

# Analyzing the Elements of the Business Model for Mobile Payment Service Provision

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## Abstract

*In this paper, we use literature review and multi case study analysis in order to identify and analyze different elements of a mobile payment business model. The result is a set of six partial models: market model, value proposition model, implementation model, capital model, distribution and communication model, and threat model. These models allow for categorization of any given mobile payment business model and, based on this, structured comparison of different business models. Moreover, the set may also support mobile payment service providers in defining and evaluating business models.*

## 1. Introduction

Mobile payment is a type of payment transaction processing in the course of which – within an electronic procedure – the payer (at least) uses mobile communication techniques in conjunction with mobile devices for initiation, authorization, or completion of payment [1]. Current mobile payment research denominates a sustainable business model for the mobile payment service provider as one of the major problems in many markets (e.g., [2]), especially those with an already existing financial infrastructure. However, a stringent analysis of the mobile payment business model is still lacking.

This paper represents a first step in filling this void. Using literature review and multi case study analysis we identify and analyze different elements of a mobile payment business model. The outcome of the paper is a set of six partial models being components of a mobile payment business model framework that will be developed as next step in our future research.

The paper is organized as follows: In Section 2 we conduct a literature review. In Section 3 we describe the method. In Section 4 we derive the six partial models: market model, value proposition model, implementation model, capital model, distribution and communication model, and threat model. In Section 5 we draw conclusions and propose further research.

## 2. Literature review

The term business model is perhaps the most discussed and least understood term in electronic commerce [3] – and thus in mobile commerce as well. The literature provides three different approaches in coping with this complex phenomenon. The first approach reviews single business model classes, e.g., the auction business model (for an extensive literature review, see [4]). The second approach deals with business model taxonomies. In the context of electronic commerce, Timmers developed his taxonomy of nine business models along two dimensions – degree of innovation and functional integration [3]. In the context of mobile commerce, Varshney and Vetter identified seven mobile commerce business models [5]. The third approach considers generic business model frameworks including different partial models. Alt and Zimmerman introduced a framework including the mission, structure, process, revenue, legal issues, and technology of a business model [4]. Buchholz and Bach differed between processes, transactions, participants, and revenues [6]. Staehler proposed a framework including the value proposition, architecture of value creation, and revenues [7]. The most promising way seems to be the business model framework of Wirtz [8] who developed six essential

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partial models including the market, procurement, service compiling, offering, distribution, and capital model. However, these frameworks are developed for electronic commerce and do not address the peculiarities of mobile commerce, especially mobile payment. For example, the proposed frameworks do not consider the partnering between the key players which is seen as critical success factor in mobile payment (e.g., [9]).

Analyzing mobile payment business models, Taga and Karlsson identified five models depending on which key player in the value chain has driven the market success [10]. Pousttchi introduced a mobile payment reference model that provides tools for analyzing business models, roles of the market participants, and their interrelation from a value-based perspective [11]. A recent literature review of mobile payment research proposed a framework of four contingency and five competitive factors [12]. While this framework provides a “big picture” illustrating how the various perspectives fit together, it lacks detailed referrals to build a concrete mobile payment business model which is the purpose of the present paper.

### 3. Method

This study used the case study approach according to Eisenhardt [13] and Yin [14] which is especially appropriate for obtaining complex details and novel understandings about a specific phenomenon under investigation. In order to provide a framework for mobile payment business models we first identified and classified relevant characteristics of mobile payment business models. Based on this, we analyzed 24 case studies<sup>2</sup> and developed six partial models that constitute the mobile payment business model framework. The case studies were chosen to fill mobile payment standard types and theoretical categories proposed in [15]. During the data collection the partial models were refined. Data were coded individually by two trained coders. After analyzing published material of the mobile payment service providers, we additionally interviewed senior executives in charge by telephone to go into detail. The study was also supplemented by a literature review, the result of which is an analysis of existing

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<sup>2</sup> billBOXtime; Contopronto AS; eCash; Electronic Mobile Payment Services; FairCash; Geldhandy; Genion M-Payment; i-mode; Iti Achat; MicroMoney; MIDRAY; Mobileview; MoreCon; NCS mobile payment Bank; ONE; Paybox Austria; Paybox Germany; PayPal; Paysafecard; SEMOPS [16]; Sonera Mobile Pay; Street Cash; Vodafone m-pay; and Whatever Mobile. Mobile. Case studies and method are described in detail in [17] and [18].

opinions on the matter found in conference papers and journals.

The partial models are summarized in morphological boxes [19]. This method is based on a three step process of negation and construction [20]. In the first step, the phenomenon has to be decomposed. This decomposition leads to a number of characteristics that make up all possible ways of comprehension. In the second step, all possible or relevant realizations are determined. Using the method in problem solving like the specification of a concrete business model, the third step is the reconstruction whereby the user selects one or more realizations for each characteristic.

The validity of the study was established through expert validity [21]. During a half-day workshop at our annual conference Mobile Commerce Technologies and Applications (MCTA 2007), 16 participants discussed, reviewed, and where appropriate, improved the emerging framework. The participants were senior executives in charge of global or national mobile payment service providers, banks, mobile network operators (MNO), and merchants.

## 4. Results and Discussion

### 4.1. Market model

The *market model* (Table 1) analyzes the demand and the competitive environment on the target market. *Customers* establishing a business connection with the mobile payment service provider fall in one of five categories. While a reseller redistributes the procedure to other merchants that charge their products and services, an administration's intention is to collect taxes and charge government services. Users are distinguished between corporate clients and consumers. Typically, corporate clients have additional requirements such as the requirement of two different accounts – one for private and one for business purchases. In this target group, mobile payment is comparable with a traditional business credit card. With few exceptions, e.g., in customer-to-customer (C2C) or reimbursement payments, the user and the payer are the same entity. The information *relationship between users* is important as this may disclose requirements and pitfalls of the business model<sup>3</sup>. For instance, questions arise with the C2C relationship whether these payments are free of charge, and if they are free of charge, how the mobile payment service provider can prevent payments between a merchant and a user that usually involve

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<sup>3</sup> The used abbreviations in Table 1 – A, B, and C – represent administration, business, and customer.

cost for either of them but simulated as free C2C payments. To characterize the *user market* we differ between mass and niche markets. In mass market strategy [22], a mobile payment service provider conducts the implementation, distribution, and communication of the payment procedure as mass product. Thus, a mobile payment service provider aims at covering as much of the mobile phone user market as possible. An example is an MNO-independent mobile payment procedure which is offered to all mobile phone users in a country. In opposite, in niche market strategy [22], a mobile payment service provider focuses on a small market and supplies a want of a special target group. An example is a mobile payment procedure that can be used only in a certain use case in a certain region. The estimated *number of transaction per payer* has an effect, e.g., on their decision to register for the procedure. For the purposes of this paper, the number is low, when the average usage is once or lower than once per workday. A high number is thus logically every number beyond. Among others, the estimated *number of transaction per payee* has an effect, e.g., on the merchants' or administrations' decision to integrate the procedure in their existing infrastructure. Contemplating a concrete use case, the number of transactions per payee is low, when it is less than the number of transactions processed with the fewest used payment procedure. It is referred to as middle when the number is between the number of transactions processed with the fewest used procedure and the number of transactions processed with the usually used procedure. Consequently, a beyond number of transactions is defined as high. In countries such as Germany *user's willingness to pay* is nonexistent [1], because users were accustomed to a "for free mentality" through their Internet usage and may transfer this attitude to mobile commerce. In case of existing willingness to pay, we distinguish between high and low and fix the borderline at the average cost of credit card usage in the specific target market. Assessing the latter three characteristics, the mobile payment service provider can decide on which revenue types and sources are most suitable (see Table 5). Considering the competitive environment on the target market, a mobile payment service provider has to take into account not only the *competing payment procedures* of other mobile payment service providers (see for examples, [17] [18]), but also payment procedures outside mobile payment market, e.g., cash, debit cards, credit cards, or electronic payment procedures [15]. An *external effect from other markets* occurs when a mobile payment service provider competes against key players with high market power

that result from their traditional business, e.g., against a monopolistic MNO who already exhibits a large customer base.

**Table 1. Market model**

characteristic	instances				
<i>customer</i>	reseller	administration	merchant	corporate client	consumer
<i>relationship between users</i>	A2B	A2C	B2B	B2C	C2C
<i>user market</i>	mass market		niche market		
<i>number of transactions per payer</i>	high		low		
<i>number of transactions per payee</i>	high	middle		low	
<i>user's willingness to pay</i>	high	low		nonexistent	
<i>competing payment procedures</i>	inside mobile payment market		outside mobile payment market		
<i>external effects from other markets</i>	yes		no		
<i>competitive strategy</i>	cost leadership		differentiation	segmentation	

With regard to the relative positioning and strategies of competitors, the mobile payment service provider has to embark on a *competitive strategy*. Cost leadership strategy emphasizes efficiency and requires a continuous search for cost reductions in all aspects of the business. Differentiation strategy involves creating a product that is perceived as unique. Examples in the context of mobile payment are the provision of a payment guarantee or the integration of mobile marketing into the payment process. Embarking on segmentation strategy, the mobile payment service provider concentrates on few selected use cases and focus marketing efforts on this narrow market segments. [23]

#### 4.2. Value proposition model

The *value proposition model* (Table 3) is used to represent the value of mobile payment procedure from the perspective of customers. According to Pousttchi, a basic set of seven exhaustive and disjoint *use case types* (Table 2) can be derived providing a reference point for any given mobile payment use case [11].

**Table 2. Use case types**

type	description
A MC premium rate	purchase or use of digital goods or services in mobile commerce with the use of premium fee charging
B MC fixed price	purchase or use of digital goods or services in mobile commerce with the use of fixed price charging
C EC digital	purchase or use of digital goods or services in electronic commerce
D EC/MC non-digital	purchase of non-digital goods or services in electronic commerce or mobile commerce
E SMA	purchase of goods or services at a physical point of sale – in the case that an automat acts as agent on the merchant side
F SMP	purchase of goods or services at a physical point of sale – in the case that a person acts as agent on the merchant side
G C2C	transfer of money between consumers

The *applicability* considers the geographic coverage of the mobile payment procedure. While regional transactions typically include payments for public transport or parking in a certain region, national transactions are common. However, some mobile payment procedures (e.g., SEMOPS described in [16] enable also international transactions. An important strategic issue for mobile payment service providers is to choose the type of *amount level* they want to focus on. Micropayments generally represent a payment which is up to and including 10 Euros. Their main problem is cost efficiency but they require relatively low security levels and management of claims. Macropayments which are thus logically every payment above 10 Euros require higher security levels and an effective management of claims while cost-efficiency remains on a lower level of importance [2]. In view of merchants or administrations, providing a *payment guarantee* is also important, because it is in their interests to avoid sales shortfalls or charge-back cost. The characteristic *mobile marketing integration* considers the possibility to couple mobile payment with mobile marketing (e.g., by the use of the confirmation for mobile coupons) and the company this kind of integration is offered<sup>4</sup>.

<sup>4</sup> Major owners of a customer base are companies or associations like TV broadcast companies or motoring organizations that have no traditional buyer-seller relationship like merchants.

**Table 3. Value proposition model**

characteristic	instances						
	A MC premium rate	B MC fixed price	C EC digital	D EC/MC non-digital	E SMA	F SMP	G C2C
<i>geographic applicability</i>	international		national		regional		
<i>amount level</i>	macropayments			micropayments			
<i>payment guarantee</i>	yes			no			
<i>mobile marketing integration</i>	merchant	major owner of a customer base	mobile parking service provider	public transport	other	none	

### 4.3. Implementation model

The *implementation model* (Table 4) describes the input factors needed to realize a mobile payment procedure. Traditionally, regulation of payment procedures, and thus also mobile payment, has been a part of banking regulation and/or monetary policy [24]. Thus, in case of charging products and services of third parties a *banking license*, at least a restricted banking license<sup>5</sup>, is required. In some cases, a *registration* of users is not required, e.g., when the mobile payment service provider possesses the relevant data or a prepaid procedure is offered. However, most procedures involve a registration before or at least after first usage – either registration on the cell phone, on the stationary Internet, or offline [25] (in case, a pass port has to be posted or the registration requires the presence of the user). Several studies revealed that security is one critical success factor of mobile payment (e.g., [26]). For the purposes of this study, *authentication* considers the verification of the identity of the payer. Means of authentication can fall in three categories [28]: (1) possession (e.g., of a subscriber identity module (SIM) card or credit card chip to carry out a mobile payment procedure with a dual-slot phone [15]); (2) knowledge (e.g., about a personal identification number (PIN) or pass word); and (3) attribute (e.g., payer’s voice). The more means are incorporated the securer is the procedure. *Realization technologies* for mobile payments have found broad discussion in mobile payment research (see [12] for an overview). The supplementary Global System for Mobile Communications (GSM) service Calling Line Identification Presentation (call capture,

<sup>5</sup> In the European Union, the e-Money Directive (2000/46/EG) aims to establish a level playing field between issuers of electronic money (e-money). However, to date, it is unclear whether e-money issued by MNO in circumstances where prepaid consumers use some of their prepaid credit to buy services from third parties falls within the ambit of the e-Money Directive [27].

CLIP) is a convenient way for users to conduct mobile payments as authentication is done by a call in conjunction with the mobile telephone number (Mobile Subscriber Integrated Services Digital Network Number, MSISDN). Typically, “first generation” mobile payment procedures use Interactive Voice Response (IVR)<sup>6</sup> and/or text messages (Short Message Services, SMS) for authorization, authentication, and payment confirmation mechanism. The GSM service Unstructured Supplementary Service Data (USSD) enables a session for mobile payment transactions and works with any GSM mobile phone since the coded commands are entered in the same way as an MSISDN (e.g., \*105\*1\*4556#). Typically, Wireless Application Protocol (WAP) enables transactions in the use case types A, B, and D to pay services and products in mobile commerce, while Personal Area Network (PAN) technologies such as Bluetooth, infrared, and radio frequency identification (RFID) enable transactions in the use case types E, F, and G. Other procedures use Java applications that have to be downloaded on the mobile phone, but allow full application programming. However, the heterogeneity of devices is indeed a challenge. After the payment authorization, a mobile payment procedure may not provide the user with any *confirmation* of the payment, e.g., when services or products are delivered immediately. In use case type F (and maybe in use case type E), traditional sales slips can be used as confirmation. An email is especially suitable for purchases on the Internet. An acoustic signal is conceivable, e.g., for IVR- or CLIP-based procedures as a sound and for Java- or NFC-based procedures as a beep. A system inherent display refers to visual confirmations that are displayed on the mobile phone screen and generated by USSD-, Java-, PAN-, or WAP-based procedures, but excludes SMS. These considerations are important as a confirmation may increase the cost of operation – especially when using SMS. In the background, the payments can be settled via various *methods of settlements* such as mobile or fixed line phone bills, separate bills [29], direct debiting, credit cards or deduction from a prepaid m-payment account [15]. A recent study has revealed that the lack of cooperation between the key players is a significant barrier to mobile payments success. As all key players have their strengths and weaknesses, the most successful business models could be those based on strong *partnering* between the key players [9]. For instance, the basic principle of the mobile payment

<sup>6</sup> IVR is a phone technology that allows a telephone caller to select options from a voice menu and interact with the phone system.

system SEMOPS is the cooperation between banks and MNO. The benefits are for instance the integration of existing infrastructures [16].

**Table 4. Implementation model**

characteristic	instances									
requirement of a banking license	full banking license			e-money license			no banking license needed			
registration	mobile registration		Internet registration		offline registration		pre-existing data		no registration	
authentication	possession			knowledge			attribute			
realization technology	CLIP	IVR	SMS	USSD	WAP	PAN technologies		Java	other	
confirmation	SMS	system inherent display		acoustic signal		email	sales slip		none	
method of settlement	mobile phone bill	fixed line phone bill	separate bill	direct debiting		credit card	prepaid card			
partnering	bank	credit card company	MNO	spec. intermediary	Internet service provider	fixed network operator	technology provider	other	none	

#### 4.4. Capital model

The *capital model* (Table 5) analyses the sources and types of revenues, costs as well as the sources of financing. *Revenue sources* may be the user, the merchant, or a third party. The latter instance includes entities which are not involved in the payment process directly, e.g., resellers or administrations that subsidize the mobile payment service provider due to politico-economic motives. Moreover, we distinguish between transaction-dependent and transaction-independent *revenue types* [28]. The former type includes revenues generated with each transaction, e.g., for the payment itself or the provision of mobile marketing integration. The latter type includes customers’ one-off cost plus period cost – independent from the volume of payment transactions. Examples are basic fees, royalties, proceeds of hardware sale, installation, integration, and support, as well as account-keeping and account set-up fees [30] [31]. While banks, credit card companies and MNO can use an existing infrastructure and (typically) customer base with an existing billing relationship, specialized intermediaries run a mobile payment procedure as their core business and have to build up both from scratch. Thus, their situation regarding revenues and cost (described in [31] [11]) is rather difficult [2]. Particularly, set-up costs (e.g., costs of foundation or royalties for the payment procedure) carry weight, when a banking license is needed. For instance,

according to the e-Money Directive (2000/46/EG), a minimum capital of 1 million Euros is required to establish an e-money institute. Furthermore, mobile payment service providers have to consider infrastructure setup cost or upgrade of their existing infrastructure; costs of operation include for instance salaries, servicing expenses, authentication fees, transport fees, and losses (e.g., bad debt and fraud losses); finally, promotion expenses accrue that can be reduced by the use of public relations or viral marketing. Especially, for specialized intermediary start-ups assuring the *financing* of the enterprise with outside capital and/or equity capital is important.

**Table 5. Capital model**

characteristic	instances				
revenue source	user		merchant		third party
revenue type	transaction-independent		transaction-dependent		
cost	set-up	infrastructure	operation	promotion	other
financing	borrowed capital		equity capital		

#### 4.5. Distribution and communication model

The *distribution and communication model* (

Table 6) denotes the two P's of the marketing mix – place and promotion [22]. It answers questions such as: How should the *rollout* of the procedure take place? Which strategies are mapped out for acquiring, issuing market segmentation, and branding? Which type of *promotion* [22] should be used? Finally, which *partnering* strategy for distribution and communication purposes should be applied? *Acquiring* refers to the acquisition of payees, normally merchants or administrations, whereas *issuing* refers the acquisition of payers, normally consumers or corporate clients [18]. With regard to acquiring, mobile payment service provider can offer the procedure to their existing customers, explicitly acquire new merchants or administrations, or mandate an acquiring service provider which also may be a payment service provider. Issuing may conducted by the mobile payment service provider on its own or by a partner depending on the branding strategy. Having segmented the market with the market model (Table 1) in conjunction with the characteristic use case type (Table 2), the task in the present model is to determine which segments are profitable to serve. The mobile payment service provider can adopt one of three *market segmentation strategies*: (1) undifferentiated

marketing in which the mobile payment service provider attempts to go after the whole market; (2) differentiated marketing in which the mobile payment service provider operates in several segments of the market with offerings and market strategies tailored to each segment; (3) concentrated marketing in which the business focuses on only one or a few segments with the intention of capturing a large share of these segments (e.g. [22]). The latter segmentation strategy would include also the strategy to offer the procedure only to existing customers. Another important strategic issue for mobile payment service providers is to choose the *branding strategy* they want to focus on. The instance no brand occurs, e.g., in system inherent payments of WAP services, when the mobile payment service provider brand is not disclosed. In the case of the procedure is issued by other partners under their own label, we define this branding strategy as white brand. Additionally, co-branding (in conjunction with partners) and establishing or extension of an own brand are possible [25]. As in the implementation model (Table 4) partnering is important for acquiring, issuing, promotion and branding.

**Table 6. Distribution and communication model**

characteristic	instances								
rollout	regional			national			international		
acquiring	existing business connection			explicit merchant acquisition			acquiring service provider		
issuing	MNO	bank	credit card company	specialized intermediary	merchant	other			
market segmentation strategy	concentrated			differentiated			undifferentiated		
branding strategy	own brand			co-brand		white brand		no brand	
promotion	print	direct mail	POS	radio	TV	online marketing	mobile marketing	other	
partnering	bank	credit card company	spec. intermediary	MNO	merchant	admini- stration	major owner of a customer base	other	none

#### 4.6. Threat model

The *threat model* (Table 7) describes potential and profound threats to the economic success of the business model. The characteristic *legal issues* involves changes in legislation and regulation as well as consumer protection issues. Also *technology issues* like the evolution of mobile payment standards are important. As the market for mobile payments still is in an experimental period, betting on an antiquated standard may be a severe competitive disadvantage.

Moreover, the mobile payment procedure has to be tested against attacks on the payment infrastructure to detect unreliable technology issues. Also an assessment of the mobile device evolution is important. Varying implementations of standard environments and multiple proprietary environments on mobile devices has led to platform fragmentation – even the implementation of J2ME (Java 2 Micro Edition) is not consistent from device to device. Furthermore, care should be taken that the scalability of the procedure is given as far as the prospect exists that the transaction volume increases strongly in the future. Scalability refers to the “ability of a system to accommodate an increasing number of elements or objects, to process growing volumes of work gracefully, and/or to be to enlargement” [32, p. 195]. Since financial services like payments can be subject to fraudulent activities, they require well-secured infrastructure. *Objective security* [26] is a concrete technical characteristic, given, when a certain technological solution responds to all of five security objectives such as integrity, authorization, authentication, confidentiality, and non-repudiation. In recent years also the availability of a system is frequently called which provides functionality to ensure that the service is accessible and usable. Finally, mobile payment service providers have to anticipate competitors’ actions. On the one hand, these may be conducted by lawful means, e.g., when an MNO refuses cooperation, and on the other hand, these may be conducted by dubious means, e.g., an MNO delays the delivery of confirmation SMS.

**Table 7. Threat model**

characteristic	instances					
legal issues	unsteady legislation	regulation		consumer protection		other
technology issues	evolution of standard	unreliable technology	mobile device evolution	scalability	other	
objective security	integrity	authorization	authentication	confidentiality	non-repudiation	availability
competitors' actions	by lawful means			by dubious means		

## 5. Conclusion

In this paper, we identified and analyzed different elements of a mobile payment business model, resulting in a set of six partial models: market model, value proposition model, implementation model, capital model, distribution and communication model, and threat model. This set allows for categorization of any given mobile payment business model and, based on this, structured comparison of different business

models. It may also support mobile payment service providers in defining and evaluating business models.

The presented perspectives and the including partial models are complementary. While only presented one after the other in this paper, they are in reality interdependent and linked to each other by influence relationships whereby instances in one partial model influence other instances in the same or one or more other partial models.

The next step in research is to consider and examine these relationships, in order to construct a mobile payment business model framework which would allow for deeper analysis and the development of clear guidelines for the construction of mobile payment business models under different market conditions.

Eventually, a link of this business model framework to the value-based analysis in the mobile payment reference model [11] could lead to an extremely powerful analytical toolset for mobile payment systems and procedures on the market.

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