

BRICS Digital Economy Report 2022



© International Trade Centre 2022

The International Trade Centre (ITC) is the joint agency of the World Trade Organization and the United Nations.

Street address: ITC
54-56, rue de Montbrillant
1202 Geneva, Switzerland

Postal address: ITC
Palais des Nations
1211 Geneva 10, Switzerland

Telephone: +41-22 730 0111

Fax: +41-22 733 4439

E-mail: itcreg@intracen.org

Internet: <http://www.intracen.org>

In collaboration with:



BRICS Digital Economy Report 2022

About the report

Dynamic business development and an improving policy environment mean the BRICS countries (Brazil, the Russian Federation, India, China and South Africa) can become important players in the digital economy. Yet challenges remain to bridge the digital divide, upgrade skills and digital governance, and improve access to technology and finance.

This report examines digital market trends and policy developments in the BRICS countries. It urges them to enhance cooperation through joint efforts to narrow the digital divide, advance digital governance discussions, improve measurement of the digital economy, catalyse cooperation among private-sector players and support development and uptake of new digital technologies.

The report was prepared by ITC in collaboration with UNCTAD, in the context of the BRICS meetings hosted by China in 2022.

Publisher: International Trade Centre

Title: BRICS Digital Economy Report 2022

Publication date and place: Geneva, December 2022

Page count: 56

ITC Document Number: TFPB-22-58.E

Citation: International Trade Centre. *BRICS Digital Economy Report 2022*. ITC, Geneva.

The views and opinions expressed in this report are those of the authors and contributors, and do not necessarily reflect the views of the BRICS members, ITC and UNCTAD.

For more information, contact: Quan Zhao: zhao@intracen.org

ITC encourages the reprinting and translation of its publications to achieve wider dissemination. Short extracts of this paper may be freely reproduced, with due acknowledgement of the source. Permission should be requested for more extensive reproduction or translation. A copy of the reprinted or translated material should be sent to ITC.

Digital image(s) on the cover: © Shutterstock

© International Trade Centre (ITC)

ITC is the joint agency of the World Trade Organization and the United Nations.

Foreword

The five BRICS countries (Brazil, Russian Federation, India, China and South Africa) have great potential to further advance the digital economy. Large domestic markets, the growing middle class, relatively well-developed digital infrastructure and an expanding youth population with stronger digital skills make BRICS countries attractive destinations for investment in digital sectors. These competitiveness factors have translated into a boom of domestic digital companies, some of which are outcompeting international peers in the domestic market.

To fully capture the benefits of digital transformation and ensure inclusive development for micro, small and medium-sized enterprises (MSMEs) and low-income populations, BRICS need to bridge the digital divide, enhance education and skill development, support innovation and digital entrepreneurship, improve the policy environment and strengthen international cooperation. The BRICS cooperation mechanism can play an important role in forging mutual support among BRICS countries, as well as providing support to other developing countries.

This publication reviews market developments in key segments of the BRICS' digital economy, including digital infrastructure, e-commerce, data centres and cloud services, digital payments, artificial intelligence and big data, assessing the development potential and priorities. The report also examines the latest policy evolutions – through a new framework covering national strategies, data governance, platform governance and ecosystem development.

Through these market and policy analyses, the publication provides practical suggestions on further enhancing BRICS cooperation in the digital economy. The suggestions are not only relevant to BRICS countries; they also apply to policymakers in other developing

countries aspiring to enhance competitiveness in digital economy. This is because they address some of the common challenges faced by the developing countries, such as improving digital infrastructure, enhancing digital governance, improving measurement, catalysing private sector growth and facilitating uptake of new digital technologies.

The International Trade Centre (ITC) helps MSMEs in developing countries access global digital markets. Our e-commerce and digital economy projects enhance digital skills through training and coaching, connect MSMEs to markets and buyers, foster digital entrepreneurship, support policymakers to build conducive domestic policy environment and facilitate international cooperation on digital issues.

ITC is pleased to have collaborated with the United Nations Conference on Trade and Development (UNCTAD) for this publication. UNCTAD plays a key role in supporting sustainable and inclusive digital development across the world through its three pillars of work: research and analysis, consensus-building and technical cooperation, as well as through convening partnerships and fostering stakeholder engagement. ITC works closely with UNCTAD's *eTrade for all* initiative to provide technical assistance to help developing countries leverage opportunities in digital trade. We strive to close the digital divide and ensure that no one is left behind in the fast-growing digital economy.



Pamela Coke-Hamilton
Executive Director
International Trade Centre

Acknowledgements

This paper was prepared by Rishab Raturi, ITC trade consultant, and reviewed by Quan Zhao and Jean-Sébastien Roure (both ITC) and Torbjörn Fredriksson and Wei Zhang (both UNCTAD) The paper was produced under the supervision of Mohammad Saeed, Chief, Trade Facilitation and Policy for Business, and Rajesh Aggarwal, Director (officer in charge), Division of Market Development (both ITC).

We would like to thank delegates from the BRICS countries for their review and comments on the initial draft.

We would like to thank Natalie Domeisen and Anne Griffin (both ITC), who oversaw the editing and production process; Jennifer Freedman, who edited the report; and Franco Iacovino and Serge Adeagbo (both ITC), who provided graphic and printing support. Thanks also to Christina O'Shaughnessy and Richard Waddington for their editorial input in the preliminary phase of writing.

Production of this publication received support from the Ministry of Commerce of the People's Republic of China.

Contents

Foreword.....	v
Acknowledgements.....	vi
Acronyms.....	xi
Executive summary.....	x
Chapter 1	
Importance of the digital economy for BRICS	2
Broaden the scope of BRICS cooperation beyond e-commerce	2
Roadmap of the report	4
Chapter 2	
Measuring the digital economy	6
Scope and definition of the digital economy	6
BRICS are trying to measure the digital economy	8
Collaboration will improve digital economy measurement	9
Chapter 3	
Market trends in key digital economy segments	12
Digital infrastructure.....	12
E-commerce.....	16
Data centres and cloud services	18
Digital payments	20
Artificial intelligence and big data.....	21
Chapter 4	
Policy developments in BRICS digital economy	26
All BRICS have national strategies for developing digital economy	26
Data governance.....	27
Platform governance	31
Ecosystem development.....	35
Chapter 5	
Enhancing BRICS cooperation on digital economy	42
Potential areas for further cooperation	42
References.....	46

Box

Box 1	International efforts to enhance measurement of digital economy.....	10
-------	--	----

Figures

Figure 1	BRICS exported 31% of global ICT goods in 2020	3
Figure 2	BRICS exported 11% of global digitally delivered services in 2020.....	3
Figure 3	Breaking down the digital economy	7
Figure 4	Mobile cellular networks cover almost all BRICS populations (2021).....	13
Figure 5	Russian Federation had most broadband connections in 2019.....	13
Figure 6	Internet use in BRICS countries has surged since 2000.....	15
Figure 7	China has fastest average download speed among BRICS.....	15
Figure 8	Few women in India use the internet (% of all women in each country).....	15
Figure 9	Most BRICS mobile internet costs are below global average.....	15
Figure 10	China has highest average download speeds among BRICS.....	17
Figure 11	More than 70% of Russians use digital payments	17
Figure 12	About 75% of internet users in China shop online	17
Figure 13	China had 215 science and technology parks in 2021.....	19
Figure 14	BRICS declarations target different aspects of digital development.....	43

Tables

Table 1	Analytical framework for digital economy policies.....	26
Table 2	Cybercrime legislation in BRICS countries.....	29

Acronyms

Unless otherwise specified, all references to dollars (\$) are to United States dollars, and all references to tons are to metric tons.

AI	artificial intelligence
B2C	business-to-customer
BRICS	Brazil, Russian Federation, India, China and South Africa
Cade	Conselho Administrativo de Defesa Econômica
CAGR	compound annual growth rate
FDI	foreign direct investment
fintech	financial technology
G20	Group of Twenty
GDP	gross domestic product
GSMA	Global System for Mobile Communications
ICT	information and communication technology
IoT	Internet of Things
ITC	International Trade Centre
Mbps	megabits per second
MSMEs	micro, small and medium-sized enterprises
OECD	Organisation for Economic Co-operation and Development
UNCTAD	United Nations Conference on Trade and Development

Executive summary

This report provides an overview of market trends and policy developments related to the digital economy in the five BRICS countries (Brazil, the Russian Federation, India, China and South Africa). It suggests that BRICS can further enhance cooperation through joint efforts to bridge the digital divide, advance digital governance discussions, improve measurement of digital economy, catalyse cooperation among private-sector players and facilitate development and uptake of new digital technologies.

The International Trade Centre in collaboration with the United Nations Conference on Trade and Development prepared the report in the context of BRICS meetings hosted by China in 2022.

Defining and measuring the digital economy is tough

The world is on the verge of a new wave of digital transformation. New technologies such as 5G, artificial intelligence (AI), big data, blockchain and the Internet of Things and the rise of digital services, digital platforms and accelerated use of digital data across all sectors and industries are expected to have major impacts on the evolving shape of the digital economy. In this context, it is timely and imperative to broaden the scope of BRICS cooperation beyond e-commerce to focus on the larger picture of the digital economy.

Although there are no official statistics, estimates from government documents suggest that the contribution of the digital economy to BRICS gross domestic product in recent years ranges from 2% in South Africa and 4% in the Russian Federation to 6.9% in India, 7.8% in China and 22% in Brazil. Collectively, BRICS countries account for about 30% of the global export of information and communication technology (ICT) goods, but only 11% of global export of digitally deliverable services.

These estimates use different definitions and methodologies, however, which points to the key issue of definition and measurement of the digital economy. There is no standard definition of the term 'digital economy', nor is there a global framework of indicators to measure it, although the Group of Twenty (G20) is developing a set of measurement guidelines and tools.

BRICS countries have developed their own understandings of the digital economy, through various government strategies and reports. These understandings are largely aligned with the international guidelines, emphasizing the role of data as a key factor of production and the use of ICT to improve economic efficiency and capturing the broader scope of the transformative impact of digital technologies on the traditional sectors.

Opportunities and challenges for BRICS digital economy

BRICS countries have significant potential to develop the digital economy. Large domestic markets, the growing middle class, relatively well-developed digital infrastructure and an expanding youth population with stronger digital skills make BRICS countries attractive destinations for investment in digital sectors. These competitiveness factors have translated into a boom of domestic digital companies, some of which are outcompeting international peers in the domestic market.

However, challenges remain for BRICS to tap into their digital potential fully. Digital divides need to be addressed for inclusive and sustainable growth. Rural and urban low-income populations, the unconnected and the unskilled are at high risk of being excluded from the rapid digital transformation. On the other hand, these groups also represent growth potential, if they can be effectively brought into the digital economy by technological advancements and move from low to higher productivity activities.

Dynamic market developments

Digital infrastructure, e-commerce, data centres and cloud services, digital payments, AI and big data underpin competitiveness in the digital economy.

BRICS countries have relatively developed digital infrastructures. Almost 90% of the populations are covered by 3G/4G mobile networks and 5G networks have started to roll out. The number of internet users in BRICS countries has increased dramatically over the past 20 years, and the quality of internet access is constantly improving. The cost of mobile internet in BRICS countries is still higher than the global average, however, and women's access to the internet needs to be further enhanced.

While BRICS countries have large e-commerce markets, the share of online shoppers among internet users varies from around 20% in India and South Africa to 40% in Brazil and the Russian Federation, to almost 80% in China. Domestic and international e-commerce platforms are active in BRICS countries and e-commerce is expected to maintain rapid growth in the post-pandemic recovery.

Data centres are key to the digital economy, as they store, process and distribute data. However, almost 80% of the world's data centres are located in developed countries. Data centre markets in BRICS countries are expected to grow rapidly due to increased demand, but further investment – both capital and technological – is needed to boost the share of domestic companies in the market.

Although digital payments are widely used in BRICS countries, card payments and cash-on-delivery remain the preferred options in e-commerce transactions. Large and small companies in the BRICS countries are starting to use AI technologies, which is expected to transform many traditional industries, including energy, manufacturing, agriculture, healthcare and finance. Some BRICS countries have also begun to develop voluntary codes of AI ethics.

BRICS work to improve policy frameworks

Developing the digital economy has been among the top policy priorities of the BRICS countries. All five countries have adopted national strategies and policies promoting the development of the digital economy. Governments have put in place policies and programmes to support development of the digital infrastructure, attract investments, sustain innovation and research, promote competition, protect consumer interests and regulate data flows that are essential to support growth and development of the digital economy.

Policy frameworks related to the digital economy have continued to improve in the BRICS countries, including policies on data governance (data protection and privacy, cybersecurity, algorithms and AI), platform governance (online consumer protection, competition, taxation, intermediary liability, labour policies) and ecosystem development (digital infrastructure, e-signatures, education and skill development, financial regulations, trade and investment policies).

How to strengthen BRICS cooperation on the digital economy?

Guided by the BRICS Strategy for Economic Partnership 2020–2025 and other strategic initiatives, and building on previous achievements, BRICS countries could further enhance digital cooperation in the following areas:

- Bridge the digital divide
 - Exchange information regarding policies on investment in digital infrastructure
 - Finance digital infrastructure projects, such as through the New Development Bank
 - Promote digital literacy, upskill small firms and support women-owned digital businesses
- Advance digital governance discussions
 - Actively participate in digital governance discussions in various international forums, especially on data governance and competition policy
 - Jointly advocate for bridging the digital divide at international level
- Improve measurement of the digital economy
 - Regular exchanges among national statistical offices and timely sharing of data
 - Supporting the G20 workstream on measuring digital economy
 - Encouraging the private sector to contribute to data collection efforts
- Catalyse private-sector cooperation
 - Host trade and investment fairs and business-to-business matchmaking events
 - Disseminate information about regulations and business opportunities
 - Promote cooperation among business support organizations
 - Facilitate movement of talent and businesspeople
- Facilitate development and uptake of new digital technologies
 - Promote joint science/technology research initiatives
 - Strengthen exchanges among research institutions and universities
 - Support cooperation between academia and business communities

Chapter 1

Importance of the digital economy for BRICS

The world is nearing a new wave of digital transformation. Emerging technologies such as faster and better connectivity through 5G networks, new computational digital infrastructure based on artificial intelligence (AI) and big data, reorganization of business relationships and transactions through blockchain technologies, and enhanced machine-to-machine communication through new sensors and the Internet of Things (IoT) are reshaping the global economy.

Beyond these core ICT activities, the rise of digital services, digital platforms and accelerated use of digital data across all sectors and industries will have dramatic impacts on the evolving shape of the digital economy.

Broaden the scope of BRICS cooperation beyond e-commerce

In this context, it is timely and imperative to broaden the scope of BRICS cooperation beyond e-commerce to focus on the larger picture of the digital economy. E-commerce has been at the centre of the digital economy in the past decade, including in the BRICS countries, reshaping how businesses sell products and services to consumers. In the coming decade, however, faster transformation is expected in business-to-business transactions. Digital technologies will be used more than ever to reshape supply chains, disrupt existing forms of collaboration between companies and create new digital collaborations in a fresh wave of Schumpeterian creative destruction.

BRICS countries have considerable potential to develop the digital economy. Relatively large domestic markets and a growing middle class make BRICS countries attractive destinations for investment in digital sectors. These countries also have well-developed digital infrastructures, with almost 90% of the population covered by 3G/4G mobile networks.¹

Although levels of digital skills vary across segments of the population, demographics and growth patterns in BRICS countries indicate that younger generations – which are likely to have stronger digital skills – will continue expanding. This is particularly the case in South Africa and India, which have high population growth rates and a median age of 28 and 28.7 years, respectively. However, China faces a rapidly aging population and the Russian Federation has been troubled by a stagnant/declining population, which may put downward pressure on the development of their digital economy.

Meanwhile, major challenges remain for the BRICS countries to fully harness the digital economy for growth and sustainable development. Collectively, these economies account for about 30% of the global export of ICT goods, but only 11% of global exports of digitally delivered services.

In ICT goods manufacturing, BRICS countries are at the lower value-added end (manufacturing and assembly) of the value chains, while developed countries still dominate the higher value-added end (research and development, chip manufacturing). Although China and India are becoming significant global players in digitally deliverable services, the world's largest digital companies are predominantly US companies.²

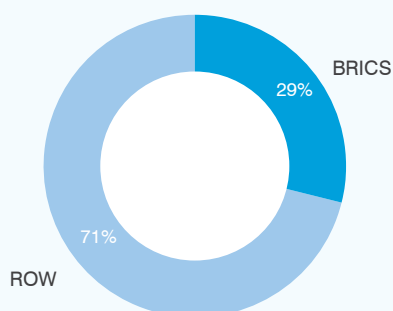
The COVID-19 pandemic has accelerated the digital transformation and made it more urgent than ever to develop the digital economy. Without digital technologies, the contraction of the global economy in the first year of the COVID-19 crisis would have been steeper and longer.³

1 International Telecommunications Union (2021). Digital Development Dashboard. Available at <https://www.itu.int/en/ITU-D/Statistics/Dashboards/Pages/Digital-Development.aspx>

2 UNCTAD (27 April 2022). 'Global Investment Trends Monitor,' No. 41. Available at https://unctad.org/system/files/official-document/diaeiainf2022d3_en.pdf

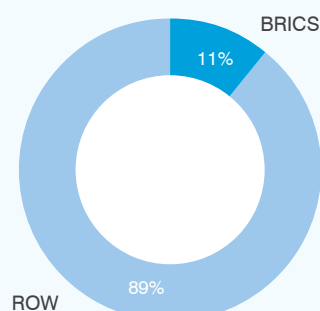
3 See Asian Development Bank (July 2021). 'Digital technology and economic impacts of COVID-19: Experiences of the People's Republic of China.' Available at <https://www.adb.org/sites/default/files/publication/726171/adbi-wp1276.pdf>. See also World Bank (2020). 'The Global Economic Outlook During the COVID-19 Pandemic: A Changed World.' Available at <https://www.worldbank.org/en/news/feature/2020/06/08/the-global-economic-outlook-during-the-covid-19-pandemic-a-changed-world>

Figure 1 BRICS exported 31% of global ICT goods in 2020



Note: ROW stands for rest of the world.
Source: UNCTADStat 2022

Figure 2 BRICS exported 11% of global digitally delivered services in 2020



Note: ROW stands for rest of the world.
Source: UNCTADStat 2022

Although the world is emerging from the pandemic, the global health crisis has left a permanent mark on the trajectory of the world's economy. Companies have greatly increased investment to develop and adopt digital technologies and consumers have adapted to remote working, online shopping, e-education and digital entertainment. These changes are expected to be long term and have increased the urgency for firms and countries to adapt to the 'new normal' of the accelerated development of the digital economy.

Developing the digital economy has been among the top policy priorities of the BRICS countries.

All five countries have adopted national strategies and policies to promote development of the digital economy. Governments have put in place policies and programmes to support development of the digital infrastructure, attract investments, sustain innovation and research, encourage competition, protect consumer interests and regulate data flows that are essential to support growth and development of the digital economy. However, much remains to be done to further improve the policy environment for the sustainable and inclusive development of the digital economy.

Digital divides between and within BRICS countries remain a substantial challenge.

Lack of high-quality and affordable internet access and inadequate digital literacy persist. Cybersecurity also is a major obstacle to building trust in the use of digital services. Many companies in the BRICS countries, especially micro, small and medium-sized enterprises (MSMEs), do not have adequate resources and support to adapt to the digitalization trends.

BRICS countries need inclusive digital economy strategies.

Compared with developed economies, BRICS countries have large shares of low-income populations at high risk of being excluded from rapid digital transformation. These include rural populations, the unconnected and the unskilled. On the other hand, these groups also represent an opportunity, as they can be brought into the digital economy by technological advancements and move from low to higher productivity activities.

In China, for example, the growth of e-commerce has attracted workers from rural and urban informal sectors into courier and delivery services and created more than 3 million jobs.⁴ Given the possibility for technology to replace or reduce the need for low-skilled employment, efforts to reskill the labour force should remain an immediate policy priority.⁵ MSMEs, which account for a major share of employment in all BRICS countries, will also need support in terms of skills and training to benefit from the promise of the digital economy.

Roadmap of the report

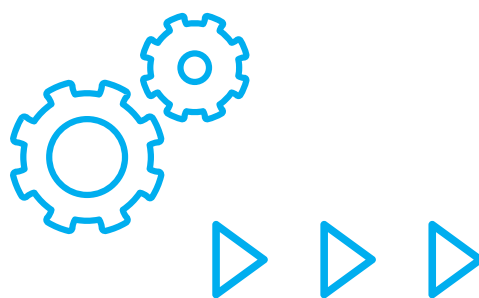
This report provides a glimpse into the digital economy development of the BRICS countries. After this introductory chapter, **Chapter 2** discusses challenges related to the scope and measurement of the digital economy and efforts of the BRICS countries in that regard. Improved measurement is vital to enable

evidence-based decision-making and may potentially be an important area for BRICS cooperation.

Chapter 3 sets out market trends in key segments of the digital economy in the BRICS countries, including ICT, e-commerce, digital payments, cloud computing and data centres, digital platforms, digital services and AI. It offers a preliminary overview and discusses how market forces and technological advancements may shape business development in these areas.

Chapter 4 discusses recent policy advances vis-à-vis the digital economy in BRICS countries, including on data governance, platform governance and development of the digital ecosystem.

Chapter 5 reviews the outcomes of BRICS cooperation on the digital economy and proposes areas for further cooperation.



⁴ See Government of China (2019). *Annual Express Market Supervision Report*. Available at <http://www.gov.cn/xinwen/2020-07/09/5525223/files/8a5890b8021b431a859a51b3f9894fb1.pdf>

⁵ World Economic Forum (2020). *Future of Jobs Report*. Available at https://www3.weforum.org/docs/WEF_Future_of_Jobs_2020.pdf



Chapter 2

Measuring the digital economy

Evidence-based policymaking requires adequate statistics and data. However, measuring the digital economy remains a challenge for all countries. There is a lack of clarity on the scope of the digital economy, and data and official statistics on key related activities are limited.

The definition of the digital economy remains fluid and variable. Today's measurements largely focus on digital connectivity, e-commerce and estimates of the contribution of the digital economy to gross domestic product (GDP).

To better understand the reach and impact of the digital economy in BRICS countries, quality data are needed, both in terms of scope and granularity. Improved metrics on employment related to the digital economy, related trade and investment, business use of digital technologies in various sectors, education and skills development, and digital divides within countries (e.g. by gender, company size, rural and urban population) would help to provide a holistic assessment of the digital economy in BRICS countries.

Scope and definition of the digital economy

Despite its significance, there is no standard definition of the term 'digital economy', nor is there a global framework of indicators to measure it, though some work has been done by the Group of Twenty (G20). Rapid innovation in digital technologies and business models, leading to the emergence of new digital businesses and activities, has contributed to this definitional challenge.

The scope and definition of the digital economy have evolved over time, along advancements and the adoption of digital technologies. Terms that were

used prior to 'digital economy' – such as the 'internet economy' – were primarily linked to the use of the internet and its impact on the economy.⁶ By the early 2000s, this definition was expanded to include e-business, e-business infrastructure and e-commerce.⁷

The term 'digital economy' emerged with improved internet connectivity and expansion of digital products and services. Initially, however, it often referred to the quality of a country's ICT infrastructure and the ability of consumers, companies and governments to use ICT.⁸

As ICT technologies continued to transform businesses and societies, more recent definitions have referred to 'digitalization' and 'digital transformation' – that is, ways digital goods and services disrupt traditional sectors – to explore cross-sectoral digitalization trends.⁹ The scope has been further broadened to include economic activities with information and knowledge as the key factors of production.¹⁰

While it is largely established that the core of the digital economy comprises the production of ICT goods and services,¹¹ the outer layer of the digital economy remains fluid. The United Nations Conference on Trade and Development's (UNCTAD) Manual for Production of Statistics on the Digital Economy (2020) provides a representation of the digital economy, consisting of a core (ICT goods and services, digital content), a narrow scope (core and economic activity from producers reliant on digital inputs), and a broad scope (narrow scope and economic activity from producers significantly enhanced by digital inputs).

Other studies suggest that the digital economy consists of the ICT sector plus segments of the economy that are essentially digital and do not have an analogue equivalent.¹²

6 Tapscott, Don (1994). *The Digital Economy: Promise and Peril In The Age of Networked Intelligence*. McGraw-Hill.

7 Mesenbourg, Thomas (2001). 'Measuring the Digital Economy.' Available at <https://www.census.gov/content/dam/Census/library/working-papers/2001/econ/umdigital.pdf>

8 The Economist Intelligence Unit, 2010.

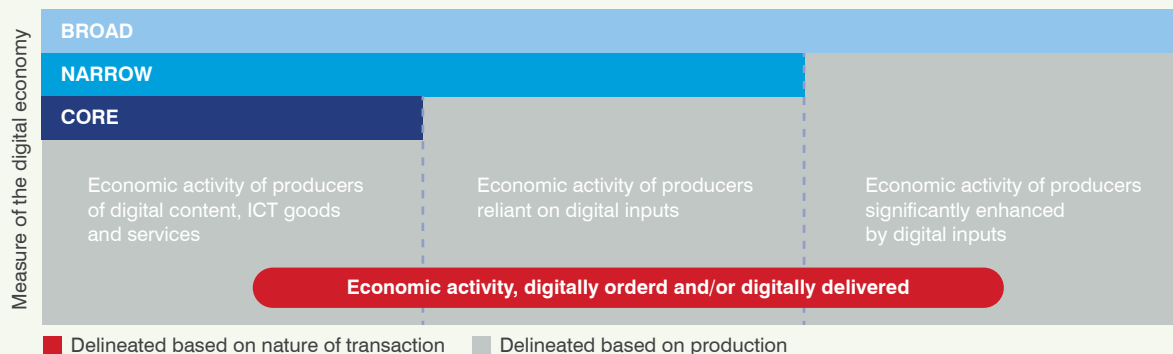
9 See Organisation for Economic Co-operation and Development (OECD) (2017). *OECD Digital Economy Outlook 2017*. Available at <https://www.oecd.org/digital/oecd-digital-economy-outlook-2017-9789264276284-en.htm>; OECD (2020). *A roadmap toward a common framework for measuring the Digital Economy*. Available at <https://www.oecd.org/sti/roadmap-toward-a-common-framework-for-measuring-the-digital-economy.pdf>

10 OECD (2020), *ibid*.

11 See, for example, Bulavko, O., Belanova, N., and L. Tuktarova (2020). 'Priority Directions of Digital Economy Development and Effectiveness of State Policy in the Informatization Field' at Digital Age: Chances, Challenges and Future.

12 Bukhta, Rumana, and Richard Heeks (2017). 'Defining, Conceptualizing and Measuring the Digital Economy,' Development Informatics Working Paper Series. Paper No. 68.

Figure 3 Breaking down the digital economy



Source: UNCTAD, Manual for Production of Statistics on the Digital Economy, 2020

BRICS countries have developed their own understandings of the digital economy. There are no laws or regulations in the BRICS countries that include a definition of the digital economy. However, some government strategies and reports¹³ reflect the official understandings of the digital economy:

- The State Digital Economy Programme of the Russian Federation describes the digital economy as 'an economic activity, in which the key factor of production is data in the digital form'.¹⁴
- China's National Bureau of Statistics released a document called 'Statistical Classification of the Digital Economy and its Core Industries' in 2021. It not only provides a definition, but also a list of core industries for statistical purposes. Digital economy is 'a series of economic activities that take data resources as the key factor of production, modern information networks as an important carrier and the effective use of information and communication

technologies as an important driving force for efficiency improvement and economic structure optimization'.¹⁵

- South Africa's Data and Cloud Policy describes digital economy as 'a hyper-connected economy characterized by a growing number of interconnected people, organisations and machines through the web and by the use of digital technology which includes advanced manufacturing, robotics and factory automation, new sources of data from mobile and ubiquitous internet connectivity, cloud computing, big data analytics and artificial intelligence'.¹⁶

These understandings are largely aligned with the international guidelines, emphasizing the role of data as a key factor of production and the use of ICT to improve economic efficiency, and capturing the broader scope of the transformative impact of the digital technologies on the traditional sectors.

¹³ There was no clear definition from the government documents of Brazil and India.

¹⁴ Government of the Russian Federation (2017). Digital Economy of the Russian Federation. Available at <http://static.government.ru/media/files/9gFM4FHj4PsB7915v7yLVuPgu4bvR7M0.pdf>.

¹⁵ Statistical Classification of the Digital Economy and its Core Industries (2021). Available at <https://tjyj.stats.gov.cn/CN/abstract/abstract5556.shtml>

¹⁶ Government of South Africa (2021). Invitation to Submit Written Submissions on the Proposed National Data and Cloud Policy. Available at https://www.gov.za/sites/default/files/gcis_document/202104/44389gon206.pdf

BRICS are trying to measure the digital economy

Timely and accurate statistics are key to formulating evidence-based policies that can effectively enhance the digital economy. Among the BRICS countries, with the exception of China, official statistics are not available to quantify the size of the digital economy. However, official statistics are usually available on the size and contribution of the ICT sector.

Despite the lack of official statistics, government papers, academic studies and industry reports have attempted to estimate the size and share of the digital economy in the BRICS countries, using differing methodologies:

- Brazil's Digital Transformation Strategy (E-Digital) – a strategic initiative by the Brazilian federal government – references a study estimating that the digital economy accounted for **22% of Brazilian GDP** in 2016 and that it could reach 25.1% of GDP in 2021.
- Estimates by McKinsey and Russian researchers indicate that the digital economy accounted for about **4% of Russian GDP** in 2015–2017, with considerable potential for further growth.¹⁷
- India's Ministry of Electronics and Information Technology estimated that the digital economy accounted for about **6.9% of GDP** in 2019.¹⁸
- China's Digital Economy Development Plan for the 14th Five-Year Plan (2021)¹⁹ suggested that the contribution of the core digital economy sectors to GDP was about **7.8%** in 2020, with potential to grow to 10% by 2025.²⁰

- South Africa's Department of Telecom and Postal Service estimated that the digital economy contributed **2% of GDP** in 2017.²¹

As a comparison, the United States Bureau of Economic Analysis found that the digital economy accounted for 10.2% of GDP in 2020.²² McKinsey estimated that the GDP share of the digital economy of the European Union Big 5 (France, Germany, Italy, Spain and the United Kingdom before Brexit) was about 6.9%.²³ The value added of the ICT sector accounted for 4.9% of the European Union's GDP in 2019, according to the European Commission.²⁴

BRICS countries have come up with their own methodologies to measure the digital economy. The State Digital Economy Programme of the Russian Federation set out indicators related to the digital economy. These include domestic spending in the digital economy as a share of GDP, share of households and socially significant infrastructure objects with broadband access to the internet, availability of data-processing centres, volume of storage and data-processing services, downtime as a result of cyberattacks and sale or rent of software.²⁵

In India, the Ministry of Electronics and Information Technology's methodology to quantify the digital economy includes data from information technology and business process management, digital communication services such as telecommunications, domestic electronics manufacturing, and direct subsidy transfers.²⁶

Three pillars have been identified to capture the 'economic value' of the digital economy in India, including digital foundation (spectrum availability, internet download speed, internet affordability, and e-government platform and services), digital reach (size

17 Aptekman, A., Kalabin, V., Klintsov, V., Kuznetsova, E., Kulagin, V., and I. Yasenovet (2017). *Digital Russia: A New Reality*. Digital McKinsey report. Available at <https://www.mckinsey.com/~/media/McKinsey/Locations/Europe%20and%20Middle%20East/Russia/Our%20Insights/Digital%20Russia/Digital-Russia-report.ashx>; and Novikov, Sergey, and Sazonov, Andrey (2020). 'Digital economy development in Russia: Main trends' analysis and assessment,' in *Espacios*, Vol. 41 (Issue 05). Available at <http://www.revistaespacios.com/a20v41n05/20410526.html>

18 Government of India, Ministry of Electronics and Information Technology (n.d.). *India's Trillion-Dollar Digital Economy*. Available at https://www.meity.gov.in/writereaddata/files/india_trillion-dollar_digital_opportunity.pdf

19 The plan aims to accelerate the digital economy, which includes a digital society and a digital government. See also <https://www.legco.gov.hk/research-publications/english/2021s06-national-14th-five-year-plan-20210610-e.pdf>

20 *Ibid*

21 Statement to the Media, Department of Telecom and Postal Service of South Africa. Available at: https://www.dtps.gov.za/index.php?option=com_content&view=article&id=17&catid=59&Itemid=101

22 Nicholson, Jessica R. (2020). *New Digital Economy Estimates*. Available at <https://www.bea.gov/system/files/2020-08/New-Digital-Economy-Estimates-August-2020.pdf>

23 McKinsey & Company (2018). *The rise of Digital Challengers: How digitization can become the next growth engine for Central and Eastern Europe*. Available at <https://www.mckinsey.com/~/media/mckinsey/featured%20insights/europe/central%20and%20eastern%20Europe%20needs%20a%20new%20engine%20for%20growth/the-rise-of-digital-challengers.ashx>

24 European Commission (n.d.). *Digital Economy and Society Index (DESI) 2021*. Available at <https://ec.europa.eu/newsroom/dae/redirection/document/80563>

25 Government of the Russian Federation (2017), *op. cit.*

26 Government of India (n.d.), *op. cit.*

of the mobile internet user base, availability of local-content websites, and data consumption), and digital value (use of e-government services, digital media, e-commerce and digital payments).

China's Academy of Information and Communications Technology, a scientific research institute under the Ministry of Industry and Information Technology, introduced a framework in 2020 to measure the size and contribution of the digital economy. It covers digital industrialization, industry digitization, digital governance and digital value development.

Digital industrialization mainly refers to the added value of the core digital industries such as ICT, electronics manufacturing, internet economy and software industry. Industry digitization refers to the added value and efficiency gains of the application of digital technologies to non-digital sectors.

Using this rather broad definition, which includes both the core digital economy industries and digital transformation of traditional industries, the Academy of Information and Communications Technology estimates that China's digital economy accounts for about 30% of GDP. The official Digital Economy Development Plan, however, puts this share at only 7.8% in 2020.

This shows that different scopes and definitions can result in considerable differences in the estimated size of the digital economy. That is why it is important to develop, at the global level, a common set of standards to measure the digital economy.

Collaboration will improve digital economy measurement

BRICS countries are trying to improve measurement of the digital economy, including developing methodologies and exploring mechanisms to collect data. These efforts are

key for evidence-based policymaking and improving the policy environment for developing the digital economy. Considering the dynamic nature of the digital economy and continuous advancement of the technologies and business models, methodologies and data collection efforts must be updated regularly and extend beyond core ICT goods and services, to capture new developments.

Domestic efforts to improve measurement should be closely linked with international efforts to develop common standards and methodologies. International standards can provide useful guidance based on good practices of countries with more experience in data collection and analysis.

Active participation by the BRICS countries in international discussions on digital economy measurement can provide useful insights from developing country perspectives. It will also focus attention on the challenges that developing economies face and leverage international support to address them. Experiences from the BRICS countries can also offer lessons for other developing countries seeking to develop their digital sectors and shape a development-focused agenda in international forums.

Inter-BRICS cooperation on digital economy statistics is also important. The various methodologies and classifications used by the statistical agencies – sometimes together with the agencies that oversee digital economy development – reflect not only the wisdom on improving statistics, but also the strategic thinking about the direction and priorities to upgrade the digital economy in individual BRICS countries.

Information exchange among statistical agencies and digital economy lead agencies can go a step beyond peer learning about the measurement methodologies. Such an exchange can dig deeper into the rationales and goals behind the statistical methodologies and explore what works best in individual BRICS countries.

Box 1: International efforts to enhance measurement of digital economy

The G20 has emerged as an important multilateral forum for advancing efforts to improve measurement of the digital economy. All BRICS countries are members of the G20 and are actively involved in the relevant G20 taskforces.

The Digital Economy Task Force, established by the G20 in 2017, has been developing approaches to measure the digital economy in close collaboration with international organizations including UNCTAD, the International Monetary Fund and the OECD. The G20 has defined digital economy broadly to include 'all economic activity reliant on, or significantly enhanced by the use of digital inputs, including digital technologies, digital infrastructure, digital services and data. It refers to all producers and consumers, including government, that are utilising these digital inputs in their economic activities'.¹

Under the Argentine presidency in 2018, the G20 published a Toolkit for Measuring the Digital Economy. It is designed to motivate the development of a stronger evidence base for analysis and policymaking. Work to define indicators for the toolkit began in 2020 under the Saudi Arabian presidency. Besides deploying indicators that address ICT access and usage and how businesses leverage digitalization, the indicators also address issues such as jobs and skills. Under the Italian presidency in 2021, work was further intensified with an additional focus on measuring AI and the digital gender divide.²

The OECD's Going Digital Toolkit examines digital developments in the OECD and accession countries, as well as BRICS countries. It examines digital developments across 33 core indicators, including access to the internet, market openness and the use of digital technologies (such as firms buying cloud services).

The International Monetary Fund has studied the digital economy in some BRICS countries. It calculated, for example, that with a broad definition (including online platforms, platform-enabled services and suppliers of ICT goods and services), the Chinese digital economy represented 30% of GDP in 2018, compared to around 20% in Brazil, India and South Africa (no data were available for the Russian Federation).³ The International Monetary Fund also identified the limitations of available concepts, definitions, price compilation and accounting techniques.⁴

UNCTAD published its *Manual for the Production of Statistics on the Digital Economy* to help statistical agencies, particularly in developing countries, measure the digital economy. This manual aims to support the production of digital economy statistics that are internationally comparable, including those on the ICT sector, trade of ICT goods and services (including of ICT-enabled services) and the use of ICT by businesses.⁵

According to UNCTAD, governments must consider the implications of digitalization for policies related to areas such as the labour market (including potential job creation and destruction), education and skills development, innovation, sectoral development, competition, consumer protection, taxation, trade, environmental protection and energy efficiency, as well as regulation related to security, privacy and data protection.⁶

1 OECD, A roadmap toward a common framework for measuring the Digital Economy (2020), see <https://www.oecd.org/sti/roadmap-toward-a-common-framework-for-measuring-the-digital-economy.pdf>

2 G20 and Istituto Nazionale di Statistica, Measurement of the Digital Economy (February 2021), see https://www.mise.gov.it/images/stories/documenti/Chair_Summary_Measurement_of_the_digital_economy.pdf

3 International Monetary Fund, China's Digital Economy: Opportunities and Risks (2019), see <https://www.imf.org/en/Publications/WP/Issues/2019/01/17/Chinas-Digital-Economy-Opportunities-and-Risks-46459>

4 OECD, A roadmap toward a common framework for measuring the Digital Economy (2020), see <https://www.oecd.org/sti/roadmap-toward-a-common-framework-for-measuring-the-digital-economy.pdf>

5 UNCTAD, Manual for the Production of Statistics on the Digital Economy (2021), see https://unctad.org/system/files/official-document/dtlstict2021d2_en.pdf

6 *Ibid.*



Chapter 3

Market trends in key digital economy segments

This chapter examines market developments in key segments of the BRICS digital economy, including digital infrastructure, e-commerce, data centres and cloud services, digital payments, AI and big data.

These segments were selected because they either play an infrastructural role for the digital economy (such as digital networks, data centres and cloud services), are key applications (such as e-commerce and digital payment) or represent key areas for future competitiveness in the digital economy (such as AI and big data).

This is not an exhaustive list. Other aspects of the digital economy could be included in future updates of this report, such as semiconductors, electronics manufacturing, advanced robotics and electrical vehicles.

The dynamism of the digital economy in BRICS countries is reflected in the vitality of their tech companies and investments in tech start-ups. BRICS countries are home to some of the most promising technology unicorns, which are private start-up firms valued at more than \$1 billion. As of February 2022, Brazil had 22 unicorns in the core digital economy sector. In India, 86 of 90 unicorns fall within the digital economy. China has 207 tech unicorns, and most unicorns in the Russian Federation and South Africa are in tech sectors.²⁷

Data and business cases used in this chapter are primarily from industry sources and are used to provide illustrative examples.

Digital infrastructure

Accessible and affordable internet access is the cornerstone for the BRICS digital economy. Mobile broadband coverage, use of smartphones, cost and speed of internet access, and use of digital payments are considered to be the main parameters to measure the quality of digital infrastructure.

All BRICS countries have high levels of mobile network penetration. They work continuously to enhance internet access further and address challenges such as regional disparity due to last-mile connectivity and inadequate levels of digital literacy.

While 4G is the leading mobile technology in most BRICS countries, the key determinant of future competitiveness in the digital economy is the next generation of networks, such as 5G. With faster speed, lower latency, lower energy consumption and more connected devices per base station, 5G is expected to enable new connected businesses, such as autonomous vehicles, Internet of Things, telemedicine and virtual reality.

China and South Africa started commercial deployment of 5G networks in 2019 and 2021, respectively. China had reached 387 million 5G subscribers by the end of 2021 and the number is expected to increase to 450 million by 2025. Mobile operators in China are expected to invest \$210 billion in mobile networks up to 2025, of which 90% will be dedicated to 5G technology and infrastructure.²⁸

In South Africa, leading telecom operators are still at an early stage of 5G network development.²⁹ Brazil and India are set to roll out 5G services in 2022, with the former auctioning 5G frequencies in November 2021, and India being expected to do so in early 2023.³⁰ The Russia Federation has scheduled 5G rollout in 2024.

The number of internet users in BRICS countries continues to rise, largely due to better accessibility and lower costs. The quality of internet access is also improving, though with the exception of China, the average mobile download speeds across BRICS countries are still below the global average.³¹

India and South Africa also fall below the global average for fixed broadband download speed of 61 megabits per second (Mbps). Despite this, working-age internet users in South Africa reportedly to spend more than 10 hours

27 Data are from 2021. See <https://contxt.com/en/news/the-latin-american-unicorns-galloping-to-success/#Brazil> for Brazil, <https://www.chinainternetwatch.com/31694/tech-unicorn-overview/> for China and <https://www.ventureintelligence.com/Indian-Unicorn-Tracker.php> for India. Wildberries and Avito are two unicorns in the Russian Federation and Go1 is based in South Africa.

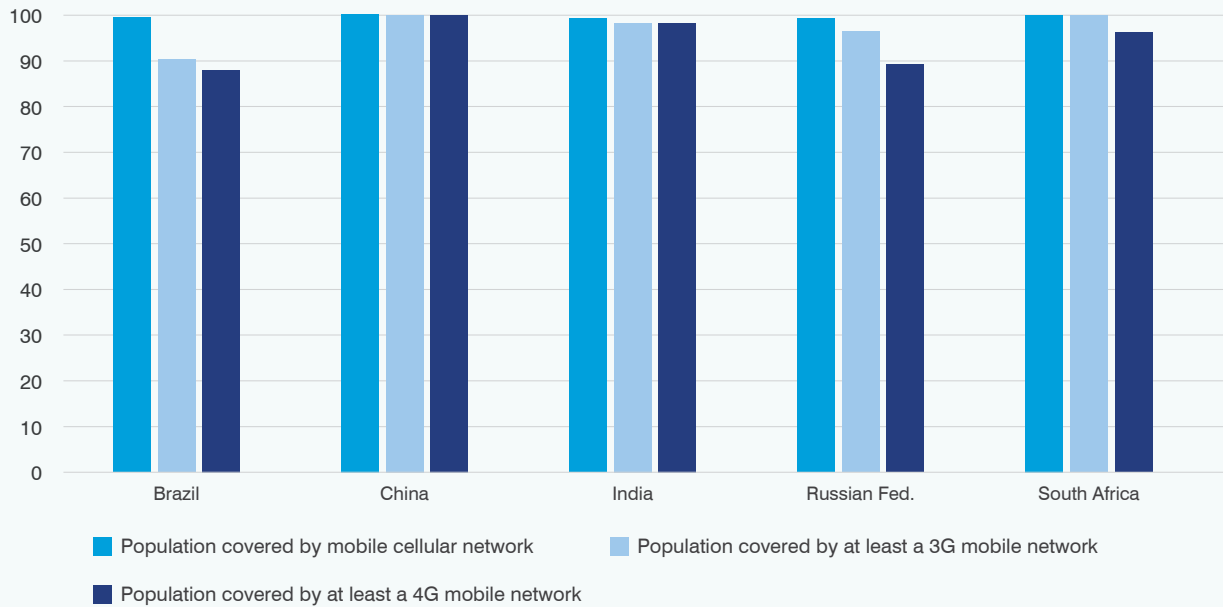
28 GSMA (2021). *The Mobile Economy: China 2021*. Available at https://www.gsma.com/mobileeconomy/wp-content/uploads/2021/02/GSMA_MobileEconomy2021_China_Eng-1.pdf

29 Independent Communications Authority of South Africa (2021). *The State of 5G in South Africa: From Readiness to Recommendations*. Available at <https://www.icasa.org.za/uploads/files/ICASA-2021-5G-Annual-Report.pdf>

30 The Economic Times (2022). '5G network: Own 5G network in final stages, India now part of 6G development'

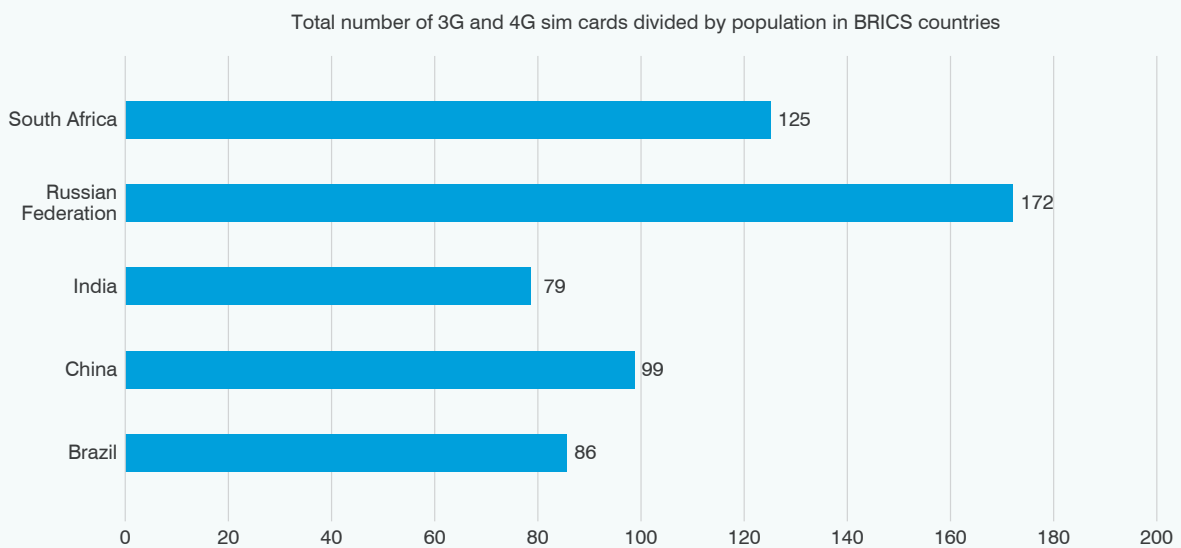
31 See Global Speedtest (January 2022) at <https://www.speedtest.net/global-index>

Figure 4 Mobile cellular networks cover almost all BRICS populations (2021)



Source: International Telecommunication Union, 2021. For Brazil, Regional Center for Studies on the Development of the Information Society, 2020.

Figure 5 Russian Federation had most broadband connections in 2019



Source: Global System for Mobile Communications (GSMA), 2022

online every day (in 2020), followed closely by Brazil at upwards of nine hours online daily on average.³²

Gender digital divides continue to persist in some BRICS countries. The global gender parity rate – that is, the proportion of women who use the internet divided by the proportion of men – is 0.87.³³ Brazil has the highest gender parity rate among the BRICS countries at 1.1, meaning that internet penetration is higher among women than among men in Brazil. This is followed by China with 1.0 and the Russian Federation at 0.99. India has a score of 0.6. No data are available for South Africa.

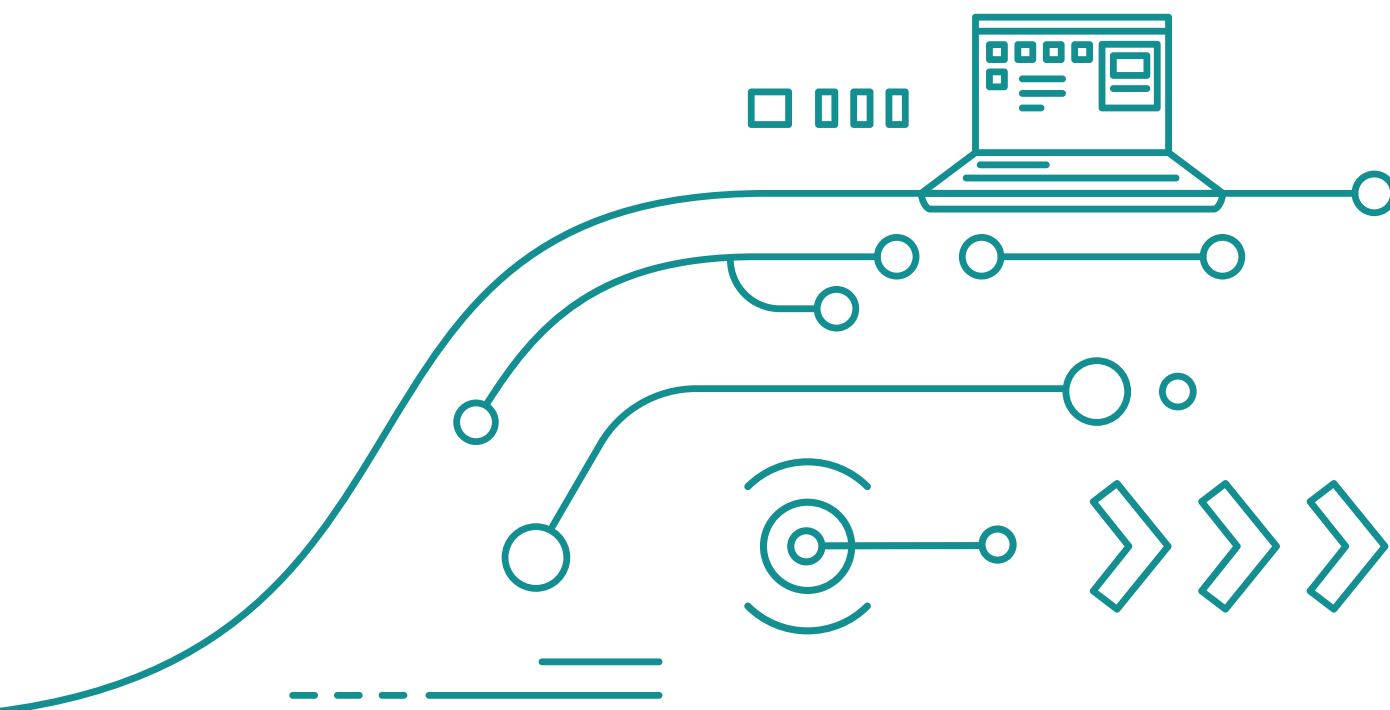
Brazil and the Russian Federation have the highest share of women using the internet (85%), followed by China (71%). Only 15% of women in India are internet users.³⁴

Improving women's access to the internet is critical for inclusive development of the digital economy. Reducing the cost to access the internet can help bridge the digital divide for women. With the exception of South Africa, the

cost of mobile internet in the BRICS countries is lower than the global average.

The use of smartphones and digital payments is rising in BRICS countries. Smartphones are key to the digital economy, as they enable access to digital information and transactions, especially with the growing use of e-payments. About 85%–98% of mobile subscribers in BRICS countries use smartphones.³⁵

Digital payments have also become increasingly popular in BRICS countries due to easier access using smartphones, safer transactions and innovative financial technology (fintech) solutions supported by regulatory sandbox safety mechanisms. By 2021, almost 87% of people aged above 15 years old, in the Russian Federation and China, had made or received digital payments, according to the latest available data in the World Bank Findex Report. The share was slightly lower in South Africa at 81%, Brazil at 77%, and 35% in India.



32 McKinsey (2021). *Brazil 2020 Opportunity Tree*. Available at https://www.mckinsey.com/br/~/_/media/McKinsey/Locations/South%20America/Brazil/Our%20Insights/Brazil%202020%20Opportunity%20Tree/McKinsey2020OpportunityTree.pdf

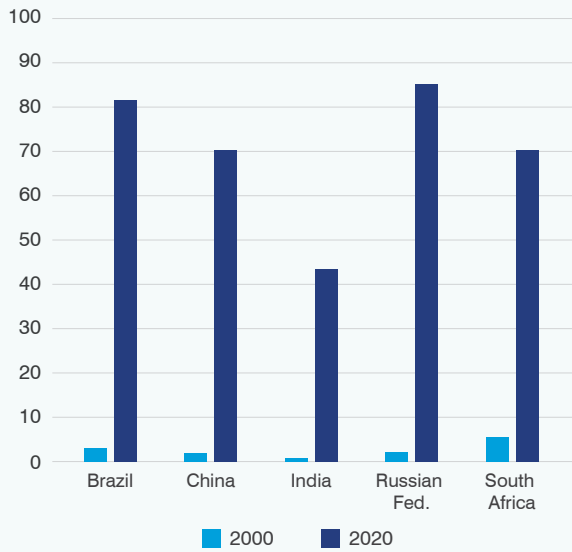
33 UNCTAD (2021). *Digital Economy Report: Cross-border data flows and development: For whom the data flow*. Available at https://unctad.org/system/files/official-document/der2021_en.pdf; and International Telecommunication Union database, <https://www.itu.int/en/ITU-D/Statistics/Dashboards/Pages/Digital-Development.aspx>

34 International Telecommunication Union (2021). *Individuals using the internet (from any location), by gender and urban/rural location (%)*. Available at <https://www.itu.int/en/ITU-D/Statistics/Documents/statistics/2021/December/IndividualsUsingInternetByGender.xlsx> Information from South Africa is not available.

35 See Telecom News (May 2020). 'Cost of data in China drops 93% as US still looks overly expensive.' Available at

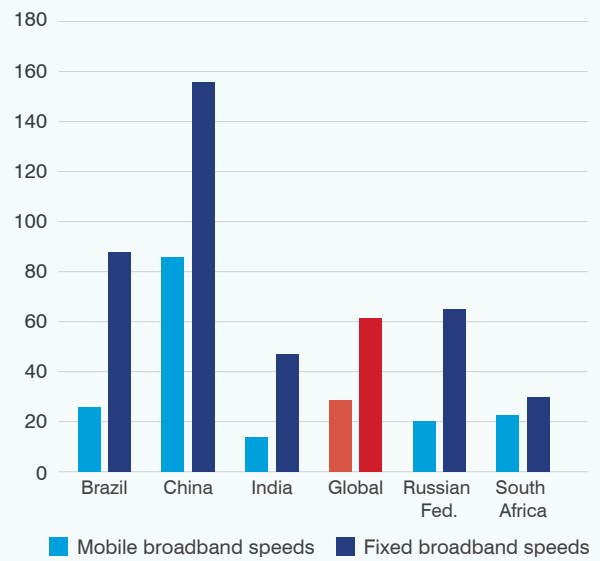
<https://telecoms.com/504110/cost-of-data-in-china-drops-93-as-us-still-looks-overly-expensive/>. See also GSMA (2021), *The Mobile Economy: Russia & CIS 2021*. Available at https://www.gsma.com/mobileeconomy/wp-content/uploads/2021/09/GSMA_ME_RussiaCIS_2021_R_WEB_Singles.pdf; GSMA (2021), *The Mobile Economy: Asia Pacific 2021*. Available at https://www.gsma.com/mobileeconomy/wp-content/uploads/2021/08/GSMA_ME_APAC_2021_Web_Singles.pdf; and GSMA (2021). *The Mobile Economy: China 2021*, *op. cit.*

Figure 6 Internet use in BRICS countries has surged since 2000



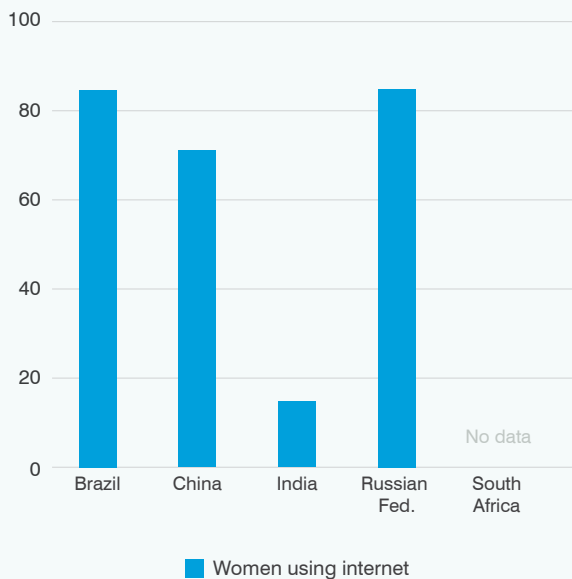
Note: Figure shows percentages of population.
Source: International Telecommunication Union, 2021

Figure 7 China has fastest average download speed among BRICS



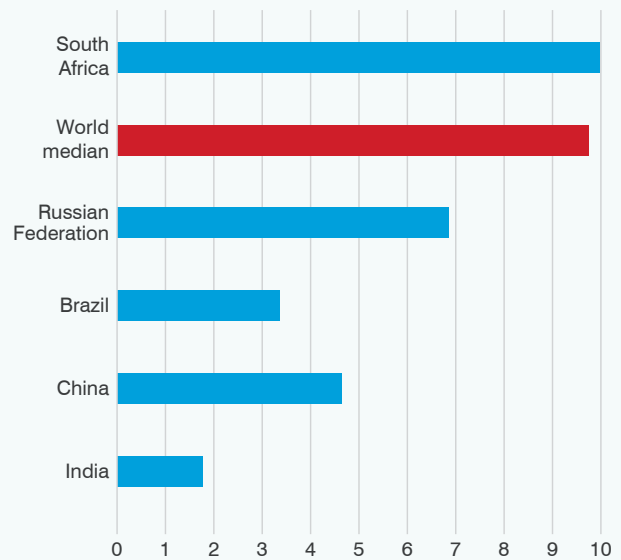
Note: Figure shows speed in Mbps in 2020.
Source: Speedtest, 2022

Figure 8 Few women in India use the internet (% of all women in each country)



Source: International Telecommunication Union, 2021

Figure 9 Most BRICS mobile internet costs are below global average



Note: Figure shows 2 gigabyte data-only broadband baskets in US dollars.
Source: ITU, 2021

E-commerce

E-commerce has been a prominent segment in the digital economy. People across the world have turned to digital platforms to shop online, with the global online retail sales share of total retail sales rising from 16% in 2019 to 19% in 2020. That level was sustained into 2021,³⁶ boosted by the COVID-19 pandemic.

BRICS countries are large e-commerce markets, but the adoption of e-commerce varies. The share of online shoppers among internet users varies from around 20% in India and South Africa to 40% in Brazil and the Russian Federation, to 75% in China. The business-to-customer (B2C) e-commerce segment has grown, with an estimated valuation of \$1.37 trillion in China (2021), \$85.4 billion in India (2021), \$42.6 billion in the Russian Federation (2021), \$39.3 billion in Brazil (2021) and \$7.3 billion in South Africa (2021).³⁷ These numbers are industry estimates as official statistics are not available.

Brazil's 2019 B2C e-commerce sales grew by 7.6% over 2018 and represented 1.1% of national GDP. The pandemic accelerated the adoption of e-commerce as 7.3 million Brazilian users purchased online for the first time, and online sales grew by 47% in the first half of 2020.³⁸ Food, personal care, cosmetics, furniture and electronics are some of the most popular categories of e-commerce purchases.

The major e-commerce platforms in Brazil are Magalu, Casas Bahia, Mercado Libre, Americanas.com and Amazonare. In 2021, Amazon reported revenues of \$2.6 billion while Casas Bahai generated revenue of \$2.4 billion. Magalu emerged as Brazil's biggest e-commerce player, with revenue of \$3.3 billion in 2021. These three e-commerce platforms collectively accounted for 30% of online sales in Brazil.³⁹

Given the country's vast size across diverse geographic areas, some e-commerce platforms such as Amazon and Mercado Libre are investing in logistics infrastructure. Mercado Libre controls about 85% of its logistical network, which enables shorter delivery times for a wider range of products.⁴⁰

The Russian Federation's e-commerce retail market was estimated at \$30 billion in 2021, according to e-commerceDB.⁴¹ The largest platforms were Wildberries, Ozon, AliExpress, Russiam, MVideo and DNS-Shop. The most popular e-commerce market segments are electronics and appliances, fashion, furniture and appliances, food and personal care.

E-commerce between the Russian Federation and China is growing rapidly due to geographical proximity and transportation networks. Russian consumers made 250 million cross-border e-commerce purchases in 2020, with 70% originating in China, according to Russia's Ministry of Economic Development.⁴²

Cross-border e-commerce has become a key topic in bilateral policy dialogues to address issues such as online consumer protection, customs procedures, intellectual property protection and e-payment security. Chinese firms have been localizing operations in the Russian Federation by setting up warehouses and establishing partnerships with local companies as a way to expand cross-border e-commerce trade.

India's e-commerce retail market was estimated at \$61.1 billion in 2020 and is expected to reach \$120 billion in 2025.⁴³ Major e-commerce players include Amazon India, Flipkart (owned by Walmart) and JioMart. Popular e-commerce market segments include consumer electronics, apparel, food and grocery, and jewellery. Mobile commerce accounts for an estimated

36 UNCTAD (25 April 2022). 'COVID-19 boost to e-commerce sustained into 2021, new UNCTAD figures show.' Available at <https://unctad.org/news/covid-19-boost-e-commerce-sustained-2021-new-unctad-figures-show#:~:text=New%20UNCTAD%20figures%20show%20that,of%20restrictions%20in%20many%20countries>. See also UNCTAD (May 2021). *Covid-19 and E-commerce: A Global Review*. Available at https://etradeforall.org/wp-content/uploads/2021/05/Covid-19-and-E-Commerce-2021-Executive_Summary_English_04_22.pdf

37 See J.P. Morgan, '2020 E-Commerce Payments Trends Report: Brazil'. Available at <https://www.jpmorgan.com/merchant-services/insights/reports/brazil-2020>; J.P. Morgan (2019), 'E-commerce payments trends: China', available at <https://www.jpmorgan.com/merchant-services/insights/reports/china>; J.P. Morgan, '2020 E-commerce Payments Trends Report: India', available at <https://www.jpmorgan.com/merchant-services/insights/reports/india-2020#footnote-src-26>; E-CommerceDB, 'The eCommerce market in Russia', available at <https://ecommercedb.com/en/markets/ru/all>; E-CommerceDB (2021), 'The e-commerce market in South Africa', available at <https://ecommercedb.com/en/markets/za/all>

38 UNCTAD (2021). 'The UNCTAD B2C E-Commerce Index 2020: Spotlight on Latin America and the Caribbean,' Technical Notes on ICT for Development No. 17. Available at: https://unctad.org/system/files/official-document/tn_unctad_ict4d17_en.pdf. See also Latin America Business Stories (28 August 2020). 'E-commerce sales grew 47% in the first half of 2020 in Brazil, the biggest increase in 20 years'. Available at <https://labsnews.com/en/news/business/e-commerce-sales-grow-47-in-the-first-half-of-2020/>

39 E-CommerceDB, 'The eCommerce market in Brazil'. Available at <https://ecommercedb.com/en/markets/br/all#:~:text=Brazil%20is%20the%2015th%20largest,for%20eCommerce%20continue%20to%20increase>

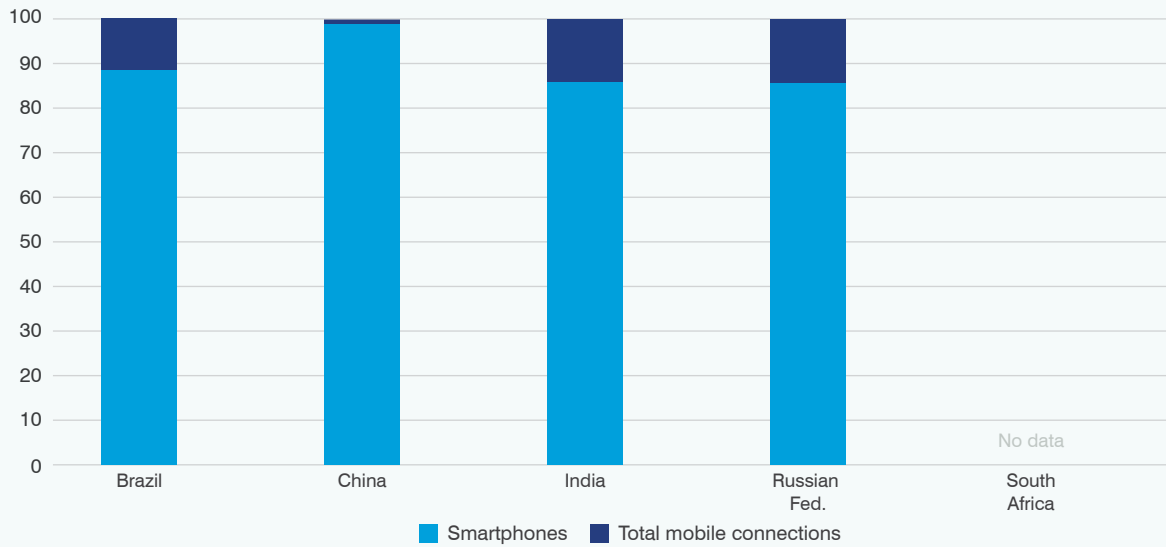
40 *Forbes* (December 2021). 'Want To Own The Amazon Of Latin America? Checkout MercadoLibre.' Available at <https://www.forbes.com/sites/michaelcannivet/2021/12/16/want-to-own-the-amazon-of-latin-america-checkout-mercadolibre/?sh=30f12bc37026>

41 E-CommerceDB, 'The eCommerce market in Russia', *op. cit.*

42 Sputnik News (14 September 2021). 'Ministry of Economic Development of Russia: E-Commerce orders between Russia and China account for 70% of the total cross-border e-commerce orders in Russia.' Available at: <https://sputniknews.cn/20210914/1034455609.html>

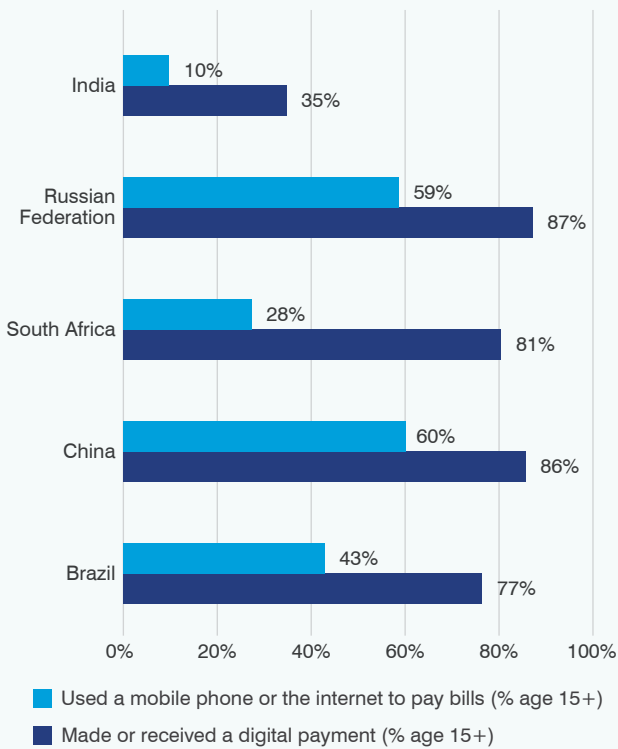
43 *Forbes* citing GlobalData study available at: <https://www.forbes.com/sites/kevinrozario/2021/07/13/e-commerce-in-india-set-to-reach-120-billion-in-2025-says-report/?sh=4c2b1874611>

Figure 10 China has highest average download speeds among BRICS



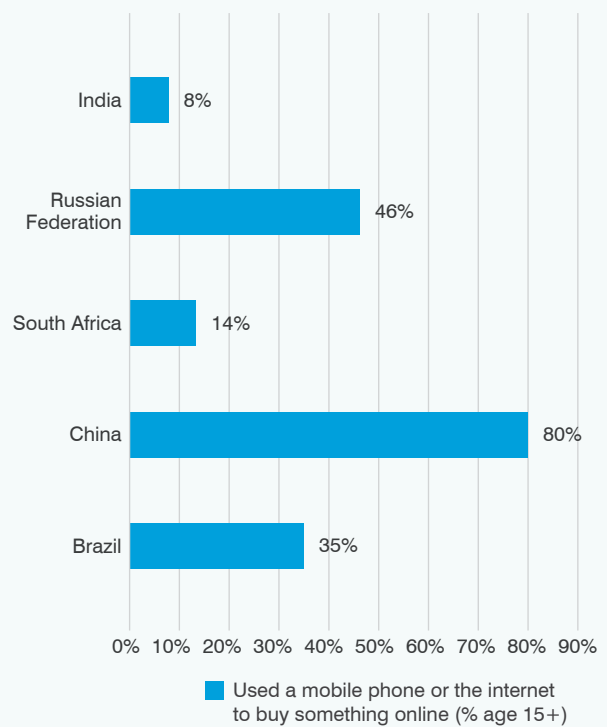
Note: Figure shows download speeds in Mbps in 2020.
Source: GSMA, 2020

Figure 11 More than 87% of Russians use digital payments



Source: World Bank Global Findex Report, 2021

Figure 12 About 80% of people in China shop online in 2021



Source: World Bank Findex Report 2021

49% of all e-commerce transactions, and businesses are adapting to this trend.

Global firms have invested in the Indian e-commerce market. Walmart, for instance, invested \$1.2 billion in Flipkart in 2020 after buying a majority stake in 2018. Cross-border e-commerce accounted for nearly 20% of the total e-commerce market in 2018, with the United States, China and Australia being the main overseas markets where Indian consumers bought products online.⁴⁴

China has one of the world's biggest online retail markets, with estimated sales of \$1.8 trillion in 2020, according to the report by the Ministry of Commerce.⁴⁵ Mobile commerce dominates the market, accounting for \$873 billion of the total. Alibaba, JD.com and Pinduoduo are among the largest e-commerce firms in China.

Chinese cross-border e-commerce imports represent major business opportunities, including for companies from other BRICS countries. Around 42% of Chinese online shoppers have bought goods or services from abroad and cross-border sales constituted 58% of China's e-commerce markets in 2019, according to a study by J.P. Morgan.⁴⁶ Another report suggests that 158 million online shoppers in China bought foreign products in 2020.⁴⁷

Most cross-border purchases are made from Hong Kong, Japan and the United States. Top e-commerce market segments include clothes and apparel, consumer electronics, travel, household goods and health and beauty products.

Chinese e-commerce platforms are also venturing overseas. Some 960 million Alibaba consumers – 180 million of whom were international – bought goods or services in 2020. AliExpress, Alibaba's global B2C e-commerce arm, has sellers from Turkey, the Russian Federation, Spain and Italy, among others. Alibaba also actively acquires local e-commerce platforms, such as Daraz in Pakistan and Lazada, the Southeast Asian online retailer.

The B2C e-commerce market in South Africa saw sales of \$5 billion in 2021.⁴⁸ The biggest player in the South African e-commerce market is Takealot, with revenues of \$602 million, followed by Superbalist, with \$85 million, and Woolworths. These top three platforms accounted for 15% of online revenue in the country.⁴⁹ Clothing, electronics, footwear, household appliances and health products are the most popular categories among online shoppers.

Ordering fresh foods online as a result of pandemic-related lockdown measures gave grocery delivery apps a boost.⁵⁰ UberEATS competes with the local platform, Mr. Delivery, in this segment. While most South African e-commerce buyers used domestic websites or online marketplaces, an estimated 27% made purchases from the United States and 14% from Europe.⁵¹

Data centres and cloud services

Data centres are facilities where a large group of networked computer servers are hosted. They are key to the digital economy, as they store, process and distribute data, supporting the operation of websites, apps and software, as well as digital transactions. New technologies for cloud services, data storage and processing, as well as certain governmental regulations requiring local storage of domestically generated data, are among the main factors that drive demand for data centres. While the North American region has the highest number of data centres, growth in the BRICS countries has been rapid.

Data centres are critical to the digital economy as they provide safer operation and storage of data. There are several types of data centres, including enterprise data centres, which are typically built and used by a single organization (common among tech giants) and colocation or managed service data centres, which rent out rack space to third parties (common for non-tech companies).

44 This figure seems to indicate cross-border e-commerce based on purchases Indian online shoppers made from abroad. See J.P. Morgan, '2020 e-Commerce Payments Trends Report: India', *op. cit.*

45 China Ministry of Commerce (2021). *China E-commerce Report (2020)*. Available at <https://dzswgf.mofcom.gov.cn/news/5/2021/9/1631698018580.html>

46 See J.P. Morgan (2019). 'E-commerce payments trends: China,' *op. cit.*

47 *South China Morning Post* (19 January 2022). 'China's 150 million online shoppers, overseas suppliers fear coronavirus mail contamination threat. Available at https://www.scmp.com/economy/china-economy/article/3163925/chinas-150-million-online-shoppers-overseas-suppliers-fear?module=perpetual_scroll_0&pg_type=article&campaign=3163925

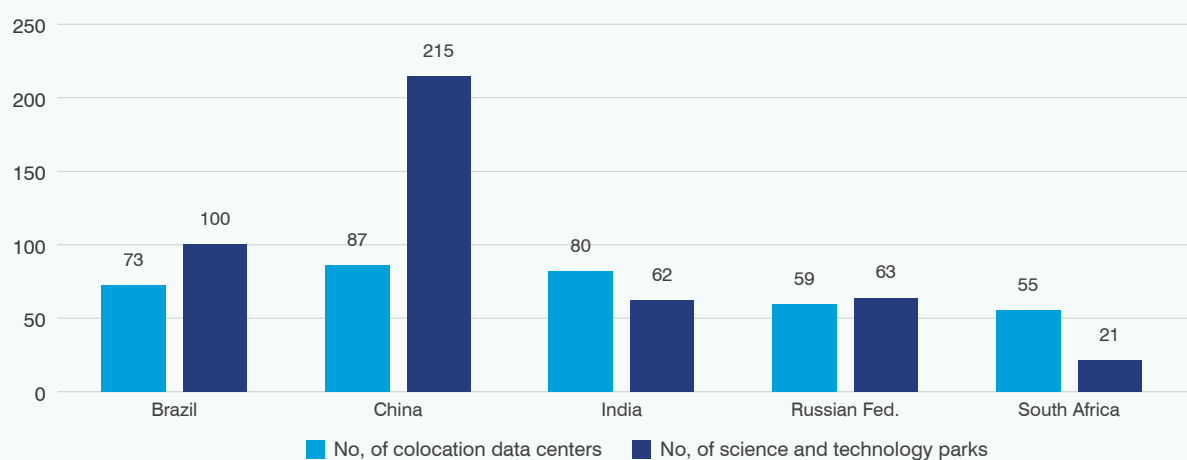
48 E-CommerceDB (2021). 'The e-commerce market in South Africa,' *op. cit.*

49 *Ibid.*

50 See Deloitte Digital (February 2021). *Digital Commerce Acceleration: Increased online purchases present new opportunities for digital commerce players*. Available at <https://www2.deloitte.com/content/dam/Deloitte/za/Documents/strategy/za-Digital-Commerce-Acceleration-2021-Digital.pdf>

51 See <https://www.westerncape.gov.za/site-page/e-commerce-south-africa-and-western-cape>

Figure 13 China had 215 science and technology parks in 2021



Source: On data centres, Datacentremap (China, Russian Federation, South Africa); Livemint (India); Techerati (Brazil)

Colocation data centres are highly concentrated in developed countries. As of January 2021, almost 80% of the world's 4,714 co-location data centres were based in developed economies, mainly in North America and Europe. Only 897 were in developing countries, notably in Asia, with 154 in China.⁵² Colocation data centres are widely used in BRICS countries, as a firm can rent space in a data centre at cost-efficient rates. Science and technology parks also play an important role in the development of the digital economy, as they create an ecosystem for innovation among research institutions, businesses, academia and markets.

Brazil's data centre market is expected to grow to \$2.6 billion by 2026.⁵³ COVID-19 has caused rapid shifts towards remote working and cloud services,

with many firms migrating to cloud services or private networks and updating their encryption services to extend user data protection.⁵⁴ Several data centre, hosting and telecommunication providers have entered the enterprise cloud market. Major cloud providers include Adentra, GVT, Vivo and Telefonica.⁵⁵ Tencent's cloud unit plans to open a data centre in Brazil.⁵⁶

Data centres in the Russian Federation are expected to see investments worth \$2.02 billion by 2026.⁵⁷ As per the Digital Economy Program (see Chapter 4), national telecom providers including Rostelecom have expanded data centres in the country. Most of these are in the Moscow and St. Petersburg areas, and the goal is to create a geographically diverse national network of data centre facilities.⁵⁸

52 UNCTAD (2021). *Digital Economy Report*, op. cit.

53 Mordor Intelligence. Brazil Big Data Analytics Market. Available at <https://www.mordorintelligence.com/industry-reports/brazil-big-data-analytics-market>

54 Global Newswires (December 2020). Brazil Data Center Market - Growth, Trends, and Forecasts (2020–2025). Available at <https://www.globenewswire.com/news-release/2020/12/04/2139750/0/en/Brazil-Data-Center-Market-Growth-Trends-and-Forecasts-2020-2025.html>

55 Businesswire (October 2021). Brazil Cloud and Data Centre Space, Power, & Pricing Market Report 2021–2025. Available at <https://www.businesswire.com/news/home/20211011005264/en/Brazil-Cloud-and-Data-Centre-Space-Power-Pricing-Market-Report-2021-2025---ResearchAndMarkets.com>

56 Verdict (November 2021). 'Tencent Cloud launches first data centre in Latin America,' available at <https://www.verdict.co.uk/tencent-cloud-launches-first-data-centre-in-latin-america/>

57 Arizton (n.d.). 'Russia data center market size will witness investments of USD 2.02 billion by 2026,' available at <https://www.arizton.com/market-reports/russia-data-center-market-investment-analysis>

58 Businesswire (September 2021). 'Russia Cloud and Data Centre Market Growth Report 2021-2025,' available at <https://www.businesswire.com/news/home/20210929005622/en/Russia-Cloud-and-Data-Centre-Market-Growth-Report-2021-2025---ResearchAndMarkets.com>

Sberbank has announced plans to build a large data centre in the Saratov Oblast.⁵⁹ Yandex, a major web service provider that operates multiple data centres in the country and one in Finland, said in September 2021 that it would open a cloud centre in Germany in 2022.⁶⁰

The Indian data centre market is expected to reach \$1.5 billion in 2022.⁶¹ Rollout of 5G is expected to increase data usage and industry experts expect that capacity of data centres will double by 2023 to meet rising demand and digitalization growth.⁶² Investments by both local and international players in data centres are expected to be worth \$4.6 billion a year by 2025, according to the National Association of Software and Service Companies.⁶³

China's data centre market was valued at \$13 billion in 2020 and is expected to reach \$36.2 billion by 2026.⁶⁴ Given rapidly increasing market demand, China must deploy more data centres to match its digital economy trajectory.⁶⁵ Most of the world's 597 hyperscale data centres are located in the United States (39% at the end of 2020), followed by China with 10%.⁶⁶

To expand the big data industry into a \$470 billion sector by 2025, China aims to build several clusters of data centres over the next three years.⁶⁷ Alibaba Cloud is the leader in the cloud market, though Huawei Cloud, Tencent Cloud and Baidu AI Cloud are also key players in the market. Collectively, these four providers accounted for 80% of the market.⁶⁸

Most South African data centres are located in or near the urban centres of Cape Town and Johannesburg. The country accounts for 54% of the data centre floor space for the entire African continent.⁶⁹ South Africa remains a favoured destination to establish data centres and has the potential to become a gateway to the region. Swiss cybersecurity firm Acronis launched a new cloud data centre in Johannesburg in January 2022.⁷⁰

Digital payments

The global digital payment market is expected to grow from \$88.1 billion in 2021 to \$180.2 billion by 2026.⁷¹ Many countries are actively promoting digital payments because they are more efficient and secure and offer better measurement in digital transactions. Growth in smartphone use, mobile commerce, digital services and apps is also driving rapid adoption of digital payments.

Credit card and digital payments are the top methods for online transactions in Brazil. Although credit cards remain the leading method for online transactions, digital payments are catching up quickly. A 2021 survey found that Pix was the No. 2 method of payment used to purchase goods and services online in Brazil, statistically tied with credit cards.⁷² Boletão bancário, a domestic push payment method regulated by the central bank, is also a popular method to pay online.

59 Data Centre Dynamics (September 2021). 'Sberbank to build data center in Balakovo, Russia,' available at <https://www.datacenterdynamics.com/en/news/sberbank-to-build-data-center-in-balakovo-russia/>

60 Capacity (September 2021). 'Russia's Yandex to open data centre facilities in Germany,' available at <https://www.capacitymedia.com/articles/3829703/russias-yandex-to-open-data-centre-facilities-in-germany>

61 Markets and Markets (n.d.). 'India Data Center Market,' available at <https://www.marketsandmarkets.com/Market-Reports/india-data-center-market-173006400.html>

62 *Business Standard* (August 2021). 'India's data centre industry capacity to double by 2023 to 1,008 MW,' available at https://www.business-standard.com/article/technology/india-s-data-centre-industry-capacity-to-double-by-2023-to-1-008-mw-report-121082400662_1.html

63 Livemint (24 December 2021). 'Data centre firms ramp up capacity in India.' Available at: <https://www.livemint.com/technology/tech-news/data-centre-firms-ramp-up-capacity-in-india-11640332271873.html>

64 Mordor Intelligence. China Data Center Market - Growth, Trends, COVID-19 Impact, and Forecasts (2022–2027). Available at <https://www.mordorintelligence.com/industry-reports/china-data-center-market>

65 *China-US Focus* (November 2021). 'Conflicts of China's Data Center Industry.' Available at <https://www.chinausfocus.com/finance-economy/conflicts-of-chinas-data-center-industry>

66 UNCTAD (2021). *Digital Economy Report*, op. cit.

67 Reuters (December 2021). 'China outlines vision for four mega data centre clusters,' available at <https://www.reuters.com/technology/china-approves-building-four-data-centre-clusters-2021-12-29/>

68 China Internet Watch (April 2022). China cloud computing market in 2021; top 4 have 80% market share. Available at <https://www.chinainternetwork.com/30820/cloud-infrastructure-services/>

69 Techerati (November 2021). South Africa holds the majority of African data centres. Available at <https://www.techerati.com/features-hub/opinions/south-africa-holds-the-majority-of-african-data-centres/>

70 Techish (January 2022). 'Cybersecurity firm Acronis opens Cloud Data Centre in South Africa.' Available at <https://tech-ish.com/2022/01/27/acronis-cloud-data-centre-south-africa/>

71 See <https://www.marketsandmarkets.com/Market-Reports/digital-payment-market-209834053.html>

72 See <https://www.cetic.br/en/tics/tic-covid-19/painel-covid-19/4-edicao/H4W/>

The Central Bank of Brazil released Pix in 2020. The instant payment platform allows immediate transfers and payments and is free for end consumers.⁷³ Pix can be integrated into e-marketplaces, delivery, e-commerce and banking apps, offering a seamless and secure solution for online payments. Federal emergency relief programmes also drove up the use of digital wallets during the pandemic, as some required requests to be submitted through a mobile phone application and money was transferred to a virtual account.

Cash-on-delivery remains the preferred mode of payment for e-commerce in the Russian Federation.⁷⁴ Cash-on-delivery accounts for most online payments, while digital wallets (such as QIWI, Yandex Money and Web Money) are increasingly used. International cards are also used for online transactions.

Cards and cash-on-delivery are the preferred methods in India. Cards are the most-used method to pay online, with debit cards preferred over credit cards.⁷⁵ According to a survey, cards were used in nearly 29% of online shopping transactions in India by 2020.⁷⁶ International brands, including Visa, Mastercard and American Express, are widely accepted and used, as is RuPay, a domestic card.

Digital wallets are expected to overtake cards by 2023.⁷⁷ Established digital wallet brands include Amazon Pay, Paytm, Google Pay and PayPal. Cash-on-delivery is also an important channel, but has declined as more Indians open bank accounts.

Home-grown digital wallets remain a preferred method of online payment in China. The digital wallet market, dominated by WeChat Pay, Tenpay and Alipay, is forecast to grow at 12% compound annual growth rate (CAGR) until 2023.⁷⁸ Cards are less significant: just two of every 10 online payments are made using cards.

WeChat Pay and Alipay have begun to integrate credit cards issued by global brands, including Mastercard, Visa and American Express, into their payment services to draw more international consumers.

Cash-on-delivery and digital payments dominates in South Africa. Some 60% of South African adults have made or received digital payments, according to the World Bank. The use of cards and other electronic payment instruments remains low, however. Even among South Africans holding a transaction account with a bank, 33% still withdraw all their money as soon as it is deposited.⁷⁹

Artificial intelligence and big data

The global AI software market is forecast to grow rapidly in the coming years, reaching an estimated \$126 billion by 2025.⁸⁰ The overall AI market includes a wide array of applications such as natural language processing, robotic process automation and machine learning. Greater adoption of big data – which is expected to grow to \$103 billion by 2027, buoyed by fast-growing mobile data and cloud computing traffic – goes hand-in-hand with the rapid development of AI technologies.⁸¹

Industrial firms in Brazil have started to adopt AI solutions. Industry sources suggest that Brazilian GDP could increase by 7.1% by 2030 as a result of large-scale adoption of AI.⁸² Fintech is considered to be a natural adopter of AI. Brazilian fintech firm GuiaBolso offers a popular mobile application that uses AI to organize the personal finances of users.⁸³

AI is transforming traditional sectors such as agriculture and mining. Solinftec is a company devoted to optimizing agricultural processes through data collected by sensors

73 Bank of International Settlements (23 March 2022). Central banks, the monetary system and public payments infrastructures: lessons from Brazil's Pix. BIS Bulletin No. 52. Available at <https://www.bis.org/publ/bisbull52.pdf>

74 Hawk, Stephen (2002). 'The development of Russian e-commerce: the case of Ozon.' *Management Decisions*, vol. 40 No. 7, pp. 702–709. See also the Paypers (2014), Preferred payment methods in Russian Federation. Available at <https://thepayers.com/payment-methods/russianfederation/18>

75 J.P. Morgan (2020). 'E-commerce Payments Trends Report: India,' op. cit.

76 *Ibid.*

77 *Business Today* (2 March 2022). 'E-commerce transactions to grow by 96% to touch \$120 bn by 2025.' Available at <https://www.businesstoday.in/latest/corporate/story/e-commerce-transactions-to-grow-by-96-to-touch-120-bn-by-2025-fis-report-324517-2022-03-02>

78 J.P. Morgan (2019). 'E-Commerce payments trends: China,' op. cit.

79 World Bank (2019). *South Africa: Digital Economy Diagnostic*. Available at <https://openknowledge.worldbank.org/bitstream/handle/10986/33786/South-Africa-Digital-Economy-Diagnostic.pdf?sequence=1&isAllowed=y>

80 Statista (n.d.). *Revenues from the artificial intelligence (AI) software market worldwide from 2018 to 2025*. Available at <https://www.statista.com/statistics/607716/worldwide-artificial-intelligence-market-revenues/>

81 Statista (2022). *Forecast of the global big data market*. Available at: <https://www.statista.com/statistics/254266/global-big-data-market-forecast/>

82 See Microsoft (n.d.). *Impacto real para um futuro melhor: Plano de compromisso com Brasil 2019-2020*. Available at <https://www.microsoft.com/cms/api/am/binary/RE4yqRL>

83 See <https://www.data.ai/en/apps/ios/app/guiabolso-controle-financeiro-e-planejamento-de-gastos/> and Bonham, John (2010). 'GuiaBolso: How machine-learning is changing competition landscape for Financial Institutions in Brazil,' available at: <https://digital.hbs.edu/platform-rctom/submission/guiabolso-how-machine-learning-is-changing-competition-landscape-for-financial-institutions-in-brazil/>

installed in agricultural machinery and meteorological stations.⁸⁴ Traive, an agri-fintech firm, aims to support access to finance through an alternative credit system that estimates a client's mortgage loan performance in real time. This AI-powered application is expected to have supported 2,500 MSME agribusiness operations by 2020.⁸⁵

Large companies have also begun to incorporate smart production methods. Vale, Brazil's top mining company, has established an integrated operations centre in Minas Gerais to integrate the production chain using AI technologies.

Brazil's major industries, such as oil, gas, minerals and agriculture, are expected to be the main adopters of big data. According to the estimates, the Latin American big data and analytics market is expected to reach \$8.5 billion by 2023 with a CAGR of 19.2%. Brazil leads this, accounting for 46.7% of overall sales.⁸⁶ Major players include QlikTech, Splunk Inc., TIBCO Software Inc., Tableau Software LLC and Cortex Intelligence Tecnologia S.A.⁸⁷

The Russian Federation is making headway on AI adoption. The value of the Russian AI market was estimated at \$3.8 billion in 2021, with a market growth rate of 9.6%.⁸⁸ The country was home to 168 AI start-ups in 2020⁸⁹ and around 480 firms developing AI technologies.⁹⁰ Sberbank, a majority state-owned financial-services company, has earmarked RUB 112 billion (\$1.96 billion) for AI development until 2024.⁹¹

Firms also use AI for healthcare. The Celsius project, for instance, uses AI technology to diagnose CT scans

for COVID-19 patients. Kaspersky Lab, a Russian cybersecurity firm, has developed a new system for monitoring digital security using AI to predict anomalies and automatically prevent or stop cyberattacks.

Several leading AI actors including Yandex, MTS, Sberbank, Gazprom and the Russian Direct Investment Fund have joined a voluntary code of AI ethics since 2019. The code establishes ethical guidelines to build trust in innovation and development of AI technology as well as effective application.⁹²

India is recognized as a leading adopter of AI among emerging economies. India's AI market is expected to reach \$7.8 billion by 2025.⁹³ The Indian retail industry is the top adopter of AI technologies and services, followed by telecom and fintech.⁹⁴ The software services, product development and contact centre automation industries are also frontrunners in adopting AI.⁹⁵

India has one of the highest AI skill penetrations across education, finance, hardware and networking, manufacturing, and software and IT services.⁹⁶ More than half of Indian start-ups now use AI, according to the National Association of Software and Service Companies.⁹⁷

AI also plays a role in bridging development gaps. A Dutch-Indian healthcare start-up, Leven Medical, launched low-cost, AI-powered ventilators that can capture patient information for better medical intervention decisions.⁹⁸ The International Crops Research Institute for the Semi-Arid Tropics, together

84 See <https://www.solinftec.com/en-us/>

85 Inter-American Development Bank (July 2020). *Artificial Intelligence for Social Good in Latin America and the Caribbean: The Regional Landscape and 12 Country Snapshots*. Available at <https://publications.iadb.org/publications/english/document/Artificial-Intelligence-for-Social-Good-in-Latin-America-and-the-Caribbean-The-Regional-Landscape-and-12-Country-Snapshots.pdf>

86 Frost & Sullivan (23 April 2018). Brazil and Mexico Stand as Front-runners in the Latin American Big Data Market, says Frost & Sullivan. Available at <https://www.frost.com/news/press-releases/brazil-and-mexico-stand-front-runners-latin-american-big-data-market-says-frost-sullivan/>

87 Mordor Intelligence. Brazil Big Data Analytics Market, *op. cit.*

88 Moscow Institute of Physics and Technology (April 2021). *Artificial Intelligence Almanac: 2020 Index Report*. Available at https://cset.georgetown.edu/wp-content/uploads/t0395_Russia_AI_report_EN.pdf

89 Tracxn (2 April 2022). Artificial Intelligence Startups in Russia. Available at <https://tracxn.com/explore/Artificial-Intelligence-Startups-in-Russia>

90 Carnegie Endowment for International Peace (8 May 2020). 'Developing Artificial Intelligence in Russia: Objectives and Reality.' Available at <https://carnegiemoscow.org/commentary/82422>. The figure is 480 according to *Artificial Intelligence Almanac, op. cit.*

91 Moscow Institute of Physics and Technology, *op. cit.*

92 AI Code of Ethics. See <https://a-ai.ru/code-of-ethics/>

93 International Data Corporation (October 2021). India Artificial Intelligence Market to Reach US\$7.8 Billion by 2025 Growing at a CAGR of 20.2%. Available at <https://www.idc.com/getdoc.jsp?containerId=prAP48288921>

94 Deloitte (December 2021). *State of AI in India*. Available at <https://www2.deloitte.com/content/dam/Deloitte/in/Documents/about-deloitte/in-State-of-AI-in-India-noexp.pdf>

95 McKinsey Analytics (December 2021). 'The state of AI in 2021.' Available at <https://www.mckinsey.com/~media/McKinsey/Business%20Functions/McKinsey%20Analytics/Our%20Insights/Global%20survey%20The%20state%20of%20AI%20in%202021/Global-survey-The-state-of-AI-in-2021.pdf>

96 Stanford University (2021). *AI Index Report*. Available at https://aiindex.stanford.edu/wp-content/uploads/2021/11/2021-AI-Index-Report_Master.pdf

97 Mascarenhas, N., and K. Park (29 March 2022). India dominates Y Combinator's latest startup batch (again). Available at <https://techcrunch.com/2022/03/29/y-combinator-india-winter-2022/>

98 *The Economic Times* (17 August 2020). 'India-Dutch collaborative start-up Leven Medical unveils smart ventilators with AI, ML.' Available at <https://economictimes.indiatimes.com/industry/healthcare/biotech/pharmaceuticals/india-dutch-collaborative-startup-leven-medical-unveils-smart-ventilators-with-ai/ml/articleshow/77595423.cms>

with Microsoft and the state government in Andhra Pradesh, has harnessed AI to power a sowing app. Artificial intelligence algorithms are used to monitor crop and soil health, where AI-based analytics solutions help to plan events such as crop harvesting, pest control and fertilization to optimize yields.⁹⁹

Indian firms are investing heavily in big data, with expenditures expected to have reached \$2 billion in 2021.¹⁰⁰ The banking industry has adopted big data to overcome challenges in an unpredictable business environment, improving customer service and enhancing productivity and performance. Telecommunication companies are using big data analytics to understand customers, business and overall operations.¹⁰¹

Big data has also been used in the healthcare industry. India launched an app during the pandemic that used big data to help identify people potentially exposed to COVID-19 through contacts. India is one of the top big data analytics markets, and the National Association of Software and Service Companies has predicted that the the country's analytics industry will reach \$16 billion by 2025.¹⁰² Major players include Mu Sigma, Dractak Analytics, IBM Corporation, Sigma Data Systems and Caggemini SE.

China is a leading global player in AI development and adoption. China's AI market was estimated at \$62.7 billion in 2021, with projected growth of 30.4% CAGR in 2019–2024.¹⁰³ The number of core AI firms in China was estimated at 260 in 2020, with a collective

value of \$11 billion.¹⁰⁴ China has filed 389,571 patents in AI, accounting for three-quarters of the global total, according to the World Intellectual Property Organization.¹⁰⁵

Meanwhile, the number of robots installed in China grew by 500% between 2012 and 2020.¹⁰⁶

Large data sets are critical to development of AI, and Chinese firms have access to assemble large databases. Didi, a China-based ride-sharing firm, processes an estimated 70 terabytes of data, with 9 billion routes planned a day and 1,000 car-hiring requests a second.¹⁰⁷ Baidu's autonomous cars can operate within limited environments.¹⁰⁸ Alibaba's cloud computing vertical, Aliyun, launched its AI platform in 2015, which allows developers and companies to use Alibaba's e-commerce data to predict consumer behaviour.¹⁰⁹

The country has also made considerable progress with AI in healthcare. Airdoc, a Beijing-based medical AI group, became the first company to gain regulatory approval for its AI-driven retina-scanning software to be deployed in hospitals.¹¹⁰

China's big data industry is forecast to surpass \$470 billion by 2025, according to a development plan for the big data industry during the 14th Five-Year Plan period (2021–2025) released by the Ministry of Industry and Information Technology.¹¹¹ The total revenue of big data was estimated at \$105 billion in 2020.¹¹² China has

99 International Crops Research Institute for the Semi-Arid Tropics (9 January 2017). Microsoft and ICRISAT's intelligent cloud pilot for agriculture in Andhra Pradesh increase crop yield for farmers. Available at <https://www.icrisat.org/microsoft-and-icrisats-intelligent-cloud-pilot-for-agriculture-in-andhra-pradesh-increase-crop-yield-for-farmers/>

100 Livemint (24 August 2021). 'Spending on big data, analytics by Indian enterprises to touch \$2bn in 2021: IDC.' Available at <https://www.livemint.com/companies/news/spending-on-big-data-analytics-by-indian-enterprises-to-touch-2bn-in-2021-idc-11629819146807.html>

101 International Data Corporation (24 August 2021). Need to Adopt a Data-Driven Culture by Indian Enterprises Propels Big Data and Analytics Spending to US\$2 Billion in 2021, Reports IDC. Available at <https://www.idc.com/getdoc.jsp?containerId=prAP48182421>

102 Mordor Intelligence. India Big Data Technology & Service Market – Growth, Trends, COVID-19 Impact, and Forecast (2022–2027). Available at <https://www.mordorintelligence.com/industry-reports/investment-opportunities-of-big-data-technology-in-india>

103 International Data Corporation (December 2020). *2020-2021 China AI Computing Power Development Evaluation Report*.

104 China Daily (25 November 2020). 'China at the forefront of AI adoption.' Available at <https://www.chinadaily.com.cn/a/202011/25/WS5fbdaf16a31024ad0ba96409.html>

105 See World Intellectual Property Organization (September 2021). 'China Leads the World in AI Related Patent Filing.' Available at https://www.wipo.int/about-wipo/en/offices/china/news/2021/news_0037.html#:~:text=In%20the%20past%20decade%2C%20China,the%20first%20in%20the%20world.

106 Deloitte (2020). *AI Enablement on the Way to Smart Manufacturing: Deloitte Survey on AI Adoption in Manufacturing*. Available at <file:///C:/Users/ameri/Downloads/deloitte-cn-cip-ai-manufacturing-application-survey-en-200116.pdf>

107 Li, Daitian, Tong, Tony W., and Yangao Xiao (February 2021). 'Is China Emerging as the Global Leader in AI?' Harvard Business Review. Available at <https://hbr.org/2021/02/is-china-emerging-as-the-global-leader-in-ai>

108 McKinsey Global Institute, Artificial Intelligence: Implications for China (April 2017). Available at https://www.mckinsey.com/~/_/media/mckinsey/featured%20insights/China/Artificial%20intelligence%20Implications%20for%20China/MGI-Artificial-intelligence-implications-for-China.ashx

109 CNBC (25 August 2015). 'Alibaba is using AI to take on Amazon, Microsoft.' Available at <https://www.cnbc.com/2015/08/25/alibaba-launches-ai-platform-to-take-on-amazon-microsoft-in-cloud.html>

110 *Financial Times* (January 2022). 'China sets the pace in adoption of AI in healthcare technology.' Available at <https://www.ft.com/content/c1fe6bf-8a87-4328-9e75-816009a07a59>

111 *Science and Technology Daily* (December 2021). 'China's Big Data Industry to Exceed 3 Trillion RMB by 2025.' Available at http://www.stdaily.com/English/ChinaNews/2021-12/09/content_1237562.shtml

112 *Ibid.*

eight big data pilot zones and five big data industrial demonstration bases.¹¹³

The Government has created supporting policies to use big data, such as the internet+ strategy focusing on integrating internet technologies into traditional industries. The internet + agriculture strategy, for example, highlights opportunities for technology to transform traditional farming methods through better data about the land, weather and markets for selling produce. Major Chinese players in big data include IBM China Company Ltd., SAP China, Huawei Technologies Co., Alibaba Cloud Computing Company and Inspire Group Ltd.¹¹⁴

The South African AI market is poised for fast growth. The country leads the continent in AI adoption with a robust ecosystem that includes numerous technology hubs and research groups. An estimated 100-plus companies in South Africa are either integrating AI solutions into their existing operations or developing new solutions using AI.¹¹⁵ IBM, for instance, operates AI-oriented research labs in the country.

Start-ups in South Africa are using AI to support agriculture and health. Aerobotics, an AI start-up funded by Naspers, is using artificial intelligence to help farmers manage their farms, trees and fruits.¹¹⁶ MomConnect, an AI chatbot initiated by the National Department of Health, connects an estimated 1.8 million expectant mothers with pre- and post-natal services and various kinds of healthcare advice.¹¹⁷

AI is also used in the finance and insurance sectors. DataProphet focuses on machine learning solutions for businesses by designing predictive analytics and conversation agents.¹¹⁸ Customers of digital insurance platform Naked enjoy lower costs because AI is used in risk assessment.

South African universities and technology hubs have proven to be strong drivers of AI innovation. The LaunchLab at Stellenbosch University, for example, successfully incubates student-led start-ups in areas including blockchain, fintech, three-dimensional printing and AI.¹¹⁹



113 Leadleo.com, Review and outlook of China's technology and communications industry in 2020. Available at <https://www.leadleo.com/report/details?id=5fed327a4b6e36685446bd9d>; Open Data Centre Committee (2020). Ministry of Industry and Information Technology announced the list of '2019 national new industrialization industry demonstration bases (data centers).' Available at <http://www.odcc.org.cn/news/p-1236457444102025217.html>

114 Mordor Intelligence. Investment Opportunities of Big Data Technology in China – Growth, Trends, COVID-19 Impact, and Forecasts (2022–2027). Available at <https://www.mordorintelligence.com/industry-reports/investment-opportunities-of-big-data-technology-in-china>

115 Atlantic Council (November 2018). Coming to Life: Artificial Intelligence in Africa. Available at <https://www.atlanticcouncil.org/wp-content/uploads/2019/09/Coming-to-Life-Artificial-Intelligence-in-Africa.pdf>

116 Kene-Okafor, Tage (21 January 2021). 'South African start-up Aerobotics raises \$17M to scale its AI-for-agriculture platform.' Available at <https://techcrunch.com/2021/01/21/south-africa-startup-aerobotics-raises-17m-led-by-naspers-foundry/>

117 *Financial Times* (16 May 2020). 'MomConnect lets expectant mothers know what to expect.' Available at <https://www.ft.com/content/7d17d354-684e-11ea-a6ac-9122541af204>

118 See Data Prophets, <https://dataprophet.com/>

119 Atlantic Council, *op. cit.*



Chapter 4

Policy developments in BRICS digital economy

Policies and regulations play a key role in shaping the development trajectory and safeguarding the long-term development of the digital economy in BRICS countries. Conducive policies in areas of online consumer protection, competition, data protection and privacy, cybersecurity and others are essential to ensure market functioning, address potential market failures and secure development gains.

This chapter sets out recent policy developments relating to the digital economy in the BRICS. As discussed in Chapter 1, data and platforms are at the core of the digital economy. Digital economy policies can be broadly grouped into three categories: data governance, platform governance and ecosystem development. National strategies also play an important role in providing overall direction and goals.

Table 1 sets out a framework for examining the policy issues covered in this chapter. Data governance is at the core of digital economy policies. It includes laws and regulations on data and cybersecurity, and increasingly also algorithms and AI. In this area, it often requires development of new laws and regulations as data is a new subject in economic development.

The second category, platform governance, may require adjusting laws and regulations, such as consumer protection, competition, taxation, IP protection and labour policies, to the new context of the digital economy. The third category, ecosystem-related policies – such as infrastructure, education, financial regulations, trade and investment policies, and e-signatures – are important as they provide inputs essential to the development of the digital economy.

Table 1 Analytical framework for digital economy policies

National strategies		
Data governance	Platform governance	Ecosystem development
Data protection and privacy Cybersecurity Algorithms and AI	Online consumer protection Competition Taxation of the digital economy Intermediary liability Labour policies	Digital infrastructure Education and skill development Financial regulations Trade policies Investment policies E-signatures

All BRICS have national strategies for developing digital economy

National strategies seek to provide a vision, identify strategic actions, set goals and milestones, and mobilize resources. All BRICS countries have national guiding policies related to the development of the digital economy, in the forms of strategies, programmes or roadmaps.

Brazil's national digital strategy document is the *Estratégia Brasileira para a Transformação Digital* (2018), also known as E-Digital.¹²⁰ It builds on previous policies that promoted internet penetration and digital inclusion in the country. The main goals of the document include enabling digital transformation, enhancing access to ICT and developing online trust.¹²¹ The relevant governmental agencies are updating the document.

The Russian Federation's Digital Economy Program (2017) seeks to create an 'ecosystem of the digital economy' by 2030.¹²² The main goals of this policy are developing existing legal and regulatory frameworks, building digital skills and enhancing digital infrastructure

¹²⁰ See *Estratégia Brasileira para a Transformação Digital* (2018) at <https://www.gov.br/mcti/pt-br/centrais-de-conteudo/comunicados-mcti/estrategia-digital-brasileira/estrategiadigital.pdf>. The English version of the Brazilian strategy can be found at <https://www.gov.br/mcti/pt-br/centrais-de-conteudo/comunicados-mcti/estrategia-digital-brasileira>

¹²¹ See Brazil Digital Inclusion Programme (2004), Connected Citizen Project – Computers-For-All plan and Decree No. 5.542 of 2005, establishing the Connected Citizen Project – Computers for All.

¹²² The Strategy for the Development of the Information Society in the Russian Federation for 2017–2030 (2017) defines a digital economy ecosystem as 'a partnership of organizations ensuring the continuous interaction of their technological platforms, applied internet services, analytical systems, information systems of public authorities of the Russian Federation, organizations and citizens'. See Office of the President, Strategy for Information Society Development until 2030 approved, available at <http://en.kremlin.ru/acts/news/54477>

investments. The Digital Economy of the Russian Federation programme puts into action the timelines, indicators for measurement and mechanisms to create a robust digital economy, as set out in the policy.¹²³

India's National Digital Communications Policy (2018) promotes the development of the digital economy.¹²⁴ This policy focuses on developing digital infrastructure, deployment of 5G technology, use of big data and job creation in the digital communications sector. The Digital India Programme (2015) also supports the development of the digital economy in the country.¹²⁵

China's Digital Economy Development Plan for the 14th Five-Year Plan (2021)¹²⁶ sets out strategic indicators and objectives to 2025, including the target of increasing the contribution of the core digital economy sectors to 10% of national GDP.¹²⁷ Developing national information network infrastructure and creating a country-wide integrated big data centre are among the major expected outputs of the plan. Commercial deployment of 5G and testing 6G are also key initiatives.

South Africa's National Development Plan of 2030 sets out the following priorities of digital development: promoting infrastructure investment, supporting local demand on digital goods and employing foreign expertise of key international organizations and bodies.¹²⁸ This is supported by the National e-Strategy, which seeks to develop ICT use throughout the value chain and accelerate uptake and usage of ICT in various social and economic sectors.¹²⁹

The section below examines policies related to data governance, platform governance and development of digital ecosystem.

Data governance

Data protection and privacy

Data protection and privacy regulations are at the core of data policies, as they determine the access to and use of data. BRICS countries have called attention to data security and development of local digital sectors in their data regulations.¹³⁰ All have data localization requirements that obligate retention and storage of certain types of personal data within the country.

Laws setting data localization requirements can include national security laws, laws regulating tax and financial records, employment laws or export control laws. Data regulations in the BRICS countries also tend to emphasize data security and focus on developing local digital sectors and maximizing economic and social benefits of data for citizens and the national economy.

Brazil's General Data Protection Law (2018) has been in effect since 2020. It applies to all entities or people that process personal data collected or processed in Brazil, as well as to processing activities that are targeted towards individuals in Brazil.¹³¹

The government authority responsible for safeguarding protection of personal data, the National Data Protection

123 Office of the President, available at <http://kremlin.ru/events/president/news/57425>. See also Presidential Decree No. 204 (2018) on the National Objectives and Strategic Tasks of the Russian Federation's Development in the Period up to 2024. For example, Forecast of Scientific and Technological Development of the Russian Federation for the Period until 2030. See also the National Security Strategy of the Russian Federation (2015) and the Information Security Doctrine of the Russian Federation (2016). The Strategy for Scientific and Technological Development (2016) sets out national policy objectives in scientific and technological development and emphasizes the importance of digital production technologies

124 National Digital Communications Policy (2018), available at <https://dot.gov.in/sites/default/files/EnglishPolicy-NDCP.pdf>. See also National Policy of Information Technology (2012), available at https://meity.gov.in/writereaddata/files/National_20IT_20Policyt%20_20.pdf; and, National E-Governance Plan (2006), available at: <https://cag.gov.in/uploads/media/PC-03-National-e-gov-plan-20210331115146.pdf>

125 Specific policy areas include the development of national broadband highways, providing mobile connectivity to achieve universal access, enhancing public internet access to maximize delivery of e-services to citizens and promoting electronic manufacturing. See Digital India, Vision, available at: <https://www.digitalindia.gov.in/content/vision-and-vision-areas>. Several public digital platforms that pre-dated the Digital India programme and were subsequently absorbed by it have built scale across the country over the years. Aadhaar (2009) was launched to give every citizen a unique identity number; BharatNet (2012) was introduced to connect all village councils or *gram panchayats* with 1,000 Mbps internet connectivity; and DigiLocker (2015) created a cloud-based platform to issue, exchange and verify certificates and documents. Other notable policies that supported the development of the digital economy and pre-dated the Digital India programme are the National Policy on Information Technology (2012), which laid out the vision to use information technology and the internet to expand the economy substantially, and the National E-Governance Plan (2006), which envisioned the creation of shared data and service centres.

126 The plan aims to accelerate the digital economy, which includes a digital society and a digital government. See also Factsheet: National 14th Five-Year Plan, available at <https://www.legco.gov.hk/research-publications/english/2021fs06-national-14th-five-year-plan-20210610-e.pdf>

127 Government of China, State Council (2021). 'The State Council on Printing and Distributing Notice of the "14th five-year" Digital Economy Development Plan.' Available at http://www.gov.cn/zhengce/content/2022-01/12/content_5667817.htm

128 South Africa National Development Plan. Available at <https://www.gov.za/issues/national-development-plan-2030>

129 Government of South Africa, Staatskoerant (10 November 2017). *Digital Society South Africa: South Africa's National e-Strategy towards a thriving and inclusive digital future*. Available at https://www.gov.za/sites/default/files/gcis_document/201711/41242gen887.pdf

130 Luca Belli, Cybersecurity Policymaking in the BRICS Countries: From Addressing National Priorities to Seeking International Cooperation, available at http://www.scielo.org.za/scielo.php?script=sci_arttext&pid=S2077-72132021000200008

131 Art. 3 of the General Data Protection Law reads as follows: 'This Law applies to any processing operation carried out by a natural person or by a legal entity governed by public or private Law, regardless of the medium, the country of its headquarters, or the country where the data are located, provided that: I - the treatment operation is carried out in the national territory; II - the processing activity aims to offer or supply goods or services or the processing of data of individuals located in the national territory; or III - the processed personal data was collected in the national territory. § 1 Personal data whose holder is there at the time of collection are considered collected in the national territory. § 2. The data processing provided for in item IV of the caput of art. 4 of this Law.'

Authority, was established in 2020 and has already initiated investigations into WhatsApp's privacy policy changes as well as a data breach by a credit-research firm.¹³² In 2021, the national Senate approved an amendment to the national constitution that made protection of personal data a fundamental right in the Brazilian Constitution.¹³³

Besides the General Data Protection Law, Brazil's Open Data Policy¹³⁴ requires that all data contained in databases of agencies and entities of the federal and foundational federal public administration in the form of open data are accessible to the public. The main objectives of this policy include:

- Promoting the publication of data contained in databases of agencies and entities of the federal and foundational federal public administration in the form of open data;
- Improving the culture of public transparency;
- Providing access to citizens, in an open manner, to data produced or accumulated by the federal executive branch;
- Facilitating the exchange of data between bodies and entities of the federal public administration and the different levels of the federation.

Data protection and privacy regulation in the Russian Federation is enacted through several laws, of which the Data Protection Act (2006) is the most important. This law, amended in 2014, requires all personal data operators to store and process personal data of people living in Russian territory, subject to certain exceptions. Notably, the Russian Federation ratified the Strasbourg Convention on Automatic

Processing of Personal Data (Convention), which regulates collection and processing of personal data among Council of Europe members, in 2006.¹³⁵

The Information Technology Act (2000) and its corresponding rules govern data protection in India. Corporate entities collecting, processing and storing personal information, including sensitive personal information, must comply with national laws.¹³⁶ A recently enacted rule requires internet intermediaries to retain information of all users collected upon registration for 180 days, even after any cancellation or withdrawal of such registration.¹³⁷

The Reserve Bank of India mandated localization of data related to payment systems operating in the country in 2018.¹³⁸ The Personal Data Protection Bill (2019), drafted after the Indian Supreme Court upheld the right to privacy as a fundamental right in 2017, has been withdrawn by the government following a parliamentary panel's review. The Indian government aims to get the new bill approved and made into law by early 2023¹³⁹. A new law may be tabled as a replacement to the 2019 bill.¹⁴⁰ India is also developing a data governance framework for non-personal data.¹⁴¹

China introduced two laws in 2021 that, individually and collectively, regulate data governance in the country. The Data Security Law (2021) entered into force in September 2021. It was enacted to regulate data processing, protect the rights and interests of individuals and organizations, and enhance national security.¹⁴² The law sets out requirements for data localization and data transfer, and suggests creating a criterion to determine the value of different kinds of data for economic and social development.¹⁴³

¹³² Autoridade Nacional de Proteção de Dados, available at <https://www.gov.br/anpd/pt-br>. An English version (for reference only as the English version has no legal validity) of LGPD can be found at: <https://iapp.org/resources/article/brazilian-data-protection-law-igpd-english-translation/>

¹³³ See <https://www.gov.br/anpd/pt-br/pt-br/protecao-de-dados-pessoais-agora-e-um-direito-fundamental>

¹³⁴ Decree 8777/2016, which contains the main principles of the policy, (http://www.planalto.gov.br/ccivil_03/_ato2015-2018/2016/decreto/d8777.htm); Resolution N° 3, which creates the Steering Committee of the National Open Data Infrastructure, (<https://www.gov.br/conarq/pt-br/legislacao-arquivistica/resolucoes/resolucao-n-o-3-de-13-de-outubro-de-2017>), and Decree 9903/2019, which updates the management of the policy (http://www.planalto.gov.br/ccivil_03/_ato2019-2022/2019/decreto/D9903.htm).

¹³⁵ Strasbourg Convention for the Protection of Individuals with regard to Automatic Processing of Personal Data (Convention) (2018), available at <https://rm.coe.int/1680078b37>

¹³⁶ Information Technology (Reasonable Security Practices and Procedures and Sensitive Personal Data or Information) Rules (2011), available at <https://www.itlaw.in/information-technology-reasonable-security-practices-and-procedures-and-sensitive-personal-data-or-information-rules-2011/>

¹³⁷ Information Technology (Intermediary Guidelines and Digital Media Ethics Code) Rules (2021), <https://www.meity.gov.in/content/notification-dated-25th-february-2021-gsr-139e-information-technology-intermediary>

¹³⁸ See Reserve Bank, Data Localization FAQs, available at: <https://m.rbi.org.in/scripts/FAQView.aspx?Id=130>

¹³⁹ See <https://www.reuters.com/world/india/indian-government-withdraws-data-protection-bill-2022-08-03/>

¹⁴⁰ See Outlook Business (17 February 2022). 'Government May Bring a Completely New Data Protection Bill.' Available at <https://www.outlookindia.com/business/govt-may-bring-a-completely-new-data-privacy-bill-says-report-news-182810>

¹⁴¹ Non-personal data have been defined as all data that do not fall within the definition of 'personal data' under the Personal Data Protection Bill (2019), available at http://164.100.47.4/BillsTexts/LSBillTexts/Asintroduced/373_2019_LS_Eng.pdf.

¹⁴² See Data Security Law of the People's Republic of China, available at <http://www.npc.gov.cn/englishnpc/c23934/202112/1abd8829788946ecab270e469b13c39c.shtml>

¹⁴³ *Ibid.*, Article 21.

The Personal Information Protection Law (2021) entered into effect in November 2021.¹⁴⁴ This law delineates the scope of sensitive personal information, sets out obligations and responsibilities of data processors, lays down data localization requirements and sets conditions for cross-border transfer of personal information. The law, for instance, requires critical information infrastructure owners to store personal information within the territory of China. When cross-border transfer of data is necessary, the Cyberspace Administration of China and other relevant government agencies oversee such transfer.¹⁴⁵

Along with the E-Commerce Law (2018), the Data Security Law (2021) and the Personal Information Protection Law (2021) form the foundation of China's data regulation architecture.¹⁴⁶

South Africa's law on Protection of Personal Information (2013) has been in force since 30 June 2021.¹⁴⁷ The law covers all organizations that collect, store, process and disseminate personal information as part of their business activities. An independent body (the Information Regulator) accountable only to the national assembly has been established to oversee implementation of the law. Its role is to monitor and enforce compliance, handle complaints and facilitate cross-border cooperation.¹⁴⁸ The South African Constitution recognizes the right to privacy as a fundamental right.

Cybercrime and cybersecurity

Cybercrime erodes online trust and prevents greater uptake of digital opportunities. Global losses resulting from cybercrimes were estimated at \$6 trillion in 2021.¹⁴⁹ Cybercrimes are major challenges for BRICS countries, as cyber-attacks targeting personal privacy, core public services and critical infrastructure are becoming more disruptive.¹⁵⁰

Legal and regulatory frameworks play a critical role in promoting a secure digital environment. The legislation

must be able to identify elements of illicit activities in cyberspace and establish investigative and litigation processes that align with existing international standards. All BRICS countries have cybercrime legislation in place, according to the UNCTAD Cyberlaw Tracker.¹⁵¹

Table 2 Cybercrime legislation in BRICS countries

Destination	Cybercrime legislation
Brazil	Código Penal Brasileiro (Penal Code of Brazil); Law No. 12.965, de 23 de Abril de 2014; Law 11,829/2008; Law No. 12.737, 2012
Russian Federation	Federal Law No. 187-FZ of 26 July 2017; Criminal Code of the Russian Federation (with the latest amendments of 1 July 2021), Chapter 28. Crimes in the Sphere of Computer Information; Federal Law No. 149-FZ of 27 July 2006 'On Information, Information Technologies, and Protection of Information' (with the latest amendments of 2 July 2021)
India	Information Telecommunication Act of 2000, amended in 2008
China	Criminal Law of the People's Republic of China, as amended
South Africa	Electronic Transactions and Communications Act 2002

Source: UNCTAD Cyberlaw Tracker, updated in 2022

Brazil's Institutional Security Cabinet of the Presidency of the Republic of Brazil is the body of the federal government responsible for cybersecurity coordination, within the federal public administration, according to Law No. 13,844/2019. This Cabinet has made several advances in policies related to digital security, including the National Information Security Policy,¹⁵² the National Cybersecurity Strategy,¹⁵³ the National Critical Infrastructure Security Strategy¹⁵⁴ and the Federal Cyber Incident Management Network.¹⁵⁵ For transparency purposes, English versions of relevant policies are available on the government website.¹⁵⁶

144 See Personal Information Protection Law of the People's Republic of China, available at: http://en.npc.gov.cn.cdurl.cn/2021-12/29/c_694559.htm

145 *Ibid.*, Article 40.

146 See E-Commerce Law of China (2018), available at https://ipkey.eu/sites/default/files/documents/resources/PRC_E-Commerce_Law.pdf

147 Government Gazette, Protection of Personal Information Act (2013), available at https://www.gov.za/sites/default/files/gcis_document/201409/3706726-11act4of2013popi.pdf

148 *Ibid.*, Chapter 5, Part A.

149 International Telecommunications Union (2020). *Global Cybersecurity Index*. Available at <https://www.itu.int/en/ITU-D/Cybersecurity/Pages/global-cybersecurity-index.aspx>

150 See Comparitech (2021). 'Which countries have the worst (and best) cybersecurity?' Available at <https://www.comparitech.com/blog/vpn-privacy/cybersecurity-by-country/>

151 UNCTAD, Cyberlaw Tracker, available at <https://unctad.org/page/cybercrime-legislation-worldwide>

152 http://www.planalto.gov.br/ccivil_03/_ato2015-2018/2018/decreto/D9637.htm (in Portuguese)

153 http://www.planalto.gov.br/ccivil_03/_ato2019-2022/2020/decreto/D10222.htm (in Portuguese)

154 http://www.planalto.gov.br/ccivil_03/_ato2019-2022/2020/decreto/D10569.htm (in Portuguese)

155 http://www.planalto.gov.br/ccivil_03/_ato2019-2022/2020/decreto/D10569.htm (in Portuguese)

156 <https://www.gov.br/gsi/pt-br/assuntos/dsi/legislacao>

The cabinet is committed to the implementation of the National Cybersecurity Strategy, introduced in 2020 via a presidential decree. However, a more comprehensive rule in the form of a law on cybersecurity is still needed. In line with National Cybersecurity Strategy, the presidency has been working on a national policy – the National Cyber Security Policy that applies to individuals, government organizations and private firms.

China's Cybersecurity Law (2017) aims to secure the internet network, protect rights of citizens and safeguard national security. National critical information infrastructure owners purchasing network products and services face a security review according to this law. The Password Law of the People's Republic of China was introduced in 2019 to regulate encryption by encouraging enterprises to apply voluntarily for testing and certification.¹⁵⁷

South Africa's Cybercrimes and Cybersecurity Act (2021) identifies unlawful access to a computing device, USB drive or external hard drive as a cybercrime.¹⁵⁸ This law covers illegal interception of data, sending harmful messages, fraud and extortion online.

India and the Russian Federation do not have dedicated cybersecurity laws. Several existing laws, such as the national criminal code and sector-specific regulations, individually and collectively regulate cybercrimes in these countries. National criminal laws in the Russian Federation, for instance, establish liabilities for using cyber tools such as hacking or spreading viruses online. A law aimed at securing critical infrastructure has also been in place in the Russian Federation since 2017.¹⁵⁹

Public utilities in India engaged in distribution and transmission of electricity are required to implement a cybersecurity framework to identify and protect critical cyber assets for reliable operation of the grid.¹⁶⁰ Developing a specific cybersecurity law is one of the goals of Brazil's National Cybersecurity Strategy, which sets out strategic measures to strengthen cybersecurity in the country.

Algorithms and AI

Artificial intelligence technologies can be leveraged to build economic and strategic power.¹⁶¹ BRICS countries have adopted strategies and policies to promote and regulate the use of AI technologies.

Brazil's Artificial Intelligence Strategy (2021) covers elements relating to AI such as economy, ethics and social development. It aims to enhance trustworthiness of AI by developing ethical principles to guide responsible use of AI, remove barriers to innovation, enhance AI-related skills and promote domestic technology overseas.¹⁶² The strategy aims to expand collaboration among the government, the private sector and academia to boost domestic capacity.

A national AI innovation network that was created in 2020 includes 17 research centres.¹⁶³ The lower house of the Brazilian Parliament (Chamber of Deputies) approved a bill setting out rights and duties for use of AI; the bill is set to proceed to the Senate for voting.¹⁶⁴ Core principles established under this bill include self-regulation, risk management guidelines and harmonization with laws such as data protection. Further, the bill sets out subjective liability on agents who work in the development and operation of AI systems.¹⁶⁵

In 2019, the Russian Federation adopted a National Strategy for the Development of Artificial Intelligence through 2030. The strategy aims to position the Russian Federation as an adopter of AI technology by 2024 and eliminate the gap with developed economies by 2030. Key development priorities highlighted in the strategy include creating a high-performing export-oriented sector in AI technologies and increased support for private and state-sponsored scientific research and patent applications on AI.¹⁶⁶

India has no rules, regulations or guidelines on AI. NITI Aayog, a government think-tank, has been tasked to develop a national programme in this area. A 2018 discussion paper titled 'National Strategy for Artificial

157 Password Law of the People's Republic of China, available at <http://www.npc.gov.cn/npc/c30834/201910/6f7be7dd5ae5459a8de8baf36296bc74.shtml>

158 The Cyber Security and Cyber Crime Act (2021), available at <https://www.parliament.gov.zm/node/8832>

159 Federal Law of 26 July 2017 No. 187-FZ

160 Central Electricity Regulatory Commission (Indian Electricity Grid Code) Regulations (2010), available at <https://cercind.gov.in/2016/regulation/9.pdf>

161 UNCTAD (2021). *Digital Economy Report*, op. cit.

162 Ministry of Science, Technology and Innovations, available at <https://www.gov.br/mcti/pt-br/acompanhe-o-mcti/transformacaodigital/inteligencia-artificial>

163 Ministry of Science, Technology and Innovations and the Brazilian Industrial Research and Innovation Company as the nodal coordinating agencies.

164 See Non-official translation of the Brazilian Artificial Intelligence Bill n.21/2020, available at: <https://cyberbrics.info/non-official-translation-of-the-brazilian-artificial-intelligence-bill-n-21-2020/>

165 *Ibid.*; see also, PL 21/2020, available at: <https://www.camara.leg.br/propostas-legislativas/2236340>; and see also, Projeto de Lei N. 21-A de 2020, available at: <https://cyberbrics.info/wp-content/uploads/2021/10/inteiroTeor-2083275.pdf>

166 See, Decree of the President of the Russian Federation of October 10, 2019 No. 490 "On the development of artificial intelligence in the Russian Federation", available at: <https://www.garant.ru/products/ipo/prime/doc/72738946/>; the Concept for the Development of Regulation of Relations in the Field of Artificial Intelligence Technology and Robotics Technology has been approved until 2024, see Order of the Government of the Russian Federation of 19 August 2020 No. 2129-r

Intelligence' identified focus areas where AI could be implemented: healthcare, agriculture, education, smart cities and infrastructure, and transportation.¹⁶⁷ NITI Aayog recommended increasing AI adoption by skilling and reskilling of the workforce, creating international centres for AI aimed at applied research, and establishing a formal marketplace focused on data collection and aggregation.

In a follow-up paper issued in 2021, NITI Aayog suggested that AI policies in India should include a risk-based mechanism and regulations should be proportionate with the likelihood of harm caused by an AI system. The paper also proposed creating an independent, multidisciplinary advisory body, tentatively called the Council for Ethics and Technology, that would formulate suitable AI policies in different sectors.¹⁶⁸

The Government of India is implementing some of the recommendations made by NITI Aayog in these discussion papers.¹⁶⁹

The Cyberspace Administration of China released a draft guideline on algorithms in August 2021.¹⁷⁰

The guideline promotes safe algorithms that generate recommendations based on user data.¹⁷¹ The Cyberspace Administration of China fixes a three-year timeframe to establish a comprehensive governance structure for algorithm security in the country.¹⁷²

The Ministry of Science and Technology has also released norms to incorporate ethics within the AI lifecycle, and promote fairness while mitigating biases and information leaks.¹⁷³ Education plans have been published that seek to make Chinese colleges and universities global AI innovation centres by 2030 by enhancing artificial intelligence talent and curricula.¹⁷⁴ As of December 2021, China had 17 national AI innovative

development pilot zones, with the aim to build and additional three zones by 2023.¹⁷⁵

South Africa has no national policies regulating the use of AI. A national commission was established in 2019 to study how the country could benefit from the Fourth Industrial Revolution. It has suggested investing in human capital, establishing a national AI institute, developing a platform for advanced manufacturing and embedding AI in the financial-services sector.¹⁷⁶

For BRICS countries, AI can only fully be harnessed if MSMEs can also benefit from it. Despite the number of start-ups and pilot projects, few MSMEs in BRICS countries have made use of AI technologies. Mechanisms could be developed to keep track of the levels of MSME adoption of AI as well as the challenges they encounter in using AI technologies. Potential regulatory challenges could also be studied, including vis-à-vis access to data and computing facilities for MSMEs, competition policies and access to finance.

Platform governance

Digital platforms are new marketplaces in the digital economy. They link sellers with buyers and process data to generate intelligence, products and services. Enhancing platform governance mainly entails reviewing and updating laws and regulations and making them fit for the digital era.

Online consumer protection

Consumers face new risks when transacting online, such as difficulty to assess product quality, uncertainty about product delivery, return and replacement policies, e-payment fraud, ambiguity or absence of jurisdiction to settle disputes, and onerous terms and conditions.¹⁷⁷

167 For more on NITI Aayog, see <https://www.niti.gov.in/>

168 See NITI Aayog (August 2021). *Responsible AI #AIForAll: Approach Document for India*. Available at <https://www.niti.gov.in/sites/default/files/2021-08/Part2-Responsible-AI-12082021.pdf>

169 See Lok Sabha, Unstarred question on the National Strategy on Artificial Intelligence, available at <http://164.100.47.194/Loksabha/Questions/QRResult15.aspx?qref=14075&lsno=17>

170 Notice of the Cyberspace Administration of China on Public Solicitation of Comments on the Provisions on the Administration of Internet Information Service Algorithms Recommendation (2021). Available at http://www.cac.gov.cn/2021-08/27/c_1631652502874117.htm

171 *Ibid.*, Article 2.

172 See Guiding Opinions on Strengthening the Comprehensive Governance of Internet Information Service Algorithms (2021), available at http://www.cac.gov.cn/2021-09/29/c_1634507915623047.htm

173 The ministry's National New Generation Artificial Intelligence Governance Specialist Committee issued a report on ethical norms for new-generation AI in 2021. Available at http://www.most.gov.cn/kjbgz/202109/t20210926_177063.html

174 Ministry of Education of the People's Republic of China (2018). Notice of the ministry of education on printing and distributing the action plan for artificial intelligence innovation in colleges and universities, AI Innovation Plan for Institutions of Higher Education. Available at http://www.moe.gov.cn/srcsite/A16/s7062/201804/t20180410_332722.html

175 See the State Council of the People's Republic of China, 17 AI pilot zones built in China. Available at http://english.www.gov.cn/statecouncil/ministries/202112/06/content_WS61ae0e58c6d09c94e48a1c59.html

176 Government Gazette, Report of the Presidential Commission on the 4th Industrial Revolution, available at https://www.gov.za/sites/default/files/gcis_document/202010/43834gen591.pdf

177 See World Bank (2021). *World Development Report 2021: Data for Better Lives*. Available at <https://wdr2021.worldbank.org/>

Addressing online consumer protection can boost trust. This will, in turn, benefit businesses and pave way for development of the digital economy.

India adopted Consumer Protection (E-commerce) Rules in 2020. These rules regulate online consumer protection across inventory-based e-commerce and marketplace e-commerce platforms. India also updated consumer protection legislation, which clarifies that the purchase of goods includes offline or online transactions through electronic means or by teleshopping.¹⁷⁸

China's E-Commerce Law (2019) provides a comprehensive framework to regulate e-commerce markets, including by safeguarding consumers and preventing the sale of counterfeit products on online marketplaces. The law sets out requirements for digital platforms to ensure consumer rights. E-commerce platforms, for instance, are not allowed to delete comments provided by consumers.¹⁷⁹

General consumer protection laws in Brazil¹⁸⁰, the Russian Federation¹⁸¹, and South Africa¹⁸² protect online transactions. However, specific rules providing consumer protection for online sales have also been introduced in these countries.¹⁸³

Advertisers targeting consumers in the Russian Federation, for instance, must obtain consent before showing such advertisements. The legislation governing e-signatures in South Africa mandates that a minimum amount of information should be made available on the website where transactions take place.¹⁸⁴

In Brazil, the National Council to Combat Piracy and Crimes Against Intellectual Property published a guide on good practices and conduct for e-commerce platforms to implement measures against sale of pirated products – counterfeit or smuggled – or any infringement of intellectual property rights. To enhance the value of the initiative, the Ministry of Economy and the national council collaborated on a booklet about it that was released in April 2022.

China and South Africa have rules regulating unsolicited commercial e-mails. China's Regulations on Internet E-mail Services (2006) require a recipient's explicit consent to be included on a mass e-mail list.¹⁸⁵ While spam is not illegal in South Africa per se, certain conditions set out in the Electronic Communications and Transactions Act (2002) must be met, including the option to cancel subscription to the mailing list. In the Russian Federation, internet users can seek compensation from a spammer in some cases, based on the national communication law.¹⁸⁶

Taxation of the digital economy

Digitalization poses new challenges to taxation, as companies can make profits in countries without having a physical presence there. The permanent establishment concept, which has been a central pillar for taxation, is hard to apply in many instances to 'asset-light' digital economy firms that often lack a physical presence in that country. Many countries, including the BRICS, are exploring ways to levy taxes in the digital economy.

In Brazil, the National Congress is debating whether to introduce taxes on digital services. Although numerous bills have been tabled in Brazil's parliament, no final decision has been made. The bills include proposals of digital service taxes ranging from 1%–5% on gross revenue accruing from advertising on digital platforms, online streaming and downloading of digital content. Another bill seeks to increase the rate of COFINS – a monthly federal social assistance contribution calculated as a percentage of revenue – by 3% on the gross revenues of digital platforms.

India has imposed a 6% digital tax on online advertisement services since 2016.¹⁸⁷ In 2020, the country introduced a digital tax of 2% on foreign firms with annual revenue exceeding INR 20 million (about \$250,000) and that sell goods and services online to customers in India.¹⁸⁸ The tax aims to level the playing

178 Section 2(7), Consumer Protection Act (2019), available at <https://egazette.nic.in/WriteReadData/2019/210422.pdf>

179 Article 39, E-Commerce Law (2019), available at https://ipkey.eu/sites/default/files/documents/resources/PRC_E-Commerce_Law.pdf.

180 See Secretaria de Estado de Proteção e Defesa do Consumidor, Code on Consumer Defense and Protection (1990), available at http://www.procon.rj.gov.br/procon/assets/arquivos/arquivos/CDC_Novembro_2014_Inglês.pdf

181 Law on Protection of Consumers' Rights (1992), available at https://www.wto.org/english/thewto_e/acc_e/rus_e/wtaccrus48_leg_78.pdf

182 Consumer Protection Act (2008), available at https://www.gov.za/sites/default/files/gcis_document/201409/34180rg9515gon293b.pdf; and Consumer Protection Act Regulations (2011), available at https://www.gov.za/sites/default/files/gcis_document/201409/34180rg9515gon293b.pdf

183 Federal Law on Information, Information Technologies and Information Protection No. 149-FZ

184 Electronic Communications and Transactions Act (2002), available at https://www.gov.za/sites/default/files/gcis_document/201409/a25-02.pdf

185 Measures for administration of e-mail services on internet, available at <http://www.asianlii.org/cn/legis/cen/laws/mtaoesoi533/>

186 See Article 62, Federal Law on Communication, available at <https://www.itu.int/osg/spu/spam/contributions/UNESCO-IFAP.pdf>

187 For all digital tax related information in Brazil, see KPMG (2021), Brazil: Review of digital services tax proposals, available at <https://home.kpmg/us/en/home/insights/2021/04/tmf-brazil-review-of-digital-services-tax-proposals.html>

188 India Briefing, India's Digital Tax: Rules Where Levy is Applicable. Available at <https://www.india-briefing.com/news/indias-digital-tax-2-percent-not-applicable-foreign-e-commerce-companies-indian-arm-21956.html/>

field for local businesses that have to pay taxes in the country. Further, digital assets such as cryptocurrencies fall within the 'highest slab' of taxes in India and face a 30% income tax.¹⁸⁹

Other BRICS countries are considering new digital taxes. China has stated its commitment to participate in the development of international standards for taxing digital currency and services.¹⁹⁰ Taxing digital services was also part of South Africa's Davis Tax Commission report of 2016. The country already imposes income tax on cryptocurrencies.

Some BRICS countries apply a value-added tax on products purchased online. Online sales of merchandise are deemed equivalent to regular sales of goods and are subject to value added tax in Brazil. ICMS tax, a state-level sales tax across Brazil on the movement of merchandise, is levied on transactions involving digital products.

Consumers of digital services who live in India are subject to an 18% goods and services tax. Amendments made in 2020 to the tax law in the Russian Federation exempt domestic companies in the information technology and digital sectors from value-added tax. China and South Africa do not impose value-added tax on digital services, but both have considered developing a digital services tax regime.

Competition policy

Platforms often benefit from network effects as the more users on a platform, the greater its 'usefulness' to all its users. This can lead to market concentration and increase the risk of anti-competitive business practices. These challenges require updated competition regulations to ensure that digital platforms provide a level playing field and do not leverage their data and market power to the disadvantage of smaller businesses. Lack of adequate competition regulations in the digital economy can result in reduced innovation, higher prices for goods and services, and lack of consumer control over their data.

BRICS countries have enhanced their competition regulations and have investigated cases on anti-competitive practices in digital markets. This is a key issue for BRICS cooperation in the BRICS Working Group on Competition Issues in the Digital Market. The working group prepared a compilation of best practices to tackle anti-competitive behaviour in the digital economy in 2019.¹⁹¹

BRICS competition authorities have signed a Memorandum of Understanding on cooperation in the field of competition law and policy.¹⁹² To avoid duplicating the work of that working group, this report only lists the competent authorities in BRICS in charge of competition issues in the digital economy.

Brazil's Conselho Administrativo de Defesa Econômica (Cade) is responsible for antitrust cases. Cade has dealt with cases where parties applied algorithms to run pricing policy and claims of anti-competitive use of AdWords advertising tool by Google.¹⁹³ Cade has also analysed several mergers and acquisition, the acquisition of LinkedIn by Microsoft and the acquisition of Vevo by Google. Cade cleared both transactions.¹⁹⁴

The Russian Federation's Federal Anti-Monopoly Service is the enforcement agency of anti-monopoly legislation.¹⁹⁵ Amendments to the country's competition legislation were made in 2021 to introduce a fifth anti-monopoly package. While the development of the rules is still ongoing, the new package is expected to cover digital competition issues.¹⁹⁶

India's Competition Commission is entrusted with investigating anti-competitive activities in the country. Recently, the commission has focused on digital markets and has reviewed several cases involving innovation, e-commerce and technology-driven markets. On the sharing economy, the Supreme Court of India has defined the relevant market for cases against Uber to be that for 'radio taxi services', a market that includes platform-based offerings such as Uber,

189 *The Economic Times* (3 February 2022). 'Budget 2022 levies 30% tax and TDS on cryptocurrency assets.' Available at <https://economictimes.indiatimes.com/wealth/tax/budget-2022-levies-30-tax-and-tds-on-crypto-assets/articleshow/89267756.cms>

190 Zhang, Zoey (18 June 2021). 'China's Position on the Digital Service Tax.' Available at <https://www.china-briefing.com/news/chinas-position-on-the-digital-service-tax/>

191 Government of Brazil (16 September 2021). Cade releases report on digital economy during the VI BRICS Competition Conference. Available at <https://cdn.cade.gov.br/Portal/centrais-de-conteudo/publicacoes/brics-in-the-digital-economy/brics-digital-economy-cade.pdf>

192 BRICS, Moscow Declaration, available at <https://eng.brics-russia2020.ru/images/114/81/1148126.pdf>

193 See reference to Case no. 08700.002055/2021-10; and Case no. 08700.005694/2013-19 in OECD, Ex-Ante regulation and competition in digital markets – Note by Brazil (16 November 2021), available at [https://one.oecd.org/document/DAF/COMP/WD\(2021\)63/en/pdf](https://one.oecd.org/document/DAF/COMP/WD(2021)63/en/pdf)

194 See UNCTAD (February 2021), *Competition and Consumer Protection Policies for Inclusive Development in the Digital Era*, https://unctad.org/system/files/official-document/ditccplp2021d2_en_0.pdf

195 Federal Law No. 135-FZ (2006)

196 See 'BRICS Competition Law and Policy Centre, FAS has proposed an updated version of the 5th anti-monopoly package', available at <http://bricscompetition.org/news/fas-has-proposed-an-updated-version-of-the-5th-antimonopoly-package>

as well as more traditional offerings that are likewise dispatched in response to calls.¹⁹⁷

China's State Administration for Market Regulation entered into force in May 2018. Entities with a dominant market position are prohibited from abusing that position. Such abuse can include selling goods at unfairly high prices or at prices below cost without justifiable cause. The State Administration for Market Regulation published Antitrust Guidelines for the Platform Economy Industry in February 2021.¹⁹⁸

South Africa's Competition Commission released a white paper in 2021 highlighting ways the country's competition laws can be applied to achieve equitable outcomes in the digital economy.¹⁹⁹

Intermediary liability

Whether internet intermediaries should be immune from liability for the behaviour and content generated by users on their platforms is a key policy issue. All BRICS countries except South Africa have rules related to online intermediary liability. They apply to internet intermediaries such as social media platforms, online search engines, content aggregation services and internet-based messaging services.

In Brazil, the Civil Rights Framework for the Internet (Marco Civil law) establishes exemptions to the liability of providers in relation to third-party content. Platform providers are exempt from liability for user content and behaviour. The Russian Federation has a general framework for intermediary liability for intellectual property infringements and introduces a notice-and-takedown system, as well as a preliminary injunctive relief mechanism to block websites accused of copyright infringement.²⁰⁰

India has issued draft rules on intermediary liability titled Information Technology (Intermediary Guidelines and Digital Media Ethics Code) Rules, 2021.²⁰¹ The E-Commerce Law in China indicates that the platforms maybe partially liable in some cases.

Digital labour

Technological improvements have raised concerns about job losses as production becomes increasingly automated.²⁰² New technologies can disrupt the labour market in many ways, including leading to the disappearance of jobs in some sectors and the creation of new jobs in others. The digital economy will require a range of new skills, a new set of social protection policies and a new relationship between work and leisure.²⁰³ It also affects legislation protecting the rights of workers that was written for pre-digital employment and the protection it offers workers in the digital economy.

BRICS countries have updated some of their labour laws and policies to account for the rights of workers in the digital economy – more specifically on labour involved in digital platforms. China has outlined new rules to safeguard rights of drivers by requiring platforms to provide them with social insurance. It has also informed digital platforms to ensure rest periods for drivers and food delivery riders.²⁰⁴

India has issued guidelines to regulate cab aggregators, capping the share of the aggregator at 20% and the driver receiving 80% of the total fare.²⁰⁵ Brazil's AI policy is based on guiding principles that also account for socioeconomic impacts of AI on the human workforce.²⁰⁶

197 Uber India Systems Pvt. Ltd. v Competition Commission of India, Civil Appeal No. 641 of 2017; see also UNCTAD (February 2021), *Competition and Consumer Protection Policies for Inclusive Development in the Digital Era*, op. cit.

198 Competition Policy International (29 March 2021). Antitrust Guidelines for the Platform Economy in the Era of Enhanced Antitrust Scrutiny. Available at <https://www.competitionpolicyinternational.com/antitrust-guidelines-for-the-platform-economy-in-the-era-of-enhanced-antitrust-scrutiny/>

199 'Competition Commission of South Africa, Competition in the Digital Economy' (2020), available at <http://www.compcom.co.za/wp-content/uploads/2021/03/Digital-Markets-Paper-2021-002-1.pdf>

200 See Federal Law No. 187-FZ, available at <https://wilmap.law.stanford.edu/entries/federal-law-no-187-fz>

201 See Indian Ministry of Electronics and Information Technology, Intermediary Liability, available at: <https://www.meity.gov.in/content/notification-dated-25th-february-2021-gsr-139e-information-technology-intermediary>

202 See International Labour Organization (2021). *World Employment and Social Outlook 2021: The role of digital labour platforms in transforming the world of work*. Available at <https://www.ilo.org/global/research/global-reports/weso/2021/lang--en/index.htm>

203 UNCTAD (2021). *Digital Economy Report*, op. cit.

204 Reuters (30 November 2021). 'China sets rules to safeguard drivers' rights in ride-hailing industry.' Available at [https://www.reuters.com/world/china/china-beefs-up-rights-workers-ride-hailing-industry-2021-11-30/#:~:text=BEIJING%2C%20Nov%2030%20\(Reuters\),and%20make%20their%20earnings%20public](https://www.reuters.com/world/china/china-beefs-up-rights-workers-ride-hailing-industry-2021-11-30/#:~:text=BEIJING%2C%20Nov%2030%20(Reuters),and%20make%20their%20earnings%20public)

205 Ministry of Road Transport and Highways (Transport Section) (2020). Motor Vehicle Aggregators Guidelines, available at https://morth.nic.in/sites/default/files/notifications_document/Motor%20Vehicle%20Aggregators27112020150046.pdf

206 See <https://www.oecd.org/digital/artificial-intelligence/>

Ecosystem development

The digital economy cannot thrive without a supporting ecosystem, including digital infrastructure, education and skills, financial regulations and trade and investment policies. As digital infrastructure has been covered in Chapter 3, this section will mainly cover education and skills development as well as financial regulations and trade and investment policies.

Education and digital skills development

The World Economic Forum predicts that 65% of today's primary school students will be working in a job that does not yet exist. Empowering people with the skills needed to succeed in the digital world has therefore become all the more urgent.²⁰⁷ Beyond employees working in the information technology sector, digital skills development programmes is essential to develop the digital economy and bridge digital gaps.

Digital skill is a broad term that range from basic use of e-mails and social media to being able to launch an e-commerce site and adopting IoT and AI to improve business output. Awareness-raising and training opportunities by government-led efforts remain important targets for BRICS countries.²⁰⁸ Promoting digital literacy is also a sustainable development priority.²⁰⁹

Reskilling can be carried out through businesses and private-sector associations. All BRICS countries have highlighted the need to develop digital skills, equip the workforce to support the planned widespread digitalization of the economy and narrow the digital divide.

Brazil's E-Digital programme stresses the importance of educational and professional skills.

The Ministry of Education has stated the need to enhance literacy in digital technology, digital culture and computational thinking.²¹⁰ The Brazil Mais Digital programme led to the launch of an online education programme for capacity building in the information technology sector targeting youth (ages 16–25 years). New vocational training opportunities under the Pronatec programme also disseminate digital skills.

The Russian Federation's digital education programme is set out under the Personnel and Education programme (2019). Trainings are offered to government officials and employees of commercial firms. Students over age 14 are trained in computer languages in some regions of the country. A programme providing citizens with information technology education at a reduced cost has also been launched. Various vocational trainings related to the digital economy are available to teachers, civil servants, school children and citizens.²¹¹ By 2020, 27% of adult Russians had a 'high degree of digital competence'.²¹²

India's national programme, PMGDISHA, launched in 2017, aims to bridge the digital divide across rural and urban areas in the country. It seeks to provide digital literacy to 60 million people through 20-hour courses on basic digital services.²¹³ In addition, the National Digital Literacy Mission scheme works to give at least one person per household crucial digital literacy skills. Various governmental departments and corporate partners have trained 110,000 people under this programme.²¹⁴ The curriculum covers accessing the internet, using e-mails and social media, and e-commerce.²¹⁵

207 World Economic Forum (2020), op. cit. See also OECD (September 2018). *Which skills for the digital era? Returns to skills analysis*. Available at: <https://www.oecd-ilibrary.org/docserver/9a9479b5-en.pdf?expires=1656885003&id=id&accname=guest&checksum=E8072544F09A09D729D2B0EB8153BEA3>

208 See UNCTAD (15 March 2021). *How COVID-19 triggered the digital and e-commerce turning point*. Available at <https://unctad.org/news/how-covid-19-triggered-digital-and-e-commerce-turning-point>

209 United Nations Sustainable Development Goals, SDG Indicators. Available at <https://unstats.un.org/sdgs/metadata/?Text=&Goal=4&Target=4.4>

210 Brazilian Ministry of Education et al., *Brazilian Common Curricular Base*. Available at http://basenacionalcomum.mec.gov.br/images/BNCC_EI_EF_110518_-versaofinal_site.pdf

211 See TAdviser (June 2022). *Personnel and education in the digital economy of Russia*. Available at https://tadviser.com/index.php/Article:Personnel_and_education_in_the_digital_economy_of_Russia#Ministry_of_Digital_Sciences_introduces_cyber_literacy_courses_for_officials

212 NAFI Research Centre, *Industry analytics*, available at <https://nafi.ru/en/analytics/?TYPE%5B0%5D=2&SORT=0&PAGE=2>

213 See Pradhan Mantri Gramin Digital Sakshatra Abhiyan, available at <https://www.pmgdisha.in/>

214 NASSCOM Foundation, *National Digital Literacy Mission*, available at <https://nasscomfoundation.org/national-digital-literacy-mission/>

215 For instance, the Internet Saathi programme launched by Tata Trust in collaboration with Google has given digital literacy training to more than 20 million women across 200,000 villages. See Tata Trust, *Internet Saathi*, available at <https://www.tatatrusts.org/our-work/digital-transformation/digital-literacy/internet-saathi>

China's current five-year National Plan underscores the importance of boosting digital skills in education and training.²¹⁶ The Cyberspace Administration of China has started a national action plan to improve digital literacy and skills by 2025.²¹⁷ It targets 40 million people to get certificates and more than eight million people to receive titles of senior engineers by 2025. A national policy has been introduced to reduce the 'elderly digital divide' by helping elderly people develop skills to use information technology.²¹⁸

South Africa's National Digital and Future Skills Strategy (2020) seeks to foster digital skills from early childhood to adult training. Policies are also in place to provide digital skills to workers in certain sectors, such as schoolteachers and government officials.²¹⁹

Financial regulation

Financial regulations must be adapted to the rapid uptake of e-payments and fintech, as well as globalized financial markets. Use of regulatory sandboxes may be considered as an option to catalyse technological innovation with minimum risks to the stability of the market and integrity of the regulations.

BRICS countries have introduced new regulations to keep pace with innovative digital financial services. The Central Bank of Brazil created a regulatory sandbox, effective since 1 December 2020, in the financial and payment services market. Firms can receive temporary authorization to test innovative projects in the market if they meet certain requirements.

The Russian Federation implemented the Basic Guidelines for Financial Technologies Development

in 2018.²²⁰ In India, the Reserve Bank of India regulates digital wallets. The Enabling Framework for Regulatory Sandbox was released in 2019 and allows testing of new products or services that would otherwise be subject to restrictions.²²¹ The FinTech Development Plan (2019–2021) governs China's fintech regulatory framework. South Africa's Intergovernmental Fintech Working Group, launched in 2016, promotes fintech and innovation in the domestic financial sector.²²²

BRICS countries have started to issue, or are in the process of developing, national central bank digital currencies. Brazil is set to launch the digital real in 2022,²²³ the Russian Federation has begun pilot projects on digital currency,²²⁴ India is expected to launch a digital rupee in 2023,²²⁵ China rolled out the e-CNY or digital yuan at the 2022 Winter Olympics and South Africa recently completed a prototype development for a digital currency.²²⁶ In 2019, the BRICS Business Council proposed developing a unified payment system for BRICS countries.²²⁷

Trade policy

E-commerce and digital trade are increasingly vital parts of trade agreements. Commitments to remove trade barriers for goods, services and data flows are sometimes made to provide assurances to businesses.

All BRICS countries except South Africa have entered into trade agreements containing e-commerce or digital trade provisions. Brazil has negotiated and signed the MERCOSUR Agreement on Electronic Commerce (together with Argentina, Paraguay and Uruguay) and is engaged in negotiations with other partners (Singapore, Canada, Republic of Korea).

216 The People's Government of Fujian Province, Outline of the 14th Five-Year Plan (2021–2025) for National Economic and Social Development and Vision 2035 of the People's Republic of China. Available at https://www.fujian.gov.cn/english/news/202108/t20210809_5665713.htm

217 The State Council (8 January 2022). Work training programs to be renewed. Available at https://english.www.gov.cn/news/pressbriefings/202201/08/content_WS61d8c688c6d09c94e48a3517.html

218 Chinese Ministry of Commerce (2020). The General Office of the State Council issued a notice on practical solutions Notice of the implementation plan for the difficulty of using intelligent technology for the elderly. Available at: http://www.gov.cn/zhengce/content/2020-11/24/content_5563804.htm

219 Department of Basic Education, et al., Professional Development Framework for Digital Learning. Available at <https://www.education.gov.za/Portals/0/Documents/Publications/Digital%20Learning%20Framework.pdf?ver=2018-07-09-101748-95>

220 Bank of Russia, Regulatory sandbox, available at https://www.cbr.ru/fintech/regulatory_sandbox/

221 Reserve Bank of India (n.d.). Enabling Framework for Regulatory Sandbox. Available at <https://rbidocs.rbi.org.in/rdocs/PublicationReport/Pdfs/ENABLING79D8EBD31FED47A0BE21158C337123BF.PDF>

222 Intergovernmental Fintech Working Group, HE Innovation Hub, available at <https://www.ifwg.co.za/Pages/About-Us.aspx>

223 See ZDNet (14 April 2022). Brazil on track to roll out digital currency in 2022. Available at <https://www.zdnet.com/finance/banking/brazil-on-track-to-roll-out-digital-currency-in-2022/>

224 See Coindesk (16 February 2022). Bank of Russia proceeds with digital rouble. Available at <https://www.coindesk.com/policy/2022/02/16/bank-of-russia-proceeds-with-digital-ruble-renews-push-for-crypto-ban/>

225 See *Economic Times*, (17 February 2022). 'What is Digital Rupee, how it works,' available at <https://economictimes.indiatimes.com/wealth/save/what-is-digital-rupee-how-it-works/articleshow/89276572.cms>

226 See Business Tech (22 March 2022). 'South Africa is testing a new type of digital currency,' available at <https://businesstech.co.za/news/banking/570026/south-africa-is-testing-a-new-type-of-digital-currency/>

227 See RBC (14 November 2019). 'BRICS proposed to create a single cryptocurrency for the alliance,' available at <https://www.rbc.ru/economics/14/11/2019/5dcd27a49a794738b8c6fdd8>

Brazil's free trade agreement with Chile, concluded in 2020, also contains provisions on e-commerce.²²⁸

India has a free trade agreement with Singapore that has e-commerce provisions and, since February 2022, a trade accord with the United Arab Emirates that contains an entire chapter on digital trade. The Treaty on the Eurasian Economic Union, to which the Russian Federation is a signatory, contains provisions on e-commerce and data flow. While South Africa has no free trade agreement with provisions on e-commerce, it is part of the African Continental Free Trade Area, which intends to start negotiations e-commerce.

China has signed many trade agreements containing comprehensive e-commerce and digital trade provisions. E-commerce is covered in China's free trade or economic partnership agreements with Australia, Cambodia, Chile, Georgia, Republic of Korea, Macao China and Hong Kong China, as well as the Regional Comprehensive Economic Partnership agreement.²²⁹

In November 2021, China applied to join the Digital Economy Partnership Agreement, a new type of international trade policy instrument initiated by New Zealand, Singapore and Chile. China has also shown interest in joining the Comprehensive and Progressive Agreement for Trans-Pacific Partnership, which contains a comprehensive chapter on e-commerce.²³⁰

E-commerce negotiations at the World Trade Organization are taking place within the work programme on e-commerce. Concurrently, Brazil, China and the Russian Federation also participate in the Joint Statement Initiative (JSI) negotiations on electronic commerce, while India and South

Africa have chosen not to join. India and South Africa question the legal validity of the negotiations²³¹ and stressed that e-commerce negotiations should remain as a topic for multilateral deliberation. India has also indicated that it would be premature to take on multilateral obligations as it is still working to frame its own e-commerce policy.²³²

Investment policy

Investments are vital to the creation and expansion of digital companies. In 2021, Brazilian fintech attracted \$3.7 billion in investments and online retail start-ups pulled in \$1.3 billion.²³³ Indian tech start-ups received \$42 billion,²³⁴ Chinese tech start-ups brought in \$131.6 billion in venture capital funding²³⁵ and South African tech firms attracted \$832 million. While information for the Russian Federation was unavailable, firms such as Yandex are actively investing in tech start-ups.²³⁶

Cross-border investments in technology-driven sectors, such as ICT, have surged during the COVID-19 pandemic.²³⁷ BRICS countries all have welcoming policies towards investments in the digital economy.

Brazil actively encourages foreign direct investment (FDI) in the digital economy. Tax-reductions and exemptions on various domestically produced ICT and digital goods, coupled with a large domestic market and access to the Latin American market, make Brazil an attractive destination.²³⁸ All foreign investors must appoint a representative based in Brazil who, along with a representative of the company receiving the investment, needs to register with the central bank.²³⁹

228 Free trade agreement between Chile and Brazil (2020), available at <https://edit.wto.org/document/show/e62cfb4c-abbf-43d9-ae34-a15c7d057ab4>; economic partnership agreement between Peru and Brazil, available at http://www.sice.oas.org/ctyindex/per/peragreements_e.asp

229 University of Lucerne (2020). TAPED dataset, available at <https://www.unilu.ch/en/faculties/faculty-of-law/professorships/managing-director-internationalisation/research/taped/>

230 Chinese Ministry of Commerce. China formally applied to join the Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP), available at <http://www.mofcom.gov.cn/article/ae/bldhd/202109/20210903199707.shtml>

231 World Trade Organization (2021). Paper by South Africa and India, The legal status of 'Joint Statement Initiatives' and their negotiated outcomes, available at <https://docs.wto.org/dol2fe/Pages/SS/directdoc.aspx?filename=q:/WT/GC/W819.pdf&Open=True>

232 UNCTAD (February 2021). JSI: What's at stake for developing countries, available at https://unctad.org/system/files/official-document/ditctncd2020d5_en.pdf

233 See Start-ups in Brazil attract capital, available at <https://www.pymnts.com/startups/2022/startups-in-brazil-attract-capital-topping-9-4b-in-2021-doubling-2020/>

234 See Financial Express, (19 January 2022). 'Indian tech start-ups raise 42 billion in 2021,' available at <https://www.financialexpress.com/industry/indian-tech-start-ups-raise-42-billion-in-2021-report/2410006/>

235 *South China Morning Post*, 'China venture funding hits record US 131 billion despite crackdown start-ups'. Available at <https://www.scmp.com/tech/article/3162764/china-venture-funding-hits-record-us131-billion-despite-crackdown-start-ups>

236 For instance, Yandex said it would spend \$650 million on e-commerce initiatives in 2021. See Reuters, 'Russia's Yandex ups e-commerce investment plans in 2021 after strong Q2', available at <https://www.reuters.com/technology/russias-yandex-says-q2-adj-net-income-up-34-yy-upgrades-revenue-outlook-2021-07-28/>

237 Economist Intelligence Unit (2021). Digital Technology: Trade challenges and opportunities post pandemic. Available at https://impact.economist.com/perspectives/sites/default/files/eiu_dit_digital_technology_2021.pdf

238 See Ministry of Economy, Processo Produtivo Básico, available at <https://www.gov.br/produtividade-e-comercio-exterior/pt-br/assuntos/competitividade-industrial/processo-produtivo-basico-ppb>

239 Banco Central Do Brasil (2015). International Capitals and Foreign Exchange Markets in Brazil. Available at https://www.bcb.gov.br/rex/legCE/Ingl/Ftp/International_Capitals_and_Foreign_Exchange_Market_at_Brazil.pdf

Foreign investors need not have a minimum amount of capital to invest in digital sectors, but may be required to demonstrate solvency.

The Russian Federation has used incentive programmes to promote FDI in the digital economy.

The Special Investment Contracts programme, developed in 2015, provides subsidies to foreign producers who establish local production lines. This programme was boosted in 2019 through subsidies to long-term private investments in high-technology projects and technology transfer in manufacturing. Criteria for evaluating bids include the speed with which the technology is introduced, the volume of manufacturing and the level of technology in local manufacturing processes.²⁴⁰

India attracts FDI in the digital sector based on an annually updated policy framework.

Programmes such as Make in India and Digital India are designed to promote domestic manufacturing with the help of foreign investments.²⁴¹ These investments can be made in certain sectors without any approval from the relevant government authority.²⁴² Foreign investors investing in venture capital funds are required to register with Securities and Exchange Board of India to invest in Indian firms. All such investments are allowed under the automatic route, subject to national regulations and relevant FDI policies.

China has developed a list of sectors to pull in foreign investment.

Many of the sectors pertain to the digital economy, for example, manufacturing of electronic goods such as 5G equipment (mobile phones, cars, drones, etc.) and their core components, chip-packing equipment and cloud computing equipment are sectors identified to attract FDI. Similarly, development of cold-chain logistics, e-commerce and AI technology are services that China has earmarked for attracting foreign investments.

China is also a major source of outbound FDI, including in the digital economy. China's Digital Silk Road initiative has supported more than \$17 billion in projects since 2013, including in BRICS countries (India's Bharti Airtel and the Russian Federation's Rostelecom).²⁴³

South Africa is open to FDI to drive economic growth and access foreign markets.

Laws have been adopted to protect foreign investors,²⁴⁴ who, along with their investments, must not be treated less favourably than South African investors in like circumstances.²⁴⁵ Improvements in the investment climate helps to attract more FDI in the digital sector. South Africa also benefits from its position in the African continental market and could potentially serve as a regional hub for digital innovation.

E-signatures

Regulations on e-signatures are essential to ensure legal validity and business security of electronic documents.

They are the basic regulations that enable digital transactions. The regulations recognize the legal validity of electronic signatures, allowing documents to be signed online just like a document is signed in the physical world.

BRICS countries have been early adopters of e-signature legislation, with businesses, government entities and private individuals increasingly using the electronic signatures.²⁴⁶

Brazil has allowed the use of e-signatures since 2001.

²⁴⁷ A bill tabled in the national parliament will, if passed, establish the National Digital Signature and Identification System. This system consolidates several documents used by citizens into a national single-digital identification document.²⁴⁸ Another recent law allows the use of e-signatures in communications with public

240 See Federal Law No. 269-FZ 'On Amendments to Parts One and Two of the Tax Code of the Russian Federation', Federal Law No. 290-FZ 'On Amendments to the Federal Law On Industrial Policy in the Russian Federation Regarding the Regulation of Special Investment Contracts', Federal Law No. 295-FZ 'On Amendments to Article 78 of the Budget Code of the Russian Federation'.

241 See Reuters (19 December 2020). 'China issues national security rules on foreign investment,' available at <https://www.reuters.com/world/china/china-issues-national-security-rules-foreign-investment-2020-12-19/>

242 Thomson Reuters (2021). 'Establishing a business in India.'

243 World Economic Forum (2018). China is building a new Silk Road, and this one is digital. Available at <https://www.weforum.org/agenda/2018/08/china-is-building-a-new-silk-road-and-this-one-is-digital> and Mercator Institute for China Studies (2019), Networking the 'Belt and Road' – The future is digital. Available at <https://merics.org/en/tracker/networking-belt-and-road-future-digital>

244 Protection of Investment Act (2015), available at <https://www.gov.za/documents/protection-investment-act-22-2015-15-dec-2015-0000>

245 *Ibid.*

246 A digital signature is secure because it encrypts documents and permanently embeds the information. If a user tries to change the document, the digital signature is invalidated. E-signature are digitalized handwritten signatures that are verified against the identity of the signer, such as e-mail and corporate ID

247 Provisional Executive Act No. 2.200-2 (2001), available at https://www.planalto.gov.br/ccivil_03/MPV/Antigas_2001/2200-2.htm; Notably, this law also established the Brazilian Public Keys Infrastructure, a set of licensed entities formed to guarantee the legal integrity and validity of e-documents in the country.

248 PL 7316 (2019). See also Ministerio Da Economia, Oficio Sei No. 84/2020/ME (2020), available at <https://legis.senado.leg.br/sdleg-getter/documento?dm=8074584&ts=1633537483501&disposition=inline>

entities, including for software licences developed by public entities.²⁴⁹

Under the presidency of Brazil, MERCOSUR countries in 2019 signed the MERCOSUR Agreement on Mutual Recognition of Digital Signatures Certificates, which defines digital signatures as 'data in electronic form resulting from the application of a mathematical cryptographic process to a digital document of information exclusively controlled by the signer – an unequivocally identified person or entity – and issued by a certification service provider accredited by each of the parties.' Uruguay and Argentina have ratified the agreement, which is in the ratification process in the Brazilian Congress.

The use of e-signatures has been permitted in the Russian Federation since 2011. E-signatures can be used for wide-ranging transactions, to perform national and municipal functions, and for legal activities.²⁵⁰ Several domestic banks including Sberbank, AlfaBank and Credit Bank of Moscow also allow the use of e-signatures.²⁵¹

India also has permitted the use of e-signatures,²⁵² though they are not acceptable for certain kinds of documents – such as wills or trusts. Foreign signatories who lack a verified e-signature must prove authenticity of their intention to enter into a contract by showing evidence such as e-mail exchange or conduct of the parties to establish such intention.²⁵³

China has allowed the use of e-signatures since 2005.²⁵⁴ According to Chinese law, parties can use e-signatures in commercial contracts and civil activities. Recently issued guidelines promote the use of electronic

employment contracts between employers and employees using e-signatures.²⁵⁵

South Africa began to allow e-signatures in 2002.²⁵⁶ An e-signature can take various forms, including a typed name in electronic format (for instance, in an e-mail), clicking on the sign button on a website or a scanned manuscript signature transformed into digital format.

BRICS countries offer a unique forum to discuss important governance issues and consider action-oriented and solution-focused responses to boost mutual cooperation. They recognized the importance of the digital economy at an early stage. The second BRICS summit set up mechanisms to discuss the role of the internet and e-commerce in 2012.²⁵⁷ Talks initially explored ways to promote digital development through the intra-BRICS scientific cooperation agenda and eventually transitioned to discussions on ICT infrastructure development.

BRICS countries first addressed digital development in 2015, under the presidency of the Russian Federation at the first meeting of the BRICS Ministers of Communication. The meeting concluded with an action plan on digital development and a decision to establish a working group. The Ufa Declaration of 2015 contained text on the development of digital technologies, particularly on the importance of creating communications infrastructure.²⁵⁸ Subsequent declarations, such as the Goa Declaration in 2016²⁵⁹ and the Xiamen Declaration in 2017, further broadened the scope of collaboration among BRICS countries.²⁶⁰

The launch of the Partnership for the Fourth Industrial Revolution in 2018 heralded deeper cooperation among

249 Law 14,063 (2020), available at <https://www.in.gov.br/en/web/dou/-/lei-n-14.063-de-23-de-setembro-de-2020-279185931>

250 Federal Law 63-FZ (2011). Other regulations governing e-signatures include the Order of the FSB of the Russian Federation No. 795 of 27 (2011) and Order of the FSB of the Russian Federation No. 796 of 27 (2011). See Order of Federal Security Service of the Russian Federation, available at <https://cis-legislation.com/document.fwx?rgn=46707>

251 See, for example, Sberbank, New eSign Application, available at <https://www.sberbank.cz/en/esign>

252 Information Technology Act (2020). Available at <https://www.meity.gov.in/writereaddata/files/The%20Information%20Technology%20Act%2C%202000%2B3%29.pdf>; other domestic laws that form the basis of e-signatures include, Electronic Authentication Technique and Procedure Rules (2015), and the Digital Signatures (End Entity) Rules (2015).

253 See Khaitan & Co., E-Contract in times of COVID-19, available at <https://www.khaitanco.com/covid-19/E-Contract-in-times-of-COVID-19>

254 Electronic Signature Law of the People's Republic of China (2004). Available at http://www.npc.gov.cn/zgrdw/englishnpc/Law/2007-12/05/content_1381960.htm. See also World Intellectual Property Organization (2004). Electronic Signature Law of the People's Republic of China. Available at <https://wipolex.wipo.int/en/text/182409>

255 Guidelines for the Conclusion of Electronic Labour Contracts (2021), available at http://www.gov.cn/zhengce/zhengceku/2021-07/12/content_5624319.htm. See also Contract Law of the People's Republic of China (1999), available at http://www.gov.cn/zhengce/zhengceku/2021-07/12/content_5624319.htm

256 Electronic Communications and Transactions Act (2002), available at <https://www.gov.za/documents/electronic-communications-and-transactions-act#:~:text=The%20Electronic%20Communications%20and%20Transactions%20Act%2025%20of%202002%20intends%3A&text=to%20provide%20for%20human%20resource,of%20e%2Dgovernment%20services%3B%20and>

257 BRICS (2012). Joint Press Release: The 2nd Meeting of the BRICS Trade and Economic Ministers. Available at https://www.ranepa.ru/images/media/brics/inpresidency1/Meeting_BRICS_28th_Mar_2012.pdf

258 See Strategy for BRICS Economic Partnership 2025, available at <https://eng.bricks-russia2020.ru/images/114/81/1148155.pdf>

259 Ministry of External Affairs, Government of India (2016). Goa Declaration at 8th BRICS Summit. Available at <https://mea.gov.in/bilateral-documents.htm?dtl/27491/Goa+Declaration+at+8th+BRICS+Summit>

260 See BRICS Leaders Xiamen Declaration at <http://www.bricks.utoronto.ca/docs/170904-xiamen.html>

BRICS countries. This partnership seeks to develop a common intra-BRICS agenda on the Fourth Industrial Revolution and to enhance cooperation in digitalization and innovation through policy co-ordination, skill development, sharing best practices, and initiating joint infrastructure projects.²⁶¹ It was a catalyst for the BRICS Business Forum, established in 2013, to create a network of BRICS-based innovation hubs to share experiences and strengthen business partnerships.

The partnership's advisory group developed an action plan in 2020 and the following year, an innovation centre was established in Xiamen, China.²⁶²

At a meeting of ICT ministers in 2019, BRICS countries agreed to increase cooperation on connectivity and access to digital technologies, which were identified as key enablers of the digital economy.²⁶³ The BRICS Digital Task Force was set up pursuant to the Brasilia Declaration of 2019. BRICS countries identified cooperation on digital technologies as a priority in the 2020 Moscow Declaration, which is also noteworthy for recognizing the transformative role of the digital economy for industry and society and for identifying an urgent need to create a workstream on consumer protection in e-commerce.²⁶⁴

A BRICS Framework on Consumer Protection in E-Commerce was approved in 2021. Noting that a minimum level of consumer protection to address e-commerce transactions can boost confidence of online consumers, the framework refers to the United Nations Guidelines for Consumer Protection (2015) as a guiding standard. The framework also recommends sharing best practices among BRICS countries

and developing an action plan to further strengthen consumer protection.

BRICS held its first Digital Health Summit in 2021. The meeting concluded by recognizing the need to develop, implement and scale up digital technology to support health service delivery.²⁶⁵

The BRICS Strategy for Economic Partnership 2020–2025, adopted in 2020, provides guidance to improve cooperation on three broad themes: trade, investment and finance; digital economy; and sustainable development. The strategy acknowledges that BRICS countries are not at the same levels of digital development. It stresses the need to address the digital divide and ensure shared benefits of digitalization.²⁶⁶

Key areas to promote further cooperation include:

- Exchanging experiences on regulatory issues of digital transformation
- Enhancing quality of goods and services produced by BRICS countries through digital technologies
- Addressing the digital divide by improving digital skills and supporting digital infrastructure
- Training the workforce and businesses so they have the skills to best use digitization and benefit from the Fourth Industrial Revolution
- Sharing best practices in developing smart cities, big data systems and national unique identification systems
- Acknowledging importance of global digital governance

261 United Nations Industrial Development Organization (August 2020). UNIDO Director General participates in the 5th BRICS Industry Minister's Meeting. Available at <https://www.unido.org/news/unido-director-general-participates-5th-brics-industry-ministers-meeting>

262 See <https://brics-russia2020.ru/images/53/44/534498.pdf>

263 BRICS, Declaration of the 5th BRICS Communications Ministers Meeting, available at <http://www.brics.utoronto.ca/docs/190814-communications.html>

264 BRICS, Moscow Declaration, *op. cit.*

265 See Government of India, Press Information Bureau: India at BRICS Digital Health Summit, available at <https://pib.gov.in/Pressreleaseshare.aspx?PRID=1751824>

266 BRICS, Strategy for BRICS Economic Partnership 2025, *op. cit.*



Chapter 5

Enhancing BRICS cooperation on digital economy

The strategy recognizes the critical role of innovative technologies in harnessing the potential of the digital economy. The 2021 New Delhi Declaration builds on these commitments by highlighting the potential impact of technologies such as AI and big data for economic development. The strategy also recognizes the role of the New Development Bank to finance social infrastructure projects using digital technologies.

Potential areas for further cooperation

BRICS countries have certain comparative advantages in developing the digital economy. Guided by the BRICS Strategy for Economic Partnership 2020–2025 and building on previous initiatives, areas where BRICS countries could potentially further improve digital cooperation include bridging the digital divide; advancing digital governance discussions; enhancing measurement of digital economy, catalysing private-sector cooperation and facilitating development and uptake of new digital technologies.

Improve BRICS cooperation to bridge the digital divide

BRICS countries could work together to bridge the digital divide in the BRICS countries and in other developing countries. BRICS countries are at different levels of digital development, and the digital divides within and between BRICS countries vary. Addressing this divide is essential to ensure that everyone benefits from the digital economy.

Better internet access and digital infrastructure, especially for unconnected or underserved populations, are vital to bridge the digital divide. Infrastructure development entails substantive long-term investment, which requires a stable, predictable and conducive policy environment. Competent authorities in charge of the telecommunication sector and FDI in the BRICS countries could work together to identify

ways to attract foreign investment, including intra-BRICS investments, in digital infrastructure development.

Such cooperation could include:

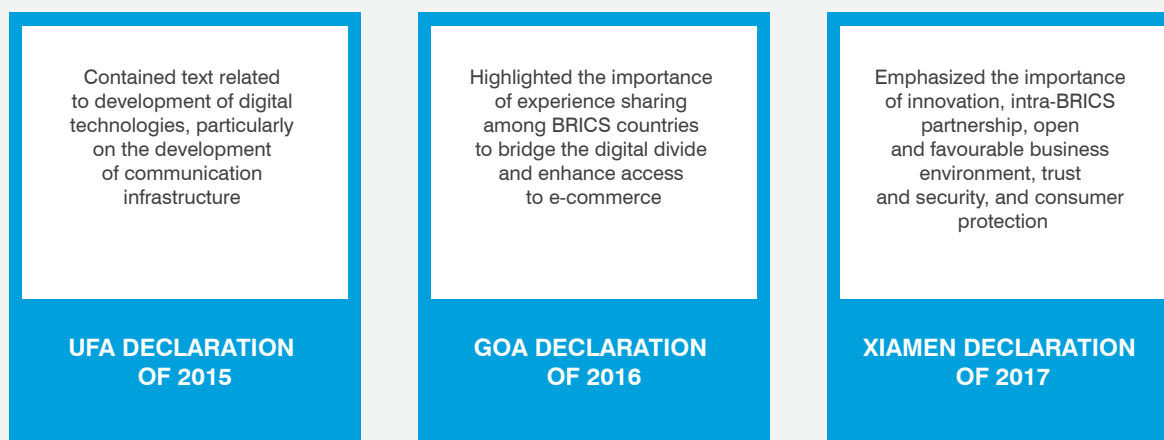
- **Exchanging information and experiences** on investment policies, roadmaps for deployment of technology such as 5G, as well as experience sharing on strategies to encourage foreign investment to help bridge digital gaps.
 - Guided by the Agenda 2030 goal to leave no one behind, BRICS countries should **collectively advocate for bridging the digital divide** in international forums, stressing that developing countries must be given sufficient policy space and support to advance their digital development objectives.
 - The New Development Bank can help finance **digital infrastructure projects**. Envisioned to strengthen cooperation among BRICS and supplement efforts of multilateral and regional financial institutions for global development, the New Development Bank aims to mobilize resources for development projects in BRICS countries as well as other developing economies.²⁶⁷
- The bank has only financed one project involving digital infrastructure: the Pará Sustainable Municipalities Project, which extends fibre optic cable by 1,000 kilometres and provides internet connectivity to 29 municipalities in Brazil.²⁶⁸ This project could provide useful experience on how to leverage New Development Bank resources in digital infrastructure development across and within BRICS countries, which the bank has already identified as a key area of operations.²⁶⁹
- All BRICS countries are trying to promote **digital literacy**. Sharing good practices to improve digital literacy, exchanging curriculum of digital literacy programmes, mutual licensing of successful training programmes so they can be adopted in other BRICS countries and an outreach strategy to potential

267 See New Development Bank, About us, available at <https://www.ndb.int/about-us/essence/history/>

268 See New Development Bank, Projects, available at <https://ndbwebhk.azurewebsites.net/project-summary-the-para-sustainable-municipalities-project/>

269 See New Development Bank, available at <https://www.ndb.int/about-us/essence/our-work/>

Figure 14 BRICS declarations target different aspects of digital development



Source: author, based on publicly available information

collaborators across the BRICS countries can greatly benefit digital skill development programmes.

- BRICS countries also need to **upskill** to keep up with technological change. This can be done with assistance from corporations or as part of government-led initiatives. BRICS could also jointly develop new digital skills development programmes. For example, e-learning courses on selling across borders may require support from BRICS e-commerce platforms.
- Helping **women-owned businesses** integrate into digital economy. Women-owned or women-led businesses are perceived to face greater challenges in adopting digital technologies. Through the BRICS Women Business Alliance, BRICS countries can work with international initiatives such as UNCTAD's eTrade for Women initiative and the International Trade Centre's SheTrades programme to train women entrepreneurs and connect them to global markets.

Advance digital governance discussions

BRICS countries share a certain level of commonality in approaches to digital governance, with emphasis on policy space, data sovereignty, data security and data flow regulations. They also want to develop national digital champions and ecosystems. In international deliberations, it is not uncommon for BRICS countries to support each other on those fronts.

Data governance and competition policy appear to be most important digital governance issues discussed at international forums. Bridging the digital divide should also be a shared priority for the BRICS economies in international deliberations on the digital economy.

- **Coordinate approaches to data governance.**

While each BRICS country has its own data policies and regulations, this should not prevent them from working together to shape international deliberations on data governance. To this end, BRICS countries could share more information about way they apply relevant data policies and how they affect the digital economy. The BRICS competent authorities could exchange views and experiences to improve understanding of the rationale and implications of each other's regulations, which could define the parameters for better cooperation on digital economy.

- **Strengthen cooperation on competition policies.** Digitalization raises new challenges in competition policy. Ensuring a level playing field and curbing anti-competitive practices are concerns for all BRICS countries.

The ongoing work on competition policy and the digital economy – including the compilation of international practices by the BRICS task force on competition policy and the work undertaken by the BRICS Competition Law and Policy Centre, as well as the vision set out under the Strategy for BRICS Economic Partnership 2025 to improve cooperation in competition law enforcement to foster fair market environment – are key steps towards better cooperation on competition related to the digital economy.²⁷⁰

UNCTAD has participated in the BRICS biennial competition conference since 2017 and can continue to provide support on competition issues. In the context of the BRICS Contact Group on Economic and Trade Issues, in coordination with the BRICS digital taskforce and competition initiatives, further work could be done to share experiences on strategically defining and creating a level playing field in the digital economy, understand how to operationalize competition policies dealing with digital platforms and learn how to improve cooperation among competition authorities in specific cases involving BRICS firms.

Improve measurement of digital economy

As discussed in Chapter 2, better measurement of the digital economy is urgently needed – both in terms of more and improved data on the core sectors in digital economy, and data to assess the socioeconomic impact of digitalization. This will require discussion on methodological and statistical efforts. Cooperation among the BRICS countries can contribute to this process through:

- **Regular exchanges among BRICS national statistical offices.** Such exchanges would be important to develop a common understanding and to keep peers updated on the latest developments in measurement, such as discussions on methodologies and data collection practices. BRICS discussions in this area could also feed into discussions at the UNCTAD Working Group on Measuring E-commerce and the Digital Economy.
- **Timely sharing of new data.** Making data publicly available can result in more accurate information about the development of the digital sectors, which can help both policymakers and businesses make informed decisions. The relevant BRICS taskforces could compile a list of data sources on the digital economy to help navigate to these sources and encourage publication of data.
- **Supporting the G20 workstream on measuring digital economy.** Active participation in these workstreams can give BRICS policymakers a more in-depth understanding about the digital economy and the rationale behind statistical approaches and methodologies. This presents the BRICS countries with an opportunity to shape a development-oriented agenda, with more relevant indicators included for measuring the digital divide and development needs.
- **Encouraging the private sector to contribute to data collection efforts.** Unlike traditional industries where government agencies are in charge of data and statistics, much data on the digital economy are in the hands of private companies such as digital platforms. BRICS countries could work together to encourage companies to share aggregated data for statistical purposes.

270 RICS, Strategy for BRICS Economic Partnership 2025, *op. cit.*

Catalysing private-sector cooperation

Private companies from the BRICS countries already work closely to leverage digital opportunities. Naspers' investment in Tencent, Infosys' first overseas campus in China and Huawei's research lab in the Russian Federation all illustrate the potential of private-sector cooperation among the BRICS countries. Although market forces largely determine cooperation at the firm level, governments could play a role to catalyse private-sector cooperation by, for example:

- **Hosting trade and investment fairs and business-to-business matchmaking events**, specifically for BRICS companies. These targeted events can reach out to firms with potential interest in investment and create new business linkages.
- **Disseminating information about regulations and business opportunities**. This could be done through a web portal for BRICS digital collaboration, for instance. Small companies have always struggled to access information, so such efforts would be especially useful for MSMEs.
- **Promoting cooperation among business support organizations**, such as business associations and alliances. These organizations play important roles as aggregators and distributors of information, providers of trainings and voices for businesses in policymaking. Cooperation among such organizations in the BRICS countries could help companies navigate the market and policy waters and reduce costs to build new partnerships through support on market research and regulatory compliance.
- **Facilitating movement of talent and business-people**. The Asia-Pacific Economic Cooperation's Business Travel Card is a good example of how streamlining the entry processes expedites short-term business travel in the region. The 'apply once, information used for multiple purposes' approach means that applicants must only make one application for permission to enter participating economies.

Facilitate development and uptake of new digital technologies

Working together to develop new digital technologies could help the BRICS countries stay abreast of technological developments. Science/technology cooperation could be strengthened in areas including applied research on AI, quantum computing, next generation of ICT networks, new communication protocols and standards, secure payment technologies, digital currency, IoT, electric vehicles, smart cities and clean energy transition. Closer collaboration could be built by:

- **Promoting joint science/technology research initiatives** to enhance collaboration *inter alia* in the development of ICT technologies.
- **Strengthening exchanges among research institutions and universities** in the BRICS countries, through science symposiums or exchange/scholarship programmes.
- **Supporting cooperation between academia and the business community** to expedite transformation of research into applied technologies and products.

References

- Aptekman, A., Kalabin, V., Klintsov, V., Kuznetsova, E., Kulagin, V., and I. Yasenovet (2017). *Digital Russia: A New Reality. Digital McKinsey report.* Available at <https://www.mckinsey.com/russia/~/media/McKinsey/Locations/Europe%20and%20Middle%20East/Russia/Our%20Insights/Digital%20Russia/Digital-Russia-report.ashx>
- Asian Development Bank (2021). 'Digital technology and economic impacts of COVID-19: Experiences of the People's Republic of China.' Available at: <https://www.adb.org/sites/default/files/publication/726171/adb-wp1276.pdf>
- Atlantic Council (November 2018). Coming to Life: Artificial Intelligence in Africa. Available at <https://www.atlanticcouncil.org/wp-content/uploads/2019/09/Coming-to-Life-Artificial-Intelligence-in-Africa.pdf>
- Bank of International Settlements (2022). Central banks, the monetary system and public payments infrastructures: lessons from Brazil's PIX. Available at <https://www.bis.org/publ/bisbull52.pdf>
- BRICS (2021). Strategy for BRICS Economic Partnership 2025. Available at <https://eng.brics-russia2020.ru/images/114/81/1148155.pdf>
- Bukhta, Rumana, and Richard Heeks (2017). 'Defining, Conceptualizing and Measuring the Digital Economy,' Development Informatics Working Paper Series. Paper No. 68.
- Bulavko, O., Belanova, N., & Tuktarova, L. (2020). 'Priority Directions of Digital Economy Development and Effectiveness of State Policy in the Informatization Field' at *Digital Age: Chances. Challenges and Future.*
- Carnegie Endowment for International Peace (8 May 2020). 'Developing Artificial Intelligence in Russia: Objectives and Reality.' Available at <https://carnegiemoscov.org/commentary/82422>.
- China-US Focus (2021). Conflicts of China's Data Center Industry. Available at <https://www.chinausfocus.com/finance-economy/conflicts-of-chinas-data-center-industry>
- Deloitte (2020). *AI Enablement on the Way to Smart Manufacturing: Deloitte Survey on AI Adoption in Manufacturing.* Available at <file:///C:/Users/ameri/Downloads/deloitte-cn-cip-ai-manufacturing-application-survey-en-200116.pdf>
- Deloitte (December 2021). *State of AI in India.* Available at <https://www2.deloitte.com/content/dam/Deloitte/in/Documents/about-deloitte/in-State-of-AI-in-India-noexp.pdf>
- Deloitte Digital (February 2021). *Digital Commerce Acceleration: Increased online purchases present new opportunities for digital commerce players.* Available at <https://www2.deloitte.com/content/dam/Deloitte/za/Documents/strategy/za-Digital-Commerce-Acceleration-2021-Digital.pdf>
- Economist Intelligence Unit (2021). Digital Technology: Trade challenges and opportunities post pandemic. Available at https://impact.economist.com/perspectives/sites/default/files/eiu_dit_digital_technology_2021.pdf
- European Commission (n.d.). Digital Economy and Society Index (DESI) 2021. Available at <https://ec.europa.eu/newsroom/dae/redirection/document/80563>
- G20 and Istituto Nazionale di Statistica (February 2021). *Measurement of the Digital Economy.* Available at https://www.mise.gov.it/images/stories/documenti/Chair_Summary_Measurement_of_the_digital_economy.pdf
- Global System for Mobile Communications (2021). *The Mobile Economy: China 2021.* Available at https://www.gsma.com/mobileeconomy/wp-content/uploads/2021/02/GSMA_MobileEconomy2021_China_Eng-1.pdf
- Global System for Mobile Communications (2021). *The Mobile Economy: Asia Pacific 2021.* Available at https://www.gsma.com/mobileeconomy/wp-content/uploads/2021/08/GSMA_ME_APAC_2021_Web_Singles.pdf
- Global System for Mobile Communications (2021). *The Mobile Economy: Russia & CIS 2021.* Available at https://www.gsma.com/mobileeconomy/wp-content/uploads/2021/09/GSMA_ME_RussiaCIS_2021_R_WEB_Singles.pdf
- Government of Brazil (2018). Estrategia Brasileira para a Transformacao digital. Available at <https://www.gov.br/mcti/pt-br/centrais-de-conteudo/comunicados-mcti/estrategia-digital-brasileira>
- Government of China (2019). *Annual Express Market Supervision Report.* Available at <http://www.gov.cn/xinwen/2020-07/09/5525223/files/8a5890b8021b431a859a51b3f9894fb1.pdf>
- Government of China, Ministry of Commerce (2020). *China E-commerce Report.* Available at https://www.samr.gov.cn/wljys/ptjyj/202110/t20211015_335714.html
- Government of China, State Council (2021). 'The State Council on Printing and Distributing Notice of the "14th five-year" Digital Economy Development Plan.' Available at http://www.gov.cn/zhengce/content/2022-01/12/content_5667817.htm
- Government of India, Ministry of Electronics and Information Technology (n.d.). *India's Trillion-Dollar Digital Economy.* Available at https://www.meity.gov.in/writereaddata/files/india_trillion-dollar_digital_opportunity.pdf
- Government of India, Ministry of External Affairs (2016). Goa Declaration at 8th BRICS Summit. Available at <https://mea.gov.in/bilateral-documents.htm?dtl/27491/Goa+Declaration+at+8th+BRICS+Summit>
- Government of the Russian Federation (2017). Digital Economy of the Russian Federation. Available at <http://static.government.ru/media/files/9gFM4FHj4PsB79l5v7yLVuPgu4bvR7M0.pdf>
- Government of South Africa, Competition Commission of South Africa (2020). *Competition in the Digital Economy, Version 2.* Available at <http://www.compcom.co.za/wp-content/uploads/2021/03/Digital-Markets-Paper-2021-002-1.pdf>
- Government of South Africa, Department of Basic Education, et al. (2018). *Professional Development Framework for Digital Learning.* Available at <https://www.education.gov.za/Portals/0/Documents/Publications/Digital%20Learning%20Framework.pdf?ver=2018-07-09-101748-95>
- Government of South Africa (2021). Invitation to Submit Written Submissions on the Proposed National Data and Cloud Policy. Available at https://www.gov.za/sites/default/files/gcis_document/202104/44389gon206.pdf
- Government of South Africa, Staatskoerant (10 November 2017). *Digital Society South Africa: South Africa's National e-Strategy towards a thriving and inclusive digital future.* Available at https://www.gov.za/sites/default/files/gcis_document/201711/41242gen887.pdf

- Hawk, S. (2002). The development of Russian e-commerce: The case of Ozon. *Management Decision*, 40(7), 702–709. <https://doi.org/10.1108/00251740210438535>
- Independent Communications Authority of South Africa (2021). *The State of 5G in South Africa: From Readiness to Recommendations*. Available at <https://www.icasa.org.za/uploads/files/ICASA-2021-5G-Annual-Report.pdf>
- Inter-American Development Bank (July 2020). *Artificial Intelligence for Social Good in Latin America and the Caribbean: The Regional Landscape and 12 Country Snapshots*. Available at <https://publications.iadb.org/publications/english/document/Artificial-Intelligence-for-Social-Good-in-Latin-America-and-the-Caribbean-The-Regional-Landscape-and-12-Country-Snapshots.pdf>
- International Labour Organization (2021). *World Employment and Social Outlook 2021: The role of digital labour platforms in transforming the world of work*. Available at <https://www.ilo.org/global/research/global-reports/weso/2021/lang--en/index.htm>
- International Monetary Fund, (2019). *China's Digital Economy: Opportunities and Risks*. Available at: <https://www.imf.org/en/Publications/WP/Issues/2019/01/17/Chinas-Digital-Economy-Opportunities-and-Risks-46459>
- International Telecommunications Union (2020). *Global Cybersecurity Index*. Available at <https://www.itu.int/en/ITU-D/Cybersecurity/Pages/global-cybersecurity-index.aspx>
- International Telecommunications Union (2021). Digital Development Dashboard. Available at <https://www.itu.int/en/ITU-D/Statistics/Dashboards/Pages/Digital-Development.aspx>
- McKinsey (2021). Brazil 2020 Opportunity Tree. Available at <https://www.mckinsey.com/br/~/media/McKinsey/Locations/South%20America/Brazil/Our%20Insights/Brazil%202020%20Opportunity%20Tree/McKinsey2020OpportunityTree.pdf>
- McKinsey Analytics (December 2021). 'The state of AI in 2021.' Available at <https://www.mckinsey.com/~/media/McKinsey/Business%20Functions/McKinsey%20Analytics/Our%20Insights/Global%20survey%20The%20state%20of%20AI%20in%202021/Global-survey-The-state-of-AI-in-2021.pdf>
- McKinsey & Company (2018). *The rise of Digital Challengers: How digitization can become the next growth engine for Central and Eastern Europe*. Available at <https://www.mckinsey.com/~/media/mckinsey/featured%20insights/europe/central%20and%20eastern%20europe%20needs%20a%20new%20engine%20for%20growth/the-rise-of-digital-challengers.ashx>
- McKinsey Global Institute (April 2017). Artificial Intelligence: Implications for China. Available at <https://www.mckinsey.com/~/media/mckinsey/featured%20insights/China/Artificial%20intelligence%20Implications%20for%20China/MGI-Artificial-intelligence-implications-for-China.ashx>
- Mercator Institute for China Studies (28 August 2019). 'Networking the "Belt and Road" – The future is digital.' Available at <https://merics.org/en/tracker/networking-belt-and-road-future-digital>
- Mesenbourg, Thomas (2001). 'Measuring the Digital Economy.' Available at <https://www.census.gov/content/dam/Census/library/working-papers/2001/econ/umdigital.pdf>
- Moscow Institute of Physics and Technology (April 2021). *Artificial Intelligence Almanac: 2020 Index Report*. Available at https://cset.georgetown.edu/wp-content/uploads/10395_Russia_AI_report_EN.pdf
- Nicholson, Jessica R. (2020). *New Digital Economy Estimates*. Available at <https://www.bea.gov/system/files/2020-08/New-Digital-Economy-Estimates-August-2020.pdf>
- NITI Aayog (August 2021). *Responsible AI #AIForAll: Approach Document for India*. Available at <https://www.niti.gov.in/sites/default/files/2021-08/Part2-Responsible-AI-12082021.pdf>
- Novikov, Sergey, and Sazonov, Andrey (2020). 'Digital economy development in Russia: main trends' analysis and assessment,' in *Espacios*, Vol. 41 (Issue 05). Available at <http://www.revistaespacios.com/a20v41n05/20410526.html>
- Organisation for Economic Co-operation and Development. (2017). OECD Digital. *Economic Outlook, 2017*, •••. Retrieved from <https://www.oecd.org/digital/oecd-digital-economy-outlook-2017-9789264276284-en.htm>
- Organisation for Economic Co-operation and Development (September 2018). *Which skills for the digital era? Returns to skills analysis*. Available at <https://www.oecd-ilibrary.org/docserver/9a9479b5-en.pdf?expires=1656885003&id=id&accname=guest&checksum=E8072544F09A09D729D2B0EB8153BEA3>
- Organisation for Economic Co-operation and Development (2020). *A roadmap toward a common framework for measuring the Digital Economy*. Available at <https://www.oecd.org/sti/roadmap-toward-a-common-framework-for-measuring-the-digital-economy.pdf>
- Reserve Bank of India (n.d.). Enabling Framework for Regulatory Sandbox. Available at <https://rbidocs.rbi.org.in/rdocs/PublicationReport/Pdfs/ENABLING79D8EBD31FED47A0BE21158C337123BF.PDF>
- Stanford University (2021). *AI Index Report*. Available at https://aiindex.stanford.edu/wp-content/uploads/2021/11/2021-AI-Index-Report_Master.pdf
- Tapscott, Don (1994). *The Digital Economy: Promise and Peril In The Age of Networked Intelligence*. McGraw-Hill.
- The Paypers (2014). Preferred payment methods in Russian Federation. Available at <https://thepappers.com/payment-methods/russianfederation/18>
- United Nations Conference on Trade and Development (2021). *Digital Economy Report 2021: Cross-border data flows and development: For whom the data flow*. Available at https://unctad.org/system/files/official-document/der2021_en.pdf
- _____ (2021). 'The UNCTAD B2C E-Commerce Index 2020: Spotlight on Latin America and the Caribbean,' Technical Notes on ICT for Development No. 17. Available at https://unctad.org/system/files/official-document/tn_unctad_ict4d17_en.pdf
- _____ (February 2021). *Competition and Consumer Protection Policies for Inclusive Development in the Digital Era*. Available at https://unctad.org/system/files/official-document/ditccplp2021d2_en_0.pdf
- _____ (February 2021). 'JSI: What is at stake for developing countries.' Available at https://unctad.org/system/files/official-document/ditctncd2020d5_en.pdf
- _____ (March 2021). *Covid-19 and E-commerce: A Global Review*. Available at https://etradeforall.org/wp-content/uploads/2021/05/Covid-19-and-E-Commerce-2021-Executive_Summary_English_04_22.pdf

_____ (May 2022). *Manual for the Production of Statistics on the Digital Economy*. Available at https://unctad.org/system/files/official-document/dtlstict2021d2_en.pdf

World Bank (2019). *South Africa: Digital Economy Diagnostic*. Available at <https://openknowledge.worldbank.org/bitstream/handle/10986/33786/South-Africa-Digital-Economy-Diagnostic.pdf?sequence=1&isAllowed=y>

World Bank (2020). 'The Global Economic Outlook During the COVID-19 Pandemic: A Changed World.' Available at <https://www.worldbank.org/en/news/feature/2020/06/08/the-global-economic-outlook-during-the-covid-19-pandemic-a-changed-world>

World Bank (2021). *World Development Report 2021: Data for Better Lives*. Available at <https://wdr2021.worldbank.org/>

World Economic Forum (2018). *China is building a new Silk Road, and this one is digital*. Available at <https://www.weforum.org/agenda/2018/08/china-is-building-a-new-silk-road-and-this-one-s-digital>

World Economic Forum (2020). *Future of Jobs Report*. Available at https://www3.weforum.org/docs/WEF_Future_of_Jobs_2020.pdf

Printed by ITC Digital Printing Service.

A free pdf is available on ITC's website at:
www.intracen.org/publications

