



Users as innovators in developing countries: The global sources of innovation and diffusion in mobile banking services



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ABSTRACT

This paper examines the extent to which users in developing countries innovate, the factors that enable these innovations and whether they are meaningful on a global stage. To study this issue, we conducted an empirical investigation into the origin and types of innovations in financial services offered via mobile phones, a global, multi-billion-dollar industry in which developing economies play an important role. We used the complete list of mobile financial services, as reported by the GSM Association, and collected detailed histories of the development of the services and their innovation process. Our analysis, the first of its kind, shows that 85% of the innovations in this field originated in developing countries. We also conclude that, at least 50% of all mobile financial services were pioneered by users, approximately 45% by producers, and the remaining were jointly developed by users and producers. The main factors contributing to these innovations to occur in developing countries are the high levels of need, the existence of flexible platforms, in combination with increased access to information and communication technology. Additionally, services developed by users diffused at more than double the rate of producer-innovations. Finally, we observe that three-quarters of the innovations that originated in non-OECD countries have already diffused to OECD countries, and that the (user) innovations are therefore globally meaningful. This study suggests that the traditional North-to-South diffusion framework fails to explain these new sources of innovation and may require re-examination.

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1. Introduction

Information and Communication Technologies (ICT) offer a myriad of opportunities for low-cost innovations by users that sometimes can be of high value and can significantly increase the usage of the underlying technology. An example of this is *Twitter*, in which users added a very valuable new functionality via hashtags, by simply using the platform capabilities differently. Similarly, users of *Nokia Beta Labs* pioneered mobile services leveraging the Nokia platform; two of the most popular examples are *Sportstracker*, which tracks and stores workouts, and *PC Suite*, which connects and synchronizes mobile devices with PCs (Mahr and Lievens, 2012). These types of modifications by users are often low-cost, yet the resulting services can add great value to a given technology.

Low-cost innovations are also increasingly observed in developing countries, and are sometimes called frugal innovation (Bound and Thornton, 2012) or grass-roots innovation (Gupta et al., 2003). One such example is *A Little World (ALW)*, a system pioneered in India, which reduced a bank branch to a smart-phone and a fingerprint scanner, thereby bringing financial services normally reserved for urban populations to rural customers. Many service innovations that originated in developing countries have had a tremendous impact on the financial service landscape. For example, *M-Pesa*, one of the most successful implementations of a mobile money service (i.e., Jack and Suri, 2011), is used by more than 70% of Kenyan adults (IMF, 2011) and by 50% of the poor, unbanked and rural populations (Alexander, 2010).

Despite its increasing importance, there is a dearth of rigorous research looking at the role that users play as innovators in developing countries. This paper investigates three main questions. First, to what extent can users play a role in innovation in developing countries? Second, what are the main factors that enable users from developing countries to innovate? Third, what is the global relevance and diffusion pattern of innovations that originate in the developing world? To address these questions, we investigated the

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origins and types of innovations in financial services offered via cell-phones, a multi-billion-dollar industry termed “mobile banking.” Users pioneered some of the most important services in this industry, such as the transfer of domestic airtime, i.e., prepaid cell-phone credit to be used for text and voice. When mobile phones became available in developing countries, pre-paid users would recharge their phone using scratch cards. These scratch cards would be distributed by the telecom operator and could be bought at any corner store. When scratched, the card would reveal a unique multi-digit activation code that, when typed into the phone, would credit airtime to that customer’s phone number. In 1998, customers in the Philippines, an archipelago made up of 7100 islands with poor access to financial services, realized that they could use this functionality to transfer airtime load between each other (Petalcorin, 2011). One person would buy a scratch card and send the unique activation code by SMS to a relative across the country, who would then use the code to upload the credit onto his or her own phone. These users pioneered domestic airtime transfer between two different phone numbers. Shortly after, in December 2003, Smart, the largest telecom company in the Philippines, realized the potential of this service and launched *PasaLoad*, which allowed electronic airtime transfer among customers.

The development of these novel services defies the way we typically think about innovation. First of all, users self-provided the services of domestic airtime transfer, and several others such as merchant payment, before any producer offered them in the market. This contradicts the bulk of the service innovation literature, which describes innovation as a process carried out by service providers (e.g., Hertog Den, 2000; Miles, 2007, 2008; Tether et al., 2001). Second, it is surprising to observe these globally significant innovations in an emerging economy, such as the Philippines, because R&D activity and major innovation activity are not expected to take place outside of Organization for Economic Co-operation and Development (OECD) countries (Bayoumi et al., 1999; Coe et al., 1997; Seck, 2011). However, since the two aforementioned innovations were first marketed in the Philippines, more than 50 other telecom providers around the world have offered Domestic Airtime Transfer, and 30 have offered a merchant payment service, including in the United States. This evolution demonstrates the value of these innovations. It is also at odds with the traditional “North–South” portrayal of world-class innovation as typically appearing in industrialized nations and then flowing from these regions to developing economies (Bayoumi et al., 1999; Coe et al., 1997; Saggi, 2002).

As there is no adequate conceptual and empirical toolkit for studying and understanding these phenomena, we set out to systematically analyze the financial services currently offered through mobile phones. We detailed the development of all services in the mobile banking industry, developed a structured set of rules to analyze the origin of service innovations, and applied these to currently available mobile banking innovations. We also investigated their relative importance and subsequent diffusion around the world. To the best of our knowledge, this is the first study to assess the global relevance of user innovations coming from developing countries. It is also the first to provide evidence of an industry in which user-innovations in developing countries have successfully diffused to industrialized countries.

The rest of this paper is structured in five parts. Section 2 lays out the literature that is pertinent to our research question. Section 3 outlines the empirical work: how the data on mobile banking services was collected, how the innovations were coded and verified using inter-rater reliability methods, and, finally, what further analyses were conducted. Section 4 presents the main findings of the analyses and explains the results related to the types of innovations and the sources of innovation, as well as the geographic origin and diffusion of the innovations. Finally, Section 5 contains

a brief discussion of these results and their implications, and offers conclusions together with suggestions for further research.

2. Background

We briefly outline previous research that inform our work in three themes: users as innovators in services; need as a driver for innovation and its impact on innovation in developing countries; and the geographic origin and diffusion of innovations.

2.1. Users as service innovators

In contrast to producers, who pursue innovation for profit, users typically innovate to satisfy their unmet needs. The idea of users improving products is not new (e.g., von Hippel, 1976). Yet, a number of studies over the last few years (Herstatt and Hippel, 1992; Jeppesen, 2004; Shah, 2006; von Hippel, 2005) have concluded that user-innovation is gaining importance (see Bogers et al., 2010, for a survey of the literature). This trend has been observed in a wide range of products and industries, ranging from scientific instruments (von Hippel, 1976, 2005), to industrial products (Morrison et al., 2000; Franke and Hippel, 2003) and consumer goods (Franke and Shah, 2003; Luthje, 2004).

Although the notion that users can be a source of innovation for new products has been receiving increasing attention, work on the topic of users as innovators in services is scarce. While a few studies have considered consumers as service co-producers (Drejer, 2004; Gallouj and Weinstein, 1997), most existing research do not look at users as potential service creators or innovators (e.g., Barras, 1986; Menor and Roth, 2008). Yet, services constitute a significant share of the world’s economy, especially in developed nations (Buera and Kaboski, 2009). For example, in the United States, 75% of the GDP and 80% of employment derives from services (OECD, 2013). Therefore, we need to better understand the nature of service R&D and innovation (Gallouj and Savona, 2009). Considering the role of users in service innovation appears to be an important avenue to be further developed.

Initial work on the role of users in service innovation has shown that users can play an important role in the development of novel services for their own use, which later become important innovations throughout the industry (e.g., Oliveira and Hippel, 2011; Baldwin and von Hippel, 2011; Repo et al., 2004). However, because the literature in this area is still scarce, no systematic or standardized methods for analyzing and categorizing the origin of service innovations are available. Furthermore, there is no clear understanding of how user service-innovation fits into the existing service-innovation paradigms, such as the “reverse product cycle” (Barras, 1986), or what characteristics it exhibits (Gallouj and Weinstein, 1997). These observations beg for additional exploration on the role of users in service innovation, which is at the core of this paper.

2.2. Need as a driver for innovation in developing countries

The notion that a larger expected benefit for innovation increases the investment in innovation has been recognized since the early literature on the economics of innovation (Mansfield, 1968; Mowery and Rosenberg, 1979; Schmookler, 1966). Recent work confirms this longstanding perspective. For example, Acemoglu and Linn (2004) showed that a larger potential market size for a new drug would lead pharmaceutical firms to invest more in its development. The problem is that such perspective leads to investment decisions that are skewed toward the most developed and rich markets, instead of addressing people and issues of the highest need. This is evident in the pharmaceutical industry, where, for example, “investment in research for malaria,

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