OLD PROBLEMS, NEW SOLUTIONS:

HARNESSING TECHNOLOGY AND INNOVATION IN THE FIGHT AGAINST GLOBAL POVERTY

THE 2012 BROOKINGS BLUM ROUNDTABLE POLICY BRIEFS

Global Economy and Development at BROOKINGS

Contents

Acknowledgments

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Introduction

There is growing excitement among governments, international organizations, the private sector, philanthropic organizations and civil society about the potential of technology and innovation to dramatically improve the lives of poor people around the world.

Mobile technology is giving poor people the capacity to transact, borrow and save through their cell phones. Connection technologies such as open source software are allowing people in Haiti and Pakistan to collect and analyze information about, and then respond to, violence, corruption and natural disasters. Myriad 'green growth' technological innovations across the globe are expanding access to electricity, increasing agricultural yields while also reducing harmful emissions.

But innovation in the service of development goals is not just about achieving technological breakthroughs. Recent research shows that new business models often matter far more than the technology of a given product when serving poor communities. Moreover, promising technologies do not bring about improvements in the lives of the world's poorest people unless they are adequately invested in, rigorously evaluated, and then brought to scale, which typically requires the collaboration of many actors, including the private and philanthropic sectors and government.

The following policy briefs explore these issues in detail, lay out the challenges, and offer a range of specific recommendations on what needs to happen and why.

- **The Innovation Revolution and its Implications for Development**: Laurence Chandy and Homi Kharas explore how technology-driven innovations in finance, management and accountability can catalyze scaled up development interventions that reach poor people around the world, but that this depends on the forging of partnerships between nonprofit and for-profit actors.
- **New Frontiers: Launching Digital Financial Services in Rural Areas**: Cameron Peake surveys the landscape of digital financial services in rural Africa, Asia and Latin America and provides valuable lessons gleaned from Mercy Corps's experience in implementing programs on the ground and reaching populations at the very bottom of the pyramid.
- **Harnessing Connection Technologies for Development**: Anne-Marie Slaughter and Eleanor Meegoda put forward a framework to describe the different types of mass networks that have emerged from advances in communication (or connection) technologies and are being harnessed to address global development challenges, and pose pertinent questions to guide further research in this exciting new field.

- **Innovation and Technology for Green Growth**: Nathan Hultman, Katherine Sierra and Allison Shapiro categorize the various types of green growth innovations and examine recent R&D and investment trends, before reviewing new approaches that help countries simultaneously realize economic, environmental and development goals.
- **The Importance of Business Models**: Mike Kubzansky argues that designing effective business models matters far more than the technology behind a product when targeting the very poor, explains why it is difficult for the private sector to develop viable business models for this segment of the global population and offers suggestions on how governments, donors and businesses can work together to overcome obstacles.
- **It's What You Make, Not How You Make It—Why Africa Needs a Strategy for Structural Change**: John Page asserts that structural change—the shift of resources in a country from low to high productivity sectors—is more important than technology in addressing the current jobs crisis in Africa and recommends specific steps to kick-start transformation and create globally competitive industries on the continent.
- **Delivering U.S. Leadership: Roles for the Public Sector**: Molly Kinder examines the role of the public sector in unlocking innovation to deliver development "better, cheaper and faster and at scale" and offers recommendations for how the U.S. government and other donor countries can work with the private sector and philanthropic organizations to drive a global innovation agenda.

These policy briefs were commissioned for the ninth annual Brookings Blum Roundtable on Global Poverty, held in Aspen, Colorado on August 1–3, 2012. This year's Roundtable theme, "Innovation and Technology for Development", brought together government officials, academics, development practitioners and leaders from businesses, foundations and international organizations to consider new ways to alleviate poverty through cross-sector collaboration.

Prepared by Steven Rocker, Global Economy and Development, Brookings Institution

The Innovation Revolution and Its Implications for Development

Laurence Chandy, Fellow, Global Economy and Development, Brookings Institution
Homi Kharas, Senior Fellow and Deputy Director, Global Economy and Development, Brookings Institution

Recent years have seen a growing sense of excitement about the possibility of harnessing technology to improve the lives of poor people around the world. A cluster of different technologies—identification, communication, payment, digitalization and data processing—are being combined in innovative ways, leading to an explosion of new applications in many of the world's poorest countries. These have the potential not only to spur progress in the developing world, but also to alter how global efforts to tackle poverty are forged—what kinds of interventions are attempted and how interventions from different development actors are organized.

THREE REVOLUTIONS

We identify three areas where there is the potential to deliver far-reaching change through technology-driven innovation: the ability to provide assistance directly to poor people; to manage complex development interventions at scale; and to raise accountability to citizens of poor countries. In each case, change is already under way, ushering in novel ways of tackling long-standing problems and introducing new players and energy to global development efforts.

The Finance Revolution

Lack of access to basic financial services—a formal bank account, plus services for saving, credit, insurance and sending money—is one of the defining characteristics of poverty. Only 23 percent of adults living on less than $2 a day report having an account at a formal financial institution.[1]

The advent of mobile money promises to upend the status quo. Mobile money offers a commercially viable business model for serving poor customers where traditional banking falls short—a model that overcomes the constraint of access by substituting mobile phone ownership and networks of agents for physical banks, and that allows small-value transfers and minimal fees by encouraging a shift away from cash to electronic money, where simple movements of money incur virtually no transaction costs.

The near universal take-up of mobile money in Kenya—where 67 percent of the population lives on less than $2 a day, as compared with the 73 percent of adults who use mobile money, with the latter share rising rapidly—suggests that it should soon be possible to conceive of a world where virtually all poor people are "banked."

The implications of this are profound. First, access to financial services can help the poor escape poverty (and prevent the near-poor from falling into poverty) by enabling them to better protect their assets, to invest in education and income-earning opportunities, and to protect themselves against shocks. Evidence shows that access to financial services is associated with other important behavioral changes. One study from the Philippines found that access to formal savings increased women's economic empowerment by raising their influence over household consumption choices, children's education and use of family planning.[2]

Second, access to financial services will act as an enormous boost to the participation of poor consumers in various product markets. This will invigorate the base of the pyramid, spurring the creation of new enterprises that can provide a wider range of goods and services targeted at the poor. In Kenya today, more than 500 organizations use M-PESA to pay bills and conduct transactions, including utilities, medical saving plans, crop insurance for smallholder farmers and teacher payment programs (as an alternative to school fees).[3]

Third, universal access to mobile money can provide the "infrastructure" for governments, donors and charities to give money directly to the poor at very low transaction cost. During the last decade, cash transfer and safety net programs have emerged as important tools for supporting poor communities, building their resilience and inducing behavioral change. An estimated 750 million to 1 billion people are today beneficiaries of cash transfers in the developing world, with at least 40 countries having experimented with conditional cash transfer programs.

Using mobile money as the delivery mechanism can dramatically increase the efficiency of these programs. GiveDirectly, an online charity that enables global citizens to send money directly to poor households in rural Kenya via recipients' cell phones, commits to putting 94 percent of donations into recipients' hands. (The remaining 6 percent is spent on identifying and tracking recipients and on wire costs.) By contrast, a traditional cash transfer program in Zambia achieved a conversion rate of 73 cents in transfers for every $1 spent on the program.[4] Further efficiency gains are possible with mobile technology by eliminating the leakage of funds to nontargeted beneficiaries.

Mobile-based transfers can also reduce the large costs borne by recipients in accessing cash transfer programs. Research shows that cash transfers employing traditional payment methods can cost beneficiaries the equivalent of 20 percent of the grant value in transportation costs—a share that could undoubtedly be reduced in an environment where universal access to financial services has been achieved.[5]

The simplicity and low cost of giving money directly to the poor via mobile money could fundamentally alter the calculus of investments for the poor, including those funded by foreign aid. The aid industry has traditionally been dominated by in-kind transfers: the provision of goods, services and knowledge that donors suspect recipients want. The provision of aid in the form of cash, in place of aid in kind, is less expensive to implement, provides recipients with the flexibility to choose what they want to purchase, and stimulates the local economy as recipients spend their money locally.[6] Contrary to the fear that income received via transfers might be frittered away, research shows that it is typically spent on food, education, health and business investments.[7] Evidence from a recent trial found that transfers via mobile money, as opposed to traditional payment mechanisms, brought additional benefits resulting from their lower cost, greater privacy, and the intrahousehold dynamics that govern their receipt.[8]

Transferring money electronically could emerge as the benchmark against which all other poverty-focused investments are judged. Justifying an alternate investment would require demonstrating its superiority against a simple electronic transfer. This would significantly raise the bar in comparison with the metaphorical helicopter test—that is, throwing money out of a helicopter hovering

above a poor region—against which aid efforts have traditionally been judged.

The Management Revolution

The scope and effectiveness of development interventions is, in large part, a function of the quality of project management. Development plans and strategies have often failed to deliver due to the difficulty of administering interventions at a scale where they can generate transformational change. Today, however, the creative application of modern technologies can expand the possibility frontier of future development efforts by enabling better targeting and real-time data collection and analysis.

About half a billion people in the developing world have had their biometric identification (using fingerprinting or iris or facial recognition) recorded in a government database—a number that is currently rising at an astounding rate of 25 percent a year.[9] This information has been used to direct assistance to specific groups, from 1.5 million flood-affected households in Pakistan to 110,000 ex-combatants in the Democratic Republic of the Congo. Biometric data has also been used to reduce the risk of fraud and corruption in elections, to monitor school attendance and civil servant absenteeism, and to test whether conditions (such as a mother's visit to a health clinic) are being met in conditional cash transfer programs. Among the key objectives of AADHAAR—the world's largest identification project, which is currently being rolled out in India—is to address the leakages in social programs and to enable migrant mobility. As biometric identification expands, so does the possibility of more accurate programs to assist the poor and other vulnerable communities.

Spatial identification and mapping can also serve to enhance the targeting of programs. These technologies are increasingly being employed to ensure the equitable distribution of programs across different geographical areas and in supporting coordination across different donors and nongovernmental organizations (NGOs). Most recently, they have proven valuable in responding to crisis situations, such as the monitoring of violence in Nairobi and the search for missing earthquake victims in Haiti, both organized by Ushahidi.

A lack of reliable data has long been recognized as one of the biggest constraints on managing development programs and the pursuit of results-based management—a core principle of effective aid. Data weaknesses limit both understanding of the conditions prevailing in poor countries and the impact of development interventions. Modern technologies allow data to be collected and analyzed in real time (or with drastically reduced lags), with greater reliability, at less cost and in larger quantities. Cell phone surveys allow data collection to be conducted remotely in conflict-affected environments and to bypass weak institutions, which are often the underlying cause of low-quality data. The various innovations described in this paper automatically create an auditable trail, typically running from the issuing agency all the way to ultimate beneficiaries, which can then be analyzed to help evaluate interventions and make them more effective.

The Accountability Revolution

A regular complaint made of the development industry is its lack of accountability to the people it is intended to help. Official aid agencies are chiefly accountable to rich-country parliaments and to citizens, neither of which is well placed to determine the impact of aid on beneficiaries. Services financed by development organizations often employ long and complex accountability chains between providers and beneficiaries; and the longer the chain, the greater the risk that the interests of citizens will be diluted or distorted along the way.

During the past decade, there has been a growing interest in social accountability mechanisms, which strengthen citizens' ability to monitor and demand accountability from service providers and funders. Examples include participatory budgeting, public expenditure tracking, community score cards, social audits, citizen charters and freedom of information acts. A study of community-based monitoring of a health project in Uganda found that it improved the quantity and quality of health services and dramatically reduced infant mortality.[10]

A first step toward domestic accountability is to enhance the voice of citizens in development planning. This has traditionally meant inviting representatives of civil society groups to consultation sessions when national development

strategies and donor country strategies are being conceived. Today's technologies offer a more satisfying solution through the polling and aggregation of individual preferences. Ben Leo from the ONE campaign has suggested that the new round of Millennium Development Goals should be developed in precisely this way, which could result in a radically different focus. For instance, the Afrobarometer, a survey of African households, found that four times more households stated poor infrastructure (for example, roads and power) as their biggest concern than did health (and education ranks lower still). Greater reliance of polling in planning can facilitate a switch from supply- to demand-driven development.

The same technologies that facilitate ex ante consultation of beneficiaries could similarly be applied to support ex post consultation, to strengthen the feedback loop from beneficiaries to service providers and aid agencies. Technologies can also be used to bypass actors along the accountability chain, such as through the provision of cash or electronic vouchers in place of in-kind transfers.

New media are transforming the way that citizens can hold governments and other development actors accountable for their efforts. In many countries, poverty issues have a low profile: there is a "poverty of coverage." New media are breaking down this barrier. Advocacy efforts can now be organized at a high speed and at a low cost. One example of impact is the recent shelving of a $3.6 billion dam in Myanmar. Advocacy can also help speed the diffusion of proven development technologies; it has raised awareness of microfinance in Africa and provided multiple avenues for concerned citizens to become engaged with development programs.

Advocacy relies on transparency in the resources, outputs and outcomes of development interventions. As new media develop beyond the written word to include multimedia that can be recorded and uploaded simply using mobile phones, the scope and power of transparency are being magnified. Thanks to transparency, absenteeism among public school teachers—estimated at 25 percent in India and 27 percent in Uganda—can be more forcefully tackled. Governments have been encouraged to simplify processes: Kenya's Revenue Authority has placed customs, excises and value-added taxes on an electronic portal; Tanzania's mPayments initiative permits taxes to be filed without citizens having to visit a government office.

Of particular importance, the accountability promoted by media access and scrutiny in developing countries extends to all development resources, not just aid, and to all development actors, not just governments. Donors, NGOs and private corporations are subject to the same standards to promote development or at least avoid harm.

WHAT IS DIFFERENT THIS TIME?

There are no silver bullets in development, and technology certainly cannot be viewed as an exception. However, the technology-driven innovations described in this policy brief can alter the underlying relationships that have entrapped the poor and can be a catalyst for change.

Many technologies have been hailed in the past without ultimately recording much impact because they could not be successfully adapted to developing countries. The innovations described here can avoid this fate. Although the technologies they employ may originate in the West, their application is uniquely tailored to the local environment in which they are being deployed. This reflects a more fundamental point about the role of technology and innovation in development: Successful innovations for development rarely depend on new and complex technologies, but rather on ones that are mature and proven. Their success instead stems from the way technologies are combined and harnessed.

Moreover, the innovations described are less important as solutions themselves than as providing the means for other development interventions to become more efficient, more effective and to reach scale. The technologies they employ are defined by their ability to disintermediate complex activities and in the process to drive down transaction costs. It is these characteristics that imply the potential to more readily achieve scaled-up impact.

A NEW APPROACH TO DEVELOPMENT

At its root, development is about identifying solutions that can be successfully brought to a scale where

they achieve a transformative impact. Historically, most attempts to provide development interventions at scale have employed subsidized models, in which the government, official donors, foundations and/or international NGOs (INGOs) agree to bear most or all of the cost of the intervention. These actors are typically large organizations with extensive networks at the subnational level that enable them to reach poor populations, often extending to the level of individual villages and communities. They are driven by the pursuit of greater inclusivity, equity and ultimately universality.

Subsidized models are credited with a number of successful scaling transformations in developing countries: HIV/AIDS treatment in sub-Saharan Africa, community-driven development projects in Indonesia and Afghanistan, and safety net programs in Mexico and Brazil. Nevertheless, there are limits to what subsidized models can achieve. There simply are not sufficient financial resources to extend subsidies to cover the full range and scope of development challenges, and efforts can be undermined by the typically poor capability of ministries and local governments to manage and implement programs.

An alternative approach is to use for-profit models. Whereas subsidized models depend on central planning to spur the transition to scale, for-profit models harness market forces, which offer a rapid route to scaling up where commercial opportunities exist. Private corporations and social enterprises replace governments, donors and INGOs as the investors behind these ventures. Meanwhile, private networks of agents and supply chains provide a route to beneficiaries. The private sector brings expertise in due diligence and selection for identifying the most viable innovations and knowledge of how to build efficient approaches to finance and delivery. Critically, they have a culture of risk taking that is necessary for developing unproven innovations.

Yet for all the enthusiasm that for-profit models have generated, there have been disappointingly few examples of their interventions reaching scale, either in delivering services to poor people or in involving them as suppliers. In most cases, the private sector has been reluctant to incur the fixed costs of creating a new market at the base of the pyramid when operating margins are seen as small. And there remain concerns—some valid—regarding the potential for private firms to exploit the poor through uncompetitive behavior and monopoly pricing.

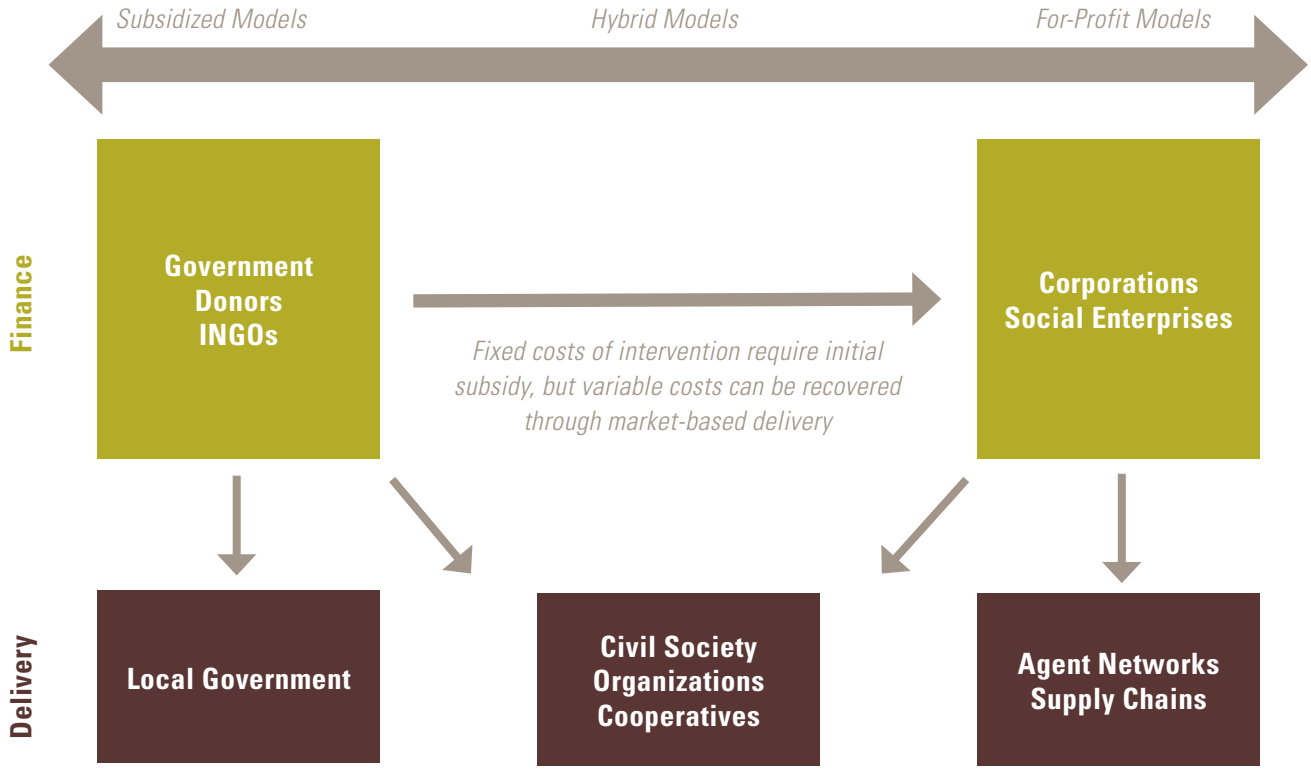
Revolutions in finance, management and accountability can catalyze new scalable solutions through both subsidized and for-profit models. The take-off of mobile money and cash transfer programs for the poor will strengthen consumers' participation in markets and thus expand the scope for market-based service delivery. Improved management capacity will increase the feasibility of administering programs at scale and lead to the development of new services and products specifically tailored to low-income markets. Enhancing citizens' accountability will reduce aversion to private sector involvement in the provision of public goods by reducing the scope for exploitation and supporting a shift toward demand-driven services.

However, the weaknesses of subsidized and for-profit models will not simply disappear. Overcoming these weaknesses requires partnerships between nonprofit and profit actors through the creation of hybrid models (figure 1).

Hybrid models would combine the development efforts of a government, donor, foundation and/or INGO with that of a private corporation under a joint venture, which builds on the financial and accountability strengths of the nonprofit sector and the management, implementation and innovation strengths of the private sector. These ventures offer most promise in those instances where the fixed costs associated with creating a new market prohibit a commercial intervention from moving forward, but where variable costs could feasibly be recovered through market-based delivery if scale economies were to be reached.

Finance from the nonprofit actor would provide a temporary subsidy to support the intervention during the early stages of scaling up, to meet the development of business models with scalable systems for research and development, market testing, piloting and evaluations, institution and skills development, and marketing and education campaigns. These costs

FIGURE 1. HYBRID MODELS FOR DEVELOPMENT SOLUTIONS AT SCALE



may not be recoverable in a commercial sense, but they would have the potential to generate large social returns and serve the development objectives pursued by government, donors and INGOs.

Another aspect of hybrid models would be to create a clearer separation between the finance and delivery components of scaling up. Subsidized models and for-profit models have usually paired up financing institutions and implementing organizations along traditional lines—government with government, NGOs with NGOs, corporations with other private actors. Under hybrid models, financing institutions would determine the mode of delivery based on its suitability for a given intervention. This could drastically expand the possibilities for scaling up and lead to significant efficiency gains.

The case of M-PESA shows how this dynamic can work: A technology developed through a donor-funded challenge; a business innovation to create a network of trusted agents developed by the for-profit corporate sector; new public regulations and accountability to ensure no abuse of monopoly power despite a network covering most of the poor; and a further round of innovations by NGOs in response to the changed circumstances of "banked" poor people.

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[3] Vaughan, Fengler and Joseph (forthcoming).

[4] See http://aidwatchers.com/2009/05/how-to-help-the-poor-have-more-money-well-you-could-give-it-to-them/. The World Bank advises close examination of all programs where administrative expenses are above 12 to 15 percent. See Grosh et al. (2008).

[5] Johnson (2008); Arora and Metz Cummings (2010); UIDAI (2010).

[6] Harvey et al. (2005); Davies and Davey (2007).

[7] Case (2001); Creti and Jaspars (2006); Davies and Davey (2007); Delany et al. (2008).

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New Frontiers: Launching Digital Financial Services in Rural Areas

Cameron Peake, Director, Impact Investing and Social Innovations Partnerships, Mercy Corps

Despite the trend toward greater urbanization, more than 50 percent of the developing world's population (3.1 billion people) lives in rural areas.[1] Technology has the potential to be a great enabler for these populations. Significantly, digital payments technology facilitates rural access to information, and increasingly to the capacity to save, borrow and transact.

The rise of mobile network operator (MNO)-led and bank-led digital financial services offerings, as well as joint and third-party initiatives, is well documented. Globally, there are more than 130 live mobile money deployments tracked by the GSMA, the mobile telecom industry body, and another 87 in development.[2] Of bank-led initiatives, there are 236 agent banking deployments in Brazil, Peru, Colombia and Mexico alone, with a total of more than 43,000 combined agents. As the market is further defined and developed, payment actors such as Visa, MasterCard and Western Union are positioning in this space as well.

Digital financial services have taken off across Africa, Asia and Latin America (see box 1). How can we support inclusive growth to benefit the poor, many of whom live in rural areas where commercial development requires a different approach? This policy brief explores the strategies and challenges to better build out digital financial services systems in rural areas, outlining practical considerations for new entrants aiming to provide services to these populations. These recommendations are based on the work and research of Mercy Corps, a global nongovernmental organization (NGO) with more than two decades of experience in financial services and rural development.

PROBLEM AND OPPORTUNITY: THE CONTEXT FOR RURAL FINANCIAL SERVICES

Numerous reports describe the runaway success of Safaricom's M-PESA mobile money service in Kenya,[3] which boasts more than 14 million users and provides financial services to more than 70 percent of the country's adult population.[4] By some accounts, nearly one-third of Kenya's gross domestic product passes through M-PESA.[5] However, services outside Kenya

BOX 1. DIGITAL FINANCIAL SERVICES IN A NUTSHELL

For the purposes of this policy brief, the term "digital financial services" refers to the provision of some mix of financial and payment services that are delivered and managed using mobile or Web technologies and a network of agents. At a minimum the agents allow clients to cash-in or cash-out physical cash for an electronic currency, which is linked to a client's mobile phone number, bank account or voucher number. Clients can then use a network of agents or their phone or computer to make purchases, take out a loan, buy insurance, pay bills and so on.

Digital financial services are a win–win for consumers and providers. Consumers are able to migrate their money to a more secure environment, transact and manage their account in a more convenient and immediate manner (including after hours and in closer physical proximity), and in a way that frequently saves them money (through more cost-effective remittances services, reduced travel costs, lost cash and so on). Providers are able to access new markets and introduce new services in a way that is cost-effective for small and frequent transactions, improves their operations and core product (for banks, decongesting bank branches and providing additional services to clients; for MNOs creating a "sticky" service to retain customers) and provides new revenue sources such as transaction fees and opportunities for cross-selling. Governments, which want to safely provide the most vulnerable rural populations with conditional cash transfers, may also utilize these electronic payment services and avoid "leakage."

Key Concepts

Providers: Digital financial services initiatives are typically led by a mobile network operator (MNO) (such as Safaricom's role in M-PESA), a bank (such as Banco Postal in Brazil) or other financial institution, a third party (such as Mobile Transactions Zambia), or—increasingly—some combination of the above (such as Equity Bank and Safaricom in Kenya or Globe Telecom and Bank of the Philippine Islands with BanKO).

Channels and devices: Services are typically delivered either through the Web or mobile channel. In many systems, end clients and agents both can manage accounts through these channels. Agents can access the system either through a web portal (by computer), mobile phone or a point of sale (POS) device that uses a mobile SIM. Clients typically interface in person at the agent level, through their mobile and, in some cases, through a computer.

Agent network: The underlying infrastructure that supports cash-in and cash-out services—the gateway for digital financial services transactions. Agents are typically located in retail locations (such as pharmacies, small stores and gas stations) and receive a commission for the services performed.

Definitions

Branchless banking: Branchless banking is the delivery of financial services outside conventional bank branches using information and communications technologies and nonbank retail agents through mobile, ATMs, or POS. This service is most frequently led by banks and allows clients to have access to an individual account at a financial institution.

Mobile money: A catchall term that typically refers to a service that allows users to transact and store electronic value on a dedicated account associated with a mobile phone number, redeemable for cash. Mobile money services are most frequently managed through a mobile wallet**.** These accounts typically do not accrue interest, are not linked to a personal bank account and do not fall under Central Bank regulation or deposit protection insurance schemes.

Superagents or agent aggregators: These are typically third-party businesses that manage a network of agents. In some cases they exist solely to manage the network, while in other cases they are the wholesale distributors to the small stores or owners of a franchise chain where each franchisee is an agent. Superagent duties may also include customer experience management, training, reporting and, most important, liquidity management. In very large agent networks, up to three levels of superagents can exist, and they earn revenue through fee sharing with their agents on each transaction.

have struggled to replicate the uptake, revenues and sustained client engagement of M-PESA, and, tellingly, 86 percent of all mobile phone owners in that country use mobile money, as compared with the regional average of 23 percent.[6] Challenges in other markets range from restrictive regulation, to low organizational capacity, from fragmented mobile money products in the market, to inadequate financing for marketing activities.[7] Regardless, M-PESA and other systems have inspired a range of institutions—MNOs, banks, and other parties—to integrate the principles of digital financial services into their operations.[8] This has been particularly true in Africa, where landline telephone service and bank branches are often rare and informal services for moving money have their own problems.

As new actors enter the mobile money space or existing institutions expand into new markets, a greater emphasis on rural market development is anticipated, particularly services for base of the pyramid (BOP) clients. Increased activity in this space has already been observed anecdotally by colleagues at the GSMA and banking consultancies.[9] In general, rural markets are considered the "last frontier" for brands and service providers to tackle and while challenges exist, the market opportunity is massive. It is estimated that rural BOP populations total about 2.5 million, and account for between $850 billion and $1 trillion in income.[10] In India alone, purchasing power was estimated to be in the multiple billions of dollars across a range of industry segments; and in sub-Saharan Africa, agriculture accounts for one-third of gross domestic product and three-quarters of employment.[11] For MNOs, 70 percent of all new subscribers come from rural areas.[12]

The rural customer segment has distinct characteristics compared with its urban counterpart. In most countries, agriculture and related activities represent a significant percentage of rural incomes, which typically result in seasonal flows and ebbs of income. Rural actors by definition fall outside urban areas and face greater constraints in terms of distance, travel times and infrastructure development. Most are more tradition bound than urban counterparts and focus on intracommunity relationships, so trust plays a huge role in engaging with them. Rural areas are also known to have lower literacy levels, lower mobile handset penetration rates and poorer network coverage. Finally, rural consumers are typically slower to adopt new brands and products but are also slower to give them up.

To date, specific use cases have prevailed in this market. Domestic remittances (peer-to-peer, or P2P, transfers), flowing from urban to rural markets, are what drove M-PESA's success. However, this has not had the same level of success in other markets. Where they exist, government-to-person (G2P) or social payments frequently flow into rural areas and represent a commercial opportunity for institutions tasked with delivering them. A positive spillover from this is the subsequent development of systems and infrastructure to support the delivery of these government payments to underserved areas. There has also been an increase in institutions looking to rural areas for market growth and to build out information communication technology enabled networks—including payment systems—to cost-effectively reach these new populations.

However, there are still hierarchies within rural areas. The most remote areas with limited or no network coverage, low incomes and disparate commercial and merchant networks remain unattractive to providers—even M-PESA does not operate outside urban centers in "the horn" in northeastern Kenya.[13] Digital financial services systems will likely need to develop unconventional business models, if the services are offered at all, in the remotest rural areas.

ANALYSIS AND THE STATE OF DIGITAL RURAL FINANCIAL SERVICES

During the last 15 years, Mercy Corps has developed several digital financial services initiatives:

- *Xac, Kompanion, and partner banks.* Mercy Corps has launched and established more than a half dozen microfinance institutions, such as Xac Bank (Mongolia, established 1998), Kompanion (Kyrgyzstan, 2004), and Partner (Bosnia and Herzegovina, 1997). Many of these are the largest and highest-rated institutions in their countries and are independently run and managed. These institutions have recognized that

digital services are critical to serving hard-to-reach areas. For example, in 2009 Xac Bank launched a large agent banking service called AMAR and is now servicing tens of thousands of clients through mobile-enabled agents.

- *Bank Andara and AndaraLink.* Bank Andara is a wholesale commercial bank, supporting the market of more than 50,000 microfinance institutions in Indonesia. Established in 2009, Bank Andara provides microfinance institutions (MFIs) with loans, technical assistance and new financial products. As part of Bank Andara's launch, the bank introduced AndraLink, a digital payments platform that enables MFIs to introduce new financial products such as microinsurance and bill pay to their clients, provide real-time settlement, and extend the reach of services beyond their bricks-and-mortar bank branches. Mercy Corps supported the launch of the bank, maintains an equity stake and takes an active role in advising management and the board of directors.
- *BPI Globe BanKO.* BPI Globe BanKO (BanKO) is a joint venture between the Bank of the Philippine Islands, the second-largest bank in the Philippines, Globe Telecom and the Ayala Group. BanKO is a savings bank focused on providing low-income clients with secure and affordable financial services, using mobile as the sole distribution channel. Mercy Corps has been working with BanKO since 2010, providing strategic support on business modeling and product development, as well as market research, marketing and technology funding.
- *Haiti Mobile Money.* After the 2010 earthquake, Mercy Corps began working with MNO Voila to roll out their mobile money product in a way that was inclusive of poor and of rural markets. With support from USAID and other donors, Mercy Corps developed rural merchant infrastructure, liquidity and consumer training, and channeled its own humanitarian payments through the mobile money system. The overarching objective was to develop a basic financial infrastructure that could sustainably support financial inclusion post-NGO activity.
- *Agri-Fin Mobile.* Agri-Fin mobile is a new program supported by the Swiss Agency for Development and Cooperation (SDC), which aims to test and explore new business models and alliances to increase harvests and incomes for smallholder farmers, by bundling mobile financial services with technical services for farmers. Agri-Fin launched in Indonesia, Uganda and Zimbabwe in June 2012 and will expand to five additional countries in 2015.

A range of initiatives outside Mercy Corps have employed specific strategies to serve rural populations. In some cases, these represent an extension of commercial growth into promising markets; in others, a government mandate may drive outreach; and in still others, an innovation specifically targeted to rural populations has taken off. Table 1 outlines some examples and the factors that make them unique.

MERCY CORPS LESSONS FROM THE FIELD

Based on Mercy Corps experiences and market research in Haiti, the Philippines, Indonesia and globally, it has compiled a number of key criteria to keep in mind when launching digital financial services operations in rural areas. It should be noted that these are not universal; context needs to be taken into account in each new market.

Design for a Different Customer

The rural poor are fundamentally different from the poor in other areas. Though they seek access to affordable financial services, providers need new strategies to engage effectively with this market.

Farmers have irregular income flows that typically follow harvests and financing needs that occur in fairly predictable cycles. Mercy Corps has found that quick and easy loan access with flexible repayment terms is successful among farmers, as are tailored savings accounts and crop insurance. Because their incomes are "lumpy," they need ways to defer payments for labor or farming inputs and to pay for their children's education without putting cash at risk.

However, financial services should be seen as one of a number of needs, which are most effectively provided in collaboration. Productivity support and

TABLE 1. EXAMPLES OF GLOBAL PROGRAMS THAT SERVE RURAL POPULATIONS

Name	Location	Description	Rural Element	Notable Strategy
ALIN (Arid Lands Information Network)	Kenya, Tanzania and Uganda	ALIN is an NGO focused on facilitating information between extension workers or intermediaries and arid lands communities.	It is 100 percent rural. ALIN has established Maarifa centers, which are physical hubs that aggregate communities of farmers, providing them with information, and house an M-PESA agent point to provide financing and generate transaction revenue.	Unified rural networks are hard to come by—particularly in sub-Saharan Africa. ALIN offers a point for providers to "plug in" and offers financial services without recruiting and managing individual agents. Providers should also look to networks like these to improve access and trust at a local level. For nonfinancial partners, acting as an agent is a way to generate new revenue.
BanKO and International Rice Research Institute (IRRI)	Philippines	This partnership between BanKO and IRRI involves the integration of IRRI's nutrient manager app into BanKO's mobile banking menu.	The program gained 1,500 users after two months. The nutrient manager app offers a precision farming tool for smallholder rice farmers that enables BanKO customers to access fertilizer input recommendations to improve their yields.	BanKO is building trust for phone transactions by creating a relevant and regular experience for farmers tied to BanKO's brand. By providing information that can increase yields for farmers, BanKO is aiming to mitigate risk among a new and less familiar market segment.
Caixa and Banco Postal	Brazil	Caixa and Banco Postal are two commercial banks that use agent networks to expand reach across Brazil, enabling account opening, bill pay, etc.	Caixa and Banco Postal built an agent in every municipality in Brazil, including hard-to-reach areas of the Amazon.	This initiative was the result of a government push to provide social transfer payments and banks to municipality in Brazil.
Kilimo Salama	Kenya	Kilimo Salama is a weather-index crop insurance delivered via mobile for small holder farmers.	The program has a 100 percent rural focus. Agents are seed distributors.	Kilimo Salama uses the "rails" of M-PESA services to deliver more sophisticated and cost-effective services to farmers.
Mobile Transactions Zambia Limited (MTZL)	Zambia	MTZL is a network of agents, developed and managed as an independent network, that enable money transfers throughout Zambia. Neither senders nor receivers are required to have a mobile phone.	More than 50 percent of MTZL's agent locations are based outside of urban areas. MTZL recently launched an agricultural voucher program to purchase cotton inputs.	MTZL has developed vouchers specifically for farmers to manage their income received from large agricultural buyers for cotton and seed. MTZL supports a variety of payments across Zambia, including salaries, NGO vouchers, P2P remittances, etc.
M-PESA	Kenya	While not known as a rural service, M-PESA is an example of how rural development can grow from a strong commercial case.	No data exist on the exact number of rural agents, but research from 2010 showed that about 59 percent of rural households were using M-PESA—a significant jump from 29 percent the year before.[14]	M-PESA is an example of a service that has been able to expand to serve the poor as a result of commercial growth.

access to inputs make capital more effective. In a digital ecosystem, this might mean that technical information for farmers is distributed through phones, or a strategic partner might be a network of on-the-ground extension workers to provide training.

Financial products should integrate strategies to overcome barriers related to illiteracy. There are typically higher levels of illiteracy in rural areas and financial literacy may be low, both of which can inhibit effective adoption of services. Digital literacy—particularly understanding the concept of banking through a phone—can be difficult to grasp, although analogous to prepaid airtime. Mercy Corps has found that visual tools are particularly useful in training and can support understanding of even complex technologies and concepts. NGOs or account officers are often well placed to further these efforts, and for older clients a child or grandchild in the household may actually perform the transactions. Mercy Corps' experience shows that a customer must be supported in making a minimum of three transactions before they are able to transact independently.

The guiding rule for rural customer engagement is that trust is key. It is vital that high-quality, trusted agents from the community are selected and that trust is built around a brand. Many unbanked clients are comfortable using the phone for communications purposes, but not for banking transactions. NGOs or village leaders can help to mitigate some of the trust concerns; for example, in Haiti the poor felt more comfortable engaging in the mobile money program because Mercy Corps was involved. It is important not to underestimate the importance of the human element, especially in the digital world, which may need to compete with traditional slower and more insecure methods of moving cash.

The New Rule of Thumb for Agents

The economics of agent networks change in rural areas. Generally, rural agents should make enough on commissions to cover the cost of rent or the cost of labor. If regulation allows and it is contextually prudent, nontraditional networks for agents (such as farm extension workers and agricultural buyers) or product advertising can be used to drive depth, efficiency and uptake.

For money management, a rural agent typically performs more cash-outs than cash-ins as money is transferred from urban areas through P2P or G2P payments. Rural agents struggle with managing their liquidity, as frequent trips to collect cash are required to meet the demand for cash-outs. To manage this, providers can team with microfinance institutions, superagents or aggregators to manage agent channels and provide liquidity. In some cases, the MFI may be the best choice as the agent.

External Factors May Force New Models

Infrastructure changes in rural areas. Mobile phone and Internet penetration are typically lower, which may severely raise costs and/or inhibit the provider's ability to introduce mobile or Internet-based services. For bank-led models, it may be wise to team with an MNO for rural development or look at more human-centered solutions where transaction data may not be real time, but regularly synched as the network allows. One thing to keep in mind is that technology infrastructure is rapidly expanding, and though a system may not be in place today, it may be completely functional in six months.

Regulations also force new models to emerge. In countries where bank account opening is not allowed at the agent level and rural banking penetration is low, typical (that is, transactional) agent models will be of limited use, and the value proposition for rural clients will be reduced. Some banks may introduce roaming employees to register clients, thus avoiding the restrictions. It should also be kept in mind that agent regulation is rapidly expanding as governments become more familiar with nontraditional models.

Government Subsidy Is a Mixed Bag for Providers

Government subsidies, usually in cash, may be high in rural areas and can be either the bane of or a boon for providers. In some cases, they may be viewed as competition for loan products, and a provider should be cautious about lending in these areas. In other cases, banks have a commercial opportunity to manage cash transfer programs and may view distributions contracts as a foundation on which to build additional rural services. For example, a government program

may finance the development of a rural agent network, support better user incentives to transact on their phone, or reduce costs by not having to pay agents for accepting cash-ins.

NEXT STEPS FOR THE NEW FRONTIER

Interest is high and experimentation is ripe for expanding digital financial services to rural areas. The challenges associated with operating in rural areas parallel those with traditional services—regulatory limitations, ensuring that transaction volumes are sufficient, developing a service that has a strong value proposition—but several additional questions remain that are particularly pertinent to this subgroup: How can we develop scalable financial and digital literacy programs? What is the appropriate ecosystem of services to drive a valuable user experience on the phone? Who are the best partners to share costs and develop meaningful "bundled" content? As these questions are better understood, there will be greater efficiency to serve these markets.

ENDNOTES

[1] CGAP (2012).

[2] "GSMA MMU Deployments Tracker (2012).

[3] See, among others, CGAP, http://www.cgap.org/p/site/c/template.rc/1.26.15552/; and MIT's report, http://www.mit.edu/~tavneet/M-PESA.pdf.

[4] African Development Bank (2011).

[5] *Telco Magazine* (2012).

[6] World Bank (2012).

[7] See, among others, Harvard, http://www.hks.harvard.edu/m-rcbg/CSRI/publications/report_39_mobile_money_january_09.pdf; and CGAP, http://www.cgap.org/p/site/c/template.rc/1.26.15552/.

[8] Other systems, such as G-cash in the Philippines and Banco Postal in Brazil, launched before M-PESA.

[9] This is the GSM Association, a mobile industry body.

[10] World Economic Forum (2009).

[11] World Bank (2011).

[12] *Wall Street Journal* (2009).

[13] This information is based on a conversation with a former M-PESA executive in the fall of 2011.

[14] Jack and Suri (2010).

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Harnessing Connection Technologies for Development

Anne-Marie Slaughter, Bert G. Kerstetter '66 University Professor of Politics and International Affairs, Princeton University

Eleanor Meegoda, former Student, Princeton University; current Princeton Project 55 Fellow, Rockefeller Foundation

The development field is exploding with the potential of new technologies, from the wireless revolution to the digitization of just about everything: words, sounds, images and geography itself. The ability to connect individuals to the knowledge and resources they need electronically—without roads, schoolhouses, clinics or corrupt government bureaucracies—seems too good to be true, and sometimes is. Communication technologies, which are really better described as connection technologies, are a part of this larger technological revolution.

The most basic connection technologies are cell phones, which exist to allow people to communicate to one another, and the Internet, which can be accessed through Internet cafes, home access or smart phones. Once connected to the Internet, additional technologies, in the form of specific software, allow individuals to connect with each other in a variety of prescribed ways (friending, tweeting, sharing, competing, querying, challenging and collaborating). Much of this software falls into the category of "social media," because it enables the kinds of interactions online that we think of as social activity (hanging out with your friends, making new friends, playing games, sharing stories and useful information).

As connection technologies, these media not only grant people easy communication access to one another but also permit greater reciprocity in relationships among development thinkers, service deliverers and beneficiaries. The rise of blogs, Twitter and crowd-sourcing Web sites has the potential to expand the variety of individuals who can present ideas and discuss approaches to development with a wide audience. The eruption of new platforms—such as Global Voices, Ushahidi, Twaweza and Wikipedia—invites beneficiaries to assume roles as data providers and fact-checkers. In doing so, consumers

become producers of content. For instance, Ushahidi allowed individuals affected by the 2010 Haitian earthquake to post information on lost individuals to a centralized Web site. Rescue organizations were then able to use these posts to reunite families. Another organization, Twaweza, enables anyone with a mobile phone to get involved in monitoring the quality of public service and distribution. These examples illustrate that connection technologies are potential resources for empowering citizens, and for already-empowered Netizens, to take charge of their own development and hold their governments accountable.

Scaling up is often the challenge that derails many promising development solutions. With connection technologies, however, scale is a precondition for success. These technologies depend on networks that link individuals to one another and hence benefit from network effects; that is, the more participants there are in a network, the more valuable the network becomes—and hence the more participants it attracts. The ease of access via Internet or mobile phone applications reduces costs to participation—whether in the form of blog posts, petitions, votes, donations, data provision or online videos. For example, Global Voices and Al Jazeera Stream make it easier for individuals who previously had limited access to global audiences to provide input, photos and videos. Additionally, these connection technologies increase the potential benefits of participation. The postings of videos and the publishing of innovative campaigns have been shown to incite global protest and change—and to attract even greater numbers into the mass network of interested and participating individuals.

Other characteristics of mass networks include fluidity, versatility, democracy and reciprocity. They are fluid in the sense that they are constantly changing, both in terms of who is participating and how. They are versatile; different types of mass networks frequently morph into one another. New applications of and for these networks are constantly emerging. They are deeply democratic, in that anyone with mobile or Internet connectivity can participate and build a following. And they are reciprocal in their very essence: They enable and depend on reciprocal exchange.

This paper maps the types of mass networks that have formed around applications of connection technologies. The discussion that follows identifies three different categories of mass networks: reciprocal information communities (RICs), reciprocal information and participation platforms (RIPPs) and crowd-solicitation platforms (CSPs). The distinctions among these categories reflect important differences in the types of participants; the degree of active participation; the types of interaction among participants; the open-ended ability to generate new uses and applications of the information collected; and the directedness of the community. This typology seeks to go beyond common terminology, such as “crowd mapping” and “crowd sourcing,” to create more conceptual categories that can group together multiple phenomena. The final section raises a number of research and policy questions that arise from this initial survey of such mass networks.

Overall, the phenomenon of mass networks in the development community (as elsewhere) is so new and changing so fast that it is extremely difficult to categorize and analyze, much less to link specific categories of networks to particular development outcomes. Another useful approach would be to categorize different networks in terms of the exact developmental functions they perform. That effort is beyond the scope of this paper, but it is our hope that the typology used here will prompt discussion and revision.

MAPPING THE TERRITORY

Reciprocal Information Communities (RICs)

RICs revolve around a basic group of actively interacting experts. These expert groups become central nodes for disseminating valuable information when they attract a large enough readership. What qualifies these communities as mass networks is that they use connection technologies that can allow for enormous amplification effects from the experts at the center of the community to less active experts or interested persons on the periphery. These amplification effects result from the effective use of tweeting, reposting, liking and linking on different social and information media. At the same time, RICs will not work if the flow of information is only from the center outward. Reciprocal information flows in all directions between theorists, policy analysts, and action-takers are thus critical to the success of the community.

A prime example of an RIC is the African development blogosphere, which frequently makes forays into the Twitter world. It is a mass network made up primarily of development political scientists, economists, think tank experts and workers in public service or nongovernmental organizations (NGOs) who have blog and Twitter connections to the African diaspora, vocal African activists and business communities. Many of the participants in this network also have many followers who are family members, former students and engaged citizens interested in development issues and in ways to take action.

This African development blogosphere RIC is an important forum for spreading knowledge about development research, best practices and failures among a diverse community of development professionals. Many central members of this network are bloggers, contributing to an institutional blog such as the Center for Global Development blog. These African development bloggers typically welcome comments and critical debate, often fostering conversation by linking and responding to posts on other blogs and broadcasting these virtual, asynchronous conversations through Twitter and other social media. In addition to citing and conversing with one another, bloggers in developed countries (often based in think tanks or universities) also summarize recent papers and books of which development practitioners may not be aware or to which they lack subscription or bookstore access. Development practitioners often respond with critiques, examples and counterexamples from their own experience.

Equally important is cross-fertilization among sectors. Development experts who blog also consistently inject new ideas and perspectives into debates by reading (or at least skimming) blogs in related spheres like economics, aid and regional politics (the African politics blogosphere is a subculture of its own). Active blogs are shared with family, friends, specialists within the NGO community and experts at government development ministries, as well as employees of international and regional development banks, development organizations and corporations that are increasingly engaged in developing markets—basically anyone with an interest in the blogger and/or the blog content.

The conversation itself, and particularly the cross-fertilization that fuels it, are themselves important for broadcasting, critiquing and improving development theories and practice. But this description of the blogosphere thus far is not so different from a description of the multiple development conferences that take place every year, bringing scholars and practitioners together to exchange ideas. What makes the development blogosphere a mass network is that the difference in degree—the scale and speed of amplification—amounts to a difference in kind.

To see how this works, consider the Twitter feed of three development experts, two based in the U.S., @TexasinAfrica and @ViewfromtheCave, and one in Africa, @AfricaTechie. @TexasinAfrica is the Twitter handle of Laura Seay, an assistant professor at Morehouse College in Atlanta who has done fieldwork in the Democratic Republic of the Congo and is widely regarded as a reliable Western voice on Africa. Seay has 8,904 followers and follows 263 other people, many of whom are also development experts. She sends out a tweet at least once every 3 or 4 hours, and often between 5 and 10 an hour during the business day in whatever time zone she is in.[1] Almost all the feeds with which she interacts have at least 400 followers, and many have more than 1,000. For instance, on Saturday July 14, 2012, @TexasinAfrica was mentioned on dozens of other feeds by name. As a result, Seay achieved a reach not only of her 8,904 followers but also of everyone following someone who mentioned her—another 43,164 followers—for a total of 52,068 followers potentially reached. (For non–Twitter users, it is important to note that almost all the tweets she sends out include links to longer pieces, such as newspaper and journal articles, think tank reports, blog posts and interviews.) That is a vastly greater dissemination of her own views, writings and assessments of valuable material from others than she could possibly ever have reached as an assistant professor at a relatively small American college even five years ago.

@ViewfromtheCave is the Twitter handle for Tom Murphy. Murphy describes himself as an "aid and development blogger, social media consultant, and self-proclaimed hack" on his blog *A View from the Cave: Learning and Discussing What Are Smart Aid and Development*, which

draws roughly 1,000 regular readers a day and 25,000 page views a month. He has 6,031 Twitter followers and follows 4,001 people or organizations. He tweets roughly at the same frequency as @TexasinAfrica and tweets about or to roughly 25 people a day, most of whom have at least 1,000 followers. Using the same formula as that given above, Murphy reached an audience of 21,824 (6,031 + 15,793) followers on July 14, 2012.

@AfricaTechie is the Twitter handle for the anonymous author of the *Diary of an African Entrepreneur Blog* who tweets about the challenges of doing business in Africa. She has 10,230 followers and follows 1,560 other handles. She tweets between 10 and 30 times a day, and at her most active hours, tweets about 5 or 6 times per hour. She tweets to or is tweeted to or about by 15 people a day. Each of these Twitter handles has an average readership of 1,000 (excluding superstar followers like Jacqueline Novagratz of the Acumen Fund, who has over 400,000 followers, and a few disconnected individuals, who have 20 followers). Using the same rough calculation, @AfricaTechie's reach on July 14, 2012, was 38,306 (10,230 + 27,806) followers.

For those familiar with Twitter, it is obviously unlikely that all of one's Twitter followers will see every post, unless they are online at the same time. These data assume that people who frequently correspond with a feed do a moderately good job of following the information on the feed and do not filter it heavily. Furthermore, July 14 was a Saturday and some of these individuals may be more or less active on a weekday or in response to a particular event that occurred that day. Thus the reach of each feed may vary considerably day by day. This very simple calculation merely shows the enormous amplification effects of social media by identifying the number of people who could easily access and view each Twitter handle's posts.

Think about it: A blogger like Murphy can have a readership of between 20,000 and 50,000 people without even having a formal institutional base (Murphy does write for the *Christian Science Monitor*, the *Huffington Post* and other places, but as a freelance development expert.) Critically, he is as much a filter and a broadcaster/re-broadcaster as he is a writer. Indeed, as he points out, "blogging is generally reactionary," by which he means that his blog introduces readers to new things popping up on the development landscape and then responding to them.[2] Compared with how they are handled at academic conferences or in journals and institutional publications, new events and changes can be analyzed and discussed quickly, editing and critiquing can be conducted organically, and new information can be spread rapidly and much more openly. A summary analysis of a World Bank publication or an evaluation of a mobile health initiative can now more easily reach a wider audience, including those who do not pay for journal subscriptions or those who do not check disparate institutions' Web sites daily. They merely have to check their Google Reader, Twitter or Facebook account.

Thus, the principal value of RICs is amplification and empowerment. Individuals who have no other way to make their views and knowledge known can participate and build a following based on the interest in, and the perceived merit of, the issues they write about or to which they respond. Organizations whose publications might normally have a relatively small group of technical readers can now reach a far larger audience. Theorists can be challenged by practitioners; practitioners can be prodded and inspired by scholars.

Although careful digital tracking would be required to establish the fact, it is also possible that an RIC can function as a virtual test laboratory where different approaches can be presented and then improved or abandoned in the context of a constant dialogue. Equally important, an RIC can help a specific solution (microfinance, a clean cookstove program, crisis-mapping technology) seed itself in countless smaller initiatives all over the development community that together can amount to the equivalent of one very large-scale project.

Finally, RICs perform the essential psychological function of building a community. This social function is a critical component of the "customer service" and marketing of the blogosphere. Through personal anecdotes, advice and even the sharing of online comics, bloggers build social relationships, in addition to the relationships formed through information sharing and debate. The creation of

a reciprocal information *community* means the building of social bonds solidified by shared affinities, interest and, most important, almost daily conversations, debates and shared news. Such social bonds are often the fuel for further intellectual, technical and organizational progress on actual development projects.

The last point to emphasize about RICs is the steady democratization of participation in them. Programmers are designing new platforms for very basic smart phones, like Facebook Zero and Twitter Zero. As these apps gain traction, they open up participation to non-data phone owners and to anyone who has access to an Internet café. A growing pool of readers can discuss, critique and show support for others' posts at high speed. Indonesia, for instance, is one of the countries with the highest share of Twitter users in the world, even though it is well behind many developed countries in other measures of technology use.

Further research will be necessary to determine if and to what extent this type of connectivity via RICs leads to faster evolution of norms, values and mobilization, as many journalists and bloggers have argued. But the potential is enormous. Individuals who were formerly easily ignored, overlooked or spoken for now have the opportunity to speak out, complain or congratulate. If and as communities adopt these technologies for political participation purposes, development organizations, government officials and community leaders will need to recalibrate their strategies concerning accountability. Obviously, social media skill and social status will still play a role in influencing members of mobile phone and online mass networks, but the vast number and increasing speed of individuals exchanging information and opinions makes the control and manipulation of information harder and harder to achieve. The very idea of a top-down development paradigm will give way to a much more horizontal, community-based model.

Reciprocal Information and Participation Platforms (RIPPs)

RIPPs are the second category of mass networks. These platforms work by collecting information about a particular phenomenon from a large number of widely distributed contributors. This information is then combined with geospatial and other technologies. The example that most people know best is the Ushahidi crisis-mapping technology, which was first developed to allow voters all over Kenya to text information about election-related violence into a central site where the data could then be mapped and used to mobilize a response.

Whereas RICs grow linearly in terms of impact and effectiveness, (even small RICs are valuable for their participants through their amplification and psychological effects), RIPP growth is nonlinear. RIPPs require a critical mass of participants to be effective in the first place. Knowing whether there was fraud at a few poll sites or that sexual harassment took place in a few places in a given area is not of sufficient interest or value; such a platform needs to have attracted a sufficiently large enough population to be useful. RIPPs thus rely on a crowd more than a community. Many if not all RIPPS would qualify as crowd-mapping or crowd-sourcing initiatives, but "crowd sourcing" is an overly inclusive category for our purposes. Here we focus on crowd participation that is both reciprocal and versatile—that is, on the creation of platforms that serve multiple functions depending on the creativity and needs of their users.

RIPPs are reciprocal because the same people who provide, aggregate or analyze the information—such as victims of violence, harassment, corruption and natural disasters—benefit from the provision of information by others. Unlike those who are part of RICs, users of RIPPs participate in a specific way, such as posting the locations of a particular act of violence or crime. The platform also explicitly serves a purpose outside (although sometimes in addition to) discussion and social bonding. For example, Esoko, an RIPP that focuses "on agricultural value chains with the explicit goal of improving the transparency of markets and the operational efficiency of organizations," asks farmers to text information about crops so that data can be collected.[3] Farmers participate because they receive valuable analysis from the aggregated data to make critical decisions about harvests, prices and trade locations.

Platforms also provide a foundation for a constantly shifting array of innovations. Entrepreneurial users can adapt the platform of other uses, as in the case

of Ushahidi's open-source software; make a copy-cat platform; or use the information from the platform for additional purposes. HealthMap is one such online platform that has been used for a variety of public health, demographic research and tourism uses. The following are other examples of RIPPs and their purposes.

Ushahidi Open Source Software and Its Applications. Ushahidi came about in response to Kenyan bloggers' calls to repurpose Google Maps to identify the extent of the violence in Kenya following the 2007 presidential election. It was meant to map and get real numbers for the violence. Bloggers realized that the numbers on international media differed substantially from the numbers implied by the stories of families and friends in Kenya at the time.[4] Today, the Ushahidi software has been repurposed for everything from disease mapping and endangered wildlife mapping to many types of crisis mapping, most notably in finding victims of the 2010 Haitian earthquake,[5] the Syria Tracker Crisis Map[6] and the Mumbai disaster tracker. In each case, coders quickly responded to multiple chaotic streams of information by building upon the open-sourced software. For example, in Mumbai, the tracker was used to show the locations of households whose members volunteered to house people stranded by the explosions.[7] Online Netizens, the Ushahidi standby task force and impromptu volunteers quickly aggregate and verify tweets, texts and other posts against impressions from aid agencies and other credible sources. The Ushahidi team then adds those posts to the map.

Ipaidabribe.com. Ipaidabribe.com is a Web site that allows individuals to post when, where and under what circumstances they paid a bribe to a government official. The goal of the project is to improve public accountability in part by shaming the public administration with data-backed numbers of bribes induced as well as identifying corrupt public officials. It has spawned a large number of copycats, including 25 in China such as woxinghuile.com,[8] and Ehtisaab in Pakistan.[9]

Al Jazeera Stream. The Stream has been branded as a "Web community with a global TV show." It builds on social media contributions and sources to disseminate information. Partnering with Storify, Al Jazeera Stream enables users to post stories via Tweets, photos and videos. The community's conversations are organized onto a formal news platform so even passive general news watchers will see the program. The Stream has masterfully added value to both parties: its international audience, which wanted up-to-the-minute news and valued the personal and dynamic presentation; and protesters, who wanted to leverage the support of the international community. For its novelty and quality, Al Jazeera's work in Egypt has been compared with CNN's Gulf War coverage.[10]

Global Voices. Global Voices is an example of a mass network that has characteristics of both an RIC and an RIPP. It is made up of more than 500 bloggers and translators brought together for a specific service. They volunteer and work part time to "aggregate, curate and amplify" news from around the world. The volunteers cull from local newspapers and blogs around the world and republish the contents on a main Web site available to a global audience. Because of its deliberate global reach, the mass network is transforming from an information community into a global citizens' media platform. It has also launched an advocacy Web site and network to "help people speak out online in places where their voices are censored," and a "Rising Voices" program that offers microgrants to innovators committed to teaching and expanding citizen media techniques to populations that are unlikely to discover citizen media tools on their own.

DAWNS. RICs can generate RIPPs. Thus, for instance, the development blogger Tom Murphy (*A View from the Cave*) has now joined with U.N. development blogger Mark Leon Goldberg to create the *Development and Aid News Dispatch*, or *DAWNS*.[11] *DAWNS* is "a platform to promote independent humanitarian journalism and storytelling"; it seeks to generate revenue by attracting subscribers to a curated digest of development and humanitarian news, and then to recycle these funds as microgrants to writers, bloggers, photographers, citizen journalists and traditional media all over the world to allow them to tell their stories on the platform. *DAWNS* is already partnering with the U.S. Agency for International Development (USAID) in this venture.

The power of RIPPs is the power of platforms everywhere: They are, by their nature, deeply enabling and empowering technologies. They are like a renewable energy source, generating and using their own mass data. One platform can support many different mass networks, as Ushahidi does. They are less personal than RICs, in the sense that the many different users and application developers are not necessarily verbally communicating with each other. Yet conversely, the creation of a platform is a logical next step for many RICs seeking to turn conversation into action.

Public Health Crowd-Sourced Data Analysis. In some cases, the reciprocal information and participation platform is not necessarily a Web site but a set of tools and mobile applications. The health care community—interdisciplinary public health researchers, doctors, patients and patient caretakers—has built myriad global- and U.S.-based disease trackers that make use of mobile phones and the R&D capacity of affiliated universities. For example, the OpenData kit is a "suite of open-source tools developed by computer scientists and engineers at the University of Washington" in collaboration with others around the world. These tools make use of existing cellular networks to free users "from the constraints of traditional computer systems."[12] For example, it allows Kenyan medical workers to track and upload patient medical information directly into the medical record system using their phones. Similarly, GeoChat, developed by the InSTEDD Group,[13] is another open source technology, which allows team members in emergency situations to "connect, visualize, report, receive and coordinate data and information."[14]

However, there are also many medically related open source software programs that make use of a (slightly) wider range of participants. There is the use of Ushahidi platforms to update and track medical and pharmaceutical shortages in Kenya, Uganda, Malawi and Zambia. Additionally, the Center of Public Health Informatics at the University of Washington provides a geospatial-visualization framework for public health data via a program called EpiVue.[15] A mobile application for a program called Outbreaks Near Me asks its users to contribute reports via smart phone applications. Midway through its first year, it had been downloaded more than 110,000 times and collected more than 2,400 submissions.[16] HealthMap, the Web site for Outbreaks Near Me, aggregates online news, eyewitness reports and other disparate data sources to track the "current global state of infections."[17] The application verifies submissions as well as filters out spam, duplicates and mistaken reports.[18] GoogleFlu is an indirectly participatory program designed on the theory that searches for certain terms, especially disease-related terms, go up when someone is or knows a patient. The application generates graphs and data on the location, time and density of queries such as "flu."[19]

The greatest challenge to this kind of crowd sourcing is the verification of the data that a victim actually has the condition that she says she has. Asthmapolis solves this problem, at least for mapping asthma triggers. It is an application that geolocates and identifies the severity of asthma attacks when patients use inhalers equipped with special trackers.[20] Asthmapolis is meant to track and further the medical knowledge on environmental asthma triggers.

In these cases, the existence of a medical community committed both to public health disaster prevention and to improving medical knowledge and expertise facilitates the spread of technologies—especially novel, open source software technology. One critical point is that connectivity between an already-interacting community enabled the initial direct collaboration among a widespread and elite group to build these new technologies (the InSTEDD innovation labs, HealthMap, Open Data Kit). The resulting technologies further enable both direct (Geo Chat) and indirect collaboration (Open Data Kit, Asthmapolis, HealthMap) among a broader cross-section of the health care community.

Crowd-Solicitation Platforms (CSPs)

CSPs, the third category of mass networks, also rely on crowd sourcing but in a more focused and limited way designed to allow a specific interlocutor to get particular results (funds, ideas, inventions) from a more self-selected or preselected crowd. Whereas an RIPP typically arises in response to a crisis or an ongoing problem that requires mass collaboration, or at least coordinated participation to generate solutions, a CSP operates on the principle that many hands make light work—or that two (or two thousand) brains are better than one. A CSP enables an

individual or organization to pose a specific question or to present a specific project to a mass of potential participants who can then choose whether or not to respond. These participants do not then continue their engagement with the project in the way that the crisis-mapping participants do, meaning that the flow of communication is much more bidirectional between the initiator and the crowd (and back) than multidirectional. The following are other examples of CSPs and their purposes.

USAID Grand Challenges for Development. USAID's Grand Challenges for Development program reaches out to the global crowd of scientists and technologists to develop solutions for specific development problems.[21] Modeled on Innocentive—a platform where companies can post R&D problems that they want solved and then pay for the best solution from a mass of freelance inventors—Grand Challenges provides sizable grants for the challenge winners to address specific problems such as reducing infant mortality, increasing literacy and providing renewable energy access for agricultural purposes.

Crowd-Funded TV Station. In time with the national protests surrounding Vladimir Putin's election, members of the Russian opposition are attempting to crowd-source 100 million rubles per month to operate "Social TV." This proposed online television station will broadcast social and political news as well as allow users to submit story ideas and vote on program hosts and writers.

Compared with channels that normally accrue revenue through ads and cable subscriptions, this platform offers content designers more direct information about customers' viewing preferences. The channel enables and encourages its viewers to take their engagement to a higher level, thereby potentially improving news content. The success of the project is predicted to build a more consistent and readily accessible news platform jointly preferred by opposition supporters.[22]

Crowd Funding Against the Impunity of the Banks. Through a local crowd-funding Web site in Spain, people raised more than €15,000. This sum was the amount of money required to submit a complaint before court and to meet the requirements to conduct a legal investigation against Bankia's management under its ex-chairman, Rodrigo Rato. The organizers hope to make the government more accountable to citizens and to break up the loyalties/relationships between the bank and government officials.[23]

These examples are a small fraction of the hundreds of crowd-solicitation ventures springing up in the development community and elsewhere. These models radically democratize the space for development solutions.

MATRIX MAKING

A Functional Matrix

The value of a typology, even a rough and tentative one, is that it begins the process of pinning down and breaking up a subject in ways that permit critical analysis and hypothesis formulation about causal relationships and potential improvements. The purpose of studying these mass networks is to examine and improve their value in helping to achieve specific development results. To this end, it is essential to connect specific types of mass networks to particular development functions. Thus, one can imagine a matrix with the categories RICs, RIPPs and CSPs down the left-hand side and different development functions (such as poverty reduction, education, health information, health treatment, accountability, agriculture and nutrition) across the top. Even imagining such a matrix immediately suggests the need for more fine-grained distinctions on both axes, but it is a start.

Creating such a functional matrix would allow us to identify issues areas where mass networks proliferate and those where they are relatively sparse. It would allow us to pinpoint smaller RICs on different development specializations, rather than identifying "the development blogosphere" or focusing on specific countries. It would in turn help link more specialized blogs and Web sites to a wider community. This happens naturally, of course. The formation of discussion networks like the prominent community members of the Kenyan diaspora—which led to the creation of Ushahidi—created access to a wealth of information by enabling input from people from previously tangential groups. For example, these networks enabled Kim Yi Dionne, the author of the blog "Haba na Haba" (@dadakim) to link Malawian blogs

that provided updates on the protest violence in the summer of 2011 to the wider development community, when western media sources were unable to do so. But the conceptual infrastructure of maps and matrices introduces a degree of rigor that helps identify holes and valuable cross-fertilization.

A Value Matrix

Equally important is the creation of a value matrix, which would seek to categorize RICs, RIPPs and CSPs in terms of the specific value that each type of mass network offers for advancing particular development goals. Based on the survey above, four basic value propositions emerge.[24] The first one is improving access to expert information. RICs, like the development blogosphere, lower barriers to expert information, both from locally grounded and academically trained specialists. Second is the democratization of knowledge creation and citizen participation in public debate. Networks such as Global Voices and Al Jazeera Stream deliberately broaden participation in the framing and provision of news and thus cover topics and include voices not normally broadcasted via traditional syndicates. Third is demand-side monitoring. Mass networks, such as Ushahidi and Al Jazeera Stream, lower the costs to becoming an activist. And fourth is improved access to intellectual and material resources. Crowd-solicitation platforms like USAID's Grand Challenges enable institutions to capitalize on the diversity of external actors and their innovative solutions, which the institutions can bring to scale.

Again, thinking about a value matrix compels the intellectual and normative work of identifying the specific value of phenomena that have arisen and proliferated organically. This process will generate many additional value propositions and likely amend the four listed above. It should also focus attention on areas where mass networks are *not* actually adding value.

One critical caveat is that, like social enterprises, the value proposition must actually be valued by the targeted populations to achieve impact. Not all tools that aim to improve demand-side monitoring via mobile phones or Twitter, for example, will actually succeed. One example showcases the critical importance of factors beyond technology, such as trust and a belief in the possibility of change. In southern Tanzania, one NGO learned that access to mobile voting and complaint systems does not automatically lead to use of the technology. In a pilot, the NGO found that the local community had no faith that complaining would lead to any change and thought, "Why bother?"[25]

A focus on defining a specific value proposition requires asking what community members would find valuable in the first place and then ascertaining what tools the community wants or believes would work in achieving the valued result. It is axiomatic in the development community that technology is a tool that can be used under the right circumstances to achieve a solution, but that it cannot substitute for the elements of human relationships such as trust, political will, faith and hope. Mass networks must be subjected to the same scrutiny as any other tools in establishing their actual value for specific development purposes.

NETWORK ANALYSIS

The foregoing is an effort to separate out and distinguish analytically what in practice is a deeply interconnected and fluid phenomenon. We have identified axes of differentiation in terms of directedness (for example, RIPPs and CSPs are more directed than RICs), versatility (RIPPs are much more versatile in terms of their adaptability for various uses than CSPs and RICs), breadth of participation (RICs are the most organic and open; RIPPs and CSPs are typically more closed due to their more targeted natures) and reciprocity (the relationship between the core and the periphery, or the requester and the audience, is most reciprocal in RIPPs, less so in CSPs, and variable in RICs). Anyone looking at the underlying organizations, however, is likely to see much more interconnection than differentiation.

Thus another way to map this territory is through network analysis—that is, by looking at how different individuals engaged in these networks are connected to one another. The three types of mass networks discussed above have mutually reinforcing relationships. Sometimes, as with Ushahidi, the idea originators and critical action takers of the other mass networks arise from RICs. More often, RICs also provide an initial audience to advertise, critique and advise, as well as to provide some of the population of the mass network for RIPPs and crowd-sourcing applications. The success of a crowd-solicited

idea and platform may in turn attract new members to RICs related to the platform. However, as with Ushahidi, an RIPP may encourage the members of another issue group or affinity group with some online presence to build a copycat application to fit their needs, as with Ipaidabribe.com, spawning additional mass networks.

Individuals can also play multiple roles within the same mass network. In the development blogosphere, for instance, participants will most likely choose one role initially, such as commenter or reader. But over time, as they gain confidence and followers, nothing prevents them from upgrading to a frequent blogger or downgrading back to commentator (as many do when they choose to close their blogs). In turn, as we saw with *A View from the Cave* and Global Voices, successful blogs and media networks can then generate platforms.

Network analysis could capture snapshots of all these interconnections by mapping the existing relationships among all these people. Equally important would be to capture offline as well as online relationships, as many mass online networks build on or combine offline best practices such as community organizing, working through business distribution channels and others. As with RIPPs, the creators of these programs repurpose or create connection technologies and (offline and online networks) to address specific problems in development.

Twaweza, for instance, is a Tanzanian organization that makes use of RIPPs and RICs. According to its Web site, it makes use of the "five networks: teachers' unions, distribution networks, mass media, mobile phones and religion."[26] For example, using mobile surveys, Twaweza secures data about public service performance and citizen needs. The collected data provide information for mobile survey participants to use. Using their relationships with traditional and social media—including the many bloggers Twaweza says it follows—Twaweza presents the compiled data not only to the survey participants but also to a wide audience to inspire additional action. Its links to large online and offline RICs provide the NGO connections to critical resources such as professors who will offer critical advice on data collection, analysis and experimental setups as well as to potential partners, like notebook distributors or newspapers, to carry out Twaweza's development activities.

All the mass networks described above have both offline and online components; much of the online community is interested in and/or working on these issues in offline forums. For example, members of the African diaspora community meet at Africa Gathering Forums and other conferences; and the HealthMap mass network is made up of health care practitioners. Remaining questions for further analysis include: What is the relationship between offline and online components of the mass networks? Does it make most sense to develop offline networks first and then move online? Or can online contacts help generate offline relationships that would otherwise not be likely to arise?

Network analysis cannot answer all these questions. But it can map the number, types and density of relationships in terms of flows of various kinds (emotions, information, resources, etc). It is a more organic mode of analysis that can complement more traditional analytics.

QUESTIONS AND PROBLEMS

In the final analysis, getting a handle on the use of mass networks for development is a bit like assessing the creation of apps immediately after the emergence of the iPhone. Instead of identifying specific problems and proposing solutions, it makes more sense to pose a set of questions to guide general analysis of mass networks as a phenomenon and to highlight issues concerning specific policy applications. This concluding section raises some of the questions that are likely to occupy future researchers and analysts.

Generating New Applications

What are the barriers to building sustainable RICs, RIPPs and CSPs? What are best practices for building them—such as branding and advertising? Is there an ideal ratio between core experts to peripheral readers and commenters? Beyond emergencies, are there specific situations that are likely to increase the potential for generating additional projects?

Building Directed Mass Networks

When shifting between an RIC to a related RIPP, who is more likely to participate and under what conditions? What circumstances or specific stimuli would lead a peripheral

reader in an RIC to become more active by updating an RIPP or commenting on a crowd-sourced idea?

Maintaining Open Access

To what extent should policymakers develop incentives to ensure that successful connection technologies with development applications be kept or made open source (when applicable)? Should special patents be developed? Are there other ways that intellectual property law and policy could be tweaked to encourage crowd-sourced technological solutions? Will we need to enhance safety protocols/anonymity protocols as more platforms and crowd-sourcing Web sites pop up in order to keep the costs of participating low? How should we reduce fears of participation, particularly in large data networks? How should privacy be protected?

Measurement

For USAID and other foreign aid/philanthropy organizations, what standards and metrics will help identify good or potentially good interventions with respect to mass networks? How can connectedness be mapped to demonstrate the dissemination and impact of specific ideas?

Leadership

How to lead within networks generally is a critical question that has occupied the business management literature for more than a decade, as well as many organizational sociologists. It is a difficult question to answer even within controlled and directed networks, much less spontaneous and reciprocal mass networks. It will be critical to track and study examples of successful leadership and to distill lessons from their experience, as well as from failed efforts to lead, orchestrate, and mobilize action within mass networks.

CONCLUSION

The technological revolution in the development community resembles the growth of a young child's (or a teenager's) brain. Synapses are proliferating at an astonishing rate in all directions, only later to be pruned back and thickened in the mature brain. Similarly, the flux and fluidity of various mass networks as they evolve and transform themselves are not only a practical advantage but also a research and analysis challenge.

Which of the millions of networks and individual connections will survive and flourish and which will simply disappear is impossible to know. This policy brief has sought to develop the rudiments of a typology to help track different, albeit interrelated, forms of mass networks, to outline the next steps for developing matrices that will enable a more concrete and detailed analysis of value and effectiveness, and to pose initial questions about how to harness their vast potential.

ENDNOTES

[1] The statistics on tweets per hour are relevant in light of studies demonstrating that between one and four tweets per hour is optimum for achieving maximum click through (visibility). See http://www.mediabistro.com/alltwitter/science-social-timing_b10473. Each of the feeds examined here follows that trend. Further research would be required to determine whether these three Twitter users are intentionally following that algorithm, their success in reaching the audience may be in part attributable to it. The larger point is that how even very new technologies can be used more or less strategically and effectively.

[2] Murphy (2012).

[3] "What Is Esoko?" http://www.esoko.com/about/index.php.

[4] Jeffery (2007).

[5] Ibid.

[6] Meier (2012).

[7] Economist (2011).

[8] Deng (2011).

[9] "Ehtisaab." http://209-20-73-212.static.cloud-ips.com/

[10] Jarvis (2011).

[11] "Development and Aid World News Service" (2012).

[12] Freifeld (2010).

[13] InSTEDD. (n.d.).

[14] Freifeld (2010).

[15] About Epivue. (n.d).

[16] Freifeld (2010).

[17] Healthmap (n.d.).

[18] Freifeld (2010).

[19] "Google Flu Trends: How Does This Work?" (n.d.).

[20] Asthmapolis (n.d.).

[21] USAID (n.d).

[22] Root (n.d).

[23] Moya (2012).

[24] The authors wish to thank Joshua Goldstein for suggesting this framework of analysis and significantly influencing our thinking on this point.

[25] This is from discussions at the Brookings Blum Roundtable, Aspen, August 1–3, 2012.

[26] Twaweza (n.d).

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Innovation and Technology for Green Growth

Nathan Hultman, Associate Director, Joint Global Change Research Institute, University of Maryland; Non-Resident Fellow, Global Economy and Development, Brookings Institution

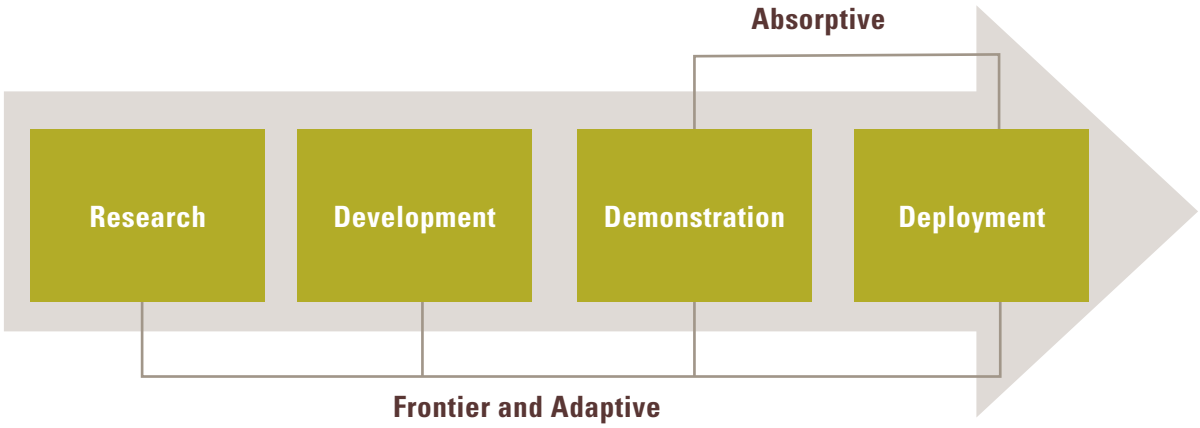
Katherine Sierra, Senior Fellow, Global Economy and Development, Brookings Institution

Allison Shapiro, Fellow, Erb Institute for Global Sustainable Enterprise, University of Michigan

For many years, the international community has approached environment and development challenges through the lens of sustainable development—usually conceived as meeting the needs of the current generation while not sacrificing the ability of future generations to meet their own needs. Though this approach has been constructive and successful in many ways, it lacks a clear pathway for how to realize those goals. As just one of many examples, addressing climate change will require fundamental transformations to the energy system, which the International Energy Agency estimates could demand up to $46 trillion of additional investment by 2050;[1] and more than three-quarters of the total new energy investment will be directed to developing countries. This capital will not come from government development efforts, but instead must be leveraged through new markets, new business models and new policies.

"Green growth" seeks to establish pathways for sustainable development through a combination of private sector innovation and engagement within a supportive national and international policy context. It aspires to tackle three challenges simultaneously: encouraging development and poverty reduction; creating new and more vibrant economies based on clean technologies; and securing an increasingly greener world. Of course, tackling such challenges as climate change, energy access, environmental degradation, sanitation and water availability while achieving economic and development goals will require unusually creative approaches based on new and profitable business models, novel approaches to financing and innovation in both U.S. and global institutions. Though not sufficient in isolation, green growth innovation will enable the advances toward goals in human health, natural resource sustainability and social equity. Countries can also benefit from cultivating new green industries as a matter of domestic economic policy. Innovations in green technology therefore represent potentially

FIGURE 1. TYPES OF INNOVATION ACCORDING TO THE PHASE OF TECHNOLOGY DEVELOPMENT



Source: Brookings.

transformational approaches to some of the world's thorniest development and environment challenges—but realizing that potential will require creative approaches for vibrant private sector engagement.

WHAT IS GREEN GROWTH INNOVATION?

As a result of more widespread economic development in recent decades, global capacity for research and development is evolving broadly across the developed world and emerging economies. However, building on this progress will require action to encourage new ideas across the diversity of development contexts, and to ensure that these ideas can reach and transform new markets. The challenge of transitioning onto cleaner development pathways is particularly difficult for developing countries because their need for rapid economic growth often seems to outweigh the importance of "leapfrogging" onto cleaner development trajectories. Achieving sustainable economic development will require regional and international cooperation for implementation, supportive domestic policies, institutional capacity building, strong public–private partnerships, long-term financing and human capital development. In parallel, new mechanisms are needed to support the development and diffusion of intellectual property that can be shared with, and created in, developing countries along with enforcement mechanisms for its protection. Many existing initiatives have been launched to support this goal, but they have not achieved scale nor are they expanding at a rate sufficient to tackle the challenges.

Innovation for green growth can be characterized as frontier, adaptive or absorptive (see figure 1). *Frontier innovations* are novel solutions that have not yet been introduced to the world. They are typically adopted in the research phase of the technology development cycle. *Adaptive innovations* are modifications to existing technology that make them more useful in alternative situations. They can occur across the technology development cycle. *Absorptive innovation* refers to changes to an institutional environment that makes the transfer, successful implementation of, and learning from frontier and adaptive innovations easier. This applies to the final two stages of the development cycle. Examples of this type of innovation include in-country infrastructure for knowledge and device diffusion, regulations to support intellectual property (IP) protection, and international agreements for technology transfer (for examples of green growth initiatives, see box 1).

When the term "innovation" is applied to technological change, it is often conceived of as a change to a product or service—for example, a higher-yielding seed or a more efficient delivery system—but it can also describe improvements in business models or a process change. When applied to a process change, however,

BOX 1. EXAMPLES OF GREEN GROWTH INITIATIVES IN DEVELOPING COUNTRIES

Sustainable Energy for All: An initiative launched by U.N. secretary-general Ban Ki-moon in 2012 ahead of the Rio Earth Summit, with the goal of mobilizing actors across a broad spectrum for urgent action to achieve three objectives by 2030:

- Ensure universal action to modern energy services.
- Double the rate of improvement in energy efficiency.
- Double the share of renewable energy in the global energy mix.

Although the initiative did not receive strong textual support at Rio+20, it is strongly supported by governments, the private sector, multilateral development banks and civil society groups. These banks pledged more than $30 billion toward the initiative's objectives, the U.S. pledged $2 billion, and several countries pledged support for domestic action.

Lighting Africa Initiative: A joint program of the World Bank and International Finance Corporation aimed at helping develop commercial off-grid lighting markets in sub-Saharan Africa. With the objective of providing safe, affordable and modern off-grid lighting to 2.5 million people in Africa by 2012 and to 250 million people by 2030, the program is mobilizing the private sector to build sustainable markets in Kenya, Ghana, Tanzania, Ethiopia, Senegal and Mali.

Green Growth Action Alliance (G2A2): A Group of Twenty (G-20) partnership initiative launched in 2012 with the goal of addressing the estimated $1 trillion annual shortfall in green infrastructure investment. The alliance calls for actions to be adopted in five target priority areas during the next three years: promote free trade in green goods and services; achieve robust carbon pricing; end inefficient subsidies and other forms of fossil fuel support; accelerate low-carbon innovation; and increase efforts to target public funding to leverage private investment.

Sources: United Nations Foundation (2012), Lighting Africa (2012), World Economic Forum (2012).

innovation for technological development has perhaps its greatest potential for creating an impact because it creates an environment supportive of continuous idea generation and capacity for research and development (R&D). This, in turn, creates opportunities for commercialization and financial sustainability. In contrast to many preconceptions about innovation and technology, it is important to consider all types of clean technology R&D—frontier, adaptive and absorptive—across development contexts, and by extension to consider the approaches that might accelerate each.

TRENDS IN GREEN GROWTH INNOVATION

To date, clean technology innovation has remained concentrated in higher-income countries, though the direction of device transfer is shifting away slowly from its historic North–South directional flow. Technology innovation for the base of the pyramid (BOP) remains very low, regardless of country origin. With the exception of China, developing countries' clean technology patents have been limited to less than a dozen countries and their share of total green technology innovation is actually on the decline. However, green patent trends indicate that a new tier of developing country innovators is emerging, joining Brazil, India and China as frontier technology developers. This presents an opportunity for the international community to support the new tier of emerging economy innovators to develop frontier technologies for the BOP.

Several sectors have emerged in recent years as testing grounds for green growth innovation, with new technologies continually in development. Technology

TABLE 1. KEY SECTORS AND TECHNOLOGIES FOR GREEN GROWTH INNOVATION

Sector	Examples of Technologies
Electricity Access	• Smart power grids • Indoor cooking stoves using renewable energy (for example, solar, wind) • Off-grid technologies such as local wind turbines
Water Management	• Desalinization plants • Wastewater treatment facilities
Climate Change/ Reducing Emissions	Mitigation technologies: • Smart power grids • Renewable energy technologies: wind, solar, geothermal, marine energy, biomass, hydro power, etc. • Electric and hybrid vehicles • Carbon capture and storage Adaptation technologies: • Higher-yield seeds (for more arid and saline soils) • Drought resistant crops and cultivation practices • Climate resistant infrastructure: sea walls, drainage capacity, water, forest and biodiversity management, etc.
Transport	• Bus rapid transit • Low emission vehicles and fuels: biogas, hybrid and plug-in electric vehicles
Building Energy Efficiency	• Smart power grids and smart meters • Thermal insulation • Energy efficient lighting: energy-efficient compact fluorescent lamps, electroluminescent light sources • Energy recovering stoves using thermoelectric generators
Agriculture	• Genetically modified crops • Mechanical irrigation and farming techniques

patenting varies by sector and scale, just as it does between country income level and region. Within the sector of climate change mitigation technologies, between 2001 and 2010 the greatest share of patents in high-income countries was issued to advanced vehicle and waste-to-energy technologies. In developing countries, it was to wind and solar, which were the third and fourth most popular issued patent categories in high-income countries. Emerging economies are also beginning to pursue patents in technology sectors in which there had been no patent activity before 2001. They are pursuing patents in sectors such as advanced vehicles, and biomass and lower-carbon cement. This hopeful trend suggests that the new tier of emerging economy innovators are not holding back from competing in sectors in which they have no historical precedent as producers. However, the pace of green growth innovation in least developed countries (LDCs) remains very slow.

EXAMPLE: INVESTMENT AND R&D IN THE GLOBAL RENEWABLE ENERGY SECTOR

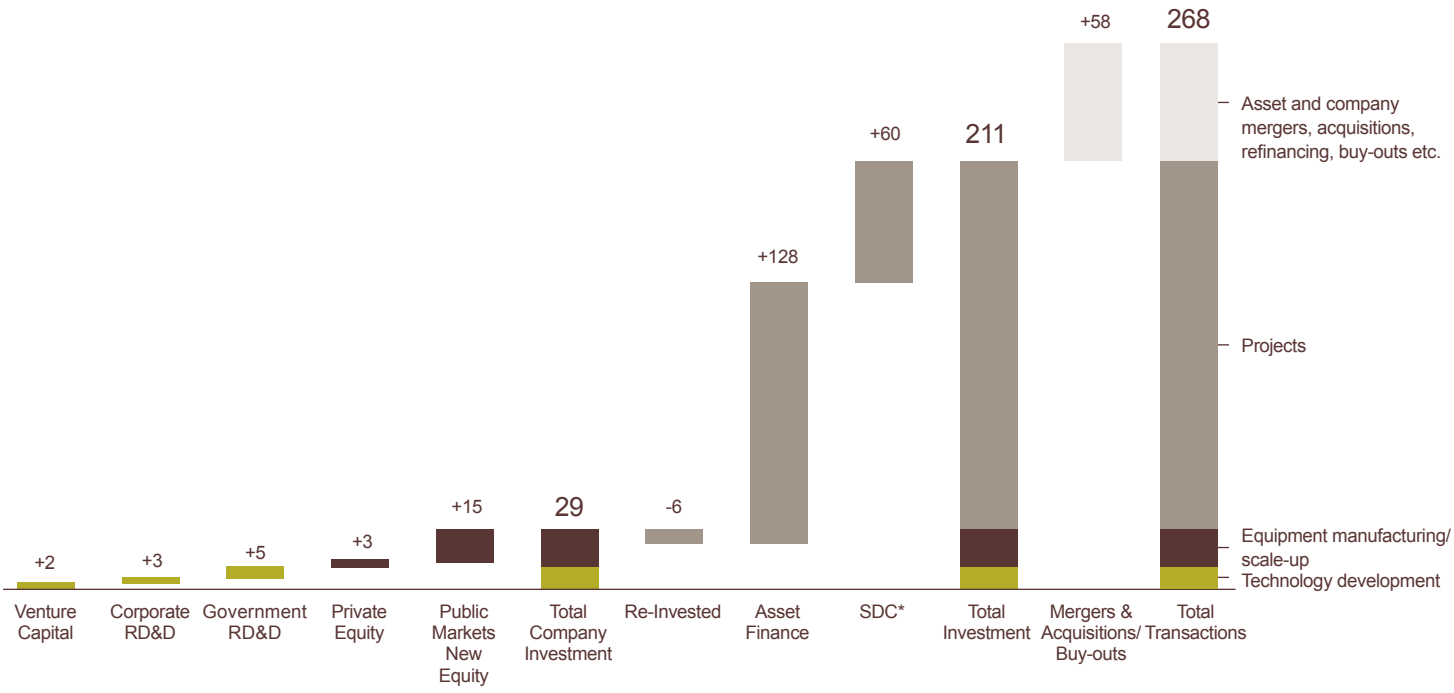
In terms of the scale of technologies, one can look to renewable energy financing data for some illustrative examples. The United Nations Environment Program and Bloomberg New Energy Finance estimate that about $268 billion was transacted in the renewable energy sector in 2010, of which $211 billion was new investment (see figure 2). This number is estimated to have reached $263 billion in 2011,[2] a roughly 25 percent increase over the 2010 global figure. Distributed energy technologies have garnered an increasing share of global renewable energy investment dollars during the past several years. In 2010, only slightly more than one-quarter of total renewable energy investment went to distributed technologies. The vast majority went to developed countries. This is largely due to domestic policy incentives for solar photovoltaics in Europe. In fact, 57 percent of distributed energy investments in 2010 were spent in Germany alone. The amount of investment in utility-scale energy companies and projects was roughly equal between developed and developing countries in 2010.[3]

Notably, in 2010 the investment in renewable energy in developing countries for the first time exceeded that of developed countries ($72 billion versus $70 billion; see figure 3). Development bank finance contributed at least $13 billion in project finance, mostly in the form of concessional loans. That year, investment in Africa rose fivefold, in Latin America it rose nearly threefold, and in Asia it rose 31 percent. However, 83 percent of developing country renewable energy investment that year went to the three largest emerging economies—China, India and Brazil—and the vast majority was spent on asset finance, not R&D. Furthermore, despite the tremendous increase in investment in Africa, total new financial investment in renewable energy remains very low ($3.6 billion in 2010) on the continent.[4]

R&D investment across all sectors of the economy, green growth and otherwise, reached $1.3 trillion in 2011. This is a 17 percent increase since 2008. Investments were led by the United States (34 percent), China (13 percent) and Japan (12 percent).[5] All other countries outside these three, the European Union and India accounted for only 3 percent of general R&D spending in 2011. However, U.S. dominance of R&D investment spending is shifting toward the major Asian economies and Brazil. Economic and technological capacity growth in the largest emerging economies, particularly India and China, have also created a trend of reverse flow of R&D investment from emerging to developed nations. Still, R&D spending as a percentage of gross domestic product remains in the low single digits across all countries—an average of 1.9 percent in 2011.

However, renewable energy R&D investments have not been keeping pace. In 2011, only 4 percent, or $9 billion,

FIGURE 2. UNEP/BNEF ESTIMATES FOR 2010 GLOBAL RENEWABLE ENERGY TRANSACTIONS (BILLIONS OF DOLLARS)



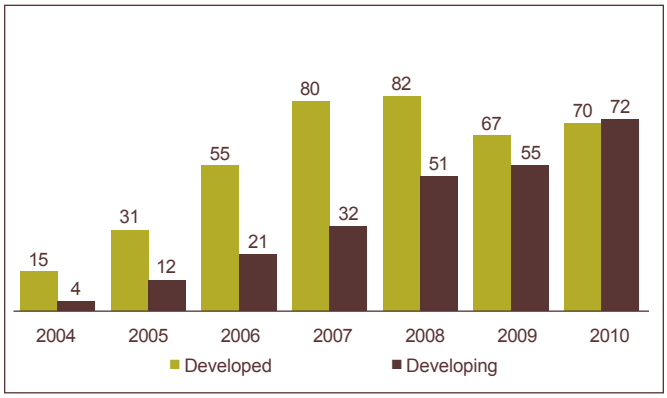
SDC = small distributed capacity. Total values include estimates for undisclosed deals. * data based on estimates from various industry sources

Source: Bloomberg New Energy Finance, UNEP

Note: Figure 2 shows in detail how the $268 billion in total global renewable energy transactions for 2010 is reached. The segmented bar furthest to the right on the chart shows the four following categories of transactions: 1) Asset and company mergers, acquisitions, refinancing, buy-outs etc; 2) Projects; 3) Equipment manufacturing/scale-up; and 4) Technology development. The other bars to its left break down the four categories into various color-coordinating subcategories.

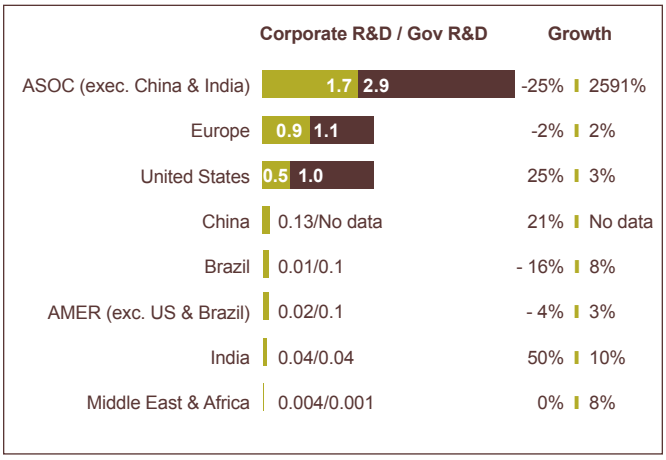
FIGURE 3. UNEP/BNEF ESTIMATES FOR TRENDS IN RENEWABLE ENERGY SUPPORT

(A) Financing New Investment in Renewable Energy (Billions of Dollars), Developed vs. Developing Countries



New investment volume adjusts for re-invested equity. Total values include estimates for undisclosed deals

(B) Corporate and Government R&D for Renewable Energy by Region (Billions of Dollars), 2010, and Growth on 2009



Sources: (a) United Nations Environment Program and Bloomberg New Energy Finance (2011); (b) Bloomberg, Bloomberg New Energy Finance, International Energy Agency, International Monetary Fund, and various government agencies.

was spent on R&D, despite the fact that alternative energy R&D investments more than doubling between 2004 and 2010.[6] Furthermore, excluding the stimulus boosts, global investment in energy research, development, demonstration and development (RDD&D) in developed countries has actually only marginally increased in real terms since 1974.[7] Additionally, global renewable energy investment in the first quarter of 2012 was at its lowest level since the height of the recession in early 2009, signaling a global decline in public financing of alternative energy with the expiration of stimulus programs.[8]

With regard to renewable energy R&D investment, in 2010, the largest regional investors were Asia and Oceania, which accounted for slightly more than half of global R&D investment in renewable energy that year (see figure 3). Most R&D financing came from the public sector, as corporate R&D budgets shrank in the wake of the global financial crisis. Early stage venture capital financing rose 41 percent to $930 million in 2010. Solar received the largest share of any technology type.[9] Biofuels received the next largest share, followed by wind. Though it continues to receive a tiny share of global R&D investment, marine energy saw the greatest investment growth of any clean energy technology type in 2010.

CATALYZING NEW APPROACHES

As companies increasingly incorporate social equity into their sustainability agendas, and as growth opportunities in emerging markets continue to outperform those in developed countries, corporate interest in innovation for emerging economies can be expected to increase. Yet investment in innovation for the BOP remains largely nonexistent. Therefore, a major question for the sustainable development agenda is how to incentivize green BOP innovation from the private sector. Many policy and IP tools exist to promote behavioral change and spur technological innovation, though they vary widely across countries. In addition, dozens of financial products have also been created to diffuse and reduce risk in technology investment. Hundreds of initiatives exist to promote natural resource sustainability and poverty alleviation in developing countries. However, major gaps remain in international collaboration for poverty alleviation.

New green innovation initiatives or partnerships might hasten the pace and scale of innovation, stimulate international venture capital markets, and broaden international cooperation across public and private partnerships for RDD&D. The gaps in green growth

innovation where private sector investment could have a substantial impact include:

- Facilitating South–South collaboration.
- Enhancing greater North–South collaboration.
- Encouraging greater frontier innovation in the new tier of emerging economy innovators.
- Supporting adaptive innovation for the BOP from all countries.
- Investing in support for absorptive innovation in all countries.
- Providing business advisory support to developing countries.
- Increasing financing for IP sharing and financial products to lessen the risk of entrepreneurial investments.

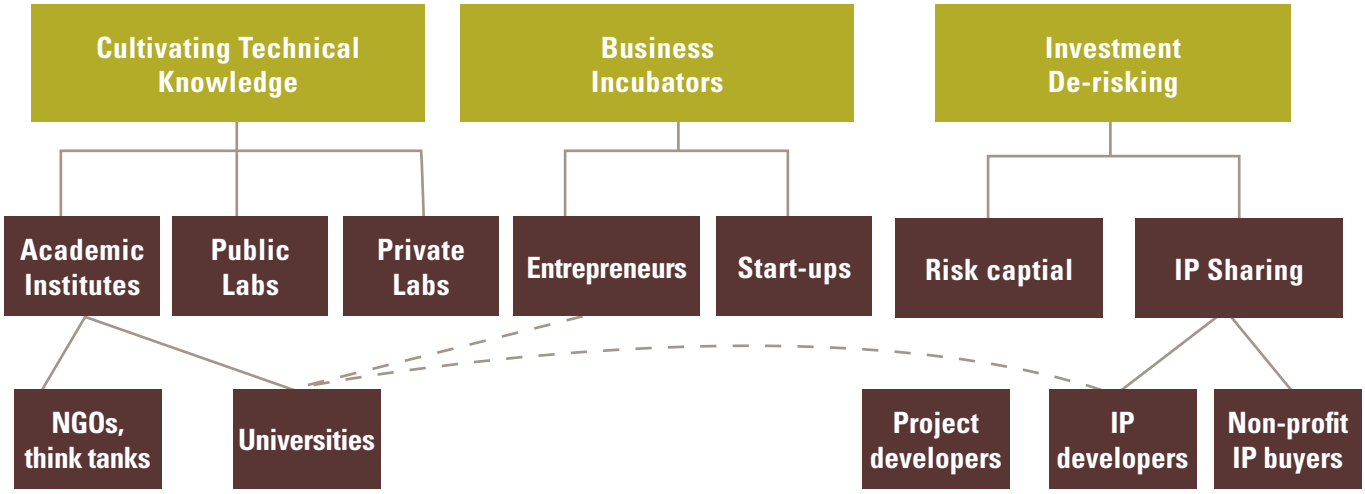
Of these, the least commonly supported areas include long-term finance, business acceleration, frontier and adaptive BOP innovations, and South–South collaboration.

New approaches to green growth innovation would both build capacity for technology development and adoption, and encourage private sector engagement in developing country research and innovation for green growth. The most effective approaches should reflect all the following factors:

- *Relevance to the challenges of green growth.* The ideal international architecture will be able to support breakthrough technology development at small, medium and large scales.
- *Capability of stimulating frontier, adaptive and absorptive innovation*. Adaptive innovation could be the key to meeting many LDCs' clean development needs, and absorptive innovation programs could be encouraged throughout the developing world. Policies to stimulate absorptive capacity must increase the quality of higher education, retain in-country talent, stimulate technology "discovery" at all levels of innovation (from household through the research laboratories) and promote economy-wide openness to new technologies.
- *Support for innovation across the technology value chain.* Technology deployment can be encouraged via financial support, logistical support for supply chain development and security, and consumer marketing to improve market penetration. This includes substantial investment in business advisory services to attract international venture capital and to take successful start-ups to full commercial scale.
- *Financial innovation to lessen the risk of private investment.* Innovative financial products can leverage public investments by lessening the risk for private capital. Examples include first loss funds, sovereign risk insurance and collateralized loans with flexible interest rates dependent on project outcomes. There are many funds that support this objective—such as the Clean Technology Fund of the Climate Investment Funds, which provides project support—as well as recent initiatives that are looking to scale this up by tapping into private capital. To date, most of the funding has gone to support the deployment of proven technologies in developing countries. Little focus has been on providing support for lessening the risk at earlier stages of the RDD&D continuum.
- *Value addition to existing institutions.* Any new approaches should be complementary to existing international initiatives that aim to stimulate clean technology RDD&D, such as the UNFCCC Technology Mechanism, the Consultative Group on International Agricultural Research, the Clean Energy Ministerial, the Green Climate Fund and Infodev Climate Innovation Centers. It will be important to understand not only the gaps in services provided by these organizations but also the programs that have been most successful so they can be replicated in other countries and sectors.
- *Attractiveness to investors, policymakers and developing countries.* In this era of fiscal austerity, it is essential to create an infrastructure with sufficient incentives to leverage public financing from developed countries and offer real rewards to the private investors.

Although there are many concrete possibilities, jump-starting the green innovation ecosystem in any given country's context will require an approach across all aspects of the innovation spectrum. This implies a need to cultivate technical knowledge, to encourage and foster the existing entrepreneurial culture and to connect entrepreneurs to financing. Figure 4 presents this three-

FIGURE 4. A THREE PART CHALLENGE FOR JUMP-STARTING GREEN INNOVATION



Source: Brookings.

part challenge for jump-starting the green innovation system. A system to address these three issues could work through universities, research organizations (both for-profit and nonprofit), academic institutions and start-ups to reach individual researchers, financiers and budding entrepreneurs. This network would be complemented by a set of funds to deploy risk capital for the diffusion of technologies that have been proven at the demonstration stage.

CONCLUSION

Green growth provides a route for realizing economic, environmental and development goals. It offers an opportunity to make existing heavy industries more sustainable while simultaneously encouraging new industries and economic diversification. Central to the green growth strategy is technological innovation and the establishment of creative, integrated, private and public sector approaches to support innovation in developing countries. It is therefore necessary to:

1. Expand the scope of innovation support to BOP and low-margin innovations.
2. Work creatively to better understand and address the challenges of IP sharing.
3. Pioneer new business models and financing structures.
4. Cultivate a broad-based technical knowledge in both emerging economies and the LDCs.

APPENDIX: DEVELOPING COUNTRY GREEN GROWTH GAPS AND OPTIONS TO ALLEVIATE THEM

Gap	Geography	Options
North–South collaboration	All countries	• Stronger IP regimes to support strategic research partnerships, joint ventures and cross-border enterprise development • Dedicated funds and challenge programs requiring North–South collaboration • Opportunities for international study—grants, scholarships, etc • Financial instruments to lessen risk and thus encourage foreign investment
South–South collaboration	Developing, emerging countries	• Regional science foundations to identify common needs, pool funding and avoid research overlaps • Strengthen top-performing university networks • Scientific and entrepreneur study abroad programs with dedicated official development assistance grants
Frontier innovation for the BOP	New tier of emerging economy innovators	• Dedicated international venture capital funding and risk capital for developing country start-ups, through challenge/prize programs • Training for developed country firms in understanding BOP needs, conducting demonstration tests, and developing supply chains • Formal extension/ cooperative/ internship programs for university students
Adaptive innovation for the BOP	All countries	• BOP innovation from developed countries, through government-funded R&D, subsidies, advanced market commitments, compulsory licensing, open source innovation, patent pools bilateral and multilateral market access agreements, and applied research networks • BOP innovation in developing countries, through dedicated official development assistance funding to LDCs, national and community-level technology “discovery” programs, higher education networks, strengthened Intellectual Property rights, challenge programs, advanced market commitments, and applied research networks
Absorptive innovation	All countries	• Financial support for early adopters and enterprise training programs • Adoption incentives through subsidies, tax credits, feed-in tariffs
Business advisory support	Developing, emerging countries	• Business services such as incubation centers, business education at technical universities, business plan competitions, deployment-focused “study abroad” programs for professors and university students, community demonstration competitions, networking events and online collaboration tools
IP sharing and implementation assistance	Developing countries	• Financial incentives to encourage sharing of patent information and provision of implementation assistance • Nonfinancial incentives to do the same (patent commons, patent pools, professional “exchange” programs for implementation advisory)
Long-term financial support	Developing countries	• Financial products to lessen the risk of investments in technology development in developing countries (for example, first loss fund, sovereign risk insurance, concessional loans)

5. Create a support structure to enable entrepreneurs to expand their own expertise and access to networks.

Indeed, without these creative approaches and the new technologies and market transformations they engender, we almost certainly will not be able to realize the goals of universal access to clean energy, water and sanitation, or the broader environmental goals of climate stabilization and biodiversity protection, while encouraging economic growth and vitality across the spectrum of development contexts. The appendix provides further details on gaps to delivering green growth in developing countries and the options to address these gaps.

ENDNOTES

[1] International Energy Agency (2010).

[2] Morales (2012).

[3] United Nations Environment Program and Bloomberg New Energy Finance (2011, 44).

[4] Ibid., 14.

[5] Batelle (2010, 3).

[6] United Nations Environment Program and Bloomberg New Energy Finance (2011, 13).

[7] Kerr (2010, 8).

[8] Morales (2012).

[9] United Nations Environment Program and Bloomberg New Energy Finance (2011, 33).

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The Importance of Business Models

Mike Kubzansky, Partner, Monitor Group

Inspired by the success of microfinance, with more than $67 billion in assets, and mobile money pioneers like M-PESA, donor agencies are increasingly supporting inclusive business as a means to address poverty. However, the main fact about such private sector–led development is that business models matter often far more than the underlying product technologies—something most donor support models fail to take into account. Because of the exacting conditions of low-income markets—such as low purchasing power, and uncertain and variable cash flows—entrepreneurs cannot use the same models as those for middle markets. They need to develop new models, of which only a few will succeed. One of the key factors for success and impact is scale, but market entry models are much quicker to scale, while market creation takes much longer. Mature models scale faster than unproven models, where the ability to cover fixed costs and/or model validation costs is an impediment. As a result, most private sector firms tend to focus on easier-to-reach segments and markets, which require less business model adjustment and cost; even impact investors tend to support later stage, less risky enterprises. This suggests a substantial policy and donor agenda, but will require approaches and tools different from the ways that most of the problems are currently being addressed.

WHAT IS THE ISSUE?

Many development actors now increasingly believe that one of the primary ways to achieve large-scale social impact is via commercially sustainable solutions.[1] Many are described as "inclusive business," which can be defined as a "profitable core business activity that also tangibly expands opportunities for the poor and disadvantaged." Private firms, social entrepreneurs, impact investors and donors have invested substantial time and effort in supporting new initiatives at the intersection of the private sector and development in the last decade. Although it is difficult to estimate the amount of donor money flowing into such efforts, or to quantify funding from multinational corporations (MNCs) or other large commercial enterprises, Global Impact Investing Network (GIIN) has

estimated that impact investing has already capitalized $50 billion available to invest in such firms, and a 2010 J. P. Morgan report suggested that impact investing will be a $1 trillion asset class in the near future. All this new activity is premised on the assumption that scale, at least on the order achieved by microfinance, is achievable by using such private sector–led approaches.

Governments and donors promote private sector–led solutions, for reasons ranging from outcome and efficiency considerations to a desire to "crowd in" private investment and activity to provide social benefits. Some do so in recognition that in many countries the private sector is already providing a given good or service at large scale (for example, health in India), and to work with the system to improve what it can deliver affordably. This approach can also help fiscally strapped governments—whether in emerging markets or donor countries—to use their resources more efficiently and target their funds more to the poorest segments or most difficult situations.

A 2012 Monitor Group review for the Rockefeller Foundation suggests there are 13 donor programs providing grant or policy support focused exclusively on inclusive businesses, committing about $55 million per year (versus about $1.7 billion committed by GIIN-surveyed investors in for-return investment in 2012).[2] Another 16 donor programs promise substantial additional support, albeit only partially focused on inclusive businesses. Further new planned programs are rolling out quickly. And multiple other donor programs focus on private sector activity, but organize around a specific technology, like mobile-phone-based health technologies, clean cookstoves or developing improved seeds, in relatively limited ways.

However, recent research suggests that the single biggest factor that enables such private sector–led approaches to reach a meaningful scale in dealing with base of the pyramid (BOP) markets is *getting the business model right*. The business model—the specific combination of product, distribution, supply chain, financing, pricing, payment and sales—is often far more important in determining success than a given specific technology. In Kenya, M-PESA succeeds in part because of a compelling combination of mobile phone technology and billing platforms, but even more as a result of its detailed attention to building its network of tens of thousands of agents who service customers.

However, most donor funding approaches for inclusive business approaches miss the lens of the business model, focusing more often on a vertical sector or technology, and do not take into account the lessons from the businesses themselves. As a result, there is still too much of a "one size fits all" expectation around private sector support. Expectations are still framed by Silicon Valley venture capital or perceived MNC success stories like Unilever's Shakti program, rather than by the realities of engaging the poor with socially beneficial goods and services, or in supply chains. These assumptions raise the risk that such these investments will fail to lead to large-scale social change as intended, and they risk missing the opportunity of truly engaging private firms in the right way to address key development issues.

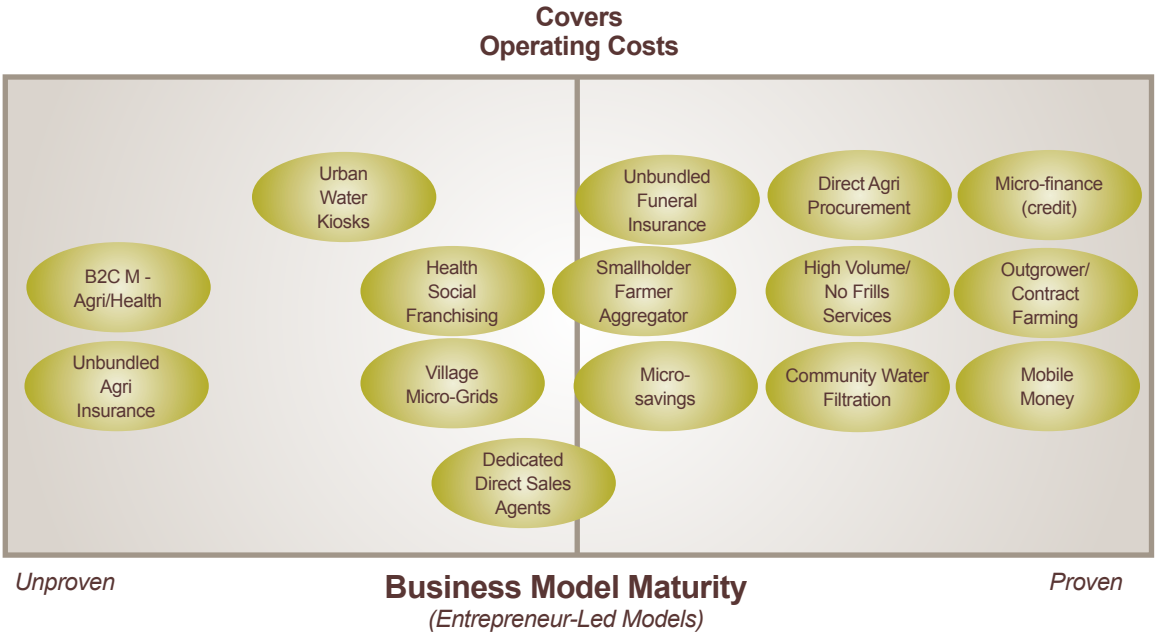
WHAT NEEDS TO HAPPEN AND WHY?

The Importance of the Business Model

The ability of a given business model to scale depends significantly on the maturity of the business model itself—that is, its ability to provide socially beneficial goods, services or livelihoods and recover its costs at scale. This in turn depends on a number of different factors: (1) whether it is promoting a pull product—for example, mobile phones and credit—or a push product—for example, contraception and solar lanterns; (2) how much of the surrounding ecosystem the business model also must manage and organize, especially but not only in models that involve supply chains; and (3) whether the task at hand requires *market entry* or *market creation.* The time to scale will depend on a combination of all three of these and additional factors, such as building out credible distribution and sales capabilities.

Some models can scale up quickly, but many require years, or decades, to get right before ever even being suitable for scaling up; thus, microfinance took more than 30 years, and contract farming more than 50 years. Many participants in inclusive business still tend to have unrealistic and overly optimistic expectations about

FIGURE 1. MATURITY OF SELECTED BUSINESS MODELS, BY DEGREE OF OPERATING COSTS COVERED



*Note: Business model maturity estimated based on (a) ability to cover costs, (b) multiple players deploying (c) large scale of buyers/suppliers etc engaged. *Dedicated direct sales refers to push products, e.g., health goods*

Source: Monitor Analysis

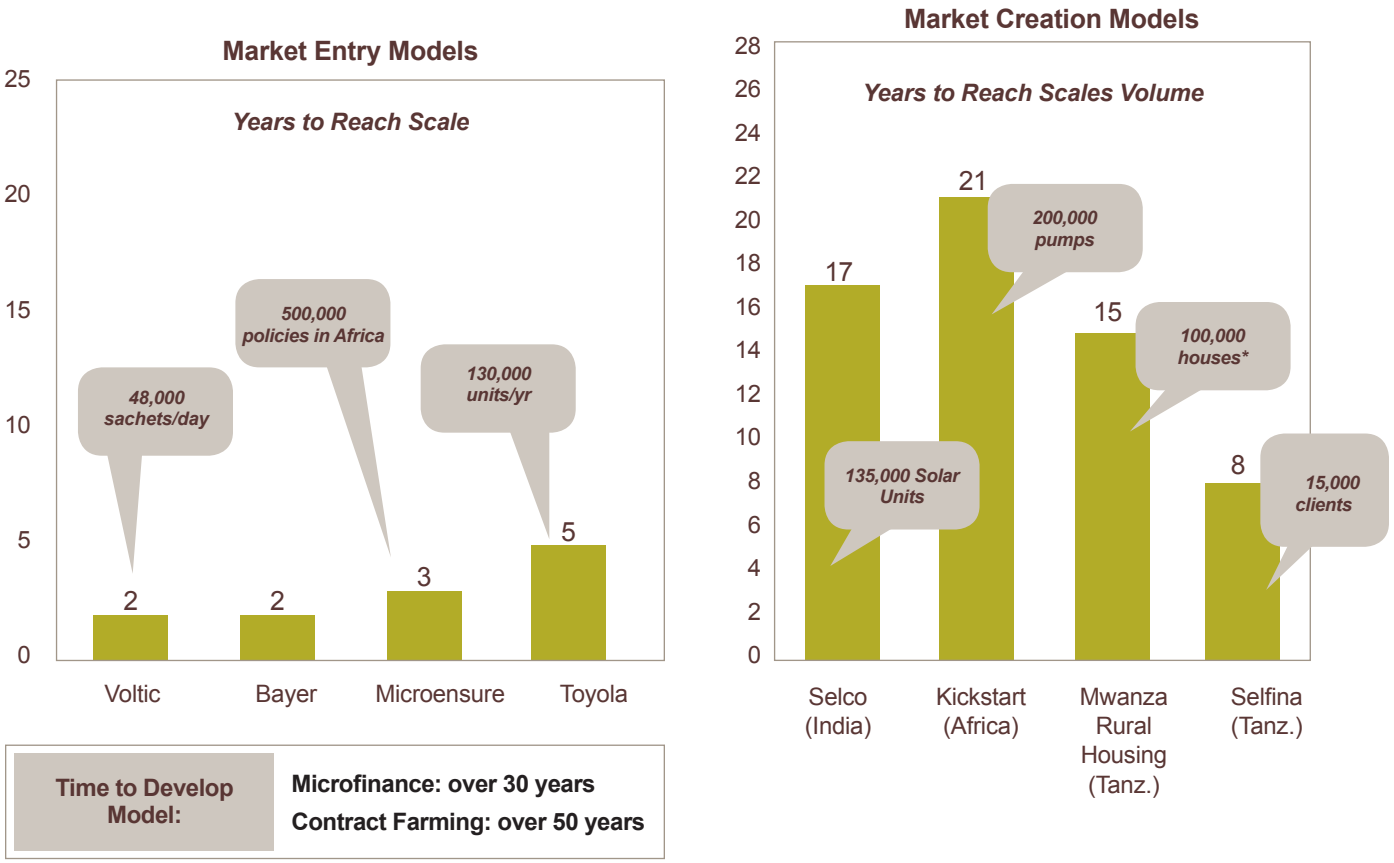
how quickly a given model can reach large numbers of customers or suppliers. This is especially true for expectations of small, inclusive commercial and social enterprises. There is, in fact, a broad diversity across business models, and each varies in its maturity, scale, reach and cost recovery. Figure 1 charts the maturity of different business models encountered, with a key break at the ability to cover costs.

Key Driver of Time to Scale: Market Entry versus Market Creation Models

In addressing models for selling to BOP consumers, market entry business models typically—although not always—take less time to perfect and to scale up (see figure 2). These efforts target markets where the low-income consumer is already accustomed to paying for a good or service, albeit informally, expensively and sometimes for life-endangering quality. Examples include credit, where microfinance substitutes for informal money lenders; money transfers, where M-PESA substituted for expensive and insecure bus transfers of cash; cookstoves, where many consumers often already pay for both cookstoves and in many cases fuel; or budget private schools, where parents are already paying government (or private) school fees. In these cases, the presence of underlying demand can make it faster to achieve large-scale reach, because the demand creation task (and associated cost) is much lighter.

Market creation business models, conversely, often require much longer times to develop, perfect and scale up—typically a decade or more. Finding a business model that works in the first place requires experimentation, failure and trying again. Such models are often attempting to create markets among the BOP for socially beneficial goods and services that are not usually paid for by low-income households, require significant amount of trust, and often entail behavioral change and related communications. Often, investments in behavioral change—for instance, in contraception or irrigation—do not benefit the first mover but the whole category of private players. Such investment is a public good, but the cost can render a given business model unviable if left to one enterprise to cover.

FIGURE 2. TIME TO SCALE UP FOR DIFFERENT MODELS



Note: The different industries for the companies listed above include Voltic, drinking water in Ghana; Bayer, chemical crop protection in Kenya; Microensure, bundled credit life coverage via microfinance institutions; Toyola, clean cookstoves in Ghana; Selco, solar home systems in India; Kickstart, irrigation pumps in East Africa; Mwanza, rural housing Tanzania; and Selfina, microleasing in Tanzania.

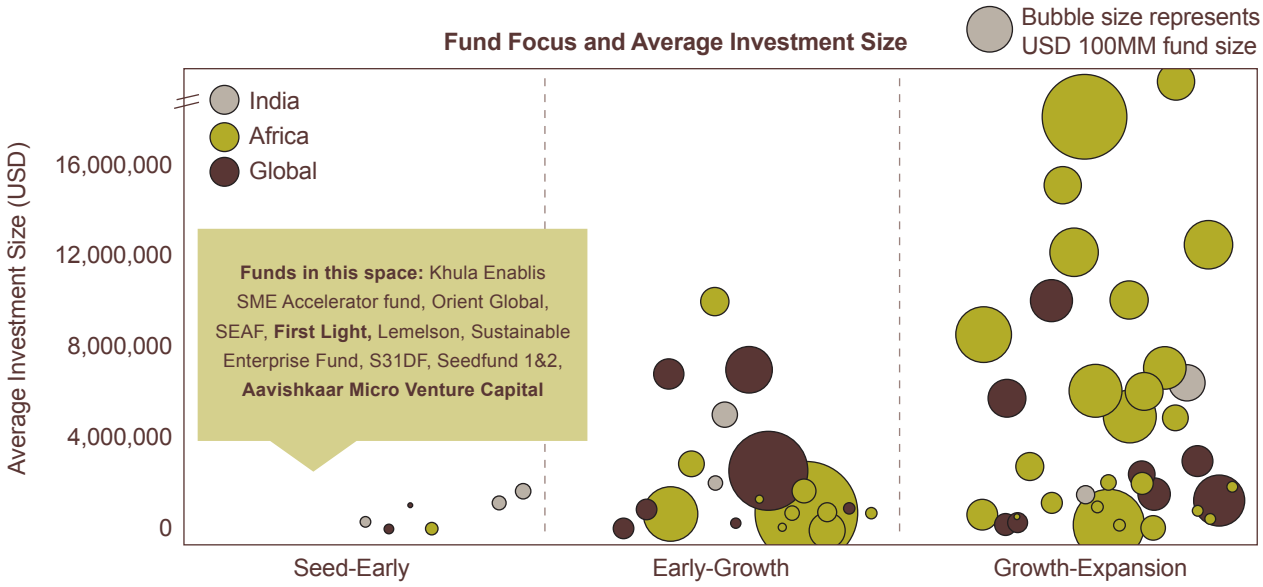
Private Sector Impact Investment: Still Skewed Toward Later Stage

Although there has been a rush of private capital to support such inclusive enterprises, most private impact investment capital, as shown in figure 3, is structured to support later stage enterprises; relatively little capital supports very early stage business model development. Even impact investors, who explicitly seek positive impact and engagement of the BOP, find this stage of investing too speculative and risky, despite the fact that many of them are backed by donor funds. The early stage of testing an idea and proving the business model is inherently risky; in purely commercial investing in developed countries, venture capital firms can recoup this risk because markets are well developed and a few will pay off spectacularly, to cover the costs of the rest failing.

In inclusive business, this ultimate payoff equation is far less likely to be clear. The underlying customers targeted make up the segment of emerging markets with the lowest purchasing power, the least skill in operating commercial farms and the most variable cash flows. These enterprises do not offer compelling financial returns; a recent Monitor Group analysis suggests that for most such enterprises in agriculture, health, water and other sectors aiming to deliver a social impact, net margins are—optimistically—between 3 and 15 percent. Such margins suggest that none of these firms trading with the poor are doing so on exploitative terms. But, conversely, these margins offer insufficient returns

FIGURE 3. FOCUS OF IMPACT INVESTMENT CAPITAL INDUSTRY (90 FUNDS), MID-2011

Most impact funders currently play primarily in the growth/expansion phases, but with some focus on early phases. There is little capital available at seed stage.



% Total Investors[1]	13%	22%	65%
% Total Investment[1]	19%	29%	52%

Illustrative—Fund landscape not exhaustive

Note: [1]11% of funds are present in the Early-Growth & Expansion Stages of Capital and these account for 37% of total investment

Source: Impact Investing Fund Landscape (collected through secondary research), Monitor Analysis

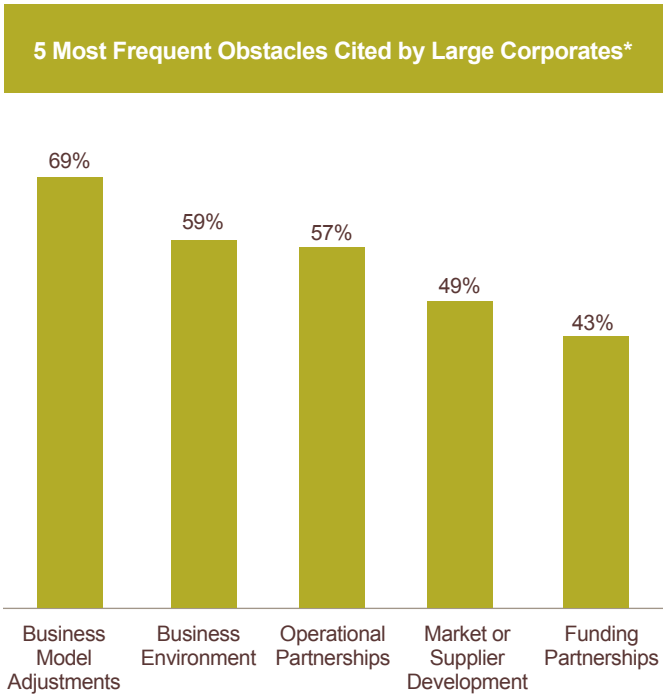
to entice commercial investment funds to take on the cost and risk of developing a new business model to serve these important segments. As a result, it is not surprising that most investors are focusing on less risky, later stage investments.

Firms Know It Is Expensive to Develop a New Business Model

The conventional wisdom of how to scale up a private sector–led solution is often implicitly grounded in a Silicon Valley or large MNC paradigm of the continued investment in and growth of a single entrepreneurial entity or firm addressing a key market or challenge, inspired by Google, Danone, Coca Cola or Nokia. In certain cases, reaching scale due to the efforts of a single large firm or entity is the optimal answer. These are the firms, after all, with the resources, systems and scale to serve people in the millions. Conversely, social enterprises have encountered all manner of difficulties when developing their business models to address critical "route to market" and distribution issues.

This would seem to argue in favor of MNCs and large-scale organizations taking on the task of scaling up such solutions, at least from a public good perspective. However as figure 4 indicates, these firms are concerned about the high cost of reinventing a business model. They typically have higher return activities, technologies or markets to take on with their investment capital, and they are highly wary of striking operating or funding partnerships with donors or nongovernmental organizations (NGOs) to achieve

FIGURE 4. TOP OBSTACLES IDENTIFIED BY 47 MNCS OPERATING IN AFRICA: WHAT KEEPS YOU FROM TAKING ON MORE BOP BUSINESS?



** One company can state more than one theme or have multiple corporate efforts.*

Source: Monitor interviews with MNCs and national corporates with operations in Africa (n=47)

these inclusive business solutions. Not surprisingly, many do not wish to target the poorest customers in the hardest-to-reach areas with the most volatile incomes but would rather reach lower-middle-income segments of emerging markets where there is more purchasing power, or engage with larger commercial farms as suppliers, and where less business model adjustment is required.

This suggests that it is perhaps inappropriate to hope that social impact at scale will be achieved primarily by either a large MNC becoming interested in providing social benefit or by an entrepreneurial firm taking the decade or longer required to create a market. This certainly needs to be one piece of the solution, but should not be the only solution.

OBSERVATIONS AND NEXT STEPS

What Government and Donors Need to Address to Engage the Private Sector

Although the potential of the private sector to have a transformational impact on "traditional" development issues is clear, what is less certain is how to unlock that potential. As commercial enterprises, private sector firms and investors will have a calculus of risk and return that is quite different from governments or the international donor community. There are four areas where this mismatch is particularly acute, although these are not the only ones:

- *Target population segment*. Firms and investors will find there is a lower risk, lower cost and higher return to trade with lower-middle-class segments than the $2-a-day BOP segments that donors traditionally target. Moreover, most inclusive businesses succeed when they trade with BOP *and* BOP-adjacent segments. Most donors want to target their support just to the poorest.
- *Stage of business supported.* As figure 3 indicates, most investors will prefer to support business at a later stage, which has more proven enterprises and business models, even if this leaves other innovative business models with potential social returns unsupported.
- *Alternative uses of capital.* Firms have other markets they can target besides socially beneficial products and services that trade with the BOP, which may earn returns more quickly with lower costs to address. Donors, conversely, always make implicit trade-offs (for example, invest in Africa versus South Asia, HIV/AIDS versus farmer productivity).
- *Focus on a technology versus a business model.* Multiple donor programs will support an isolated specific technology solution, like a new seed, health technology or mobile phone application without consideration of how it will be commercialized. Firms and investors, conversely, must always think about these technology and product development costs with an idea of the revenue model, distribution strategy, payment and pricing.

Left to their own devices, private businesses will pursue the more profitable, higher-income segments, such as the $8-a-day or $5-a-day segment, while the areas of greatest concern to donors are the very poor living on less than $2 a day. Firms will not think about such initiatives in isolation but will have a "hurdle rate," a certain rate of return that they could get by investing in other sectors or countries, which any potential investment will need to clear. Any investment in revamping or developing the required business model (see figure 4) will be weighed against other possibilities that do not require such heavy development.

As an illustration of these trade-offs, *The Economist*, describing large consumer goods firms' efforts in emerging markets, recently detailed Procter & Gamble's June 2012 announcement of "a much narrower strategy of focusing [only] on P&G's 10 biggest development markets as well as, worldwide, its 40 most profitable products and 20 biggest innovations." Naturally, there are some areas where private interests and donor objectives overlap, creating a "win–win." One such example is Natura's use of low-income women in urban areas in Brazil as sales agents for its cosmetics, or Unilever's announced plans to engage more than 500,000 small farmers in its supply chains, but these instances are still relatively rare.

How, then, can these differing interests be resolved, unlocking the vast creative potential, scale, distribution reach and deep pockets of the private sector to tackle some of the world's most pressing challenges? Investing in inclusive businesses and patiently nurturing business models that engage the poor requires a substantially different approach from policymakers and funders, and often takes them into territory that many are historically not accustomed to traversing.

Nonetheless, if the central task is to bring in private sector resources, scale and sustainability—ironically—few other actors besides multilateral and bilateral aid donors can mobilize the required capital and absorb the risk necessary to (1) develop and try new models, (2) make it cost neutral for larger firms to address these markets and opportunities, (3) invest not just in technologies but also in the whole business model that is required for commercial success, and (4) assist the successful enterprises in reaching the maximum number of people. To succeed at this, donors and policymakers will need new tools and means of doing so; many are ill suited to make direct investments in private firms for a range of reasons. They lack the expertise and knowledge of private firms and their operations; they have strict procurement and contracting requirements that value competition in making awards over making informed individual investments; they undergo significant scrutiny and risk of backlash over failed investments using public funds (think Solyndra); and their monitoring and evaluation frameworks are often far better attuned to public or NGO-led programs than to understanding the impact of investing in a given enterprise or set of firms.

As a result, a first, necessary condition for donors to begin to engage meaningfully with private firms, whether smaller impact enterprises or large MNCs, is the creation of independent, arm's-length intermediaries with the expertise, independence and investment outlook to be able to take on such tasks, and to do so at the scale required to address the problems at hand.

Beyond funding such enterprises, if donors are to take on the idea of supporting impact enterprises using a business model lens, they will also need to undertake a variety of other tasks, including:

- Fund research and activities to solve for issues that block business models from a range of sectors from being successful—for example, distribution, payment, aggregation, customer education and supplier training. These solutions can and should be crosscutting, and help make these elements cost neutral for any firm undertaking an impact-oriented business serving the poor.
- Develop data, staging framework, a point of view and rigorous standards on when a business model is mature and ready for the next stage, or when it is ready to be cut off from grant subsidy funds (either through commercial viability or failure to achieve stated goals).
- Generate data on additional business models to learn from—this policy brief has noted only a fraction of

the potential business models that exist that could successfully engage BOP populations.

- Issue "grand challenges" around specific business models or elements of them that need solving—for example, correspondent banking, social franchising and direct sales agent models.

There is, in other words, much to be done to organize the significant resources of the donor community if its members are to take enterprise solutions to poverty—and the business models that they employ—seriously.

ENDNOTES

[1] This brief draws on analysis conducted over several years by Monitor Group's inclusive markets practice, which has studied over 1,000 enterprises engaging with or serving low-income customers around the world. Relevant publications can be found at http://www.mim.monitor.com/. An extended elucidation of the same thesis, titled "Why Business Models Matter," is available in the forthcoming volume *Getting to Scale: How to Transform the Lives of Millions of the World's Poorest People*, published by Brookings Institution Press. The author thanks Drosten Fisher for his assistance in the research and drafting of this brief.

[2] These 13 programs do not include those that focus mainly on microfinance, of which there are many programs.

It's What You Make, Not How You Make It: Why Africa Needs a Strategy for Structural Change

John Page, Senior Fellow, Global Economy and Development, Brookings Institution

In poor countries, what the economy makes matters as much for growth as how it makes it. Structural change—the shift of resources from low-productivity to high-productivity sectors—is as important as new technology. In a rapidly growing economy, technical change and structural change work together. In Africa they do not. Technical progress in Africa has been good, but structural change has moved in the wrong direction; resources have shifted from high-productivity to low-productivity sectors. The result is that Africa has created too few good jobs for its rapidly growing population. Today, less than 20 percent of young Africans find wage employment.

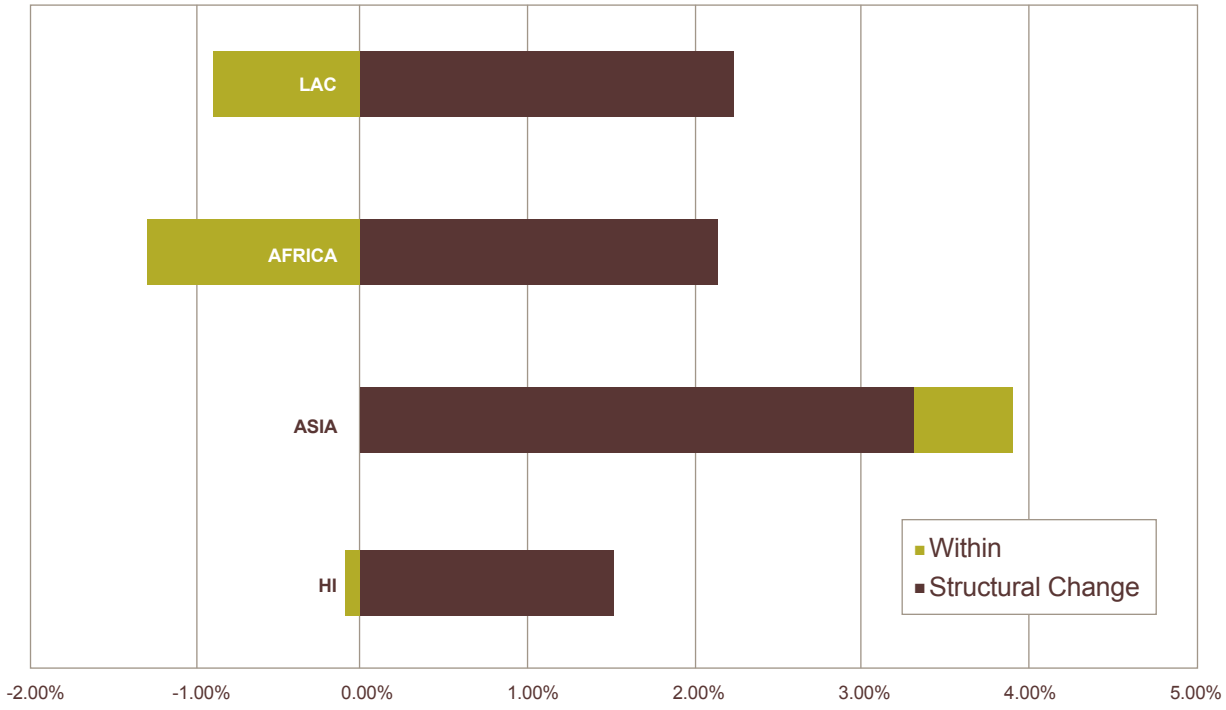
To deal with its jobs crisis, Africa needs to close its "structural deficit." It has too little structural change because it has too little industry. And new technologies will not help very much. Access to technology—in the narrow sense of production or process technology—does not constrain industrial investment in Africa. Rather, a new development strategy—one that boosts private investment in globally competitive industries—is urgently needed.

A first step is to reorient private sector development initiatives away from low-impact regulatory reforms toward relieving Africa's infrastructure and skills constraints. Beyond that, to attract competitive investments, Africa must master three global drivers of industrial location: task-based exports, agglomerations, and firm capabilities. This will require new policies and new investments to create an "export push," build globally competitive special economic zones and attract foreign direct investment (FDI) outside mining and energy. Governments will need to do most of the heavy lifting, but the donor community can help by changing aid priorities and introducing supportive trade policies.

WHAT IS THE ISSUE?

In poor countries, w*hat* the economy makes matters as much for growth as *how* it makes it. Differences in structural change—the shift of resources from low-productivity to high-productivity sectors—account for

FIGURE 1. "PERVERSE" STRUCTURAL CHANGE HAS SLOWED PRODUCTIVITY GROWTH IN AFRICA



Source: McMillan and Rodrik (2011).

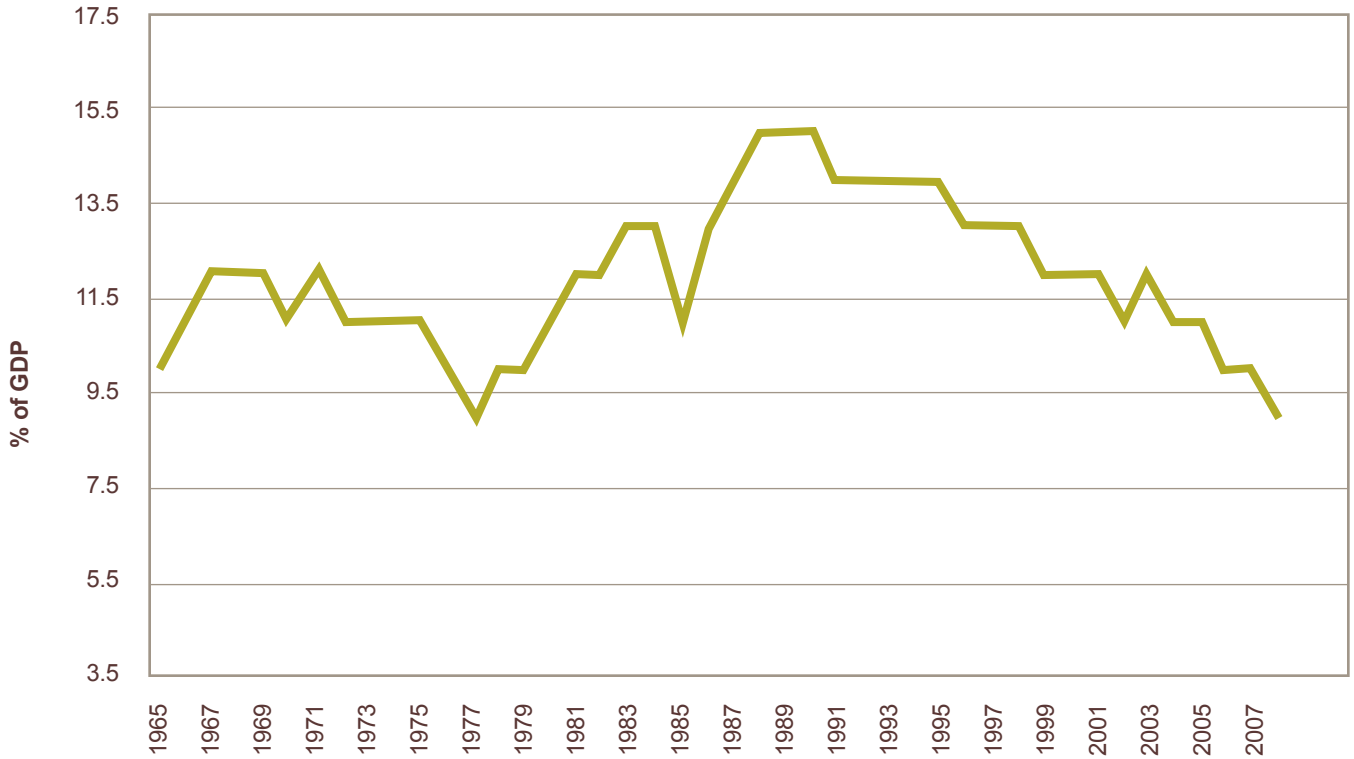
more of the differences in growth and employment creation between countries and regions than do differences in production technology.

A recent paper (McMillan and Rodrik 2011) illustrates this point. Productivity change can be split into two components. The first takes place within sectors. Broadly, this captures improvements in technology and business practice. The second reflects the reallocation of labor across sectors; this is structural change. In a rapidly growing economy—such as those in East Asia—the two components work together (see figure 1). But in Africa they do not. Africa has rates of within-sector productivity growth that exceed the advanced economies and equal Latin America, but the movement of workers from higher- to lower-productivity sectors has largely offset these gains.

Put simply, structural change in Africa is moving in the wrong direction. This is not merely of academic interest; it has a human cost. Africa is creating too few jobs capable of paying decent wages for a rapidly growing population. In North Africa and in Southern Africa, this has resulted in alarmingly high rates of open unemployment, especially among the young. Across the rest of the continent, workers are trapped in low-productivity agriculture or are forced into low-wage, informal employment. Today, less than 20 percent of young Africans find wage-paying jobs.

To deal with its jobs crisis, Africa needs to close its "structural deficit." In low-income countries with sustained economic growth, coupled with rising employment and increasing real wages, manufacturing and modern services (relatively high-wage sectors) grow rapidly. Africa, in contrast, has become deindustrialized. The region's share of manufacturing in gross domestic product (GDP) is less than half the average for all developing countries, and it is declining (figure 2). Per capita manufactured exports are less than 10 percent of the developing country average, and Africa's share of global manufactured exports is less than 0.2 percent.

FIGURE 2. MANUFACTURING AS PERCENTAGE OF GDP SUB-SAHARAN AFRICA



Note: Low-income countries only.

Source: World Bank, "World Development Indicators."

Today, Bangladesh produces more manufactured goods than all of sub-Saharan Africa.

Africa needs more private investment in globally competitive industries—broadly defined as agroprocessing, manufacturing and tradable services. Despite recent growth, private investment has remained at about 11 percent of GDP. This is well below the levels found in East Asia—especially during periods of rapid structural change (table 1). And, while there has been a modest increase in FDI, it has been in mining and minerals. African industry has not been attractive to local or global investors because it has not been judged to be globally competitive.

TABLE 1. PRIVATE INVESTMENT AS A SHARE OF GDP, 1990–2009

Group or Region	1990–94	1995–99	2000–4	2005–9
Africa, low-income countries	10.2	11.2	11.1	11.8
Africa, middle-income countries	14.6	14.5	13.8	15.8
East Asia	24.9	19.9	12.4	16.8
Low-income countries	10.0	11.5	12.9	15.4
All developing countries	13.7	14.5	14.0	16.6

Note: Entries are five-year averages in percentages.

Sources: World Bank, "World Development Indicators"; World Bank national accounts data; and Organization for Economic Cooperation and Development National Accounts data files.

Better technology is not the answer. In most industries in low-income countries, technology—in the narrow sense of production or process technology, the "hardware" of the firm—can be imported, either directly from equipment suppliers or indirectly through FDI. Since the mid-1990s, the World Bank has conducted surveys of more than 20,000 firms in 20 African countries. Not a single survey has identified a lack of access to technology as a binding constraint on industrial investment. It is policies, institutions and capabilities—software, not hardware—that is lacking. And though it is possible to define some institutional innovations or improvements in management practice as "soft" technologies, such definitional gymnastics do not add much to our understanding of what is needed to accelerate structural change.

WHAT NEEDS TO HAPPEN, AND WHY

A new approach to development in Africa is urgently needed—one that centers on boosting private investment in globally competitive industry. It must encompass two sets of public actions. One is largely noncontroversial: policy reforms and investments directed at private sector development. But efforts to increase private investment overall will not be sufficient. A second and potentially more controversial set of interventions—designed to influence where new investment goes, a strategy for structural change—is essential.

Refocusing "Investment Climate" Reforms

Since the 1990s, efforts to boost private investment in Africa have focused on the "investment climate"—the regulatory, institutional and physical environment within which firms operate. By the accounting of the Development Assistance Committee (DAC) of the Organization for Economic Cooperation and Development, about one-quarter of official development assistance, some $21 billion per year, currently supports investment climate improvements. In practice, most of the attention has been directed at easily measured but low-impact reforms of trade, regulatory and labor market policies intended to reduce the role of government in economic management. Although such reforms may do no harm, they have diverted the attention of policymakers and donors alike from two more binding constraints to investment: a lack of infrastructure and skills.

In some product lines, such as garments, African enterprises have factory floor costs comparable to Chinese and Indian firms. They become less competitive because of higher indirect costs, many of which are attributable to poor infrastructure (Eifert, Gelb and Ramachandran 2005). Africa lags at least 20 percentage points behind the average for low-income countries on almost all major infrastructure measures. The quality of service is low, supplies are unreliable, and disruptions are frequent and unpredictable.

The lack of relevant skills also constrains industrial development. Africa's skills gap vis-à-vis the rest of the world is large and growing. Postprimary education in Africa suffers from limited funding, limited access and poor quality. Employer surveys report that African tertiary graduates are weak in problem solving, business understanding, computer use and communication skills. On the positive side, there is evidence that enterprises managed by university graduates in Africa are more competitive and have a higher propensity to export.

Setting New Objectives: Exports, Agglomerations and Capabilities

During the past quarter century, as Africa has deindustrialized, Asia has become the "world's factory." Three interrelated drivers of industrial location have largely determined Asia's rise and Africa's decline: success in task-based exports, rapid growth of industrial agglomerations, and the ability to attract and transfer firm capabilities (UNIDO 2009). Piecemeal investment climate reforms, even broadly defined to include infrastructure and skills, are unlikely to prove sufficient to address these.

For the vast majority of African countries, exports are the only path to industrialization. Trade in tasks is a potential entry point to the export market. As transportation and coordination costs have fallen globally, it has become efficient for different stages of production, or tasks, to be located in different places. The rapid growth of manufacturing and exports in Asia reflects its success in mastering task trade. Very little task-based production

takes place in Africa. To attract investors, Africa will need an "export push"—a focused set of public investments, policy reforms and institutional innovations to remove the constraints to exporting.

Industries usually concentrate in clusters. Because of the productivity boost that such industrial agglomerations provide, starting a new industrial location is a form of a collective action problem. If a critical mass of firms locates in a new area, they benefit from productivity gains, but no single firm has the incentive to move in the absence of others. Africa has few modern industrial clusters, making it both more difficult for existing firms to compete and more difficult to attract new industry. Governments can foster agglomerations by concentrating investment in high-quality institutions, social services, and infrastructure in a special economic zone (SEZ). This has been one of the keys to rapid growth of industry and jobs in Asia.

In most industries, productivity and quality depend on the "tacit knowledge" or "working practices" of the firm's workforce. These "firm capabilities" largely determine the ability to compete globally. In poor countries, higher capabilities most often come with FDI, but they can also come from other sources, such as supplier–purchaser relationships or management training. The spillover of capabilities to other firms occurs mainly through supply chain relationships. Public policy can influence both. Investment climate reforms make it easier to attract FDI. Governments can also work with the private sector to build effective foreign investment promotion agencies and encourage the formation of linkages, knowledge sharing and management training.

RECOMMENDATIONS AND NEXT STEPS

Changing development priorities in Africa will not be easy. The U.N. Millennium Development Goals, after all, do not reward productive private investment. African governments will need to do most of the heavy lifting; implementing a strategic approach to global competitiveness is far more demanding than carrying out piecemeal investment climate reforms in response to local and donor pressures. However, the international community will also need to play a new role.

Investing in Infrastructure and Skills

Closing Africa's infrastructure gap will require about $93 billion a year, which is roughly 15 percent of the region's GDP. It is clearly unrealistic in the current global fiscal environment to count on African governments or aid to fill the financing gap. New approaches and products are needed. Guarantee instruments could leverage limited public financing by reducing the perceived risk of private debt financing for infrastructure. Greater cooperation and coordination between DAC donors and nontraditional donors, like China, could improve the focus and efficiency of resource use. The Infrastructure Consortium for Africa, if properly funded and used, could lead this effort.

Financing an expansion of postprimary education presents at least as daunting a challenge as closing the infrastructure gap. The current funding gap for education across Africa has been estimated to be anywhere between $6 billion and $29 billion. DAC donor commitments to all levels of education in Africa only approach $4 billion. Confronted with the rising unit costs of primary education and the limited prospects for external finance, it is time to replace the primary education Millennium Development Goal with a more broad-based measure of human capital.

Creating an Export Push

Institutional reforms and improved trade logistics are central to the export push. Surveys of manufacturing firms highlight a number of areas where regulatory or administrative burdens fall especially hard on exporters. Port transit times are long, and customs delays on both imported inputs and exports are significantly longer for African economies than for Asian competitors. Export procedures can also be burdensome. African countries rank at the bottom of the World Bank Trade Logistics Index.

Because so many African countries are landlocked, their competitiveness depends fundamentally on their coastal neighbors. Africa's multiple regional organizations have failed to address the institutional and physical constraints to trade through regional policy reforms and investments. Africa's development partners have failed to support regional integration, preferring instead to deal with individual countries, not

regional organizations. Both will need to work together to create regional trade-related infrastructure and institutions.

Africa's success in boosting industrial exports may ultimately depend as much on the actions of its international partners as on its own efforts. Aid for Trade has the potential to improve trade logistics, but its share of total development assistance has fallen steadily since 1996. This will need to be reversed. A simple, time-bound system of preferences for Africa's nontraditional exports to high-income countries could ease entry into task-based exports. A sensible place to begin would be for the European Union and the United States to harmonize their individual preference programs for Africa—respectively, under the Economic Partnership Agreements and the Africa Growth and Opportunities Act—and to liberalize rules of origin.

Building Industrial Clusters

Africa's experience with spatial industrial policy has been largely unsuccessful. A recent review concluded that most African SEZs have failed to reach the levels of physical, institutional and human capital needed to attract global investors (Farole 2011). The first order of business is, therefore, to upgrade Africa's SEZs to international standards. African governments have generally regarded SEZs as enclaves. This will need to be reversed, and SEZ programs will need to be integrated within broader investment promotion and industrial development programs. Business support services, training, and skills upgrading are also critical to success. This is an area where a public–private dialogue to identify key performance bottlenecks and partnerships to address them could be particularly effective.

China—drawing on its own success with spatial industrial policies—has recently launched an initiative to build export-oriented SEZs in Africa. This represents an opportunity to use Chinese investment and expertise to overcome the collective action problem. The DAC donors—which have neglected SEZs as a development tool—should learn from the Chinese experience.

Strengthening Capabilities

Today, the vast majority of Africa's foreign investment promotion efforts fall short of international best practice. Often, agencies lack the active support of the head of state. Personnel practices and compensation policies are not sufficiently attractive to make it possible to recruit high-caliber staff, and agencies are frequently burdened with multiple objectives. All these deficiencies can be addressed with political will and donor support. Donors can also help "import" global best practices by supporting networks of related manufacturing companies to share advice on achieving international standards for the quality of production.

Another promising area for capability building is management training. The World Bank and the Japan International Cooperation Agency have undertaken pilot projects in which management training programs are provided free of charge to small entrepreneurs. These training programs have measurably improved management practices, including through spillovers from the training participants to nonparticipants. Recent controlled experiments with management training programs among large firms in India raised average productivity by 11 percent through improved quality and efficiency and reduced inventory. This is an area where governments, donors and the private sector can collaborate.

A FINAL NOTE

The question of whether governments can successfully implement strategies for industrial development is at the heart of the ill-tempered debate over industrial policy. What is often overlooked is that governments make industrial policy every day, through public expenditure choices, and institutional, regulatory and international economic policy changes. These decisions favor some enterprises or sectors at the expense of others. The relevant question is: Do they reflect a coherent strategic focus? In Africa they have not, and this needs to change.

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Delivering U.S. Leadership: Roles for the Public Sector

Molly Kinder, Director, Agriculture and Europe Policy, ONE Campaign; former Director of Special Programs, Development Innovation Ventures, U.S. Agency for International Development

The U.S. government and other donors have championed innovation as a key pillar of development policy. Today, opportunities abound for innovation to help donors do development better, cheaper, faster and at scale. The Obama administration has shown leadership in pioneering new mechanisms for developing, testing and scaling development solutions with the potential to reach millions. Past successes from the Green Revolution to smallpox eradication point to the potential for impact of these initiatives. Yet the development landscape is also littered with resounding failures and promising innovations that have failed to scale. This policy brief highlights some of the key challenges and considerations for avoiding the pitfalls. The brief discusses strategies for avoiding fads, managing risk and narrowing the gap between the potential of innovative solutions and their impact at scale.

WHAT IS THE ISSUE?

Innovation has driven some of the most dramatic development successes over the past 50 years. The Green Revolution, childhood vaccines, the microfinance revolution, oral rehydration therapy and the M-PESA-led mobile money movement are just a few of these game-changing development successes. Their impact has been profound. Agricultural advances have saved a billion people from starvation in the past half a century. Childhood deaths are down more than 80 percent. Smallpox has been wiped out. All these innovations have benefited from donor funding in their invention, piloting or scaling. And in each case, the benefits of the innovations to the developing world have dwarfed the benefits to any one country or institution, illustrating a clear public good rationale for the donor investments in innovation.

Today, new opportunities abound for doing development better, cheaper, faster and at scale. Innovation is at the heart of this march toward progress and aid effectiveness. As the tools, technologies and approaches to development evolve, innovation can help the development community bring game-changing solutions

to scale. For instance, the near ubiquity of mobile phones, new behavioral insights and fresh evidence from field experiments about what works, advances in low-cost technologies, and the growth in for-profit models for solving pressing global challenges each present an unprecedented opportunity for improving the welfare and livelihoods of the world's poor.

The push for disruptive innovation and scale is driven not only both by a sense of opportunity but also by budgetary necessity. In the current fiscal climate, lawmakers in Washington and other Western capitals have pledged to cut spending and save taxpayer dollars, while donor agencies still aim to cut poverty and save lives. Reconciling these conflicting mandates requires donors to stretch shrinking resources even further, getting more development impact for each dollar. Disruptive innovation is designed to do just that. Innovation can enable development actors to replace standard practice with new, more cost-effective approaches that have a greater impact—thereby enabling donors like the U.S. government to drive down the cost of their core business of poverty reduction and development. Past experience illustrates this marriage between saving lives and saving dollars. In the case of the global campaign that eradicated smallpox, for instance, the Center for Global Development documented that the U.S. government saves the total of all its contributions every 26 days because it does not have to vaccinate against or treat the disease.

Seizing this opportunity, the U.S. government has set out to accelerate this process of development innovation and has championed innovation as a key pillar of its development policy. This high-level commitment is enshrined in President Obama's Global Development Policy, released in the fall of 2010, which calls for investments in game-changing innovation to accelerate progress toward development goals in health, food security, climate change, energy and environmental sustainability, and broad-based economic growth. "A core part of my development strategy is harnessing the creativity and innovation of all sectors of our society to make progress that none of us can achieve alone," said President Obama. Likewise, the State Department's first-ever Quadrennial Diplomacy and Development Review calls for investments in innovation, while the U.S. Agency for International Development (USAID) has placed innovation as one of the central pillars of its Forward reform agenda.

U.S. government leadership in harnessing development innovation falls into three primary categories: invention, experimentation and competition, and taking solutions to scale:

- *Invention:* Across U.S. government agencies, from the U.S. Department of Agriculture to the National Institutes of Health (NIH) to USAID, investments in scientific research and development have catalyzed the invention of game-changing breakthroughs. Through investments in research laboratories, universities and networks and consortia of scientists, the United States has provided "push" funding for research into breakthroughs like crops that are tolerant of drought and disease, climate change adaptation technologies and HIV vaccines. These efforts are similar to the Pentagon's Defense Advanced Research Projects Agency *(*DARPA), which develops cutting-edge military technology, and the Department of Energy's ARPA-e program, which promotes the research and development of advanced energy technologies. The U.S. government has done less to exploit the potential of "pull" mechanisms for scientific discovery and development breakthroughs.
- *Experimentation and competition*: The Obama administration has pioneered several innovative new approaches and mechanisms to foster development innovation through experimentation. Increasingly competitions, prizes and venture capital–style innovation funds are used to subsidize promising early stage innovations. For instance, USAID launched a series of Grand Challenges in Development to focus attention on a specific, defined challenge and to invite foundations, corporations and individuals to engage in developing and piloting solutions to these challenges with small seed grants. In 2010, USAID launched Development Innovation Ventures (DIV) as a venture capital–style fund that awards competitive grants to pilot, rigorously test and scale cost-effective development solutions.

- *Taking solutions to scale*: Several U.S. government initiatives are addressing the barriers to scaling up solutions that prevent the most promising development innovations from reaching millions of beneficiaries. Across the U.S. government, from the Patent and Trademark Office to the NIH, efforts are under way to accelerate patent processing and licensing and to facilitate the commercialization of new technologies. Global partnerships have been established to scale up the use of innovative technologies like clean cookstoves and mobile health applications. At the Group of Twenty (G-20) summit in Cabos, the U.S. and other donors announced financial support for three pilots that will use "pull" mechanisms to reward agricultural innovation and spur the delivery and adoption of agriculture innovations that benefit the poor. Dedicated funds, like USAID's DIV, have allocated grant money to scale up innovations that are proven successful. Meanwhile, financing from USAID's Development Credit Authority and the Overseas Private Investment Corporation is unlocking capital to scale up promising innovations through the private sector.

WHAT NEEDS TO HAPPEN AND WHY?

The public sector has an important role to play in unlocking the potential of groundbreaking innovation to deliver development better, cheaper and faster.

Define—and Balance—Innovation

The term "innovation" is used with such regularity and ubiquity that its precise meaning has been blurred. Too often, "innovation" is seen as synonymous with technology—a misnomer that brings to mind the folklore around the U.S. National Aeronautic and Space Agency's (NASA's) space pen. According to popular (albeit fictional) legend, NASA spent years and millions of taxpayer dollars during the 1960s to develop a pen that allow its astronauts to write without gravity. Meanwhile, the story goes, their more frugal and sensible Soviet counterparts simply picked up a pencil.

This NASA folklore illustrates a basic point: Simply because a development solution utilizes a novel technology or a mobile phone does not mean that the solution is necessarily better, cheaper or faster than the standard approach. A high-tech, futuristic classroom funded by donors in Lahore that is outfitted with the latest computers and visual technology, for instance, does not necessarily increase the student's learning than a more basic classroom. This type of innovation that increases costs without improving outcomes was dubbed "pseudo-innovation" in a recent *New York Times* column. Nor does the successful development of a high-potential technological innovation necessary guarantee global impact or scale. The development landscape is littered with seemingly brilliant technological solutions that have failed to achieve widespread adoption due to misunderstood consumer markets and poorly developed dissemination plans and business models.

Conversely, some of the most promising game changers in development are decidedly low-tech. Oral rehydration therapy, deemed by *The Lancet* as "potentially the most important medical discovery of the 20th century," is just a simple solution of salt, water and sugar that replaced a more advanced technology of intravenous therapy, and is attributed with saving the lives of an estimated 1 million children each year. Similarly, researchers at Georgetown University discovered through a rigorous experiment in Kenya that simply posting stickers encouraging bus passengers to tell the driver to slow down resulted in a two-thirds reduction in insurance claims involving road traffic injuries—the leading cause of death of young people in Africa.

What, then, should development innovation mean from the perspective of public investment? Innovation can entail many different pathways to development impact. Many—but not all—involve a *low-cost technology*: a mobile phone application for farmers, for instance, or a new maternal health technology or crowd-sourcing device for mapping violence. Some might entail a *new business model* that unleashes consumer demand, such as a new payment plan for purchasing solar lanterns. Innovation might also mean the introduction or application of a *behavioral breakthrough*, such as new knowledge of consumer behavior that leads to increases in chlorine filtration of water. Or it might mean *a new process, policy or tool*,

such as innovative energy audits or new diagnostic tests that use psychometric analysis to evaluate the creditworthiness of entrepreneurs. Regardless of the inputs, the key criterion for innovation is producing development outcomes more cheaply, better, and faster while reaching more beneficiaries.

The U.S. government should avoid overemphasizing technology in its quest for development innovation, and it should heed the caution to avoid "pseudo-innovation." The temptation to seek silver bullet technology solutions is strong, particularly when crafting competitions and prizes. However, a narrow focus on mobile and technology solutions can crowd out other potentially higher-impact approaches. Similarly, U.S. government efforts to foster innovation should balance the push for new technology development with equal attention on the deployment at scale of these technologies. Business model innovation and process innovation may be needed to overcome market failures to reaching scale.

Marry Experimentation and Evidence

Despite the rich legacy of success in donor efforts to foster game-changing development innovation, there are also many cases of resounding failure. The disappointing experience of PlayPumps is one of the most cited examples of this failure. PlayPumps have a novel design: Children push a revolving wheel that looks like a merry-go-round, which draws water from a well at the same time that the children are playing. But the program was a resounding flop; the pumps costs four times as much as traditional pump systems and are overly complex, and even a few hours of play is insufficient to pump much water. After PlayPumps' $16 million launch in 2006, by 2009 very few pumps were still operating.

Harvard University's Michael Kremer and the Center for Global Development's Charles Kenny have highlighted the PlayPumps failure in their calls to marry innovation with evidence. Kenny points out that many technologies that look great on paper fail miserably in the field. "Africa is scattered with the desiccated hulks of technological solutions that turned out to be less than miraculous," he warns.

Kremer argues that while some failure is inevitable, donors have still erred by throwing good money after bad ideas. By failing to adequately invest in evaluation, donors have been caught investing large amounts of money in fads and failures. He calls on donors to seek rigorous evidence early that an innovation is achieving the desired impact, preferably through a randomized evaluation, and to critically assess progress when investing large sums of money. Kremer and USAID's Maura O'Neill advise donors to conduct evaluations at the early stages of a project, not at the project completion stage, as is often done, to fuel an iterative process of piloting, testing, refining, retesting and scaling.

Of course, though eminently sensible, this approach is not standard practice in aid agencies, where program budgets tend to be large; evaluations are conducted at the end of a project (if at all); and little room is available for testing, iteration and adjustment. There is a growing (albeit nascent) momentum for change. The Obama administration's acting head of the Office of Management and Budget (OMB) recently issued a memorandum calling on all agency heads to use evidence and evaluation in budget, management and policy decisions, citing the tiered funding approach of USAID's DIV program.

Manage Risk

Innovation inevitably carries risk. In the private sector, a venture capitalist seeking the next big innovative breakthrough—the next Facebook, for instance—will expect as much as nine carefully chosen investments to fail for every one grand slam that succeeds. The individual losses are balanced by the success of the overall portfolio. Similarly, without taking some amount of risk, donors lose the potential for very large payouts in the form of development breakthroughs with the potential to improve millions of lives.

This raises several questions: How can the U.S. government and other donors prudently manage risk? How much risk is tolerable, both at the individual project level and overall as an institution? Can USAID sustain a portfolio view of its investments and explain reasonable failures in an environment of intense congressional and public scrutiny?

One interesting case study is USAID's new DIV, which has introduced a novel way of managing risk through its

staged financing model. Applicants for DIV grant funding can submit proposals for any of DIV's three stages of financing—ranging from $100,000 for a Stage 1 seed grant to up to $15 million for Stage 3 funds. The more money an applicant seeks, the higher the standards of evidence required that the approach works. In this way, USAID places small bets of $100,000 or less to try out promising new innovations that are not yet tested, to support their research, design and prototyping (that is, if a promising new innovation will fail, better to fail early and cheaply). DIV provides up to $1 million for Stage 2 projects to collect rigorous evidence of an innovation's impact at a larger scale. Only those innovative approaches that have rigorous evidence of effectiveness are competitive for Stage 3 financing of up to $15 million to take this approach to scale. Project risk is further managed by rigorous selection criteria (including the quality of the management team, soundness of approach, and evidence) and a stringent due diligence processes, including 100 percent external review of short-listed proposals by sector experts in the private sector and academia.

Still in its early days, DIV's first investments have yielded several big wins and numerous positive results—helping DIV build political support and buffering itself from what might have otherwise been more intense congressional scrutiny. Yet it is entirely reasonable to assume that some of the USAID-supported innovations selected through DIV, the Grand Challenges program, or other incubators will not yield positive results. In fact, it is even desirable—if every investment works, it is likely that the initiatives are not taking sufficient risk and are losing opportunities to discover innovations that would have an even greater impact. Though sensible from an aid effectiveness point of view, the likelihood of some projects failing carries reputational and institutional risk for USAID and other donors. Even small $100,000 investments in early stage innovations that do not work could be singled out by the media and lawmakers as examples of USAID's failure, especially when taken out of context of its overall portfolio. Much work is left to be done to educate the development community and policymakers, especially on Capitol Hill, about the appropriateness of sensible, managed risk.

Support Public Goods in the Private Sector

Some of the most promising development innovations are being pioneered by commercially sustainable enterprises that aim to deliver positive social change through the private sector. These market-based development solutions developed through "inclusive businesses" have attracted an estimated $50 billion in impact investment capital to take their solutions to scale. And this is just the beginning; J. P. Morgan has estimated that the potential capital market for impact investing could grow to $1 trillion—a potentially vast source of new development financing that could be leveraged to support development goals.

Despite this enormous potential for private investors to provide the capital to scale up game-changing development solutions, today that potential is not yet being realized. In a recent report, Harvey Koh and Ashish Karamchandani of the Monitor Group, and Robert Katz of the Acumen Fund argue that there simply is not a sufficient deal flow of investor-ready enterprises that are ready to scale up with private money. Monitor Group's Mike Kubzansky examined 439 promising inclusive businesses across nine countries in sub-Saharan Africa over a period of 16 months and found that only 32 percent were commercially viable, and only 13 percent were operating at scale. Too many promising innovations get lost in the valley of death between invention and scale—stymied by a dearth of funding, the challenges of achieving economies of scale and profitability, and the difficulties of recruiting talent and high volatility.

Koh, Karamchandani and Katz call on donors and philanthropists to provide greatly needed early stage seed capital to "pioneering" enterprises, as they refine business models, create new markets and pave the way for other "copycat" entrants who free-ride on the first mover's marketing investments. Investors are too often unwilling to provide the heavy up-front investments in building out the market, raising awareness and creating the right skills. They urge donors and philanthropists to provide direct, early stage support to promising "pioneering" enterprises with innovative development solutions. Without such

funding, they argue, the volumes of private, impact-capital will remain on the sidelines.

Their case comes from a public good perspective: Pioneering enterprises face first-mover costs that might otherwise deter entrance to nascent markets. Subsidized pioneers can not only become successful individually but can also pave the way for replication of the model more quickly, more easily and more cheaply. Take the microfinance sector: The pioneer Grameen Bank took 17 years to break even in South Asia. But two decades later, SKS broke even in India in just 6 years. And three decades later, Equitas broke even in just one year.

However, others have cautioned against direct public funding of early stage investments, instead calling for public investment in the enabling environment to make private sector investments more desirable, such as in regulations, market information and standards. Charles Kenny has called for USAID to invest in public goods (vaccines), as opposed to private goods (solar lanterns, cookstoves). Still others have cautioned against early stage investments for the very same reasons that private investors have not moved downstream: risk. Koh, Karamchandani and Katz point out that "innovation across multiple dimensions in order to pioneer new business models serving the base of the pyramid is especially risky. In the emerging field of inclusive business, there are still more unproven models than there are proven ones, so the vast majority of investment opportunities are at the early stage. And building and scaling new business models take time: Monitor's research in India suggests that new inclusive firms take more than a decade to achieve a reasonable level of scale. Meanwhile, the extreme challenges of the base of the pyramid environment mean that margins are typically low and volatile."

Philanthropic organizations and foundations may have more appetite for this risk—do public sector donors? Do donors have the right skill set in house for due diligence and selection, and for providing support for scaling? Koh, Karamchandani and Katz recommend the creation of a specialist intermediary, with the right private sector skill set and expertise for scaling up impact enterprises with innovative solutions. Should donors fund an external entity such as this, or develop this type of capacity in house?

RECOMMENDATIONS AND NEXT STEPS

Measure Cost-Effectiveness and Set Clear Targets

Ultimately, innovation is a push for doing development cheaper, better, faster and at scale. Realizing the high-level commitment for incorporating innovation in the U.S. government's development programs should lead to the adoption and scaling up of approaches that are significantly more cost-effective than current practice. As innovations are piloted, tested and evaluated, donor agencies should have an incentive to adopt the most successful and cost-effective development solutions. However, USAID does not measure cost-effectiveness of programs in such a way that comparisons could be meaningfully drawn, and improvements in cost-effectiveness could be measured. USAID should undertake a major effort to incorporate measures of cost-effectiveness and cost/benefit analyses in its programming, and set clear targets for annual improvements in cost-effectiveness. Such indicators would create the needed incentives for the adoption and scaling up of cost-effective innovations.

Set Aside Funding for Evaluation and Learn from Failure

Failure is fundamental to the process of discovery—fueling a process of iteration, innovation and improvement. In this sense, failure can actually be a public good, if it leads to fresh insights and learning that pave the way for future development success. But this can happen only if the lessons from failure are first acknowledged, grappled with and shared. Obviously, the political and institutional pitfalls of publicly acknowledging failure serve as a deterrent. USAID might be even more reluctant than other government agencies to highlight its failures, given the difficult budget climate and scrutiny on Capitol Hill.

At a bare minimum, USAID's new policy, planning and learning office should lead internal efforts to share lessons from failure and to encourage missions to foster a culture of learning and iteration. OMB's recent guidance to all agency heads to improve public access

to evaluations of what does and does not work provides an additional opportunity. OMB could take a lead role in creating a government-wide culture and forum for sharing lessons from failures. From a game theory point of view, if all government agencies put forward lessons from failures, no one agency or department would alone risk a reputation of underperformance. The Pentagon's DARPA program, for instance, may have more political flexibility to highlight instances of failure, thus giving more political cover to USAID and other agencies.

Create Multidonor Special Intermediary to Seed and Scale Up Innovative Private Sector Solutions

The U.S. government should spearhead a multidonor initiative to create a new external entity dedicated to seeding and scaling up game-changing developing innovations through the private sector. The initiative could have a narrow focus on a select number of development sectors that are especially ripe for early stage support and where the private sector is key to scaling up innovation, in particular energy poverty.

The initiative could deploy a combination of innovative mechanisms to seed, develop and scale up the most promising solutions. "Pull" mechanisms and advance market commitments could be used in combination with DIV's staged financing model. The initiative could provide specialized technical assistance and business support to help the enterprises overcome the market barriers to growth, and work closely with impact investors, such as the U.S. Export-Import Bank and the Overseas Private Investment Corporation, to prepare for later stage deals. By bringing in a multitude of partners—foundations like the Rockefeller Foundation and Hewlett Foundation, impact investors, incubators and accelerators, private sector firms, and a range of multilateral and bilateral donors—along with private sector skills and expertise, the U.S. and other public sector partners could manage their own institutional risk exposure.

The initiative could be launched at the Group of Eight (G-8) summit in the United Kingdom in 2013, starting with a major push for seeding and scaling up sustainable, market-based approaches to expanding energy access in Africa and Asia. Since Rio+20, there has been a growing momentum in the international community around this call for expanding access to sustainable energy in the developing world. Innovation and private sector scaling are central to this objective, but donors and smart public sector support can play a critical role in catalyzing investment opportunities and addressing barriers to growth. In a recent Center for Global Development report, Nigel Purvis and Abigail Jones describe the global push for providing sustainable energy for all as akin to the market for cell phones, and less like drugs for infectious disease. "Markets and consumers, not philanthropy and aid" will drive the sustainable energy revolution, the authors contend. Donors should seek strategic interventions that help unlock the latent demand for energy services in poor communities and that help small and medium-sized businesses, startup companies and social enterprises overcome market barriers to the rapid dissemination of innovative off-grid and mini-grid solutions. They warn that despite keen interest from investors in global clean energy opportunities, there simply are not enough projects today that meet basic investment criteria. The U.K.'s presidency of the G-8 provides an opportunity to galvanize support for the creation and launching of the new initiative for seeding and scaling up development innovation, starting with a major push on energy for all goals.

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1775 Massachusetts Avenue, NW
Washington, DC 20036
202.797.6000
www.brookings.edu/global