



Impacts of mobile Internet use intensity on the demand for SMS and voice services of mobile network operators: An empirical multi-method study of German mobile Internet customers

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ABSTRACT

Scholarly and business publications alike convey the message that past and future strong growth in mobile Internet (MI) access and service demand has solely positive commercial implications for mobile network operators (MNOs). This position neglects the possibility that increasing MI use intensity may lead to demand decreases for the highly profitable short messaging service (SMS) and mobile voice telephony. The extant literature provides few insights on relations between MI use intensity, on the one hand, and SMS as well as mobile voice call use intensities, on the other hand. This study developed hypotheses concerning the presence or absence of impacts of MI use intensity and circumstances of MI use (e.g., device type, tariff scheme) on the demand for SMS and mobile voice telephony at the individual customer level. The hypotheses were tested by analyzing actual use behaviors of 304 MI adopters in Germany, for whom objective use intensity data were extracted from the billing system of an MNO. These non-reactive measures were combined with responses collected from the adopters through a telephone survey. Multivariate regression results suggest that though MI use intensity significantly negatively affected both number of SMS sent and received, these effects were so small that their practical relevance is highly doubtful. Further, customers who used MI more intensively did *not* generate lower volumes of outgoing or incoming mobile voice connection minutes. Conclusions are drawn for MNO, telecommunications sector regulators and scholarly researchers seeking to explain the acceptance of mobile communications services.

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1. Research background and questions

Market analysts agree that demand for Internet access through nationwide cellular wireless networks via various portable devices, that is *mobile Internet (MI)*, has started to boom in the past few years. Further hefty MI subscriber and traffic growth is expected in the near future. [IDATE \(2009\)](#) forecasts that the number of MI customers in Europe will increase from about 70 million at the end of 2008 to more than 160 million at the end of 2012. With regard to the US, the [IDATE prediction](#) for this timeframe is that the MI subscriber number will move from 35 million to 110 million. Similarly, [Cisco Systems \(2009\)](#) expects that the average monthly global MI traffic will increase from 0.033 million terabyte in 2008 at a compound annual growth rate of 139% to 1.076 million terabyte in 2012.

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At a first glance, the bright MI market development projections appear to have solely positive business implications for mobile network operators (MNOs), since they promise increasing revenues and profits from MI access and services. However, a closer look reveals that MI diffusion and use increases may also have negative commercial ramifications for MNOs. MI could substitute the established short message service (SMS) and (circuit-switched) mobile voice calls sold at high prices by Internet Protocol (IP)-based packet-switched traffic, which generates lower prices per service unit and consequently reduces MNOs' profit contribution margins. Demand for SMS or mobile voice calls simply could decrease because customers have a limited time and monetary budget for telecommunication activities and spend more time and money on MI access and applications.

Looking merely at SMS, it is important to recognize that many customers use laptops instead of handsets to obtain MI access. Portable computers have fully fledged keyboards, which make it more convenient to send written (short) person-to-person news via the Internet to the email or instant messaging (IM) account of a recipient rather than conveying them by SMS to the mobile access number of the addressee. On the other hand, compared to SMS, customers could perceive MI-based email or IM services as not being functionally equivalent or, in media use theory parlance, as not providing the same "gratifications". A first justification for this imperfect equivalence is that, at least in the residential end-customer market, many mobile users are not reachable without major delays because the share of MI users among all MNO customers with access to mobile (push) email or IM clients is still low in most countries. This in turn decreases the likelihood that *any* mobile user can be contacted almost in a real-time manner by MI-based email or IM services (Buvat, Mehra, Beijn, & Prabhakar, 2007). Second, interoperable and easy-to-use email or IM clients are currently not embedded in every MI-ready device. This increases the SMS substitution barriers for customers with limited technology skills or learning motivation (Haas, 2006).

The relationship between *mobile voice call* volumes and the use intensity of MI services raises complex demand- and supply-side issues. From a *customer* standpoint it is obvious that mobile calls serve bidirectional/interactive and synchronous/real-time communication needs occurring in work-related, social and emergency situations. Compared with this, most MI services such as IM or emailing fulfill diverging needs for unidirectional and asynchronous information exchange or collection triggered by other work-related and social situations (Wei, 2008). The proposition that mobile voice calls and mobile access to data services satisfy distinct communication needs is also reflected in the regulatory framework of the European Commission for service markets within the electronic communications sector. More specifically, the Commission Recommendation (2007/879/EC) on the definition of telecommunication service markets susceptible to *ex ante* regulation for ensuring effective competition implies that mobile data and voice offers address different markets and thus should not be treated as mutually interchangeable (Commission of the European Communities, 2007; see also ECC, 2004).

However, from a *supply-side* perspective MI access and use may decrease the number and length of "old-fashioned" circuit-switched mobile telephony connections. Technically, voice is just one kind of data with specific performance requirements in terms of maximum tolerable periods of transport delay and variance of such delays. Therefore, it is possible to "produce" a mobile telephony service by carrying voice data over IP networks (i.e. mobile voice over IP/VoIP) (Heikkinen & Luukkainen, 2008; Verkasalo, 2009). Put differently, established circuit-switched mobile voice supply is exchanged for packet-switched mobile VoIP traffic. However, up to now, MNOs and manufacturers of mobile communication devices have typically reverted to technical measures, which ensure that VoIP clients downloaded to various types of end-customer appliances do not work on cellular mobile networks (Heikkinen & Luukkainen, 2008). Thus, at least until today, the potential of MI access to cannibalize the circuit-switched production of mobile telephony by routing voice traffic over (wireline) Internet infrastructures, which are not completely under MNO control is volitionally restricted by MNOs.

This limited supply-side substitution potential is unlikely to change quickly even if mobile voice service providers cease the technical blockage of mobile VoIP. Mobile data network transport speed and capacities will remain too limited for several years to allow for large mobile VoIP traffic volumes without severe degradation of the quality of voice calls and other data applications. In addition, a considerable share of residential mobile customers could lack the skills and/or the motivation to install VoIP clients on their mobile appliances.

In summary, in most national mobile communication markets the supply strategies of MNOs currently prevent their customers who adopt MI access from the possibility of substituting mobile VoIP for circuit-switched telephony. Nevertheless, it remains an open question to what extent diverse MI access-based applications other than mobile VoIP provide MNO customers with functionalities or gratifications, which have impacts on consumers' use intensity of mobile voice calls.

The scholarly literature is almost silent with regard to interdependencies between individual MI use intensities on the one hand, and individual SMS or mobile voice call activity levels on the other hand. This is surprising because not only are these relationships interesting from an academic consumer behavior point of view in order to better explain mobile communication service use patterns in a multi-service environment, but also, an enhanced understanding of cross-demand elasticities between MI use and SMS/mobile voice call activity levels is important for practitioners. First, this knowledge is helpful in making better informed MNO marketing strategy decisions concerning, among others, the degree of aggressiveness in promoting MI offerings in a market, which in the past was dominated by mobile voice and SMS revenues, or the integration of MI access, SMS, or mobile voice service in "bundled" offerings. Second, this understanding is beneficial for telecommunications sector regulatory authorities in improving their decisions on the delimitation of mobile

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