



Transformations in Technology, Transformations in Work

October 2016

A photograph of a woman sitting on the ground in a market stall, surrounded by large piles of produce, likely carrots. She is holding a large umbrella over herself. The entire image is overlaid with a semi-transparent green color. The text is white and positioned in the upper left and center areas.

DEPLOYING TECHNOLOGY TO GROW MICRO-ENTERPRISES IN INDIA

Evidence from urban Gujarat

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Saath is a non-profit organization based in Ahmedabad, India and a member of JustJobs Network. Over the past 27 years, Saath has facilitated participatory community development to improve quality of life for the urban and rural poor. Its one-stop, integrated services have reached over 500,000 individuals in the states of Gujarat, Maharashtra and Rajasthan. It has incubated and facilitated the launch of a credit and savings cooperative, an affordable housing facilitation company, a marketing platform for rural weavers and a successful formal platform for domestic workers.



INDIA



14,681

GDP per person
employed
(constant 1990 PPP \$)



26

Internet users
(per 100 people)



79

Mobile cellular
subscriptions
(per 100 people)



0.82

Research and development
expenditure
(% of GDP)



8

High-technology exports
(% of manufactured exports)

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Overview

In most countries, micro-enterprisesⁱ have the smallest share of aggregate employment. India is no exception. Yet these firms are manifestations of entrepreneurial activity that can grow into small- and medium- sized enterprises, which are significant sources of new job creation.

Technology is key to the growth and productivity of an enterprise. Using primary data on micro-entrepreneurs in Ahmedabad, the largest city in the Indian state of Gujarat,ⁱⁱ this chapter explores the role of technology in micro-enterprises. Specifically, it examines (i) the extent to which informal micro-enterprises utilize technology, (ii)

the policy environment that governs their access to technology, and (iii) the broader potential for technology to help micro-enterprises expand their operations, become small and medium enterprises, and create jobs.

Ahmedabad is the largest industrial center in the western state of Gujarat¹ and the second largest industrial center in western India after Mumbai. In Gujarat, the Government's Industries Commissionerate reported in 2014 that there were 230,000 registered and 1.94 million unregistered micro-enterprises in the state, employing about 1.25 million and 3.5 million people, respectively.

ⁱ Micro-enterprises are manufacturing and service sector enterprises with investments in plant and machinery less than US\$ 37,290 and less than US\$ 14,915 respectively. In India, according to the MSME Development Act of 2006, a manufacturing firm is defined as a micro-enterprise if its total investment in plant and machinery does not exceed INR 2.5 million (about US\$ 37,290). A firm in the service sector is defined as a micro-enterprise if investment is less than INR 1 million (about US\$ 14,915). Many other countries define a micro-enterprise in terms of the number of employees or annual turnover.

ⁱⁱ The Saath Savings and Credit Cooperative is a microfinance institution started in 1994 in urban slums and as of date has over 20,000 members from 7 slums, of which 16,906 members are active as of 31 March, 2016. The remaining are considered inactive as they had not accessed their accounts in at least 6 months.

The state capital, Ahmedabad, alone accounts for 63,915 registered micro-enterprises that employ over 370,000 people.ⁱⁱⁱ

This study looks at micro-enterprises in two distinct informal settlements, or “slums” of Ahmedabad – Saraspur and Sarkhej. The data include information from a wide variety of micro-entrepreneurs, including those selling apparel and furniture, owners of provision stores and service providers such as tailors and beauty parlors.

The findings of the analysis highlight that owners of micro-enterprises are familiar with simple technologies, but their ability to fully exploit the benefits of those technologies, upgrade or use more advanced technologies is limited by several

factors, including lack of access or exposure to technology, or lack of information about it.

The chapter begins by describing the landscape of urban informality, micro-entrepreneurship and technology use, and the relevant policies in India. It then analyzes primary data from 327 micro-enterprises in Ahmedabad. The analysis focuses on entrepreneurs’ access to technology, their understanding and willingness to adopt new technology to upgrade existing technology, and their perception of how technology will impact their business. Finally, the authors offer policy recommendations to Indian policymakers on using technology as a catalyst for micro, small and medium enterprises (MSMEs), especially among women-owned enterprises, to create more and better jobs.

Micro-entrepreneurship in India

With poor access to formal sector employment – because of a lack of formal jobs or because workers lack the requisite skills for existing jobs – many Indian workers opt for self-employment or become casual laborers. According to the Fourth Census of Micro, Small and Medium Enterprises in 2006-07, of all MSMEs in India, micro-enterprises

make up 95 percent of registered businesses and 99.8 percent of unregistered businesses.² In terms of output, the MSME sector accounted for about 45 percent of manufacturing output and 40 percent of the country’s total exports in 2011-12.³ Micro-enterprises can be formal or informal, sole proprietorship, part-time and/or home-based.⁴

ⁱⁱⁱ No reliable estimate exists for the number of unregistered micro-enterprises in Ahmedabad.

Of the 36.1 million MSMEs – both registered and unregistered – in 2006-07 in India, 2.6 million were owned by women.⁵ Nearly 98 percent of the women-owned MSMEs were micro-enterprises.⁶ Running micro-enterprises is a way for women to engage in economic activity at a time when women's labor force participation in India is declining – from 37 percent in 2004-05 to 22.5 percent in 2011-12.⁷ These women-owned micro-enterprises contributed 3.09 percent of industrial output and employ over 8 million people.⁸

The Indian government has made entrepreneurship a priority through recent campaigns like "Make in India," a national initiative to transform India into a global design and manufacturing hub, and "Start-up India," an initiative to foster entrepreneurship and promote innovation by creating an environment conducive to start-up growth.^{9,10} There is a renewed focus on the MSME sector as an engine of growth. While these firms already employ millions of Indians, the

government seeks to bring informal enterprises into the formal economy and grant them access to schemes, subsidies, credit and technology. Historically, micro-enterprises have largely avoided formal registration and have proved difficult to regulate.

Lack of access to technology, finance and skills are key problems that prevent the growth of micro-enterprises. Micro-entrepreneurs could benefit from training in skills such as business plan development, marketing and book and record keeping.¹¹ Micro-entrepreneurs consistently cite the lack of finance as one of their most significant barriers to growth.¹² They also lack

access to technology.

This goes hand-in-hand with low productivity and low wages.^{13,14}

Microenterprises would also benefit from more and better avenues for

accessing technology. Such interventions would not only boost the output and growth of micro-enterprises, but could also serve to enhance the livelihoods of many micro-entrepreneurs.¹⁵

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Placing urban micro-enterprises in context

Urban micro-enterprises are often housed in informal settlements or slums, which act as hubs of economic activity in Indian cities. Slum residents provide cities with myriad services – from domestic help like cleaning, cooking, gardening and driving, to informal retail vending, repair work and manufacturing. The quintessential example of an informal settlement that plays an important economic role is Dharavi, one of the world's largest slums that is located in Mumbai, where over 10,000 businesses operate in leather, pottery, manufacturing and recycling.¹⁶

The two slums in this study, located in the city of Ahmedabad, differ geographically and demographically. Saraspur lies in the western part of the city; it is a diverse neighborhood with residents from different religions and castes. Sarkhej is located on the outskirts of the city and its residents are almost exclusively Muslim. The Sarkhej community has struggled to stake

its claim to the city, having been marginalized socially, politically and economically. This study highlights that Sarkhej has a higher adoption of technology amongst its micro-entrepreneurs.

Ahmedabad is known as a megacity, with a population of 6.3 million.¹⁷ It is one of twenty designated cities selected by the Indian government to develop into “smart cities”, with the vision of *“providing efficient, affordable, equitable and customized governance to the citizens of Ahmedabad.”*¹⁸ The plan calls for the redevelopment of slums and faster registration for businesses, but does not explicitly take into account the specific needs of the city's 63,915 registered micro-enterprises. Plans propose improving transport, surveillance and other facilities, which may indirectly improve the business environment for micro-enterprises. However, micro-entrepreneurs are not the primary focus of urban strategies.

Access and use of technology by micro-enterprises

Low levels of technology adoption are partly responsible for the low productivity of micro-enterprises. Despite contributing 45 percent of the industrial output, 40 percent of exports, and 42 million in employment,¹⁹ the sector constitutes

only 17 percent of India's gross domestic product (GDP).²⁰

Discourse on the kind of assistance micro-enterprises need tends to focus on credit

constraints. The question of how technology might help micro-enterprises expand features less prominently in policy discussions despite the fact that there is a strong body of academic evidence to suggest that micro-enterprises can benefit from technology.^{21,22}

Previous studies show that mobile phones are the technology that micro-entrepreneurs most often prefer.^{23,24} Entrepreneurs prefer mobile phones due to a variety of reasons including their low cost and high penetration. Most micro-entrepreneurs use mobile phones to communicate with their customers and exchange information with vendors on input supply and payments. A study of Ugandan women micro-entrepreneurs found that 63.9 percent saw an increase in profits from mobile phone usage through the elimination of middlemen, and 76 percent of women micro-entrepreneurs who owned a phone witnessed an increase in sales through business networking, which increased the number of customers.²⁵ Mobile phone technology has been shown to have a positive and significant impact on economic growth, and

this impact may be twice as large in developing countries, where the density of micro-enterprises is greater when compared to developed countries.²⁶

A study examining the role of information technology for urban, women-run, micro-enterprises in Mumbai showed that education, perceived usefulness of mobile phones, increased access to information, and the way mobile phones were deployed, all had an impact on business growth. In other words, simply having technology like a mobile phone may not lead to business growth, but the way in which the mobile phone is used for the business does.²⁷ The findings of the study conducted for this chapter support this conclusion.

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The need for access to technology among micro-entrepreneurs is well recognized by the Indian government.²⁸ One of the main objectives of the Ministry of MSMEs is to support upgrading of technology and modernization. A 2010 report by the Prime Minister's Taskforce on MSMEs identified low technology levels and lack of access

to modern technology as major barriers to MSME growth in India.²⁹ Technology adoption among MSMEs is extremely low due to a variety of factors: cost, lack of awareness of the use and benefits of technology, not enough skilled manpower to operate technology, poor infrastructure for utilizing technology and concerns over security and privacy.³⁰

The government has introduced various measures to increase firms' access to technology, some of which focus on improving manufacturing competitiveness, such as the Credit Linked Capital Subsidy Scheme for Technology Upgradation^{iv,31}

and the ICT scheme.^{v,32} These programs tend to target larger firms rather than taking into account the specific needs or limitations of micro-enterprises. For example, there is no government scheme aimed at supporting micro-enterprises in learning how to use technology for the benefit of their businesses. Awareness is another issue. Among 748 micro and small enterprises interviewed in a study conducted by Intuit and the Indian government in August 2012, only 32 percent of firms had knowledge of specific government schemes to improve access to technology.³³

Methodology

Respondents in the study were micro-entrepreneurs receiving loans from the Saath Savings and Credit Cooperative. Micro-entrepreneurs make up about 17 percent of the cooperative's nearly 17,000 active members. Almost all of these entrepreneurs have taken asset creation or productive loans to build their businesses. About 11 percent of active members are self-employed, which means that they work

from home and take on contractual or task-based work, and 6 percent run small businesses. The researchers randomly selected 327 respondents from this pool of 2,890 micro-entrepreneurs, half from Saraspur and half from Sarkhej. The questionnaire was designed to generate data on micro-enterprises and their use of technology which could range from communication devices such as mobile phones to sewing machines.

^{iv} The revised scheme aims to facilitate technology up-gradation by providing 15 percent up-front capital subsidy to SSI units, including tiny, khadi, village and coir industrial units, on institutional finance availed of by them for induction of well-established and improved technologies in specified sub-sectors/products approved under the scheme.

^v The objective of the scheme is to encourage and assist the potential manufacturing MSME clusters to adopt ICT tools and applications in their production and business process, and thereby, improve their productivity and competitiveness in national and international markets.

A major obstacle in primary data collection was the fact that enumerators and micro-entrepreneurs did not have a single, common

definition of technology, and interviewers had to use individual strategies to overcome this challenge.

Profile of the micro-entrepreneurs

The study^{vi} included 163 micro-entrepreneurs from Saraspur and 164 micro-entrepreneurs from Sarkhej. The vast majority of the micro-enterprises were unregistered sole proprietorships. Of the respondents from both areas, 25 percent were men and 75 percent were women.^{vii} This is roughly the same as the share of women that are loan recipients; 80 percent of the members of the cooperative with active savings and loan accounts are women.^{viii}

The entrepreneurs ranged in age from 18 to 57 years old, with the majority (45 percent) between the ages of 27 and 38, and only about 11 percent between the ages of 18 and 27. Young business-owners tend to be better educated than older business-owners (see **Figure 1**). On the one hand, this is to be expected, as access to education in India has improved significantly over the years. On

the other hand, micro-entrepreneurship remains a livelihood strategy even for young people with higher levels of education, suggesting that the labor market may not be providing suitable employment opportunities even for relatively well educated young people.

Men tend to enter micro-entrepreneurship at an earlier age than women. They also tend to exit earlier. This suggests that men begin their businesses at an age when women are likely to be involved in the care economy and household management. But as families grow, women must take up income-generating activities in order to make ends meet.³⁴

Broadly, the enterprises can be divided into firms selling goods and firms selling services. About 45 percent of firms sold goods, including items

^{vi} The primary data collection was carried out by Saath Savings and Credit Cooperative and Saath Charitable Trust.

^{vii} However, the share of women micro-entrepreneurs in these two settlements is not indicative of the proportion owned by women in India overall. According to the Fourth All India Census of MSMEs, in 2006-07, only 7.36 percent of all MSMEs – registered and unregistered – are women-run.

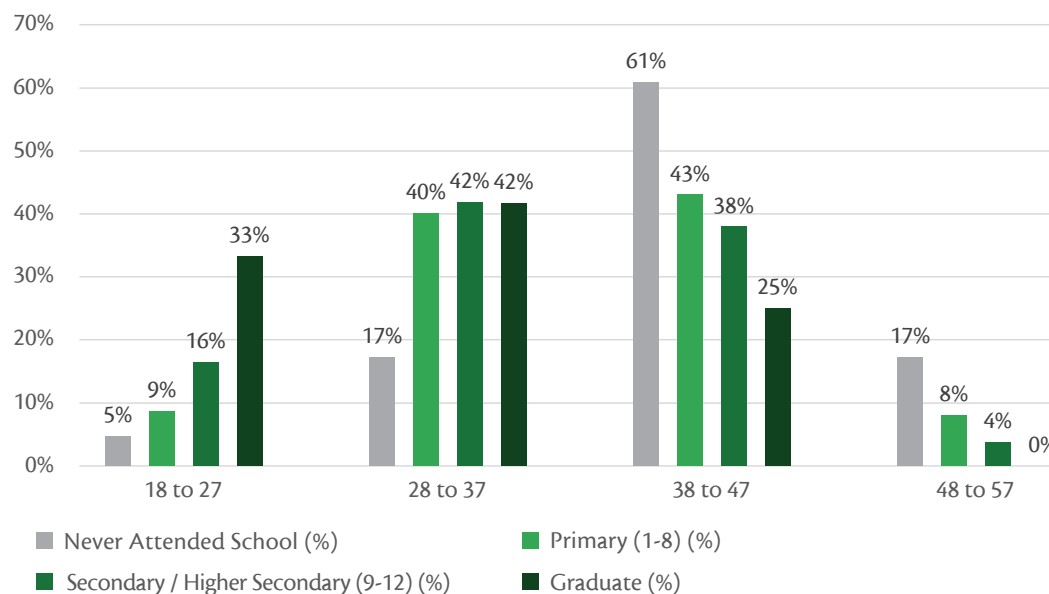
^{viii} Cooperative here refers to the Saath Savings and Credit Microfinance Cooperative Ltd. that is registered in Gujarat and has over 20,000 active savings members. It is through the database of this cooperative that micro-entrepreneurs were identified for the study.

like clothing, food, as well as other items such as perfumes and kites. The remaining 55 percent of firms were service-based businesses such as tailor shops and beauty parlors. Service-providing micro-entrepreneurs also provided electrical, plumbing, carpentry, masonry, and driving or chauffeuring services. About 43 percent of the surveyed enterprises were “young” (less than 5 years old), another 44 percent were “middle-aged” (5 to 16 years old), and just 12 percent were “old” (16 years or older).

The monthly income of micro-entrepreneurs was between INR 1,000 and 50,000 (about US\$ 15 to 750). About 64 percent of the micro-enterprises reported generating profits that were less than INR 10,000 per month (about US\$ 150). Nearly 30 percent of micro-entrepreneurs earned between INR 10,000 and 20,000 (about US\$ 150 and 300), while about 6 percent of the surveyed enterprises earned over INR 20,000 (see **Table 2**).

Figure 1

Age and education distribution of micro-entrepreneurs



Source: Authors’ calculations.

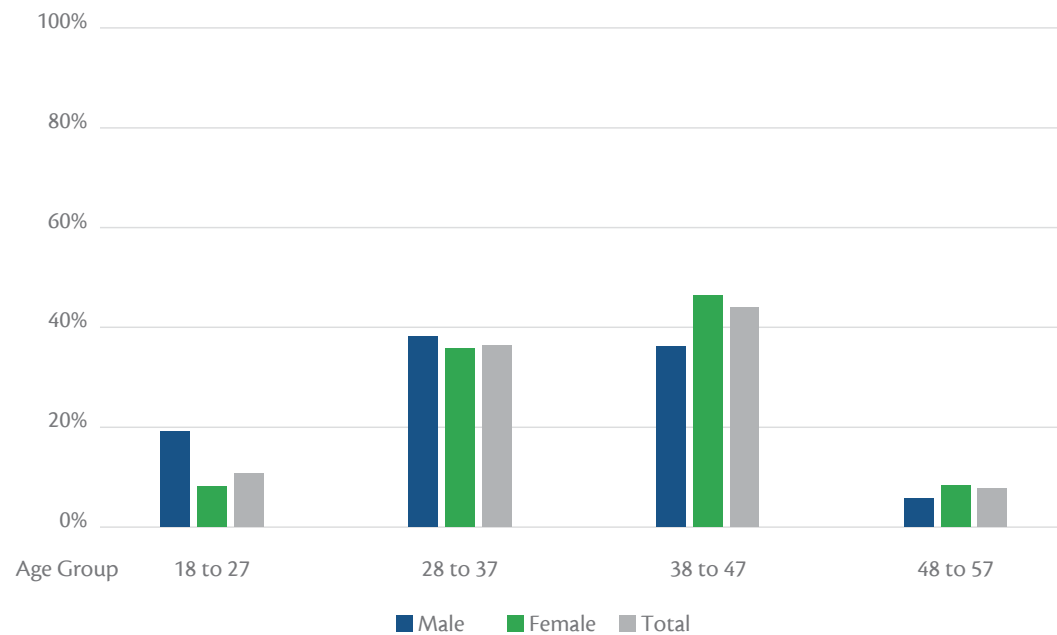
Application and access to technology

Among the surveyed micro-entrepreneurs, 77 percent said that they were currently using technology in their businesses, although the type of technology varied across businesses. Among those who reported using *any* technology, 62.2 percent reported using a mobile phone as their primary technology, while 26.3 percent reported using a sewing machine.^{ix} Other technologies

used by entrepreneurs in the study include digital weighing scales, refrigerators and computers, laptops and tablets. Only one business owner, a kite maker, was using internet-based marketing to increase his customer base.

The most commonly utilized technology among those surveyed was mobile phones, which were

Figure 2
Age and gender distribution of micro-entrepreneurs



Source: Authors' calculations.

^{ix} While micro-entrepreneurs could be using multiple technologies at once, they reported the main technology as a response to the survey question.

primarily used to communicate with customers. Most micro-entrepreneurs stored customer phone numbers and details. In some cases, mobile phones were used to arrange the procurement or delivery of raw materials or goods. Micro-entrepreneurs claimed that this significantly improved procurement and delivery and by eliminating the need for them to physically visit the place of procurement, reducing waiting times and making their work more efficient. However a few business owners reported using their phones for tasks such as accounting or budgeting. Only four of the 327 micro-entrepreneurs surveyed

were using a laptop or tablet in running their business (see **Table 1**).

Among the 251 firms using technology, roughly 60 percent were engaged in services oriented trades while the remaining 40 percent were engaged in the sale of goods. Forty-seven percent of the young enterprises began utilizing technology when they started operations, whereas 41 percent of middle-aged and only one in five old enterprises were using technology at the time they started. The declining costs of smart phones and cellular data, and their growing

Table 1
Technology used by micro-enterprises*

Type of Technology	Frequency	Frequency in %
Mobile	156	62.2
Sewing Machine with Electric Motor	66	26.3
Advanced Sewing Machine	6	2.4
Beauty Parlor Machines	5	2.0
Digital Weighing Machine	6	2.4
Computer/Tablet/Laptop	4	1.6
Online Marketing	1	0.4
Refrigerator	1	0.4
Other Machines	6	2.4
Total	251	100.0

* Among all those who are technology users.

Source: Authors' calculations.

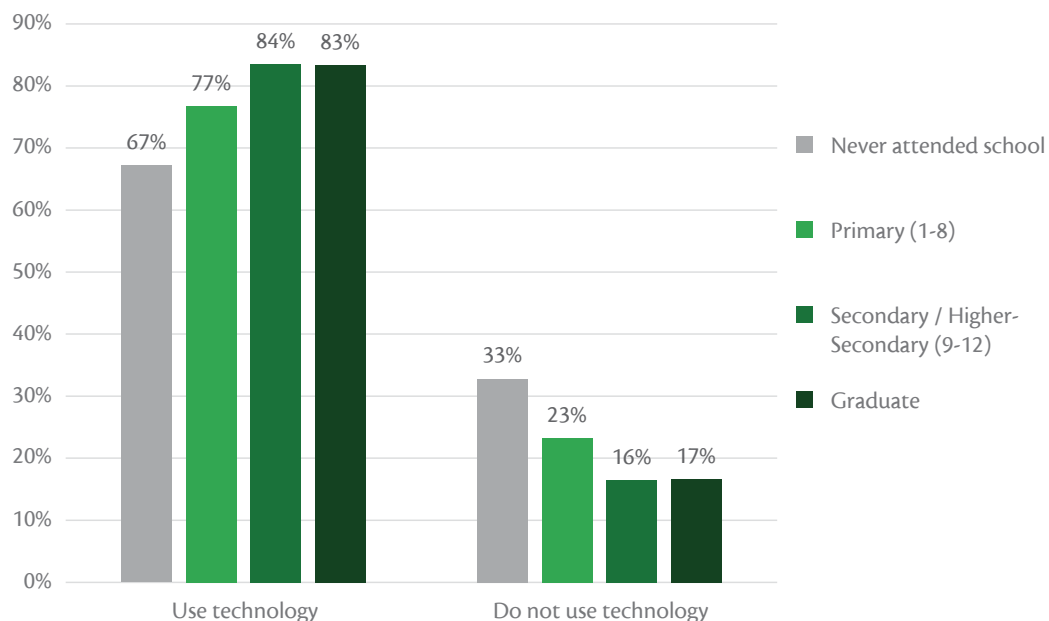
pervasiveness, may account for the difference in the point of technology uptake between “middle-aged” and “young” firms.

Male micro-entrepreneurs were slightly more likely to use technology than female micro-entrepreneurs, though the gap was not substantial: 82 percent of men and 75 percent of women in the sample used technology.

Women’s strong representation in the micro-enterprise sector, as well as their high rates of technology use, point to an opportunity to facilitate female labor force participation. The government could use micro-enterprises as an entry point to get women into the labor force.

The likelihood of using technology increases with education level. While 67 percent of those who

Figure 3
Usage of technology based on education (% of respondents)



Source: Authors’ calculations.

never attended school were using technology, about 83 percent of those with secondary and tertiary education were utilizing technology. This finding supports the widely discussed notion that technology is skill-biased in nature – i.e. procuring technology, incorporating it into the business, and then utilizing it generally requires some a certain skill level.

The likelihood of using technology increases with education level. Technology is skill biased in nature, i.e. procuring technology, incorporating it into the business, and actually utilizing it generally requires a certain level of skill.

One might expect that business owners in the more centrally located community, Saraspur, with deeper social and economic links to the rest of

Ahmedabad, would be more likely to adopt new technologies, but the data show the opposite.

Sarkhej – the relatively more disenfranchised neighborhood on the city’s periphery – had a larger share of technology users among micro-entrepreneurs. The gap was particularly pronounced among women. While 91 percent of female entrepreneurs in Sarkhej reported using technology, just 63

percent of women in Saraspur did. It is possible that, given their strategic location in a dense, central neighborhood, enterprises in Saraspur

Table 2

Monthly income of micro-entrepreneurs who use technology vs. those who do not

Monthly Income	Usage of Technology				Total
	Yes	%	No	%	
1,000 to 10,000	158	62.95	53	69.74	211
10,001 to 20,000	74	29.48	21	27.63	95
20,001 to 30,000	17	6.77	2	2.63	19
30,001 to 40,000	1	0.40	0	0	1
40,001 to 50,000	1	0.40	0	0	1
Total	251	100	76	100	327

Source: Authors’ calculations.

have less need for information communication technologies (ICTs) such as mobile phones to establish interface with customers or attract business.

Almost three-quarters of the respondents said they were comfortable with technology, while over half claimed to keep themselves abreast of newer technologies for possible upgrading. However, when asked what technologies could be used to help them expand their business, 61.8 percent said they did not know, suggesting that moving beyond simple technologies and uses would have to be facilitated through skills training, access to finance and improving

awareness. The latter are barriers that need to be addressed in order for a micro-entrepreneur to fully harness the potential of new technologies to grow their business.

One of the survey questions focused on barriers to growth vis-à-vis technology. While 60 percent of enterprise-owners said that they would require an additional loan or financial help to procure new technology, just 6.7 percent said they needed better machines, and only about 1 percent mentioned computers, tablets, or laptops. Not a single individual said that they were aware of any government scheme related to technology that they could access to improve their business.

Table 3

Answers to the question “Which technology could you use to expand your business?”

Name of Technology	Frequency	Frequency in %
Don't Know	202	61.8
Advanced Sewing Machine (Juki)	82	25.1
No Need	13	4.0
Computer/Tablet/Laptop	10	3.1
Smart Phone	7	2.1
Sewing Machine with an Electric Motor	6	1.8
Other Machines	4	1.2
Vehicle for transportation of goods	2	0.6
Digital Weighing Machine	1	0.3
Total	327	100.0

Source: Authors' calculations.

Technology as a catalyst for micro-enterprises

There is need for more studies into technology can enhance efficiency for micro-enterprises. This study shows that 62.2 percent of all respondents are using mobile phones, but not necessarily in all the ways they could be useful.

Comparing patterns of technology use with firm profits, two stylized facts emerge. The first is that a firm's use of technology does not guarantee a more profitable business. About 63 percent of micro-enterprises utilizing technology still earn less than INR 10,000 (US\$ 150) per month.

However, the data also make evident the fact that most firms that earn higher incomes utilize technology. Among micro-enterprises earning more than INR 20,000 (US\$ 350) per month, over 90 percent are technology users, compared with 77 percent of all surveyed

firms. Technology may not guarantee business expansion, but the likelihood of a micro-entrepreneur growing his or her business in its absence is slim. Technology enables greater efficiency and greater outreach to customers. In particular, technologies such as mobile phones

– the most commonly used technology in the sample – act as a gateway to a wider customer base.

The majority of respondents were not familiar with specific technologies to help expand their business or improve productivity. Only 34 percent of respondents gave a specific answer when asked if they were aware of which technologies could help them expand their business (see **Table 3**). This could mean that their understanding of technology remains restricted to its immediate

Technology may not guarantee business expansion, but the likelihood of a micro-entrepreneur growing his or her business in its absence is slim since technology enables greater efficiency and greater outreach to customers.

function rather than its broader productivity-enhancing potential. It is also possible that the current scale of work is small, and they are not yet in a position to create streamlined production processes or invest in expansion. This highlights the fact that any intervention to boost

technology use among micro-enterprises must work in concert with other initiatives that can increase their ability to expand, such as access to affordable credit, and in turn leverage the economies of scale that technology enables.

Conclusion

Primary data from urban settlements in Ahmedabad reveal important insights on technology use among micro-enterprises and their potential to create jobs. Digital technology has reached some of the poorest micro-entrepreneurs in the Global South's urban slums and has influenced their business operations.

In Saraspur and Sarkhej, even though a large share of micro-entrepreneurs use technology, they do not always leverage its full potential. For instance, firm owners are using mobile phones to communicate with customers through voice calls, but rarely did these owners use their phones in other ways, like SMS-based accounting systems. Moreover, few firms used technology that was more advanced than the mobile phone and in the case of tailors, a sewing machine.

The limited use and simplicity of technologies suggests two hypotheses. First, micro-enterprises struggle to expand in size to a point where technology may be more useful to capitalize on economies of scale. Second, micro-entrepreneurs

often lack the necessary information and training to more successfully tap into the benefits of technology.

For technology to prove transformative for microenterprises – that is help them expand in size to become small and medium enterprises, improve efficiency and productivity and/or formalize – policymakers must adopt well-rounded interventions. Programs that improve

The limited schemes that define technology only in terms of large industrial machines completely neglect more affordable, smaller technology inputs that can revolutionize micro-enterprises.

access to credit and offer loans to finance better technology, trainings that include modules on using simple technologies in an impactful way, and slum upgrading initiatives that take into account the specific needs of MSMEs operating in informal settlements would help micro-enterprises harness the benefits of technology.

Beyond policies to improve technology at the firm level, a successful approach would also take into account the unique factors applicable to micro-enterprises. Currently, schemes aimed at supporting the MSME sector tend to be more appropriate for small- and medium-sized

firms rather than micro-enterprises. The micro-entrepreneur may be accessing finance through microfinance institutions and may have some skill-building opportunities, but still may not be able to access information and technology. The limited schemes that define technology only in terms of large industrial machines completely neglect more affordable, smaller technology inputs that can revolutionize micro-enterprises. For example, amongst the entrepreneurs who were tailors, 25.1 percent requested the efficiency-enhancing Juki sewing machine,^{*} a machine that has in-built programs for designs, patterns and buttons, and costs INR 10,000 (about US\$ 150) in the market. A credit-linked subsidy scheme for such an appliance would be welcomed by many micro-entrepreneurs.

Technology has the potential to be a catalyst for business development, job creation and growth among the smallest enterprises. Moreover, the fact that women micro-entrepreneurs and business owners in marginalized communities are using technology at similar rates as peer firms means that the micro-enterprise sector may hold opportunities to improve livelihoods for female and other marginalized workers. A more integrated policy approach that recognizes and addresses the particular needs and constraints of micro-enterprises – even within larger schemes such as the “Smart City” initiative – can unlock the potential of technology to expand micro-enterprises and grow them into successful businesses that generate new jobs.

^{*} This machine has an automatic Needle threader, White LED Light, 4-Step Buttonholing, 7-Point Feed Dog, 22 Stitch Pattern and Buttonhole.

Endnotes

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