Internet use (and non-use) among urban microenterprises in the developing world: an update from India

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Abstract

This paper draws on interviews and observational visits with small businesses in urban India to explore the ways in which the internet is–and is not–used by small and informal businesses in the developing world.

These "microenterprises" with five or fewer employees face significant challenges to survival and growth. Among development practitioners and government policymakers, there is a great deal of enthusiasm surrounding the potential of Information and Communication Technologies (ICTs) to increase the productivity and vitality of the microenterprise segment. Yet many questions persist about precisely how and to what extent this group of firms could effectively use ICTs, particularly the internet.

The paper considers internet use against a broad context of other communication and information behaviors, including face-to-face interpersonal communication, traditional mass media use, and new mediated communication options, particularly mobile telephony. It argues that 'convergence' between the mobile telephone and the internet might be particularly relevant for this segment, many of whom have business needs that are better served by mobile phones rather than the PC-based internet.

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Introduction

Meet Praveen. Praveen runs a small woodcarving shop in Bangalore, India. With the help of two employees, he earns a little over $200 a month working on pieces for customers around the city. Praveen owns a mobile phone, but not a PC. Although he thinks he might like to use the internet to uncover new woodcarving designs, he hasn't made any efforts to investigate shared-access internet cafés, or to put aside money to purchase a computer of his own. This paper explores significance and value of PCs and the internet to small business owners like Praveen. For the better part of a decade, as internet use has spread throughout the developing world, there has been a drumbeat of hope that small and informal businesses will benefit from the internet, using it to join global and formal markets, to find new local customers, to increase productivity, to achieve differentiation, and ultimately to improve the livelihoods of the business people and employees involved. Expressing the mirror image of this hope, others are concerned that Praveen will choose not to (or will be frustrated in his attempts to) take advantage of PCs and the internet, falling victim instead to what many call the "digital divide" separating internet users from nonusers.

This paper draws on interviews and observational visits with small and informal businesses in urban Bangalore to revisit and reframe some of the issues around their internet and PC use. It does so against a broad context of other communication and information behaviors, including face-to-face interpersonal communication, traditional mass media use, and new mediated communication options, particularly mobile telephony.

The analysis has three primary components. First, it builds on previous work, particularly that of Richard Duncombe and Richard Heeks (1999; , 2001; , 2002), to identify distinct groups within the microenterprise sector. It identifies a range of needs and patterns of

information use, ranging from informal face-to-face interactions to complex information processing and storage activities. In doing so, it helps differentiate between those businesses that are more likely to take advantage of the internet, and those for whom the business-specific rationale for use is not very strong. Second, it introduces the mobile phone into the analysis, as both a complement to and, perhaps, as very strong substitute for the PC-based internet. Third, it considers the implications to microentrepreneurs of recent changes in the capabilities of the PC-based internet and of mobile phones

Though the first two components contain strong assertions about the relative utility of the internet and the mobile phone, the third component softens these assertions. On the one hand, the PC-based internet is offering increasingly informal, personalized, and intrinsic experiences to users. On the other hand, the mobile phone and the internet are converging. Mobile telephones are offering increasingly powerful information processing capabilities, previously available only on PCs—including access to the internet itself. For the most part, researchers have not considered The implications of either of these changes for small and informal businesses in the developing world.

Background

Two themes about microenterprises are relevant to this discussion. First, there are more microenterprises in the developing world then any other kind of non-farm business. In India, for example, there were at least 44 million non-agricultural unincorporated/proprietary enterprises in 1999. Of those, 36% were sole proprietorships, and 64% (roughly 29 million) had five or fewer employees (National Sample Survey Organization, 2000). These millions of enterprises are found in urban and rural areas alike, and include trading stalls and retail stores, small manufacturers, transport providers, and services such as tailors and plumbers. Some microenterprises are home-based, or have no fixed location, such as hawkers who sell their wares on the streets. Thus, the degree of permanence, productivity and formality varies considerably between microenterprises. Since barriers to starting these enterprises are generally low, households or individuals may engage in more than one microenterprise, or may use one to augment or temporarily replace wage salaries. Thus, even if it is not the primary engine of growth, the microenterprise sector is very important for broad-based economic development, and for basic household economic survival (Mead & Leidholm, 1998).

Second, among the economic development practitioners and government policymakers, there is enthusiasm surrounding the potential of information and communication technologies (ICTs) to increase the productivity and vitality of the microenterprise segment (Barton & Bear, 1999). Given the vast number of households involved in the segment, and given the seemingly intractable persistence of the poverty in which many of these households find themselves, this hope for a transformational power of ICT is understandable.[2] For example, stories abound of rural artisans (UNDP, 2005) or small manufacturers (Cloete, Courtney, & Fintz, 2002) using the internet to sell products to American suburbanites, and of farmers using text messages to check crop prices (King, 2004).

The challenge is to inform that enthusiasm with a sufficient level of research into the actual utilization of ICTs by small and informal businesses in the developing world. Though the benefits of ICTs to larger firms are fairly apparent, the question is more open with respect to "small and medium-size businesses" (SMEs). For example, some have questioned whether high expectations around e-commerce in the developing world adequately reflect the day-to-day challenges facing small firms (Humphrey, Mansell, Paré, & Schmitz., 2003). A growing number of studies are looking specifically at the ICT behaviors of SMEs (la Rovere, 1996; Lind, 2000; Matambalya & Wolf, 2001; Müller-Falcke, 2002; Stork, Esselaar, Ndiwalana, & Deen-Swarra, 2006). Müller-Falcke's (2002) study examines and models ICT utilization among small-scale Indian manufacturing firms. However, its sample draws on firms with an average of 28 employees, and finds, in 1999, PC users outnumbering mobile phone users. Fewer studies specifically address the smallest and most numerous businesses – microenterprises with five or fewer employees. Fewer still have been conducted recently enough to capture the recent uptake of mobile telephones by this segment.

Perhaps the best assessments of the ICT behaviors of microenterprises were conducted in Botswana by Richard Duncombe and Richard Heeks. Two elements of their work with SMEs (Duncombe, 2005; Duncombe & Heeks, 1999; , 2001) and microenterprises (Duncombe & Heeks, 2002) in Botswana are particularly helpful. First, the researchers stress that not all microenterprises use ICTs in the same way, nor to the same degree. In one paper (Duncombe & Heeks, 2001), they draw on Mead and Leidholm (1998) to distinguish between a few relatively scarce, 'entrepreneurial' firms and the more common form of enterprise,

[2] ICT use is not the only avenue the development community hopes to use to improve the microenterprise segment. Microfinance (Robinson, 2001), the provision of financial services to small businesses, and business development services (BDS) (Kapila & Mead, 2002), the provision of training and technical assistance, are also important development initiatives.

which is simply struggling to survive. Elsewhere (Duncombe, 2005; Duncombe & Heeks, 1999), they employ a simple grouping mechanism based on ICT use to delineate between non-ICT users, telephone-only users, and IT users of various intensities (non networked PC users through intensive UCT users).

Second, Duncombe and Heeks stress the utility of the telephone, relative to the internet. They argue that for most small firms, the costs of accessing the internet exceed the benefits. Instead, it is the telephone which is:

> …the information-related technology that has done the most to reduce costs, increase income and reduce uncertainty and risk. Phones support the current reality of informal information systems, they can help extend social and business networks, and they clearly substitute for journeys and, in some cases, for brokers, traders and other business intermediaries. They therefore work "with the grain" of informality yet at the same time help to eat into the problems of insularity that can run alongside. Phones also meet the priority information needs of this group of communication rather then processing of information. (Duncombe & Heeks, 1999, p. 18)

Having conducted their primary research in 1999, Duncombe and Heeks did not differentiate between landline and mobile telephony. Nor did they focus specifically on microenterprises, including SMEs in their sample. However, other more recent research has turned to mobile use by microentrepreneurs. Samuel, Shah, and Hadingham (2005) highlight the importance of mobiles to microenterprises in South Africa, Tanzania, and Egypt; roughly 60% of the microentrepreneurs surveyed in each country reported that the mobile had increased the profitability of the business. Previous work by this researcher in Rwanda indicates that microentrepreneurs use mobile phones both to intensify personal ties with friends and family, and to broaden instrumental business ties with new customers and suppliers (Donner, 2004, 2005c). Maloney (2005) studies ICT use by Tanzanian microentrepreneurs, finding more enthusiasm for the mobile telephone than for the internet, and tempering all assessments with a caution about the continued importance of the interpersonal, face-to-face interactions in building and maintaining trust between business traders. Jagun, Whalley, and Ackerman (2005) note potential problems with mobile use by microentrepreneurs, illustrating how unequal access among the Nigerian fabric weavers offers advantages to some users, and significant informational and competitive disadvantages to non-users.

It is against this background that we revisit ICT use by microenterprises, focusing in this case on small and informal businesses in urban Bangalore. With all the media attention given to the growth of its IT-enabled software and business process outsourcing industries, India's experiences symbolize the importance of ICTs to the developing world. However,

India remains a poor country, with the average GDP per head of only $728 (economist.com, 2006). Despite a population of nearly 1.1 billion people, India had only 6.9 million paying internet subscribers in the first quarter of 2006.Telephony is more widespread, driven by 50 million landlines and 90 million mobile lines, teledensity (the number of telephones per hundred people) now stands at 12.8 lines per 100 people. The most torrid growth is in mobile subscriptions, which grew by 73% between March 2005 and March 2006, contrasted with growth rates of 8.6% and 25% for landlines and internet connections, respectively (Telecom Regulatory Authority of India, 2006). Of course, connectivity in the rural areas remains scarce, but even in the cities, there are great discrepancies between the ICT-enabled growth happening in shiny office towers, and the rhythms of small and traditional businesses operating literally in their shadows. If anything, the exposure and utilization of ICTs by Bangalore's informal businesses should be higher than that of similar businesses elsewhere in India, or in countries with similar (low) GDPs per capita. Yet, as the results of this study make clear, many small businesses in urban Bangalore have more in common with the microenterprises in rural Botswana, Nigeria, or Tanzania than they do with larger firms in Bangalore: a few have the internet; most can not afford to access it; some have not even heard of it.

In order to capture and assess a wide range of ICT use scenarios, the paper takes a particularly broad view of the definition of “microentrepreneur” to include virtually all non-agricultural firms five or fewer employees, including small professional outfits and established businesses alongside the more archetypal street vendor or informal home-based cottage industry. Following Duncombe and Heeks, this research groups microenterprises according to current ICT use practices, ranging from non-use through intensive use. The discussion uses this categorization to amplify themes addressed by Molony, contrasting the use of mobile phones and internet-enabled PCs, and to consider the implications for microenterprises of two changes underway: the blurring of the personal/intrinsic and the business/instrumental on the internet, and the spread of the internet-enabled mobile phone.

Methods

The study draws on interviews and observational visits with 47 small and informal business owners in urban Bangalore. All were recruited by two trained research assistants fluent in Kannada, one of Bangalore's primary languages. The research assistants screened for employee size—all the businesses have less than five employees. They were also

instructed to seek out 1/3 retail, 1/3 manufacturing, and 1/3 service and other miscellaneous businesses. These proportions correspond roughly to the proportions of businesses with five or fewer employees as measured by national surveys (National Sample Survey Organization, 2000). However, there is no assurance that the businesses in the sample are representative of the distribution of businesses within Bangalore, across India, or certainly across the developing world as a whole. It is likely that they skew towards male-owned enterprises, and towards relatively established, prosperous, permanent, easily approachable businesses. Nonetheless, the sample businesses includes a wide range of vocations, from people who sit on the side of the street and sell betel leaves (plants used to wrap raw spices and chewing tobacco), through shop owners and small manufacturers, to high-income professionals, including an architect and a consultant. The respondents have a similar range of mediated communication technology behaviors, from no landline or mobile ownership at all, through PCs with broadband connections.

Interactions with each of the business consisted of a mix of structured, closed-end survey questions and open-ended, semi-structured interview questions. In addition, the research assistants used extensive photo documentation, taking pictures of every act of communication or information processing that they could find during their 2-4 hours with the business. This design follows a method of rapid and remote ethnography for working with low-income communities, as outlined by (Whitney & Kelkar, 2004). Analysis of the photo documents will appear in a separate paper. This paper draws mostly on the semi structured interview questions.

Two important caveats are both conceptual and operational. First, the research design does not make a strong distinction between internet use and PC use. Of course, there are PCs that do not have internet accounts enabled—in our sample, 2 of 5 home-based PCs and 3 of 11 work-based PCs lacked an internet connection. Follow-up studies should more carefully probe the practical and conceptual differences (beyond the obvious barriers of ISP cost and landline availability) between internet-enabled and stand-alone PCs to microenterprises. However, the interviews were structured around contrasting “mobile phones” and “PCs”—a distinction broad enough to be meaningful to a sample population ranging from savvy internet users to those who had not heard of the medium. Second, the research was not designed to directly explore “impacts” (changes to revenue, productivity, or costs) associated with PC and mobile use (see Stork, *et. al.* (2006) for this design). Instead, it focuses on current use patterns, and links these patterns to a broader background of non-mediated and routine information and communication behaviors.

Results

Drawing on Duncombe and Heeks (1999), table one divides respondents into three categories, according to their current levels of mediated communication usage. Fourteen respondents are classified as having virtually "no mediated communication", having indicated that they did not own a telephone of their own, either a landline or mobile, and did not in any way utilize PCs. A second group of seventeen respondents fall in a "telephony only" category. They own either a mobile phone or a landline, or both, but do not use PCs. The remaining sixteen respondents are classified as PC or internet users. The majority of these owned their own PC at home, at work, or in both locations, though a few used only public computers.

Table One: Three Categories of Mediated Communication Use

Non-Phone Owners	Telephony Only	PC / Internet Users
Retail stand: religious items Snack & cigarettes cart (2) Street hawker: betel leaves Hot breakfast stand Small dairy Cobbler Clothing ironer Bicycle repair Locksmiths (2) Gardener Auto-rickshaw driver Tool and knife sharpener	Convenience store Printing press Tailor Video CD rental Wholesale scrap dealer Real estate agent Mechanic Wood carver Rental of lighting & sound equipment Carpenter Transport / truck owner Contractor Manufacturer: seat covers Manufacturer: picture frames Manufacturer: food products (2) Manufacturer: bedding material	Retail stand: lemons* Retail shop: auto parts* Yoga instructor* Barber* Food caterer Playhome / day care Instrument repair, music instruction Architectural consultant Library Wholesale rice dealer Xerox shop Courier service Business consultant Manufacturer: food products Manufacturer: incense Manufacturer: packaging material * Shared PC/Kiosk only
Median… Age: 50 Number of Employees 0 Monthly Income (Rs): 4500 Education: Primary Percent literate: 57%	Median… Age: 36 Number of Employees 1 Monthly Income (Rs): 7000 Education: Secondary Percent literate: 94%	Median… Age: 38 Number of Employees 1.5 Monthly Income Rs: 19500 Education: University Percent literate: 94%

These classifications are rough, and by necessity reduce some of the complexity in ICT use. For example, some of the respondents in the "non-phone owning" group occasionally borrow mobiles or landlines from friends, or use public telephones. Similarly, there is a lot of variation between intensive PC-owning broadband subscribers, and the occasional visitor to an internet or game parlor. Nevertheless, these categories are broadly consistent, highlighting significant differences in ICT access and use.

"Non Phone Owners". Respondents in the non-phone-owning group were almost exclusively sole proprietors, with no employees at all. Monthly revenues were lowest of the three groups. They were the oldest, and were, by far, the least likely to have education beyond the primary level. Some mediated communication takes place. Most made occasional telephone calls from public booths (India, and Bangalore in particular, has a broadly accessible set of payphones). Payphones are never more than a short walk away in the urban areas. Even many rural villages have a shared landline telephone, thanks to aggressive rollout campaigns over the last couple of decades (Pitroda, 1993). Also, lest we forget an important and pervasive medium that far exceeds the reach of the internet, we must note that all but one of the entrepreneurs in this segment had a television at home.

Leaving aside revenue, physical barriers to PC use are quite clear. Of the fourteen participants in this group, only the urban dairy had anything resembling a truly fixed location. The snack carts and stands were portable, were locked up and removed in the evening (though the hot breakfast stand was in front of the proprietors' home). The cobbler works from a small canvas tent; the bicycle repairman works from a small toolbox. The gardener and the knife sharpener roam from house to house looking for work. The betel leaf salesman, the locksmiths, and the religious items saleswomen sit at the same places every day, selling their wares from a basket, box or tarp on the street. The auto-rickshaw driver is, of course, completely mobile. In most cases, reliable power was not available in the work setting. An important question, also asked about the domestic space by my colleague Nimmi Rangaswamy (2005) is, "where would the PC fit?" Many of these enterprises simply will not support a desktop PC; and, as Nimmi's work points out, their operators return back to homes that are not much bigger then the workspace they left—often one room.

Language skills are another impediment. Out of the 47 total interviews; eight were with people who could not read in any language. Of these eight illiterates, six are found in this non-mediated communication segment. Only one of the respondents in this group could read English, meaning any content intended to appeal to them would have to be in Kannada.

Barriers to mobile use also exist. Many (5 of 14) expressed frustration at the cost of mobiles and cited this as the reason they did not purchase one—this in a market where per-minute prepaid tariffs costs are among the lowest in the world, sometimes as low as 1.09 rupees a minute (roughly 2.5 US cents) (Telecom Regulatory Authority of India, 2006). Place constraints also present problems for landline ownership.

Yet, despite these barriers to PC and mobile use, the enterprises survive. This might be partially because their communication requirements are quite straightforward. In almost every case, customers simply drop by a certain location to transact with the business. Only the dairy has a scheduled set of pick-ups and drop-offs. (When the dairy owner needs to purchase supplies, he uses a public payphone to call ahead and make sure the feed for his cows is available). Their information processing needs are also straightforward; the dairy owner and the cobbler kept a log book related to their business, and one of the locksmiths kept a balance book from his bank. The rest transacted in exclusively cash and kept the figures in their heads. Some get by without wallets or a cash box, literally stashing the day's earnings underneath the edge of the tarp on which the goods were being sold. Needless to say, there is little interaction with the formal banking sector nor tax collector among this segment; only three of the fourteen had a bank account.

One could argue that many of these businesses would be stronger and more productive if they had access to a telephone, so that customers could call ahead, perhaps to check on whether the shoes were repaired, or to provide special instructions to the gardener, or to ask for an auto-rickshaw ride or a visit from the tool sharpener. Yet these enterprises have been around for a median of 20 years. So far, they have gotten by fine without mediated communication devices of their own.

"PC / Internet Users". At the other extreme of the spectrum are the users of PCs and the internet. This group of respondents is quite heterogeneous, ranging from occasional visitors to internet cafés, to intensive users with broadband access at both the home and the business. Indeed, Duncombe and Heeks (1999) separate SMEs in this category into two groups–non-networked and networked/intensive ICT users. Demographically, they strike a prosperous, educated, youthful profile that would be predicted by any reading of the diffusion of innovations (Rogers, 2003) or the digital divide (Dijk & Hacker, 2003; Norris, 2001; Rice & Katz, 2003) literatures.

Some are using the internet and their PCs to support relatively more complex businesses. The courier wants to use the internet to link up to online package tracking

systems. The manufacturer of packing material uses the internet to pay bills. The perfume manufacturer uses it to source raw material and contact dealers, as well to pay bills; the manufacturer of foodstuffs uses the internet to research new products; the musician uses his PC and broadband connection to record, play and share music. These behaviors reflect the more complex and formal communication and information needs of the businesses. However, instrumental business behaviors were not the only pattern we observed; three other issues are worth noting here.

First, some of the internet and PC users stressed more personal, less instrumental uses for the technology. The operator of the day-care center talked about using her husband's broadband-enabled computer to browse the internet and copy CDs. The Xerox shop owner and the librarian—both purveyors of information-related services—nevertheless stressed that the internet has more appeal to them for personal pursuits, rather than for their businesses. The librarian said that though they had a computer and dial-up connection, once their son moved away there was little call for it in their business, and that they rarely used it. He prefers to work without one. Similarly, the wholesale rice dealer was a little more ambivalent. He said that he “feels” like he should use the computer for business purposes, but says that so far he only uses it at home, for personal purposes.

Second, kiosk/café users (those without a PC of their own) have different orientations to the internet. For example, the barber visits internet cafés from time to time, to look for new hairstyles, thus illustrating that even a shared computer can provide some source of competitive advantage and differentiation to business users. The yoga instructor is also an active PC and internet user, using the café settings to compose articles on yoga, and to share them online with her friends and colleagues. Yet she prefers to have her own computer, and hopes that within a few months she will have the money saved to afford a system of her own. Most impressive, and perhaps strangest, is the story of the lemon salesperson. He spends his days in front of a Hindu temple, selling lemons to visitors, who use them as part of the religious ceremony. He is one of the eight illiterates I mentioned earlier in the article, but not one of the six in the non-phone-owning group. For, although he is illiterate, he spends time (and money!) in an internet café playing computer games. Though he says, “how to use the internet, is a mystery to me”, his story signals the appeal of personal/recreational uses for relative newcomers to the technology. This is simply extrapolation, but we might say that he has already taken the hardest step towards internet use, by simply walking in the door of the game café. Perhaps with the addition of an interface

that was more accessible to illiterate or semi-literate people (Medhi, Sagar, & Toyama, 2006) he could use internet for a broader set of pursuits beyond gaming.

Finally, it is interesting to note that not all those in the PC / internet segment had a mobile phone. Five of the seventeen were without a mobile, and one, the lemon salesperson mentioned in the last paragraph, did not have a phone at all.. The other four non-mobile owners each had a PC at home or work. The food caterer and the food (millet) manufacturer both expressed no desire to purchase a mobile phone. On the other hand, the musician, the day care operator, and the lemon seller are all already sharing mobile phones, or learning from friends and family, and are on the cusp of a becoming mobile phone owners themselves. Our sample is small, but these few cases do remind us that internet and PC use does not necessarily begin after mobile use (recall Müller-Falcke's (2002) work, mentioned earlier, which found that in 1999, more Indian manufacturing SMEs had PCs than mobiles). There are some parallels between migration from shared/kiosk PC use to PC ownership (as the yoga teacher intends), and migration from shared mobile use to mobile ownership. However, apart from the Grameen phone model (Bayes, 2001) shared mobiles have received only limited attention from researchers (Donner, 2005b; Molony, 2005; Samuel, Shah, & Hadingham, 2005; Sey, 2006), and there is much about the dynamic that needs to be explored.

"Telephony Only". For the purposes of this paper, the sixteen people who own a telephone, but are not computer users, are perhaps the most interesting category. Two respondents in this category own only landlines, eight own landlines and mobiles, and six use only mobiles.

The two non-mobile users held clear and divergent opinions on the device. The mechanic was intending to purchase one, since he had become frustrated by missing jobs when people call him and he is away from the landline. This is a classic statement of the reachability and "micro-coordination" afforded by the mobile (Ling & Haddon, 2003). The mechanic's desire to be reachable echoes that expressed by microentrepreneurs in Kigali, Rwanda, in an earlier study (Donner, 2005b). On the other hand, the printing press owner had no interest in mobiles; he explained to the research assistants that mobile phones can cause brain tumors.[3]

Most respondents in this category ran manufacturing or services enterprises. They were generally more prosperous than those in the non-phone-owning group. However, a few

[3] See (Burgess, 2004) for a discussion of the mobiles-and-health debate in the UK

were involved with surprisingly “information-intensive” initiatives: a CD rental shop, a real estate agent, and a printing press. Yet the printer was one of the most adamant about not wanting a computer. In any case, we can not uniformly attribute the lack of PC use to cost, or to physical space constraints. Unlike in the non-phone-owning communication group, in this group only the transport/truck driver lacked a physical space to conduct business. Similarly, only one respondent in this group mentioned the high cost of a computer. Instead, the most common explanation for non-PC use was more of a “shrug”. Half the respondents asserted, with varying degrees of certainty, that the internet and PCs were simply not relevant or not useful to their businesses. They could see no purpose as to why they would use such a thing.

Another common reason for non-use of PC/internet was a lack of familiarity with the device. Five individuals said that they did not have the time or the opportunity to learn. To say this segment works hard is an understatement: participants report getting up with the sun, and working far into the evening. Most work six days a week; some work seven.

Of the sixteen people in this group, four were mildly positive about using the internet. Two expressed hope that their children would use PCs in the future. Another two, the mechanic and the real estate agent, said they intended to learn PCs themselves.

It is important to note that two of the users (the carpenter and the scrap dealer) had not heard of the internet; the research assistant had to explain the concept to them. These individuals do not live in rural areas; and were not without electronic equipment. They owned televisions, like everyone else in this group, and both of them owned a mobile telephone. Thus, in Bangalore, in the shadow of the IT industry, there are still people who are a long way from walking into a kiosk and sitting down in front of the PC.

The scrap dealer's lack of exposure and awareness to the internet is particularly interesting. The storefront next door to his (rented) shop had failed before he opened his scrap business. However, the signs remain: "cyber corner"! Even more curious is the fact that there is already a black-and-white PC monitor in the scrap shop. He had received the monitor one day, as part of the normal exchange of scrap coming in and out of the shop. He found it still worked, so he hung it from the rafters inside the shop, adding an external tuner and antenna. To control his new "television", he rigged up a remote control out of a fan thermostat. Now, he and a crowd of friends and neighborhood kids happily watch cricket most days when there is a match.

Discussion

How should we interpret the differences in ICT needs and behaviors among there groups? The discussion has three themes, focusing on internet adoption (and non-adoption), on mobiles versus the internet, and on the implications of "internet convergences".

On Internet Adoption. We might decide to explore how to help these microentrepreneurs become active computer users. In doing so, we would probably draw on the long and storied history of the diffusion of innovations paradigm (Rogers, 2003), perhaps explicitly and systematically assessing the internet's trialability, relative advantage, affordability, and alignment with microentrepreneurs' existing behaviors. Or we might further pursue the categorization of microenterprises undertaken here, re-defining some as "early adopters", some as the majority, and some, particularly those in the non-phone-owning communication group, as "laggards". Or, we might focus on one topic, such as computer literacy, or "distance to telecenters" as a key barrier or driver of "adoption". "Adoption", as a concept, continues to command significant attention from the research community and industry alike. However, when it comes to the microenterprise segment, our focus on adoption would be bolstered if we had more demonstrable evidence that PC and internet use would add to the productivity of these particular businesses. This small study does not directly address the prospect of productivity gains or a financial return on investment. However, the profiles of Bangalore's smallest businesses—the sole proprietors who sell lemons in front of the temple, or fix bicycle tubes on the street—should give pause to those who might think that the internet is immediately useful to all business ventures. Many of the microenterprises in the "non-phone-owning" and "telephony only" groups have little need for

information search, document creation, or information storage/processing which could be performed using a PC or the internet.

Of course, the discussion within the ICT for Development field is not focused exclusively on productivity. Others stress that microentrepreneurs, like most people, might benefit from the internet's capability to support adult and childhood education. They might remind us that the internet could provide health information, could allow the participation in civic affairs, couple support long-distance ties to allow families to form an economic diaspora of overseas workers, or could simply help people to feel more confident and efficacious in their daily life. Each of these assertions gives us hope, and each helps fuel the excitement about the spread of the medium (which I personally share)–but none makes the case *specifically* for microenterprises, and thus the immediate economic case for many microenterprises remains as elusive today as when Duncombe and Heeks did their assessment in Botswana.

On mobiles versus the internet. As we transition to discussion of telephony, and mobiles in particular, we see more businesses where there is a rationale for adoption. Indeed, there are enterprises in the ”telephony only” which would probably be in the non-phone-owning communication group were it not for the availability and affordability of the mobile telephone. As Hamilton (2003) has demonstrated, for many people facing economic constraint, the mobile is a substitute for the landline. For those with the wherewithal, like the mechanic who is sick of missing calls while he is away from the landline, the mobile is a complement.

For this set of enterprises, the more subtle dynamic is the choices between the telephone and the internet. Some of enterprises in the middle category in this study keep financial records, maintain an inventory, issue receipts, and look for information learn about new products. Many even advertise. Yet none of these actions on their own seem to have difficult enough, in the short run, to merit investment in a PC or even a trip to an internet café. Instead, it is the telephone, and particularly the mobile, which, as others (Molony, 2005) have asserted, serves as the primary tool for mediated communication. In his study of three groups of Tanzanian microenterprises (foodstuffs, construction, and handicrafts), Molony found almost no internet use outside of the more formal, cosmopolitan handicraft exporters. Indeed, he found that the utility of both the internet the mobile phone was dwarfed by that of “traditional” face to face, direct communication. By extending our sample to include small

professional firms and service providers, we found more examples of internet use than Molony–but proportionally speaking, these internet users remain scarce.

Of course, the PC and the mobile are not as functionally equivalent as the mobile and the landline. There are trade-offs; ones which, given the informal information and communication needs of many microenterprises, tend to favor the mobile. Leaving cost aside, the PC is more complex. The PC is harder to maintain. It demands more power. Meanwhile, the mobile phone gets a little bit cheaper and a little more powerful each day.

Nor are the PC and the mobile symbolic equivalents. Slater and Kwami (2005) discuss the perceived and actual differences between internet and mobile use among a broad sector of users in Ghana (though not all were microenterprises). They found that whereas the internet was distant, used for over-the-horizon communication, particularly in an economic "fantasy" chatting mode with foreigners, mobiles were personal, intimate, and everyday, and were used to maintain dynamic social and economic networks. Though we did not probe the symbolic and intrinsic merits of the mobile versus the internet in this study, we suspect that respondents in both the telephone and PC-using categories might echo these points.

On convergence – softening the last two assertions. A summary of the paper so far might read that "while the internet is not helpful to all microenterprises, mobiles seem to be quite helpful". Yet it is premature to stop the paper here. Two transformations are underway. The internet itself is changing, and the "mobile internet" continues to spread. Each might significantly change the ICT landscape for microentrepreneurs in the developing world.

The information needs of most microenterprises have changed very little since Duncombe and Heeks completed their Botswana studies. As we have seen in the profiles, the majority of microenterprises still rely on the local and informal (many have been around a lot longer than seven years). On the other hand, the internet itself has not stopped evolving. From the perspective of Indian microenterprises, the most salient changes are probably cost and accessibility. ISP tariffs in India continue to fall, and a thriving used and low-cost PC market has emerged. Pervasiveness may also be important. As we mentioned above, internet use is growing in India, though not as quickly as mobile use. As network models of the diffusion of innovations make clear, peers' adoption of a technology increases the likelihood that one will adopt (Rogers, 2003; Valente, 1995)—if a carpenter or truck transport owner sees his friends or customers using the internet, he is more likely to do so himself.

However, these questions of cost and pervasiveness are the stuff of diffusion, and while they are undoubtedly important, we know roughly how this story goes—in the direction of more widespread adoption of each technology. What is more interesting for this particular paper, and for the theme of the conference, is that the medium itself is changing. As the participatory, collaborative, personalized "web 2.0" develops (O'Reilly, 2005), it is increasingly difficult to describe the internet as exclusively a resource for business-specific, instrumental, "formal" information. (Indeed, perhaps no-one does this, outside of those in the ICT for Development and digital divide dialogues). The internet remains a great place to gather information about competitors, find new products, communicate with customers via email, order supplies, advertise, and to conduct a myriad of other "formal" business process. In fact, these functions are spreading now to the developing world, as a range of factors such as multilingual websites, increasingly reliable connectivity, revised e-commerce regulations, and a growing density of users make internet-enabled businesses more realistic. And yet, the internet is also becoming a better place for sharing photographs, keeping a blog, checking cricket scores, browsing personal ads, finding music, and talking with friends and family in real-time or asynchronous chats combining text, voice, images, and video.

As the personal and entertainment functions of the internet continue to improve, they are likely to increase the appeal and utility of the medium to some microentrepreneurs currently in the "telephony only" group. Recall that many of the PC / internet users in this study were already doing so for personal reasons. There are at least two implications of this draw. The first is the notion of sequencing–that if we are interested in encouraging business-related internet use (in alignment with ICT for Development approaches), we might do so by introducing users first to the personal functions of the web, instead of jumping directly to business-related information searchers or ecommerce applications. Even the illiterate lemon seller will sit in front of a PC to play a game. Earlier, the paper mentioned the rice wholesaler, who felt a twinge of guilt about using the internet at home for personal reasons. The implication of this draw of the personal is that this guilt is misplaced.

The second is that, functionally, the line between the personal and the business life of a microentrepreneur is blurry indeed. Nearly one third of microenterprises in India are based in the home (National Sample Survey Organization, 2000); others have no fixed business location, many will not have separate financial accounts for home and business. All spend an enormous part of their day worried about their livelihood (revenues) and expenditures and debts–even when they are at home or at rest. This blurring spills over into ICT behaviors. For example, in an earlier study of microentrepreneurs in Kigali, Rwanda, we found that roughly

two thirds of calls (most made during the day, from the workplace) are with friends and family, rather than with customers and suppliers (Donner, 2005a). This blurring will occur among microentrepreneurs using the PC and internet, as well. Many will use the same PC for personal and business functions.

Yet at the same time that the internet is becoming more intimate and personal, the little intimate mobile is getting "smarter"—better at instrumental and business functions. Many handsets sold in India support non-voice and SMS functions like photographs, calendars, and address books. In some cases, the convergence between the internet and the mobile is even more apparent–with GPRS or other data-enabled phones allowing direct access to the internet and the World Wide Web. All allow users to access a wide range of services via SMS, including some experiments with micro-payment bank transactions. Thus, as the mobile is increasingly able to serve as a substitute for the internet across an increasingly broad range of simple business (and personal) activities, its widespread adoption has important implications for how microenterprises will elect to use mediated communication technologies, and for the designers, industry providers, development agencies, and regulatory parties who wish to reach them. Currently, internet-enabled smart phones are more likely to be offered to high-revenue generating users such as traveling business professionals, but over time if the costs of such handsets (and of prepaid or postpaid mobile data access plans) continue to fall, there is likely to be increasing interest in smarter phones among some microentrepreneurs. It is possible (but by no means certain) that for microentrepreneurs currently in the "telephony only" group, the process of replacing a relatively simple mobile phone with an internet-enabled phone will be more consistent with their existing mediated communication behaviors (and easier and more appealing), than the process of purchasing a standalone PC. A better analog to the behaviors of microentrepreneurs in the developing world might be found in the behaviors of Japanese users, many of whom access the internet exclusively through their mobile handsets, eschewing PC ownership altogether (Ishii, 2004).

Conclusion

The research presented here was not designed to plumb every factor of adoption or non-adoption from a "diffusion" perspective; nor did it explore the impacts of mobile, PC, or internet use on the livelihoods of microenterprises. Other initiatives should return to this population to address those questions. Instead, this research was designed to illustrate the

complexity of the microenterprise segment, and raise some questions about the relative appeal of mobile telephones versus the internet, as traditionally accessed via a standalone PC. Though focused on a different continent, and on urban rather than rural populations, the results of the research are largely consistent with the overall assessments of Duncombe and Heeks. In addition, we have considered the particular appeal of the mobile phone, which was not present in the Duncombe and Heeks studies.

If anything, the introduction of the mobile has further divided the microenterprise segments into PC users and non-users. It has made the move from the non-phone-owning to the telephone-only category easier; over time, phone ownership will continue to expand to include more of the smallest businesses with no fixed address or place for a landline phone. At the same time, despite dropping costs and greater range of content, the mobile's increased processing powers will likely serve to reduce the relative appeal of the PC-based internet.

Nevertheless, there is excitement among all three categories of ICT users. There is great appeal in the idea of the picture framer or the barber, going online for the first time to find new ideas for their businesses. Similarly, everyday, more people, like to yoga instructor, are buying computers of their own and leaving the kiosks behind.

That said, we should be equally excited for those users, like Praveen the wood carver, who have found their mediated communication needs well fulfilled by a mobile phone. By the time Praveen, the transport/truck owner, the contractor, or the seat cover manufacturer decided to upgrade their mobiles, they might find that its replacement comes with email or a web browser. Some might only use the new functionality to look at cricket clips, others might begin exchanging emails with customers, or use a formal online banking service.

Among the non-ICT users, those with the fewest resources, we will continue to see the telephone adoption in the form of a mobile phone. This research is another reminder of how much of a difference basic voice connectivity can make to a business, and to recall the phone's basic value. Thus, we can conclude with a picture of the knife sharpener, walking away from the interview, with a heavy grinding stone on his back, in search of another customer. It would literally take

a load off his back if he could sit and wait for the customers to contact him. The mobile phone will allow him to do it. There is no word yet on whether the knife sharpener has purchased a phone. However, since we conducted interviews in June 2006, the gardener from the non-phone-owning group has purchased his first mobile phone. Perhaps he too will use the mobile to increase his productivity, reduce travel, and to find new customers. Chances are that for the time being, the voice calls he makes will remain the most important mediated communication activities for his business.

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