

CHAPTER 1

INFORMATION AND COMMUNICATION TECHNOLOGIES FOR EVERYONE

INNOVATIVE WAYS TO REACH THE MAJORITY OF THE WORLD

Information and communication technologies (ICTs) have revolutionized our lives by changing the ways we live, play, work, communicate, learn, manage our finances, and stay healthy. But for people living in the poorer areas of our planet—usually areas with insufficient infrastructure, environmental challenges, weak governance, and few resources—this is not the case. The majority of the world’s people—the four billion at the bottom of the global economic pyramid—remain largely unable to capitalize on the ICT revolution.

Why? There are many reasons, but the primary ones are:

- Technology is usually not affordable; it’s too expensive in relation to their purchasing power.

2 INFORMATION AND COMMUNICATION TECHNOLOGIES

- Technology is often not relevant to their needs.
- Technology may not be accessible because the context in which it was designed—for a literate, affluent, educated population—is very different.

What if we could change all this? What if ICTs were affordable, relevant, and accessible? What impact would that have on reducing poverty and improving lives? What barriers need to be overcome before that can happen? What innovation is required?

A COMPUTER FOR EVERY CHILD—A GREAT IDEA, BUT . . .¹

The vision of One Laptop per Child (OLPC) generated significant enthusiasm. It was seductive to imagine solving the world's education problems by giving an inexpensive \$100 PC to every child. However, the impact fell short of the lofty expectations. The cost, low by developed countries' standards, still represented a big fraction of the annual income of the target audience. It was still a PC, which meant it needed a usable electric grid, which is unreliable in most developing countries. It also needed literate people to use it, which made it inaccessible to more than 40 percent of the population in some countries. Furthermore, these machines are sophisticated and powerful, and require high expertise to maintain and service them, which was another missing element. And most important, the magic of hardware comes to life through great software. Since the purchasing power of this group was perceived as low, vendors did not invest in creating compelling software applications for them, further reducing the case for buying the laptops.

After many years and millions of dollars of investment by the countries least able to afford it, the outcomes have fallen short of the expectations. Few machines were built and sold. The ones that were built will probably face a limited future since there is no ecosystem and capacity to repair and maintain them. The impact, such as it was, was instead felt in developed economies where the specter of OLPC forced PC makers to reduce costs and come out with a new and competitive category of Netbooks.

What partnerships need to be forged? Are there lessons from other arenas such as consumer products that might be applied? What could multinational corporations (MNCs), nongovernmental organizations (NGOs), governments, and most important, individual entrepreneurs do to facilitate the process?

These are some of the questions and possible solutions we explore in this book, drawing from actual successes and failures from the field.

What Are the Needs of This Group?

Poverty is more than just a lack of money—it is a lack of opportunity, rights, and resources. It is created by ill health and poor or no health care, inadequate housing and transportation, illiteracy, and racial and gender discrimination. It can be affected by things as personal as one's actions and as uncontrollable as the weather. Poverty is caused by things as small as lacking a few dollars of credit and as large as war, national debt and international trade policies.

—Shannon Daley-Harris, Jeffrey Keenan,
and Karen Speerstra, *Our Day to End Poverty*

Every day, facts wash into our minds and seep out again nearly as quickly. Throughout this book, we've highlighted some of the facts you might wish to remember. But one fact that has been bandied about for the past few years bears considering here: *Nearly half of the world lives on less than \$2 a day.* They live on today's food, today's energy, today's clothing, and today's chances of staying alive.

They need to augment their meager incomes. They need to provide food and shelter. They need to take care of their health and the health of their children. They need to educate their families and learn more themselves. They need to learn to survive in a world short of resources and becoming more constrained each day.

But as we learned from *The Next 4 Billion*,² there are still four billion consumers. They buy things, albeit usually at much higher cost than need be.

People at the base of the economic pyramid are customers with the power to choose—not simply “beneficiaries.”

—Ashish Karamchandani, Michael Kubzansky, and Paul Frandano, “Emerging Markets, Emerging Models”

Billions of consumers will be reached only by using innovative techniques and different business models from the ones in use in the rest of the world. As Prahalad and Hammond have said, “to reach them, CEOs must shed old concepts of marketing, distribution and research.”³

Can ICT Really Help?

Yes it can—by reducing transaction costs and by reducing the level of skills required to deliver services. Take, for example, efforts to provide health-care services at a fraction of the cost of similar services in the developed world.

As Figure 1.1 illustrates, costs of health-care services provided are largely determined by the location where those services are provided and by the skill level of the person providing those services.⁴

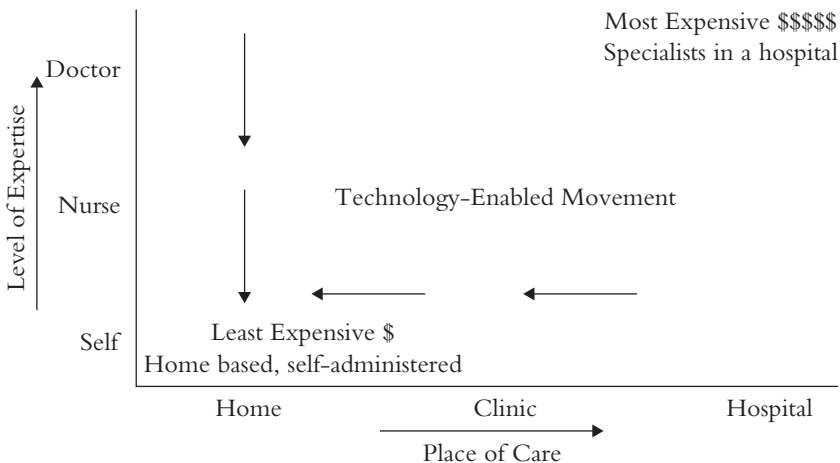


Figure 1.1 Impact of ICT on Health Care

Source: Adapted from Clayton Christensen, Jerome H. Grossman, and Jason Hwang, *The Innovator's Prescription: A Disruptive Solution for Health Care*. New York: McGraw-Hill, 2008.

Services provided in a hospital tend to cost more than those provided by clinics. Similarly, doctors cost a lot more than nurses. One way to reduce costs is to provide the same service, with similar health outcomes, in a cheaper place, and performed by a less skilled person. As we show in Chapter 2 on health care, ICTs can help achieve that goal. This is critical in an inequitable world where there will never be enough doctors or hospitals for everyone.

This cost reduction in providing essential services is really key to providing affordable access in tightly resource-constrained environments, as is the ability to provide sophisticated services with less trained people. Pursuing this vision has forced technologists, businesses, academics, leaders, and practitioners alike to think and act more creatively. We have had to move away from our trusted old business models based on wealthy customers' ability to purchase goods and services. Technology must be designed to respect the constraints of the environment and the needs of different groups. When they are ignored, the product or service is doomed to fail.

The fact of the matter is that in this world of limited resources we will never have enough doctors, teachers, or bankers to meet the needs of all people in the world. We have no option but to explore (1) ICT and other innovations targeted at poor populations, (2) new partnerships between the for-profit and not-for-profit entities, and (3) new business models. While it's certainly true that many multinational corporations have found ways to reach poorer consumers—look at fast foods and soft drinks—for-profit businesses cannot, or often will not, solve the challenges of reaching this huge base of potential customers on their own. Innovative partnerships with NGOs, international organizations, and local efforts must all be part of the solution.

That's what this book is all about. Many researched efforts have performed well; some have failed miserably; other ICT methods we have yet to discover may provide positive solutions for many regions. Take, for example, KioskNet.

KIOSKNET TO THE RESCUE⁵

Internet kiosks, or telecenters, provide a great service for people who don't have any other way to send and receive emails and photos or videos—when they work.

Unfortunately, within a few months of installation, all but a few fail. Frustrated users stop coming and, of course, investors become extremely skeptical. Computer kiosks are now empty for several reasons. Weak infrastructure offers intermittent electricity at best, and generators are expensive and require further maintenance. Dial-up often malfunctions in poor rural areas due to floods, landslides, wind-driven misaligned antennas, and faulty construction. Empty kiosks can be partially blamed on unstable software, malfunctioning PCs, and very few available high-cost technicians. No wonder that kiosk companies and collaborating partners become discouraged.

This seems like another good idea rapidly decaying by the wayside. Or is it? Enter KioskNet.

After a conference conversation in 2006, Professor Srinivasan Keshav of Canada's University of Waterloo and his colleagues set out to outfit existing kiosks with cutting-edge wireless technology. KioskNet—a Microsoft-funded three-year research project—now involves more than 20 researchers and various collaborating supporters.

Take some solar panels to recharge the kiosk battery, they suggested. Add a recycled PC, a car battery to power the kiosk during power outages, and a controller box, and—here's the interesting part—pick up the data accumulated in the kiosk server by using a computer mounted in a bus or truck that passes by on a regular basis. The "kiosk ferry" then drives by a "gateway" computer, which is always connected to the Internet, and transfers the kiosk data as well as picks up any data intended for the kiosks along the bus/truck ferry's route. It's a process called "Mechanical Backhaul" and was pioneered by the Massachusetts Institute of Technology's (MIT's) DakNet project for delivering data, but the MIT folks may not have thought of mounting it on an old car or bus. A small rechargeable computer inside the ferry has a WiFi card and storage and a routing protocol.

How about maintenance for outpost kiosk locations often plagued by heat and dust? Kiosk controllers need upgrading and patching from time to time and even semi-field technicians are few and far between. Researchers have devised a threefold backup centralized management and maintenance subsystem that zips and can send updates over one of three channels. It's robust and tolerant and it works.

And here's the best part: The KioskNet project gives away the software to make this work with no patent or copyright restrictions.

Of course, there is still the heat and dust, but creativity knows no bounds and those problems also can be solved by thinking "outside the kiosk," as Keshav and his colleagues have proven.

It's an exciting time to be facing the challenge of feeding, housing, and keeping healthy and safe the four billion and still protect the fragile environment we all call home. There are, however, many difficulties ahead.

WHAT ARE THE BARRIERS TO SUCCESS?

Many once believed that once everyone had access to the Internet, information and communication channels would become universally available. Not true.

Not all e-mail accounts are equal because not all social networks are equal.

—Kentaro Toyama, NetHope Summit,
Redmond, WA, May 20, 2009

They also paid attention only to one-time costs when in reality even low-cost PCs at about \$100 per child escalate up to another \$250 per year per child when you add in replacement software, breakage, theft, connectivity charges and power, administration expenses, and teacher training.

Many businesses hoping to serve the four billion people at the bottom of the economic pyramid are unaware of the opportunities as well as the problems. For one thing, they have not fostered innovation that meets very different cultural needs. They may have overlooked, for example, that they're designing ICTs for people who can't read or write well and who may be living in an environment where electricity is at best only sporadically available. The businesses may not use appropriate business models since the ability to purchase technology goods is far lower than their usual customers'. They may be unaware of how to price, how to market, how to distribute, and how to nurture a sustainable chain of supply. And they may underestimate how long it will take to enter the market; in other words, they may lack foresight, experience, and patience.

Of course there are many other factors keeping our well-intentioned efforts from succeeding, such as lack of capital, lack of local expertise, cultural differences, suspicion of outside meddling, and the inherent complexity of technology.

WHERE ARE WE TODAY?

Broad awareness of the business potential of the bottom of the pyramid (BoP) exists.⁶ Corporations realize that there is a real market for them to serve. More and more companies are realizing that *low* incomes do not mean *no* income. Once people's food and water and other basic needs are met, there is, according to *The Next 4 Billion*, a total base-of-the-pyramid household income of \$5 trillion.⁷ That is the incentive for companies—large and small—to enter those markets.

Targeted Innovation

There is also awareness that new innovation would be required to serve the needs of this market, especially since the ability to enter developing markets in low-income countries using technologies from advanced economies has proven to be a great challenge for technology leaders.

Take the multidisciplinary team approach to research used by Microsoft Research India, formerly headed by Kentaro Toyama, as an example. Many classrooms can afford only one computer, so the team's Multiple Mice for Computers project enables several children to share a single classroom computer for the cost of a few extra mice. They developed software that allows multiple mice with colored cursors to appear on the monitor at the same time. They continue to explore this possibility, and trials reveal that five mice show no visible degradation in the children's ability to interact with the PC. Students become more engaged with software when they are working together. At the same time, they are learning joint decision-making and other collaborative insights and skills. We will soon know if these technologies find success in the marketplace because products have been *commercialized* or made available to customers. In this case, Multiple Mice research has led to real-world products such as Microsoft's MultiPoint Mouse, Mouse Mischief, and the MultiPoint Server in partnership with Hewlett Packard.

In a similarly innovative effort, Microsoft Research India's Digital Green Project, in collaboration with the GREEN Foundation, offers short agricultural videos to marginalized, illiterate farmers with

REAL PRODUCTS CAN MEET REAL DEMANDS

Most governments seek to drive twenty-first century skills for their citizens. Educators want to provide increased student technology access to harness the tools necessary in the global information age. However, most schools cannot afford computers, let alone 1:1 access per student. Recent innovations aim to overcome this challenge through energy-efficient, lower-cost hardware, software, and peripherals.

Shared-resource computing allows one computer's excess capability to support multiple users at the same time, thus lowering acquisition costs, operating expenses, management complexity, and energy consumption. Shared pointers and mice also allow for collaborative learning and increased student-teacher inputs. In this way, products like these can bring the benefits of information technology to the other 90 percent of the world's people.

about three acres of land. The videos focus on sustainable agricultural practices and natural seed diversity. The project maintains a topically indexed online video database for easy downloading and disseminating to a variety of venues available, including “on-street” showings. This kind of training has proven far more effective than any other. This is partly due to the fact that the information contained in the videos is of an immediate and personal nature so that many farmers identify quickly with the videos.

Another research group at the University of California at Berkeley, TIER (Technology and Infrastructure for Emerging

INNOVATION FROM EMERGING MARKETS: JOHNSON & JOHNSON’S BABYCENTER

Johnson & Johnson launched its BabyCenter mobile campaign with mobile agency Velti in 2007, first in India and then worldwide. One offshoot targeted young, pregnant Latina women, as PC Internet availability is very poor within this demographic. A *New Media Age* article profiled BabyCenter’s global campaign:

[Pregnant women] were invited to text their due date to a short code to join the community and receive advice and product offers relevant to the stage of the pregnancy.

After 12 months, the community had attracted several thousand members and was achieving retention rates above 90 percent on a monthly repeat opt-in. As a result, BabyCenter rolled out an English version in the United States and now provides the same community-led service, including Booty Caller, a mobile ovulation alert service.

“The powerful aspect of BabyCenter is that it gives new and expectant mums the information they need when they’re on the move,” says Velti CEO Alex Moukas. “It doesn’t try to replicate the website experience on mobile but it does connect with the same community and quality content in an on-the-go experience that can be accessed by all phones. BabyCenter’s mobile service can provide constant reassurance and advice a woman can trust.”

Steven van Zanen, vice president of product marketing at mobile messaging company Acision, believes the key to the success of the campaign was relevance, which he says underpins all effective examples of mobile marketing: “It was targeted at a very specific audience, and by making it an opt-in service and encouraging users to provide their due dates, Johnson & Johnson could personalize and tailor the campaign to a fine degree.”⁸

Regions), is partnering with the National Science Foundation and others such as Intel, Microsoft, and Grameen Bank to create educational tools, such as their locally produced mobile software learning games and programmable cell phones; health-care options; wireless technology (WiLDNet); distributed storage possibilities; and speech technologies. Their low-cost solar-powered WiFi long-distance but locally managed networks now operate in India, Ghana, Guinea-Bissau, and the Philippines. TIER recognizes that because many users are illiterate or semiliterate, spoken language input and output should play a major part in the design of any user interface, which is usually only visual.

These are all examples of innovations that are specifically designed for the needs of the target segments because the existing technologies fall short. But there are other examples where powerful technologies are in search of a business model to reach users in need.

TECHNOLOGY IN SEARCH OF A BUSINESS MODEL⁹

What started as a college class assignment spawned an investigation that could help bring the benefits of modern microscopy to the developing world. Student researchers and their professor at the University of California, Berkeley, have developed a camera-phone microscope powerful enough to diagnose malaria and tuberculosis—diseases that still take a heavy toll in many parts of the world.

While diseases such as malaria and tuberculosis are largely under control in most of the developed world, they remain leading killers in many impoverished countries. Together, the two diseases kill more than 2.5 million people each year—the vast majority in Africa and other developing regions. More than 80 percent of the estimated 881,000 people who died of malaria in 2006 were African children under the age of five, according to the World Health Organization.

(continued)

It was against this grim backdrop that Daniel Fletcher, an associate professor of bioengineering at Berkeley, posed a challenge to students in his optics and microscopy class. Imagine you are working in a remote African village at the time of a disease outbreak, Fletcher told his students, and among your meager supplies you happen to have a camera cell phone and an assortment of basic optics lenses and mounts. Would it be possible to convert the camera phone into a sort of mobile microscope that could be used to diagnose disease? Soon after, Fletcher and his team, with funding from Microsoft Research and others, developed CellScope, powerful enough to use as a microscope in diagnosing tuberculosis and malaria and transmitting images to a physician or medical specialist anywhere in the world.

Overcoming the Barriers of Market-Based Approaches: New Business Models

There is not enough charity or aid to meet the needs of 4 billion people on an ongoing basis. Without sustainable—that is, profitable—businesses involved, efforts to address unmet needs must fall short.

—Allan Hammond, William J. Kramer,
Robert S. Katz, Julia T. Tran, and Courtland Walker,
The Next 4 Billion: Market Size and Business Strategy
at the Base of the Pyramid

Discovering appropriate business models has continued to be a big challenge. Even if technology is available, lack of suitable business models can result in MNCs not entering a market, quitting the market too early, designing the wrong product at the wrong price, and hence risking failure.

Low purchasing power and lack of infrastructure generally mean bigger upfront investment by businesses in developing the manufacturing, distribution, marketing, and sales infrastructure themselves. And it also means lower margins because they have to

price their products and services to be affordable. Investments in emerging markets also compete for resources with investments in opportunities in the developed world that offer surer and higher returns.

Companies are experimenting with different pricing, packaging, and distribution models. They are also bringing in innovative financing. These examples have been well documented by Prahalad in his book on the BoP, *The Fortune at the Bottom of the Pyramid*.¹⁰ For example, CEMEX, one of the largest manufacturers of cement in the world, started Patrimonio Hoy in Mexico, a program to allow customers to add onto their homes—one room at a time. Unilever is improving and expanding soap sales, and thus improving health, in remote and rural populations in India by offering smaller-quantity “sachets.” There are Indian e-Choupals, information centers linked to the Internet, that connect subsistence farmers with large firms, current agricultural research, and global markets to get better prices for their crops, better yield through better practices, and independence. There are countless other examples of experiments designed to innovate at the margins and many lessons learned.

There is also awareness that MNCs have to play in these markets as a matter of survival because of the disruptive potential of technologies developed to meet the needs of the BoP. There are strategic reasons why MNCs need to care about developing products for this segment because any innovation that addresses those segments will potentially outcompete MNCs’ offerings in the developed markets. We can already see this happening in the telecommunications market. Network operators in India and China have innovated in their business models to where they can be profitable while having the lowest and most affordable rates. Now their ambitions are becoming global and they are beginning to compete with European and U.S. operators. Similar stories can be told in other industries as well, such as Suzlon in wind energy, Mahindra in tractors, and Huawei in telecommunications gear. There is even a name for this phenomenon: *reverse innovation*. Companies like GE have taken this to heart and are

using this strategy to develop medical devices. They are, however, the exception.¹¹

Unconventional Partnerships, Unconventional Business Models

Just as businesses are reorganizing around the need to open up to innovative partnerships with NGOs and the public sector to benefit the impoverished, and doing so through a sustainable business model, in parallel the nonprofit world is realizing that sustainability of many development initiatives is hard to achieve without a viable business model. By combining their efforts, many organizations and businesses have made outstanding progress in addressing these emerging markets by better understanding product design and the real needs that exist.

We are seeing a new breed of *public-private partnerships*—those involving corporations, governments, universities, and intergovernmental agencies like the United Nations, World Bank, and NGOs. In fact, a new breed of organization is gaining currency—*social enterprises*—which are both business-savvy and results oriented. In our view, they are undervalued by for-profit firms seeking to enter developing world markets. These social enterprises are leading the way in adapting traditional business models to emerging markets and in meeting the world's most pressing needs through business and community practice.

Social enterprises consider the context of impoverished regions and have built successful business models that the for-profit sector can replicate, partner with, or expand upon. As businesses that seek to make the world a better place through their entrepreneurial focus on the common good, they are able to offer unique solutions to the world's problems that have emerged from local communities in need. Social ventures view the private sector far differently than those that consider MNCs as merely exploitative, instead viewing the private sector as a technology enabler locally, regionally, and globally. Since government programs are limited

and donor funding intermittent, the private sector also offers a chance for long-term sustainability.

We bring an entrepreneurial attitude to our social mission, and we are committed to working with—instead of against—governments and the private sector.

—Bridges.org

Within poorer nations, governments and NGOs have played a prominent role in social and economic development. Both sectors have traditionally been slow to adopt technologies. The latter, however, has proven more effective than both the public and private sectors in identifying and securing new market opportunities, especially where none existed before.¹²

PEDAL PUMPS AND MORE¹³

In India, 70 percent of the farming population cultivates tiny farms that grow even smaller each year because of rapid population growth. Farms are rain-fed and monsoon driven, with few alternative sources of irrigation. Large farmers can afford diesel-operated water pumps. An Indian not-for-profit organization, IDEI (International Development Enterprises of India), saw the need to engage in the development of simple and affordable pedal pumps for small farm and other relevant technologies for farming and water irrigation. Thanks to donor funds, IDEI is now active in ten Indian states. Since its inception in 1991, 350,000 farmers in northeastern India alone, where water tables are high, have purchased pedal or treadle pumps.

In more arid parts of India, IDEI supplies AdITI kits—affordable drip-irrigation technologies enabling growers to produce off-season crops—to 85,000 small or marginal farmers. Women, in particular, are benefiting from this micro-irrigation technology that delivers water

(continued)

directly to the roots of plants. They are now able to stay at home to operate the light bucket-and-drum kits, providing needed income they otherwise had to get by traveling to often-exploitive mills and factories. They no longer fear harassment, nor do they have to leave their young children with older siblings. Furthermore, their farm-fresh vegetable and fruit diets have shown a remarkable increase in healthier families.

Because isolated interventions are rarely sustainable, IDEI partners with various stakeholders to create a strong demand for the technology along with a dependable supply chain: NGOs, market forces, and agriculture and research institutions work along with the farmers to create more stable production and markets. This synergy stimulates the private sector to provide affordably priced tools and technologies and at the same time creates a pro-poor market raising the level of small farm incomes.

Another IDEI project focuses on removing obstacles to both buyer and seller in the marketplace, along with training farmers in successful crop management and output marketing.

At the time of this writing, IDEI has a viable network of about 35 manufacturers, 100 distributors, 325 dealers, 1620 assemblers, and 225 NGOs to support the output keeping 450,000 farmers in business. That's a lot of pedal pumps—and more!

These business models take significant time and experimentation to develop (often five years or more). This creates a significant problem for the investment time horizons of for-profit organizations seeking to tap the bottom of the pyramid as quickly as possible. NGOs are able to do much more of the initial creation of the business model infrastructure. This suggests a surefire formula to resolve the time-horizon issue for for-profit companies: Engage with NGOs to assist in the discovery and creation of business models. From the NGOs' perspective, enlisting the involvement of for-profit firms creates sustainability for a technology and scaling up of the impact, and enables the social enterprise to exit and search out the next opportunity.

KICKSTART: A SUCCESSFUL BUSINESS MODEL

Hoping to eradicate poverty by building a middle class from the bottom up, Nick Moon and Martin Fisher started ApproTEC in 1991 in Nairobi, Kenya. In 2005, Approtec became KickStart. According to KickStart's website, "their model was based on a five-step process to develop, launch and promote simple money-making tools that poor entrepreneurs could use to create their own profitable businesses."¹⁴ KickStart designs and develops low-cost tools, equipment, manuals, and business plans required for establishing small enterprises in Kenya and Tanzania and Mali, among the world's poorest nations. There is much to be learned from the firm's comprehensive approach. Its most successful product, thus far, is its Super MoneyMaker (SMM) manually operated irrigation pump. *Fast Company* pointed out in 2005:

East African farmers who buy the SMM irrigation pump easily recoup their investment in their first crop cycle and, in Kenya, are making more than \$1,100 profit per year, increasing their annual farm income by a factor of 10 and more than doubling their total income. For the first time they can properly feed and educate their families, pay for health-care, and invest in their futures. They are on an upward spiral of growth rather than a downward spiral of poverty.¹⁵

But more than creating usable products, the company makes an effort to build and develop the entire value network for its product in a market where the nodes of the network—manufacturers, distributors, finance providers, marketing partners, and others—are not initially present and functioning at a level necessary for the success of the business model. KickStart takes a leadership role at all levels of the network with the goal of eventually allowing each node to achieve sustainable profitability. As a result, the risk is reduced for the entrepreneur and coordination is built into the entire business system.

KickStart has its own commissioned sales staff and promotes the new technologies and installs them in the private sector to ensure that they are well known, easily available, and purchased by thousands of small-scale investors. The firm recruits and trains a

(continued)

network of local retail shops and then buys the technologies from the manufacturers and sells them with a markup to the retailers. Finally, the company develops cost-effective marketing tools to promote and market the new equipment to local entrepreneurs, including:

- Live demonstrations at the retailers
- Radio and newspaper advertisements
- Mobile truck-mounted demonstrations in local villages
- Demonstrations at local shows and exhibitions

The local entrepreneurs/investors buy the technologies from the retailers and use them to establish profitable new businesses. By reducing investment and risk, and increasing coordination, KickStart increases the chance that these entrepreneurs will be profitable, promoting sustainability for the business. Note, though, that KickStart does not attempt to eliminate risk from the distribution channel. Entrepreneurs must still make risky investments and compete with others for the business. This imposes market discipline on the distribution system.

It measures the number of new businesses and jobs created and the amount of new profits and new wages earned by the new entrepreneurs and their employees. These impacts are compared to the costs of the program. This enables KickStart to learn from its experience, and develop best practices for future initiatives.¹⁶

Before a new product is introduced, KickStart makes sure they have the market research identifying small business opportunities. Then the firm designs a low-cost tool or piece of equipment, develops a sustainable and profitable supply chain from manufacturer to retailer, and then mass-markets that new technology to the farmers or other rural residents. Once the company's critical mass of buyers has been reached, it no longer markets the product. At that point, sales will continue to grow without more promotion.

By June of 2010, this business model has led to the following impressive results:

- 150,000 pumps have been sold
- 97, 500 new businesses have been started.
- 288,000 people have moved out of poverty with annual profits and wages in excess of \$98 million dollars¹⁷

There are many similarities between a master franchisor in a developed economy and a social enterprise. They both must develop the entire business architecture, and recruit outsiders to invest their own time and money in a portion of that architecture in order to bring it into being.¹⁸ During the initial bootstrapping of the value network, the nonprofits are the hubs of that network. Unlike master franchisors in advanced economies, though, the social enterprise leaves the great majority of profits for local small businesses in order to build a sustainable economic ecosystem and provide incentives for local entrepreneurs. The creation of profits throughout the value chain is critical for NGOs and social enterprises to be able to move on and allow local small businesses to sustain the manufacturing, sales, and installation of the products. Nonprofits may better address developing-world issues because of their long time horizons, their alignment with the community interest, and their comprehension of the overall context of use. Nonprofits primarily focus on social benefits, and see the profit model as a means to that end. Nonprofits view the profit model as an exit option that facilitates sustainability once the nonprofits have moved on to new initiatives.

Success Strategies

Allen Hammond and his colleagues, who created *The Next 4 Billion*, outline four broad critical strategies for success:

1. Focusing on the BOP with unique products, unique services, or unique technologies that are appropriate to BOP needs and that require completely reimagining the business, often through significant investment of money and management talent. Examples are found in such sectors as water (point-of-use systems), food (healthier products), finance (microfinance and low-cost remittance systems), housing, and energy.

2. Localizing value creation through franchising, through agent strategies that involve building local ecosystems of vendors or suppliers, or by treating the community as the customer, all of which usually involve substantial investment in capacity building and training. Examples can be seen in health care

(franchise and agent-based direct marketing), ICT (local phone entrepreneurs and resellers), food (agent-based distribution systems), water (community-based treatment systems), and energy (mini-hydropower systems).

3. Enabling access to goods or services . . . [This may involve different packaging strategies that lower purchase barriers, prepaid or other innovative business models that achieve the same result, or the use of alternative financing and distribution strategies or deployment of low-cost technologies.] Examples occur in food, ICT, and consumer products (in packaging goods and services in small unit sizes, or “sachets”) and in health care (such as cross-subsidies and community-based health insurance). And cutting across many sectors are financing strategies that range from microloans to mortgages.

4. Unconventional partnering with governments, NGOs, or groups of multiple stakeholders to bring the necessary capabilities to the table. Examples are found in energy, transportation, health care, financial services, and food and consumer goods.¹⁹

Based on successful deployments, we conclude that the successful innovative products have been implemented through a business model that was locally relevant and customized. And sound leadership and assistance to local entrepreneurs were provided in order to build up sustainable networks that can continue to deliver the product into the marketplace.

Introducing technology to the poor, for instance, has been attempted in various forms. One of the more successful methods is the Grameen Bank’s “phone ladies,” who live in areas without phone services. Dr. Muhammad Yunus founded a bank in Bangladesh ready to provide loans of about \$100. Bangladesh alone now has 7 million borrowers, 95 percent of whom are women, since men are more likely to be credit risks while women generally pay back the loans. Hajera Begum is one phone lady who bought her “business in a box”—a Finnish-made mobile phone, a battery charger, a stopwatch, a calculator, and an advertising signboard—to set up her business for about \$400; she makes weekly payback installments of \$5. She charges her neighborhood

MICROSOFT ADDRESSES NEEDS, CONFRONTS BARRIERS, AND REALIZES MARKET POTENTIAL²⁰

Microsoft has made a long-term commitment to research and development on (and increasingly *in*) emerging markets and innovative partnerships required to reach new and potential clients.

Raising Awareness

Microsoft Research ran multiple requests for proposals (RFPs) to identify and fund research in universities around the world to advance the state-of-the-art technologies relevant to challenges of the developing world. Some of these have been global and some have focused on regions such as India and Latin America. They have targeted advances in technology for applications in education, health, environment, and microeconomics. Some examples of the problems tackled are:

- Create new infrastructures, form factors, and applications of mobile devices (which include mobile phones or embedded devices).
- Improve connectivity, particularly in environments without existing network infrastructures or with intermittent availability, to networking and power. Challenges in wireless networks would be a relevant theme in this category.
- Design appropriate user interfaces addressing challenges in literacy and for novice users of technology.

While the initial funding was around \$3 million, Microsoft was the first company of its size and scale to legitimize this field of research. One aspect of the RFPs that was unique was that this was a partnership between corporate research and community affairs and encouraged academics to partner with NGOs to submit and implement their proposals. Now, many more agencies have an active program to pursue these areas of inquiry and many have matched their own funding to push the research further.

(continued)

Microsoft has also created competitions such as the Imagine Cup and Developers Without Borders to encourage nascent developer communities to create innovative technologies. Imagine Cup, Microsoft's annual technology development competition for students from around the world, challenges participants to create software solutions that address a specific societal need, ranging from education to health care to the environment.²¹

To give the community a forum and voice to publish and discuss research in this space, Microsoft became a founding member of the IEEE/ACM International Conference on Information and Communication Technologies and Development (ICTD). Former Microsoft chairman Bill Gates served as its keynote speaker in 2009 in Doha Qatar, and the journal (*ITID*) that was spun out of the first ICTD conference event is already considered a top venue for publishing in this field. On the ground, its Community Affairs teams have been working globally in over 110 countries in support of expanding access to community-centered technology centers. The program has a digital literacy curriculum, and sponsors community technology centers that often serve as training centers for the local population. The group also has a program in NGO capacity building through TechSoup and Telecentre.org nonprofit programs. The company has also co-funded the *ITID* journal for the past several years, providing the opportunity for academics to publish peer-reviewed works.

Conducting Research

Microsoft's Bangalore lab, which opened in January 2005, represents the company's effort to tap into India's rich university research community and considerable software engineering talent. The Technology for Emerging Markets research group has been a pioneer in applying both social-science research and technology innovation toward the needs and aspirations of two kinds of communities worldwide: emerging markets, whose members are increasingly able to afford computing technologies and services, and underserved communities, for whom access to computing remains largely out of reach. This multidisciplinary group has been responsible

for work on microfinance, social entrepreneurship, intra-family technology sharing, and children's sharing of resources. In addition to influential work on text-free interfaces, the group's work on multiple mice for shared computing has been expanded and made available to emerging-market users. The group also contributes to worldwide efforts in information and communication technology for development and to Microsoft's Unlimited Potential efforts in emerging markets.

Creating New Business Models

One of the company's goals is to provide the most appropriate applications and technologies for new markets and the platforms that local content developers can fully utilize. Business groups have developed new models and products to service low- and middle-income segments of the world. Through shared-access devices, prepaid/postpaid solutions, mobile plays such as health-care applications with CARE and microfinance tool with FINCA, it enables access and tailored services to its new customers in the majority of the world. With lower-cost pricing models for software in some countries, Microsoft is working to enable an infrastructure and platforms that broaden its base of users to learn, to communicate, and to share.

villagers a nominal fee to send and receive calls from her phone. Grameen and their international partners who own and operate the phone system bill her about 4 cents a minute for outgoing calls and a dollar a minute for international calls. Incoming calls are not billed. Phone ladies have now formed a national network and are the basis for an expanding high-tech industry. They earn about three times as much as the average annual income. Village phone projects are currently underway in Uganda, Rwanda, Indonesia, Cambodia, the Philippines, and Haiti.

In a similar vein, solar energy systems designed by Grameen are being rented out by their owners so they can augment their incomes and break out of poverty.

Success Stories

We will be highlighting many of these global success stories, some market based, some representing unique innovations, in the pages that follow. Here are some quick snapshots of a few of them:

- Research labs and universities such as Microsoft Research; University of California, Berkeley; Carnegie Mellon; and Massachusetts Institute of Technology have successfully grappled with access gaps using cell phones, low-cost wireless, and other technologies.
- A team of researchers at the Massachusetts Institute of Technology worked to create wireless sensor networks to provide early flood detection in underserved countries.
- A team of researchers at the University of Buenos Aires is developing technologies to marry wireless smartphones to low-cost diagnostic tools such as electrocardiograms to send preventive care information.
- The Intel-powered Classmate PC, a rugged laptop for kids, with its lightweight design and water-resistant keyboard, is looking promising for low-income classroom use.
- In March 2007, Kenya's largest mobile network operator, Safaricom (part of the Vodafone Group), launched M-Pesa, an innovative payment service for the unbanked. Its rapid take-up is a clear sign that there is market demand for faster, cheaper, and more efficient ways of moving money.
- Celtel, an entrepreneurial company operating in some of the poorest and least stable countries in Africa, went from start-up to telecom giant in just seven years.

Action Plan

The most critical step for an MNC planning to venture into this space is to understand the problem that has to be solved and to determine whether technology and business models exist to help solve it.

As Figure 1.2 illustrates, if the technology doesn't exist, then you have to go back to R&D to help create it, from ground zero

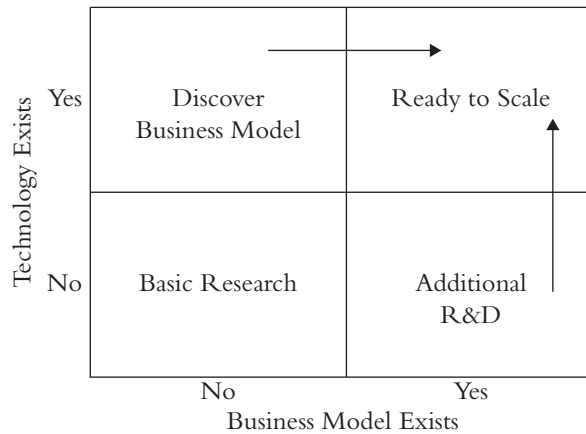


Figure 1.2 Action Plan

or by modifying existing technologies. If, however, the technology exists, but the business model is not clear, this has to be discovered. This process can be long and expensive, because the margins are small due to the limited purchasing power of the target segment, and significant returns can take a long time to materialize. As we pointed out earlier through many examples, NGOs can help at this stage due to the way they operate and their nonprofit motive. They also have the local context and relationships that can reduce the cost of discovery. Hence the optimal strategy in this case is to partner with NGOs to discover the business model and build local capacity.

If both the business model and the technology are known and tested, the real impact comes from scaling up. MNCs have the means and knowledge to do that. Through the scaling up, they not only become sustainable as a business; they can impact a larger number of people in a positive way. Since this is closer to their core strength, they can rely on their more conventional partnerships.

The most expensive mistakes happen when the MNCs do not accurately identify the nature of the problem and the maturity of the technology and business models available to solve it. If the technology doesn't work, business models can't sustain it and any

entry is premature. If the business models don't work, the companies will likely lose a lot of money before deciding to exit. They are also less likely to reconsider the opportunity later.

SUMMARY POINTS

- ICT has the potential to positively impact the lives of those at the bottom of the pyramid by providing products and services in a resource- and skill-constrained environment.
- Successfully meeting these needs requires targeted innovation, appropriate business models, and partnerships between the for-profit and the not-for-profit world.
- Products and services have to be designed to meet the local context and must be affordable, relevant, and accessible.
- Enough evidence is emerging about what works and what doesn't in the fields of health, education, environment, and finance to guide the MNCs. The pipeline of innovations is also becoming richer.
- The action plan for MNCs requires them to determine the nature of the needs and the availability of appropriate technology or business models, and then develop local partnerships to meet those needs.
- If MNCs do not develop products and services specifically targeted for the emerging economies, they are likely to get disrupted by local companies that perfect a business model that is profitable with low margins. These companies will eventually compete with MNCs in their local strongholds.

NOTES

1. Rabin Patra, Joyojeet Pal, Sergiu Nedeveschi, Madelaine Plauche, and Udai Pawar "Usage Models of Classroom Computing in Developing Regions," Second International Conference on Information Technologies and Development, IEEE Conference Proceedings, Bangalore, December 2007.

2. Allen L. Hammond, William J. Kramer, Robert S. Katz, Julia T. Tran, and Courtland Walker, *The Next 4 Billion: Market Size and Business Strategy at the Base of the Pyramid* (World Resources Institute and International Finance Corporation/World Bank Group, 2007).
3. C. K. Prahalad and Allen Hammond, "Serving the World's Poor, Profitably," *Harvard Business Review*, 80(9): 48–58, 2002.
4. Clayton Christensen, Jerome H. Grossman, and Jason Hwang, *The Innovator's Prescription: A Disruptive Solution for Health Care* (New York: McGraw-Hill, 2008).
5. Srinivasan Keshav, "The KioskNet Project," <http://blizzard.cs.uwaterloo.ca/tetherless/index.php/KioskNet> (accessed July 14, 2010).
6. C. K. Prahalad and Stuart L. Hart, "The Fortune at the Bottom of the Pyramid," *strategy + business*, Issue 26, September 2002; C. K. Prahalad, *The Fortune at the Bottom of the Pyramid: Eradicating Poverty through Profits* (Philadelphia: Wharton School Publishing, 2006); and Stuart L. Hart, *Capitalism at the Crossroads* (Philadelphia: Wharton School Publishing, 2005).
7. Hammond, Kramer, Katz, Tran, and Walker, *The Next 4 Billion: Market Size and Business Strategy at the Base of the Pyramid*.
8. David Murphy, "NMA Global Campaigns," *New Media Age*, www.nma.co.uk/features/global-campaigns/3003382.article, August 13, 2009.
9. Microsoft Research, "CellScope Could Offer Low-Cost Portable Options for Disease Diagnosis," <http://research.microsoft.com/en-us/collaboration/focus/health/cellscope.pdf>, 2008.
10. Prahalad, *The Fortune at the Bottom of the Pyramid*.
11. Jeffrey R. Immelt, Vijay Govindarajan, and Chris Trimble, "How GE Is Disrupting Itself," *Harvard Business Review*, October 2009.
12. Henry W. Chesbrough, Shane Ahern, Megan Finn, and Stephane Guerraz, "Business Models for Technology in the Developing World: The Role of Non-Governmental Organizations," *California Management Review* 338 (May 1, 2006).
13. International Development Enterprises (India): www.ide-india.org/ide/index1.shtml (accessed July 14, 2010).
14. KickStart, "About KickStart," www.kickstart.org/about-us (accessed July 26, 2010).
15. "ApproTEC: Winner's Statement," *Fast Company*, www.fastcompany.com/social/2005/statements/approtec.html (accessed July 14, 2010).
16. Chesbrough, Ahern, Finn, and Guerraz, "Business Models for Technology in the Developing World."
17. Martin Fisher, "Income Is Development: KickStart's Pumps Help Kenyan Farmers Transition to a Cash Economy," *Innovations* 1(1), Winter 2006.
18. Chesbrough, Ahern, Finn, and Guerraz, "Business Models for Technology in the Developing World."

19. Hammond, Kramer, Katz, Tran, and Walker, *The Next 4 Billion: Market Size and Business Strategy at the Base of the Pyramid*.
20. Microsoft, "Unlimited Potential," www.microsoft.com/about/corporatecitizenship/en-us/about/unlimited-potential (accessed July 26, 2010).
21. Microsoft, "Imagine Us," www.imagineusgulf.com (accessed March 2, 2010).