A Design of Mobile Payments Business Model Based on Value Network

Jin-luan Ren, Xia-fei Zhuo, Li Zeng, and Bo Li

Abstract According to the characters of mobile payments and the requirements of business model design, some designing principles and essentials were proposed. Based on the process of value creation in mobile payments, the value network model of mobile payments was constructed. The design of business model of mobile payments was divided into four phases: value discovery, value creation, value management, and value realization. Every phase was designed in detail. At the end, the future research directions were proposed.

Keywords Business model • Mobile payments • Value network

1 Literature Review

1.1 Concept of Mobile Payments

With the development of mobile business, a new means of payments – mobile payments is becoming popular. Some scholars explained mobile payments as following. Q. Zhang (2008) referred to mobile payments as a mode of payment that consumers pay the fees for services or commodities through mobile phone

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(Zhang 2008). R. Wang (2007) and J. Ondrus and Y. Pigneur (2004) defined mobile payments as payments carried out wirelessly via a mobile device (Wang 2007; Ondrus and Pigneur 2004). From other researchers' view, mobile payments, not only confined to wireless payment, but include the initialization and activation of mobile devices and confirmation from payments (He 2008; Hort et al. 2002). Some scholars gave the definition as 'payments through mobile devices (Krueger 2001)'.

This paper defined mobile payments as a process of exchanging payment information through mobile commercial payments. Money in customers' accounts is transformed to electric data with the assistance of payment service providers, and eventually is transferred to product providers or service providers via mobile terminals. Mobile payments are characterized by the transaction conducted through mobile terminals. Here, mobile terminals are electronic devices used to access the wireless network such as mobile phones, PDA (Personal Digital Assistant) and POS (Point Of Sale), etc.

1.2 Related Perspective About Mobile Payments Business Model

There is few specific research about mobile payments business model. We reviewed literatures about business models and e-commerce business models, and summarized the main points into Table 1.

The business model consists of a profit model and three layers termed the 'client', 'boundary' and 'coordination' layers. The factors of profit model include profit ports, risk and profit distribution. The client layer is directly associated with accomplishment of clients value. Factors at this layer include value offering, customer segments, channel distribution and client relationship. The boundary layer supports the client layer, where contains factors of core technology, cost structure and investment activities. The coordination layer is comprised of two factors – value network and related activities. It is a layer to coordinate all actors in this model.

Mobile payments have a complete value chain structure that links various participants involved in different fields and industries. Its development cannot only be facilitated by a certain kind of companies, but require the systematic participation of all actors in the value chain. The business model of mobile payments is described as a system that consists of relationships among actors and an interactive mechanism, which is supported by the research of X. Bi, H. Li, H. Zhang (2009). In this system, service integrators offer values for clients and share profits with other participants. The system consists of products, service flow, information flow and cash flow, the description of different participants and their profit models, and the rules for business participants to obtain and distribute profits.

Table 1 Main perspectives on mobile payment business model components

Components	Empirical support	Researcher
Value chain structure, actor benefits, and revenue sources	Case study	P. Timmers (1998)
Customer understanding, marketing tactics, corporate governance, and intranet/extranet capabilities	No	R. Donath (1999)
Value proposition, target markets, internal value chain structure, cost structure and profit model, value network and competitive strategy	Case study	H. Chesbrough and R. S. Rosenbaum (2000)
Actors, market segments, value offering, value activity, stakeholder network, value interfaces, value ports, and value exchanges	No	J. Gordijn, J. Akkermans, J. Van Vliet (2001)
Value model, resource model, production model, customer relations model, revenue model, capital model, and market model	No	O. Peterovic, C. Kittl, R. D. Teksten (2001)
Customer value, scope, price, revenue, connected activities, implementation, capabilities, and sustainability	No	A. Afuah and C. Tucci (2001)
Transaction content, transaction structure, and transaction governance	Case study	R. Amit and C. Zott (2001)
Value object, value content, value offering, and value recovery	Case study	J. Weng (2004)
Value proposition, target customers, channel distribution, customer relationship, value chain structure, core competency, partner network, cost structure and revenue model	No	A. Osterwalder, Y. Pigneur, C. L. Tucci (2005)
Effective acceptance, actors rewards, usability, free content, initial contact, key cluster and scale	Case study	K. Pousttchi and D. G. Wiedemann (2007)
Business structure, technology structure, organization network and profit model	Case study	H. Bouwman, T. Haaker, H. D. Vos (2008)
Benefit point, value, range, price, revenue sources, associated activities, realization, property, sustainability and cost structure	Case analysis	U. Varshney (2008)

Note: Table 1 is sorted out and improved based on M. Morris et al. (2003)

2 The Value Network of Mobile Payments

The market drives the development of mobile payments. As people's lifestyle is constantly changing, more participants enter this industry for the pursuit of profits and further development in mobile payments. As a consequence, consumers receive better products or services provided by corporate efforts of various

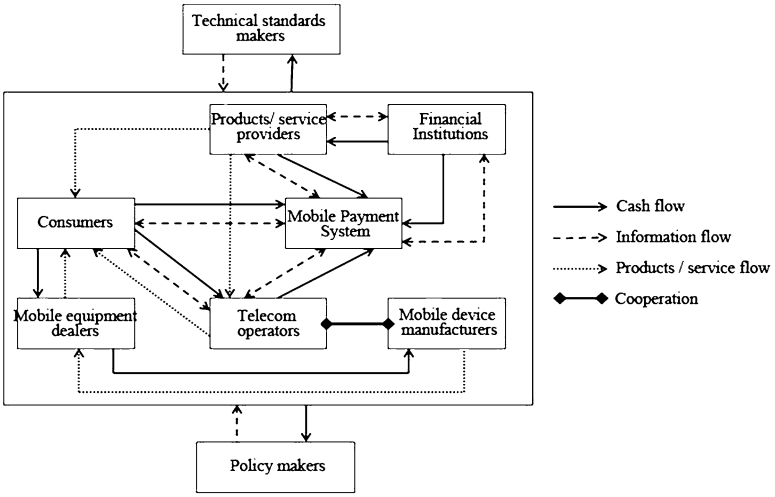

Fig. 1 The value network of mobile payments

participants including consumers, telecom operators, products/service providers, platform providers, financial institutions, mobile device providers and so on. Every business linkage and aspect creates new values. At the terminal, consumers purchase products or services to realize the entire values. Taking other profit relationship such as policies and standard-setters into consideration, the value network of mobile payments can be seen in Fig. 1.

In Fig. 1, values accumulate and pass within the value network, which is quite a long process. It illustrates how values are delivered in this network.

3 Designing of Mobile Payments Business Model

3.1 Design Principles

According to the research into business models and mobile services, we design a business model of mobile payments based on the following basic principles:

1. *Maximizing users' value.* Users are at the terminal of value chain. The value of products or services is realized in the customers' using it.
2. *Optimizing leaders' value.* The leader is the participant who controls the critical development of the entire model. It is fair to say that a leader is indispensable on any successful models. The optimal value realization of a leader can be transformed into the fundamental power that further stimulates the industry's development.

3. *Adopting win-win strategy for stakeholder.* The emphasis on the importance of cooperation, mutual learning and over-all group success creates benefits and larger profits for all participants. To ensure all stakeholders obtaining profits, total profits made under this strategy should exceed the sum of all individual profits. Besides, the distribution of profits should be relatively fair and proportional to each stakeholder's contribution.
4. *Rational utilization of resources.* Different participants access to different resources. Therefore, an effective integration and redistribution of available resources impacts the process of value creation.

3.2 Key Design Points

Some key points are essential to an effective mobile payments business model.

1. All-round engagement ensures that participants involve device providers, product or service providers, network operators, financial settlement providers, integration platforms, etc. It is important to avoid any single participant to control the whole business process.
2. A variety of pricing strategies meets different demands from users.
3. Strong adaptability enables the adjustment of the model to be possible and convenient when the relationship of competition and collaboration changes or the user patterns change.
4. A well-designed structure is robust and flexible when encountering revolution of the mobile technology or relevant technologies.

3.3 Design Steps

There are three kinds of methods to design business models, the Reference Method, the Key Factors Method and the Value Innovation Method. The mobile payment business is becoming popular. Thus, combination of the Key Factors Method and the Value Innovation Method is more appropriate to design the mobile payments business model. There are four steps to design the model: value discovery, value creation, value management and value realization.

3.3.1 Value Discovery

The amount of profits obtained by service providers depends on the amount of values they can offer to customers. Thus, it is significant for service providers to figure out the real demand of users, which is the process of value discovery.

Table 2 Index system of mobile payments user values

	First-level indexes (A)	Second- level indexes (B)
User value in mobile payments service (U)	Products value (A1)	Rate of paying successfully (B1)
		Paying limit (B2)
		Security of paying environment (B3)
		Paying speed (B4)
	Service value (A2)	Interactive interface (B5)
		Personalized service (B6)
		Operating guide (B7)
	Image value (A3)	Brand (B8)
		Innovation (B9)
	Total cost (A4)	Cost of purchase and maintenance (B10)
		Cost of data traffic (B11)
		Transaction cost (B12)
		Transaction time (B13)

S. Alter (2008) thought value capture is the process that customers acquire values from the service provider or automatic services (Alter 2008). R. C. Basole, W. B. Rouse (2008) pointed out that the value is determined by the final consumers in service economy, which is transferred within a complex network (Basole and Rouse 2008). W. Xie (2009) suggested the value created by labors is used to meet social demands, and it is realized through exchange (Xie 2009).

According to the benefit obtained from mobile services, users measure its value, which means that the user value is described by the experience in using the services, such as usability, economy, security, and so on. Scholars believe that the core of the perceived value is the trade-off between perceived benefits and perceived loss. Users of mobile payments include consumers and companies. Perceived benefits in mobile payments include product values, experience values, service values and image values. Perceived loss consists of facility costs, use-costs, transaction costs and time costs. Consumers play an extraordinarily important role in mobile payments because the basic driver to mobile payments development is the consumers' willingness to use mobile-payment technology to buy products or services. For this point, authors decided to analyze the user value empirically from the perspective of users. Since companies' profits come from consumers, whether consumers are willing to use mobile payments to purchase goods or services is the fundamental driving force of mobile payment business. Then this paper will analyze the features of mobile payments from the view of customers. The index system based on the characteristics of mobile payments is designed to analyze the user value of mobile payments (see Table 2).

According to the index system, we constructed a measurable model of the user value in mobile payments service as formula (1).

$$U = \sum_{i=1}^{4} \alpha_i A_i = \sum_{j=1}^{4} \beta_j B_j + \sum_{j=5}^{7} \beta_j B_j + \sum_{j=8}^{9} \beta_j B_j + \sum_{j=10}^{13} \beta_j B_j \quad (1)$$

Table 3 Results of indexes B_i

Index	B_1	B_2	B_3	B_4	B_5	B_6	B_7
Value	9.86	1.50	28.81	5.80	3.14	1.59	0.52
Index	B_8	B_9	B_{10}	B_{11}	B_{12}	B_{13}	
Value	7.30	2.17	4.89	0.95	8.30	1.28	

$\alpha_i, i = 1, 2, 3, 4$ stand for the weights of fist-level index, $\beta_j, j = 1, 2, \ldots, 13$ stand for the weights of second-level index.

To verify the credibility and reliability of this model, we conducted a questionnaire survey via the internet and eventually received 132 effective responses. Firstly, based on the analysis of SPSS, the Cronbach's Alpha result is 0.895, which indicates a high reliability of the collected data.

Using the Factor Analysis tool in SPSS, the value of KMO is 0.881. According to the general KMO's metric, variables of this questionnaire are qualified to carry on the Factor Analysis. Since the cumulative index of each factor is more than 0.5, we can believe that the questionnaire has a strong convergent validity.

Thus, the Fuzzy Comprehensive Evaluation Method is used to calculate the evaluation credits of the user value in mobile payments service. Table 3 shows the results of each index (B_i) from the survey. Then, we applied formula (1) to calculate the value of the user value in mobile payments service, $U = 76.1$.

Each component of the user value gets a corresponding value of comprehensive evaluation, and the larger the credits, the higher the value perceived by users. The security of the paying environment (B3 equals 28.81) is the largest value users obtain, and the rate of paying successfully (B1 equals 9.86) ranks the second. These two components are the main sources of perceived benefits. The top five weights of indexes also include brand (B8), the paying speed (B4) and interactive interface (B5). Perceived loss primarily comes from transaction cost.

The mobile payment industry is still an emerging industry undergoing all-round.

3.3.2 Value Creation

Value creation refers to a range of business activities which production and supply of products or services meet the needs of target customers.

In terms of mobile payments, value creation is to provide users with mobile payment devices, networks, platforms, interfaces and so on. It can be comprehended as the organic combination of several value modules (shown in Fig. 2). Value in mobile payments accumulates along the path from device producers to service integrators and reaches terminal users to meet their demand.

In mobile payments, users receive services from an integrated service provider who often is the core enterprise within the value network, including operators, financial institutions, the third party or alliance of those three kinds and mobile device providers. Core enterprises need to establish a cooperative mechanism to integrate dispersed resources in the value network and offer centralized services to users. The mobile payment service is the activity with multi-party cooperation where any

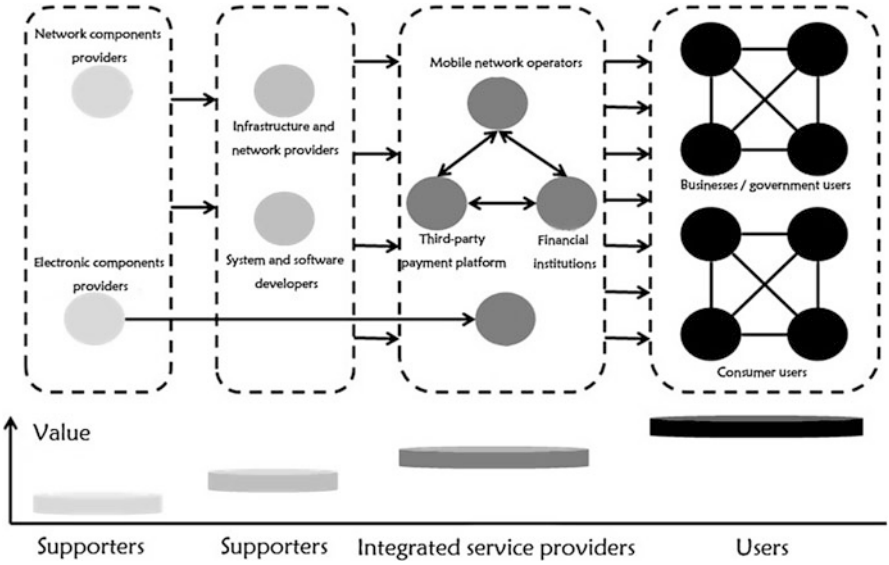

Fig. 2 Value creation and value-added process in mobile payments

company is unable to provide all the services independently. Besides, integrated service providers need strong supports to provide services for users. These supports include data exchange networks, the interface standard (communication standards, technical standards, etc.), system and software developers, etc.

3.3.3 Value Management

Value management is not an independent section, but relates to the entire process of mobile payments, which includes formulating development strategies and competitive strategies during the process of value discovery, distributing resources effectively during the process of value creation, determining the path and the method of value delivery, developing and maintaining customer relationship, etc. It plays a relatively important role in value management that how to take advantage of the income distribution mechanism to stimulate stakeholders' enthusiasm in order to utilize various resources more sufficiently to achieve value maximization.

Participants currently negotiate about the distribution ratio. However, the lack of fairness is the obvious defect in negotiation. For a better solution, we tried to discuss the issue from the perspective of the multi-person decision. The result is that it would be relatively fair if the distribution ratio is in accordance with the contribution level and the risk degree for a single enterprise. But benefits coming from various cooperation strategies are difficult to measure, so this method can be only used as a reference in negotiation.

3.3.4 Value Realization

Users purchase products or services to realize value, which is the final stage of the whole value activity. The essence of value realization is to meet users' demands. For this purpose, the first step is to know what kind of needs users have. Then, how to deliver values to users should be accurately figured out. Finally, enterprises should consider benefits they can obtain.

Mobile payments are still at the very beginning of their development. What would be most crucial is to expand their user base and to cultivate users' habits. But with the development and maturation of the mobile payment industry, different kinds of users will have different needs. Thus, user subdivision is necessary for accurate value delivery. It is also essential for value realization to expand channels of distribution or pathway of delivery from, such as opening the mobile payment business, and promotional programs.

Value realization should also be considered from the perspective of enterprises, not limited to that of users. Enterprises can realize their values by providing services for users and obtain benefits, reputation and experience in this process. For them, the key is to devise what enterprises can obtain from their users or partners, in other words, to devise benefit points. For example, when consumers are extremely sensitive to transaction fees, companies may have to develop other profitable ways.

There are two parts of benefits that mobile payments generally bring to the entire market. The first part of benefits is derived from convenient mobile payments which increase volumes of transactions and thus increase income that mainly belongs to products or service providers. The other part of benefits is a great amount of mobile payment currency in the hands of integrated service providers. Through the appropriate mechanism of benefits distribution, the first part of the funds disperses to all participants again and then regenerates more benefits. The second part of benefits can produce more by appropriate financial activities. However, in China, only institutions with financial licenses can participate in. This requirement needs closer cooperation of integrated providers.

4 Conclusion

In mobile services market, innovation is the catalyst to develop. The design and innovation of the business model has become the key for enterprises to perform better. This paper concentrated on the characteristics of mobile payments – the core in mobile service industry. It analyzed existing researches on mobile payments business models. Guided by the idea of value network, this paper provided a perspective on mobile payments to view them as a system with many participants and an interactive mechanism. Starting from the value of innovation and analysis of the key elements, the mobile payment business model was proposed: value

discovery, value creation, value management and value realization. Each stage involves lots of different elements and key points for analysis. A well-designed business model must be based on market reaction, so the paper showed an empirical research on value discovery.

Future research topics are as following:

1. The method of value discovery is not confined to initiative market surveys. For example, deeper mining of user data base and open payment terminal application program interface are feasible methods, which may involves more knowledge from various disciplines and fields.
2. The value assessment study has always lacked a unified platform and caliber. The mobile payment itself is a complex, multi-party collaboration process. How to measure value created by each participant in this process? Could traditional negotiations be able to resolve the problem of value assessment? Is it feasible to adopt a multi-person decision model? These questions still await answers.
3. People tend to focus on value flow itself, while they often ignore other factors that may affect perceived value. Then, how to elevate users' perceived value through other social environment? This is the question but appears to associate with the marketing more closely.

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