





# Digital divide(nd)?

A man in a grey hoodie is shown from the chest up, looking upwards and to the left with a thoughtful expression. His right hand is raised to his forehead, with fingers spread. The background is a bright, clear blue sky. The overall image has a grainy, textured appearance.

Chapter 8

**T**he digital revolution has been advancing with undreamed-of speed over the past several decades. Thirty years ago, the idea that a poor smallholder farmer in a remote area of Mozambique (or Niger, or Myanmar, or the Andean highlands) could be in regular (and, for the most part, affordable) touch with a son or daughter who had migrated to the capital city, or with traders in a market 40 kilometres away, would have seemed absurd. Today, this is a common occurrence that is repeated hundreds of millions of times each day. Yet this is only the narrow point of the spear, as digital technology has expanded in uncounted directions to allow people to make connections, seek and send information, make better-informed decisions, or simply see and be amazed by the ideas, possibilities, sights and sounds to be found in areas of the world that they had never imagined being able to lay eyes on before. Already dizzying in its implications, the digital revolution is set to take another giant leap forward as artificial intelligence embeds itself in countless apps linked to people and the Internet of Things (IoT).

Today's youth are the first group of young people in the developing world whose entire working lives will be permeated by digital technology. This process is further undermining the prospects for untransformed countries to transform and escape poverty through labour-intensive manufacturing, as previous generations did. At the same time, the penetration of digital technology into all aspects of today's economies and people's lives is opening up startling new opportunities for rural youth to vastly increase their connectivity, productivity and agency.<sup>45</sup>

Whether this revolution creates the kind of digital dividend that will transform and improve the lives of today's developing-country rural youth, or whether it instead creates a digital divide that exacerbates existing inequalities, will depend on policy and programmatic decisions that Governments can take today. This chapter summarizes the existing evidence on the challenges and opportunities that the digital revolution presents for youth employment and highlights the types of policies and investments that will be needed to turn it into a digital dividend for both the larger society and rural youth.

### **Digital technology is likely to accelerate the decline of labour-intensive manufacturing as a source of job growth in developing countries**

This report has underscored the fact that the kinds and extent of opportunities open to young people are determined by the intersection of opportunities across young people's national, local and family settings. The sustained growth that is required to increase the opportunities for young people in rural areas has always depended on investment in a country's fundamental capabilities: expanded access to high-quality education as a means of building human capital; basic infrastructure for roads, energy, water and sanitation,

<sup>45</sup> The social and psychological consequences of this revolution will be profound and are well beyond the scope of this chapter.



**BOX 8.1** The Internet of Things for intelligent agriculture

The term “Internet of Things” (IoT) refers to a wireless sensor system that is intended to achieve the interoperability of various networks. In recent years, IoT has been making remarkable progress and is regarded as a promising technology, particularly in the agriculture sector (FAO and ITU, 2017). To reduce costs and enhance the efficiency of rural labour, sensors, electronic measurement algorithms and drones are being used to collect data on targeted inputs such as soil moisture and crop health. The collected data are stored on a server or in the cloud and can be easily accessed by farmers via the Internet with tablets and mobile phones to enable intelligent and remote wireless control over the agricultural production process (Lee, 2018). The tech industry has produced a number of promising apps in the field of intelligent agriculture in recent years – ranging from livestock applications to on-call vehicles. Unfortunately, evidence on uptake, input use and productivity is still scarce.

**Aquaculture:** South Asia can be considered a pioneer in intelligent solutions in aquaculture. Companies such as Eruvaka, JALA [<https://jala.tech/id/beranda/#product>] or eFishery [<https://efishery.com/en/home/>] offer data-analytics-supported aquaculture equipment that enables farmers to monitor their ponds through a smartphone and adjust the amount of fish feed based on water quality and weather data. These real-time monitoring mechanisms help farmers to increase their yields and reduce unnecessary input costs (Tinsley and Agapitova, 2018).

**Precision agriculture:** The Indian enterprise Flybird Farm Innovations [<http://www.flybirdinnovations.com/aboutus.html#quality>] aims to improve agricultural productivity and resource management by promoting precision irrigation and fertigation through a sensors-connected, automated controller. In 2013, it developed a smart irrigation system which is programmed to manage water and fertilizer inputs based on information on soil moisture, temperature and humidity gathered by sensors placed in the ground. Similar approaches have been taken by a number of African start-ups. AgriPrecise, with its app AgIQ, aims to assist farmers to apply the correct amount of fertilizer and has projects under way in Ethiopia, Zambia, Zimbabwe, Mozambique, Malawi and South Africa (IT News Africa, 2018). The Kenya-based UjuziKilimo enterprise has developed a soil analysis platform that measures soil characteristics using an electronic sensor in the ground. It alerts farmers and gives them guidance, via SMS, concerning real-time soil conditions (IT News Africa, 2017).

Illuminum Greenhouses, meanwhile, builds greenhouses equipped with solar-powered sensors to monitor and maintain optimal crop growth conditions. The company also supplies drip irrigation kits that deliver the precise quantity of water that a plant requires at any given time (CTA, 2018).

ThirdEye [<http://www.thirdeyewater.com/#primary>] is an initiative launched by FutureWater and HiView in 2014 with the support of United States Agency for International Development (USAID) as part of the Securing Water for Food (SWFF) programme. ThirdEye’s low-cost flying sensors (drones) have cameras which can measure the reflection of near-infrared and visual light to give

an indication of crop stress as a basis for farmers’ management decisions regarding the use of resources such as water, seeds, fertilizer, pesticides and manpower. Since near-infrared light is not visible to the human eye, near-infrared sensors can provide information on the status of crops about 10 days before a person could detect anything (World Bank, 2017). By 2017, ThirdEye had already been adopted by 5,500 farmers in Kenya and Mozambique.

**Livestock:** Other IoT solutions focus on optimizing the livestock and dairy value chains. iCow, for instance, has developed a gestation calendar that helps cattle ranchers maximize breeding potential by tracking the fertility cycles of their animals. Farmers can register their cows by sending a text message to iCow, which sends them messages via their mobile phones that are tailored to their needs. These messages alert them, for example, regarding feeding schedules, when to expect their cows to be in heat or about disease outbreaks. The service also functions as a “Craigslis”, of sorts, for farmers looking to connect with their peers to buy and sell cattle (Washington Post, 2013).

The Indian SmartMoo platform, developed by Stellapps [<http://www.stellapps.com/index.php/farm-herd-management-system-smartfarms-2/>] in 2010, targets small and medium-sized livestock producers in India. It is an end-to-end dairy farm services product with a focus on clean milk production protocols, productivity improvement, cost optimization and real-time data access. It is offering knowledge-based solutions to optimize the milk production process and keep a check on cattle health. Users can access data via sensors that are embedded in milking systems, animal wearables, milk chilling equipment and milk procurement peripherals. These data are also sent to a cloud server where the data are analysed before the analytics and outcomes are disseminated to various stakeholders over low-end and smart mobile devices.

**The Internet of Tractors:** Although manual labour provides employment, it is often more expensive for employers and requires more time than tractors. When available, tractors can work 40 times faster and be significantly less expensive than human labour (World Bank, 2018). Most farmers, however, cannot afford their own tractors, and most tractor service providers operate well below their potential. Hello Tractor developed a solution to address these problems in 2017. A farmer registered with Hello Tractor can simply send an SMS text to a booking agent who will locate and schedule a device-equipped tractor and send the tractor to the requested location to complete any task that the farmer may need done, such as ploughing, tilling or planting. The tractor operator will then help any nearby farms in need of assistance, making this “Uber for tractors” a very efficient service. A monitoring device on each tractor makes farmers aware of how much land has been worked and the speed of crop growth, and these records are then kept for use as a basis for future agricultural production decisions (Lawson, 2017).

and communications; and strong institutions that can appropriately regulate the economy while generating fiscal resources and using them well. Yet a basic fact is that the first industrializers and (to a lesser degree) the East Asian Tigers obtained an extra quantum of growth – beyond what could have been achieved by means of these basic investments alone – thanks to rapid structural changes in their economies. These structural changes involved a shift of vast amounts of labour from low-productivity farming and family enterprises to wage employment in labour-intensive manufacturing industries. As this segment of the labour force moved from one sector to the other, it and the economy as a whole achieved a much higher level of labour productivity with the help of constantly increasing technology inputs. This “technology escalator” operates robustly in manufacturing sectors and leads to “unconditional convergence” – convergence over time of labour productivity in the manufacturing sector with world standards independently of the broader economic context in which the manufacturing takes place (McMillan, Rodrik and Sepulveda, 2017). This kind of convergence has been much less apparent in the service sector, leading many experts to become pessimistic about that sector’s ability to drive rapid growth.<sup>46</sup>

Over the past several decades, however, the automation of industrial processes has led to sharp declines in industrial employment in Western countries and to stagnation in most of the rest of the world. In the United States, manufacturing employment fell from 15 per cent of total employment in 1990 to 9 per cent in 2010; in Great Britain, the decline was from 20 per cent to 11 per cent over the same period (de Vries, de Vries and Gouma, 2014). Manufacturing employment in lower- and upper-middle-income countries has been stagnant over this period, despite a pace of economic growth that would, in the past, have driven large increases in such employment. Lower-middle-income countries have seen a modest rise in this category of employment (World Bank, 2019). Debates about some of the more detailed aspects of the situation aside, no one expects labour-intensive manufacturing employment to increase to anywhere near the levels of 30 per cent or higher seen in today’s advanced economies during the classical period of Western industrialization. What seems more likely is that a small number of developing countries that are keenly pursuing manufacturing investment with effective policies will be able to achieve those levels, while the rest of the developing world will at best maintain employment in manufacturing industries at levels well below the advanced-economy peaks of the early and mid-twentieth century. Countries that have yet to attract meaningful industrial investment may be especially challenged in their attempts to grow their manufacturing employment.

### **Fundamental capabilities will be more important than ever, but getting them right is complicated**

These trends strongly suggest that, in most countries, growth is likely to depend more than it has in the past on the service sector and on investment in fundamental capabilities. Building these capabilities, which now also include the broadband and mobile connectivity that is central to future growth, has always been necessary to ensure long-term growth (see chapter 5 regarding the role of such investments in ensuring the crucial second demographic dividend). But countries that were able to draw heavily on labour-intensive manufacturing during their early growth phase enjoyed additional gains in growth that

<sup>46</sup> Ghani (2014) makes the case that the service sector has exhibited a more rapid convergence towards world standards than manufacturing has, but this contention is much less accepted in the literature.

were less dependent on these capabilities (especially human capital). For most countries, that source of (relatively) “easy growth” will be less accessible in the future.

Making the right investments, and enough of them, in fundamental capabilities is more complex than achieving structural change. This complexity derives from two sources. First, fiscal resources are needed to make the investments. It is challenging for less transformed countries to generate sufficient resources, since incomes are low, informality is high (making taxation difficult), and government capacities for designing and implementing effective fiscal mechanisms are less robust than in more transformed countries.

Second, good investments require forward planning, collaboration across ministries and regular reviews to ensure maintenance and suitability (World Bank, 2019). This kind of complexity may be especially challenging when building high-quality education systems, which are becoming ever more important for national growth. Managing such complexity requires strong institutions staffed by highly skilled personnel. The least transformed countries thus find themselves in a trap, since low incomes, limited fiscal resources and weak institutions make it difficult for them to make the necessary investments to raise income levels and then capture a more meaningful share of that income via taxation.

### **What will replace labour-intensive manufacturing?**

These dynamics may dampen growth in developing economies in the future. The essential question is this: If structural transformation will not make the contributions to growth that it did in the past, what will replace it? The answer is not clear (McMillan, Rodrik and Sepulveda, 2017). Some manufacturing growth could still be achieved in large domestic and regional markets (e.g. Nigeria and its neighbours and Brazil and its neighbours), but this would require, among other things, robust regional trade, to which policymakers have so far shown little commitment. Without it, the scope for manufacturing growth is greatly reduced. Globalized competition is also greater than in the past, especially as investors now see emerging economies as attractive markets. Attempts to expand within a regional market, or even a national market, are thus not free of competitive pressure from large multinational firms, which may be using highly automated manufacturing plants located elsewhere. Expanding into non-traditional agricultural export markets can provide some room for growth for some countries, including in value-added processing and packaging-for-export segments. Yet such markets are inherently limited if the objective is to provide long-term growth for multiple countries; people can eat only so much food, and this demand can almost certainly be satisfied by a limited number of countries.

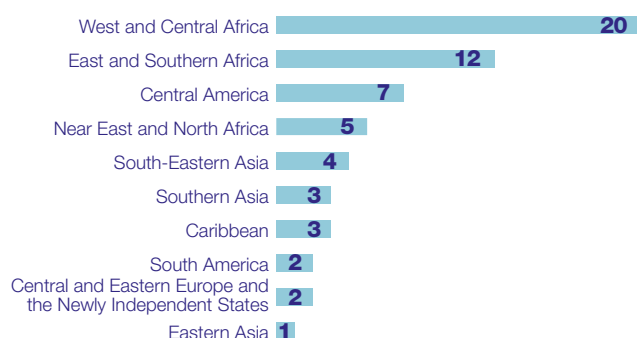
## **Yet the digital revolution also opens up new opportunities for bridging age, gender and rural-urban divides**

The same digital revolution that is reducing access to past avenues of growth and transformation is also opening up new opportunities. Most fundamentally, it is doing so by dramatically reducing the cost of information and transactions costs throughout the economy. As a result, the wide adoption of digital technologies promises to dramatically increase the pay-off to investment in fundamental capabilities.

Adoption of these technologies has been extremely rapid in developing countries. This has been especially true of mobile phones, but Internet adoption has also grown very swiftly and has spread across rural-urban and income divides. Smartphone adoption

**FIGURE 8.1** Mobile phone operating costs vary greatly across regions.

**Percentage of gross national income per capita**



Source: ITU 2017.

jumped from 24 per cent in 2013 to 42 per cent in 2018 across 19 developing and emerging economies (Pew Research Center, 2018). Even in Africa, smartphone adoption stands at 33 per cent, while it has surpassed 50 per cent in LAC and APR. This increase has happened in spite of the very high costs of using mobile phones in many countries (see **FIGURE 8.1** and Mabiso and Benfica, 2018), which point to inequalities in access that have an especially marked effect on young and marginalized groups. It is reasonable to expect that the adoption of these technologies will continue to rise rapidly as costs come down and coverage improves with increasing competition, at the same time that demonstration effects stoke demand.

**Evidence on the impact of government- or donor-funded “digital development” programmes is so far inconclusive**

Piggybacking on this source of growth, over 400 digital development programmes have been launched worldwide over the past decade (GSMA, various years; Aker, 2017). These programmes use digital technology to disseminate information, provide training or distribute transfers. They span a variety of sectors, including youth education and employment (especially agricultural training and adult education and vocational training), the environment, financial services and social protection. Most use simple mobile phone technology – voice and SMS – rather than smartphone applications. See Rotberg and Aker (2013), Aker and Mbiti (2010) and Aker, Ghosh and Barrell (2016) for a survey of digital initiatives in a variety of sectors, notably in agriculture.

Although fewer than 10 per cent of these programmes have been subjected to rigorous impact evaluations, the existing evidence suggests that their effects have been mixed and, for the most part, limited at best. There is little evidence on the duration of their impact, and most studies do not distinguish between youth and other beneficiaries. Overall, it appears that using digital technologies may reduce intervention costs, but the returns will depend heavily on the presence of other enabling conditions.<sup>47</sup>

One area where very recent research points to significant effects is video-mediated extension approaches. In Ethiopia, Abate et al. (2018) have found that community-based video-mediated extension initiatives increased the target group’s knowledge about the agronomic practices that they sought to promote and increased smallholder uptake by as much as 35 per cent compared to the control group. These effects were found both when male household heads participated and also when male and female co-heads were involved. In Peru, Nakasone and Torero (2016) have found that information provided to teenagers through agricultural extension videos in a rural school increased their parents’ knowledge about agricultural practices by between 21 and 30 per cent and boosted their adoption of the practices that were being promoted by between 14 and 18 per cent. In Uganda, Van Campenhout et al. (2018) also found that video-mediated extension programmes had significant effects in terms of knowledge, adoption and yield outcomes, along with important gendered effects. Smallholders who were shown the

<sup>47</sup> Aker, Ghosh and Burrell (2016) does note, however, that “focusing on average effects over populations may conceal differential impact” and identifies large returns to some users and no returns to others.

video adopted a range of recommended practices, increasing maize yields by 14 per cent. Showing the videos to women or couples increased the women's level of knowledge and their participation in household decision-making.

**Adoption of purely private services, however, may have transformational systemic effects**

This proposition is based on an argument that is supported by the earliest empirical research on mobile phone use. If the fundamental effect of digital technology is a dramatic reduction in the cost of information, and if information is the foundation of appropriate action, then the set of actions that are taken on the basis of the available information should generate a higher pay-off as access to this technology spreads. Jensen (2007) has identified this impact in fish markets in southern India, and Aker (2008 and 2010) has demonstrated that it exists in grain markets in Niger. Both studies examined the privately driven adoption of mobile phones in situations where there was no publicly provided platform (the only available platform was a privately provided cellular network that allowed calling and texting). Jensen found a "dramatic reduction in price dispersion, the complete elimination of waste, near-perfect adherence to the Law of One Price,"<sup>48</sup> and increases in both producer and consumer welfare as measured by economists. Aker (2008 and 2010) found smaller but still large effects for grain markets in Niger (the smaller effects were attributed to the fact that grain is more storable than fish).

Sekabira and Qaim (2017) took this a step further by examining the impact of privately provided mobile money (MM) services among coffee producers in Uganda. This involved adding value to the basic service available from the cellular network by a profit-seeking firm that delivered this new service and could scale it up rapidly if consumer demand warranted it. The authors found that adoption was extremely rapid, with 62 per cent of the farmers holding an MM account by 2015, only two to three years after its introduction. They also found large effects on household welfare through multiple pathways. For example, MM adopters were more likely to add value to their coffee prior to selling it and more likely to sell to buyers from outside the region at higher prices. Overall, off-farm income increased by 45 per cent and total income by 19 per cent. This technology was also highly inclusive: female-headed households were more likely than male-headed households to adopt MM, and typical constraints on the adoption of new technologies, such as human capital and wealth, were less important.

Generalizing this argument suggests that the widespread adoption of this technology should increase the pay-off to public investment in fundamental capabilities. This argument can be substantiated with two examples. First, roads, railways, ports and marketing infrastructure reduce the cost of physically responding to opportunities. If widespread mobile phone ownership means that more people have access to more and better information that allows them to use this infrastructure for more profitable endeavours, then the economic return to the country from this investment should increase. The improved infrastructure, in and of itself, and the access to better information, despite degraded infrastructure, should both have positive effects. These effects could be large, as both studies showed, and they should be much larger when combined.

A second example is that of young people who receive a public education (another fundamental capability) that does a better job of teaching them how to ask questions, how to learn, how to identify problems and how to develop solutions to those problems

<sup>48</sup> The Law of One Price indicates that, under conditions of perfect information, prices for the same product across a set of markets converge to the same level and will be differentiated only by the transfer costs between these markets.



(i.e. non-cognitive skills). Without access to the vastly larger set of information made possible by digital technology, these young people should still be able to profit from their education, as long as policies (or social norms, especially for young women) are not too restrictive and physical infrastructure is not too degraded. Yet they should be able to multiply the return to their education through much more profitable actions if they have access to digital technology and the information and ideas and connections that it offers.

The next frontier in privately provided applications using digital technology is the Internet of Things (IoT) (see **BOX 8.1**). The IoT emerges as digital sensory technology that is installed in the “things” that people use in their daily life, allowing communication with online databases to provide real-time, context-specific and time-specific information for decision-making. One example is precision farming, in which GPS-enabled farm machinery is loaded with a high-resolution soil quality map of a farmer’s field. As the machinery for dispensing fertilizer moves over the field, the GPS communicates with the high-resolution map and automatically varies the mix of fertilizer applied to optimize results. Other uses include agricultural drones to monitor crop health or livestock monitoring through embedded chips and “smart greenhouses” that automate many crop husbandry activities (IoT For All, 2018).

These types of applications have become very common in Western agriculture. In developing countries, the number of start-ups whose owners are trying to establish a useful and profitable space has skyrocketed in the past two years. For example, new firms in Nigeria, Kenya, Ghana and South Africa are using aerial images from satellites or drones, weather forecasts and soil sensors to help farmers manage crop growth in real time. Numerous firms in Africa and India (and certainly elsewhere as well) are providing farmers with price and market information, in some cases integrated with real-time farm management information. Others are experimenting with potential applications to improve the usefulness of index insurance through links to MM (Greatrex et. al., 2015).

Because this phenomenon is so young in the developing world and moving at such a rapid pace, no solid empirical evidence yet exists on the identity of the adopters or the benefits that they are obtaining. Observation suggests, however, that one result of the availability of these technologies has been a renewed interest among entrepreneurial youth in farming that is closely linked to the possibility of serving growing markets with technology-enabled farming and marketing practices (Bello, Allajabou and Baig, 2015; Noorani, 2015; personal observation at Mastercard Foundation “Young Africa Works” Summit in Kigali, February 2017).

### **These benefits may be especially large, and especially inclusive, in the area of digital finance**

There is evidence that MM has the potential to reduce age, gender and rural-urban gaps in access to financial services. This is, first of all, because young people are early adopters of digital technologies (Aker, 2018; Gasparri and Muñoz, 2018). Second, across all country types in the country transformation typology, young people and persons over 25 years of age have comparable degrees of access to MM (Gasparri and Muñoz, 2018). This finding paints a dramatically different picture from the age patterns observed in traditional finance, where youth have little or no access. It is also surprising because young people are less engaged in the economy than adults and thus might be expected to have less of a need for MM services. Third, in Côte d’Ivoire, women are just as likely as men to have an MM account only, while men are twice as likely as women to have a traditional bank account (Clement, 2018). Fourth, MM account penetration is similar in rural and urban

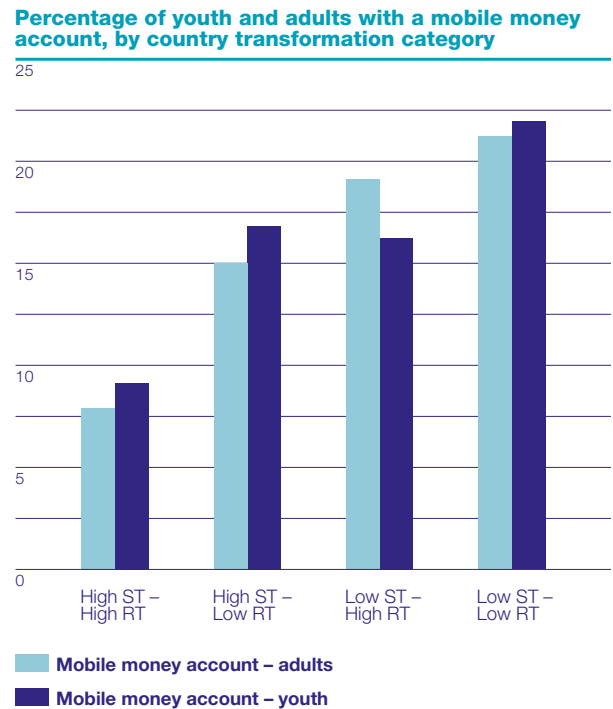
areas of developing countries, standing at 14.3 per cent in rural areas compared with 16.1 per cent across the entire population (Gasparri and Muñoz, 2018). In some countries that are at the leading edge of the digital revolution, MM penetration is higher and still exhibits little if any urban-rural divide. Examples include Kenya, where MM adoption is 72 per cent, and Uganda, where it is 50 per cent for both rural and urban populations.

Most surprisingly, less transformed countries actually have a *higher* penetration rate for MM than more transformed countries (see **FIGURE 8.2**). Mobile telephony opened the way for leap-frogging invoice services, as residents in countries with poor and sparse landline phone connections exhibited an extremely rapid uptake of mobile phones. A similar dynamic seems to be taking place in financial services, where MM penetration rates are *inversely* proportional to the level of structural and rural transformation in a country. With poor access to formal banking services, digital finance is growing most quickly in countries with little pre-existing banking infrastructure and where uncovered needs are greater. This suggests that today's rural youth could have dramatically better access to financial services over the course of their lives than their elders have had, with large and lasting effects on their well-being.

To date, MM has been dominated by peer-to-peer (P2P) transfers and bill payment arrangements. Mobile credit and savings services started up later and have a lower degree of penetration, but they are growing rapidly. By far the two leading firms in this area, both in East Africa, are M-shwari in Kenya and M-pwara in Tanzania. These start-ups were just launched in 2014, but by 2017 had 13.5 million and 4.8 million users, respectively, which is equivalent to 56 per cent and 20 per cent of all users across Africa, Asia and Latin America.

Rigorous studies are still few in number, but initial evidence points to the presence of positive impacts. If scaled up, mobile credit and savings options could be transformative for many rural youth by providing far easier access to credit for activities in which short-term credit is useful. This would include trading and potentially other non-farm activities as well as horticultural farming, where loans for inputs could be paid off quickly with the proceeds from sales of crops at later stages in the cropping cycle. Bastian et. al. (2018) find positive effects on savings and credit use among female microentrepreneurs in Tanzania from the promotion of mobile savings by M-pwara combined with business training. Habyarimana and Jack (2018) evaluated the impact of the "High Hopes" initiative, a mobile-money-administered programme aimed at Kenyan high school students that sought to incentivize them to meet educational savings goals. They identified a threefold increase in financial savings and found that parents who had savings were from 18 to 24 percentage points more likely to enrol their children in high school. These students were at the lower end of the youth spectrum, which makes the results quite promising in that they suggest that digital technology could offer such young people an alternative savings vehicle.

**FIGURE 8.2** Mobile money provides youth in the least transformed countries with access to finance



Note: ST: structural transformation; RT: rural transformation.

Source: Gasparri and Muñoz, (2018), based on data from the World Bank (2017) as adapted by the United Nations Capital Development Fund.

**BOX 8.2** The digital revolution may exacerbate the aspirations gap in rural areas

According to the idea of the “revolution of rising expectations”, commonly attributed to Tocqueville, social upheaval typically starts not when economic and social conditions in a population are at their worst, but when they start to improve but then level off. Improvement breeds awareness of possibilities, and people then become frustrated if progress is perceived to stop or slow. More recently, Ray (2016) has formalized a theory of the *aspirational gap* in the context of rapidly changing developing countries.

The developing world, in particular Africa and Asia and some countries in Latin America, has seen strong economic growth over the past 20 years, with impressive declines in poverty and undernutrition and advances in education. This is the same period during which the digital revolution broke out around the world, including in developing countries. Together, these two dynamics have almost certainly led to dramatic increases in young people's aspirations for a better life.

Yet growth has broadly stalled over the past several years, and many suggest that expectations of rapid long-term growth may have to be scaled back (McMillan, Rodrik

and Sepulveda, 2017). Given the ingrained patterns of urban bias in national investment planning, rural areas and links between them and urban areas may suffer the brunt of governments' adjustment to more straitened circumstances. To a much greater extent than young people living in urban areas, rural youth may thus continue to have to cope with spotty or non-existent Internet and mobile phone service owing to a lack of investment and competition, along with poor roads, erratic supplies of electricity and sanitation services, and the social exclusion inherent in living in rural areas of rapidly urbanizing countries. The result could be frustration, potentially high rates of out-migration from rural areas, potential political and social unrest – and higher rates of poverty than would otherwise exist.

Governments can forestall these effects, however, if they emphasize transparent and effective governance, promote competition in the provision of digital services, invest in their countries' fundamental capabilities, including sound rural development, and work to ensure the inclusion of rural youth in these processes.

### **Capturing the potential benefits of the digital revolution for rural youth requires new investments at the national level and the development of new skills by young people**

The digital revolution promises profound changes in the way that people live and work in the developing world. Digital technology also has the potential to be far more inclusive than traditional technologies, with evidence emerging that rural areas can adopt such technologies as quickly as urban ones, women as much as men, and low-income individuals as much as their more wealthy counterparts. It is particularly striking that MM adoption is much higher in the least transformed countries, which speaks to the transformative potential of this technology.

Living in rural areas, being young and being female are three of the key “layers of exclusion” that limit the productivity, connectivity and agency that are central to building good lives. The evidence that these divides or gaps may not exist to anywhere near the same extent in the case of digital technology as they have with older technologies suggests that rural youth, and young rural women in particular, could stand to gain the most, at least in a relative sense, from policies and investments that promote broad access within countries.

#### **Improved fundamental capabilities, combined with an appropriate regulatory environment, are the key elements in promoting broad access**

Rural areas suffer the most from poor infrastructure and education. If the rural-urban divide persists in these kinds of investments, rural youth may adopt digital technologies but will be unable to obtain the level of returns they need in order to keep up with urban youth, and the overall divide will widen. This is a clear area for public action.

Direct investment in mobile telephony and mobile broadband infrastructure is *not* a public responsibility, but rather a private opportunity. Governments' primary



responsibility is to create a regulatory environment that promotes competitive investment by multiple private mobile network operators in order to keep costs down.

With respect to MM, there are several important regulatory issues. First, regulatory frameworks should facilitate the emergence of *agent networks* for the provision of financial services. Such networks hold out special promise in promoting financial inclusion in sparsely settled rural areas where the cost of setting up brick-and-mortar branches may be prohibitive. The concept is based on the provision of financial services through a network of convenience stores and outlets that sign an agency agreement with the provider and earn a commission on every transaction performed on the provider's behalf. Agent networks allow financial service providers to lower the costs associated with opening branches or installing ATMs, thereby overcoming the limitations of brick-and-mortar models in order to reach a wider customer net and extend their services to "the last mile". They also offer mobile network operators the possibility of moving into locations that financial service providers have not yet reached. For rural populations, both adults and young people alike, having an agent nearby means they no longer have to travel long distances and spend money on transportation to get to the branch office of a financial service provider. At agent locations, rural youth can also pay bills, send/receive money to/from family members and friends, or pay instalments on purchases via pay-as-you-go technology, among other services.

Second, companies may need technical assistance to ensure the interoperability of MM platforms – assuming government regulatory frameworks promote this. The International Finance Corporation's provision of this type of assistance to companies in Tanzania contributed to a tripling of MM transactions just between February and September 2016 (Moretto and Scola, 2017). Third, regulations should allow mobile network operators (not just banks) to provide MM. This is critical to promoting competition and facilitating the emergence of the agent networks that have been so central to the expansion of MM in Kenya and Tanzania. Fourth, because the vast majority of MM services in Africa are provided by foreign firms (Nakasone and Torero, 2016), openness to foreign investment is important in order to promote access. This relates back to the need for a strategy that promotes broad competition, not just competition among local or regional providers.

**People seeking to benefit from digital technology need stronger cognitive and non-cognitive skills so that they can seek and productively utilize information**

The productive utilization of information is a complex ability requiring multiple skills, but without it, access to mobile technology will have a much lower pay-off for an individual. People who have this ability will be able to dramatically increase their productivity; those who do not will see little effect. Rural education needs to improve what are currently very poor (especially in Africa) learning outcomes, which should include the development of the non-cognitive and socio-behavioral skills that will be so important in the new economy. Financial literacy is another important element, since rural youth need to be financially literate in order to use MM and other digital financial services. In keeping with these ideas, schools need to emphasize "learning to learn" instead of simply having students engaged in mastering facts, since the rate of change in information and knowledge – very much driven by the digital revolution – means that any mastered set of facts will need to be updated regularly and throughout a person's life if they are to remain relevant.

## SPOTLIGHT Remittances contribute to rural youth development

### Migrants' contributions, in numbers, to rural youth development

**Remittances to low- and middle-income countries amounted to around US\$389 billion in 2015,<sup>49</sup> and around 44 per cent of that sum flowed into countries where more than half of all rural youth live.** The fact that countries with high levels of structural transformation saw a rapid increase in remittance inflows between 2000 and 2015 throughout their transformation process underscores the massive contribution being made by international migrants to the development of their home countries. In many places, the level of remittances is much higher than the level of foreign development aid inflows. Even the least transformed countries have experienced an increase over the past 15 years, but they still receive only 4 per cent of global remittances. These inflows have a huge potential for fostering inclusive rural development because of their private nature. Rural youth can benefit from these contributions in various ways, such as improved access to financial services, improved health and education facilities, and direct capital and knowledge investments in young rural entrepreneurs.

**Remittances from internal migration are more likely to reach rural areas and play an important role in reducing household poverty.** Global estimates indicate that only 40 per cent of international remittances reach rural areas (IFAD, 2017), which suggests that remittances to rural areas are more likely to come from internal migrants. In fact, although these remittances are often smaller in amount, they reach more families (McKay and Deshingkar, 2014), helping to reduce the depth of household poverty and increase investments in housing and education (Housen, Hopkins and Earnest, 2013). Remittances can be especially important when a household experiences an economic shock, since they may then allow the household to mitigate its negative effects and, in particular, to keep children and young people in school (Alcaraz, Chiquiar and Salcedo, 2012; Adams and Cuenca, 2010). In a recent study using data from 11 countries, rural youth with a migrant relative were found to have, on average, lower incomes (excluding remittances) than rural youth who were not receiving remittances, indicating the income-smoothing function of remittances for rural youth (Orozco and Jewers, 2018).

### Remittances to rural areas can facilitate young people's access to finance

Evidence has shown that remittances promote the expansion of financial services in developing countries (Aggarwal, Demirgüç-Kunt and Martínez Pería, 2011) and that a larger proportion of remittance receivers in rural communities can increase financial access in these areas (Efobi, Osabuohien and Oluwatobi, 2015; Aggarwal, Demirgüç-Kunt and Martínez Pería, 2011). In a study conducted by Orozco and Jewers (2018), around 46 per cent of the rural youth receiving remittances were found to possess at least one financial product. The most common financial product was a savings accounts (32 per cent), and these young people saved, on average, significantly larger amounts than those who did not receive remittances. However, rural youth remain among the population groups with the lowest banking penetration rate (Orozco, Yansura and Carmichael, 2014). A functioning financial ecosystem is required in order for remittances to have their full developmental effect. In this connection, recently developed tools that have helped to significantly reduce the transaction costs of sending remittances to rural areas include mobile money and other digital technologies. This is especially true in countries and areas where mobile phone penetration is high and related payment systems function well (IFAD, 2017). However, in more remote rural areas, Internet-based services are less likely to be implemented, and poorer households are unlikely to own a smartphone.

### Diaspora investment in rural communities benefits rural youth

While remittances sent directly to households of origin can be seen as private investments in one's own family, diasporas are also contributing to community development. Hometown associations are organizations that bundle together the private contributions of migrants in a specific destination country to local communities in their country of origin, many of them in rural areas (Orozco and Jewers, 2018). The main areas of investment involve economic development, including education, rural development and health and sanitation improvements. These are all areas that are especially beneficial for rural youth, giving them greater access to higher-quality education and health facilities, along with basic infrastructure in areas where local government capacity has fallen short. However, diaspora engagement in rural communities does not have

<sup>49</sup> The countries included in this calculation are the same ones covered in the country typology presented in chapter 1. The full list of countries is provided in annex C. The data on remittances are taken from the World Bank, Annual Remittances Data: Inflows (updated to April 2018).

to be a substitute for local government. On the contrary, collaboration between public and private agents can lead to effective rural development initiatives. Aside from financial contributions, international migrants can also share valuable experience with less skilled and less experienced persons in their home country. One example of such partnerships involving government- and donor-supported initiatives is the African Diaspora Marketplace (ADM). ADM provides capital funding to international migrants from African nations who have business partners and proposals for investments in their country of origin. While this initiative is as yet small in scale, it points to potential areas of investment that would allow young entrepreneurs in rural areas to start and run a successful business (Orozco and Jewers, 2018).

**Public investments should aim to channel remittances into productive areas.** In order for this to happen, two major strands are envisioned. One is investment in satisfying the basic needs of rural households so that remittances can be used to save and invest in productive activities instead of being used to pay for daily consumption items. The other strand targets the business environment of rural areas and would provide incentives for private investment by helping to build a functioning financial ecosystem and market linkages. The direct benefits for rural youth from such investments can take the form of lower poverty rates, more schooling, better health and access to finance for entrepreneurial activities.

**BOX 8.3** IFAD's Financing Facility for Remittances: Lowering the cost and maximizing the impact of remittances for development

IFAD's Financing Facility for Remittances (FFR), a multi-donor facility financing innovative projects to enhance the development impact of remittances and migrants' investment, supports capacity-building, advocacy and research in this field. Since 2006, the FFR has funded more than 60 projects in over 45 countries across the developing world that use innovative technologies to lower the transaction cost of remittances, promote access to financial services in remote areas and foster migrant investment and entrepreneurship. The FFR is also an important source of knowledge on remittances and migrants' investments.

Among other initiatives, the FFR has pioneered the creation of an enabling environment for the introduction of mobile remittance and banking services, reducing the costs, enhancing financial inclusion for un(der)banked populations and increasing the contribution of migrant remittances to sustainable development. Further information is available at: <https://www.ifad.org/web/guest/ffr>



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