

Disruptive Technologies, Innovation and Global Redesign: Emerging Implications

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Published in the United States of America by
Information Science Reference (an imprint of IGI Global)
701 E. Chocolate Avenue
Hershey PA 17033
Tel: 717-533-8845
Fax: 717-533-8661
E-mail: cust@igi-global.com
Web site: <http://www.igi-global.com>

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Library of Congress Cataloging-in-Publication Data

Disruptive technologies, innovation and global redesign: emerging implications / Ndubuisi Ekekwe and Nazrul Islam, editors.

p. cm.

Includes bibliographical references and index.

ISBN 978-1-4666-0134-5 (hbk.) -- ISBN 978-1-4666-0135-2 (ebook) -- ISBN 978-1-4666-0136-9 (print & perpetual access) 1. Disruptive technologies. 2. Technological innovations. I. Ekekwe, Ndubuisi, 1973- II. Islam, Nazrul, 1973- HC79.T4D57 2012
338'.064--dc23

2011039612

British Cataloguing in Publication Data

A Cataloguing in Publication record for this book is available from the British Library.

All work contributed to this book is new, previously-unpublished material. The views expressed in this book are those of the authors, but not necessarily of the publisher.

Chapter 4

Is the Mobile Phone a Disruptive Technology?

A Partial Review of Evidence from Developing Economies

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ABSTRACT

The authors of this chapter provide an inter-disciplinary review of studies on economic impacts of mobile telephony in developing countries, giving particular attention to the disruptive potential of the technology and its associated social practices. Four major areas of impact are identified: the emergence of a mobile phone economy around retail and service provision, including mobile banking; a significant reduction in search costs with profound impacts on market efficiency and, possibly, welfare distribution; changes in the formation and maintenance of trusting relationships between market actors as face-to-face contact is replaced with remote communication; and facilitated organisation and cooperation within and among firms, as well as changing credit procurement practices. While the mobile phone has been hailed for its transformative power, the authors tentatively conclude that its impact in most areas is not primarily disrupting, but rather amplifying existing structures.

INTRODUCTION

Developing economies are an environment in which “information is poor, scarce, maldistributed, inefficiently communicated, and intensely valued” (Geertz, 1978, p. 29). Information poverty is a common feature of these economies, where

costly or inaccessible means of telecommunication constrain the search for alternative courses of action (Aminuzzaman et al., 2003). Subsequently, market agents frequently experience uncertainty over economic conditions. Transportation, too, is costly and often insecure. In this “high risk and low trust environment” (Overå, 2006, p. 1302), ICT, and in particular mobile phones, have been

DOI: 10.4018/978-1-4666-0134-5.ch004

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projected to have an immense impact. Indeed, Waverman et al. (2005) found that the technology carried a significant growth dividend. For low income countries, 10 more mobile phones for every 100 inhabitants would translate into a per capita GDP growth higher by 0.59 percents (p. 18).

Mobile telephony has experienced staggering growth rates in the developing world over the last decade. Between 2003 and 2010, the number of subscriptions increased tenfold in Africa, from 51 to 507 million. It thus went from 0.5 to 50 subscriptions per 100 persons within a mere decade. In Latin America, subscriptions increased by a factor of 4.6 (from 127 to 578 million) to 98 per 100 persons, and in Asia's non-developed countries¹ by a factor of 6.1 (from 440 million to 2.7 billion) to 71 per 100 persons (ITU, 2010). However, there are clearly strong differences between regions, with some countries in Africa reaching subscription rates of more than 80 percent, while others remain below 10 percent. With the introduction of mobile broadband services, mobile phones are also quickly becoming a common means of accessing the Internet. In many developing countries, mobile phones have thus leap-frogged landline-based ICTs.

There is some heterogeneity in mobile phone use and ownership within societies. Gillwald et al. (2010) found that in a range of African countries, income, education, and urbanicity were significant factors for owning a mobile phone or an active SIM card, but age and gender mostly were not (p. 13). Women were found to use mobile phones as often, and in some countries even more than men (ibid., cf. Samuel et al., 2005). Zainudeen et al. (2008), who researched mobile phone use at the bottom of the pyramid in Asia, found that gender differences were smaller in countries where mobile phones were most pervasive. They assert that "the gender divide, as with the digital divide, has been found to be especially large in low income countries, where ICT penetration levels are also low". Further evidence that higher personal income raises the probability of mobile phone ownership

comes from Chabossou et al. (2008). Jensen (2007) has used data from the Demographic and Health Surveys to estimate mobile phone use among farmers. He asserts that "in large part, ownership rates among farmers are low where ownership rates overall are low. In many cases, the ownership rates are not much lower for farming households than other households" (p. 4).

The economic impact of mobile phones in developing countries has been the subject of research for more than a decade, but most studies were published within the last five years. Two major perspectives have emerged from this research. On one hand, economists such as Aker (2008, 2010), Jensen (2007), and Muto & Yamano (2009) have focused on improved market efficiency as an effect of decreased search costs, which leads to reduced price dispersion and greater market integration. On the other hand, researchers with an anthropological perspective from a variety of fields, such as Overå (2006) and Molony (2007, 2008, 2009), but also Samuel et al. (2005), have stressed the potential of mobile phones to improve coordination between market agents, but have also cautioned that the impact might be suboptimal due to structural boundaries to the use of mobile phones. Unfortunately, these two strands of research seem at times unconnected. Existing reviews are limited in scope. Donner and Escobari (2010) have reviewed research on mobile phone use in micro and small enterprises, and Aker and Mbiti (2010) focus mostly on effects related to the reduction in search costs.

The mobile phone has some unique characteristics which have enabled its prevalence in the developing world, such as low acquisition costs for both network infrastructure and consumer handsets. Nevertheless, the established literature on ICTs and economic development provides a valuable source of theory that is applicable to mobile telephony. Saunders et al. (1994) identify four main impacts of ICT in their review of studies, concluding that telecommunications contributes to economic development by providing better market

information; improved transport efficiency and more distributed economic development; reduced isolation and increased security for villages, organizations, and people; and increased connectivity to (and coordination with) international economic activity. Similarly, Donner and Escobari (2010) find four tendencies in the literature on mobile phone use by micro and small enterprises, including more accessible and feasible market information; the entry of new actors into markets; the possibility of cutting out intermediaries due to facilitated direct communication between market agents; and facilitated business start-ups (p. 648).

A variety of models have been proposed to describe the economic impact of mobile telephony. Donner (2007) has asserted that some studies emphasize increases in productivity as an effect of ICTs, while others emphasize structural or social change (p. 5). With regard to mobile phone use by micro and small enterprises, Donner and Escobari (2010) come to the conclusion that the effect of mobile phones is mostly one of enhancing productivity, as they find “more evidence for the benefits of mobile use accruing mostly (but not exclusively) to existing MSEs rather than new MSEs, in ways that amplify existing material and informational flows rather than transform them” (p. 641). Aminuzzaman et al. (2003) discern technologies that cause a “ripple effect”, i.e. impact various fields of life, “starting a transformative process of development”, and those that have a “segmentation impact”, which merely “creates pockets of modernization in a traditional society” (p. 332). They come to the conclusion that mobile phone-enabled village pay phones impact a range of interrelated fields, such as transportation, family issues, and female empowerment, which points towards a possible ripple effect (pp. 343-344).

Much research has focused solely on improvements in market efficiency associated with mobile phone adoption. An early model for this effect is the “digital provide” conceptualized by Eggleston et al. (2002, p. 71): Mobile phones make information for economic decisions acces-

sible, which improves market efficiency and thus causes higher incomes and economic growth. More recently, Jensen (2010) identified two key mechanisms through which mobile phone might impact economic development. Besides improving arbitrage, they also have the potential to cause a transfer of market power towards formerly less informed market agents. Aker and Mbiti (2010) identified a total of five areas in which mobile phones have an economic impact. They reduce search costs and improve arbitrage; facilitate cooperation between firms; trigger the creation of new, mobile phone-related jobs; reduce risks; and enable a wide variety of applications in areas such as banking, health care, and education (pp. 213-214).

This chapter provides an interdisciplinary review of the existing literature on the economic impacts of mobile phones. It evaluates papers from economic as well as anthropological research. Its main aim is to link these two often unconnected strands of research to provide a full picture of the state of research into the economic impact of mobile phones in developing countries. We therefore identify four areas of impact: the creation of a mobile phone economy around retail, maintenance, and credit distribution, as well as mobile banking; a reduction in search costs and improved arbitrage with impacts on trade and employment; shifting market power and transformations of trusting relationships; and facilitated organisation and cooperation.

THE MOBILE PHONE ECONOMY

The emergence of a “mobile phone economy” over the course of the last decade itself has had a profound direct impact. It has enabled new income and employment opportunities, particularly in sale and maintenance of mobile phones and sale of airtime cards. In Kenya, for example, employment in the transport and communications sector has risen by 130% between 2003 and 2007, making it

the fastest growing sector of the formal economy (Communications Commission of Kenya, 2008, pp. 15-16). However, Aker and Mbiti (2010) have suggested that much employment opportunity has been created in the informal sector, supported by the practices of network operators. Using prepaid phone cards is prevalent in developing countries, and thus “mobile phone companies had to create extensive phone credit distribution networks”, as Aker and Mbiti (p. 220) write. Small-denomination airtime cards are often sold by formal or informal shops offering dietary staples, or by men and women in the streets (*ibid.*).

A particularly salient phenomenon is the introduction of call-boxes run by micro-entrepreneurs, which has been chronicled across the developing world. In a study of call-box operators and clients in the Cameroonian university town of Buea, Nkwi (2009) counts at least 550 such stalls for a population of about 150,000 (p. 57). He finds the business to be profitable and to provide incomes above the minimum wage for both the owners of call-boxes and their employees (p. 59). Within this business, there is an economic hierarchy which is supported by the phone network operator’s practice of giving boni to large-scale customers. As Nkwi notes, however, “[t]hese inequalities also open up new opportunities for access to wealth”, in particular below the level of the largest call-box businesses (p. 67).

In Bangladesh, Grameen Telecom has systematically introduced a network of village pay phones in rural areas since the late 1990’s. The program leases mobile phones to successful micro-credit receivers, providing a source of income for up to 280,000 mostly female operators (Shaffer, 2007, p. 2). An early study by Aminuzzaman et al. (2002) found that village pay phones had proven profitable for 94% of operators (p. 15). However, Shaffer (2007) more recently argued that increasingly wide-spread mobile phone ownership had made Grameen Telecom’s village phone initiative “obsolete” (p. 1), and criticised that many operators were only gaining a marginal income.

Mobile Banking

Most research into mobile telephony in developing countries has been focused on the basic functionalities of voice calls and text messaging (SMS). More sophisticated applications, however, are increasingly common, in particular mobile banking services, also known under various terms such as m-money or m-payment. Most mobile banking services have three principal uses: storing value (currency), converting cash into and out of stored value, and transferring stored value between accounts (Donner & Tellez, 2008, pp. 319-320). These services are frequently less expensive than conventional banking and money transfer options (Alampay & Bala, 2010, p. 86). Mobile banking services have existed on the Philippines since 2001 (p. 80), and have more recently spread across the developing world (p. 78). M-Pesa, launched in Kenya in 2007, has by far been the most successful service of this kind, with 14 million customers as of April 2011 (Safaricom, 2011). In other countries, such as the Philippines, adoption has been slower and less widespread (Alampay & Bala, 2010). While some mobile network operators have partnered with banks, linking SIM cards to regular bank accounts (Comminos et al., 2009), others such as M-Pesa have been created without involvement from a financial institute. This has created a job market for mobile banking agents who process in- and out-going payments; e.g. M-Pesa as of April 2011 has 28,000 registered agents (Safaricom, 2011).

Despite hopes of “banking the unbanked” (e.g. Comminos et al., 2009), mobile banking services have frequently been found to cater mostly to the more affluent members of societies in developing countries. In a study in Uganda, Ndiwalana et al. (2010) found that mobile banking users had above-average education and employment, and 72.6 percent had a regular bank account (pp. 5-6). Exploring the potential of mobile banking for the bottom of the pyramid (BoP) in the Philippines, Alampay and Bala (2010) apply van Dijk’s (2006)

classification three level of access as preconditions for ICT usage, mental, material, and skill access (Alampay & Bala, 2010, p. 80). They find that while even the poor have access to mobile phones and skills to use them, a lacking grasp of the workings of mobile banking remains a barrier to adoption (pp. 87-88).

Money transfers have been found to be the most common usage of mobile banking across countries. Remittances sent to family members, and to a lesser degree friends, dominate the transactions; these often originate in the respective capital and benefit relatives in rural areas (Alampay & Bala, 2010; Morawczynski, 2009, pp. 496-497; Ndiwalana et al., 2010, p. 6). Most transfers involve relatively small sums; Ndiwalana et al. (2010) found that nearly 60 percent of mobile banking users received sums between UGX 5,000 and 30,000, less than USD 12 (p. 7). Among “heavy users” – those who use mobile banking to both send and receive money – using the service for payments is more common, in particular to pay for airtime (pp. 6-7). Surveyed users also appreciated using mobile payments to purchase transportation tickets or hospital and utility bills, but expressed low satisfaction with existing implementations (pp. 9-10).

SEARCH COST AND MARKET EFFICIENCY

Exchange of supply and demand information as well as prices is the utility most valued in mobile phones by traders (Overå, 2006, p. 1308) and is the subject of a main part of their phone communication (Molony, 2009, p. 99). Indeed, mobile phones reduce search costs and facilitate access to information on supply and demand as well as prices (Overå, 2006, pp. 1308-1309). A positive impact of such technology on market efficiency has been predicted by economic theory, and is well evidenced by researchers. This is probably the best documented economic impact of mobile

phones, particularly due to a range of quantitative case studies. Aker (2008, p. 1) has argued that the reduction of search costs is also the most profound economic impact of mobile telephony. As Jensen (2009) has pointed out, two main ways in which improved access to supply and demand information might have an impact on market behaviour and the welfare of producers, traders, and consumers are more efficient arbitrage and transfers in market power (p. 3).

There is abundant literature on the importance of information for the functioning of markets (e.g. Stigler, 1961; Salop & Stiglitz, 1977; Reinganum, 1979; Stahl, 1989; McAfee, 1995). In order to engage in optimal arbitrage, market participants need to have access to sufficient and symmetric price information. Then, according to the law of one price, the price of a good on two markets will not differ any more than the cost of transportation between them (Jensen 2007, p. 879). In reality, however, the law of one price is often not adhered to; because information is costly or inaccessible, excess price dispersion arises (Stigler, 1961, pp. 213-214). To obtain price information, market participants have to engage in search. Where the cost of search exceeds the expected gains, however, it is not undertaken (pp. 219-220). In this case, prices come to an equilibrium in which dispersion is higher than expected according to the law of one price (Jensen, 2007, p. 885).

Reducing the cost of information, then, lowers the threshold for expected gains at which search is conducted, and should lead to a decrease in price dispersion (Stigler, 1961, p. 217). As agents can engage in better arbitrage, adherence to the law of one price is improved, and the market gains efficiency. In particular, goods can be allocated more efficiently across markets. Jensen (2009) provides a simple model which shows that a reduction in search costs will always yield a persistent net welfare gain to society (p. 8). However, there might still be winners and losers, i.e. consumers might benefit at the expense of producers or vice-versa (ibid.), but gain for both groups is possible

e.g. in a scenario where more efficient arbitrage reduces spoilage or waste (p. 9). The model also does not predict whether the average price of good will rise or fall (ibid.). Clearly, it can be expected that the introduction of mobile telephony reduces the cost of search in developing countries, enabling producers, traders, and consumers of goods to engage in more efficient arbitrage, thus creating a net welfare gain to society.

Perishable and Non-Perishable Goods

The impact of mobile phones is strongest where access to information was previously costly or hard to obtain. Jensen (2007) and Abraham (2007) have studied the effects of network roll-out on the fisheries industry of the Indian state of Kerala, where mobile telephony for the first time enabled communication between fishermen at sea and buyers in the markets. The fishing industry is located in several ports along the coast of Kerala; before the introduction of mobile phones, fishermen would usually sell their catch in their home port. As yield differs daily across the ports' fishing zones, and it is uneconomical to store fish, this would lead to price dispersion across the towns' markets (p. 882); however, lacking access to price information on sea, fishermen would not be able to engage in arbitrage (p. 881). Resulting was a misallocation of goods, which left some towns underserved while producing waste in others (p. 882-883). Mobile phones, however, make it possible for fishermen to search for market prices while on sea, enabling them to engage in arbitrage (p. 883). As Jensen has shown, this resulted in more efficient allocation of goods, diminishing waste altogether; price dispersion was decreased to a level adhering to the law of one price. This yields welfare gains for both producers of fish, whose profits rose by 8 percent as the amount sold increased, and consumers, as the price of the commodity decreased by 4 percent; the consumer surplus increased by 6 percent (Jensen, 2007, p. 883).

Most evidence indicates that access to information is most important in the trade of perishable goods, as it is the case in Jensen's study. Molony (2009, p. 94) writes that "[p]erishables [...] deteriorate more quickly and the delivery process over huge distances relies on fast decision-making lest the crop rots. This necessitates efficient and prompt communication in trading". Overå (2006) has documented several cases of wholesalers in Ghana trading perishable goods such as onions across long distances. She finds that wholesalers trading in frozen import fish were among the first adopters of mobile phones, as "[f]or them, access to information about prices, fish types and qualities, and timing of deliveries is vital" (p. 1310). Further evidence comes from Aker and Fafchamps (2010), who found an impact of mobile telephony on farm-gate price dispersion only for semi-perishable cowpeas, but not for more storable millet (p. 4). Research by Muto and Yamano (2009) on agricultural markets in rural Uganda further substantiates this point. The authors studied the changes in market integration of banana and maize farmers after mobile phone network expansion, which they predict to reduce marketing costs, including transport and search costs (p. 1887). They found that network introduction has a positive impact on the price ratio and probability of sales of banana - a highly perishable good -, while maize sales remain unchanged (pp. 1892-1893). They argue that this might be due to maize being a less perishable good than banana.

While Muto and Yamano did not find an impact of mobile telephony on a local maize market, Aker (2008, 2010) argues that network introduction can make markets for storable goods traded across long distances significantly more efficient. Aker studied grain markets in Niger, where goods are frequently traded across immense distances within the country. Markets in the Western African nation are often vastly dispersed, making it difficult to obtain price information (Aker, 2008, p. 6). Previous to the introduction of mobile phones, grain traders would rely on visiting weekly grain markets to ob-

tain price information (p. 2), meaning high search costs resulting in considerable price dispersion. Mobile phones, however, enable traders to collect price information remotely, thus vastly decreasing the cost of search, and enabling them to engage in better arbitrage. Aker and Tack (cited in Aker and Fafchamps, 2010) found that mobile phone coverage correlated with an increased probability of traders searching for prices, and them doing so across a 25 percent greater number of markets, contacting 22 percent more people. This resulted in a significant change of traders' behaviour, as those in markets with network coverage increased the number of markets they visited by 25 percent. While farmers' probability of searching for prices was also increased, they did not search across more markets, and did not increasingly make use of arbitrage (pp. 26-27). This utilisation of mobile telephony has led to a more efficient grain market, as Aker has shown. The introduction of mobile phones in Niger resulted in a 10 to 16 percent decrease in consumer price dispersion (Aker, 2010, p. 57) and 29 percent higher incomes for traders, yielding welfare gains for traders and consumers of grains (Aker, 2008, pp. 39-40).

The existing body of research clearly suggests that mobile telephone introduction in developing countries results in a net welfare gain to society. How these gains are distributed among market agents, however, remains ambiguous. Research has regularly found a decrease in consumer price dispersion (Jensen, 2007; Aker, 2008, 2010), and a decrease in producer price dispersion for more perishable goods (Jensen, 2007; Aker & Fafchamps, 2010). Findings regarding the impact of mobile telephony on prices are less clear, however. Whereas Muto and Yamano (2009) found that Ugandan farmers yielded higher market prices for banana after the introduction of mobile telephony (cf. Goyal, 2010, for a similar effect after the introduction of Internet kiosks in rural India), Jensen (2007), on the contrary, observed that fishermen in Kerala obtained lower prices following the adoption of mobile phones

(although made up for by a reduction in waste). Research by Aker and Fafchamps (2010) in Niger and Fafchamps and Minten (2010) in India did not find a significant impact on farm-gate prices. Studies have also shown a decrease in consumer prices for perishable goods such as fish (Jensen, 2007) and storable goods such as millet (Aker, 2008). There is considerable uncertainty how these welfare gains are distributed among market agents. While Jensen (2007) argues that mobile phone adoption brings Marshallian welfare gains benefiting producers as well as consumers, Aker and Fafchamps (2010) conclude that the primary beneficiaries are traders and consumers. The form taken by the impact of mobile telephony, and its strength, is certainly dependent on pre-existing social, economic, and infrastructural conditions yet to be researched.

Distance and Transportation Infrastructure

Communication is only one of several interrelated infrastructural factors influencing market integration, as Abraham (2007, p. 16) has pointed out. The cost of transportation is particularly important (Jensen, 2007, p. 911), and is the primary cause of price dispersion in developing countries (p. 881; cf. Minten & Kyle, 1999). In a study of maize markets in Ghana, Badiane and Shively (1998) have shown that prior to the introduction of mobile phones (between 1980 and 1993), the average time for a price shock to be fully transmitted from the central market to two to outlying markets was "about four months", which they partially attribute to high transport costs.

Especially in cases when travelling is necessary to obtain price information, as documented by Aker (2008, p. 2), expensive transportation is detrimental to the functioning of markets. In such cases, cheaper communication tools can make transportation obsolete and thus decrease search costs, effectively leading to decreased price dispersion. Aminuzzaman et al. (2003) argue that

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village pay phones in Bangladesh had the strongest impact on transportation and mobility, as they “enhance the geographic reach of the users while, at the same time, reducing the need to travel to obtain information” (p. 343). Molony (2008) has also pointed out that mobile telephony provides additional reliability where it replaces prior means of communication via information sent with traveling messengers (p. 646). Similarly, Overå (2006) has shown that large-scale wholesalers can make significant savings in time and money by substituting phone communication for traveling (p. 1307). She writes that “it is clear that the longer the distance and the more intermediaries and transactions a commodity chain involves, the more time and money can be saved by substituting travel with calls” (pp. 1311-1312).

This assumption is supported by Aker’s (2010) research on grain markets in Niger. She found that mobile phones were more useful in reducing price dispersion when cost of transportation was high (p. 54). In particular, the effect was stronger when markets were more remote (*ibid.*); and when they were connected by unpaved roads (*ibid.*). Similarly, Muto and Yamano (2009) report a positive correlation between banana farms’ distance to the district centre and gains in market participation and income subsequent to the introduction of mobile phones (pp. 1893-1894). These findings suggest that the impact of mobile phone adoption on market behaviour is stronger where the cost of transportation is high, particularly in underdeveloped and remote areas.

Labour Market, Employment, and Self-Employment

If mobile phones reduce search costs and facilitate access to information, this should also affect the labour market. Klonner and Nolen (2008) argue that the improvement in information flows affects the labour market in two ways. It improves “spatial integration of the market for wage labor”, as well as conditions for business start-ups. Indeed,

Samuel et al. (2005) write that nearly a quarter of the mobile phone owners and users surveyed in South Africa reported to have made or received a call about an employment, business or training opportunity (pp. 49-50). They found that “mobile phones enabled job seekers to ring for information about employment, and enabled them to be contacted by potential employers” (p. 50). The authors also found that more than a quarter of small business holders in both Egypt and South Africa reported being “influenced to some extent by the availability of mobile phones in starting up their business” (p. 51).

Klonner and Nolen’s (2008) macroeconomic study on municipalities in rural South Africa found that “[e]mployment increases by 15 percentage points when a locality receives network coverage” (p. 18). These gains are entirely due to an increase in wage employment, particularly by women. Self-employment remains unaffected (p. 16); however, the authors note that “self-employment is exceptionally low in South Africa” (p. 15), meaning that the impacts might differ in other countries. They also observed a shift in employment by sector, as “cellphone coverage results in a decrease in agricultural employment” as men switch into other sectors. While this points towards a significant effect of mobile telephony on employment at the extensive margin, labour supply at the intensive margin seems unaffected according to Klonner and Nolen’s data. Neither the number of hours worked by the employees nor wage rates were significantly affected by network roll-out (p. 16). Future research will have to show whether the findings made by Klonner and Nolen are robust and more broadly applicable to developing economies.

MIDDLEMEN, MARKET POWER, AND TRUST

It is rarely the case that producers sell directly to consumers; more often, a long chain of interme-

diaries is involved, including traders, wholesalers, and retailers. In developing countries, such middlemen are often in the position to exert monopsony power over producers. This enables them to exploit information asymmetries to reap excessive profits (Eggleston et al., 2002; Goyal, 2010). Some researchers have argued that mobile telephony can improve producers' bargaining power and increase competition among intermediaries, leading to a transfer of welfare (Eggleston et al., 2002; Jensen, 2009). To the opposite, others have pointed out that such structural conditions of developing economies can hinder producers' utilisation of mobile telephony for arbitrage (Abraham, 2007). In particular, traders might provide additional services of intermediation, such as "sorting for and attesting to quality, storing and transporting goods, organizing sales, assuming or pooling risk, or supplying credit" (Eggleston et al., 2002, p. 68; cf. Biglaiser, 1993; Li, 1998; Stigler, 1961; Van Raalte & Webers, 1998).

Jensen (2009) posits that both traders' and producers' use of mobile phones can reduce intermediaries' market power. He argues that, as mobile phones enable them to inquire into farmers' supply in advance and reduce unsuccessful travels, traders will increase the range of producers they buy from, which would lead to increased competition among intermediaries (pp. 10-11). A more competitive market for traders, in turn, would reduce their market power and lead to higher price offers to farmers, to the point of achieving "full, optimal-arbitrage" prices, even if farmers did not have access to price information themselves. Jensen's second assumption is that farmers may gain from having direct access to price information (ibid.). It relies on the observation that "[i]n many cases, while each farmer may face a locally monopsonistic trader, most goods are sold to wholesalers in competitive, open outcry auctions in large towns" (Jensen, 2009). Mobile phones can give farmers relative certainty on prices offered on these markets, making it more attractive to sell directly to wholesalers, so that intermediary

traders would have to offer higher prices to prevent farmers from marketing their goods to these wholesalers (ibid.). Both mechanisms described by Jensen might lead to a welfare transfer from traders to producers of goods.

Jensen's assumptions are in part supported by research which finds that traders increase the radius in which they operate, however, this deals mostly with markets traders visit to sell goods (Overå, 2006; Aker, 2008, 2010; Aker & Fafchamps, 2010; Aker & Tack, 2010). On the other hand, Aker and Fafchamps (2010) find that farmers do not utilize mobile phones for more efficient arbitrage. Indeed, most research shows welfare gains for traders and consumers rather than producers (e.g. Aker, 2008, 2010), Jensen's (2007) research on fishermen in Kerala being an exception. Mobile phone adoption and network coverage might well be an important factor, as Aker and Fafchamps (2010) note that farmers had little access to mobile telephony during the time of their research, whereas Jensen (2007, p. 891) reports quick mobile phone adoption as high as 60-75 percent (whereas the adoption rate among the general population at that time was 5 percent). Further support for Jensen's assumptions come from Goyal (2010), who found that Internet kiosks set up by a major purchaser of soy beans enabled farmers to access information on market prices and to bypass intermediate traders, leading to a decrease in market prices. Nevertheless, in most cases, research on the impacts of mobile phone introduction suggests that welfare transfers towards producers of agricultural goods as predicted by Jensen have not occurred.

Aker and Fafchamps (2010) have suggested that farmers' lack of utilisation of mobile phones for arbitrage can be explained by structural factors such as their access to credit and their bargaining power vis-à-vis traders (cf. Molony, 2008). Indeed, middlemen often procure exclusive rights to purchase producers' outputs in exchange for credit or investment (Bell & Srinivasan, 1989). Abraham (2007) has argued that fishermen's less-

than-optimal arbitrage could be explained with intermediaries' monopsony power as shareholders of the boats, which enabled them to determine where a day's yield would be landed and sold (p. 12). However, such monopsony power might be lessened or even broken, as the example shared by Goyal (2010) shows. In this case, traders lost their monopsony power over soybean farmers as Internet kiosks enabled the latter to access information on prices offered by an ultimate buyer. On the other hand, Jensen (2007) has posited that farmers' access to price information should lead to higher offers from traders, rather than their elimination. He argues that intermediaries perform important tasks, and that there are likely gains from their greater efficiency compared to farmers undertaking these efforts themselves (pp. 11-12; cf. Eggleston et al., 2002, p. 68).

Trust

Face-to-face communication has been identified as a prevalent feature of micro and small enterprises (MSEs) in developing countries, in particular for its capacity to forge trusting relationships between market agents (Egbert, 2004; McCormick, 1999, p. 1532; Mungunasi, 2000; Trulsson, 1997, 132-133). As mobile telephony enables the replacement of face-to-face with mediated communication, social capital has arisen as a salient topic in recent research. A set of qualitative studies is concerned with the question how mobile telephony impacts trusting relationships, and how use of mobile phones is shaped by reliance on these relationships (Donner & Tellez, 2008; Molony, 2007, 2008, 2009; Morawczynski, 2009; Overå, 2006).

Morawczynski's (2009) study on mobile banking in Kenya outlines two contrary developments, showing that mobile payment systems can both strengthen and weaken social networks. The study focuses on migrant workers in Kibera, a suburb of the capital Nairobi, and their relations to family and friends back home in Western Kenya.

Morawczynski argues that the main impact of mobile banking is reduced vulnerability as the technology facilitates maintaining social networks and soliciting capital through them (p. 500). Urban migrant workers use mobile banking to send remittances to relatives in their rural home regions, by that way saving significant sums on transportation otherwise necessary to transmit the money (p. 499). Mobile banking also allows for more frequent money transfers (ibid.). Morawczynski argues that these remittances, alongside their practical function, also have symbolic meaning in reassuring commitment, thus strengthening existing social ties (p. 500). A steady stream of remittances allows internal migrants to maintain a "safety net" in their home villages, which rises to importance in case of shocks such as Kenya's 2007-08 post-election crisis, when the money flow was reversed to support urban migrants fleeing ethnic violence in Kibera (ibid.). However, the study also documents a potential weakening of social networks as mobile banking replaces visits back home as a means of transmitting remittances (p. 500). Thus, while mobile banking enables an increase in both amount and frequency of remittances, it might ultimately contribute to their reduction or elimination of social ties become strained or break in the absence of personal interaction. This contrast between amplification of existing relations and creation of new ones on the one hand and weakening or elimination of social ties on the other marks much of the literature on the impact of mobile telephony on trusting relationships.

In a series of papers on Tanzanian businesses, Molony (2007, 2008, 2009) has analyzed the use of mobile phones with regard to a multi-phase process of developing trusting relationships between market agents such as farmers and wholesale traders. He finds that business relationships are initiated in face-to-face meetings, where mobile telephony plays no role (Molony, 2008, pp. 647-650). These meetings between business partners are frequently repeated to strengthen ties between

the parties and develop a trusting relationship or “customer friendship” (Lyon, 2000, p. 672), which will e.g. enable farmers to ask wholesalers for credits. While mobile phones are regularly used to submit supply and demand information (mostly from wholesalers to farmers), Molony (2008) finds that “the mobile phone cannot alter the trust between the two”. He concludes that due to the importance of face-to-face communication in building and maintaining crucial trusting relationships between traders and producers, mobile telephony can only play a minor role (p. 653).

However, Molony (2008) also discusses potential consequences of mobile telephony for the relationship between farmers and wholesalers. SMS-based market information systems could strengthen farmers’ bargaining power vis-à-vis wholesalers, but as Molony cautions, “[t]he risk is that while mobile phone-based services provide farmers with the opportunity to supply to different buyers, by not building a relationship with one dalali [wholesaler] alone farmers are weakening their ties with their traditional source of credit.” Social constraints would then make the overall impact of mobile phones an adverse one.

In line with Molony (2008), Overå (2006) states that “[t]o establish and maintain trust and cooperation among individuals in a network [...], repeated interaction and communication are required” (p. 1302; cf. Fafchamps, 1996, p. 442). However, she argues that mobile phones can support this process, as they enable frequent, quick, and direct communication (Overå, 2006, p. 1303) which serves as an enforcement mechanisms for the “testing by monitoring one another’s behavior” (p. 1313; cf. Granovetter, 1985) which trust requires. Accountability is increased as business partners can immediately verify and control information, and reduced information asymmetries mean increasingly predictable transactions. Dishonest behaviour can be observed in remote places, and the improved information flow means that rumours about it can spread more quickly,

but as Overå states, “this also works in the other direction: reputation building takes less time and extends more widely in space” (p. 1313). For these reasons, Overå concludes that the “adoption of new technology may enhance the development of trust between actors in the market and facilitate transactions that might otherwise not take place or would take place at a higher cost” (ibid.). For example, traders’ possibility to inform customers of legitimate reasons for delays can “contribute to the creation of an atmosphere of trust” (p. 1312). However, she also acknowledges that some issues, including credit requests and contract negotiations (as noted by Molony (2007)), are perceived as necessitating face-to-face communication (Overå, 2006, p. 1312).

Evidence provided by these studies suggests that mobile phones play a role in the development of trusting relationships for business purposes. While Molony (2007, 2008, 2009) stresses the importance of face-to-face communication for initiating and strengthening business ties, Overå (2006) argues that frequent interaction via mobile phones provides an important function in business partners’ mutual monitoring, which is crucial for the development of trusting relationships. Mobile phones may facilitate the organisation of spatially dispersed networks relying on micro-level trust between individuals, but Overå cautions that these still need to be supported by meso-level reputation mechanisms. She argues that “talking on the phone is not itself a trust-building mechanism: rather it is a tool to make already existing trust-building mechanisms—exchange of information, observation of behavior and sanctions against dishonest action, and contract fulfillment—more efficient” (p. 1313). In this sense, mobile phones, rather than introducing new mechanisms, magnify existing structures and make them more efficient. Whether the technology and its associated practices has an adverse impact on some existing relationships, as Molony (2007) and Morawczynski (2009) suggest, needs to be further investigated.

ORGANISATION AND COOPERATION

Mobile telephony can make businesses more efficient by facilitating organisation as well as cooperation among partners. A survey of South African and Egyptian small businesses by Samuel et al. (2005) found that owners valued being able to run errands and place orders without leaving the shop, as well as keeping contact with staff and customers while travelling (p. 51). Similarly, Brinkman et al. (2009) report views that “the mobile phone offers new possibilities to fix up business appointments, arrange for wares to be delivered and develop clear time schedules” (p. 74). These advantages are also enjoyed by customers, for whom, as Overå (2006) points out, “without phones the ordering of goods is very time consuming”, as it involves physical travel (p. 1310).

Overå (2006) has argued that the benefits of mobile telephony increase as the need for coordination rises. “The cost-saving potential appears to be particularly great in commodity chains that are geographically extensive and organizationally complex” (p. 1309). Mobile phones enable traders to coordinate multi-local activities without the need to travel themselves. One example is the case of a Ghanaian onion trader shared by Overå, who utilizes telephony to coordinate the “timing of harvesting, drying, packing, and transportation to achieve an ultimate balance between supply and demand” with his partners who are dispersed across the country (ibid.). Similar advantages exist for businesses which trade in non-perishable goods, but where a large number of business relationships is nonetheless necessary, as in the case of a cloth wholesaler documented by Overå (2006, p. 1311). For her, mobile phones make it possible to inquire supplies and place orders remotely and to coordinate the business while travelling. However, some degree of personal attendance to partners is still necessary, e.g. to inspect new designs and to ensure product quality.

Mobile phones also enable entrepreneurs to stay in contact with their customers and to win new clients. For example, Brinkman et al. (2009) write that mobile phones enable women in Khartoum to do business despite being restricted in their movement. While they may not be able to travel, “making appointments by phone can help them to plan their lives and allow them to operate within the imposed limits of ‘respectable’ behaviour” (p. 74). Another reported advantage of mobile phones is that they help reducing unsuccessful visits to clients (ibid.). As Overå (2006) points out, a trader’s availability to customers’ inquiries enabled by a mobile phone “is a comparative advantage in an overcrowded market” (p. 1310). It enables the trader to forge a trust relationship with their customers, as she demonstrates in the case of a young onion trader, and “facilitates the building up of a good reputation” (ibid.). Furthermore, mobile phones enable traders to cater to a more spatially dispersed customer base (ibid.).

Credit procurement as been noted as a further field of impact for mobile phones, in particular in connection with mobile banking and micro-credit services. Morawczynski (2009) argues that one important impact of mobile phones is an opportunity to reduce vulnerability through “mobilization of financial assets”, making funds instantly available during shocks (p. 500). In her study, subsistence farmers also used mobile banking to expand their networks of potential creditors and remitters (p. 500), making “it easier for them to acquire small amounts of money from a larger base of contacts” (p. 501). In contrast, Molony (2008) discusses the potential pitfall that mobile telephony could strain farmers’ relations to traditional creditors: “[t]he risk is that while mobile phone-based services provide farmers with the opportunity to supply to different buyers, by not building a relationship with one dalali [wholesaler] alone farmers are weakening their ties with their traditional source of credit.” He proposes that micro-credit systems, perhaps implemented via mobile banking, could provide a solution for this dilemma (pp. 649-650).

As Molony argues, “Madalali [wholesalers] generally have a much better record of getting credit to the rural poor than formal credit systems in low-income countries” (cf. Lyon, 2000, p. 678). He suggests that these wholesalers could thus play a part in providing farmers with micro-credits. As Molony and Morawczynski show, mobile telephony and mobile banking has complex and not always direct impacts on farmers’ credit networks. Relations to traditional sources of capital could become strained, but a widening of credit networks might also create new opportunities for funding.

CONCLUSION

The introduction and adoption of mobile phones in developing countries has wide-spread economic implications. Within a mere decade, an important mobile phone economy has emerged to satisfy the needs of users, and new businesses such as mobile banking are based on the technology. A main impact of mobile phones use is the greatly improved accessibility of information. Although other factors such as transportation matter, reduced search costs have been shown to decrease price dispersion and improve market efficiency. The impact on market power distributions, however, is not as clear. Trust-building processes are impacted by a replacement of face-to-face with mobile communication. Whether the technology is primarily amplifying existing relations, enabling new contacts, are having an adverse impact on traditional relationships, however, remains open to debate. The organisation of businesses and cooperation within and between firms is improved by mobile phones which enable entrepreneurs to make decisions remotely and reach out to broader customer circles.

In accordance with the conclusion of Donner and Escobari (2010), this suggests that mobile telephony primarily serves to enhance productivity in existing processes. An important indicator for change would be evidence for welfare transfers

enabled by mobile telephony. While literature on other ICT suggests such effects (Goyal, 2010), the net welfare gain to society due to mobile telephony seems to benefit intermediaries rather than (less well-off) farmers. However, this situation might well undergo further change. As Jensen (2009) has shown, farmers still use mobile phones less often than the average in most areas, and their location in rural areas might carry infrastructural disadvantages (Molony, 2009). In fact, in Jensen’s (2007) study, where mobile phone use among fishermen was high, producers benefited from mobile telephony. However, at the current state of research, evidence that mobile phone technology amplifies existing economic structures rather than to disrupt them dominates.

Nevertheless, this chapter has shown that the introduction and adoption of mobile telephony has already had a profound impact on several areas of developing economies. Other research provides evidence of impacts in social, political and cultural spheres (Ekine, 2010; de Bruijn, Nyamnjoh, & Brinkman, 2009). In this sense, the mobile phone meets the preconditions for a ripple effect as defined by Aminuzzaman et al. (2003). Whether the technology is indeed “starting a transformative process of development”, as their analysis finds, is a question that remains open. Increasing mobile phone adoption among the bottom of the pyramid points towards a transformative potential of mobile telephony that has not yet been realized. In addition, technological invention continues to bring changes. The introduction of mobile Internet services in developing countries is increasingly changing Internet access for people in developing countries, with economic and broader social impacts that are yet to be researched.

Future research will have to show whether mobile telephony is associated with changing business practices and welfare transfers, two questions which are not yet sufficiently answered at the current state of research. Bridging the divide between economic and anthropological research could help to identify questions which

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are in need of further exploration. The impacts of mobile phones on coordination and cooperation, in particular, have yet to be quantified; whereas qualitative studies could advance the understanding of factors that so far seem to limit welfare transfers. Technological developments, too, need to be taken into account. Mobile Internet services and their impacts in developing countries, in particular, have barely been studied. Technological innovation and social adoption of mobile phones are progressing at an astounding speed, giving researchers great opportunities to gain insights into the disruptive and transformative power of information and communications technologies.

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ENDNOTE

- ¹ Excluding Hong Kong, Israel, Japan, Singapore, South Korea, Taiwan.