**KEY MESSAGES**

- Value added growth of information technology (IT) services averaged 8 percent annually between 2000 and 2022, growing nearly twice as fast as the global economy. Employment in IT services grew by 7 percent annually during the same period, far outstripping the meager 1 percent growth in total employment.

- IT services are also being used increasingly as intermediate inputs in other sectors. The input intensity of IT services almost doubled in high-income and upper-middle-income countries during 2000–20, but it did not grow at all in lower-middle-income countries.

- Globally, IT services exports grew at 12 percent annually during 2010–22, eclipsing all other types of services exports. Low entry barriers and soaring demand led to remarkable growth in IT services exports in many low- and middle-income countries.

- Digital start-ups from low- and middle-income countries have received an influx of venture capital (VC) funding since 2020, with most VC deals being in e-commerce, fintech, health, education, and entertainment.

- The app market has become more local and less global. From 2015 to 2022, 54 out of 63 countries where data are available witnessed an increase in the share of domestic apps in the list of top 100 most downloaded apps. Low- and middle-income countries with vast domestic markets, unique language, and strong cultural identity are especially well positioned to develop homegrown giants, and firms from smaller economies can still prosper in niche markets.

**Introduction**

The information and communication technology (ICT) sector combines manufacturing and services industries whose products fulfill or enable the function of information processing and communication primarily by electronic means, including transmission and display (UN 2008). Due to variations in industry and product classifications across countries or sources and the increasingly blurred lines between industries, this chapter adopts a slightly modified definition of the ICT sector (refer to figure 2.1). It presents a granular breakdown of ICT manufacturing and ICT services, whenever possible, to allow for more accurate and detailed analysis.

Today, digital platforms comprise some of the largest ICT companies by market capitalization. Digital platforms have also transformed businesses in other sectors and blurred traditional industry lines. A digital platform is an economic agent with a business model that permits interactions and
exchanges of information, goods, or services between multiple types of users—which can include producers, consumers, or a community—through digital means. While some digital platforms like Google and Meta belong to the ICT sector, others such as Amazon and Uber are often mapped to other sectors. Digital platforms have spread to many different industries, including real estate (Redfin), health (Teladoc), education (Coursera), and so forth. Traditional businesses have increasingly embraced the platform-based model as well. For instance, Walmart has become an e-commerce giant, while banks have launched their own apps and digital wallets. Digital platforms have widened firms’ boundaries and businesses to bring increasingly diverse and unrelated business lines together to create digital ecosystems, further complicating the industry classification of such firms.

Business process outsourcing and information technology (IT)-enabled services (BPO-ITES) refers to contracting business activities and functions to third-party providers. Business processes are often IT based or delivered electronically over the internet or through telecommunication networks. Common outsourced business processes include call center or customer services, accounting and bookkeeping, human resources, data entry, editing and typesetting, design, marketing, and so forth. BPO-ITES has created abundant job opportunities and improved inclusion by providing new sources of income for youth, women, the disabled, and people from remote areas.
The ICT sector, BPO-ITES, and digital platforms (hereafter referred to as “the digital sector”) both address and exacerbate several market failures. The digital sector can enhance innovation and boost efficiency by overcoming information barriers, augmenting production factors, transforming products, and reducing searching, matching, and transaction costs (Beuermann, McKelvey, and Vakis 2012; Paunov and Rollo 2016; World Bank 2016). The Internet and data are borderless by nature, nonrival, and sometimes nonexcludable, exhibiting characteristics of global public goods (Buchholz and Sandler 2021). At the same time, network externalities, economies of scale and scope, and “winner-takes-most” characteristics tend to result in high market concentration and power imbalance. Thus, the characteristics of the digital sector necessitate government intervention to alleviate market failures.

First, this chapter examines how the digital sector contributes to economic growth and job creation. Next, it shows different pathways for countries to create value in the digital sector and identifies outperforming economies in each pathway. The chapter seeks to answer the following questions: (1) How much does the digital sector contribute to growth and job creation? (2) What are the opportunities and pathways for countries to create value in the digital sector? (3) What factors have contributed to the success of certain low- and middle-income countries in different pathways?

The digital sector drives growth, creates jobs, and generates huge positive spillovers

ICT was the most innovative field of technology during the past few decades and a key enabler of innovation in other sectors. Fields related to ICT technology have been among the most rapidly growing fields in patent publications (refer to figure 2.2); their share of total patent publications grew from less than 10 percent in 1980 to 26 percent in 2021. From personal computers, the internet, digital platforms, 4G/5G, smartphones, and cloud services to artificial intelligence (AI), the most significant technological breakthroughs during the past few decades were dominated by the ICT sector. The world’s seven biggest spenders on research and development in 2020 were all ICT companies: Alphabet, Amazon, Apple, Huawei, Meta, Microsoft, and Samsung. Generative AI tools such as ChatGPT and Stable Diffusion dazzled the public in late 2022. As a general-purpose technology (GPT), ICT enables and accelerates innovation in other sectors. For example, AlphaFold2—a software that uses AI to predict the shape of proteins—has opened new paths for the discovery and design of drugs.

The IT services segment has been the fastest-growing segment in the global economy over the past two decades, growing twice as fast as the rest of the economy. Based on the ICT sector data set compiled by this report team (refer to the appendix for more information), the total value added of the ICT sector exceeded US$6.1 trillion in 2022, representing around 6 percent of global gross domestic
product (GDP) (refer to figure 2.3). Within the ICT sector, value added is increasingly captured in IT services rather than in hardware manufacturing or telecommunication. The value added growth rate of IT services is nearly twice the growth rate of the global economy, surpassing all other sectors in the past two decades, based on information in the Trade in Value-Added (TiVA) data set.

Similar to other GPTs, such as electricity, digital technology’s growing importance is not reflected in national accounts. Some people are puzzled by the conflict between the ubiquitous presence of digital technologies and their modest share in global GDP. As a new general-purpose technology matures and becomes widely adopted, the price of technology often drops more than the expansion of output, resulting in a stable or contracting share of the technology-producing sector in GDP. Part of the explanation also reflects a measurement problem. The variety and quality of digital goods and services have soared over the past few decades, but they are not captured accurately in price indexes. The welfare gains from a few popular digital services—many of which are free to users—amount to an estimated 6 percent of GDP. These digital services also disproportionately benefit lower-income groups (Brynjolfsson, Li, and Raymond 2023).

Value added in ICT manufacturing and ICT services is highly concentrated in high-income economies, and the concentration increased further during the past decade. China and the United States account for more than half of global value added in the two industries. Furthermore, the top six economies account for 80 percent of global value added in ICT manufacturing and 70 percent in ICT services. These shares have increased further since 2010, as economies of scale and scope, network effects, and winner-takes-most characteristics of the ICT sector have cemented and escalated dominance by the world’s leading economies.

Several Central and Eastern European countries achieved impressive growth in both ICT manufacturing and ICT services production in the past few years. Bosnia and Herzegovina, Bulgaria, Iceland, Lithuania, Malta, North Macedonia, Slovenia, and Türkiye achieved double-digit growth in ICT manufacturing value added during 2015–22 (refer to figure 2.4, panel a). Bulgaria, Croatia, Cyprus, Czechia, Estonia, Latvia, Lithuania, Malta, and Romania achieved double-digit growth in ICT services (refer to figure 2.4, panel b). Other countries such as Chile, Costa Rica, Senegal, and Viet Nam also experienced brisk growth in ICT manufacturing, while China, Ghana, Ireland,
Kenya, Saudi Arabia, and Singapore excelled in ICT services. Most of these countries achieved such growth by integrating into the global ICT value chain.

ICT goods and services are also increasingly used as intermediate inputs in other sectors. Based on the TiVA database, the share of ICT goods inputs increased modestly from 2000 to 2020 in all sectors (refer to figure 2.5a). The intensity of telecommunication inputs remained stable (refer to figure 2.5b). The share of IT services inputs rose dramatically across sectors, especially in modern services (refer to figure 2.5c), highlighting the substantial spillovers that IT services generate in the broader economy.

**FIGURE 2.4** Value added growth in ICT manufacturing and services, select countries, 2015–22

![Figure 2.4](image1)

*Source:* Original calculations for this publication based on the World Bank ICT sector data set.

*Note:* ICT = information and communication technology; CAGR = compound annual growth rate; VA = value added. For a list of country and economy codes, go to [https://www.iso.org/obp/ui/#search]. Only major economies and the fastest growing economies are labeled. Bubble size represents the economy’s share of the global ICT value added.

**FIGURE 2.5** Intensity of ICT inputs, by sector, 2000 and 2020

![Figure 2.5](image2)

*Source:* Original calculations for this publication using Organisation for Economic Co-operation and Development Trade in Value-Added (2022) data.

*Note:* Modern services include publishing and broadcasting, telecommunications, IT services, finance and insurance, and professional and scientific services. Input share is calculated as the percentage of ICT manufacturing, telecommunication, and IT services in all intermediate inputs. ICT = information and communication technology; IT = information technology.
There is a growing digital divide in production. Gaps in the use of IT services have widened both within and across country income groups. In 2000, the finance industry’s IT services intensity was below 1 percent in most middle-income countries and between 1 percent and 2 percent in high-income countries (refer to figure 2.6). Between 2000 and 2020, IT services intensity in the finance sector barely increased in low- and middle-income countries, while it doubled in most high-income countries. The dispersion within income groups also widened. Similar trends can be observed in professional services. These findings strongly suggest that productivity gains from the use of IT services have not been fully exploited in low- and middle-income countries.

The ICT sector directly employs a small but growing share of workers, driven largely by the IT services subsector. Global employment in the ICT sector reached 68 million in 2022, up from about 37 million in 2000. The ICT sector’s contribution to the share of global employment grew modestly from 1.3 percent in 2000 to 2 percent in 2022, with most new jobs added in IT services (refer to figure 2.7). The compound annual growth rate (CAGR) of employment in IT services averaged nearly 7 percent during 2000–22, significantly eclipsing the 1 percent growth of total employment.

**FIGURE 2.6 Intensity of IT services inputs in select industries, by country income group, 2000 and 2020**

Source: Original calculations for this publication using Organisation for Economic Co-operation and Development Trade in Value-Added (2022) data.
Note: Whiskers represent 95% confidence intervals. HIC = high-income countries; IT = information technology; LMIC = lower-middle-income countries; UMIC = upper-middle-income countries.

**FIGURE 2.7 ICT sector as a share of employment, by subsector, 2000–22**

Source: Original calculations for this publication based on the World Bank ICT sector data set.
Note: ICT = information and communication technology; IT = information technology.
ICT manufacturing jobs withered in Brazil, France, Japan, the United Kingdom, and the United States, while they mushroomed in China and Viet Nam during the past two decades. As the world’s factory floor, China’s ICT manufacturing sector employed around 13 million people in 2021, accounting for nearly 60 percent of global employment in ICT manufacturing. Viet Nam’s ICT manufacturing employment approached 1 million in 2021 and grew at an astonishing 21 percent annually during the past two decades. ICT manufacturing employment also grew in China; India; Malaysia; Mexico; and Taiwan, China.

Rapid technological advances and explosive demand have made the IT services industry one of the most desirable employers in the 21st century. The sector has created some of the most well-paid jobs, minted a vast new middle class, and increased social mobility. The increasing dependence on digital technologies has spurred tremendous demand for app developers, software engineers, data analysts, cloud architects, and many other professions that did not even exist 20 years ago. The IT services industry houses some of the world’s most valuable companies by market capitalization and provides jobs with opportunities for professional success. In the United States, IT services occupations were among the most well-paid occupations in 2022. In China since 2020, the IT services industry has replaced financial services as the highest-paying industry. The IT services industry employs many more people and offers more social mobility than traditional lucrative industries like medicine, law, and finance. There are also more routes of entry into the IT industry as well as lower costs to attain the required qualifications and skills.

China created by far the most jobs in IT services during the past two decades, followed by India. China’s IT services employment approached 10 million by the end of 2022, a 30-fold increase from 0.3 million in 2000 (refer to figure 2.8, panel a). Underpinning this jobs spurt is the remarkable growth of China’s homegrown technology firms, enabled by a massive domestic market, vast pool

**FIGURE 2.8 Size and growth of IT services and gender ratio in IT services, 2000–22**

Source: Original calculations for this publication based on the World Bank ICT sector data set.
Note: The gender ratio is the ratio of women to men. CAGR = compound annual growth rate; IT = information technology. For a list of country and economy codes, refer to https://www.iso.org/obp/ui/#search.
of talent, enormous investments, and policy support. India maintained second place, behind China, during the past two decades. In India, more than 3 million people worked in IT services in 2022, up from 1.4 million in 2000. Direct employment in India’s ICT and BPO-ITES sector is estimated to have been around 5.1 million in 2022.²

Israel, Malaysia, Nigeria, the Philippines, Viet Nam, and several Central and Eastern European countries (Hungary, Poland, Romania) saw the fastest growth in employment thanks to the burgeoning local IT services industry and roaring IT exports. Viet Nam has emerged as a major software hub in Southeast Asia. The country’s IT services job sector grew at a breakneck annual rate of 20 percent during the past two decades, thanks to its young and growing population, low labor costs, and strong science, technology, engineering, and math education. Similarly, Nigeria’s tech industry has been on the rise, with start-ups and tech hubs popping up across the country. Hungary, Malaysia, the Philippines, Poland, and Romania have become increasingly attractive destinations for IT services outsourcing. Companies are drawn by their skilled workforce, competitive labor costs, and favorable business environment.

The gender gap in the IT services industry is narrowing, with low- and middle-income countries leading the progress. Back in 2010, women only accounted for 23 percent of global employment in the IT services industry, 6 percentage points below the level in 2020. Many low- and middle-income countries led the progress, as educated women joined the tech industry in droves to pursue their career ambitions. The Kyrgyz Republic had the largest increase in female participation in IT services, with the ratio of women to men jumping from 0.04 in 2010 to 0.79 in 2020 (refer to figure 2.8, panel b). Albania, Bangladesh, Brunei Darussalam, Cyprus, the Arab Republic of Egypt, Iceland, the Islamic Republic of Iran, Tanzania, and Uganda also achieved remarkable progress in bringing more women into the IT services workforce.

**Pathways to create value in the digital sector**

Countries have two main pathways to develop their digital sector: export oriented and domestic market oriented. While each pathway has its own set of prerequisites, they complement and reinforce each other. Not all countries need a large domestic digital sector; however, many low- and middle-income countries could benefit from developing their local digital sector. Both ICT manufacturing and ICT services present huge potential for export-led growth. At the same time, a vibrant local digital sector can better serve domestic demand, generate more positive spillovers in the economy than foreign firms, and ultimately stimulate innovation and growth (Keller 2002; Sampson 2023). For low- and middle-income countries, the export-oriented pathway is often the first step in creating value within the digital sector. Global value chains have enabled them to focus on specific tasks in the digital sector without having to build the entire industry from scratch. Through export activities, countries accumulate capital, skills, and knowledge that prove to be invaluable in the domestic market. As the local digital sector develops, it paves the way for the emergence of domestic entrepreneurs. These entrepreneurs establish firms specializing in local ICT manufacturing, ICT services, and local digital platforms. Subsequently, these homegrown digital firms expand and internationalize, fueling exports in return.

In the short term, countries need to assess their comparative advantage in different segments of the digital sector and to formulate strategies accordingly. The digital sector is vast, complex, and rapidly evolving, and almost no single country can produce a product without any foreign inputs. Countries’ endowments, stage of development, and industry structure play a key role in determining their comparative advantage in different segments of the digital sector. Leveraging current strengths through tailored pathways is a more pragmatic approach for many low- and middle-income countries in the short term.
However, comparative advantage is not destiny. In the longer term, low- and middle-income countries can identify the most promising global opportunities for creating value and formulate strategies to overcome existing constraints through innovative approaches. Constantly evolving technologies in the digital sector present opportunities for countries to circumvent existing constraints and move up the value chain. For example, smaller and less developed economies have been hindered by the lack of availability of large data sets to train AI models. However, with synthetic data, the lack of data may be less of a constraint. Similarly, cloud computing can help countries to overcome some of their constraints in computing power. Policy makers and the private sector can work together to identify promising opportunities in the digital sector and leverage innovative approaches to move into more complex tasks that promote technological spillovers. Reshaping their comparative advantage toward more sophisticated tasks can lead to long-term economic growth and prosperity.

Policies and institutions also need to keep adapting to a country’s level of maturity and market dynamics in the digital sector. As countries move up the digital value chain and their domestic digital sector matures, innovation and market contestability become more important. It is inefficient and ineffective for policy makers to sustain labor-intensive ICT manufacturing when wages are high. Similarly, premature efforts to leapfrog into cutting-edge segments without adequate digital infrastructure, skills, and innovation ecosystems are likely to flop. Governments need to adapt their policies and regulations constantly based on the country’s position in the digital value chain.

This section analyzes the latest global trends, highlights well-performing countries in each pathway, and identifies factors contributing to their success. Data on ICT goods and services exports are used to examine the export-oriented pathway. Venture capital and private equity investment data are used to examine the emergence of domestic digital start-ups in low- and middle-income countries. Finally, app performance data are used to shed light on the performance of digital start-ups in low- and middle-income countries and to highlight the intersection of the two pathways—that is, how local digital firms in low- and middle-income countries go global.

**Promoting ICT goods and ICT and BPO-ITES exports**

Global ICT goods exports grew faster than total merchandise exports during the past decade. Global ICT goods exports expanded from US$1.7 trillion in 2010 to US$2.9 trillion in 2021, driven mainly by communications equipment and semiconductors (refer to figure 2.9). Their share in total merchandise exports also edged up from 11 percent to 13 percent during the past decade.

China’s dominance in ICT goods exports has weakened slightly since 2013, as its demographic dividend has been running out. China; Germany; Hong Kong SAR, China; the Republic of Korea; Malaysia; Singapore; Taiwan, China; Thailand; the United States; and Viet Nam were the top 10 exporters of ICT goods in 2021. Together they accounted for 82 percent of global ICT goods exports. China became the largest ICT goods exporter in the early 2000s, and its export share peaked at 31 percent in 2013 (refer to figure 2.10), the same time as its working-age population peaked. Consequently, the concentration of ICT goods exports also peaked around 2013. As China’s demographic dividend runs out and labor costs creep up, its dominance in labor-intensive assembly tasks has slipped.

Czechia, Hungary, India, Mexico, Poland, Thailand, and Viet Nam have become new hotspots for ICT manufacturing. From 2015 to 2021, Viet Nam gained a significant share of global exports in all four categories of ICT goods and became one of the top five ICT goods exporters (refer to figure 2.11). Thailand increased its export share of computers and communication equipment. The picture for Mexico is mixed, as its share of computer exports increased, while its share of
communication equipment and consumer electronics dropped. Smartphone production in India ramped up from a very low base and continues to grow. Czechia, Hungary, and Poland all showed increases in ICT goods exports and have become regional ICT manufacturing hubs for Europe.

Attracting foreign direct investment (FDI) has been instrumental in jump-starting and accelerating ICT goods exports in most low- and middle-income countries. ICT goods manufacturing is dominated largely by multinational corporations. The long and highly complex global value chains for ICT goods create high entry barriers for domestic firms in low- and middle-income countries. Most of the major ICT goods exporters in these countries relied on FDI to build up an incipient ICT manufacturing industry focused on labor-intensive production and assembly. The entrance of Intel in Costa Rica, Malaysia, and the Philippines catalyzed FDI from other multinational corporations.

FIGURE 2.9 Global exports of ICT goods, by category, 2000–21


Note: Mirror data are used to fill in missing values in ICT goods exports. ICT = information and communication technology.

FIGURE 2.10 Top 10 exporters of ICT goods, 2000–21


Note: Mirror data are used to fill in missing values in ICT goods exports. ICT = information and communication technology. For a list of country and economy codes, refer to https://www.iso.org/obp/ui/#search.
and transformed the industry structure and export basket of these economies (Awan et al. 2017; Freund and Moran 2017; Qiang, Liu, and Steenbergen 2021). China’s rise as a behemoth in ICT manufacturing is linked inextricably to FDI. Samsung has turned Viet Nam into a leading ICT goods exporter. Mexico, Thailand, and, more recently, many Central and Eastern European countries similarly owe their success in ICT manufacturing to FDI. These economies often lured multinational corporations with proactive investment promotion, generous tax incentives, infrastructure building, cheap labor, and a conducive business environment. Over time, multinational corporations in these economies have shifted their operations into higher value added activities and developed local suppliers, some of which have become multinational corporations themselves.

Intensifying geopolitical tensions between China and the United States, the pandemic, and the war in Ukraine have galvanized multinational corporations to accelerate diversification of their global value chains, creating opportunities for low- and middle-income countries near major markets and suppliers. The trade war between China and the United States reached an inflection point in July 2018. Since then, geopolitical tensions between the two countries have worsened, with ICT sector conflict at the forefront of the superpower competition. On top of this conflict, the COVID-19 pandemic and the Russian Federation’s invasion of Ukraine further laid bare the vulnerabilities of placing too much dependence on a single country. Furthermore, China’s unpredictable and heavy-handed policies during recent years have alarmed global investors. As a result, more and more ICT giants are eyeing alternative locations and weakening their reliance on China. Members of the Association of South East Asian Nations, Eastern Europe, India, and Mexico have been primary choices. Apple plans to start making its MacBook computers in Viet Nam and is expanding production in India (Roy, Kubota, and Wen 2023). Sony Group has transferred production of cameras sold in the European, Japanese, and US markets to Thailand from China (Furukawa 2023).
The Intel plant in Costa Rica was reactivated in 2020 with an announced investment of US$350 million that ultimately grew to US$1 billion (Murillo 2022).

ICT services exports have grown much more rapidly than ICT goods during the past two decades, with growth accelerating during and after the pandemic. Global ICT services exports nearly quadrupled between 2005 and 2019, owing primarily to IT services (refer to figure 2.12, panel a). The share of ICT services in total services exports also rose steadily from 7 percent to 11 percent during the same period. ICT services exports grew 19 percent in 2021, the fastest pace since 2008. IT services, the core element of ICT services exports, were up by 43 percent in 2022 compared to 2019. The share of ICT services in total services exports jumped to an unprecedented 15 percent in 2021 and declined to 14 percent in 2022 as travel rebounded.

China’s rise as a major ICT services exporter has eroded India’s market share, although the latter’s outlook remains strong. India’s booming IT industry has long been celebrated as a great success story in the country’s economic rise. India’s IT industry thrived on its vast engineering talent and a vibrant start-up ecosystem; its ICT services exports raked in US$100 billion in foreign exchange in 2022 and grew by nearly 8 percent annually during 2010–22 (refer to figure 2.12, panel b). However, India’s growth was outpaced by China’s 19 percent growth rate during the same period. Riding on its domestic market success as a testing ground and stepping stone, Chinese software and IT firms are increasingly foraying into foreign markets and have propelled China’s ICT services exports. As the domestic market matures and competition stiffens, Chinese software and internet firms are looking overseas to expand their revenue sources.

The IT services segment has been the most vibrant category of international trade for the past decade and has created a new export-led growth pathway for countries to expand and diversify their economies. During 2010–22, IT services grew by 12 percent annually, surpassing all other service categories. In 2022, IT services became the third largest category of services exports, right after transport and travel (refer to figure 2.13). Countries around the world are embracing the IT services sector as a new driver of growth, economic diversification, and job creation. For high-income economies, exporting IT services extends the global reach and influence of their technology firms. For resource-rich, landlocked, and lower-income countries, IT services exports offer a tantalizing opportunity to diversify their economies and integrate into the global economy. For most other

![Figure 2.12](https://example.com/figure212.png)

**FIGURE 2.12** Global export of ICT services, by category, 2005–22, and top 10 exporters of ICT services, 2010–22

- **Panel a.** Global export in ICT services
- **Panel b.** Top 10 exporters of ICT services

Source: Original calculations for this publication based on International Monetary Fund balance of payments data.

Note: IT services include computer services and information services. ICT = information and communication technology; IT = information technology. For a list of country and economy codes, refer to https://www.iso.org/obp/ui/#search.
economies, IT services exports create well-paid jobs and improve inclusion.

Several upper-middle-income countries have enjoyed exuberant growth in IT services exports since the pandemic. Among upper-middle-income countries, 6 out of the top 10 performers are from the Europe and Central Asia region, including Albania, Armenia, Georgia, Kazakhstan, Moldova, and Montenegro (refer to figure 2.14). These economies achieved annual growth ranging from 30 percent to 130 percent during 2019–22. Among countries that exported more than US$1 billion in IT services, Indonesia achieved a whopping 41 percent annual growth, followed by 30 percent in Pakistan, 28 percent in Türkiye, 26 percent in Brazil, 23 percent in Serbia, 21 percent in Bulgaria and Ukraine, and 16 percent in China, Costa Rica, and India.

The pandemic turbocharged the nascent computer services sector in several lower-middle-income countries, but many low-income countries failed to partake in the rally. Bangladesh, Egypt, Ghana, India, the Kyrgyz Republic, Pakistan, Tunisia, Ukraine, and Uzbekistan led the growth of IT services exports during 2019–22 (figure 2.14). Among low-income countries, Madagascar and Uganda were the only two countries that reported decent growth, albeit from a low base. Hampered by weak digital infrastructure, a dearth of ICT

FIGURE 2.13 Global services exports, by category, 2022

Source: Original calculations for this publication based on International Monetary Fund balance of payments data.
Note: CAGR = compound annual growth rate; IT = information technology; R&D = research and development.

FIGURE 2.14 Growth of IT services exports, by country income group, 2019–22

Source: Original calculations for this publication using World Trade Organization services trade data.
Note: HIC = high-income countries; UMIC = upper-middle-income countries; LMIC = lower-middle-income countries; LIC = low-income countries. For a list of country and economy codes, refer to https://www.iso.org/obp/ui/#search.
talents, and a less favorable business environment, many low-income countries failed to realize pandemic-fueled growth and continue to struggle to develop their IT services industry.

More broadly, the pandemic spurred booming BPO-ITES exports around the world and unlocked growth opportunities for low- and middle-income countries to create jobs and combat the brain drain. Digital technologies have driven a paradigm shift in how services are supplied, delivered, and consumed across borders. Worldwide, digitally delivered services grew from below 52 percent of services exports in 2019 to 64 percent in 2020 (UNCTAD 2021). To cut costs and tap into the vast pool of global talent, companies are increasingly outsourcing and offshoring business functions from data entry, customer service, human resource management, finance, and administration to business research, data analytics, legal processes, and other professional services. The global software and BPO services market reached US$2.4 trillion in 2022 and is expected to reach US$3.9 trillion in 2026 at a CAGR of 12 percent. The huge growth potential and wide range of activities involved in BPO-ITES offer opportunities for countries and companies of all sizes. IT and BPO-ITES services also help to retain talent and to combat the brain drain that many low- and middle-income countries are experiencing.

**Nurturing domestic digital start-ups**

Homegrown digital firms fill important gaps in low- and middle-income countries and can better serve domestic demand and drive innovation. Digital markets in many countries remain too shallow or too small to appeal to global tech giants (Ungerer 2021). Furthermore, most global digital platforms are tailored to high-income markets and may not be suitable for drastically different local settings. Ample opportunities exist for homegrown firms, especially in e-commerce, fintech, entertainment, edtech, and e-health subsectors. Digital start-ups in low- and middle-income countries are leveraging digital technology to facilitate transactions in specific markets or to offer services that are otherwise not available. As a result, these start-ups are filling important gaps in the market and creating new avenues for economic growth. This section uses data on venture capital investment to document trends in low- and middle-income countries’ digital start-ups.

VC plays an important role in the highly dynamic and innovative digital sector, as it is a critical source of funding for start-ups and firms with high growth potential. ICT firms and internet-based businesses usually require significant investments in research and development to bring their ideas to fruition. For young start-ups, such investments are hard to come by, as their high growth potential is accompanied by high risk. Venture capitalists not only mobilize the funding that digital start-ups may otherwise struggle to obtain, but also provide valuable guidance to entrepreneurs on strategy, marketing, and business development. In addition, they often have extensive networks to connect start-ups with potential partners, customers, and additional investors.

The pandemic sparked a significant increase in VC funding for digital start-ups in many low- and middle-income countries. With record-low interest rates, start-up investments have soared, resulting in higher valuations across various sectors and regions from 2021 to mid-2022. As the pandemic acted as a catalyst for the digital sector, venture capitalists went on a funding frenzy and plowed money into companies developing digital infrastructure, software, and digital solutions. The birth of digital unicorns hit an unprecedented 470 in 2021, breaking the most recent record of 90 in 2020. Among low- and middle-income countries, Brazil, Chile, China, Egypt, India, Indonesia, Mexico, Nigeria, Pakistan, Türkiye, and Viet Nam have seen an influx of VC funding (refer to map 2.1). Most of the VC deals in low- and middle-income countries are in e-commerce, health, education, entertainment, and fintech. High-income countries received 70–80 percent of all VC deals in all subsectors except for ICT manufacturing during 2017–22. Low- and middle-income countries are gaining momentum in consumer-facing digital platforms (refer to figure 2.15). In the business
and productivity subsector, VC deals more than tripled in Côte d’Ivoire, Morocco, Nigeria, Senegal, Tunisia, and Uganda between 2017–19 and 2020–22, driven by digital financial services. In the education and health subsector, investments have been on an upswing in Bangladesh, Nigeria, Peru, and Türkiye. In the entertainment subsector, Nigeria, the Philippines, Türkiye, and Viet Nam are highflyers. The e-commerce subsector had the highest share of VC deals going to low- and middle-income countries in both periods, and the share rose nearly 6 percentage points. Bangladesh, Ghana, Morocco, Pakistan, Tunisia, and Uganda registered the fastest growth in e-commerce deals.

Although low- and middle-income countries are catching up with high-income countries in the business-to-consumer segment, the gap in the business-to-business segment remains huge. While fintech and e-commerce are among the top three subsectors attracting VC investments in countries

**MAP 2.1 Absolute change in the number of investment deals, 2020–22 versus 2017–19**

Source: Original calculations for this publication using CB Insights (2023) data.

**FIGURE 2.15 Share of venture capital deals received, by subsector and country income group, 2017–22**

Source: Original calculations for this publication based on CB Insights data.

Note: HIC = high-income countries; ICT = information and communication technology; IT = information technology; LMIC = lower-middle-income countries; UMIC = upper-middle-income countries.
at all income levels, high-income countries attract by far the largest share of investments in the business-to-business segment, such as business management tech, big data and analytics, security tech, software, and software as a service (Zhu et al. 2022).

VC investments, however, have plummeted since late 2022 amid runaway inflation and rising interest rates. As global VC funding continues to cool off in 2023, start-ups in low- and middle-income countries, which are heavily reliant on foreign capital, are feeling the squeeze. Following a bleak 2022, global venture funding decreased by 13 percent quarter over quarter (QoQ) in Q1 2023. Except for the United States, where funding remained stable, all other regions experienced a double-digit drop in funding. Latin America saw the largest QoQ drop, at 54 percent, with only US$0.6 billion raised in the first quarter of 2023. Funding also shriveled 30 percent in Africa and 27 percent in Asia. AI start-ups are the only bright spot, although they are concentrated primarily in high-income countries (CB Insights 2023).

Despite the inevitable pain that comes with market correction and consolidation, significant growth and value creation still lie ahead for digital start-ups in low- and middle-income countries. Most of these countries are only beginning their journey of digital transformation, as fintech and e-commerce are still underused. Excluding China, only 40 percent of adults in low- and middle-income economies made digital merchant payments using a card, phone, or the internet in 2021 (Demirgüç-Kunt et al. 2022). Cash is still used in 90 percent of transactions in Africa. Thus, there is huge potential for growth. McKinsey estimates that revenues for African fintech could grow by up to eight times between 2020 and 2025 (McKinsey and Company 2022). Accelerated digitalization during the pandemic has created a more fertile environment for new technology players to thrive.

**From localization to globalization**

The previous section examined VC funding in the digital sector and highlighted burgeoning digital start-ups in certain low- and middle-income countries. Expanding on this examination, this section analyzes two overarching questions: Can digital firms from low- and middle-income countries compete with global giants in local, regional, and global markets? How can digital firms from low- and middle-income countries move from localization to globalization? This section uses app intelligence data from Apptopia to shed light on these questions. Box 2.1 illustrates the growing importance of apps and provides an overview of Apptopia data.

The app market is becoming more local and less global, and this trend has accelerated postpandemic. Low- and middle-income countries with a large domestic market, unique language, strong cultural identity, and prolific IT talents have enabled and incentivized local firms to cater to their home markets. From 2015 to 2022, domestic apps made up an increasing share of the 100 most downloaded apps in 54 out of 63 economies (refer to figure 2.16). The use of domestic apps also varies widely across markets. China is the most localized market, and its localization continues to increase over time. Domestic apps also dominate in Japan, Korea, and the United States, although their dominance has recently weakened. Brazil, Denmark, Germany, India, Norway, Russia, Türkiye, and Viet Nam had the next highest share of domestic apps in 2022. Argentina, Brazil, Chile, India, Indonesia, Russia, Saudi Arabia, South Africa, Türkiye, Ukraine, and the United Arab Emirates had the largest increase in the share of domestic apps between 2015 and 2022.

The development of the local IT services industry, pandemic-induced changes in patterns of app use, and policies favoring localization all contributed to the rising popularity of domestic apps in low- and middle-income countries. As previous sections have shown, the IT services industry is growing rapidly in many countries. The industry’s rise has naturally inclined domestic digital firms to enter the app market and offer more relevant local content and services. The increased
BOX 2.1 The importance of apps and an overview of Apptopia app performance data

Over the past decade, the importance of apps has grown significantly and continues to grow as smartphones become an indispensable part of modern life. Apps allow users to access digital services and content simply by tapping their mobile devices. Individual users can customize apps to suit their preferences and needs. The ease of use and personalization are complemented by device features such as a camera, Global Positioning System, and sensors. Altogether, these features make apps more powerful than mobile websites. Today, many big companies and government agencies offer their own apps to gain competitive advantage, enhance customer experience, collect valuable user data, and improve efficiency.

Data on app performance can offer rich insights into companies’ performance, industry trends, and shifts in consumer preferences and behavior, including downloads, active users, session length, total time spent, and average revenue per user.

This report uses Apptopia data collected from Android’s Google Play and Apple’s App Store. Together, these two systems represented 99 percent of smartphone operating systems in 2022. This chapter uses app-level data for the monthly top 500 most downloaded apps in Google Play and the App Store for each country from January 2015 to December 2022.

The data are available in 65 countries across all World Bank regions. These economies accounted for 90 percent of total mobile internet users in the world by the end of 2022. In addition to the main high-income countries, data are available for many major low- and middle-income countries: Argentina, Bangladesh, Brazil, Bulgaria, Burkina Faso, China, Colombia, the Arab Republic of Egypt, Ghana, India, Indonesia, Jordan, Kenya, Malawi, Malaysia, Mexico, Nigeria, Pakistan, Peru, the Philippines, the Russian Federation, Senegal, Serbia, South Africa, Tanzania, Thailand, Tunisia, Türkiye, Ukraine, Uruguay, República Bolivariana de Venezuela, and Viet Nam. Global aggregate data are also available.

The main variables used in this report include downloads, monthly active users, total time spent, average session length, and average sessions per user.

- Downloads are the number of total downloads for an app during a given period.
- Total time spent measures the total time all users spent on an app during the specified period.
- Average session length measures how long users are actively engaged with the app. Things like switching apps without quitting the app, phone lock, and even swiping down the notification screen will end a session. Background activities are not counted in session length.
- Average number of sessions per user measures the average number of sessions per user per day (or month) and shows how frequently users use an app.

The data come with a few caveats:

- Apptopia estimates performance for many apps. Metrics on less popular apps may be less accurate.
- Publishers self-select app categories. It is also inherently challenging to classify apps accurately, given the versatility of some apps. Google Play and the App Store have different systems of categorization, so the same app can have different categories in the two stores. This report has cleaned and harmonized the two systems into 20 categories.
use of health, medical, shopping, fintech, and tools apps after the pandemic has also fueled the rise of domestic apps. These categories are either heavily regulated or require deep knowledge of the local market; thus, homegrown firms have a leg up in developing apps that cater properly to local users. Policies and regulations have also spurred the popularity of domestic apps. For instance, the Indian government has banned more than 200 Chinese apps since 2020, and domestic apps have been quick to fill the void. The interlinkage of these three elements have jointly accelerated the localization of apps.

In addition to being competitive in domestic markets, apps from a few low- and middle-income countries are conquering foreign markets, including high-income markets. US apps continue to rule the world, as they remain most likely to appear in the top 50 most downloaded apps in regional and international markets (refer to figure 2.17). Additionally, apps developed by China are also widely used in regional and international markets, although the gap with the United States remains huge. Despite the dominance of China and the United States, Brazil, India, Russia, Türkiye, and the United Arab Emirates have developed successful apps in regional markets. Furthermore, apps from India, Russia, Türkiye, and Viet Nam have also competed successfully in international markets, especially in the gaming category.

Mobile games developed by low- and middle-income countries have the strongest appeal in foreign markets. Apps from high-income countries have a much larger share of international users across categories. In 2022, four out of five users of apps developed by US publishers were foreign. By contrast, most apps developed by low- and middle-income countries have less than 20 percent...
of foreign users. While regional and international users only accounted for about 40 percent of all users of apps produced by upper-middle-income countries, users from regional and international markets represented 80 percent of users of game apps (refer to figure 2.18). Apps produced by lower-middle-income countries have a smaller share of users from other countries, but games still stand out as the most internationalized category of apps. Türkiye has become a prominent exporter of mobile gaming. In fact, mobile games developed by Turkish studios accounted for 20 percent of the most downloaded games in the United States (Obedkov 2021). Turkish developers of mobile games have attracted billions of dollars in funding since 2017. Government incentives to export Turkish games abroad also helps. The Turkish government covers the commission fees charged by Apple’s App Store and Google’s Play Store, making it much easier for Turkish developers of mobile games to go international (Lee 2022).

For digital start-ups in low- and middle-income countries, leveraging home court advantage and offering deeply localized products are often key to gaining traction and getting off the ground. Domestic start-ups often have home court advantage over global giants in terms of time and space. Time refers to the head start and first mover advantage that local companies have before global giants enter or capture market share. Space refers to the deep knowledge that local companies have about their country and its consumers (Moed 2019). Naturally, most start-ups will focus on creating localized products in their home markets. The Vietnamese browser and search engine Cốc Cốc has challenged Google’s growth in Viet Nam by factoring in Vietnamese language tones and accents, focusing on locally relevant search results, and embracing a video-first approach, given the affinity of local consumers for video content. Offering fast local delivery, accepting payment in local currency, and providing an online shop in a local language can all be critical in gaining a competitive advantage in e-commerce and enabling the emergence of e-entrepreneurship, even in small national markets such as in the Western Balkans (Ungerer 2021). Government support is also a critical aspect of home court advantage, as such support can facilitate access to finance and address information asymmetry.

Digital start-ups blessed with vast domestic markets have more time to accumulate experience and resources before they go global. Start-ups in smaller markets often face a localization paradox.

**FIGURE 2.18 Geographic distribution of users, by category of app and country income group of the app publisher, 2022**

<table>
<thead>
<tr>
<th>Category</th>
<th>Domestic</th>
<th>Regional</th>
<th>International</th>
</tr>
</thead>
<tbody>
<tr>
<td>Business</td>
<td></td>
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<tr>
<td>Communication</td>
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<td></td>
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<tr>
<td>Education</td>
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<tr>
<td>Entertainment</td>
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<td>Finance</td>
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<tr>
<td>Games</td>
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<td></td>
<td></td>
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<tr>
<td>Health and medical</td>
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<tr>
<td>Productivity</td>
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<tr>
<td>Shopping</td>
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</tbody>
</table>

Source: Original calculations for this publication based on Apptopia data (https://apptopia.com/).
Note: Regional markets are markets in the same World Bank region as the app publisher’s economy. Global markets are markets in other World Bank regions. HIC = high-income countries; LMIC = lower-middle-income countries; UMIC = upper-middle-income countries.
Start-ups from many smaller countries are forced early on to choose between a bigger market or a more customized product. However, if a start-up initially forgoes a deeply localized product and instead builds a more general product to cater to several markets at once, the firm’s product may never get the initial boost of domestic engagement and adoption needed to get off the ground.

When start-ups look to expand abroad, their original products and business models, which are tailored to domestic needs, may not be nearly as relevant or as transferable to other countries. Regional markets are often the first step in start-ups’ foreign expansion, but even large regional markets like Latin America, Southeast Asia, and Sub-Saharan Africa, often thought of as consolidated, can be quite distinct and fragmented. For example, M-Pesa achieved remarkable success in East Africa but failed to gain a foothold in South Africa due to product-market mismatch. WeChat was wildly successful in China, with the features offered by Amazon, Apple Pay, Facebook, Grubhub, Messenger, WhatsApp, Uber, and Venmo all living in one app. However, WeChat failed to offer comparable capabilities to foreign users, and its China-centric design further alienated foreign users.4

Governments can play a crucial role in supporting their digital start-ups by facilitating access to funding, information, markets, and skills. Access to finance is often the first obstacle that aspiring entrepreneurs must overcome when turning their idea into a viable business. The challenge is particularly pronounced in low- and middle-income countries with underdeveloped start-up investment markets. Governments can attract foreign VC funding, explore innovation grants and loan guarantees, and set up incubators, accelerators, and other support mechanisms that help entrepreneurs to develop and commercialize their ideas. It is equally important to develop the domestic VC market. China, India, Japan, Korea, Saudi Arabia, and the United Arab Emirates all developed a thriving local VC market; consequently, domestic VC investors funded as much as 90 percent of the VC deals in these countries in 2022. To overcome information asymmetry, the government can connect their digital start-ups with potential buyers and investors in their own country and in the global market. Technical assistance, mentoring, training, and other types of capacity building can upskill existing talents in the country. Governments can also streamline visa requirements to attract foreign digital talents.

Market harmonization through trade and investment agreements and international coordination are needed to remove excessive barriers to cross-border online activity. Data localization requirements, onerous and unnecessary technology security standards, differences regarding electronic authentication and signatures, and electronic payment platforms are common barriers that hinder digital firms’ access to foreign markets. To reduce trade and investment barriers for digitally deliverable services, policy makers need to ensure holistic market openness through multistakeholder dialogue to ensure interoperability across regulatory regimes, including for cross-border data flows and related privacy and security considerations (OECD 2019). Africa’s Continental Free Trade Area and the European Union’s Digital Single Markets are useful examples.

As the domestic digital sector grows and matures, intellectual property protection, competition, taxation, and innovation policies become more important. The winner-takes-most characteristics of the digital market and the tendency of incumbents to deploy anticompetitive strategies typically increase as a country’s digital market matures. This situation can reduce market contestability, harm consumers and businesses, and slow down innovation. In addition, dominant digital firms may also shift profits overseas to avoid paying their fair share of taxes. To alleviate these concerns, a country must provide stronger intellectual property protection and other policy support to forge a dynamic innovation ecosystem as the country’s digital firms approach the technological frontier.
Notes

Hans Christian Boy and Jieun Choi contributed to this chapter.

1. If optical products and publishing, broadcasting, and audiovisual activities are excluded, the ICT sector contributed 5 percent of global GDP in 2022, slightly higher than the 4.5 percent in 2017 estimated by UNCTAD (2019).


References


