

Form, Transform, Platform

How the Ubiquity of Mobile Phones Is Unleashing an Entrepreneurial Revolution

The spread of mobile technology throughout low-income countries has given rise to prominent entrepreneurs like Indian-born Sunil Mittal and Sudanese-born Mo Ibrahim, who took the initiative to introduce the technology in large parts of India and Africa, respectively. Entrepreneurs like Mittal and Ibrahim, along with major mobile phone operators, have succeeded in making mobiles virtually universal and have deservedly become highly visible industrial leaders and role models for younger generations in terms of how to create new success stories. Mobiles themselves are in turn now unleashing thousands, if not millions, of entrepreneurs in low-income countries. These new entrepreneurs are less visible but nonetheless contributing to a dispersed entrepreneurial ecology on the ground that will change lives, create innovations, and strengthen democratic forces.

Numerous studies and accounts of mobile phones have discussed their global ubiquity, their substantial economic impact, and the extent of entrepreneurial possibilities they unleash. How can we better understand the scope of these new entrepreneurial roles? To start, we can observe that, for each new widely accepted technology, there are at least three phases of interaction between the technology and the economy, although the relative importance of these phases may vary for any given technology. Each of these phases gives rise to a class of entrepreneurs. I call these three categories *Form*, the development and utilization of a new base of purchasing power arising from increased user productivity; *Transform*, the new ways of doing business that further capitalize on the technology's possibilities; and *Platform*, the new applications based on the original root technology. With these three classifications, I seek to create a framework for understanding and analyzing the broad long-range implications of a widely accepted technology like the mobile phone.

Take the case of the Model T a century ago; Henry Ford, in this case, would be the equivalent of Sunil Mittal or Mo Ibrahim. When these affordable cars first

Iqbal Quadir is a professor of the practice of development and entrepreneurship at MIT, the founding director of the MIT Legatum Center, and the founder of Grameenphone in Bangladesh.

came out, their users travelled much faster, thus saving time and accomplishing more. The ensuing economic benefits allowed users to advance materially and gain the ability to purchase other goods and services. This created an opportunity for entrepreneurs to produce and sell these other goods and services. This is the category I call *Form*. Next, as the affordable cars became widely available, it became

We can observe that, for each new widely accepted technology, there are at least three phases of interaction between the technology and the economy, although the relative importance of these phases may vary for any given technology. Each of these phases gives rise to a class of entrepreneurs. I call these three categories *Form*, the development and utilization of a new base of purchasing power arising from increased user productivity; *Transform*, the new ways of doing business that further capitalize on the technology's possibilities; and *Platform*, the new applications based on the original root technology.

possible to build larger factories away from residential settings, employing more workers dispersed over a wider area who could drive to work. Complementary but non-automotive assets such as better roads and highways were built to fully capitalize on the benefits of automobiles. Shopping malls outside of city centers became desirable. With time, the economy adjusted to the new possibilities of automobiles. I label the entrepreneurs in this category of activities—rethinking and reworking solutions to the needs of the economy — a *Transform*. Finally, a third set of activities were launched to produce new kinds of vehicles (such as

trucks, vans, buses) on the original automobile Platform, to capitalize not just on the automobiles but also on the emerging complementary assets such roads and highways. Transform and Platform, moreover, in producing more value in the economy, gave rise to greater purchasing power and strengthened the impact of Form.

By exploring these categories, we can better understand the different entrepreneurs who emerge from each phase of the co-evolution between a widely accepted

technology, such as the mobile phones, and an economy. Entrepreneurs, in their own self-interest, capitalize on this co-evolution, but also in turn advance it. They benefit and are benefited by the blossoming of a technology.

FORM

Because mobiles are both accessible and empowering, they have been embraced en masse by people of all walks of life. Mobile phone penetration worldwide has skyrocketed since the 1990s; South Asia and sub-Saharan Africa, two of the world's poorest regions, together experienced an increase in penetration from 0 percent to 63 percent between 1996 and 2011. Increases in access form the foundation for broad-based purchasing power, giving low-income economies greater fertility for entrepreneurs in every imaginable area of human want, from consumer goods to housing and transportation.

Let us first explore why mobile phones have mass appeal. First of all, they are affordable even for average citizens of low-income countries. The cost of digital technologies has decreased steadily and dramatically because both hardware and software take billions of dollars to develop but only a few dollars to copy. At the same time, simple devices can cheaply accommodate increasingly enormous amounts of processing power due to continual advances in engineering and science. Second, unlike computers, which require literacy and training, people use only their voices to access the impressive processing power of mobile phones. Third, communication is a universally pressing and constant need, and people are eager to ease that process.

Beyond their wide accessibility and universal appeal, mobile phones are economically beneficial to billions of people of very low income, who generally cannot indulge in purchases that do not advance them economically. In easing the process of communication even over great distances, mobiles save time (which translates into saving labor), and money, and create opportunities, giving rise to higher productivity and earning. These saved resources can then be applied to other purposes, and a more complex and diversified economy arises, including producing the effects that I describe as Transform and Platform. Beyond economic progress, the increased incomes that give rise to Form and are further enriched by Transform and Platform allow citizens to hold their governments accountable—but that is a topic to be discussed elsewhere.

To get a sense of the magnitude of Form, let us return to the increase in mobile phone penetration in South Asia and Sub-Saharan Africa from 1996 to 2011. Building on a World Bank study of 120 countries, which found that a 10 percent increase in mobile phone penetration correlates with a 0.8 percent average increase in GDP growth, I calculate that the increase from 0 to 63 percent mobile phone penetration contributed on average an additional percent annual economic growth from 1996 to 2011.¹ Since these regions together grew at an average rate of 5.72 percent per year over this time period, I estimate that

they would have grown at 4.72 percent without mobile phones. This translates to a difference of a quarter trillion constant 2000 U.S. dollars in the economies of the world's poorest regions.² In today's U.S. dollars, the effect is much larger.

A quarter trillion constant 2000 U.S. dollars in additional purchasing power in the hands of people of all walks of life means greater demand for a wide range of products and services. This demand gives rise to opportunities for entrepreneurs to provide consumer goods, financial services, entertainment, transportation, edu-

A quarter trillion constant 2000 U.S. dollars in additional purchasing power in the hands of people of all walks of life means greater demand for a wide range of products and services. This demand gives rise to opportunities for entrepreneurs to provide consumer goods, financial services, entertainment, transportation, education, medical services, and many other human wants and needs.

cation, medical services, and many other human wants and needs. In addition, the widespread availability of communication technologies has enabled immigrant workers in high-income countries to better connect with their families in the rural areas of low-income countries: collective people-to-people remittances to South Asia and Sub-Saharan Africa are forecast to be \$128 billion in 2012.³ These remittances, like mobile communications in low-income

countries, boost the purchasing power of ordinary citizens and subsequently create opportunities for entrepreneurs. Let us also remember that of the revenues of the mobile industry, which total roughly \$40 billion in South Asia and sub-Saharan Africa alone, a portion have been supporting other entrepreneurs who are building cell towers and supplying computers, batteries, and other industry needs. The wages of employees in these supporting industries also contribute to Form.

Historically, increased purchasing power among consumers has activated entrepreneurs, producing significant economic growth. During the "Industrious Revolution" in England in the 17th and early part of the 18th century, ordinary people found opportunities to work more hours and raise their incomes so that they could attain a better standard of living by purchasing better and more goods. Entrepreneurs responded to such aspirations, contributing to the Industrial Revolution.⁴

TRANSFORM

In Form, entrepreneurs simply take advantage of the economic results of widespread and cost-effective communication. Such entrepreneurial opportunities are only the beginning, however. Individuals in a second category of entrepreneurs unleashed through mobile phones are rethinking the problems and solutions that can follow once pervasive connectivity becomes part of the context. Though it is hard to obtain quantitative data to illustrate this Transform phenomenon, I have seen enough cases to firmly believe that it represents a substantial component of the impact of mobile phones. Some of the Transform impact may have been captured in income growth figures, but some of it will continue to occur in the years to come.

In Bangladesh, I have seen even small farmers rethinking their world because of mobile phones, reworking and adjusting to new opportunities. They seized the opportunity to become entrepreneurs when useful information fell into their laps through pervasive communication. This example, in a way, is an enactment of Frederick Hayek's 1930s vision that everyone, armed with market information, could potentially become entrepreneurs. Hayek observed that an economy moves forward as individuals try to capitalize on dispersed bits of information available only locally. For example, I saw an owner of a small mango grove become actively involved in distant markets rather than the local market where he had traditionally sold his mangos. Discovering a discrepancy in prices between the markets by using his mobile phone, he capitalized on major arbitrage opportunities. As Hayek would have argued, the farmer made the economy as a whole more efficient as he sought to profit individually from the local information. The increasingly widespread availability of mobiles brings more of these dispersed bits of information into play, and small farmers, craftsmen, and traders became entrepreneurs rather than merely selling to middlemen.

In 2004, several years after mobile phones began to proliferate in Bangladesh, a barber told me an interesting story. Due to the rising cost of real estate, the barber faced a prohibitively steep increase in rent for his shop in a posh neighborhood in Dhaka. After his lease expired, he bought a motorbike and started visiting his existing clients to give them haircuts at their residences, using the addresses and mobile phone numbers he had collected before closing his street-front shop. He kept records of his home visits and began making phone calls several weeks after each visit to schedule another appointment. Clients found the in-home services more convenient, emboldening the barber to charge 20 percent more per haircut, all while avoiding paying high rent. As satisfied clients recommended his services to others, the barber steadily gained new customers. The mobile phone, in his own hands and in those of his clients, allowed the barber to rethink and transform his business.

I also met a doctor who, in order to practice medicine, had abandoned his rural ancestral home. Living and working a hundred miles away in Dhaka, the doctor was unable to make use of his significant amount of land and, for emotional

reasons, was unwilling to sell it. The emerging availability of mobiles, however, opened new possibilities for the urban doctor, and he organized a fish farm on his rural property. Equipped with a mobile phone, the doctor could travel to the village on weekends while staying in touch with his clinic and, likewise, keep in touch with his managers at the rural fish farm during the workweek in Dhaka. The mobile phone had transformed the potential use of the land.

Prior to the spread of mobile phones in Bangladesh, many wealthy apparel factory owners built their manufacturing facilities near their expensive, posh urban residences by necessity, given the lack of quality telecommunications, electricity, and road connections. Owners paid high prices for land, and workers who had been uprooted from their villages struggled to survive on low wages in the expensive urban areas. Though many owners continue this practice, others, motivated by better communication through mobile phones, have begun to locate factories in less expensive areas away from their own homes.

These stories illustrate some of the countless ways that economic assets have been creatively redeployed in low-income countries, capitalizing on the availability of widespread communication facilities and improving livelihoods. Rethinking and redeploying physical assets is one important way that mobile phones have mobilized entrepreneurs. People like the farmers, the barber, the doctor, and the factory owners are able to use their existing skills and assets in new, more productive ways.

As I described earlier, all technologies help Form, Transform or provide a Platform, some to a greater or lesser extent than mobile phones. The effect of personal computers in the U.S. economy may be of interest in this context. Though computers spread widely throughout the 1970s and 1980s, it takes time for businesses and entrepreneurs to rethink their activities and attain higher productivity through new technologies, and increased productivity did not immediately follow. Until about 1995, the annual growth in output per worker per hour hovered around 1 percent; Robert Solow, winner of Nobel Prize in Economics, famously said in 1987 that one could “see the computer age everywhere but in the productivity statistics.”⁵ However, growth in productivity jumped to above 2 percent in the mid-1990s and continued for a decade, an increase that has been attributed to the widespread use of computers.

Why did it take decades for computers to increase productivity? Mobile phones, which bring communication to people who were previously unable to afford or access communication technology, affect the economy on a fundamental level: anywhere someone is interacting with another person. Because interaction and coordination between any two individuals is a pervasive need, an increase in efficiency in these activities immediately affects the economy. Computers, which are more costly and complicated to use, impact the economy on a more sophisticated level. They are therefore less likely to increase productivity and purchasing power through simple ownership; instead they require creative transformations of surrounding complementary economic assets, which takes a significant amount of time.⁶ In my language, at least in terms of growth in

productivity, computers may have had a small initial Form but relatively larger Transform and Platform which subsequently led to a larger Form. Computers, of course, have enriched lives in many ways not necessarily reflected in the figures for growth in output per worker.

PLATFORM

We see now that mobile phones give rise to greater incomes among users, boosting their purchasing power and, in turn, creating opportunities for Form entrepreneurs. Over time, mobiles unleash new ways of production or distribution, opening Transform possibilities. A third category of entrepreneurs goes a step further: mobiles themselves are used in new ways, unleashing a brand new set of production and distribution possibilities. The mobile phone becomes a Platform for new economic schemes.

Many other technologies can give rise to entrepreneurship in these three categories, but Platform is especially potent for mobile phones, which in essence are small, powerful computers. Voice communication and its ensuing economic benefits have helped mobiles proliferate, but voice communication is, perhaps, merely the first killer app. Mobile phones are rife with potential to fully blossom as handheld, connected computers, since many businesses in areas such as payments and banking, healthcare, and entertainment require combining the services of multiple providers. The natural abilities of computers—and thus mobiles—to store, retrieve, and process vast amounts of data in various forms (text, images, video, audio), connect many providers, and use complicated sets of logic contribute to the creation and delivery of complex services. All this can happen in the hands of billions of people.

Let me provide some examples of Platform entrepreneurship in a few of many different possible areas: medical advice, pharmaceutical authentication, medical diagnosis, financing of solar equipment, and payment systems. Although there are many emerging services by NGOs and government, I list below only for-profit enterprises, which may be considered more entrepreneurial and, in the long run, prove their viability and value through continued sales. Entrepreneurs are demonstrating that for-profit enterprises can flourish in meeting needs ordinarily considered appropriate for the state to provide, such as in the areas of authentication of pharmaceuticals and providing medical information.

In India, mDhil sells health tips to 18- to 25-year-olds through mobile text messages. It covers health issues from nutrition to various ailments for a monthly charge of 30 Indian rupees per month. Confidential information through mobiles is quite helpful to the tech-savvy age group.

Sproxil, established in 2009, is helping to authenticate medications in Ghana, Kenya, and Nigeria. Fake medicines not only mean losses of billions of dollars for pharmaceutical companies; they also mean potential fatal risks for patients. Sproxil provides a scratch-off label with a PIN attached to a product, charging brand own-

ers for the service. A consumer texts the PIN to a phone number and receives a reply text stating whether the product is genuine or counterfeit.

bKash, a mobile payment system, has 25,000 agents all over Bangladesh who do cash-ins (that is, accept cash from a subscriber and provide electronic money on his phone) and cash-outs (that is, accept electronic money and provide cash to subscribers), both for a fee. A subscriber cashes in with an agent and sends his electronic money to someone else over the phone. The receiver then cashes out with another agent. In its first year of operation, bKash has signed up more than a mil-

lion subscribers, mostly poor migrant workers in urban areas who need to send money to their rural homes.

M-Kopa is enabling pay-as-you-go solar solutions in Kenya. Low-income households and stores in rural areas of the country currently depend on kerosene for lighting and mobile phone charging, with an estimated three million Kenyan homes, or 80 percent of the population living off the power grid. M-Kopa allows people to lease solar equipment for as much time as they can afford; the equipment shuts down if the customer does not make another pay-

ment at the end of the leased time and restarts after payment is continued. Customers who complete the lease cycle own the equipment, rendering future lighting and phone charging free. This pay-as-you-go scheme has become possible through payment mechanisms over mobile phones.

The above examples are by no means exhaustive. They simply illustrate the possibilities, yet to fully materialize, that emerge when innovators are able to custom tailor to local conditions. When mobile services started in low-income countries, they were generally faithful copies of existing Western services. In contrast, Platform projects generally adjust to specific circumstances, giving advantages to local entrepreneurs. As a result, these Platform projects may play out a truly Schumpeterian “creative destruction,” provided mobile operators are mindful of facilitating an environment for fair competition among the projects.

As mobiles become more powerful in computing power and smartphones proliferate in low-income countries, this trend will continue at an accelerating pace. Given the limits of other infrastructures in low-income countries, we can only underestimate what might eventually be possible with devices that are already in

When a new technology arrives on the scene and people embrace it to advance their economic lives, one life at a time improves at a micro-level. At a macro-level, when billions of such advancements add up, they give rise to substantial new markets open to entrepreneurial exploration.

billions of hands. Entrepreneurs are not only taking advantage of the mobile phenomenon in pursuit of profits, their very actions are making the phenomenon blossom further.

CONCLUSION

We can safely assume every human being is constantly trying to improve his or her economic condition.⁷ When a new technology arrives on the scene and people embrace it to advance their economic lives, one life at a time improves at a micro-level. At a macro-level, when billions of such advancements add up, they give rise to substantial new markets open to entrepreneurial exploration. The entrepreneurs who take on the challenge of working in these new market spaces are also trying to improve their conditions. The overall such direct effect is Form. Over time, as people constantly strive to improve their conditions, they find new ways of allocating other resources to capitalize on the technology. The medium- to long-term response of an economy to the technology is Transform. Human beings still do not rest. They continue to improve their conditions, this time by adjusting and tweaking the technology itself. Despite the well-known adage that discourages people from reinventing wheels, there are thousands of kinds of wheels. The wheel has become a Platform. Our economies are simply the consequence of individuals reacting and responding to whatever is emerging in their surroundings while striving to improve their own conditions. Though these reactions and counteractions make forecasting difficult, the Form, Transform, Platform framework may be useful in structuring our projections.

Since phones are handheld, connected computers, everything that can be done on computers eventually will be done on mobiles—only to a greater extent because in the future these devices will have more power, more innovations, and a greater network. Hence, the Platform effect in the future will mushroom on a much larger scale than we have seen in the past, facilitated by several additional features of low-income countries. First, the percentage of smartphones in low-income countries is small but rapidly rising. Smartphones tend to loosen the hold of network operators on phones, allowing small entrepreneurs to create products on the mobile platform. Concurrently, expertise in developing apps and software for mobiles, which took time to develop, is now gaining momentum. Finally, the problems to be solved—and thus entrepreneurial opportunities—in low-income countries are greater because of the lack of other infrastructures. It is for this reason that mobile money spread so rapidly in Kenya, faster than similar technologies did in high-income countries.

Roy Amara, who headed the Institute for the Future in Palo Alto, once said, “We tend to overestimate the effect of a technology in the short run and underestimate the effect in the long run.” The hype around any new and exciting technology may create unmet short-term expectations, but we also fail to foresee the true long-term potential of a technology because it is difficult to grasp the effects of Form, Transform, and Platform. These three simple categories may prove helpful

not only in understanding the incredible phenomena of technologies like mobiles, but also in assessing the potential economic marvels of the future.

-
1. Christine Zhen-Wei Qiang, "Mobile Telephony: A Transformational Tool for Growth and Development," *Private Sector & Development*, no. 4 (2009): 7. The study did not define a time frame for the increase in GDP growth; I assume that this effect lasts for more than one year. I consider my overall calculation conservative for at least two reasons. First, though the average penetration for the two regions is 63 percent, higher-income pockets within the regions are likely to have higher penetration and thus a greater contribution to overall region growth-boosting effect on larger incomes. Second, the assumption of one percent additional growth over a 15-year period possibly overestimates the effect in the early years. However, this overestimation is more than compensated for by the possible underestimation in later years when the economy is larger, the penetration is higher, and the network effect is greater.
 2. From 1996 to 2011, the combined GDP of South Asia and sub-Saharan Africa grew from \$811 billion to \$1,870 billion in constant 2000 U.S. dollars, an average growth rate of 5.72 percent per year. Had the regions grown at 4.72 percent instead of 5.72 percent, their combined GDP in 2011 would be only \$1,620 billion.
 3. Sanket Mohapatra, Dilip Ratha, and Ani Silwal, "Migration and Development Brief 18: Remittance Flows in 2011—an Update," Migration and Remittances Unit, World Bank, 2012, p. 3.
 4. Jan de Vries, *The Industrious Revolution: Consumer Behavior and the Household Economy, 1650 to the Present* (Cambridge: Cambridge University Press, 2008).
 5. Robert M. Solow, "We'd Better Watch Out (review of *Manufacturing Matters*)," *New York Times*, July 12, 1987.
 6. Dale W. Jorgenson, Mun S. Ho, and Kevin J. Stiroh, "A Retrospective Look at the U.S. Productivity Growth Resurgence," *Journal of Economic Perspectives* 22, no. 1 (2008): 3-24.
 7. In *The Wealth of Nations*, Adam Smith writes, "The natural effort of every individual to better his own condition . . . is so powerful a principle, that it is alone . . . capable of carrying on the society to wealth and prosperity . . ." Adam Smith, *An Inquiry into the Nature and Causes of the Wealth of Nations*, ed. Robert Maynard Hutchins, Chicago: Encyclopedia Britannica, 1952, p. 221.