

OVERVIEW

Digitalization presents investment opportunities for African firms and those who conduct business with them. Digital technologies are being adopted at a faster pace than previous waves of technological innovation. People and firms in Africa have embraced this transformation. By making fuller use of digitalization, African firms across all economic activities can become more productive, profitable, and integrated in global, regional, and local value chains. Likewise, people can benefit from the lower costs and learning that digital technologies can facilitate. Existing or new businesses can serve this rapidly expanding market—for example, by building digital infrastructure or providing appropriate software solutions. Previous studies suggest that digitalization can create opportunities for investment, growth, and jobs.¹ However, access to and utilization of digital technologies are uneven, with many firms in Africa being left behind.

This book analyzes the opportunities to increase productive use of digital technologies by businesses across Africa. Building on ongoing World Bank Group research initiatives,² it provides a novel analysis of the extent of digitalization across businesses. The analysis goes beyond country-level uptake gaps to understand the opportunities arising from using specific digital technologies more intensively. It also analyzes the cost and investments needed for digital upgrading by firms and the opportunities for digital business providers in Africa.

The book consists of two parts. Part 1 measures various aspects of incomplete digitalization of firms in Africa; assesses the main barriers to, and costs of, adoption; and analyzes the potential economic impact of digitalization. Part 2 explores what can be done to mobilize more private sector investment to boost digitalization and development. It focuses on three areas in which the World Bank Group, particularly the International Finance Corporation, has actively supported businesses in developing countries: infrastructure, tech start-ups and disruptive technologies, and access to finance. It concludes with a discussion of policies to unlock private investments. The book's findings can be summarized in the following main messages, organized by key topics addressed in this book.

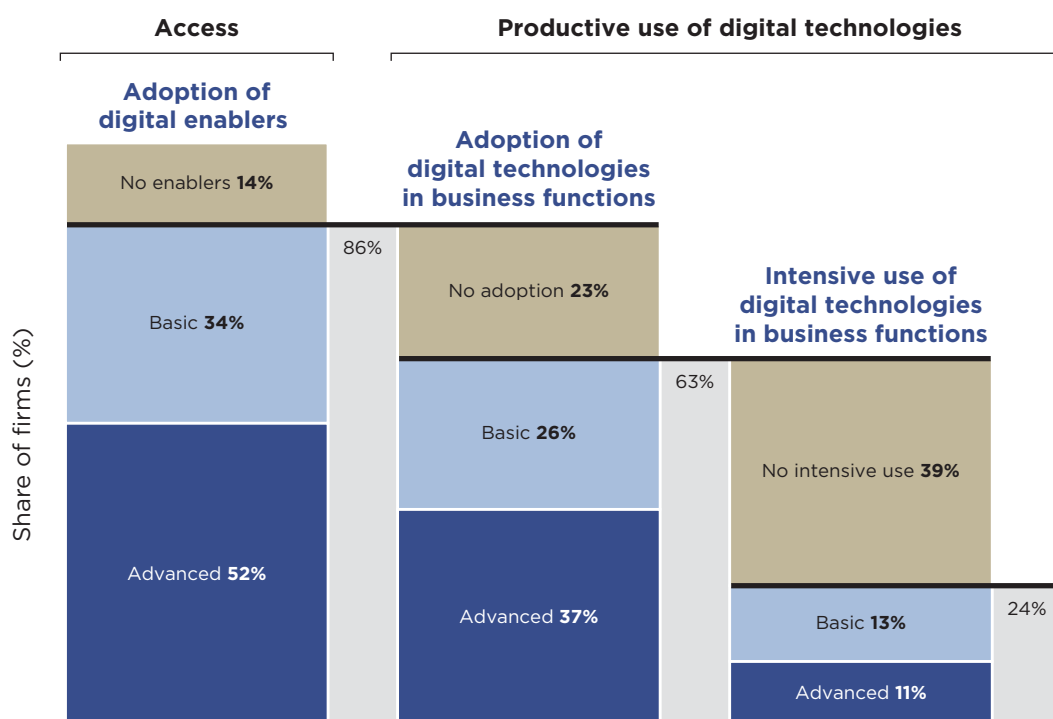
State of Digitalization in African Businesses

African firms can reap opportunities by making fuller use of digitalization. Fewer than one in three firms that have adopted digital technologies make intensive use of them for business purposes, a phenomenon defined in this book as

incomplete digitalization (refer to figure O.1). This new evidence, based on nationally representative data from Burkina Faso, Ethiopia, Ghana, Kenya, Malawi, and Senegal, shows that 86 percent of firms with five or more workers have access to one or more digital enablers (mobile phone, computers, or internet). Even so, 23 percent of firms are digitally enabled but do not adopt digital technologies for productive tasks, such as business administration, planning, sales, and payments. Moreover, 39 percent of firms adopt digital technologies for those functions, but not intensively—that is, as the most frequent technology used to perform a task. On average, only 24 percent of firms make intensive use of the most sophisticated digital technology they adopted in a business function. Only 11 percent make intensive use of advanced digital technologies for general business functions (such as enterprise resource planning).³ The bulk of firms continue to regularly rely on manual methods. Additional novel data from Ethiopia, Ghana, Kenya, Nigeria, South Africa, Tanzania, and Uganda show that this gap follows similar patterns and is wider among microbusinesses (those with fewer than five employees).

FIGURE O.1

Degrees of Incomplete Digitalization



Source: World Bank, Firm-level Adoption of Technology survey data; Cirera et al. (2024).

Note: The left bar classifies adoption of enablers, namely the percentage of African firms with access to at least one digital enabler (mobile phone, computer, or internet). Computers with internet connection are classified as advanced enablers. The middle bar shows the average share of firms with digital enablers that adopt digital technologies across GBFs. *Basic* digital technologies refer to general applications (e.g., standard software, email). *Advanced* digital technologies refer to integrated systems or specialized software designed to perform specific functions (e.g., enterprise resource planning). The right bar shows the average share of firms that intensively use their most sophisticated digital technologies across GBFs. “No intensive use” estimates include 6 percent of firms that adopt advanced digital technologies but intensively use basic digital. GBFs = general business functions.

Africa is a diverse region with variation in adoption and use of digitalization across countries, mostly driven by differences in size of firms. In a group of middle-income countries (Ghana, Kenya, and Senegal), 57 percent (on average) of firms with five or more workers adopt computers and internet versus 44 percent of such firms in low-income countries (Burkina Faso, Ethiopia, and Malawi). Large and medium-size firms tend to make fuller use of digitalization and are more prevalent, relative to the working-age population, in the first group of countries. Firms in low-income countries are less likely to have access to digital enablers and to productively use digital technologies, but cross-country differences in business digitalization are driven mostly by the composition of firms, with a high prevalence of micro- and informal businesses in low-income countries. Cross-country differences also mask regional variations. For example, lower-income subnational regions in middle-income countries still face sizable gaps in uptake of digital enablers. Gaps in intensive use are especially relevant for middle-income countries in regions with better digital infrastructure.

Mobile phones and digital payments are important entry points to digitalization, but they do not necessarily lead to digitalization of other business functions performed by firms. As many as 86 percent of firms use mobile phones for business operations, and 61 percent have adopted advanced digital technologies for payment. These are by far the most common uses of digital technology by African firms. However, these firms are slow to digitalize beyond mobile and digital payments. Almost two-thirds of firms that adopted advanced digital payment systems in the region have not yet adopted a second advanced digital technology to perform business functions. Moreover, widespread adoption of digital payments does not translate into its intensive use as the most frequent payment method. Only 7 percent of firms that have adopted digital payment methods report using them intensively.

Economic Effects and the Potential for Digital Upgrading across Businesses

Digitalization of businesses can boost productivity, jobs, and growth. The arrival of high-speed internet in Africa has led to productivity gains in incumbent firms and further growth in output and employment, driven by both entry of domestic firms and greenfield foreign direct investment. Yet, further gains may be limited if internet availability does not translate into intensive use of digital technologies. Research presented in this book shows that each step in the process of digitalization matters. Firm-level productivity gains led by high-speed internet have hitherto been driven by adoption of digital technologies to perform general business functions (for example, administration, sales, or payment). The gains are potentially greater if such adoption is translated into more intensive use.

More than 600,000 formal firms with five or more workers and up to 40 million microbusinesses in Africa have high potential to benefit from digital upgrades. To shed light on the potential for digitalization across the continent, this book provides new estimates of the universe of firms and own-account businesses across all

54 countries in Sub-Saharan and North Africa, including characteristics such as the number of workers, registration status, and sector. Using statistical models to identify the type of firms that are more likely to adopt digital technologies, the analysis then identifies more than 600,000 formal firms with five or more workers (24 percent of all such firms) with high probability to adopt basic or advanced digital technologies for key business functions, based on similar characteristics of firms already using these technologies.⁴ Similarly, about 10 percent of firms that have already adopted these technologies have the potential to use them more intensively. Among 230 million informal microfirms and owner–operator businesses, as many as 40 million could start using some form of digital technology for functions such as accounting, planning, sales, marketing, supply management, or payments.

The overall economic effects of firm digitalization might be limited if not expanded to microbusinesses and informal businesses, which account for most employment in Africa. Large formal firms play a disproportional role in moving workers to use more productive digital technologies. However, 7 in 10 African workers are self-employed, and the bulk of employment is informal. If all formal firms with the predicted market potential to upgrade to advanced digital technologies were to do so, this gain would be limited to 7 percent of all formal workers in Africa. If micro and informal businesses with high probability also were to upgrade, about 15 percent of all workers could gain access to some form of digital technology for productive tasks, switching from manual to digital technologies. This potential highlights the importance of expanding all workers' access to digital technologies, as well as facilitating entry of new formal firms and reallocating workers to larger, more digitally enabled firms.

Barriers to Digital Adoption

Incomplete digitalization results from several factors, including the following:

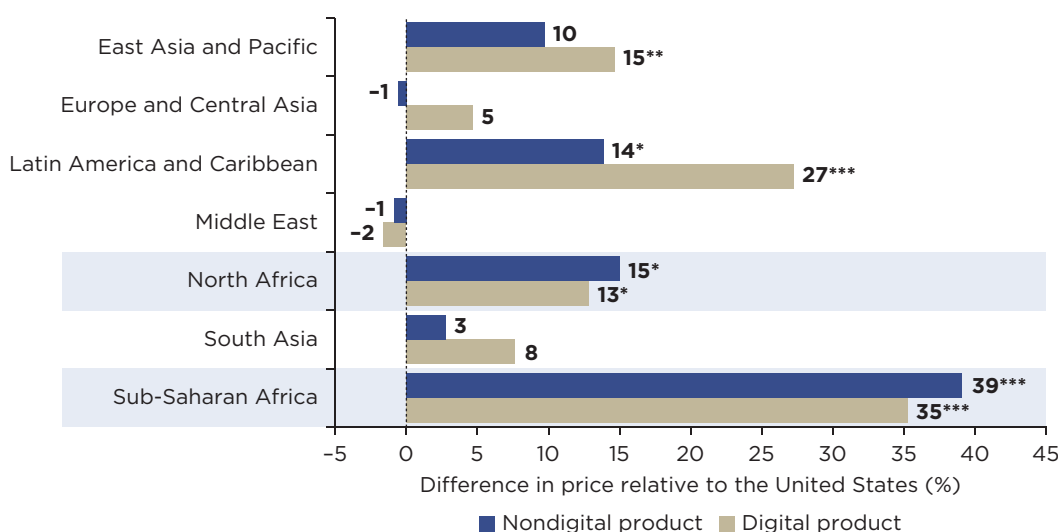
- Poor digital and complementary electricity infrastructure
- High prices of technology (high tariffs, lack of competition, insufficient continent-wide regulations supportive of market integration)
- Low levels of human capital and firm capabilities (which constrains the development of digital solutions and their adoption by firms)
- Limited access to finance (hindering investments in digitalization and innovations by digital adopters and providers).

These elements cover both demand and supply sides of digitalization. African countries lag other regions and developing countries of similar per capita income in most of these areas.

Digital equipment and software cost more, in terms of US dollars, in Africa than in other regions, thereby deterring firms from adoption. Using novel datasets with item-level information, this research finds that machinery and equipment, both digital and analog, are 35–39 percent more expensive in Sub-Saharan Africa, in absolute terms, than in the United States, and 13–15 percent more expensive in North Africa.

FIGURE O.2

Prices of Digital and Nondigital Products, by Region, Relative to the United States



Sources: International Comparison Program (database), World Bank; Cruz et al. (2024).

Note: Percentage difference in the average price of digital versus nondigital products in the categories of machinery and equipment and other products from the International Comparison Program, relative to prices in the United States. Prices of digital and nondigital technologies are in US dollars at market price. The analysis is done on a sample of 160 countries, including 49 African countries. There are 107 products, of which 46 are digital, including software, and the remaining 61 are nondigital. Prices for machinery and equipment include the import duties and other taxes actually paid by the purchaser, the costs of transporting the asset to the place where it will be used, and any charges for installing the asset so that it will be ready for use in production. The coefficients reported are the percentage differences relative to the United States computed using the results of the ordinary least squares estimations, where we estimate the logarithm price of the products on region dummies and product dummies. The results are robust, with a sample restricted to products for which price data is available for more than 40 percent of countries and at least 25 percent of African countries.

*Significant at the 10% level. **Significant at the 5% level. ***Significant at the 1% level.

This research also finds that standard software is more expensive in Africa (refer to Figure O.2). Other factors that complement technology adoption, such as digital infrastructure, electricity, and specialized high-skilled workers, are also relatively scarce and expensive in Africa, compared to other regions in the world. Trade frictions—including high tariffs on imported digital goods, lack of infrastructure, and market concentration—hamper technology affordability and diffusion in the continent.

Opportunities and Policies to Unlock Private Investments

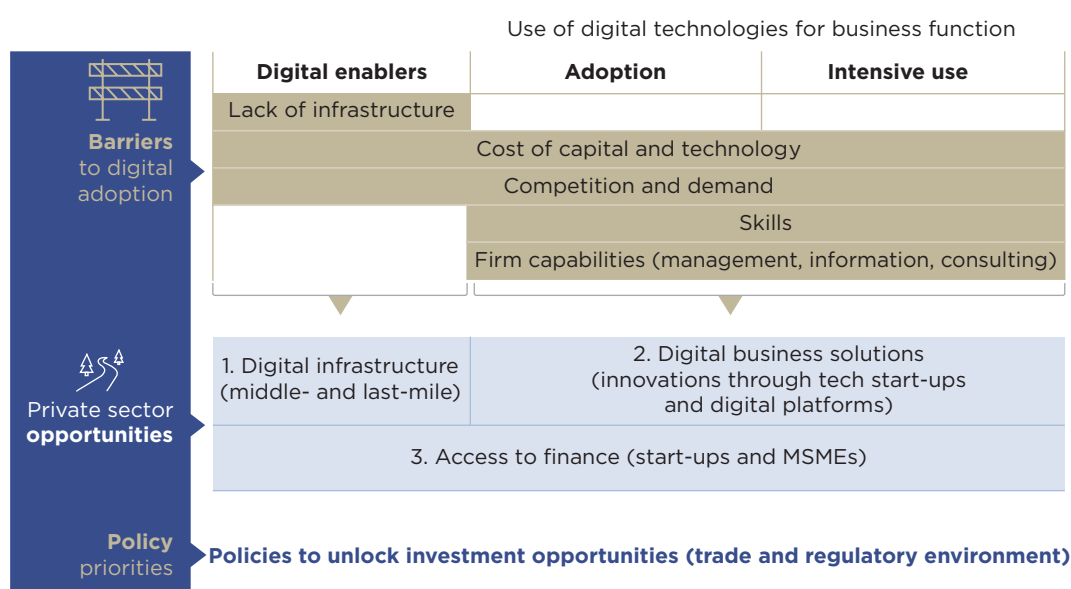
High costs of digital adoption can lead to opportunities for digital business providers and the financial sector. Part 2 of this book highlights the private investment opportunities that arise from the diagnostics presented in part 1 and points to policy

areas to unlock these investments (refer to figure O.3). First, improving the coverage of digital infrastructure can enhance the quality of digital enablers (for example, internet connection, use of cloud computing) and facilitate access to advanced applications (for example, business administration software with a lower cost of implementation and maintenance). This can also increase the expected value of adopting computers and other devices. Second, digital tech providers, especially start-ups, can design novel applications and digital platforms that offer affordable, user-friendly solutions for performing specific business functions. Third, financial sector providers can expand their markets to fund these new digital solutions, as well as finance digital technologies that leverage information on businesses and reduce risks and transaction costs for their operations, improving coverage and reducing the cost of capital involved in digital upgrading.

The arrival of new submarine cables in Africa can reduce the price of connectivity, if regulatory reforms boost investment in middle- and last-mile digital infrastructure. The arrival of new submarine cables is projected to generate a sixfold increase in international internet bandwidth by 2027 (compared with 2022). Estimates in this book suggest that this expansion of connectivity could lead to a 10–11 percent annual drop in the price of broadband internet below the historical trend. Yet, to reduce prices and increase the number of connections among new users, more investment in middle- and last-mile infrastructure (up to \$6 billion annually) is required. Regulatory reforms

FIGURE O.3

Incomplete Digitalization, Investment Opportunities, and Policies



Source: Original figure for this publication.

Note: MSMEs = micro-, small, and medium-size enterprises.

to facilitate private investments in middle- and last-mile infrastructure include allowing foreign participation in digital infrastructure and providing connectivity services, liberalizing incumbents in broadband markets, facilitating competition in international gateways and leased-lines markets, and supporting or mandating infrastructure sharing.

Additional funding for tech start-ups can enable further innovation and diffusion of digital technologies. Disruptive start-ups can turn problems such as informality or lack of financial inclusion into profitable business opportunities, thereby enabling digitalization of micro-, small, or medium-size firms. The success of mobile payments in Africa shows the importance of innovation led by tech companies. Local digital solutions can be tailored to local needs, such as the use of artificial intelligence (AI)–driven speech recognition software to address communication costs in the presence of illiteracy or many local dialects, or user-friendly applications to improve accounting systems and reduce matching cost with suppliers and customers. Satellite imagery with AI-powered weather forecasts can improve the quality, timeliness, and productive use of data for agriculture and many other applications, with the promise of transforming rural livelihoods. Digital tech start-ups incorporating such disruptive technologies are more likely to succeed in terms of exit price or valuation growth, but they often struggle to attract funding—even more so in Africa, where these firms are younger and smaller and grow at a slower pace than in other regions. In Latin America, ventures with disruptive potential receive twice as much funding as nondisruptive ones, whereas in Africa they receive 40 percent more. Addressing market failures to facilitate financing of innovative early-stage disruptive businesses can strengthen the design and scaling of apps to boost firm digitalization and help low-income, low-skilled owners and workers to learn and meet their productive needs.

More private finance is needed to enable the generation and productive use of digital technologies addressing local demands. Digital infrastructure investments in Africa reached more than \$32 billion between 2010 and 2021 (cumulative), with large participation of the private sector. Yet, to enable the productive use of digital technologies, it is critical to increase access to finance both for digital tech start-ups to provide innovative applications and for enterprises across all sectors, aiming to digitalize day-to-day operations. Firms in Africa experience a greater rejection when applying for loans to carry out technology upgrades than those in other regions. The financing gap for the digitalization of business administration among existing formal firms is \$1.4–\$2.7 billion, based on different scenarios. Moreover, the funding pipeline for digital tech firms in Africa is smaller and takes longer than in other regions, particularly for young firms, with only one-quarter of the funded firms receiving their first venture capital deal within the first five years.

Reducing tariffs on digital goods and facilitating market integration of digital business solutions would make technology more affordable. African countries have consistently imported nearly 70 percent fewer digital goods relative to other manufacturing imports than the rest of the world. Tariffs on digital goods are higher in Africa than elsewhere. The African Continental Free Trade Area (AfCFTA) is set to reduce tariffs on technology goods imported from member countries, but its impact might be

limited because most imports of digital goods come from outside the region. Import-weighted tariffs on these products would decrease by only 0.3 percentage point, on average, across countries. Simulation exercises suggest the AfCFTA negotiations should consider including tariff concessions on digital goods imported from nonmember countries, potentially curbing costs more significantly, especially in countries that currently have the highest tariffs. Regional market integration may also provide opportunities for complementary policies to facilitate exports and intraregional trade on digital business solutions.

Notes

1. For example, using the time of and geographical variation in the rollout of submarine cables across the African continent, studies have shown that the arrival of high-speed internet has led to an increase in firm entry, greenfield foreign direct investment, employment, and productivity (refer to Hjort and Tian, forthcoming). Additional evidence indicates that the spread of mobile phones and banking have led to poverty reduction (refer to Suri and Jack 2016).
2. See Begazo, Blimpo, and Dutz (2023) on digitalization in Africa and Cirera, Comin, and Cruz (2022) for a broader discussion on firm adoption of technology, including the description of the methodology and data used in this book.
3. Chapter 1 provides the detailed classification of basic and advanced digital technologies across business functions. *Basic* refers to general-purpose digital technologies that are not specifically designed to perform a particular task (e.g., standard software, email). *Advanced* refers to digital integrated systems that rely on specialized software, applications, or platforms designed to perform specific business functions.
4. These estimates suggest that 28 percent of formal firms with five or more workers already adopt basic digital technologies, and 22 percent of them adopt advanced digital technologies for administration.

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