

**THE ECONOMIC IMPACT OF INFORMATION AND COMMUNICATION
TECHNOLOGIES (ICTs) ON MICROENTERPRISES IN THE CONTEXT OF
DEVELOPMENT¹**

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ABSTRACT

This paper investigates the impact of information and communication technologies, especially landline and mobile phones, computers, and Internet cafés in facilitating economic growth in the developing world. Data on access to ICTs, as well as business-relevant behaviors and attitudes, was collected by a multi-stage probability sample of women microentrepreneurs in Mumbai, India. Main findings include evidence that in urban microenterprises owned by women, business growth is a function of ICT access and is related to motivation to use ICTs for business purposes; and that the more positive a woman microentrepreneur feels about her status and power because of her business, the more she will be motivated to use ICTs in support of her business. Implications for the study of digital divides and strategies for studies of communication and technology more generally are considered.

1. BACKGROUND INFORMATION

As the most rapidly diffused information and communication technology (ICT) in history, the mobile phone has justifiably been singled out for substantial research attention (Castells et al., 2007; Katz, 2008; Ling and Donner, 2009). Significant effort has gone into examining the social, political, and cultural impact of mobiles. But until quite recently, the changes in social interaction brought about by mobiles have been largely limited to studies in wealthy, industrialized nations. There is, however, a small but expanding literature that focuses on the impact of mobiles, and indeed, all ICTs, in economically poor, developing nations.

Indeed, the role of ICTs as a facilitator of development in the world's poorest nations has become a well-established maxim of scholarly and public discourse. International organizations (International Telecommunication Union, 2009; United Nations, 2009; World Bank, 2009), governments (e.g., Republic of Rwanda, 2004; Government of India, 2004; Jamaica Ministry of Industry, Technology, Energy and Commerce, 2007), and even the news media (Agence France-Press, 2009; The Economist, 2009; The New York Times, 2009) now take it as an article of faith that ICTs, especially mobile phones, can be significant enablers of positive change in the developing world.

However, robust evidence in support of that upbeat perspective still remains in short supply (Donner, 2008). This article presents an attempt to add to our understanding of how ICTs do and do not facilitate economic development. We will examine four communication technologies: landline and mobile phones, computers and Internet cafés. We will report findings about these four communication technologies because we believe that a more complete understanding of the impact of ICTs might be achieved by taking a more holistic look at an individual's communication repertoires. This perspective is supported by empirical

work which shows that poor persons often use more than one communication technology in pursuit of their occupational roles (see, for example, Qiu, 2009). How and why individuals choose among available technologies is undoubtedly influenced by extant infrastructures, specific communication needs, and characteristics of the individual.

We seek to learn more about the consequences of communication technologies in the context of a specific economic formation – urban microenterprises owned by women in the developing world. We chose microenterprises as our research site because microenterprises are the major source of income, jobs, manufacturing, and services in developing economies (Liedholm, 2001; Nichter and Goldmark, 2005). Micro-entrepreneurs make a wide range of goods in small workshops, engage in trading and retail activities, and provide services ranging from motorcycle repair to medical care. Because of their ubiquity and potential as a path toward poverty alleviation, microenterprises have long been of interest to the development community.

In this article, we focus on microenterprises located in cities, first, because urban microenterprises have an almost 25 percent greater chance than similar rural businesses of surviving beyond their first year (Mead and Liedholm, 1998); and second, with regard to the availability of mobile phones and other ICTs, it is clear that the ICTs have been rolled out earlier and with higher subsequent penetration in the urban areas than in the countryside of developing nations (Galperin, 2005; Castells et al., 2007). Moreover, since studies of ICTs and micro-enterprises have most often been based on fieldwork in rural settings (e.g., Duncombe and Heeks, 2002; Galperin, 2005; Konstadakopulos, 2005; Jensen, 2007) or are case studies (e.g., United Nations Development Programme, 2005; Jagun et al., 2007) or report findings from small, non-random samples (e.g. Donner, 2006; Molony, 2006), our research will fill a gap in the literature by studying a relatively large number of urban microenterprises and their owners, selected by random sampling.

Finally, our choice of women microentrepreneurs as subjects of research comes from a sense that increasingly available communication technologies might have a powerful effect in altering the often marginalized position of women in business and society (Gurumurthy, 2003; Huyer, 2005). By studying women microentrepreneurs, we anticipate that our research might provide some insights into the efficacy of ICTs in bridging digital divides more generally. We recognize that in attempting to understand digital divides it is no longer adequate to investigate only physical or material access (Hargittai, 2008). Other factors, including social and psychological variables also must be examined. In our judgment, the realm of women microentrepreneurs might prove to be a fruitful site for interrogating those variables.

2. LITERATURE REVIEW

All definitions of microenterprise start by locating microenterprises in the “informal sector” of developing economies—the economic sector where very small businesses go unregulated, unlicensed, and often untaxed (Portes and Haller, 2005). The economics literature has examined the relationship between informality and business growth among microenterprises. Some scholars suggest that informal enterprises are actually or potentially very productive, but are kept from exercising that productivity because of unfair taxes, burdensome government regulations, and limited access to capital (de Soto, 1989). If these barriers to becoming more formal are eased, then microenterprises are more likely to register, borrow, and, due to the benefits of a more official status, grow and generate economic development (United Nations, 2008).

By contrast, other economists present a more pessimistic view of microenterprises and their owners. Farrell (2004), for example, argues that microenterprises must stay small and hence unproductive in order to avoid detection by governments, while La Porta and Shleifer

(2008) report data from a 27-nation survey showing that few unregistered microenterprises ever move from the informal sector to the formal sector. Rauch (1991) maintains that microenterprises are additionally handicapped because less entrepreneurially talented workers tend to find jobs in the informal sector, while workers with greater human capital are more likely to migrate to better paying jobs in the formal sector. Finally, whether the economic benefits of informality are an impediment or an incentive for increased productivity and growth might be country-specific and depend on the relative enforcement of laws and government provision of services (Gelb et al., 2009).

In operational terms, microenterprises are most often defined by their number of hired workers. However, the line between microenterprises and small or medium businesses varies from study to study, with various researchers setting the upper bound for a microenterprise at five, ten, or higher numbers of hired workers (for various thresholds, see Donner, 2007; Duncombe and Heeks, 2002; Jagun et al., 2007). This inconsistency makes it difficult to aggregate findings and to reach more general conclusions about the relationship between microenterprises and ICTs.

Regardless of inconsistent operational definitions, several studies lay out their definitions of micro and small enterprises only to conflate micro and small businesses when data about ICT use is presented (Moyi, 2003; Opiyo and K'Akumu, 2006; Frempong, 2007). Further, although these three studies do present findings on how businesses in the micro and small enterprise (MSE) sector use a full repertory of ICTs (i.e., landline, mobile, computer, etc.), none includes specific evidence regarding the impact of communication technologies on MSE revenues. One study (Esselaar et al., 2007) does report that ICTs contribute positively to revenue generation; however, again the data mixes micro and small businesses.

Turning to research exclusively on mobile phones and microenterprises, some scholars (Souter et al., 2005; Donner, 2006; Rufaro et al., 2008) have researched the smallest microenterprises and generally conclude that (1) microentrepreneurs are more likely to use their mobile phones for personal rather than business communication and (2) that face-to-face communication is perceived to be more important than mobile phone use in building business contacts or increasing customer base.

Studies of computer use by microenterprises and their owners are also relatively few in number (Donner and Escobari, 2009) and reflect the lower levels of computer and broadband penetration in the developing world (World Economic Forum, 2009; World Bank, 2009). Moreover, studies that demonstrate a significant or even a limited positive effect of mobiles on microenterprise profitability are relatively scarce (see, for example, Souter, 2005; Kantor, 2005; Jensen, 2007; Esselaar et al., 2008; Aker, 2008). Furthermore, only Kantor and Esselaar et al. investigated microenterprises in an urban setting, which is the research site of our investigation.

Across both pioneering and recent studies, there is, however, a consensus that proprietors of micro or small businesses believe computers to be less important for their work than the fixed-line telephone (Duncombe and Heeks, 1999) or the mobile phone (Molony, 2006; Donner, 2006; Esselaar et al., 2007). However, the existing literature offers no systematic insights into the impact of computer use regardless of whether the computer is located in the work place, at home, or in an Internet café.

Although there is no reliable count of Internet cafés either globally or in specific nations, Internet cafés are thought to hold significant development potential, particularly in urban settings, where they might provide inexpensive Internet access to people without computers and broadband access (Haseloff, 2005; Hobbs and Bristow, 2007). Limited research, mostly ethnographic, suggests that the overwhelming majority of Internet café patrons are young men who buy computer time for gaming, online chats, viewing pornography, and seeking information about jobs and educational opportunities (Chawla and

Behl, 2006; Rangaswamy, 2007). These studies also report some limited use of Internet cafés for business purposes, although the evidence is often anecdotal.

The research literature that speaks explicitly to the possible positive economic impact of ICTs on microenterprises owned by women is sparse and scattered. Recent examples include Aminuzzaman et al., 2003; Kantor, 2005; Prasad and Sreedevi, 2007; Buskens and Webb, 2009). One case study (Guihuan, 2005) does however provide some support to the direct impact argument that women benefit from the ICT usage. Moreover, the more general literature about women and ICTs suggests that ICTs may have an empowering function for women users, improving their sense of agency and control, increasing self-esteem and self-confidence, and improving power relationships (Slater and Tacchi, 2005; Huyer, 2005; Garrido and Roman, 2006; Maier and Nair-Reichert, 2007).

Finally, regarding the literature on digital divides, pioneering work in the 1990s into the differential diffusion of computers and Internet access has now moved, first, into more nuanced conceptualizations of the term “digital divide” itself (Warschauer, 2004; Van Dijk, 2005) and second, into studies of the digital divide in a broad range of ICTs and communication settings. For an overview of this recent research, see Best and Kenny (2009).

While retaining physical or material access to ICTs as a fundamental measure of any digital divide, and Van Dijk (2006) suggests, for example, that “motivational access” is prior to physical access and that the desire to engage with communication technologies grows out of social, psychological, and cultural factors. Although the terminology employed may differ, sometimes in significant ways, most conceptualizations also include a focus on human capital such as education, traditional literacy, and digital skills (i.e., the capacity to effectively operate various ICTs). In addition, more fully conceptualized discussions about digital divides also point to demographic factors such as social class, age, gender, or ethnicity as impediments or expeditors of effective ICT use (Gurstein, 2003; Gurumurthy, 2004).

3. RESEARCH QUESTIONS AND HYPOTHESES

Based on our literature review, we propose the following research questions and hypotheses.

RQ1: What are the current patterns of phone, computer, and Internet café use among women microentrepreneurs in urban centers of economically poor nations?

RQ2: What factors influence economic growth in urban microenterprises owned by women?

H1: The greater the business-relevant ICT access a woman microentrepreneur has, the more her business will grow.

H2: The more hired workers a microenterprise has, the more the business will grow.

H3: The more formal a microenterprise is, the more it will experience business growth.

H4: The greater the entrepreneurial motivation of the owner, the more her business will grow.

H5: The more positive a woman microentrepreneur feels about her status and power because of her business, the more her business will grow.

4. METHOD

4.1 Sample Design

The research site for our study was Mumbai City, India. We chose Mumbai for several reasons. With a population of approximately 14 million inhabitants (World Gazetteer, 2009), Mumbai city is the commercial capital of India. It has 2.9 million landlines and more than 20

million mobile subscribers, the most mobiles in India (Telecom Regulatory Authority of India, 2009). While there is no official count of either computers or Internet cafés in Mumbai, the total installed base of computers nationwide was somewhat greater than 36 million (IDC, 2009) and one informed estimate put the number of Internet cafes at 500 to 800 registered cafes, with another 1,000 unregistered (Times of India, 2009). Finally and of central importance to our research, the informal sector - “home” to the urban microentrepreneur - accounts for two-thirds of total employment in Mumbai (Srivastava, 2005).

Data were gathered by a three-stage random cluster probability sample. Interviews were conducted with women owners of microenterprises that had between one and nineteen hired workers. According to the National Sample Survey Organization (NSSO) of India (2000), 97 percent of India’s approximately twenty million urban microenterprises have between one and nineteen employees, but women own only 5 percent of urban microenterprises nationwide. We set the cap at nineteen hired workers in order to potentially capture “growth enterprises” —those comparatively larger and technologically more sophisticated businesses “that show a greater business focus and which deliver broader/longer term benefits of competitiveness, innovation and exports” (Duncombe and Heeks, 2005, p.5).

For the first stage of the sample, we chose 34 “investigative units” (IVs) by circular systematic random sampling from the 900 IVs that make up the NSSO’s Urban Survey Frame for Mumbai city.¹ According to the NSSO, every IV unit is subdivided into a variable number of “blocks”, which were usually composed of one or two roughly square city blocks or other similar areas circumscribed by other geographic features. We obtained maps from the NSSO of the IVs we had chosen. All blocks, usually between 15 and 20 in any given IV, were numbered and, for stage two of the sample, we selected one block in each IV by simple random sampling. A number from one to n was next assigned to each corner of each block chosen in stage two, moving clockwise around the block starting in the uppermost left-hand corner. To determine the final stage of the sample, one of the numbered corners was then selected by simple random sampling. That corner became the starting point for the interviews.

Interviewers were instructed to begin looking for eligible respondents at each starting point. Once an eligible respondent had been located, interviewers used a snowball approach to locate subsequent respondents. To ensure adequate representation of various size microenterprises, we established the following quotas within each of the sampled IV units: one business with 1–6 hired workers, four with 6–9 hired workers, one with 10–19 hired workers, and one from any of the three preceding categories. These quotas reflect the distribution of microenterprises by number of hired employees as reported by the NSSO. In six investigative units, interviewers were unable to identify eligible respondents within the IV boundaries and were instructed to move slightly outside of the IV to complete the quotas. However, since contiguous IVs shared similar social and economic characteristics, we believe this procedure to have no serious implications for the integrity of the rigorously constructed probability sample.

Interviews were conducted during May and June 2009 by GNN Market Research Private Limited, a Mumbai-based marketing research firm. A cash incentive of Rs. 600 (approximately US\$12 at the time and equal to four days’ wages for a semi-skilled urban worker in India) was offered to respondents as partial compensation for completing the survey. Interviews generally ran 30–40 minutes. A total of 231 completed interviews were obtained. The completion rate for the survey, calculated by dividing completed interviews by encounters with potential respondents, was 67 percent.

¹ We wish to thank Mr. N. S. Deoghare, NSSO, Mumbai for physically drawing the sample. During data collection, one IV turned out to be an uninhabited seashore area and was dropped from the sample

4.2 Questionnaire Construction

As a first step in preparation of the survey instrument, the third author and a graduate student assistant conducted open ended interviews lasting 30–40 minutes with a convenience sample of eight owners and two managers of microenterprises in New Delhi. Then, based on those interviews and a review of the literature, we created a draft questionnaire. The draft survey instrument questionnaire was pilot tested with seven respondents in the Chandni Chowk area of New Delhi, a neighborhood that was convenient and which we believe approximates Mumbai in density and type of micro-enterprises. Following the pilot test, we modified the wording of certain items and reduced the overall length of the questionnaire.

Two versions of the completed questionnaire were then created, one in English and one in Hindi. After mock interviews with field staff and on the advice of the interview firm, it was decided that the Hindi questionnaires would be used in the fieldwork, while all interviewers would carry the English version to use if needed. The questionnaire was translated into Hindi from English and subsequently back-translated to English. Two separate translation agencies were employed. A comparison of the original English version and the back-translation into English found substantial agreement, indicating that a linguistically and culturally text in Hindi had been created.

4.3 Measures

The survey included indicators of the financial performance of the micro-enterprises, ICT access, the motivation of the microentrepreneurs to use ICT, the perception microentrepreneurs have of their status because they own a business, and how formal or informal each business was. The exact wording of survey questions and the (Cronbach's alpha) internal consistency coefficients for the multi-item additive indices constructed can be found in Appendix A.

The dependent variable, *business growth*, was operationalized as the change in the annual income of the business and the business owner's assessment of the effects on the business of the Mumbai terrorist attacks in November 2008. None of the microenterprises in our sample were targets of those attacks. The relevant independent measures were the formality of the business, entrepreneurial motivation to use ICT, the business owners' perceived social status and power, and the total access to ICTs.

The index of *formality* consisted of items that measured whether the business was registered with the government, whether it had a business bank account and what bookkeeping practices the business followed. The index of microentrepreneurial *motivation to use ICTs for business purposes* was made up of items that indicated the respondent's degree of agreement with Likert-type responses. These statements include the extent to which the mobile phone helped keep the entrepreneur informed about prices and other business news and whether possessing a mobile phone makes the entrepreneur more confident that the business will grow. The index of *perceived social status and power* was comprised of items such as a measure of the self-confidence of the entrepreneur because she owned a business and the degree of respect that is given by friends and neighbors as a result of that business ownership. *Total ICT access* was constructed from items that measured the possession of mobiles phones, personal computers, laptop computers and access to the Internet both in the home and at the workplace. Access to a workplace landline was excluded in the final index, because, with its inclusion, the Cronbach's alpha for the index of total ICT access fell to an unacceptable level ($\alpha = .53$). We think that the workplace landline may not be fitting in to the total ICT access index that predicts business growth because they are being used to meet business communication needs in an extremely limited manner. Indeed, from the open ended questions in the survey, we found that many microenterprises maintained their landlines primarily because of the historically long waiting period to acquire a landline. Also, there is a

belief that businesses need to have a landline in order to maintain the business' presence in the business space, however infrequently these landlines are used (Ilavarasan and Levy, 2010). A logarithmic transformation was performed on the final total ICT scores.

4.4 Sample Characteristics

Of the 231 women microentrepreneurs sampled, 86.5 percent were married, 3.5 percent were widowed, and 10.0 percent were unmarried. The married women had on average two children (mode= 2.0, range = 0-9). The modal age of all women interviewed was 35 (range = 18-65). Only 7.0 percent of respondents had limited formal education (a primary school education or less), while 51.9 percent had a high school or higher secondary school education, and 41.1 percent had earned a bachelor's degree or more. All respondents said they speak, read, and write Hindi, while 70.1 percent could read English and almost as many (67.5 percent) could write it. In addition, more than half (56.3 percent) said they could calculate taxes or interest, another 39.8 percent said they could do simple arithmetic, while only 3.9 percent said they could recognize or write numbers but could not do calculations.

Taking the microenterprise as the unit of analysis, the modal number of hired workers was 6 (range = 1-15) Fewer than one-third (31.6 percent) had between one and five hired workers, 51.9 percent had between six and nine hired workers, and 14.4 percent had ten or more. It may seem that the majority of microenterprises sampled were on the moderately high end of the microenterprise space (six to nine). However, we expected these numbers since the stratified sampling method we used was based on the national sample. Our sample distribution approximated the national distribution of microenterprises reported by the NSSO. The largest number of women-owned microenterprises (55.7 percent) was in the trading sector. Businesses in trade included restaurants and sellers of clothing, groceries, small electronics, dress materials, or jewelry. Some 42.6 percent of the microenterprises sampled were classified as service sector businesses. Examples of services offered included medical care by general physicians, taxicabs and tours, academic tutoring, beauty parlors, and data entry. Only 1.7 percent of the microenterprises sampled were in the manufacturing sector of the economy and was most typically makers of dresses or leather goods. Most microenterprises had been in business for a decade (mode = 10, range = 2 months – 60 years) and only 5.6 percent had been in business for a year or less.

5. FINDINGS

Regarding RQ1 (patterns of ICT access and use), it is clear that both landlines and mobile phones are widely diffused among urban microentrepreneurs and their businesses. More than three-quarters (77.5 percent) of microenterprises owned by women had business landlines and nearly nine out of ten (87.9 percent) of women surveyed had at least one mobile phone (see Table 1). Only 4.3 percent of respondents had two mobiles. Since most microenterprises in the sample had been in business for at least ten years, it seems likely that many of these very small businesses had acquired their landlines well before the recent take-off in mobile ownership.

We have no direct comparisons of respondent attitudes toward landlines and mobiles. But we do have attitudinal measures for mobiles alone. The survey found, for example, that 62.1 percent of microentrepreneurs strongly agreed or agreed with the proposition that "having a mobile makes me more confident that this business will survive". By contrast, a smaller fraction of the sample (44.8 percent) strongly agreed or agreed with the proposition, "Having a mobile makes me confident that this business will grow", while 22.2 percent neither agreed nor disagreed and 33.0 percent strongly disagreed or disagreed. In addition, 58.1 percent stressed the portability of their mobile by strongly agreeing or agreeing with the proposition, "My mobile helps me come and go without worrying about missing important

business phone calls”. Based on these attitudinal measures and our observations in the field, we believe that the three-quarters of respondents with access to both a landline and a mobile would be more likely to use the mobile for conducting business

Table 1: Percentage of Urban Microentrepreneurs with Physical Access to Various Information and Communication Technologies. (N=231)

Type of ICT	Percentage
Mobile phone	87.9
Home PC	15.6
Home Laptop	4.8
Home Internet Connectivity	9.5
Business landline	77.5
Business Computer	10.4
Business Internet Connectivity	5.2

Even if mobiles are preferred over landlines, we still found business-related use of mobiles to be quite low (see Table 2). No respondents used their mobiles “very often” for any business-related activity. Fewer than one in eight (11.4 percent) of mobile owners called customers “often” or “sometimes” and only slightly more than half that number (6.4 percent) used their mobiles to contact suppliers. Almost none of the respondents, only 1.5 percent, ever contacted business people in other parts of Mumbai by mobile, suggesting that these microentrepreneurs might not be connected to social networks that could generate additional revenues and serve as a source of social capital (Molony, 2006; Goodman, 2007).

Table 2: Frequency of Mobile Phone Use (N =203)

Nature of Use	Very Often	Often	Sometimes	Rarely	Never
To call customers	0.0	3.0	8.4	1.5	87.2
To call suppliers	0.0	1.0	5.4	0.0	93.6
To call business people in other parts of Mumbai	0.0	0	1.5	0.0	98.5
To call family and friends	7.9	24.6	47.8	0.0	19.7

Confirming earlier work on how mobiles intermediate lives and livelihoods (Donner, 2009), the data shows that the predominant use of mobiles was to call family and friends. Almost one-third of respondents (32.5 percent) did so “very often” or “often” and another 47.8 percent called sometimes. Still, one out of every five respondents (19.7 percent) said they never used their mobile to call family and friends.

Only 4.8 percent of women business owners used public street phones (PCOs/STD booths) to place business calls. A handful (2.6 percent) gave mobiles to their employees to use for business purposes, while 7.8 percent required their workers to use their own mobiles for business.

Overall, computers seemed to be secondary technology for women microentrepreneurs. One out of six had a PC (15.6 percent) at home, while only one out of twenty (4.8 percent) had laptop at home. Of respondents with home computers, almost half (46.8 percent) reported having home Internet connectivity. Still, that means only 9.5 percent of the entire sample could go online from home. Moreover, only three women out of all respondents said they used their home computer in any fashion for business and only one

respondent took her laptop to work. Compared to home penetration rates, there were even fewer computers in the workplace. Only one out of ten (10.4 percent) businesses owned by respondents was computer equipped and only half of those were connected to the Internet. Only 4.8 percent of owners provided computers for their employees, pointing to the possibility that few microenterprises in the sample hired workers with the requisite computer skills (see Table 3).

Table 3: Percentage of Urban Microentrepreneurs Who Use Various ICTs.

Type of Use of ICT: “Do you ever ...”.	Percentage
Use your home computer for business purposes	15.6
Bring your home laptop to work to use for business purposes	0.4
Use computers at an Internet café for business	0.4
Use external PCOs/STD booths for business	4.8
Provide computers for the employees to use at work	4.8
Give mobile phones to your employees to use for business purposes	2.6
Have your employees use their personal mobiles for business	7.8

In microenterprises with computers, the most common uses of the business computers were to email friends and family (66.7 percent “ever”), to email customers (58.3 percent “ever”), and to track supplies (54.2 percent “ever”). Not a single respondent with a computer at work said she used that computer “to browse the Internet for information about prices and other business news”. Additionally, a strikingly small percentage (0.4 percent) of respondents went to Internet cafes to use the computers for business. Given that most patrons of cybercafés are young men and given their reported content preferences, it is entirely likely that Internet cafés might be considered a culturally inhospitable environment for women.

Research question 2 (factors influencing economic growth in urban microenterprises owned by women) was initially explored by creating Pearson product-moment correlations among the dependent variable (business growth) and six independent variables (the indexes of total ICT access, number of hired workers, business formality, motivation to use ICTs for business, self-perception of status and power, and respondent’s educational attainment, see Table 4).

Table 4: Pearson Product-moment Correlations between Dependent and Independent Variables

Variable	1	2	3	4	5	6	7	Mean	S D
1 Business Growth	1.00	-.177**	.156*	.045	.135*	-.047	.088	-6.01	17.74
2 Formality	-.177**	1.00	-.224**	-.061	.218**	.218**	.266**	2.73	1.06
3 Motivation	.156*	-.224**	1.00	.365**	.150*	-.200**	-.022	3.58	.65
4 Perceived social status	.045	-.061	.365**	1.00	.195**	-.090	-.010	3.74	.67
5 Total ICT access	.135*	.218**	.150*	.195**	1.00	.181**	.273**	1.06	.04
6 No. of hired workers	-.047	.266**	-.200**	-.090	.181**	1.00	.033	6.47	3.41
7 Education	.088	.184**	-.022	-.010	.273**	.033	1.00	2.97	1.07

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

Two of the six independent variables (total ICT access and motivation to use ICTs) were positively and significantly correlated ($p < .05$ two-tailed test) with business growth.

Even though these correlations ($r = 0.135$ and 0.156 respectively) are relatively weak, they do give modest support to H1 and H4. Furthermore, we believe that these two statistically significant correlations are substantively significant as well. The correlation between a respondent's total ICT repertoire and business growth is a clear demonstration that ICTs can have a real, positive impact. The correlation between motivation and business growth substantiates the need to go behind physical access when assessing digital divides by addressing relevant psychological factors.

The number of hired workers is not significantly associated with business growth and thus H2 is not supported. However, the number of hired workers was weakly correlated with total ICT access ($r = .181$, $p < .01$ two-tailed test). Whether microentrepreneurs with larger numbers of hired workers turn to ICTs to meet business communication needs associated with having more workers is not clear. However, since only 1.0 percent of respondents said they ever sent SMS messages to their employees, it seems more likely that this correlation is the result of other factors, possibly the overall stability or revenues of the enterprise.

Additionally, the number of hired workers is somewhat more strongly correlated with enterprise formality ($r = .266$, $p < .001$). However, since only one microentrepreneur with a computer at work said she used that computer at work "to record information about employees"—the sort of record keeping that might indicate compliance with labor laws or regulations—we think it is unlikely that increased numbers of workers necessarily causes greater business formality.

The correlation between business formality and enterprise growth was negatively and significantly associated with business growth ($r = -.172$, $p < .01$ two-tailed test). This finding suggests that the more formal the enterprise, the less likely it will experience growth. This result does not support H3, which predicted a positive association between formality and growth. It is nevertheless in keeping with that part of the literature that suggests microenterprises will do better economically if their owners make a conscious decision to stay in the informal sector. However, business formality was positively correlated with total ICT access ($r = .218$, $p < .01$ two-tailed test).

Self-perception of social status and power because of owning a business is not significantly correlated with business growth. Thus, the data does not support H5. However, self-perception of status and power is moderately correlated with motivation to use ICTs for business purposes ($r = .365$, $p < .01$ two-tailed test). This raises the possibility that self-perception of status and power may act indirectly through motivation to influence business growth. If, for example, a women microentrepreneur perceives that her social standing and related power is linked to her business, then perhaps she will turn to ICTs as way of increasing the viability of her microenterprise and thereby garner additional amounts of standing and power. Finally, respondent education was not significantly correlated with business growth but was correlated with total ICT use ($r = .273$, $p < .01$ two-tailed test). The ability to read and write in English was also correlated with total access to ICTs ($r = .274$, $p < .01$ two-tailed test) but was not found to be related to business growth.

To test whether the traits of the entrepreneur and the business significantly predicted business growth, we carried out a standard multiple regression analysis, with business growth as the dependent variable and ICT access, business formality, motivation, and self-perception of status and power as predictors. Number of hired workers, which was not significantly correlated with business growth, was not included as an independent variable.

The results of the regression showed a weak, but statistically significant relationship between the variables ($R^2 = .07$, $F(4,225) = 4.27$, $p < .01$). Total ICT access significantly predicted business growth ($\beta = .17$, $p < .05$), as did formality ($\beta = -.19$, $p < .01$). Neither self-perception of status and power nor motivation for ICT use was a significant predictor (see Table 5).

Table 5: Regression Coefficients of Formality, Motivation, Perceived social status and Total ICT Access on Business Growth

Model	Unstandardized Coefficients		Std. Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	-76.723	27.96		-2.744	0.007
Formality	-3.192	1.143	-0.191	-2.792	0.006
Motivation	2.777	1.937	0.102	1.434	0.153
Perceived social status	-0.978	1.849	-0.037	-0.529	0.597
Total ICT access	68.961	27.742	0.169	2.486	0.014

a. Dependent Variable: Business growth

Finally, we re-ran the regressions examining microenterprises in the service and trade sectors one sector at a time. Manufacturing businesses were not analyzed because of their very small number in the sample. No formal hypothesis had been generated to guide this exploration, since there was no *a priori* way to suggest whether service or trade sector microenterprises were more likely to experience ICT-related growth (see Tables 6 and 7).

Table 6: Regression Coefficients of Formality, Motivation, Perceived Social Status and Total ICT Access on Business Growth for Service Industry

Model	Unstandardized Coefficients		Std. Coefficients	T	Sig.
	B	Std. Error	Beta		
(Constant)	-76.723	27.96		-2.744	0.007
Formality	1.161	2.199	.059	.528	.599
Motivation	-.524	3.324	-.017	-.158	.875
Perceived Social Status	5.723	2.972	.209	1.925	.057
Total ICT access	14.166	11.327	.142	1.251	.214

a. Dependent Variable: Business growth

In the regression model for service sector microenterprises, the five predictor variables failed to generate a statistically significant R-square. By contrast, controlling for microenterprises in trade resulted in a stronger R-squared ($R^2 = .218$, $F(4,123) = 8.57$, $p < .001$) than in the regression model based on all cases. However, in the regression model for businesses in the trade sector ICT access dropped out as a predictor variable ($\beta = .126$, $p = .149$) and formality, which was not a significant independent variable in any other regression, emerged as the sole predictor of business growth ($\beta = -.383$, $p < .001$). Once again, formality was negatively associated with business growth, reiterating earlier findings in this study.

Table 7: Regression Coefficients of Formality, Motivation, Perceived Social Status and Total ICT Access on Business Growth for Trade Industry

Model	Unstandardized Coefficients		Std. Coefficients		Sig.
	B	Std. Error	Beta	t	
(Constant)	-76.723	27.96		-2.744	0.007
Formality	-5.916	1.414	-.383	-4.184	.000
Motivation	3.695	2.286	.146	1.616	.109
Perceived Social Status	-2.946	2.338	-.108	-1.260	.210
Total ICT access	16.463	11.332	.126	1.453	.149

a. Dependent Variable: Business growth

6. DISCUSSION

This article explored the economic impact of ICTs on women microentrepreneurs and their businesses in an urban setting. We found:

- a. that in urban microenterprises owned by women, business growth is a function of ICT access and business growth is related to motivation to use ICTs for business purposes;
- b. that the more positive a woman microentrepreneur feels about her status and power because of her business, the more she will be motivated to use ICTs for business; and
- c. that microenterprises in the trade sector of the informal economy may be especially likely to experience economic growth from the combination of ICT access and owner motivation to use ICTs for business.

Our research makes a significant contribution to the literature on communication technologies in several ways. First, it enlarges the behaviors and contexts explored, expanding from research on the cultural meaning of ICTs and their use in everyday life, largely in industrialized nations, to a focus on more instrumental economic behaviors. Second, the data presented here was gathered using a probability sample design, making it more likely that the findings are more representative than a large number of previous studies based on smaller or convenience samples.

We also would suggest that this study increases our understanding of digital divides by providing empirical evidence for evaluating some of the proposed, theoretically fuller conceptualizations of the term. Our findings show, for example, that motivational variables do play a significant part in how women microentrepreneurs approach ICT use in business and that a more highly motivated usage has positive consequences. Our study also points to the importance of human capital variables. Both level of education and being able to read and write English are correlated with ICT use. Still, neither education nor English ability translated into business growth, suggesting that human capital factors alone are not sufficient to overcome other economic, social, or cultural barriers. Finally, by examining self-perceptions of status and power resulting from business ownership, our research illuminates how social and gender norms impact ICT use and it provides additional insight into the interplay of demography, society, and information and communication technologies.

Attempting to demonstrate that landlines, mobiles, computers, and Internet cafés have a positive economic impact on microenterprises owned by women has proved challenging. In

most instances, our findings show only weak relationships between ICTs and business growth. Having a more reliable measure of business growth might yield stronger results. However, some potentially informative data on specific indicators of business growth proved difficult to obtain. Our original questionnaire asked, for instance, about business income; amount of taxes, if any, paid to the government; and how much money is required to start a similar business. But these items were dropped from the final questionnaire after the pilot study showed that respondents were exceedingly unlikely to answer. Obtaining meaningful responses to sensitive questions such as these is longstanding problem in survey research and trying to overcome respondent reticence is a crucial challenge that must be met in future investigations of the impact of ICTs on microenterprise growth. Possible indicators for future research might include measures of increase or decrease in customer base, whether the owner had recently moved her microenterprise to larger business quarters, or comparisons of revenue growth with similar microenterprises.

However, even with better measures of business growth, the question of causation — whether ICTs have the impact our data suggests—remains open. The correlations and regression model both point toward a causal conclusion. Still, it is possible that business growth in microenterprises precedes the acquisition and use of ICTs. There also might be a recursive relationship between business growth and ICT access and use. In that case, establishing the temporal priority of ICT access or use and business growth becomes more difficult. Indeed, it is even possible that microentrepreneurs who already use, say, their mobile phones for personal matters, decide to use their mobiles in business as they become aware of technological upgrades that are business-relevant and relatively inexpensive (Gitau et al., 2009). Ultimately, of course, these issues are probably best addressed through ethnographic action research (Hearn and Foth, 2005) or field experiments (Banerjee and Duflo, 2008).

In a larger sense, however, our study might be best understood as pointing to the need to more circumspect in our uncritical and unexamined enthusiasm for ICTs as re-makers and re-molders of social life. A full understanding of the impact of ICTs requires investigation of multiple factors and forces. In the case of women microentrepreneurs in economically poor nations, the handicaps that stand in the way of ICT-generated business success are substantial. For example, even though the women owners of the urban microenterprises we investigated are comparatively well educated and literate, these capabilities appeared insufficient to translate their ICT use into business growth.

In addition, women entrepreneurs are often limited to traditional gender roles, both in terms of the kind of businesses they own and the competing time-pressures they face as wives and mothers (Munyua, 2009). Traditional microenterprises owned by women (e.g. food preparation, beauty care, and sales of dry good or notions) often have limited intrinsic capacity for growth and indeed might be unable to generate additional revenues, even if ICTs were freely available. Moreover, to the extent that limited time for business activities might result in lower rates of business success, it is not surprising that ICTs alone cannot easily overcome entrenched gender roles.

Finally, we found little evidence that women microentrepreneurs used ICTs to participate in business relevant social networks, either by mobile or online. It is an open question whether women owners of microenterprises are generally not connected to such potentially valuable networks because few such networks exist, because women business persons are simply unaware of those that do, or because for cultural reasons women may not be welcome to participate in local, regional, or global value chains. Thus, the social networks of women microentrepreneurs clearly merit future study.

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APPENDIX

Survey Items and Reliabilities

Index	Questionnaire Items	Scoring	Alpha
Business Growth	Compared to a Year ago, has the annual income of this business: How, if at all, have the recent Mumbai terrorist attacks affected this business? Compared to before the terrorist attacks:	Change in percentage 0=less business, 1=no change, 2=more business	0.54
Formality	Is this business registered with the government? Does this business have a bank account? For maintaining the financial and business records of this business, which of the following statements is most applicable?	1=yes; 0=no; 1=yes; 0=no 0=no records, .5=written records, 1=accountant	0.64
Motivation	My mobile phone helps me keep informed about prices and other business news. Having a mobile makes me more confident that this business will survive. My mobile helps me come and go without worrying about missing important business phone calls. Using my mobile makes it easier to stay in touch with my family and friends. Using my mobile helps me stay in touch with current customers. My mobile helps me stay in touch with other business people who have similar interests and problems like mine. Using a mobile makes me feel more connected to businesses in other parts of Mumbai.	5=strongly agree	0.79

Having a mobile makes me feel up-to-date.

Perceived social status and power	<p>Because of my business, I am feeling more confident.</p> <p>Because of my business, I have gained respect among my friends and in my neighborhood.</p> <p>Despite my business, my parents do not feel especially proud of me (reversed).)</p> <p>Because of my business, my parents-in-law are proud of me.</p> <p>Despite my business, my parents do not feel especially proud of me (reversed).</p> <p>Despite my business, my opinions are not considered to be important in family decisions (reversed).</p>	5=strongly agree	0.70
Total ICT access	<p>Do you have/own a mobile phone; Personal computer; Laptop; Internet connection?</p> <p>Do you ever use external PCOs/STD booths for this business?</p> <p>Have you ever given mobile phones to your employees to use for business purposes?</p> <p>Do they ever use their personal mobile phones for business purposes?</p> <p>Does this business have computers in the workplace;</p> <p>Does the business have an Internet connection?</p> <p>Have you provided computers for the employees to use at work?</p>	1=Yes	0.61

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