Mobile Phone Use, *Bricolage*, and the Transformation of Social and Economic Ties of Micro-Entrepreneurs in Urban Morocco

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The telephone was only a convenience, permitting [people] to do more casually and with less effort what they had already been doing before.

Daniel Boorstin (1974, p. 391)

The mobile is my lifeline to earning my bread and keeping in touch with my family. [To me] it is…the sixth pillar of Islam.

Plumber from the slums of Mohammadia

In this article, I explore ways in which urban micro-entrepreneurs use the mobile phone as a tool to organize a newly networked work life. Based on ethnographic and survey evidence, first, I argue that mobile phone use expands the productive opportunities of certain types of activities by enhancing social networks, reducing risks associated with employment seeking, and enabling bricolage or freelance service work, leading to higher incomes. Second, I demonstrate how the use of mobile phones for bricolage jobs begins to transform, rather than simply augment and reinforce, the social and economic ties of micro-entrepreneurs. Third, I explore ways in which the mobile phone is distinct from traditional technologies. Finally, I hope my findings could highlight new ways to think about designing innovative mobile applications to serve the needs of micro-entrepreneurs in the developing world.

INTRODUCTION

In nearly two decades of its commercial viability, the mobile phone has become an essential part of everyday lives of billions of people. According to the International Telecommunication Union, there were 3.3 billion mobile phone users worldwide by the end of 2007, equivalent to a penetration rate of 49 percent (While these figures may not account for the fact that users may own more than one subscriber identity module (SIM) card at a given point of time, it should also be noted that more than two thirds of mobile phone users added during the prior two year period were in low-income countries). In Africa, for instance, only 4.7 percent of the population has access to the Internet, while mobile users have surpassed landlines and represent about 90 percent of all telephone subscribers (ITU, 2008).

As a portal for communications, asynchronous messaging, entertainment and information, the mobile phone has become the manifestation of the "digital age" for many of the world's poor. This paper addresses these issues in the context of Morocco. The case for understanding the economic and social impacts of mobile telephony in Morocco is compelling. Between 1998 and 2007, the majority of Moroccans has gone from no phone ownership to ownership of mobile phones. There are 20.5 million subscribers; around two-thirds of the population. This adoption rate can best be understood as the result of two major contributing factors, both of which will be explored in this paper: the major economic reforms undertaken by the state in the mid-1980s, and the ease of use and creative entrepreneurial deployment of the mobile. This penetration rate of mobile telephony, as elsewhere in the developing world, underscores the degree to which this new technology has become part of everyday routines and has been tinkered with to serve various social and economic needs (ANRT, 2007).

In this article, I am concerned with ways in which urban micro-entrepreneurs and the self-employed use the mobile phone as a tool to organize a newly networked work life. Based on ethnographic and survey evidence, first, I argue that mobile phone use expands the productive opportunities of certain types of activities by enhancing social networks, reducing risks associated with employment seeking, and enabling *bricolage* or freelance service work, leading to income increases. Second, I demonstrate how the use of mobile phones for *bricolage* jobs begins to *transform*, rather than simply invigorate, augment, and reinforce, the social and economic ties of micro-entrepreneurs. Unlike Levi-Strauss's classic definition of *bricolage* in which he defines a *bricoleur* as "someone who works with his hands and uses devious means compared to those of a craftsman" (1974, p. 16), *bricolage*, or the term *bricolat* used by micro-entrepreneurs in our context, refers to unanticipated supplementary informal income-generating possibilities and activities. Third, I show how my findings could highlight new ways to think about designing innovative mobile applications to serve the needs of micro-entrepreneurs in the developing world. Fourth, I explore ways in which the mobile phone is distinct from traditional technologies. Finally, I hope my findings could highlight new ways to think about designing mobile applications to serve the needs of micro-entrepreneurs in the developing world.

This article is divided into five sections. The first provides a theoretical background on mobile telephony; the second deals with the macro-economic and political context of mobile phone adoption; the third describes methods used to collect data, provides a descriptive analysis of mobile phone usage and trends of the study group, and presents findings from the survey data; the fourth dives into an analysis of the reasons behind some of my findings, discussing both factors contributing to income enhancement and ways this new technology is different from other technologies; and the fifth provides a summary of the study and points to further research opportunities.

THEORETICAL BACKGROUND ON MOBILE TELEPHONY

Despite their ubiquity and consequences on face-to-face communications, the social and economic impacts of mobile phones on individual users have been understudied. Since the publication of seminal articles by Ball (1968) and Aronson (1971), and the edited collection by Pool (1977), few studies on the history and development of the telephone appeared until 1990s (e.g., Fisher 1992). While there is a burgeoning literature on the effects of mobile telephony in the developing world, most studies on mobile phones are mostly centered on its social dimensions in affluent regions such as Scandinavia, North America, and Japan. These studies

deal with a wide range of issues and include how mobile phones have destabilized personal and communal space (Sherry and Salvador, 2001; Ling and Pederson, 2005; Glotz et al., 2005; Kavoori and Arceneaux, 2006; Maroon, 2006; Bowen et al., 2008); how digital technology invades public settings, as in transportation and schools; how youths pattern voice and text messaging to escape parental or societal monitoring (Ito et al., 2005; Ling, 2004 and 2008; Katz and Sugiyama, 2005); and how the capabilities of mobile phones extend to entrepreneurship, banking, e-learning, and health delivery systems and become an instrument for political mobilization (Goggin, 2006; Donner, 2006 and 2008).

While economic and business literature suggests that the availability of telecommunications increases income and makes local economies more efficient (see Sullivan, 2007; Jensen, 2007; Aker, 2008), anthropological research on the economic and social impacts of the use of information technology is slowly growing. For example, Horst and Miller (2005), based on ethnographic research on income generating opportunities related to cell phone use in Jamaica, write that "the phone is used much less among low-income Jamaicans in connection with either jobs or entrepreneurship than we anticipated" (2005, p. 761). They suggest that the primary way in which Jamaicans use the phone is to maintain and refresh local and non-local networks and connections to cope with everyday economic uncertainty. They also point out that the function of the mobile is to "link up," referring to ways in which Jamaicans keep an active inventory of personal and kinship networks to be tapped into when social and economic needs arise. This can include facilitating the participation of emigrants and "foreigners" in the daily lives of their children, regular transfer of remittances in and into Jamaica, explorations of transnational marriage, and pursuit of sexual relations. This approach can be used to study urban poor mobile phone users by identifying symbolic meaning and socio-economic drivers that influence the uptake and use of mobile phones and how they are used to augment the intensity and scale of social relationships.

Samuel et al. (2005) examined the use of mobile phones by micro-entrepreneurs in South Africa, Tanzania, and Egypt and found that 60 percent of the surveyed micro-entrepreneurs in each country reported that the mobile phone has contributed substantially to their business profits. Donner (2006), although not centered on the economic value of mobile phones in Rwanda, argues that "micro-entrepreneurs use their mobile phones to increase the frequency of their contact with friends, family, and existing business contacts and to facilitate new contacts with business partners, suppliers, and customers" (2006, p. 14). Additionally, because Tanzanian farmers and informal construction workers prefer face-to-face communications and do not give primacy to the mobile phones in their daily activities, Molony (2008) found that mobile telephony has a limited role in the economic and social lives of Tanzanian workers. He writes, "While mobile phones can help forge new relationships within the market, they play little part in strengthening current relationships" (2008, p. 654).

From an urban planning perspective, Townsend (2000) states that the application of mobile communications are constantly, and in a chaotic fashion, reconfiguring the way in which urbanites deal with spatial and temporal constraints of the urban built environment and function. He goes on to say that "the mobile might lead to a dramatic increase in the size of the city, not necessarily in a physical sense, but in terms of activity and productivity. No massive new physical infrastructure will emerge; rather it is the intensification of urban activity, the speeding up of urban metabolism" (2000, p. 14). Likewise, Ling (2004 and 2008) argues that the mobile phone functions to structure the rituals of daily routine, conversation, and the norms of family life. Specifically, he asserts that it allows for personal security, organization of activities on the

fly, micro-coordination as in mid-course adjustment, iterative coordination, and softening of schedules. As a tool used for the coordination of time and the fostering of a "carpe diem" attitude towards management of minute variations in different locations by users, the mobile phone succeeds in reinforcing chaotic urban interactions, and at the same time, in bringing together disjoint networks into coherent sets of activities.

While these theoretical contributions are useful and explain some aspects of the social and economic impacts of mobile phones on individual users, they provide a narrow understanding of the use of mobile telephony in the sense that the phone is seen essentially as either a tool for recalibrating, amplifying, and reinforcing social relationships, or as a device with no significant role in structuring users' economic and social activities. My mixed-method study provides another case study to this growing body of literature on the productive uses of mobile telephony in the developing world, and fills a gap that has not been addressed in the literature on the effects of mobile telephony: I argue that mobile phones, especially when coupled with *bricolage*, begin to *transform*, rather than only augment or reinforce, the social and economic networks of urban micro-entrepreneurs. My survey data suggests that mobile phones make a financial difference in the lives of users, and not simply by virtue of the ability of the mobile to compress time and space and bend local and non-local boundaries. As will be discussed, the *passe-partout* mobile phone is used to both intensify and extend local and non-local forms of communications within social networks. In so doing, users have been able to employ the mobile to sustain and create new pockets of entrepreneurship and special social ties, enabling users to piece together economic opportunities that would otherwise be impossible.

THE TELECOMMUNICATIONS SECTOR IN MOROCO

In the 1980s, facing negative balance of payments, severe budget deficits, and the burden of servicing international debt, Morocco subscribed to the World Bank and International Monetary Fund packages of structural adjustment policies, or the so-called "Washington Consensus" (see Williamson, 2000; Rodrik, 2006). This led to a fundamental shift from the state-based economy planning to a free-market strategy in which Morocco opened state-run monopolies to foreign competition. In the mid 1990s, there was also recognition of the importance of promoting production of high tech industries, given their potential to create wealth, jobs, and revenues for the state. The state revamped its tariff regime and established a new legal and administrative framework for rapid adoption of information technology. The Moroccan government has since that time increased investment and adopted policies favoring the use of mobile technologies such as wireless telephony, computers, and the internet to boost business, enhance connectivity and efficiency, reduce bureaucratic red tape, make government machinery transparent, accommodate the new international requirements of E-commerce with the European Community and other trading partners, and improve the population's economic and social standards of living.

No sector of the Moroccan economy has felt the force of these measures more than the telecommunications. In 1997, Morocco's Post Office and Telecommunication Act [*Loi sur la poste et les télécommunications*], or Law 24-96, was passed, allowing for a favorable legal framework and business climate for the liberalization and privatization of the telecommunication industry. As a result of this sweeping legal reforms, the old National Post Office and Telecommunication Agency (*Office National des Postes et des Télécommunications*, ONPT) was broken into two separate entities: a telecommunication entity called Maroc Télécom (Itissalat Al-Maghrib S.A.) and a postal-services entity called Poste Maroc (Barid Al-Maghrib)– and

creating an independent regulatory authority, the National Telecommunication Regulatory Agency (*agence nationale de réglementation des télécommunications*, ANRT). Under this new legislation, ANRT has been in charge of implementing telecommunication policy, administering the application of laws and regulations with respect to all those involved in the telecommunication sector and industry, and resolving conflict.

The liberalization and partial privatization of the telecommunication sector has had positive economic impacts. In 2000, The French media and telecommunication group, Vivendi Universal, paid US$ 2.4 billion for a 35 percent stake in Maroc Telecom, and was increased to 51 percent in 2004. The Médi Télécom consortium paid US$ 1.1 billion to acquire the second GSM license. These license sales were judged by market analysts, at the time, to be the most profitable transactions in the GSM markets ever in an emerging market. In 2007, the nation's third telecommunication company, Wana, a subsidiary of Omnium Nord Africain (ONA) which is a dominant and powerful private group in Morocco, entered the telecommunications market (Ilahiane; 2004; ITU, 2001).

Additionally, Morocco's political will and determination to harness the power of information technology for economic development was outlined in its national E-strategy, which was spearheaded by the Office of the Secretary of State to the Prime Minister responsible for Postal Services and Telecommunication and Information Technologies (*Secrétariat d'État auprès du Premier Ministre chargé de la poste et des technologies des télécommunications et de l'information*, SEPTI), with ambitious goals to insert the Moroccan economy into the information and knowledge society. The SEPTI, which replaced the Ministry of Posts and Telecommunication (*Ministère des postes et des télécommunications*) in 1998, is responsible for designing, developing, and implementing national policies on information and communication technologies (Hajji, 2001; Ibahrine, 2004).

Beyond simply awakening to the prospects of ICTs as an engine of economic growth, one of the most significant impacts of the changes in the Moroccan policy-making matrix of telecommunications deals with what in Morocco is known as "the new culture of the market." As one Moroccan telecommunications official put it, "By catering to the diverse needs of consumers, the new Telecom operators have been successful in fostering not only a culture of 'consumer is king', but also managed to smooth the transition to getting consumers used to the idea of new technological features and types of mobile technologies." Adoption rates of cell phones in Morocco, for instance, are pegged directly to the appearance of prepaid calling cards and plans. Even when they expire, these plans still allow customers to receive calls, providing a crucial bridge in service and marking an important business innovation in a culture once dominated by state-level bureaucracies.

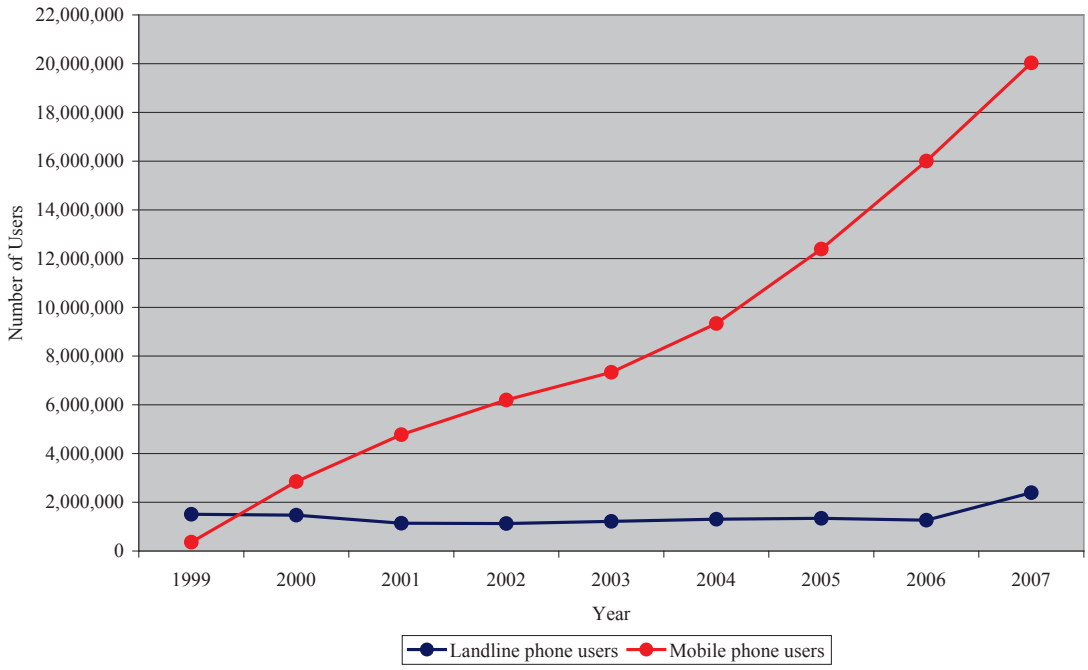
The success of telecommunication in Morocco owes something to the informal sector as well, particularly the informal markets or *Joutias* in promoting and making electronics goods available and accessible to consumers en masse. The *Joutia*, with its anchored shops and savvy footloose street venders of mobile phones trading in mostly smuggled and used electronics, for a very large number of Morocco's population remains the traditional place of buying and selling high tech goods. Here one can find just about any high tech product one needs, often available as soon as they are released in Europe or North America, at prices that attract not just farmers and skilled laborers (*hrayfiya*) but local doctors, professors, even government officials. The informal flow of electronics goods into the country was further fueled by an increasingly sophisticated clientele. An informal economy in information technology and communications has thus gained momentum in Morocco. Places such as the *Joutia*, and even more so Darb Ghallaf, in

Casablanca, have become renowned as places "where you can get anything that is anything. The latest technologies get to Casablanca before they hit the wider markets. It is the source of innovation." *Joutia* entrepreneurs have recognized that the artisans, peasants, plumbers, carpenters, maids, mechanics, and taxi drivers, most of these new beneficiaries of technologies with a minimal level of education and income, use the informals of *Joutia* as their "retail outlet" of choice (Ilahiane and Sherry, 2008).

The growth in the uptake of mobiles has exceeded even the most optimistic market projections, given that the country is classified as a low-income country, with an annual per capita income of US$1,200. Despite the recent surge in economic growth, poverty and literacy rates are still a cause for concern, and are mirrored in a low level of human development: in 2003 Morocco was 125th of the 177 countries classified according to the Human Development Index (HDI). Approximately 50.7 percent of adults aged 15 and above were illiterate in 2003. Women are particularly affected, with female illiteracy rate at 62 percent, and significantly higher in rural areas. Despite slight improvement in poverty reduction, about 20 percent of the total population remains under the absolute poverty line (about one dollar per day), with two-thirds found in rural areas (3.5 million, or more than 10 percent of the population). Moreover, according to the UNDP's Human Development Report (2003), about 55 percent of the rural population and 33 percent of the urban population were considered "economically vulnerable" in 2002. With an estimated population of 31 million, the country's economy remains dependant on rain, and adverse climatic conditions directly impact the level of rural poverty. Urban poverty is a direct consequence of unemployment, which is particularly high among the youth (up to 35.4 percent in 15-24 year olds in 2002). Such indicators of high unemployment, illiteracy, and poverty contribute to insecurity and instability in rural and urban areas (UNDP, 2003).

Morocco has 20.029 million mobile subscribers, up from 16.005 million at the end of 2006 and 2.550 million in 2000 (see Figure 1. Number of landline and mobile phone users in Morocco, 1999-2007). According to the figures from market regulator ANRT, mobile penetration has reached 65.66 percent of the population versus 53.54 percent a year ago. Out of the total mobile user base, only about 4 percent use postpaid services, while the rest are prepaid. While the number of mobiles has almost eclipsed landline accounts, the number of fixed-line users has grown to 2.394 million, up from 1.266 million at the end of 2006. By way of comparison, there are 520,080.00 internet users, equivalent to a penetration rate of 1.7 percent (ANRT, 2007).

Number of Landline and Mobile Phone Users in Morocco, 1999-2007



Source: Agence Nationale de Réglementation des Télécommunications (ANRT, 2007).

RESEARCH METHODS AND FINDINGS

This article draws on ethnographic research on mobile phone use and economic productivity among skilled and semi-skilled urban micro-entrepreneurs, centered in a shanty town in the city of Mohammadia near Casablanca. This study examines the way in which the mobile is put to economic use to create and augment business opportunities and social networks. It also investigates daily calling practices of users by analyzing incoming and outgoing logs of voice calls, the proportion of personal and business voice calls, and trends of landline phone usage. In addition to the ethnographic practice of participant observation, I conducted in the summer of 2003 structured interviews using a questionnaire format with 32 informal micro-entrepreneurs (in Moroccan Arabic they refer to themselves as *hrayfiya* or those who have a *harfa*, skill or trade) that include plumbers, carpenters, electricians, tile laying masters, maids, and skilled construction workers.

The questionnaire consists of four parts. The first part captures standard demographic and socio-economic characteristics of respondents (place of residence, household size, occupation, gender, age, marital status, years of education, and ethnicity). The second consists of a technology inventory of each respondent's communicative ecology (number of bicycles, number of mopeds, number of cars, number of radios, televisions, fax machines, satellite dishes, personal computers, access to the internet, mobile and landline phones, mobile phone fees, mobile phone brands, and name of mobile phone provider). The third section provides detailed information about the daily frequency of personal and business incoming and outgoing voice calls, the average annual income difference before and after the use of mobile phones, and the average

contribution of *bricolage* or freelance service activities to one's annual revenue. I also recorded the type of person, or the call-partner, with whom each communication was made (family, friend, neighbor, supplier, employer, employee, or business partner), the content of that call, and its place of origin. The fourth section deals with ethnographic questions and themes on users' perception of, and attitudes towards, the transformative qualities of the mobile phone and on stories about its economic multiplier effect and de-localization of business networks.

Using a snowballing technique to recruit respondents, my study involved 32 micro-entrepreneurs using mobile phones, with prepaid calling cards. First, while the snowballing technique is problematic in terms of sample selection and external validity of the study, I do not claim that this study sample is representative of the city's population or even that of Morocco. Second, given the non-existence of census data on the informal sector and its practitioners at the city level, snowballing seemed to be the appropriate way to conduct this study. Third, I am aware of the biased tendency of informants to know or point researchers in the direction of individuals like themselves. More importantly, I am more interested in understanding the setting and question in depth and from the point of view of informants than I am in knowing the distribution of variables across a population. Interviews were conducted in Moroccan Arabic and Berber during weekdays, except Sundays (considered by respondents as a day of rest), shopping in the *suq*, and playing soccer on the beach with fellow *hrayfiya*. Because of low levels of education and the tradition of voice in communication exchanges, short message system (SMS) or text messaging was not used, although most respondents talked about the use of beeping –calling and hanging up after the first ring- or, "pinching" in local parlance, their customers, employers, and suppliers (Donner, 2008).

Of the surveyed data, 78 percent of interviewees were males and 22 percent females, with a median age of 31 years. Most have been schooled in Quranic or in modern educational institutions: 12.5 percent are illiterate, 3.1 percent attended Quranic schools, 59.4 percent attended primary schools, 25 percent attended secondary school, and none attended postsecondary or university. The average years of education were 5.5. In terms of household conjugal status and size, 38 percent were married, 53 percent were single, and 9 percent were divorced, with an average of 3.5 persons per household. As for the ethnic composition of the survey, 75 percent were Arab and 25 percent were Berber. The occupational profiles of respondents included plumbers (21.9 percent), carpenters (9.4 percent), tile-laying masters (18.6 percent), skilled construction workers (12.4 percent), electricians (15.5 percent), and maids (21. 9 percent).

One of my key research interests was the way in which mobile technologies fit into an ecology of other modes and means of social contact and media use. This included identifying the presence of such alternative means. The mean number of bicycles per individual surveyed was 1.5, mopeds stood at 1.3, video players stood at 1.03, radios at 1.5, television sets at 1.25, and satellite dishes at 1.5. While ownership of traditional forms of mass media appears to be fairly ordinary, the average number of mobile phones per respondent is 1.3, and the number of mobile phones acquired over the last five years was 3.0. While none owns a personal computer and access to the Internet is insignificant, all respondents had mobile phones, and none had a complementary landline except one respondent who had a landline at work.

Survey evidence on usage patterns of mobile phones for personal and business calls shows a monthly mean of 38.06 personal calls and 102 business calls per respondent. The analysis also shows that respondents spend a monthly average of 130 Moroccan dirhams, or US$13, on prepaid calling cards, and about 77 Moroccan dirhams, or US$7, on public (*téléboutique*)

phones. While monthly incomes vary according to skill sets and seasonality, respondents spend on average about 4.8 percent of their monthly income on telecommunication fees, 3.8 percent on prepaid calling card and 1 percent on public phones.

Using self-report and recall techniques to understand the economic impact of the mobile phone on users' income and on shaping respondent social networks, I examined the best pre- and post-mobile average incomes in good years. The analysis, although limited by the lack of control groups (users who did not have mobiles and wage laborers who could not use them for *bricolage*) or triangulation by other measures, appears to indicate that mobile phone use has led to an increase of 56 percent in users' incomes.

MAKING SENSE OF THE EFFECTS OF MOBILE PHONE USAGE

What were the sources of this increase in income? As my analysis suggests, there are a number of contributing factors. In addition to the financially rewarding and lucrative *bricolage* jobs brought by the mobile, respondents recognized the significant economic contributions of the mobile to the bottom line of their business and also emphasized its "help" in expanding the size and scale of their operations. One plumber, for instance, said that "the mobile gets one out of his circle and into other circles."

Goodman (2005) argues that mobile phones in South Africa and Tanzania are being used more often to sustain existing and strong social ties, especially family, than for supporting or building weak ties. Donner (2006) reports that Rwandan micro-entrepreneurs use the mobile phone as a "job telephone" and as a tool to increase the frequency of their contacts with friends, family, and existing business contacts and to facilitate new contacts and leads with business partners, suppliers and customers. While there is a potential economic impact of the mobile phone, he points out that the device is mostly put to use within the immediate and inclusive networks. That seemed to hold true among my contacts, as illustrated in many stories from my contacts, and everyone had a story about how the phone is a means of staying in touch or *tawassul*, and this staying-in-touch or staying-in-communication is vital to knowing what is happening in the social and economic scenes. One electrician said, "When I met Youssef, we worked on a job together in Meknes [210 kilometers from Mohammadia]. He was a nice guy, but after the end of the job, the relationship was over. Now the phone allows us to keep in touch. I have him (meaning his number) in my phone, and he has me in his." Another plumber told me, "One week I had nothing to do. I called my friend in Fez. He knows I'm a good worker, he told me there is work."

At the same time, on the local level, the mobile phone appears to augment or thicken relationships with worker friends, or with their families. It provides an additional channel by which they extend relationships in time, refresh local or horizontal bonds, and it slows the decay rate of vertical and external bonds. This intensification seems to offer potential for productivity. Such intensification may ultimately depend on a mélange of place-based and interest-based networks– locations where the preparations for such intensification are made possible.

Consider the telling example of one plumber who also owns a plumbing store and is the only respondent in the surveyed sample with a landline phone subscription. This plumber exists at the hub of an entire network of carpenters, plumbers, electricians, masons, roofers, tile makers, maids, and others. The mobile phone, as per Townsend's insight, enables the plumber and his contacts to rapidly mobilize in response to a need or opportunity. Note, however, that the effectiveness of the mobile network rests on a somewhat more complex mix of placed-based and

interest-based interactions where the "work" of preparing this network of providers is carried out.

The plumber himself occupies a privileged position within the network by virtue of his modest physical store-front. It represents a known "first stop" for people who do not know where else to turn for help with their household building plans or improvement needs and plans. There are no Yellow Pages; people come to him. The plumber keeps and manages a directory, or *kunash*, listing names and mobile phone numbers of *hrayfiya* (skilled laborers). He is also able to tell customers seeking services about the location and the availability status of any of his associates; in a sense he is in the business of arranging and matchmaking service seekers with service providers. His store serves as a physical anchoring, a touch point into a trusted, accountable network of providers. The very presence of the store explicitly or inadvertently communicates to customers the plumber's willing accountability in this system of referrals. "Trust me," his store says, "I will find you the right person. And you know where to find me if he turns out bad."

The plumber's own network of relations, in turn, is built up through a cluster of place-based and interest-based interaction – the café, the soccer field, the mosque, job sites – where working relationships and bonds of trust are formed, where information about opportunities is exchanged, along with verbal banter and teasing, discussions about the relative merits of techniques and tools, and discussions about other workers and various clients. This cluster of networks provides a kind substrate on which the plumber and many members of his own social network, assemble and pursue the relations that govern their modest economic livelihood. In essence, these networks provide the location for the creation of the alternate forms of capital described above.

Putnam (2000) discusses the dimensions of social capital forms and builds on Gittel and Vidal's (1998) differentiation between bonding (or inclusive) and bridging (or exclusive). Putnam (2000, p. 13) argues that while bonding social capital shores up narrow and local interests, bridging social capital can result in extensive and broader forms of reciprocity and networking. To paraphrase Putnam, the *passe-partout* properties (i.e. time and space compression) of the mobile phone provide a "sociological WD-40" to recalibrate and align different yet complementary sources of employment such as shopkeepers, café shops, worker friends, and neighbors. Equally, Granovetter (1973) has argued that when seeking jobs or political allies, the "weak ties" that bind individuals to distant acquaintances that move in different circles are actually more valuable than the "strong ties" that link one to intimate friends or relatives who operate in the same social and economic niche. As a device used for the micro-management of time and the fostering of a "carpe diem" attitude towards manipulation of minute variations in different sites by the always- accessible-user, the mobile phone succeeds in reinforcing and speeding up hectic urban interactions, and at the same time, in fusing disjoint networks and activities into coherent and centralized sets of activities (Townsend, 2000). Seen through this lens, the mobile phone simultaneously bonds and bridges users along and across close and distant social and economic dimensions, and this is perhaps where the "secret" to its capabilities to blur and collate social and economic benefits dwell (see also Donner, 2009).

In contrast to such technological concepts as the virtual marketplace, the present example suggests that new technologies do not necessarily succeed by displacing other modes of contact. The plumber's modest storefront, now augmented with the cell phone, symbolizes the way that new technologies succeed by adding to existing systems and networks. The traditional means of connectivity such as bicycles, mopeds, and public transportation likewise contribute to the health of social networks, and are obviously all necessary for physically getting to job locations. The

mobile provides the plumber's customer an instant connection into a network of trusted and "vouched-for" contacts. For the plumber the mobile provides a chance to make another sale (he becomes the supplier to the contacted workman). The mobile also provides the opportunity to enhance his *social capital* – his prestige within the network and stronger reciprocal bonds with those whom he has referred. For the lucky recipient of the plumber's call, it provides a chance for much desired work. Mobile phones thus enhance, rather than displace, other places in the network, and the "work" of relationship building across these other places pays off with the phone call. The network of store front / work site / the mosque/ football pitch / café, and the work carried on at these places, is rendered more valuable by the presence of the mobile phone. As Harper (2003, p. 194) has cogently put it, "the mobile is a kind of *invigorating* of social relations," or as many respondents would say "weaves," existing social and geographical connections, "enabling the same social patterns that have been in existence for quite some time to evolve in small but socially significant ways" (Harper 2003, p. 187).

Bricolage

A consequence of this easier access to social networks is an enhanced ability to engage in what my contacts called *bricolage*, augmenting one's income by engaging in much more ad hoc, supplemental labor. The concept of *bricolage* is used in several disciplines and refers to the creative process and spontaneous action in which the *bricoleur* cobbles together a product from a mix of components that happen to be at hand – a type of mixing, matching, or tinkering with leftover fragments until the product is complete. According to Levi-Strauss, the *bricoleur* is a resourceful person who works with existing sets of materials and skills to create what might be useful in the context of a given problem, performs improvisation work within a closed and finite universe, and "makes do with whatever is at hand," regardless of their original purpose (1974, p. 16-17). Importantly, Levi-Strauss stresses that by repurposing materials and giving them new shapes and meanings, *bricolage* empowers those with limited skill sets and resources.

For the skilled laborers I observed and interviewed, *bricolage* jobs include emergency or routine home repairs and improvement, usually occurring after normal work hours. Such projects ranged considerably in scope, from fixing a leaking water pipe down the street, to installing water heaters, to major bathroom renovation projects. My survey data also demonstrates that *bricolage* or informal freelance service accounts for 31 percent of a respondent's monthly income. Consider, as another example, the telling and difficult situation of maids, many of whom live with their employers, some of whom find themselves in abusive situations. Several of my contacts who worked as maids reported that the mobile phone enabled them to get out of the home – at least virtually – by calling their parents and friends, something they could not previously do. Additionally, for many in my surveyed data the mobile enabled them to serve multiple households, allowing them to be more fluid in their location and engagement of work. Just like the semi-skilled laborers, the mobile allows them to do "*bricolage,*" that is, to take on moonlighting jobs to augment their income.

In using the mobile phone to capture *bricolage* work, micro-entrepreneurs appear to succeed in bringing together disjointed social ties, both local and extra-local relations, to pursue temporary income-generating opportunities. In leveraging social connections through improvisation and micro-coordination, *bricolage* provides a space for new uses of technology and applications to social contexts. By positioning the mobile phone to tap into social ties, micro-entrepreneurs have not only embarked upon innovative ways of putting technology to obtain flexible and casual work opportunities but have also begun to transform their revenue streams. In

other words, because of the unstable nature of the job market coupled with either weak or strong social ties in one's social networks of Moroccan society, the *bricoleur's* labor, which otherwise would appear only supplementary in economic terms, is actually transformative. In this case, it is transformative because the use of the mobile exploits the local and extra-local contexts and resources at hand (work ethics and reputation; family, friends, mosque, café, soccer field, construction sites, and stores), which are then converted into economic terms (see discussion of plumbing store owner above and the case of a tile-laying master below). In sum, mobile phone users appear to have skillfully tapped into and drawn out further the existing practices of *bricolage* in Morocco, and in the process have empowered themselves and transformed their livelihood strategies.

Quest for Employment and Entrepreneurial Instincts

When asked about reasons for the purchase a mobile phone, one carpenter looked at me for a minute, shook his head, and released a controlled and short laugh, only to declare in no uncertain terms, "The mobile is very important for the *hrayfiya* community in terms of communication inside and outside Mohammadia, you are here and there at the same time. The mobile brings work and moves you forward here or anywhere else where jobs are available; that is the secret of the mobile." One plumber simply said, "It is my lifeline to earning my bread and to keeping in touch with my family and friends here and in other places; in addition, you must get one as employers and potential employers always ask for a mobile phone number; with it I have increased my economic earnings," and continued, with a serious face and a question, "How many pillars are there in Islam?," I responded, "Five pillars." The five pillars of Islam refer to the obligatory duties that every Muslim must practice. They are *al-shahadah* (professing monotheism and accepting Prophet Mohammad as Allah's messenger and final prophet), *al-salat* (five daily prayers), *al-zakat* (alms-giving), *sawm* (fasting the month of Ramadan), and *al-haj* (pilgrimage to Makah for are able-bodied and can afford its cost). While the first four pillars are obligatory for every Muslim, the fifth pillar is optional and is a must for those who are healthy and financially secure. The plumber responded with poise, "Yes. There are five pillars, but the mobile phone is the sixth pillar of Islam. Now, you know the importance and meaning or *ma'na* of the mobile in our daily lives!"

What is poignant about this statement is the fact that the plumber considers having a mobile phone so meaningful as to view it as an additional pillar to the five pillars of Islam. The five pillars are mandatory rituals and duties (except for pilgrimage) and are not an employment means or a simple convenience; they are commandments that every Muslim must practice. One must profess *al-shahadah*, one must perform the five daily prayers, one must perform alms-giving, and one must fast the month of Ramadan. These are practices that define what it means to be Muslim. The sixth pillar, or the mobile phone, is metaphorically seen as an order or a must. The necessity of doing what it takes to acquire a mobile phone underscores the fact that one cannot go about his/her daily business and rituals without it; it is an obligatory duty that brings job opportunities/possibilities and anchors one's identity, just as the other five pillars of Islam bestow identity and meaning to one's life. In this sense, for the plumber, the mobile becomes both a significant article of faith and a vital and practical tool for employment opportunities.

Indeed, *hrayfiya* have exploited the coordination and organization capabilities of the mobile. Of the surveyed data, 25 percent of respondents have successfully harnessed the portability asset of the mobile and created micro-enterprises employing between 4 and 19 workers in and out of town. Based on this latter finding and adding to growing evidence which suggest that access to

telecommunications boosts incomes and creates economic opportunities (Jensen, 2007; Donner, 2006); I also found that in my survey one additional mobile phone appears to create about 8.62 jobs and travel an average distance of 405 kilometers.

One of the benefits of this is that it lowers the cost, or the risk, of finding work. Most respondents draw circles – increasingly large circles, to illustrate the "serious" economic benefits associated with the mobile. The mobile phone seems to have enlarged the radius of distance *hrayfiya* travel to find work or what I call spatial entrepreneurship. The mobile phone has enlarged the radius of distance these hrayfiya travel to find work. One plumber traveled from Mohammadia all the way to the city of Dakhla (2000 kilometers away) where a company had a contract to build schools. One of the employees who used to work for the company (a plumber), was let go, and the company said, "We'll call you if we need you." The person received the call, and called his plumber friend. The mobile has bought convenience for the worker and the hiring party. Both sides are incentivized. This is particularly important in places where these construction companies do not want to keep a regular workforce. It makes it easy for a company to keep a virtual workforce, saving them money. "I keep you in my range!" This little bit of connectivity appears to be driving major economic trends. It optimizes both the laborer's time and the hiring corporations because they have access to a more fluid and dynamic workforce.

Consider the situation of one tile-laying master. He is about 54 years old and has been in the tile-laying business for as long as he can remember. One of his dreams was to scale up his tile business operations and to "export" his skills outside of his native town, Mohammadia, where he can make more money. Although he tried to do so, many a time he failed; he blames his failures on time constraints and costs associated with transport, supervision efforts, and communication. Only with the emergence of the mobile phone could the tile master envisage the idea of working "here and there." With a mobile phone in hand, coupled with a long experience in tile work and a good reputation with people, the tile master finally became a contractor, and today has three work crews in multiple sites in Mohammadia and Rabat. The mobile phone appears to have enlarged the circle of opportunities for the tile-laying master and the mobile phone, in his opinion,

> It is like a saint to whom you go to solve your problems and concerns, and it works miracles for you. It is a blessing that I can sit here in Mohammadia and check on my associates and get information on their progress. There is nothing like it and the money is good. Before I only worked around here, now we are ready to go to your house (referring to the author) to put in some good Moroccan ceramic or tile if you wish.

The preceding sections explored the direct benefits of mobile phone ownership. All of the surveyed respondents, whether they liked or disliked mobile phones, stressed the importance of owning a mobile phone, and they also emphasized the fact that by the mere fact of having one, one has access to real and potential job opportunities. For these reasons, many respondents said that they did everything they could, even borrowing money they did not have from aunts or relatives and friends to buy a mobile phone. One might still ask the question: how does the mobile phone compare as an investment to other options?

Although the mobile phone has several mobility properties such as coordination and speeding up of economic activities with other traditional types of technology, mobile phone technology is different in many ways for various reasons (see Pelto, 1973). First, it appears that the mobile phone reverses the economic advantages associated with centralized technology ownership and

adoption. While the costs of owning a snowmobile or other form of transportation can be seen to have continuously risen, the direct costs of mobile phone ownership have decreased considerably, the result of the opening up of the Moroccan telecommunications markets discussed above, the appearance of prepaid usage options, user cost-reduction techniques (i.e., beeping), and the generally declining cost per capability ratio associated with electronic goods as exemplified in what has come to be known as "Moore's Law." As a result, both the initial capital investment and continued operation of mobile phones are well within reach of many people.

But, as mentioned, it is not simply the cost of investment that is at issue. A more important effect is at work here. With many technologies, the competitive advantage bestowed by an investment decreases as others in a system adopt a similar technology. A number of studies on the effects of the "Green Revolution" in Asia, for instance, suggest that large farmers with early access to Green Revolution technologies (improved seeds, farm mechanization, irrigation technology, and fertilizers, and so on), were able to outproduce and outcompete the non-adopters, in many cases driving out small farmers and tenants out of business and purchasing their land (Griffin, 1972 and 1974; Cleaver, 1972). New technology led to lower product prices, higher input prices, efforts by large-scale farmers to increase rents or force tenants off the land, and attempts by big operators to increase landholdings by purchasing small farms, thus resulting in rural landless and rural outmigration, mostly to periurban slums. These studies argued that the green revolution, although successful in terms of increasing food production and land areas utilizing the new technology, encouraged needless mechanization, creating a reduction in rural employment. The end product, they argue, was a quick increase in the inequality of income and asset distribution, and a worsening of poverty in areas affected by the Green Revolution technologies.

With information and communications technologies, something different occurs. In the case of ICTs, the value of the investment depends directly on the number of other users; as Ethernet inventor Robert Metcalfe observed in the early 1990s, the value of networks increases exponentially with the addition of new participants in a networked medium. The relative economic advantage of ownership actually increases as other participants in an economic system acquire the technology. With a slight twist on the debate on common resources use (Ostrom, 1990; Ilahiane, 1999) and "the tragedy of the commons" (Hardin, 1968), access and use of network does not lead to resource depletion or overuse, rather, the resource or the network is increased with each use, thus enabling users to reap the rewards of the network effects.

Another element to consider in comparing mobile phones to other potential technological investments is the fact that since its use still primarily involves human conversation, it is a tool of considerable "interpretive flexibility," allowing users to conduct many different types of transactions. Mobile phones enable users to obtain, exchange, and manipulate information. Increasingly, users are enabled by mobile phones to focus, search, and extract useful and up-to-date market information from social and business networks. Users are also able to make tentative decisions much more easily than before and are less constrained by time and place in doing this because they are always accessible and can give the order to "travel now!" or "hold on for later!" But, it should be noted, most of this happens via the wonderful plasticity of human conversation. This not only helps explain the advantage of the mobile phone when compared to, for instance, personal computers. It also suggests that newer technologies (e.g., smart phones with greater power to run numerous enterprise applications) may not be a natural "next step" for people who are not currently familiar with sophisticated business tools. While other uses – texting for funds

transferal, for instance – offer great promise, the phone's utility will always be anchored in its support of human conversation and actions.

CONCLUSION

In the above discussion I document the use and importance of mobile phones to micro-entrepreneurs and the self-employed in urban Morocco. I also demonstrate how the use of mobile phones for *bricolage* jobs begins to *transform*, rather than simply augment and reinforce, business operations and social relations. With respect to the rapid adoption of the mobile phone, I show that the combined strategies and opportunities of the telecom operators in terms of innovation and marketing strategies (pre-paid cards and caller-pays protocols) to accommodate the irregular and unpredictable cash of the poor, the use of the informal sector to purchase used and cheap mobile phone handsets, and users' agency in combining mobile use with fixed public telephony have resulted in higher penetration rates of mobile technology among the poor.

As a "bottoms up" tool that allows a more flexible, self-organizing approach to matching labor suppliers with work needs, the mobile phone stands as a rather different tool for development than top-down development programs or even many other more capital intensive technologies, such as personal transportation. Among my contacts the mobile enabled a greater degree of agency among individuals in identifying and capitalizing on work opportunities by enhancing their ability to both nurture and tap into social networks more fluidly. This reduces risks, enables *bricolage*, and enhances social standing for the skilled workers and maids I observed. And despite the observation that mobile phones offered differential benefits depending on one's location in a social network, most did not regard the mobile as exclusionary and divisive.

Many questions remain, of course. The interesting hints at differential benefits in this research suggest the need to further explore the role of the mobile phone in the economic lives of others, beyond the population of skilled laborers and maids. What is it about the economic circumstances of individuals in other studies, for example Horst and Miller's (2005) Jamaicans, that makes the mobile phone less of a tool for income enhancement – and how might these individuals compare to differently situated members of Moroccan society, such as the day laborers? With regards to the importance of social networks, it would be useful to understand more clearly not just how individual networks are built up, but also how boundaries within and between networks may emerge and persist. What are the limits to the size and composition of these networks, for instance? My own research has suggested that the networks energized by mobile phones depend at least partially on place-based interactions, and yet sometimes overcome the limitations of physical space, enabling workers to travel to far flung job sites. A tension seems to exist between place-based interactions, which deepen social relations, and place-independent interactions, which enable individual opportunities. Additional research might explore how people manage this tension, especially in places such as Mohammadia where it seems neglect of one's local network may pose greater individual economic risk.

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REFERENCES

Agence Nationale de Réglementation des Télécommunications (ANRT) (2007). Le Rapport Annuel 2007. http://www.anrt.ma/fr/admin/download/upload/file_fr1525.pdf . (Accessed July 28, 2008).

Aker, J. (2008). Does Digital Divide or Provide? The Impact of Cell Phones on Grain Markets in Niger. BREAD working paper. Harvard University: Center for International Development.

Aronson, S. (1971). The Sociology of the Telephone. International Journal of Comparative Sociology 12 (3): 153-167.

Ball, D. (1968). Toward a Sociology of the Telephones and Telephoners. In Sociology and Everyday Life. M. Truzzi, ed. Pp. 59-75. Englewood Cliffs, NJ: Prentice-Hall.

Boorstin, D. (1977). The American Democratic Experience. New York: Vintage Books.

Bowen, D., A. Green, and C. James (2008). Globalization, Mobile Phones and Forbidden Romance in Morocco. Journal of North African Studies 13 (2): 227-241.

Cleaver, M. (1972). The Contradictions of the Green Revolution. American Economic Review 62:177-88.

Donner, J. (2006). The Use of Mobile Phones by Microentrepreneurs in Kigali, Rwanda: Change to Social and Business Networks. Information Technologies and International *Development* 3 (2): 3-19.

_____. (2008). Research Approaches to Mobile Use in the Developing World: A Review of the Literature. The Information Society 24 (3): 140-159.

_____. (2009). Blurring Livelihoods and Lives: The Social Uses of Mobile Phones and Socioeconomic Development. Innovations (winter): 91-100.

Fisher, C. (1992). America Calling: A social History of the Telephone to 1940. Berkeley: University of California Press.

Gittel, R. and A. Vidal (1998). Community Organizing: Building Social Capital as a Development Strategy. Thousand Oaks, CA: Sage Publications, Inc.

Glotz, P., Bertchi, S. and Locke, C. Eds. (2005). Thumb Culture: The Meanings of Mobile Phones for Society. Bielefeld: Transcripts.

Goggin, G. (2006). Cell Phone Culture: Mobile Technology in Everyday Life. New York: Routledge.

Goodman, J. (2005). Linking Mobile Phone Ownership and Use to Social Capital in South Africa and Tanzania. http://www.vodafone.com/etc/medialib/attachments/cr_downloads.Par.78351.File.dat/GPP_SIM_paper_3.pdf. (Accessed July 9, 2008).

Granovetter, M. (1973). The Strength of Weak Ties. American Journal of Sociology 78 (6): 1360-1380.

Griffin, K. (1972). The Green Revolution: An Economic Analysis. Geneva: United Nations Research Institute for Social Development.

_____. (1974). The Political Economy of Agrarian Change. London: Macmillan.

Hajji, N. (2001). Insertion du Maroc dans la société de l'information et du savoir: pour une nouvelle vision. Casablanca: Afrique Orient.

Hardin, G. (1968). The Tragedy of the Commons. Science 162:1243-1248.

Horst, H., and D. Miller (2005). From Kinship to Link-up: Cell Phones and Social Networking in Jamaica. Current Anthropology 46 (5): 755-778.

Ibahrine, M. (2004). Towards a National Telecommunications Strategy in Morocco. First Monday 9 (1). http://firstmonday.org/issues/issue9_1/ibahrine/index.html

Ilahiane, H. (1999). Berber *Agdal* Institution: Indigenous Range Management in the Atlas Mountains. Ethnology 1: 21-45.

Ilahiane, H. and J. Sherry (2004). Mobile Phones, Globalization, and Productivity in Morocco. In Information Technology, Globalization, and the Future. Intel, Hillsboro, Oregon.

_____. (2008). Joutia: Street Vendor Entrepreneurship and the Informal Economy of Information and Communication Technologies in Morocco. Journal of North African Studies 13 (2): 243-255.

Ito, M., Okabe, D. and Matsuda, M. Eds. (2005). Personal, Portable, Pedestrian: Mobile Phones in Japanese Life. Cambridge, MA: MIT Press.

International Telecommunication Union (2001). Effective Regulation. Case Study: Morocco 2001. http://www.itu.int/osg/spu/casestudies/#regulation. (Accessed May 15, 2002).

_____. (2008). Online Statistics. http://www.itu.int/ITU-D/ICTEYE/Indicators/Indicators.aspx. (Accessed August 7, 2008).

Jensen, R. (2007). The Digital Provide: Information (Technology), Market Performance, and Welfare in the South Indian Fisheries Sector. The Quarterly Journal of Economics 122 (3): 879-924.

Katz, J., and S. Sugiyama (2005). Mobile Phones as Fashion Statements: The Co-creation of Mobile Communication's Public Meaning. In Mobile Communications: Re-negotiating the Social Sphere. R. Ling and P. Pedersen, eds. Pp. 63-81. London: Springer.

Kavoori, A., and N. Arceneaux (2006). The Cell Phone Reader: Essays in Social Transformation. New York: Peter Lang.

Levi-Strauss, C. (1974). The Savage Mind. Chicago: University of Chicago Press.

Ling, R., and P. Pedersen, eds. (2005). Mobile Communications: Re-negotiating the Social Sphere. London: Springer.

Ling, R. (2004). The Mobile Connection: The Cell Phone's Impact on Society. San Francisco, CA: Morgan Kaufmann.

_____. (2008). New Tech, New Ties: How Mobile Communication is Reshaping Social Cohesion. Cambridge, MA: MIT Press.

Maroon, B. (2006). Mobile Sociality in Urban Morocco. In The Cell Phone Reader: Essays in Social Transformation. A. Kavoori and N. Arceneaux, eds. Pp. 189-203. New York: Peter Lang.

Molony, T. (2008). Running Out of Credit: The Limitations of Mobile Telephony in a Tanzanian Agricultural Marketing System. Journal of African Studies 46 (4): 637-658.

Ostrom, E. (1990). Governing the Commons: The Evolution of Institutions for Collective Action. Cambridge: Cambridge University Press.

Pelto, P. (1973). The Snowmobile Revolution: Technology and Social Change in the Arctic. Menlo Park, CA: Cummings Publishing Corporation.

Pool, de Sola, I. Ed. (1977). The Social Impact of the Telephone. Cambridge, MA: MIT Press.

Putnam, R. (2000). Bowling Alone: The Collapse and Revival of American Community. New York: Simon & Schuster.

Rodrik, D. (2006). Goodbye Washington Consensus, Hello Washington Confusion? A Review of the World Bank's Economic Growth Reforms in the 1990s: Learning from a Decade of Reforms. Journal of Economic Literature XLIV: 973-987.

Samuel, J., N. Shah, and W. Hadingham (2005). Mobile Communications in South Africa, Tanzania, and Egypt: Results from Community and Business Surveys.

http://www.vodafone.com/etc/medialib/attachments/cr_downloads.Par.78351.File.dat/GPP_SIM_paper_3.pdf. (Accessed July 9, 2008).

Sherry, J. and T. Salvador (2001). Running and Grimacing: The struggle for balance in mobile work. In Wireless World: Social and Interactional Aspects of the Mobile Age. B. Brown, N. Green and R. Harper, eds. Pp. 108-120. London: Springer.

Sullivan, N. (2007). You Can Hear me Now: How Microloans and Cell Phones are Connecting the World's Poor to the Global Economy. New York: John Wiley & Sons, Inc.

Townsend, A. (2000). Life in the Real: Mobile Telephones and Urban Metabolism. *Journal of Urban Technology* 7 (2): 85-104.

United Nations Development Program (2003). Human Development Report. http://hdr.undp.org/en/reports/global/hdr2003/. (Accessed March 20, 2003).

Williamson, J. (2000). What the World Bank Should Think about the Washington Consensus? World Bank Research Observer 15 (2):251-264.