consideration (communication and information) should play an important part. In the m-payment cases, security and privacy concerns become even more critical than other services or activities in m-commerce.

Quality of service: The service offering and the created value are greatly influenced by the performance of the technical functionalities. Since improvement in the technical architecture requires significant investments, the trade-off between quality and cost needs to be optimized. Service quality has been defined as having the potential to deliver strategic benefits, such as improving customer loyalty and profitability to the firm [26].

Management of user profile: Managing and analyzing user profiles can also help to improve customer loyalty.

System integration: The acceptance of services greatly depends on the extent to which they can be integrated with existing infrastructure: building on the banking legacy system can decrease the cost and reinforcement of customer lock in.

Accessibility by customers: Accessibility is one of most important driver for m-payment services. It requires from the banks to be more involved in payment transaction to control the whole process. Control in payment transaction enables banks to acquire more knowledge about users' personal data and interests that can help them to provide personalized services for the consumers as well as vendors behavior.

Table 2 Components in technology domain

Technology	Definition	Critical design issues
Managing security and privacy	Banks should pay attention to privacy, security and risk management issues and problem	Security
Standardization of technical protocols	Banks try to unify the technical standardization of important protocols	System integration
User Profile Management	Banks can guide future strategies with personal data, interest, and context and provide the generic business functions as authentication, billing, location-based services	Management of user profiles
Control payment transaction	Banks get more involved in payment transaction to control the whole process	Accessibility by customers

3.3 Organization domain

The Organization domain describes the m-payment ecosystem. Critical design issues that originate from the organization domain are partner selection, network openness, network governance and network complexity [7].

Partner selection: The m-payment ecosystem mainly consists of banks/financial institutions, mobile network operators, trusted service managers, merchants and consumers.

Network openness: Network openness is a parameter to judge to which degree the new organizations can join the network and be allowed to provide additional services to customers. From previous studies on organization models, two major arrangements become apparent. One is the closed model, in which a relatively fixed group of partners collaborate with each other and network openness level is low. Another model is the walled garden model, where if new partners follow the given rules, they are allowed to join the ecosystem. In this model the ecosystem is not completely open and certain degree of control is required.

Network governance: To govern the collaboration, actors need to solve the problem of typically conflicting interests between banks and telecom operators that block the development of an ecosystem.

Network complexity: Network complexity arising from increasing number of relations with actors needs to be managed within an ecosystem. Therefore, it is essential to have a controlled ecosystem and access to resources and capabilities. For instance, banks can choose to reduce network complexity by selecting an intermediary actor such as trusted service manager to manage the relations with the different service providers.

Table 3 Components in organization domain

Organization	Definition	Critical design issues
Choosing appropriate partners	Banks should carefully choose the most appropriate partners in the ecosystem that make profit maximization	Partner selection
Platform interoperability	Banks need to support customers from a lot of competing platforms to be profitable.	Network openness
Key role player in ecosystem	Banks play a key role in determining the intended customer value and creating the business model	Network governance
Customer/merchant relationship	Banks have a direct relationship with customers and merchants.	Network complexity

3.4   Finance domain

The main goal in the Finance domain is to create a financially beneficial situation for all actors and to balance the division and sharing of benefits and costs. Critical design issues in this domain include pricing, division of investments and risks, valuation of contributions and benefits, and division of cost and revenues [7].

Pricing: The price of a service is the amount of money a customer has to pay for using that service. In an extended definition, price and effort together refer to all sacrifices the customer has to make to obtain and use the service, for instance the effort involved in switching to a new service. As m-payment is a new service, customers will only adopt it if the perceived value exceeds the sum of price and effort. Pricing aims at maximizing profits or creating market share. With regard to the adoption research based on m-payment, perceived cost was found to have a significant negative influence on perceived customer value for consumers to adopt m-payment services [8]. Therefore, the price of m-payment service must be at least equal or lower than other payment solutions such as credit/debit cards and cash.

Division of investments and risks: Some restraints inhabit the development of banks in m-payment ecosystem. The cost of implementation is one of the most important barriers for banks [8]. Banks are hesitant to make the first move and invest heavily in m-payment services when consumer engagement is not guaranteed. The internet giants are already wading into the space, but cannot succeed alone. In many ways, the industry is caught in a "catch 22" situation: key players are waiting for consumers to buy in, but as yet there is little for consumers to buy. Banks

should carefully select the most suitable collaborating partners to control the initial technical infrastructure investment and the maintenance cost. One of the options can be outsourcing the initial technical infrastructure such as software to other professional software companies. For instance, Crosskey[4] offers cost-effective payment solutions tailored for banks and financial players in both Sweden and Finland.

Valuation of contributions and benefits as well as Division of cost and revenues: For fair and viable revenue sharing arrangements, it is essential to value the contribution of each player in the ecosystem to offer the services and receive the (intangible) benefits [7]. Perhaps the most significant issue for banks is the possible revenue logics. At first, m-payment solution provides a new revenue stream for banks from m-payments which may increase the transaction volume of credit/debit cards, processing fees, and the potential to include value added advertising to retailers for a fee. In addition, cost reduction might be an important motive to develop m-payments. M-payments reduce handling costs relative to cash and checks.

Table 4 Components in finance domain

Finance	Definition	Critical design issues
Control investment	Banks should control the initial investment such as technical infrastructure, and maintenance of mobile applications	Division of investments and risks
Avoiding the sharing revenues	Banks should manage how to control revenue sharing with other actors, as the intermediaries take an increasing proportion of profits	Valuation of contributions and benefits
Increasing revenue via various channels	The revenue is increased increase credit and debit card transaction volumes, processing fees and value added advertising to retailers for a fee	Division of cost and revenues
Reducing the cost of cash handling	With the use of m-payment, the cost of cash and check handling can be reduced	Division of cost and revenues

Based on the review, we see that a number of critical design issues play a role. However, we do not know the interdependence of the different aspects. Therefore, we executed an Analytic Hierarchy Process (AHP) analysis.

4   Methodology

AHP [27] is a multi-attribute decision making methodology which is based on the decomposition of the problem: the attributes are structured in a hierarchy with the main goal at the top of the hierarchy. On the second level of the structure, the main goal is decomposed into a number of attributes/criteria that are comparable to each other (in our case the basic components of the STOF model: service, technology, organization, and finance). In the next step, every attribute from the second level is considered as a sub-problem of the decision making process and decomposed

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[4] http://www.crosskey.fi

in the third level of the hierarchy. For example in our model the service component can be characterized by the four attributes described in Table 1. The number of levels in the hierarchy depends on the complexity of the main goal of the decision making problem. After the hierarchy is created, attributes on the same level and belonging to the same attribute on a higher level are evaluated by means of pairwise comparison. The outcome of AHP is a set of weights representing the importance of the associated attribute in the decision making problem.

The questionnaire used in this study was designed after a series of group discussions with the experts and senior researchers who have sufficient knowledge and insights into analytical and statistical techniques (AHP and different business model approaches). We have also conducted an extensive systematic literature review. The questionnaire was first translated into Chinese by two native Chinese researchers. Then another researcher translated it back into English to ensure consistency. The online questionnaire was distributed among a number of bank employees working on m-payment solutions in Chongqing and Wuhan in China in February 2013. In total, 54 responses were returned. Of those 15 were discarded due to incomplete answers or high consistency values. The effective response rate of the survey is 72.2 percent. The data analysis was performed on the basis of 39 complete responses. The average age of the respondents is 34.9 years. In the sample, the number of females and males is 16 and 23, respectively. There are 10 managers among the respondents, and the remaining 29 are staff in banks working on m-payment solutions. The average number of years spent as employees of a bank is 11.38 years, which means that the respondents are experienced and knowledgeable about the banking industry. 23 respondents work in local (city) banks, the remaining 16 in state-owned banks. The average number of employees in different banks is 1175 persons.

5   Results and Discussion

In the empirical analysis, Service domain has the highest weight compared to the other domains, followed by technology, organization and finance domain (Table 5). The result indicates that the respondents take service and technology as the most important domains. It is worth mentioning that finance domain is considered as the least important domain.

Table 5 Priority ranking and weight of the main factors

Priority Ranking	STOF	Weight
1	Service	0,33
2	Technology	0,26
3	Organization	0,22
4	Finance	0,19

In the overall ranking of the components (Table 6), the two security related factors account for almost 25% of the overall weights (avoiding security and fraud from the Service domain and

Managing security and privacy from the Technology domain), indicating that security is the main factor when designing a business model for m-payment (Table 6). As we reasoned previously, thanks to their experience in data security and fraud prevention, banks can assure customers of security and privacy on traditional banking services, so customers trust them. On the other hand, this does not mean any advantage when banks try to extend their customer base. Based on the analysis, banks do not consider this factor (extend market to new segments) as an important factor.

Table 6 Priority ranking and weight of the components in STOF model

Priority ranking	Attribute level	Relative weight	STOF
1	Avoiding security and fraud	0,138	Service
2	Managing security and privacy	0,089	Technology
3	Speed in transaction	0,080	Service
4	Innovative payment experience	0,062	Service
5	Platform interoperability	0,061	Organization
6	User Profile Management	0,058	Technology
7	Standardization of protocols	0,058	Technology
8	Control payment transaction	0,058	Technology
9	Increasing revenue	0,056	Finance
10	Key role player in ecosystem	0,053	Organization
11	Choosing partners	0,053	Organization
12	Customer/merchant relationship	0,051	Organization
13	Extend market to new segments	0,051	Service
14	Control investment	0,046	Finance
15	Reducing the cost of cash	0,046	Finance
16	Avoiding the sharing revenues	0,037	Finance

It is well-known that technology is crucial to support the requirement of m-payment services. The result from the respondents shows that all the components in the technology domain are considered as essential important to build a viable business model to support m-payment services. Except that security was ranked in the 2nd place, the others (User Profile Management, Standardization of protocols, and Control payment transaction) are equally important ranked in the first half of the priority list as it can be seen in Table 6.

As m-payment is a multi-sided platform-based service, m-payment ecosystem needs to make agreements on identifying the respective places in the ecosystem and determining viable and

equitable business models with bringing all the interests together. As can be seen in Table 6, the respondents ranked platform interoperability in the 5th place, while the others (Key role player in ecosystem, Choosing partners, and Customer/merchant relationship) were ranked from 10th to 12th. Based on the observation, three reasons can be addressed here why banks do not have profitable m-payment services yet. Apparently, banks have not attached great importance to playing a key role in the m-payment ecosystem, even if they have the capabilities and resources. Banks have not paid enough attention to choose the proper partners which may lead to conflict interests among actors in the ecosystem. And banks in China have not made significant efforts to improve customer/merchant relationship.

As it can be expected, the most important component in the finance domain is increasing revenue through m-payment services. Beyond our expectation, the other three components (Control investment, Reducing the cost of cash, and Avoiding the sharing revenues) were ranked among the least important priorities (Table 6) based on the respondents. Sharing revenues was ranked at the last place. This shows that sharing revenues with the other actors in m-payment ecosystem is the least consideration for the banks, which means there is a high likelihood that banks will cooperate with the others.

6   Conclusions

M-payment has not gained the promising market as anticipated. The lack of research found in the literature concerning the service providers' perspective, by making use of the STOF model as a research framework, this paper analysis and identify different components of business model to provide insights to banks which provide m-payment solutions as a part of their service portfolio. Providing m-payment services requires a collective action and tight collaboration between different stakeholders in the ecosystem. Banks, telecom operators, merchants and customers are the key players in providing m-payment services. Banks are considered to be one of the most important providers as they play an ever-increasingly crucial role in the m-payment ecosystem.

We identify a set of components for each domain in the STOF model, which can be considered as vital to build a viable business model. In the empirical analysis, Analytic Hierarchy Process (AHP) has been employed. AHP is one of the most widely used approaches to assess decision making processes. The outcome of AHP is the ranking of the components which can be used in this research to identify how banks should improve their business models. The results of the analysis show that service domain is the most important, and to a lesser degree technology, organization and finance domains. Security related issues are considered to be the most important attributes from the bank representatives' perspective.

Based on the results, we suggest banks to improve their business models from two angles. Firstly, in order to enlarge their customer base and stay competitive in the market, banks should provide more attractive and appealing services to the customers. Secondly, banks as one of the most important players in the m-payment ecosystems should make more efforts to improve customers/merchants relationship, and pay careful attention to choose the partners.

The limitation of this research is the fact that we cannot generalize the research findings and claim that they are valid for the entire bank industry. The sample population for this research is not chosen randomly; therefore, the findings of this paper only represent the opinions of the respondents who work in some Chinese banks. It is also worthwhile mentioning that AHP has its own limitations, such as inconsistency, rank reversals and repeating the evaluation.

In the future research, we strive to collect data from different players in the m-payment ecosystems and compare the results with the current findings.

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