

Mobile Powered Development

Theory of Change and Policy Recommendations to Drive Social Impact at the Bottom of the Pyramid

Over the past several years, a number of hubs, incubators, accelerators, and start-up garages have sprung up along the Ngong corridor¹ in Nairobi to service the city's emerging startup ecosystem, which has led *The Economist* to dub the city "Silicon Savannah" ("Upwardly mobile," 2012). Caffeine-fueled hack-a-thons and events sponsored by blue-chip IT companies have become recurrent meeting places for "who's who" on the Kenyan technology scene. Although some in the industry are fatigued by the hype, the excitement at competitions, at informal meetings over coffee at Pete's,² and among the young founders of technology companies remains contagious, as many believe mobile technology has the potential to solve some of Africa's most pressing problems. While still nascent, Kenya's rapidly growing mobile technology scene already has produced several success stories. Unfortunately, entrepreneurs in Kenya struggle harder to bring their startup ventures to market or to scale than those in advanced innovation hubs, such as California's Silicon Valley or Israel, which sometimes is referred to as the "start-up nation" (Senor & Singer, 2009).

As ever more young technology entrepreneurs emerge, impact investment and development funds are becoming increasingly interested in sector-driven approaches that focus on scaling entire industries and ecosystem-driven approaches that support cross-sector development in the private sector (Ayrikyan & Lee, 2013; Bannick & Goldman, 2012; Koh, Karamchandani, & Katz, 2012). This new tack reflects a convergence of issues, interests, and solutions in the developing world, and while probably the right approach, it requires a significant amount of funding and substantial collaboration. As noted by Bauer et al. (Bauer, Lang, & Schneider, 2012), coordinating the formulation and implementation of policy even in commercially viable sectors requires managing a challenging and diverse set of

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stakeholders. In the developing world, the situation is especially difficult, in that core pieces of the ecosystem are often absent and public support is needed until market dynamics can take over.

A policy dialogue is emerging regarding the potential of mobile services developed by entrepreneurs to have an impact on end-users at the bottom of the economic pyramid (BOP). Many of the discussions are about resolving the barriers entrepreneurs are facing, such as access to financing, lack of mentorship, and the ability to monetize. Ideas for implementation that are being piloted in various locations range from building developer toolkits to sponsoring hack-a-thons to creating Silicon Valley-style incubators and accelerators. However, before donors and policymakers finalize their strategies to support mobile entrepreneurs in the developing world, it would be worthwhile to clarify the pathways that are enabling end-users living in poverty to realize social benefits from mobile services.

This paper proposes a theory of change in terms of how entrepreneurs working in partnership with the mobile industry can deliver these benefits to people with low incomes, especially those at the BOP. We begin with our theory of change hypothesis and describe the enabling factors that make it possible to scale impact using mobile technology. We then introduce several policy approaches to addressing barriers in the entrepreneurship ecosystem that will help to accelerate the development of mobile services that reach the BOP.

THEORY OF CHANGE

A 2011 paper by Accenture, the global consulting company, (Bulloch, Lacy, & Jurgens, 2011) presents the increasing reality of and desire for collaboration among donors, private sector, and government on a converging set of issues, interests, and solutions in the developing world. The theory of change we posit in this chapter describes how cross-sector convergence among the mobile industry, the entrepreneurship ecosystem, and development interests can scale mobile services for BOP end-users. As illustrated in Figure 1, we see three important enablers:

Mobile networks' economies of scope has lowered the transaction cost for servicing BOP segments.

Mobile user digital identity enables transactions through the mobile network as trusted parties, without limitations of location and time.

Open innovation provides a collaborative framework for tapping into consumer needs and providing creative talent to help address those needs.

1. Mobile networks' economies of scope

As noted by Hodge and Weeks (2006), large economies of scope exist within mobile networks because creating network infrastructure has a high fixed cost, while providing access to the network has a very low marginal or incremental cost. Combined with the fact that mobile network operators offer voice and data services at prices even poor households are willing and able to pay, this has resulted in an explosion of mobile connections in emerging markets. The significance of the

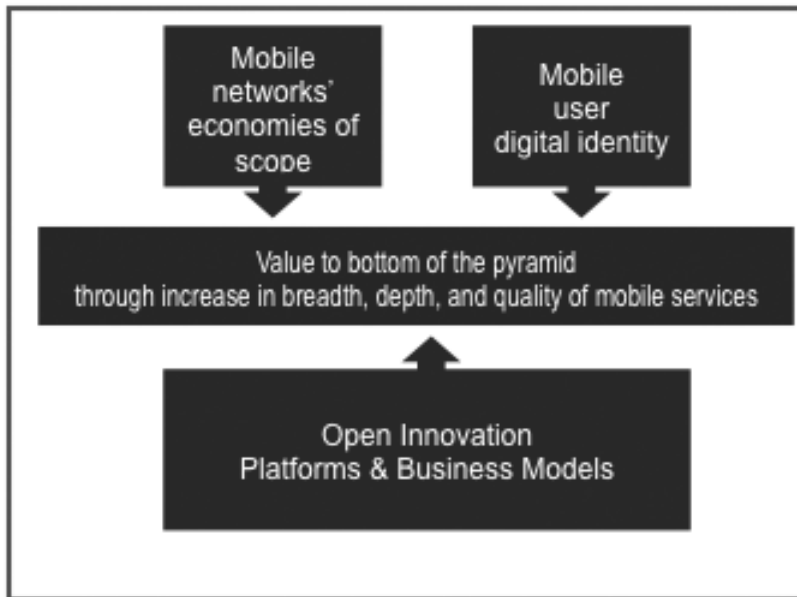


Figure 1. Enablers driving the impact mobile services have on the BOP

impact this is having on the BOP is that mobile services are deployed using mobile network operators' existing assets. While there are costs associated with adding a new service for an existing customer, these are mostly on the marketing rather than the delivery side.³ Scaling mobile services for the BOP therefore becomes not only physically plausible but financially feasible. It should be noted that this is in direct contrast to the feasibility of scaling physical goods at the BOP. As noted by Simanis (2012), impractical penetration rates have limited the success of many multinationals looking to generate substantial profits in low-income segments of the population. Mobile technology therefore presents a profound opportunity to deliver virtual substitutes for physical goods, cost-effectively and potentially profitably.⁴

The opportunity to leverage the scale of mobile networks in Africa is tremendous. Mobile networks already reach deep into poor and rural areas of Africa that are otherwise difficult to access, and the mobile phone is the most widely owned communication device in Kenya, with penetration at an estimated 31 percent of the population (see Figure 2; GSMA Intelligence, 2013, following page).

More people in sub-Saharan Africa enjoy access to mobile phones than to other basic services, such as electricity and sanitation (see Figure 3, following page).

While these numbers are disheartening, they do give some indication of the extent and importance of the opportunity to reach people living in poverty through mobile services. As illustrated in Figure 4, low-income segments, including the BOP, constitute over 55 percent of the Kenyan population.



Figure 2. Population penetration of communication devices in Kenya

Source: GSMA Intelligence, 2013

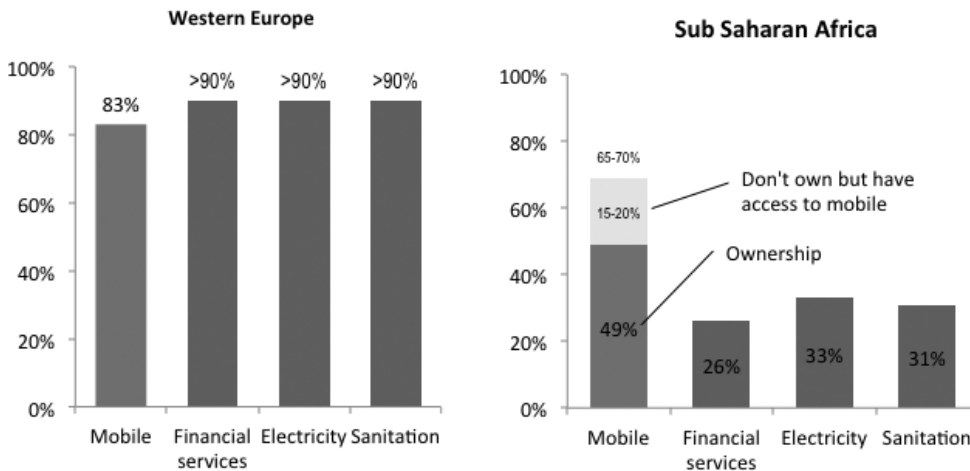


Figure 3. Access to services

Source: GSMA Intelligence, 2013

If we include the floating class, which drifts between aspirational middle class and poverty, the lives of 80 percent of Kenya’s 43 million people, who currently are underserved by corporate and traditional infrastructure, could be improved through mobile services. As discussed in Prahalad’s (2009) *Fortune at the Bottom of the Pyramid*, the mobile phone industry was one of the first to recognize viable business opportunities at the BOP, which demonstrated beyond a doubt that there is a market for affordable world-class goods and services. Furthermore, as discussed in “Mobile Usage at the Base of the Pyramid in Kenya,” a report by iHub Research and Research Solutions Africa (2012), at least 20 percent of respondents

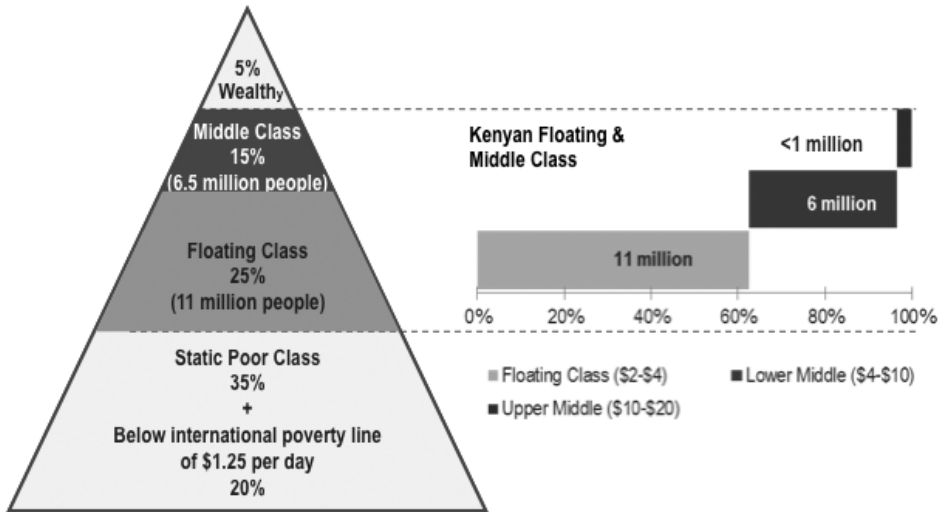


Figure 4. Household income and the emerging middle class

Source: Created from Ncube, Lufumpa, & Kayizzi-Mugerwa (2011); iHub Research & Research Solutions Africa (2012); Suri, Tschirley, Irungu, Gitau, & Kariuki (2008)

to their research survey were willing to make real sacrifices, such as forgoing food, to recharge their mobile credit—an expense equivalent to 84 U.S. cents per week. Even more striking was the finding that one in four Kenyans at the BOP browse the Internet on their mobile handset. With 65-70 percent of people in Kenya having access to a mobile phone, including people living in poverty, mobile services present a tremendous opportunity to leverage mobile networks to deliver value-adding products, services, and content, if innovative business models can be developed and replicated.

2. Mobile user digital identity

Mobile user digital identity, which is a mobile phone number combined with records about usage, enables mobile users at the BOP to transact with any other party on the mobile network without limitations of location or time. Examples of transactions include sending a text message, paying for a product or service, or making a voice phone call. The transparency required to participate on mobile networks creates trust among unknown parties. In other words, users are credentialed to engage in transactions because their identity and behaviors are monitored. Mobile networks also reinforce the rules: only if a user has enough credit in their account will the mobile network allow the phone call to be initiated, or the message to be sent. Or in a mobile payments example, only if the user enters the correct PIN and has sufficient funds in their mobile money account will the payment be made to the counterparty.

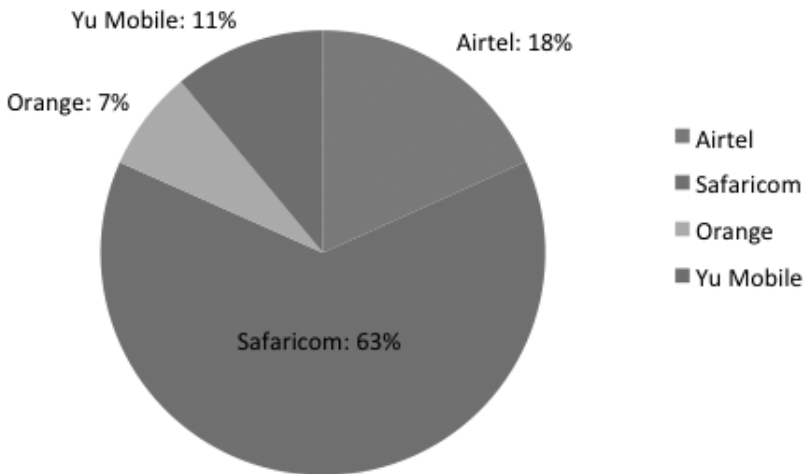


Figure 5. 2013 mobile market share in Kenya

Source: GSMA Intelligence (2013)

Mobile payment platforms have extended mobile user digital identity to financial services products, enabling end-users at the BOP to pay for goods or services easily. Transactions such as paying for school fees happen virtually, saving time and *kitu kidogo* (small money).⁵ In Kenya, Safaricom's⁶ mobile payment platform M-PESA, launched in March 2007, has been hugely successful.⁷ M-PESA is easy to use: after registering with Safaricom, any user can load an account with cash, thereby creating "e-money." Users can then exchange cash using a simple application on a feature phone, which is any mobile phone that is not a smartphone.⁸ M-PESA has had a tremendous impact on the unbanked in Kenya by making it easier to receive remittances from abroad and to send money from Nairobi to family in rural areas. As noted in Sondhi et al. (Sondhi, Biswas, Gupta, & Bharwani, 2011), remittance services offered through M-PESA are being used by approximately 27 percent of Kenya's population, accounting for the transfer of approximately \$375 million per month.⁹ According to the GSM Association (GSMA), there currently are about 20 million registered mobile money accounts in Kenya on about 31 million mobile connections.¹⁰ To be clear, M-PESA in Kenya is serving the poor. A survey of BOP mobile phone owners by iHub Research and Research Solutions Africa (2012) revealed that 78 percent of respondents send and receive money on their mobile phones. Moreover, nationally representative data collected from Research ICT Africa showed that, because Safaricom has over 60 percent of the market share in Kenya (see Figure 5), it was able to gain traction quickly with its mobile money platform. Other mobile operators and some retail banks in

Kenya have now launched their own mobile payment platforms, following the M-PESA model.

Where mobile digital identity was not well-established, mobile payment platforms have been difficult to implement. A report by the International Finance Corporation (2010) on Vodacom's¹¹ M-PESA rollout in Tanzania identified the following key challenges:

- *A lack of customer education and financial literacy:* Vodacom's M-PESA business model in Tanzania limited funds that could be used for consumer education campaigns and agent network rollout.
- *A very competitive environment:* Vodacom's product was second to market in Tanzania, where the company had only 41 percent market share.
- *Large geographic spread:* Vodacom did not have strong retail partners to help expand its agent networks rapidly; moreover, business license obligations added tax burdens for potential agents who previously operated informally.
- *A lack of national ID:* At the time of the M-PESA rollout, Tanzania did not issue national identification cards. This made it impossible to verify customers' identity. While the M-PESA account was registered to a phone number, the phone number was not registered to a user. This opened opportunities for criminals and extortionists to carry out activities without the risk of being identified. It also limited the ability of Vodacom or other third parties to offer other financial products that required customer risk-scoring, such as credit and insurance, because behaviors could not be tracked and linked to an individual

Widespread digital identity creates a commercial incentive for entrepreneurs to get involved because they allow mobile services to be personalized and they make monetization of mobile services possible through mobile payments. As we discuss later in this chapter, our view is that entrepreneurs are essential to increasing the breadth and depth of mobile services because they understand unmet needs in their communities. Thus they are in a better position to build niche products than are large organizations, which may view people at the BOP as a monolith.

3. Open innovation platforms and business models

Open innovation strategies are a way to tap the creativity of entrepreneurs already developing mobile services that BOP end-users want and need. Henry Chesbrough, adjunct professor and executive director of the Center for Open Innovation at UC Berkeley's Haas School of Business, was the first to coin the term "open innovation." He described it as

the use of purposive inflows and outflows of knowledge to accelerate internal innovation, and expand the markets for external use of innovation, respectively. [This paradigm] assumes that firms can and should use external ideas as well as internal ideas, and internal and external paths to market, as they look to advance their technology. (Chesbrough, Vanhaverbeke, & West, 2006, p. 1)

Chesbrough charges strategists to move away from 20th-century linear thinking (such as Porter's value chain) and begin to think about business innovation from a services perspective (Birudavolu & Nag, 2011).

The most important concepts from Chesbrough's doctrine applied to the telecommunications industry are (1) turning business into a platform for others to build on, and (2) transforming the business model to profit from building a platform business model in order to gain from others' innovative activities.

The "business as a platform" concept is highly technical, therefore we will only introduce it as a concept here. Business as a platform means moving beyond thinking of companies as producing products to viewing them as platforms that enable the contributions of others (Lopez, 2013).¹² The One API initiative led by the GSMA is an example of an industry-wide initiative to move to "business as a platform" by enabling applications to exploit mobile network capabilities, such as messaging, authentication, payments, and location-finding with a cross-operator reach (GSMA, 2013). Through the One API initiative, more network functionality will be available to entrepreneurs and functionality will work across operators, which will make scaling quicker and easier. Platform business models are gaining more traction with mobile network operators. For example, the Roadmap to New Telco 2.0 Business Models (2011) identified opportunity areas such as authentication, mobile identity, marketing and advertising, payments, and customer care. China Telecom announced in 2012 that it would be opening an interface to its IP Multimedia Subsystem architecture for mobile video monitoring, which analysts see as critical to the development of the Internet of Things (Dongling, Yu, & Hongsheng, 2012).¹³ According to China Telecom, its system offers a range of scenarios for profiting by using the interface, including revenue sharing, commissioned development, and joint operations. Similar models for sharing profits may work well for operators and entrepreneurs in Kenya and other developing economies.

Open innovation strategies for building and supporting mobile services are already becoming the status quo in the developed world and there are tremendous opportunities for such ideas in the developing world. First, new services could be rolled out more quickly, more cheaply, and be tailored to specific needs, thereby leveraging the power of creative destruction to iterate and improve on products and service models. Additionally, the specific needs of end-users at the BOP are often not a high priority for mobile network operators and may have little to do with core business activities. Entrepreneurs who understand this population's unmet needs are in a good position to create solutions that address the problem, provided they can be given the building blocks to build a service that can scale. Some progress is already being made in Kenya to implement open innovation strategies. For example, several operators are launching or have launched app stores, thus creating a channel for entrepreneurs to market mobile services alongside services developed by operators' internal development teams. Other operators have mentioned opening application programming interfaces, although we are aware of no specific commitments at this time.

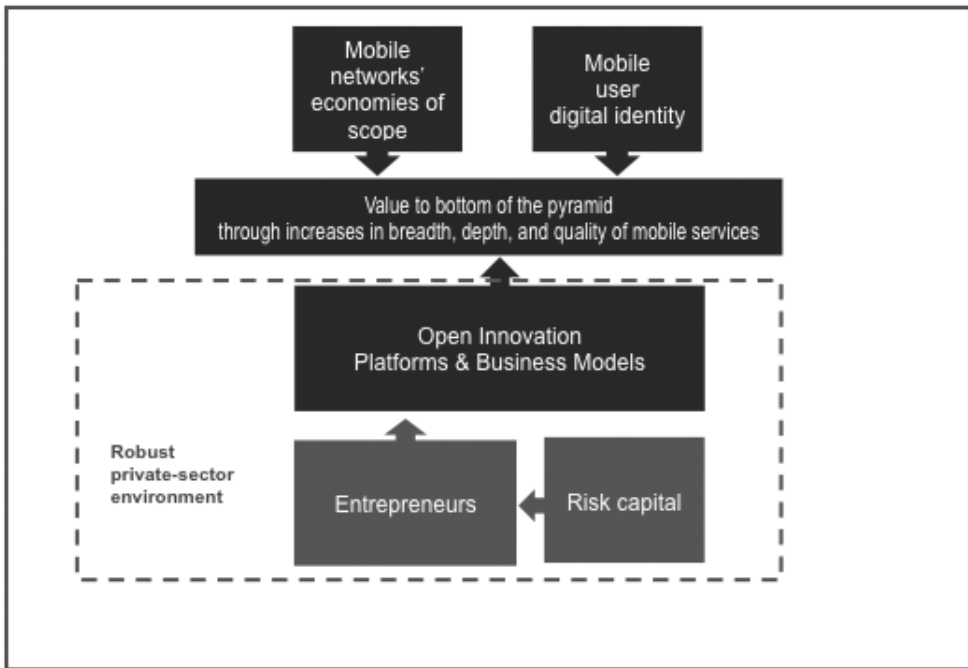


Figure 6. Entrepreneurship link to enablers driving the impact mobile services have on the BOP

THE LINK TO ENTREPRENEURSHIP

Entrepreneurs are the engine of ingenuity behind open innovation strategies for scaling mobile services, fueled by risk capital in a robust private-sector environment, as illustrated in figure 6. However, it is not only self-employed, innovative entrepreneurs who think and act differently to find solutions to problems (Gregersen, 2012).

Kenya benefits from a growing number of young, educated, creative entrepreneurs who are already building mobile services using SMS, Web, and Android channels. Developing technology in a country lacking stable electricity, cheap or even high-quality bandwidth, and, at present, an international airport terminal building in its capital city, requires perseverance, resourcefulness, and agility. Arguably, the raw creativity coming out of Nairobi is far more impressive than the garden variety mobile applications one hears are being developed in New York or London. For example, several well-funded mobile applications launched recently in the U.S. now make it easier to order a beer at the pub, while Dash, which received \$700,000 of seed funding, launched a bar-tab payments application for iOS and Android earlier this year. “We want to alleviate the pain points of going out,” Dash cofounder Jeff McGregor told VentureBeat (Ludwig, 2013). Evidently, the term “pain points” means something different in the developed world!

Sector	Mobile Services
Health	A. ChildCount and ChildCount+ (child survival and maternal health support and diagnostics) B. Daktari 1525 (tele-triage service) C. M-Chanjo (SMS immunization reminders) D. iPedigree (counterfeit drug verification) E. KimMNCHip (maternal newborn and child health information, vouchers, and payments) F. Mamakiba (maternal health planning and savings platform) G. Changamka Smart Card (medical insurance provider linked to M-PESA)
Agriculture	H. M-Kilimo (farmers' helpline) I. M-Farm (price transparency, farm inputs purchasing, farm products marketing) J. iCow (information, record-keeping, gestation planner for small farmers in the dairy industry)
Water	K. M-maji (USSD-based system for advertising water in Kibera slum)
Education	L. g.Maarifa (interactive SMS platform content and analytics) M. eLimu (tablet deployed in Kenyan primary schools) N. Tichaa (Swahili lessons for children) O. Eneza Education (text and mobile Web studying and reports) P. SkooBox (mobile Web application for college students)

Table 1. Mobile services developed for Africa

There are many examples of mobile services addressing unique local challenges, including certain needs of the BOP, as demonstrated in Table 1.

Some of these products have been built by Kenyan entrepreneurs, others by donor-funded groups or NGOs. ChildCount, piloted by the Millennium Village Project, developed a platform to support community health workers. The system uses SMS text messages to register children and mothers, and to monitor for malnutrition and disease. Eneza Education, built by entrepreneurs in Kenya, aims to provide educational content to isolated parts of the world using mobile technology. They are prototyping mobile services products that work on basic phones and mobile Web, including a text message-based studying product for students and reports for parents. M-Farm, cofounded by a young female entrepreneur from arid northeastern Kenya, is an SMS-based transparency tool that enables Kenyan farmers to access information about the retail price of their products, to buy farm inputs directly from manufacturers at favorable prices, and to find buyers for their produce. These examples demonstrate that delivering the services most desired by people at the BOP—health information and education—is possible through mobile services (iHub Research & Research Solutions Africa, 2012).

The emergence of technology talent in Kenya therefore gives rise to an opportunity to exploit mobile networks that already reach deep into the country's poor rural communities. These entrepreneurs must be guided on how to address these market needs more effectively and be better supported through open innovation technology and business models.

The Role of Risk Capital

Like most Internet technology startups, much early development work on mobile services takes place on nights and weekends and involves many pivots on the business concept. There comes a point when the entrepreneur must decide if an idea is worth pursuing full time; if the answer is yes, he or she first forms a small team and begins to develop what is often a series of design iterations, then runs trials in target markets and thinks through monetization strategies. In more developed innovation hubs, such as Silicon Valley, New York, or Israel, prototype and seed stages are typically funded through personal savings or credit cards, "friends, family, and fools," and "angel" business investors. Angels help by providing capital to sustain the entrepreneurs until they are ready to launch a formal round of venture funding, and usually also introduce the entrepreneurs to potential venture capital suitors. Not entirely benevolent, most angels take equity shares or convertible debt in an entrepreneur's company, although they recognize the risk that a business concept may not gain traction in the marketplace. Risk-taking by angels and venture capital investors varies, depending on factors such as their familiarity with technology, market dynamics, and alternative investment opportunities. Risk capital is vital to bringing mobile services to market in the developing world, especially in the early stages.

Developing world entrepreneurs need risk capital because few alternative sources of funding are available. Funding from friends and family may be available to entrepreneurs who come from affluent backgrounds, but several entrepreneurs in Kenya revealed that sizable funding was difficult to obtain unless family members understood the business model. It often took several conversations to convince relatives that the startup ideas were gaining traction or that they, the would-be entrepreneur, were serious about pursuing the opportunity. Generational gaps of confidence and understanding of mobile services are probably not unique to Africa, but a lack of other options certainly makes Kenyan entrepreneurs more desperate. Moreover, banks do not lend to startups without collateral—in the developed world or in Africa—as banking officers have fiduciary responsibility for the safety and soundness of their banks, as well as the broader financial system. Startups therefore are the territory of those who can provide risk capital, typically "smart-money" investors who are well informed, experienced, and willing to speculate on a potential windfall.

In well-developed startup ecosystems, angels are abundant and accessible, but in Kenya there is presently an expectations gap between risk capital providers and entrepreneurs. Telefonica Digital and Startup Genome (2012) surveyed startups in

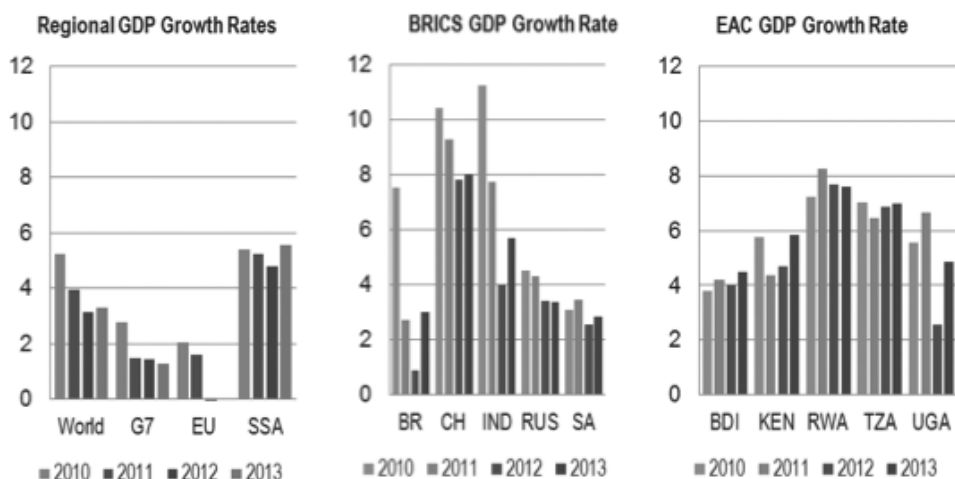


Figure 7. Select GDP growth rates

Source: East African Community Statistics Portal (2013); International Monetary Fund (2012); World Bank (2012). The EU achieved near zero growth rates in 2012 and 2013.

Silicon Valley and found that nearly two-thirds had received funding from angels or venture capital investors and accelerators, and only 13 percent were bootstrapping.¹⁴ Mobile services startups in Kenya reveal a completely different situation. In a survey conducted by iHub Research and GSMA (2013), only 7 percent of startups had received funding from angels or venture capital investors, and 86 percent were bootstrapping.¹⁵ Therefore, the majority of mobile services startups support early stage work through personal savings and side businesses, such as consulting or farming, but many still struggle to find the resources needed to hire another team member or pay for office space.

In developing countries, therefore, there is an immediate need for risk-taking at the very early startup stage. Kenya and other countries in similar situations have used government-sponsored initiatives to kick-start investment. For example, Start-Up Chile, a program created by the Chilean government to attract early stage, high-potential entrepreneurs to bootstrap startups in their country, provides \$40,000 of equity-free seed capital and a temporary one-year visa to entrepreneurs who want to develop their projects in Chile, along with access to influential networks in the country (Arietta, 2013). The program has received impressive international recognition and has stimulated several spinoffs in other locations. Mexico, too, has recently passed some interesting reforms to stimulate early stage opportunities. Like Kenya, Mexico's economy is growing rapidly, yet most startups and small and midsize enterprises have little access to bank financing or credit (Arregui, 2012). The government of Mexico thus has established a development fund that is able to co-invest alongside venture capital funds, reformed investment

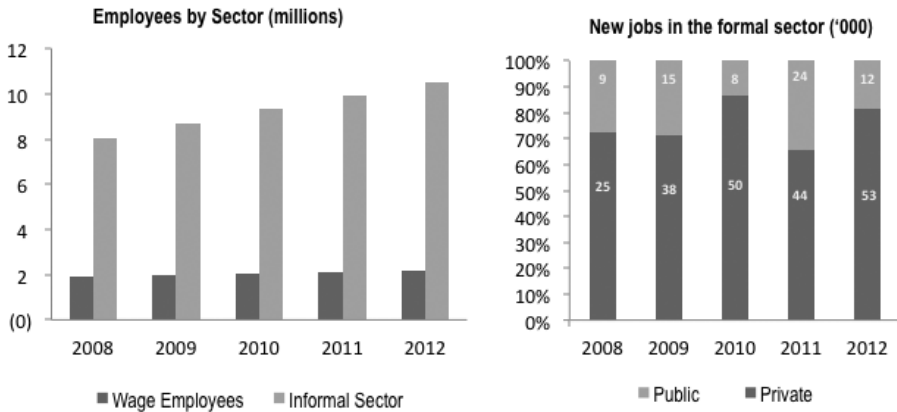


Figure 8. Employment sector

Source: African Development Bank (2013); Kenya National Bureau of Statistics (2013); USAID Kenya (2013)

vehicles for pension funds, and launched a \$22 million seed capital fund focused on early stage ventures. These examples demonstrate that, where financing innovation carries great risk due to issues of structure or the support environment, government may be in a position to catalyze growth by reducing risk in the early stages of development.

The Importance of the Entrepreneurship Environment

It is not unreasonable to suggest that momentum in the economy leads to investor confidence and entrepreneurial activity. Perceived risk declines when fundamentals appear to be on track. In fact, empirical studies have shown that there may be truth in this hypothesis. A study by Klapper et al. (Klapper, Laeven, & Rajan, 2006) found a positive and significant relationship between economic and financial development and entrepreneurship, reinforcing the notion that a robust private sector is related to greater business opportunities and better access to capital. Kenya is well on its way to developing a dynamic private sector. As demonstrated in figure 7, the Kenyan economy has been thriving for several years and will continue to improve.

Moreover, as illustrated in figure 8, an increasing number of new jobs in the formal sector (waged employees and self-employed workers) are being created in the private sector; since 2008, more than twice the number of new formal-sector jobs were created in the private sector than in the public sector.¹⁶

Indeed, such strong fundamentals, combined with a growing middle class, are some of the factors driving investor attention to Kenya.

The regulatory environment also plays a role in driving a robust private sector. As discussed by the Deutsche Gesellschaft für Technische Zusammenarbeit (2008),

reforms to ease business registration and property titling and to simplify labor regulations have been especially influential in sub-Saharan Africa. Moreover, the report describes how previous reforms in Kenya made registering businesses and obtaining appropriate licenses easier, saving businesses an estimated \$6 million.¹⁷ The telecommunications regulator is also influential for mobile services startups. Regulatory institutions' typical responsibilities include market entry, interconnectivity, spectrum licensing, tariffs, universal service, and service quality (Okamoto, 2006). Indeed, one important regulatory act in Kenya that has impacted the telecommunications sector was the Kenya Communications (Amendment) Bill of 2008. Part VII of the regulation legally recognized electronic records, thus making electronic messages valid in developing contracts (Waema, Adeya, & Ndung'u, 2010). Acknowledging electronic records and messages as legally binding has legitimized digital identity for commercial activities and has been foundational in creating opportunities for electronic commerce, as well as mobile services that involve financial transactions. Because mobile services startups in developing markets often depend on mobile network operators to market and deploy solutions, the competitive environment for operators has an impact on a startup's business. For example, if there is one dominant player, obtaining a commercial agreement with that particular operator becomes vital to achieving national scale, as is currently the case in Kenya with Safaricom. Alternatively, a regulator that limits market consolidation may create a favorable environment for mobile services because startups will be in a position to negotiate for a best possible commercial arrangement from interested mobile operators.

POLICY IMPLICATIONS

The overall objectives of mobile entrepreneurship policy should be to accelerate the breadth, depth, and quality of the mobile services that are available to the BOP. As presented in the theory of change, this could be achieved with open innovation platforms/business models and a thriving entrepreneurship ecosystem. A broad set of policy approaches and strategies could be implemented to create momentum for open innovation and reduce barriers to entrepreneurship. Focusing specifically on barriers in the entrepreneurship ecosystem, there are two policy approaches to consider:

- Increasing resources available for mobile entrepreneurs working on mobile services that address poverty issues (social entrepreneurs)
- Increasing resources available for all mobile entrepreneurs (flat targeted)

Both approaches can be expected to reduce barriers for entrepreneurs working on mobile services. A flat-targeted approach will inevitably result in some entrepreneurs being socially minded. In a survey conducted by the GSMA in June-September 2013, 4 percent of digital entrepreneurs in Kenya were already targeting low-income communities. Moreover, an entrepreneur who becomes successful in middle- or upper-class communities may move downmarket, building on early success in premium market segments. That said, with 80 percent of the Kenyan

population dealing with poverty issues, there is justification for targeting social enterprise with public funds.

Public financing of innovation is widely used by the Organization for Economic Cooperation and Development, and in developing world contexts (Guinet, 1995). In Kenya, scenarios for donors or government to consider include establishing a fund that would provide co-investment grants for projects at the prototype or seed stage, or a donor fund of funds¹⁸ for venture capitalists already investing in mobile entrepreneurs as either an anchor or minority shareholder. Similar funding mechanisms for ventures addressing poverty may also work well, along with programs that provide nonmonetary resources, such as business workspace, data, mentoring, etc.

A blend of policy—flat targeted and focused on social entrepreneurs—may be the best approach in developing countries. This will ensure that some progress is made in the near term on poverty issues while general ecosystem support to develop commercially driven mobile services and the information and communications technology (ICT) sector is also implemented. Given that public funds may be used to fund ecosystem development activities, a flat-targeted approach alone may be less politically feasible than a blended or socially focused approach. Combining the two would deliver value for money by working at the greatest possible leverage point (all entrepreneurs), while simultaneously focusing to some degree on specific poverty issues.

CONCLUSION

Entrepreneurship policy is becoming increasingly interesting to developing world governments and donor aid agencies as private-sector development becomes a strategy for reducing poverty. While there are only a few empirical studies at present that demonstrate the impact entrepreneurship and mobile services are having in the developing world, we expect this area of research to increase rapidly, especially in Africa, given the recent attention Kenya has received as Africa's next innovation hub. Our theory of change presents what we see as the three critical enablers to scaling impact at the BOP using mobile services: mobile networks, digital identity, and open innovation. Given the progress that mobile network operators have made in Kenya to deploy mobile infrastructure and mobile payments platforms, as well as recent activity among mobile operators to engage entrepreneurs, we feel that Kenya is an excellent test bed for scaling mobile services to the BOP. The best policy approach for delivering these results may be through measures that blend targeting social entrepreneurs with all entrepreneurs working on mobile services. This will ensure that implementations have the flexibility to work with a variety of entrepreneurs, and potentially steer business ideas toward markets where needs and opportunities are most effectively matched. If open innovation strategies are embraced by the mobile industry, then policy to support entrepreneurs by addressing the challenges faced by the ICT ecosystem should have an impact on the BOP. Measures that facilitate interoperability and openness of physical and logical plat-

forms on which further innovation rest will be increasingly important to growth in Africa's ICT sector; where this requires significant investment and substantial risk-taking, interventions, high-level coordination, and possibly a commitment of public funds may be required.

In sum, mobile networks, digital identity, and open innovation are critical enablers to scaling impact at the BOP. Open innovation strategies in particular offer an opportunity to engage young technologically skilled entrepreneurs who are already innovating around local challenges. Where these three enablers are already in place in developing economies, the agenda for policymakers and donors should shift to support for entrepreneurs and the entrepreneurship ecosystem, including the availability of risk capital and policies to support private-sector development. In this regard, donors and government could help unlock potential benefits that open innovation models can deliver to the BOP, thereby leveraging the power of mobile networks.

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Endnotes

1. Ngong corridor refers to Ngong Road in Nairobi, along which many technology startups and incubators are located
2. Pete's is a popular coffee shop located at Nairobi's iHub.
3. Tariff schemes for third-party or operator technology vary. One model appropriate for enterprises that are scaling is the "inclining block rate," whereby the rate is fixed over a range of volumes.
4. Mobile penetration refers to the proportion of people that subscribe to mobile services. The GSMA advocates reporting unique users that subscribe to mobile services, as opposed to the number of registered SIM cards on mobile networks. "The assumption that the number of connections reflects the number of individuals subscribed to a network is increasingly a misleading one. The picture is being distorted by a significant number of inactive SIMs being included by operators in their reported connection totals, and by multiple SIM ownership, as many mobile consumers actively use more than one SIM card each" (GSMA Intelligence, 2013).
5. *Kitu kidogo*, a Swahili phrase meaning small money, refers to small payments made to officials and others on a daily basis to take care of business matters.
6. Safaricom is the leading mobile network operator in Kenya.
7. The word "pesa" means "cash" in Swahili; the "M" stands for mobile (Hughes & Lonie, 2009).
8. Users with smartphones can also use the service, although as of this writing the M-PESA smart-

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- phone application is buried in the phone settings, which makes it awkward to use.
9. More information on M-PESA can be found at the GSMA Mobile Money for the Unbanked portal: <http://www.gsma.com/mobilefordevelopment/programmes/mobile-money-for-the-unbanked/mmu-examples/m-pesa>.
 10. The GSM Association is an association of mobile operators and related companies devoted to supporting the standardizing, deployment, and promotion of the GSM mobile telephone system.
 11. Vodacom is a mobile network operator in Tanzania.
 12. Schaer (2011) provided several technical models in a presentation made at the 5th International FOKUS IMS Workshop in Berlin.
 13. The Internet of Things refers to uniquely identifiable objects and their virtual representations in an Internet-like structure.
 14. Bootstrapping describes a situation in which an entrepreneur with little capital builds a company from personal savings or credit cards, or from business profits.
 15. The results of the iHub Research and GSMA survey were published in October 2013. The author led the research phase of that study.
 16. The Kenyan labor force can be categorized into modern (which can also be interpreted as formal) and informal (Kenya National Bureau of Statistics, 2013). The formal sector comprises waged employees and self-employed workers. Because waged employees constitute more than 98 percent of the modern/formal sector, they are a good proxy for the entire formal sector.
 17. The amount is presumably per year, although the report does not make this clear.
 18. A “fund of funds” is an investment strategy of holding a portfolio of other investment funds rather than investing directly in stocks, bonds, or other securities.