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**Correlates of using the billing system of a mobile network operator
to pay for digital goods and services**

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Abstract

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In many countries mobile network operators (MNOs) offer their customers the possibility to pay for digitized content, applications or services which they buy over their mobile smartphone via the carriers' billing systems. To date, customer take-up of this mobile carrier billing (MCB) payment option is predominantly modest. At the same time, there is little empirical evidence on individual level factors significantly associated with the acceptance of MCB payment which differentiates firstly the principal adoption of the service in the sense of a yes-or-no decision and secondly the intensity of service usage among adopters. Therefore, the present study explores correlates between a total of 10 socio-demographic, contract-, communication habits- and smartphone-related variables on the one hand and the two MCB payment acceptance criteria on the other in a sample of 5,010 postpaid residential customers of the German subsidiary of a multinational MNO. In contrast to many prior investigations, MCB payment adoption and usage intensity measures in the present work reflect real (and not retrospective subjective estimates of or intended) payment behaviors. A probit regression analysis indicates that, compared to non-adopters, customers who have paid via MCB are male, have a shorter MNO tenure,

have higher mobile service spending, generate more mobile Internet traffic, send more SMS and use a smartphone whose OS manufacturer offers MCB payment on its own online market place. In the subsample of adopters of MCB payments higher mean monthly MCB settlement amounts are generated by male and older subscribers who have a shorter MNO tenure, create more mobile Internet traffic, use mobile voice telephony more and SMS less heavily and who are equipped with a smartphone whose OS manufacturer does not offer MCB payment on its online market place. Findings are discussed in terms of their implications for scholarly research on antecedents of the acceptance of novel telecommunication-based service offerings such as MCB payments and of basic levers of MNOs for improving the customer take-up of their MCB payment offerings and the usage intensity of the service among its adopters.



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Contents

Abstract	3
1. Introduction	6
2. Literature review and research hypotheses	8
// 2.1 General profile of past empirical research	8
// 2.2 Research hypotheses	10
3. Empirical methods	13
// 3.1 Data generation	13
// 3.2 Variable measurements	13
// 3.2.1 MCB payment acceptance	13
// 3.2.2 Potential antecedents of MCB payment acceptance	15
// 3.3 Statistical procedures	19
4. Empirical hypothesis testing	21
5. Discussion and implications	24
References	26

1. Introduction

Recent technological progress has enabled customers of mobile network operators (MNOs) to use their handset to purchase a wide variety of intangible goods or services which can be distributed electronically. Initially, mobile device-based sales of digital products started with ringtones for incoming mobile voice calls in the late 1990s. To date, it has grown to a substantial market covering a broad range of digital offerings such as games, multimedia content, news services or event tickets which generated worldwide revenues of 63 billion USD in 2014 (PwC, 2015).

In the course of this market expansion, the way to pay for digital goods and services purchased via mobile devices has changed. Whereas MNO billing systems used to be the exclusive option to pay for digital products in the early stages, nowadays credit cards have become the most frequently used payment method for this type of purchase. Prominent distribution platforms for mobile applications such as Google's Play Store or Apple's App Store require a valid credit card as the preferred means of processing payments. However, according to the World Bank (2015), in 2014 even in highly developed countries such as Sweden or the United States an average share of 47% of the adult population did not own a credit card. Particularly in Germany, which is the country of empirical interest in the present study, just 46% of all adults hold a credit card. As a consequence, relevant Internet market places supplemented their portfolio of payment methods by third-party billing variants such as PayPal or ClickandBuy.

These payment systems allow customers who deposit their bank data at registration to pay by debiting their bank account. However, many customers have security concerns with regard to storing sensitive information such as credit card or bank account data on Internet market platforms (Deutsche Bundesbank, 2015, pp. 28, 71-73). Alternatively, consumers may buy gift cards at brick-and-mortar retail stores and redeem them on Internet market places. In contrast to the above mentioned payment options, this means of settlement does not allow to buy digital products at a broad range of Internet market places because such cards are far from being universally accepted but are limited to specific merchants. This in turn substantially hampers the payment attractiveness of gift card systems. Consequently, in Germany a substantial share of mobile handset users who want to buy digital goods on various Internet platforms could be receptive for alternative ways to pay for products which they purchase via their mobile device.

Consumers' openness for alternative methods to pay for commercial transactions initiated over MNO networks may be further amplified by the enormous smartphone proliferation over the last few years. In 2014 alone, MNO customers worldwide bought more than 1.3 billion new smartphones (IDC, 2015). Specifically in Germany, the compound annual growth rate of smartphones sold to consumers amounted to 33% between 2010 and 2014 with the number of devices sold to consumers exceeding 24.1 million units in 2014 (CEMIX, 2014). Modern smartphones

are a promising candidate for promoting the use for various mobile device-based payment systems: Smartphone enable mobile subscribers to move beyond a narrow range of simple digital products (e.g., ringtones, text-heavy documents) to a broad variety of digital offerings such as mobile games or movies which may even be tailored to a subscriber's idiosyncratic location.

In the light of these market developments, MNOs in Germany currently provide their customers with the option to purchase digital content, applications or tickets via their established billing system.¹ This option, which is labelled as (*direct*) "*mobile carrier billing*" (*MCB*) *payment*, enables subscribers to buy digital products from popular online market places run by the suppliers of their smartphone's operating system (OS) or from other "virtual outlets" without having to disclose personal credit card or bank account information to the seller. A subscriber just has to click on a virtual button on her device screen to trigger a payment. MCB payment also includes the option to pay for digital products by sending an SMS to a seller's mobile number or by wireless application protocol-based access to the seller's landing page, respectively. MCB payment can be used both for an isolated purchase or for subscribing to a series of future deliveries. MCB payment is a variant of remote mobile payment services which also include third-party payment systems operated by other intermediaries such as PayPal or ClickandBuy. In contrast to such remote payment services, MCB payment neither requires an additional

1. The focal payment service of MNOs does not cover physical goods. One likely reason behind this limitation is that MNOs have already introduced additional services to pay for physical goods (e.g., near field communication (NFC)-based services). Put differently, MNOs have launched several payment systems which address different market segments and try to supplement (and do not substitute) each other.

registration on the intermediary's portal nor a login during the purchase process. Payment amounts for digital goods are shown on the monthly invoices which (postpaid) customers receive from their MNO. The MNO deduces the total billing sum from their customers' accounts and passes through the share of revenues due to the sellers of the digital goods bought by the MNO subscribers. Hence, MCB payment offers a customer-friendly way of selling for online transactions. Therefore, MNOs hope that customers of other payment services will shift at least some of their settlements to MCB payments.

According to Ovum (2015, p. 4), the global revenue generated by goods sold via MCB payments amounted to 14.5 billion USD in 2014. The largest share of 34% of this total revenue stemmed from mobile applications sold on the virtual market places of the providers of various smartphone OS (e.g., Apple App Store, Google Play Store). This proportion is expected to grow to 66% which will equal an absolute amount of 24.7 billion USD in 2019. The forecast of Ovum (2015) is in line with several other market research publications (e.g., Dimoco, 2015; Juniper Research, 2015) predicting that revenues paid via MCB will rise rapidly in the next five years. MNOs keep a fixed share of the overall transaction revenues in exchange for running an MCB payment platform. Therefore, the strong growth in MCB-based overall transaction revenues implies that MNOs' income from MCB payment should also go up quickly.

In spite of these positive market forecasts, scholarly research explaining the take-up of MCB payments by consumers is scarce. The bulk of earlier work has explored antecedents of intentions to use mobile payment systems in general and omitted real use behaviors of specific

systems such as MCB payment as well as predictors of such use behaviors (see section 2.1). Against this background, the present study contributes to the literature by exploring MNO subscriber characteristics which correlate with two behavioral MCB payment acceptance criteria in a sample of 5,010 subscribers of the German subsidiary of a multinational MNO in the period from October 2011 to October 2013. The exploration does not only encompass an analysis of the yes-or-no decision to use (i.e., principal service adoption) MCB payment but also of the subsequent use intensity of MCB payments among adopters.

The remainder of this article is structured into four sections. The next section reviews previous relevant conceptual and empirical contributions to develop our hypotheses. Section 3 explains the empirical methods. Section 4 reports the empirical results. The final section derives implications both for management scholars in the field of novel telecommunication-based services and for MNO practitioners responsible for improving the market success of MCB payment offerings.