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# Key enablers for 5G adoption by Asia-Pacific countries

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# Foreword

I am delighted to present this new report on key enablers for IMT-2020 (5G) adoption by ITU Member States in the Asia and the Pacific region.

For many years, ITU has been collecting information and communication technology (ICT) indicators to provide a deeper understanding of the state of digital connectivity globally. Through this work, we have launched a number of innovative flagship reports that set out the current state of ICTs and champion the policy and regulatory enablers that can provide meaningful connectivity to the unconnected.

As of 2023, most recent ITU statistics estimate that 67.4 per cent of individuals are using the Internet globally. However, while over 90 per cent of the world's population is covered by at least LTE/WiMAX, only 38.4 per cent are covered by at least 5G. There is a need to understand how to advance 5G deployment globally.

Therefore, this report investigates the current status in Member States in the Asia and the Pacific region of key 5G policy and regulatory enablers, infrastructure readiness, national broadband strategies, regulatory frameworks, spectrum availability and allocation, and explores how they relate to the implementation and adoption of 5G technology.

This exploratory study of potential correlations, and given the recent data linked to 5G, reflects a need for deeper analysis through longer time-series data to expand our understanding of these initial findings, and I hope that this study will serve as a basis for further discussion of the key socioeconomic policy and regulatory enablers that can advance 5G throughout Asia and the Pacific and elsewhere.

**Dr Cosmas Luckyson Zavazava**
Director of the Telecommunication Development Bureau
International Telecommunication Union

# Abbreviations

| | |
|---|---|
| AFG | Afghanistan |
| APAC | Asia and the Pacific |
| AUS | Australia |
| BGD | People's Republic of Bangladesh |
| BoP | balance of payments |
| BRN | Brunei Darussalam |
| BTN | Kingdom of Bhutan |
| CHN | People's Republic of China |
| CPIA | country policy and institutional assessment |
| FJI | Republic of Fiji |
| GDP | gross domestic product |
| GNI | gross national income |
| ICT | information and communication technology |
| IDN | Republic of Indonesia |
| IMT | International Mobile Telecommunications |
| IND | Republic of India |
| IoT | Internet of Things |
| IRN | Islamic Republic of Iran |
| ITU | International Telecommunication Union |
| ITU-D | ITU Development Sector |
| ITU-R | ITU Radiocommunication Sector |
| ITU-T | ITU Standardization Sector |
| JPN | Japan |
| KHM | Kingdom of Cambodia |
| KOR | Republic of Korea |
| LAO P.D.R. | Lao People's Democratic Republic |
| LKA | Democratic Socialist Republic of Sri Lanka |
| MDV | Republic of Maldives |

(continued)

| | |
|---|---|
| MIMO | multiple-input multiple-output |
| MMR | Union of Myanmar |
| MNG | Mongolia |
| MYS | Malaysia |
| NPL | Republic of Nepal |
| NZL | New Zealand |
| PAK | Islamic Republic of Pakistan |
| PHL | Republic of the Philippines |
| PNG | Papua New Guinea |
| PPP | purchasing power parity |
| QoS | quality of service |
| SGP | Republic of Singapore |
| SLB | Solomon Islands |
| THA | Thailand |
| TLD | top-level domains |
| TLS | Democratic Republic of Timor-Leste |
| TON | Kingdom of Tonga |
| VAT | Value-added tax |
| VNM | Socialist Republic of Viet Nam |
| VUT | Republic of Vanuatu |
| WDI | World Development Indicators |
| WGI | Worldwide Governance Indicators |
| WSM | Independent State of Samoa |

# 1 Introduction

5G, the new generation of mobile technology, is characterized by ultra-fast speeds, low latency and excellent reliability. Estimations vary, but 5G is expected to enable USD 13.2 trillion of global economic output by 2035 and support over 22 million jobs (Huawei Technologies Co. 2020; GSMA 2024). The rapid advancement of telecommunication technology has brought about transformative changes in various sectors, and the advent of 5G is poised to revolutionize connectivity on an unprecedented scale globally and in the Asia-Pacific region (see Australian Communications and Media Authority 2016; Liu et al. 2017; ITU 2018a and 2018b; Andonian, Karlsson and Nonaka 2018; Hasan 2019; Sawad, Nilavalan and Al-Raweshidy 2020; Clari, Fadil and Pourcher 2020; Iqbal et al. 2021; Shayea et al. 2021; Houngbonon, Rossotto and Strusani 2021; Hong, Ryu and Lee 2021; Koratagere Anantha Kumar et al. 2021; ASEAN 2022; Olofsgård and Göransson 2022; ABI Research 2023; ITU-D 2023). With key industries such as manufacturing, health care, transportation, utilities, retail sales, financial services and the public sector standing to benefit the most from the new technology for digital transformation, Industry 4.0 and Enterprise 4.0 with 5G networks will emerge as the foundation not only for advanced communication services but also for socio-economic transformation and development as a whole.

The characteristics commonly associated with 5G include the following:

(a) Increased bandwidth and data rates: 5G offers significantly higher bandwidth and data rates compared to previous generations of mobile networks. This enables faster and ultra-reliable connections, allowing for a wide range of new applications and services that support bandwidth-intensive applications such as 4K/8K video streaming, virtual reality and immersive gaming.

(b) Low latency: 5G networks aim to provide ultra-low latency, which is essential for applications that require real-time responsiveness, such as autonomous vehicles, remote surgery and augmented reality. The reduced latency enhances user experience and enables new possibilities in various industries.

(c) Massive device connectivity: 5G is designed to support a massive number of connected devices simultaneously. This capability is crucial for IoT, which allows a vast array of sensors, smart devices and machines to communicate seamlessly and efficiently.

(d) Network slicing: Network slicing is a key feature of 5G that allows the network to be divided into multiple virtual networks, each tailored to specific requirements. It enables customized services for different industries and applications while optimizing resource allocation and network management.

(e) Edge computing: 5G networks integrate with edge computing infrastructure, bringing computational power closer to the end-user devices. This proximity reduces latency and enables time-sensitive applications by processing data locally, rather than relying on distant cloud servers.

(f) Network resilience and reliability: 5G networks are designed to be highly resilient and reliable, offering uninterrupted connectivity even in densely populated areas or high-demand situations. This resilience ensures the consistent service delivery that is critical for applications requiring constant connectivity.

(g) Spectrum availability: The availability of suitable frequency bands and spectrum allocation is essential for deploying 5G networks. Governments and regulatory bodies play a crucial role in allocating and managing spectrum resources to enable 5G deployment.

With countries around the world preparing for the deployment of 5G networks, it is crucial to assess the enablers and factors influencing 5G implementation at the country level. In an early

comprehensive report on the opportunities and challenges of 5G, ITU (2018b) recommends that policy-makers and regulators adopt a measured, practical and collaborative approach to 5G-related issues and create an enabling environment for its development and adoption. The report identifies specific key issues and responses for regulators and policy-makers to consider as they formulate strategies to stimulate investment in 5G networks: investment case, spectrum management issues,[1] infrastructure-sharing, access costs, investment incentives and others. It recommends that regulators planning for 5G take account of issues such as streamlining small cell deployments, facilitating fibre backhaul, harmonizing and licensing spectrum, promoting infrastructure-sharing, supporting 5G pilots and trials, and ensuring digital inclusion and consumer protection. It also recommends that policy-makers and operators should consider deploying 5G networks where there is demand or a robust commercial case for doing so, and that policy-makers improve the availability and quality of 4G networks until the case for 5G networks becomes clearer and more compelling.

This report proposes a framework for a comprehensive study of 5G enablers for ITU Member States in the Asia and the Pacific region to enhance understanding of each individual country's readiness and preparedness for the next generation of wireless communication technology and to provide insights and suggestions for improvements needed for 5G mobile development and adoption. The report therefore considers the key aspects facilitating 5G deployment, such as infrastructure readiness, spectrum allocation, policy and regulatory frameworks, industry collaboration and research initiatives. It also identifies the challenges and barriers that need to be addressed to ensure a smooth transition to 5G, including financial considerations, skill gaps, regulatory hurdles and public concerns. By understanding these challenges, stakeholders can develop strategies and recommendations to overcome obstacles and capitalize on the opportunities presented by 5G.

The findings and recommendations set out below aim to guide the efforts of policy-makers, regulators, industry players and other relevant stakeholders to foster an enabling environment for the successful deployment and utilization of 5G technology in their respective countries. Ultimately, the goal is to unlock the immense benefits of 5G, ranging from enhanced mobile broadband to transformative applications in sectors that include health care, transportation and industry, thereby contributing to national socio-economic development and competitiveness in the digital age.

## 1.1 Background information on 5G technology

In today's interconnected world, where the demand for high-speed and reliable connectivity continues to grow, the emergence of 5G technology represents a significant leap forward in wireless communication. 5G, short for fifth generation, is the latest generation of mobile network technology, succeeding its predecessor, 4G LTE. It offers exponentially faster data transmission speeds, lower latency, increased network capacity, energy efficiency, and the ability to connect a massive number of devices simultaneously.

Unlike previous generations of wireless networks, 5G is not just an incremental improvement; it introduces a paradigm shift in network architecture and capabilities. At its core, 5G utilizes advanced technologies such as large-bandwidth spectrum resources, massive multiple-input multiple-output (MIMO) and network slicing to deliver exceptional performance (Moozakis

[1] A key aspect of 5G stand-alone or full 5G is its relevance for economic verticals, hence the aspect of spectrum for public networks, spectrum for private networks, etc.

and Gittlen 2023). One of the key features of 5G is its remarkable speed. With peak download speeds projected to reach up to 20 Gbit/s, or up to 100-times faster than 4G LTE networks, 5G surpasses its predecessors by a significant margin. This ultra-fast connectivity enables seamless streaming of high-definition content, real-time cloud gaming and swift downloads of large files (Intel Corporation 2020). Moreover, 5G technology significantly reduces latency, the time it takes for data to travel between a source and a destination. With latency expected to be as low as 1 millisecond, 5G enables near-instantaneous communication, opening doors to applications that demand real-time responsiveness. Reduced latency will support new applications that leverage the power of 5G, IoT and artificial intelligence; industries such as autonomous vehicles, remote robotic surgery and industrial automation stand to benefit immensely from this ultra-low latency (McKinsey & Company 2021).

Another fundamental aspect of 5G is its ability to support a massive number of connected devices concurrently. This feature is critical for IoT, where billions of interconnected devices, sensors and machines require constant and reliable connectivity. With 5G, the infrastructure can handle the substantial increase in device density, paving the way for smart cities, smart homes and various IoT-driven innovations. According to Kim (2019), the 5G standard for massive IoT will support up to 1 million connected devices for every 0.38 square miles (roughly 1 square kilometre). When fully operational, 5G networks will have the capacity to connect 500 times more devices than 4G, laying the foundation for the future of massive IoT- a world with a million or more connected devices per square kilometre (Ericsson 2020).

Compared to previous generations, 5G is designed to minimize energy consumption while delivering superior performance and enabling energy-saving mechanisms that make it a sustainable and environmentally friendly technology, striking a balance between connectivity needs and energy efficiency.[2]

Furthermore, the benefits of 5G are not limited to mobile-broadband enhancements. The technology offers diverse use cases, including enhanced mobile services, mission-critical communications, massive IoT deployments, and network infrastructure support for emerging technologies such as virtual reality, augmented reality and artificial intelligence. As countries worldwide embrace its potential, 5G is expected to revolutionize industries, drive innovation and create new economic opportunities. From autonomous transportation systems to smart manufacturing, 5G technology will act as a catalyst for digital transformation, enabling faster data-driven decision-making, unlocking new business models and reshaping the way societies function.

Notwithstanding the enormous benefits of 5G, the technology does have some downsides, as highlighted by Cherukuri (2022), such as the need for significant infrastructure investment. The transition from 4G to 5G is not a simple upgrade; it requires a complete overhaul of existing infrastructure, which includes the deployment of new antennas and base stations, and the installation of high-speed fibre connections to these sites. The cost of this infrastructure development is substantial and can be a barrier to 5G roll-out, particularly in rural and remote areas where the return on investment may be lower. Overall, the higher costs associated with 5G could potentially be passed on to end-users, but that would act as a barrier to switching from 4G to 5G (Deloitte 2023). While 5G infrastructure requires upfront investment, it does promise

[2] According to McKinsey & Company, the 5G new radio standard is more energy efficient per gigabyte than the 4G standards. See https://www.mckinsey.com/industries/technology-media-and-telecommunications/our-insights/the-case-for-committing-to-greener-telecom-networks

a host of long-term benefits that can offset these initial costs, such as enhanced operational efficiency, the potential for new revenue streams from innovative services and technologies, and the likely reduction in technology costs as the industry matures, all of which enhance the future value of 5G. Further, advanced features of 5G, such as automation and artificial intelligence integration, can decrease maintenance costs, while improved network speed and communication can boost productivity across sectors.

It must also be borne in mind that 5G networks are not immune to security threats. In fact, the risks are amplified by the sheer volume of devices connected and the sensitive nature of the data they handle. Cybersecurity concerns range from data privacy and protection to potential threats to critical infrastructure.

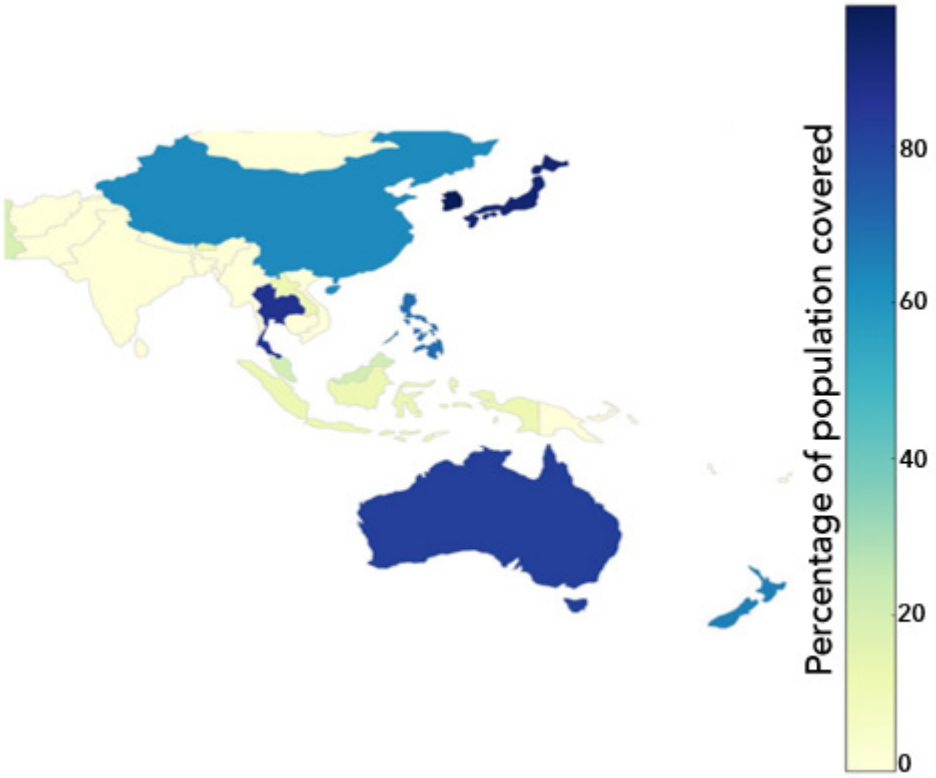
Furthermore, the risk that real gaps in skills and education will exacerbate the digital divide, and concerns about the health effects of radiofrequency radiation, potential interference with flight operations, device compatibility and battery drain on cellular devices, are important outstanding issues (Kimachia 2023). Be that as it may, while there are challenges to the deployment of 5G technology, they will likely be outweighed by the benefits in the long run.

In sum, 5G technology represents a transformative shift in wireless communication, delivering unprecedented speed, ultra-low latency, massive connectivity and energy efficiency. As countries adopt and deploy 5G networks, they open doors to a wide array of applications, revolutionizing industries and paving the way for a more connected and advanced digital future, which will potentially affect nearly all aspects of socio-economic life. Not all impacts are positive, however, and it is therefore important to carefully consider how to introduce 5G networks, mitigating the negative side effects and maximizing the benefits.

## 1.2 Current situation of 5G in the Asia and the Pacific region

The Asia and the Pacific region is home to a wide variety of network deployments and technologies (see GSMA 2021). While the majority of countries are beginning to invest in 5G networks (Figure 1), there is still a great deal of LTE investment, particularly in countries where regulators have not been clear with their spectrum release programme. In some countries where LTE roll-out has been slower, operators and policy-makers continue to carefully consider how to balance the need for increased LTE availability against the introduction of 5G networks.

## Figure 1: 5G population coverage, Asia and the Pacific region, 2022




Source: Created using data from ITU DataHub (https://datahub.itu.int/)

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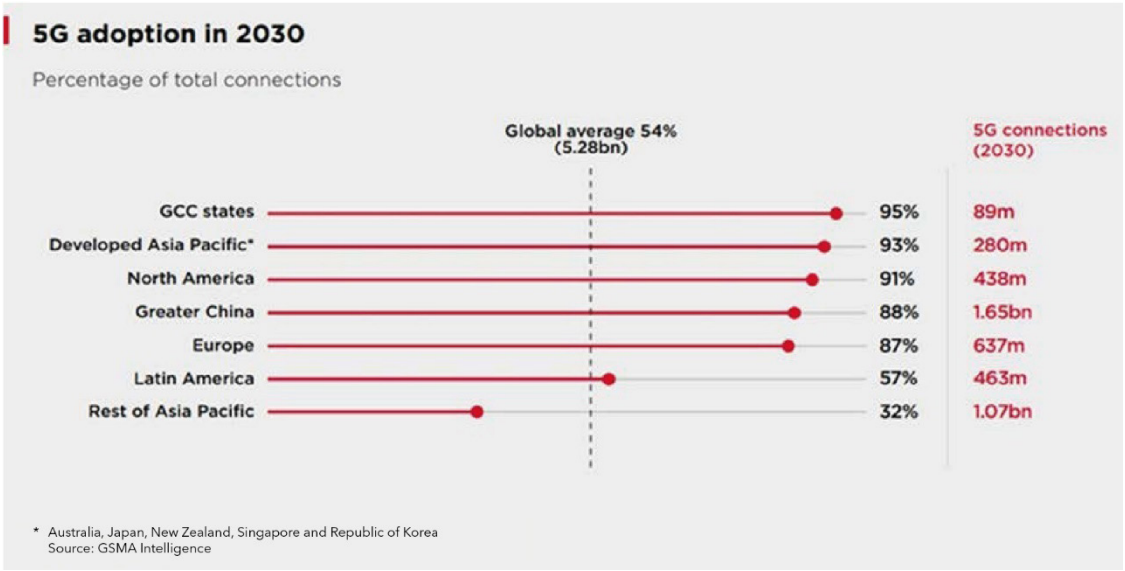
## Figure 2: 5G adoption in 2030 worldwide, by region

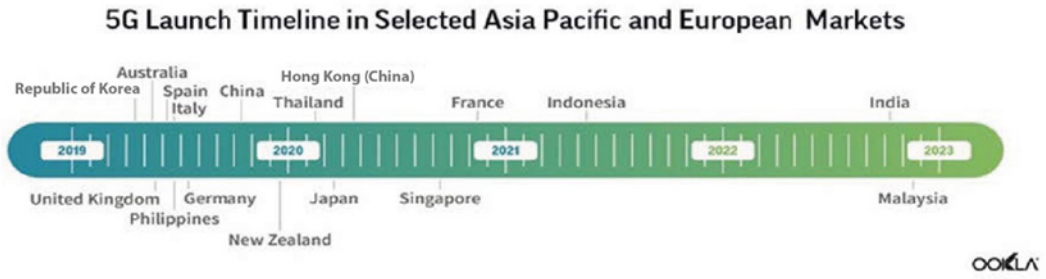



Source: GSMA 2023

Figure 2 illustrates how the Asia and the Pacific region differs in terms of 5G adoption.[3] By the end of 2023, it is expected that 5G adoption will hit the mass market in Australia (42%), China (45%), Japan (47%) and the Republic of Korea (53%), putting them on a par with global peers such Germany (35%) and the United States of America (59%). Despite delays caused by the COVID-19 pandemic, 5G network deployment is progressing in many countries in the region. According to GSMA 2022a, although 4G will remain the dominant technology for the foreseeable future they note that "a second wave of 5G network rollouts has begun in Asia-Pacific". The GSMA also reports that 5G coverage is set to accelerate across the region as the technology footprint expands. Currently, it is commercially available in 14 markets, with others, including India and Viet Nam, going live in the coming months (GSMA 2022b).

Advanced Asia-Pacific markets, including Australia, China, Japan and the Republic of Korea, have led the way in rolling out 5G networks, with more countries in the region following suit. According to a recent report by Ookla (Johan 2023), these early adopters have surpassed major European markets in terms of 5G performance, thanks to factors such as early access to spectrum and government support. However, 5G availability varies across the region owing to factors such as population density, device affordability and pricing. The Republic of Korea was the first market in Asia and the Pacific region and in the world to deploy a nationwide 5G network, in April 2019, followed by Australia, the Philippines, China and New Zealand later that year. GSMA Intelligence (GSMA 2023b) predicts a second wave of 5G roll-outs in countries that include Indonesia, India, and Malaysia (Figure 3), making the region one of the world's largest 5G markets.

## Figure 3: Comparative timeline of 5G roll-outs




Source: Ookla (https://www.ookla.com/articles/5g-asia-pacific-q3-2023 )

5G availability, defined as the percentage of users on 5G-capable devices that spend most of the time with access to 5G networks, also varies widely across the region. Factors such as access to low-band spectrum and affordability and availability of 5G devices influence each market reported 5G availability (Johan 2023). Analysis based on data from Speedtest Intelligence shows that Hong Kong (China) stands out as the only place analysed to have surpassed 40 per cent 5G availability, reaching 42.3 per cent in the first half of 2023. Despite Australia being 78 times larger than the Republic of Korea and one of the least densely populated countries, both countries reported similar 5G availability rates of 36.6 per cent, with a remarkable 5G smartphone penetration rate of more than 80 per cent.

[3] See Network World Asia (2022) for a country-by-country guide.

In general, regulators in Asia and the Pacific have been quick to allocate spectrum for 5G applications, and in many cases, operators have been able to secure substantial bandwidth in the key C-band. The GSMA reports that 5G spectrum assignments in some Asia-Pacific countries, with the exception of Indonesia, the Republic of Nepal, Pakistan, Viet Nam and small island developing States, had all been completed by mid-2023 (Johan 2023). Furthermore, 5G performance is closely tied to an operator spectrum allocation, with more C-band spectrum, especially when contiguous, leading to faster download speeds. The top cities for 5G performance in the region are Seoul and Kuala Lumpur, boasting median download speeds of 533.95 Mbit/s and 523.44 Mbit/s, respectively. However, 5G availability depends on various factors beyond low-band spectrum access.[4]

## Figure 4: 5G spectrum awards in selected countries

**The 5G Pioneer Band Spectrum Awards Across Select Asia Pacific Countries**

| | Low-Band (sub 1 GHz) | Mid-Band (1-6 GHz) | High-Band (>6 GHz) |
|---|---|---|---|
| Republic of Korea | – | 3.6 GHz | 28 GHz* |
| China | 700 MHz<br>900 MHz | 2.6 GHz<br>3.6 GHz<br>4.9 GHz | – |
| Singapore | – | 2.1 GHz<br>3.5 GHz | 28 GHz |
| Australia | 700 MHz<br>850 MHz<br>900 MHz | 3.6 GHz | 26 GHz |
| Thailand | 700 MHz | 2.6 GHz | 26 GHz |
| Philippines | 700 MHz | 3.3 GHz<br>3.5 GHz | – |
| Japan | – | 3.6 GHz<br>3.7 GHz<br>4 GHz<br>4.5 GHz | 28 GHz |
| Malaysia | 700 MHz | 3.5 GHz | 28 GHz |
| Hong Kong (China) | 700 MHz<br>850 MHz<br>900 MHz | 1.8 GHz<br>2.3 GHz<br>2.5 GHz<br>2.6 GHz<br>3.5 GHz<br>4.9 GHz | – |
| India | 700 MHz<br>900 MHz | 1.8 GHz<br>2.1 GHz<br>2.5 GHz<br>3.3 GHz | 26 GHz |
| New Zealand | – | 3.5 GHz | – |

*canceled

OOKLA

Source: Ookla

The mid-band spectrum, the top choice for commercial 5G deployment because it balances 5G coverage and capacity, is the most widely awarded spectrum band in the region. In some markets, however, 5G deployment uses low-band (sub 1 GHz) frequencies, allowing for wider outdoor 5G coverage and better penetration inside buildings in urban and suburban areas, which may come at the expense of the median download speed.

[4] See Ookla Speedtest Intelligence at https://www.ookla.com/speedtest-intelligence.

The Asia and the Pacific region is experiencing a rise in the adoption of 5G fixed wireless access, with South-east Asia leading the way, as an alternative to traditional fixed broadband to improve connectivity and access to digital services. According to GSMA Intelligence, nearly three in five users who have either upgraded or plan to upgrade to 5G find the idea of using 5G for home broadband appealing. With fixed wireless access becoming one of the primary 5G use cases for operators, there is some optimism regarding opportunities to increase revenue and monetize network investments and wireless spectrum (GSMA 2022c).

## 1.3 Scope

This report covers ITU Member States in the Asia and the Pacific region, including Afghanistan, Australia, Bangladesh, Bhutan, Brunei Darussalam, Cambodia, China, the Democratic People's Republic of Korea, Fiji, India, Indonesia, the Islamic Republic of Iran, Japan, Kiribati, the Lao People's Democratic Republic, Malaysia, Maldives, Marshall Islands, Micronesia, Mongolia, Myanmar, Nauru, the Republic of Nepal, New Zealand, Pakistan, Papua New Guinea, the Philippines, the Republic of Korea, Samoa, Singapore, Solomon Islands, Sri Lanka, Thailand, Timor-Leste, Tonga, Tuvalu, Vanuatu, and Viet Nam.[5]

The analysis presented aims to identify the key 5G enablers for each country, drawing mainly on the ITU DataHub but also on indicators from other sources to gain insights into their individual readiness for 5G wireless communication technology. The information presented here is based on the IMT-2020 (5G) terrestrial wireless access component only, it does not cover the IMT-2020 (5G) wireless backhaul nor IMT-2020 (5G) satellite components. The data for this report was collected from the ITU DataHub and other sources in July 2023, which is updated for data until 2022.

## 1.4 Research questions and objectives

This report seeks to investigate the current status of key 5G enablers in the Asia and the Pacific region, including infrastructure readiness, national broadband strategies, regulatory frameworks, spectrum availability and allocation, and policy enablers, and investigates how these enablers relate to the implementation and adoption of 5G technology.

Based on the evaluation of 5G enablers, the research objectives are:

1) To provide a detailed description of the status of key 5G enablers, including infrastructure readiness, spectrum availability, regulatory frameworks and policy enablers, in order to provide information on best practices for 5G implementation and adoption.
2) To provide insights into the readiness and progress of 5G enablers so as to clearly identify areas where improvement or strategic interventions may be required.

[5] The Democratic People's Republic of Korea, Kiribati, the Marshall Islands, Micronesia, Nauru, and Tuvalu are omitted from the empirical part for want of data.

# 2 Conceptual framework

There are many key enablers that are significant for the analysis of 5G adoption. The enablers vary depending on the context and specific focus of the research. For example, Akyildiz et al. (2016) identify 10 major technological breakthroughs of significance for wireless communication networks: a wireless software-defined network, network function virtualization, mmWave spectrum,[6] massive MIMO, network ultra-densification, big data and mobile cloud computing, scalable IoT, device-to-device connectivity with high mobility, green communications and new radio access techniques.

At the country level, the following key enablers are crucial for the successful implementation and adoption of 5G technology. Although highly complex, and the specific importance of each enabler may vary depending on the country's existing infrastructure, regulatory framework and technological readiness. These enablers have been classified into three groups:

1) **Technical and infrastructure readiness**: infrastructure and network; spectrum and bandwidth; security and legislation; geographical and environmental factors.
2) **Economic and regulatory factors**: affordability and costs; economic and development indicators; regulatory and policy considerations.
3) **Socio-cultural and political factors**: Consumer readiness and mobile ownership; content and services; governance and stability.

## 2.1 Technical and infrastructure readiness

**Infrastructure and network**: 5G is a next-generation wireless technology that is expected to revolutionize the way we communicate and interact with the world around us. Building the necessary infrastructure is a fundamental enabler for 5G adoption. This includes deploying a network of base stations, upgrading existing telecommunication infrastructure and establishing fibre-optic networks to support high-speed connectivity. Small cell deployment is also key, as are access to street furniture and energy-efficient backhaul links, right-of-way policy facilitation and access to other street infrastructure (electric poles, billboards, traffic signals, etc.) (see ITU 2019 and Grijpink et al. 2023). According to McKinsey & Company, the infrastructure investments required to enable 5G are significant. Mobile operators must invest in all network domains, including spectrum, radio access network infrastructure, transmission and core networks (Wilson 2023).

**Spectrum and bandwidth**: Effective spectrum management and allocation by regulatory authorities are vital for 5G deployment. Governments need to allocate suitable frequency bands for 5G networks and ensure that spectrum policies are favourable, enabling operators to acquire and deploy spectrum efficiently.[7] However, routine spectrum management may not lead to any significant economic benefits from 5G. According to the GSMA white paper, 5G Spectrum Public Policy Position (GSMA 2023b), 5G needs spectrum across low, mid and high spectrum ranges to deliver widespread coverage and support all use cases. The white paper also suggests that governments and regulators should avoid inflating 5G spectrum prices, as this risks limiting

[6] Although mmWave was initially thought to be one of the prime drivers, in practice it failed in the roll-out of 5G public networks. Several countries reported that it provided inefficient coverage, resulting in very high network investment costs. These network deployments were rolled back, as in the United States.

[7] ITU-R issued a comprehensive report (2014) to help administrations develop strategies on economic approaches to national spectrum management and their financing. The *ITU handbook on national spectrum Development* (2015) provides guidance and information on the principles, processes, functions and activities of spectrum management at the national level.

network investment and driving up the cost of services. Furthermore, regulators must consult 5G stakeholders to ensure spectrum awards and licensing approaches take account of technical and commercial deployment plans (see also Miller 2022). Consideration must be given to case studies of 5G spectrum through local licensing, together with different spectrum pricing systems (e.g. with commitment to investment in infrastructure (France), with commitment to cover several municipal areas, along the Amazon coast, highways, etc. (Brazil) or citizens broadband radio service spectrum for 5G (United States)). Furthermore, administrative assignment or auction is a contentious issue in some countries. Best practices should be shared.

**Security and legislation**: Robust cybersecurity measures are critical for protecting 5G networks and the data transmitted over them. Countries should develop and enforce cybersecurity regulations, establish standards and promote best practices to safeguard against potential threats and vulnerabilities. Collaboration between regulatory bodies and industry stakeholders to address cybersecurity risks, preparedness and response mechanisms able to handle cybersecurity incidents are all vital for successful 5G deployment. As early as 1996, ITU addressed the importance of security frameworks for open systems, which can communicate and exchange data with other systems, emphasizing confidentiality frameworks as a way of protecting information from unauthorized disclosure. Recommendation ITU-T X.814-T (1995) explained the basic concepts, types and facilities of confidentiality mechanisms, together with the management and interactions of confidentiality with other security services, while Recommendation ITU-T X.1815 (2023b) and Recommendation ITU-T X.1816 (2023a) addressed security guidelines and requirements for IMT-2020 edge computing services and network slice, respectively. More recently, the GSMA and the 3rd Generation Partnership Project have developed two unified cybersecurity standards for mobile network equipment: the Network Equipment Security Assurance Scheme and the Security Access Specification, respectively.[8]

**Geographical and environmental factors**: Geographical factors can influence 5G deployment strategies. For instance, densely populated urban areas might benefit from the high capacity of 5G, while challenging terrains might require specific infrastructure solutions. Access to electricity, land area and population density can affect the availability and accessibility of 5G infrastructure and services in different regions. For example, better access to electricity may indicate a more favourable environment for 5G deployment, while higher population density may indicate a greater demand for 5G services and applications. It is important to consider these factors when developing 5G deployment strategies and policies to promote equitable and sustainable growth of 5G (Curran 2020).

## 2.2 Economic and regulatory factors

**Affordability and costs**: Affordability of mobile data, handsets and other devices is another important factor that can influence the adoption and use of 5G services and applications.[9] The World Bank suggests that, to be affordable, the cost of broadband services should not exceed

[8] Additional ITU-T standards on 5G security include the following: X.1811 (04/21) Security guidelines for applying quantum-safe algorithms in IMT-2020 systems; X.1812 (05/22) Security framework based on trust relationships for the IMT-2020 ecosystem; X.1813 (09/22) Security and monitoring requirements for operation of vertical services supporting ultra-reliability and low latency communication (URLLC) in IMT-2020 private networks; X.1814 (09/22) Security guidelines for IMT-2020 communication systems; X.1815 (03/23) Security guidelines and requirements for IMT-2020 edge computing services; X.1816 (03/23) Guidelines and requirements for classifying security capabilities in IMT-2020 network slice; X.1817 (09/23) Security requirements for 5G messaging service.

[9] See 2025 Broadband Advocacy Target 2 of the Broadband Commission for Sustainable Development, at https://www.broadbandcommission.org/advocacy-targets/2-affordability/.

5 per cent of the average monthly income.[10] However, in many countries, especially in low- and middle-income regions, the cost of mobile data and devices remains high, potentially limiting access to and use of 5G services by low-income households and individuals. It is therefore important to develop policies and strategies that promote affordable and accessible mobile data and devices for all. This includes measures such as reducing taxes and fees on mobile services, promoting competition among service providers, investing in mobile infrastructure in underserved areas, and providing subsidies or vouchers for low-income households.

**Economic and development indicators**: Other socio-economic factors (e.g. per capita income and value added in high-tech manufacturing) may influence 5G deployment and investment in 5G-related research and development (PwC 2023). For example, higher per capita income may indicate a greater ability and willingness to invest in 5G infrastructure and services, while higher value added in high-tech manufacturing may indicate a more favourable environment for innovation and technological development. These factors can also affect the demand for 5G services and applications, as they can influence the affordability, accessibility and quality of digital content and services (Qualcomm 2023). It is important to consider these factors when assessing the potential of 5G in different regions and countries. By doing so, policy-makers, regulators and industry players can identify the key drivers of, and barriers to, 5G adoption and develop effective strategies to promote its growth and development.

**Regulatory and policy considerations**: Establishing a supportive regulatory framework is crucial for 5G adoption. Clear regulations and policies should address issues such as spectrum allocation, infrastructure deployment, licensing, privacy and competition. A favourable regulatory environment that includes licensing, permitting and compliance requirements, and considers their impact on investment and innovation, will encourages investment by, and promote healthy competition among, operators.[11]

## 2.3 Socio-cultural and political factors

**Consumer readiness and mobile ownership**: A key factor determining the success of new technology is consumer demand and adoption. Consumers need to be ready and eager to use 5G services and applications, but they also need to be able to use and access 5G-enabled devices and networks. Factors such as mobile ownership, literacy and basic skills are indicative of the population's capability and willingness to embrace 5G services. For example, mobile ownership indicates the availability and affordability of 5G-compatible devices, literacy indicates the level of education and digital skills among consumers, and basic skills indicate the ability to use mobile services effectively and safely. These factors can vary significantly across different regions, countries and income groups, affecting the potential adoption and spread of 5G (Wilson 2023). It is important to measure and monitor these factors to understand consumer readiness for 5G.

**Content and services**: 5G is not just about speed; it also supports revolutionary services and content, from augmented reality to IoT applications (Qualcomm 2023). The potential of 5G goes beyond faster downloads and smoother streaming. It enables new use cases and applications

[10] According to the GSMA, to be affordable, the cost of mobile data and devices should be less than 2 per cent of the average monthly income.

[11] For an example, see the National Strategy to Secure 5G Implementation Plan of the National Telecommunications and Information Administration, United States Department of Commerce, https://www.ntia.gov/files/ntia/publications/2021-1-12_115445_national_strategy_to_secure_5g_implementation_plan_and_annexes_a_f_final.pdfhttps://digital-strategy.ec.europa.eu/en/policies/eu-radio-spectrum-policy

that were not possible before, such as remote surgery, autonomous vehicles, smart cities and immersive entertainment. To realize this potential, a rich ecosystem of digital content and services is required that can drive 5G adoption by showcasing its potential benefits and applications. This encompasses content providers, app developers, device manufacturers, network operators and other stakeholders who collaborate to create innovative solutions that leverage the unique capabilities of 5G. In so doing, they unlock new revenue streams, enhance user experiences and create new business models that can transform industries and societies (see Sultan 2023).

**Governance and stability**: A comprehensive national broadband strategy is important to ensure equitable access to 5G services across the country. When assessing the demand for, and sustainability of, 5G projects, service providers may naturally begin with areas with higher potential returns. And while governments should focus on bridging the digital divide, especially in rural and underserved areas, by promoting affordable and accessible connectivity options,[12] it is not practical to deploy 5G networks unless there are demanding 5G use cases that provide sustainability for 5G projects, as per the 5G network toolkit. National broadband strategy should also focus on ideation, piloting and adoption of 5G use cases to trigger demand in economic verticals for 5G roll-out.

Overall, by focusing on the above enablers, countries can create an ecosystem conducive to 5G adoption and thus facilitate economic growth, innovation and improved quality of life for their citizens.

[12] See, for example, the 2021 report by the Center for Strategic and International Studies, Accelerating 5G in the United States, https://www.csis.org/analysis/accelerating-5g-united-states

# 3 Data sources: Specific variables used

There are two main data sources, outlined below, that have been used to provide input for analysis of the technical and infrastructure readiness, economic and regulatory factors, and socio-cultural and political factors.

1) The ITU DataHub (World Telecommunication/ICT Indicators database) contains information and statistics compiled and/or collected by the ITU ICT Data and Analytics Division and the Regulatory and Market Environment Division. It comprises ICT indicators covering multiple years for around 180 statistics and over 200 economies worldwide, including fixed-telephone, mobile-cellular, fixed-broadband and mobile-broadband services. It also contains statistics on international connectivity, quality of service (QoS), traffic, persons employed, ICT prices, revenue, investment and ICT access and use by households and individuals. Selected demographic and macroeconomic statistics are also included. The data are collected from the annual statistical questionnaires sent out by ITU-D to telecommunication ministries, regulators and national statistical offices.
2) Other relevant country-level data were obtained from the GSMA, the WDI and WGI, the E-Government Development Index and national statistical offices, as and when required.

Over 125 variables were looked at across 170 countries, including 32 countries in Asia and the Pacific, from 2014 to 2022 and for which data are available. To help reduce the dimensionality of the variables for consideration in regression analysis, cross-correlation dendrograms were used, which are a graphical representation that uses cross-correlation values between multiple variables to create a hierarchical clustering tree, helping not only to visualize and identify similarities, patterns and anomalies in the data, but also to select variables that have the best explanatory power for further statistical analysis. The variables (metric) for each of the 10 enablers are listed in Tables 1 to 10, as are the data sources. See Appendix C for a description of the variables.

***Technical and infrastructure readiness: infrastructure and network; spectrum and bandwidth; security and legislation; geographical and environmental factors***

**Infrastructure and network**: 5G relies on robust and advanced infrastructure, including cell towers, base stations and data centres. The presence of a strong network indicates the readiness of a region to deploy and scale 5G services. The seamless integration of previous network generations (2G, 3G, 4G) is also crucial for a smooth transition and widespread 5G adoption.

### Table 1: Variables and data sources for infrastructure and network enabler

| Metric | Source |
|---|---|
| Infrastructure | GSMA |
| Network coverage | GSMA |
| Network performance | GSMA |
| 2G population coverage | ITU DataHub |
| 3G population coverage | GSMA Intelligence |
| 4G population coverage | GSMA Intelligence |
| 5G population coverage | GSMA Intelligence |
| Mobile download speeds | Ookla Speedtest Intelligence |

### Table 1: Variables and data sources for infrastructure and network enabler (continued)

| Metric | Source |
|---|---|
| Mobile upload speeds | Ookla Speedtest Intelligence |
| Mobile latencies | Ookla Speedtest Intelligence |
| Electric power consumption (kWh per capita)* | International Energy Agency |
| Fixed broadband subscriptions (per 100 people) | ITU DataHub |
| Secure Internet servers | Netcraft |
| Secure Internet servers (per 1 million people) | Netcraft |
| 4G services commercially available* | ITU |

Note: * denotes variables later dropped in the analysis due to insufficient observations

**Spectrum and bandwidth**: Spectrum is the lifeblood of wireless communication. Efficient spectrum allocation, management and use are crucial for the successful deployment of 5G. The availability of various bands, especially those suitable for 5G, is an indicator of the readiness of a region.

### Table 2: Variables and data sources for spectrum and bandwidth

| Metric | Source |
|---|---|
| Spectrum | GSMA |
| Spectrum assigned in bands below 1 GHz | GSMA Intelligence |
| Spectrum assigned in bands between 1-3 GHz | GSMA Intelligence |
| Spectrum assigned in bands between 3-6 GHz | GSMA Intelligence |
| Spectrum assigned in mmWave bands | GSMA Intelligence |
| Amount of spectrum licensed for IMT systems, in MHz | ITU |
| Amount of spectrum offered for IMT systems, in MHz | ITU |
| Digital dividend spectrum reallocated | ITU |
| IMT (3G/4G) spectrum assigned** | ITU |
| Information on spectrum publicly available | ITU |
| International bandwidth usage | ITU DataHub |
| Lit/equipped international bandwidth capacity | ITU DataHub |
| National Table of Frequency Allocations | ITU |
| Spectrum licences, technology-neutral | ITU |
| Spectrum or licence fees subject to VAT | ITU |

Note: ** Overlaps with the first three spectrum measures- below 1 GHz, 1-3 GHz and 3-8 GHz

**Security and legislation**: As 5G networks support critical applications, ensuring their security is paramount. Robust cybersecurity legislation and measures are essential to protect the networks from threats. Additionally, clear legislation can provide a framework for 5G deployment and operations.

### Table 3: Variables and data sources for security and legislation

| Metric | Source |
|---|---|
| Cybersecurity index | ITU |
| Cybersecurity legislation/regulations exist | ITU |
| ICT consumer protection legislation | ITU |

**Geographical and environmental factors**: Geographical factors can influence 5G deployment strategies. For instance, densely populated urban areas might benefit from 5G high capacity, while challenging terrains might require specific infrastructure solutions.

### Table 4: Variables and data sources for geographical and environmental factors

| Metric | Source |
|---|---|
| Access to electricity (% of population) | International Energy Agency, International Renewable Energy Agency, United Nations Statistics Division, World Bank, World Health Organization |
| Land area (sq. km) | FAO |
| Population total | United Nations |
| Surface area (sq. km) | FAO |
| Population density (people per sq. km of land area) | FAO, WDI |

***Economic and regulatory factors: affordability and costs; economic and development indicators; regulatory and policy considerations***

**Affordability and costs**: For widespread 5G adoption, services and devices must be affordable for the general public. This enabler gauges the economic feasibility of 5G for consumers, considering factors such as handset costs, data pricing and other related expenses. A region where ICT services are affordable is more likely to see quicker 5G uptake.

### Table 5: Variables and data sources for affordability and costs

| Metric | Source |
|---|---|
| Affordability | GSMA |
| Mobile data affordability | GSMA |
| Handset affordability | GSMA |
| Taxation | GSMA |
| Affordability of entry basket (1 GB) | Tarifica |
| Affordability of higher basket (5 GB) | Tarifica |
| Affordability of entry basket (1 GB) for poorest 40% | Tarifica |
| Affordability of higher basket (5 GB) for poorest 40% | Tarifica |
| Device affordability | Tarifica |
| Device affordability for poorest 40% | Tarifica |
| Cost of taxes on mobile data | GSMA Intelligence |
| Cost of taxes on handsets | GSMA Intelligence |
| Cost of sector-specific taxes on mobile data | GSMA Intelligence |
| Mobile data and voice high-consumption basket | ITU |
| Mobile data and voice low-consumption basket | ITU |
| Device pricing* | Alliance for Affordable Internet |

**Economic and development indicators**: The overall economic health and developmental stage of a region can influence 5G deployment. Developed regions with strong economic indicators may have the resources and incentives to invest in and adopt 5G faster.

### Table 6: Variables and data sources for economic and development factors

| Metric | Source |
|---|---|
| GNI per capita (USD) | WDI |
| GDP per capita (constant 2015 USD) | WDI |
| GDP per capita PPP (constant 2017 international USD) | WDI |
| GNI per capita (constant 2015 USD) | WDI |
| GNI per capita PPP (constant 2017 international USD) | WDI |
| Gini index | WDI |
| High-technology exports (% of manufactured exports) | UN |

Table 6: Variables and data sources for economic and development factors (continued)

| Metric | Source |
|---|---|
| Human capital index (scale 0-1) | WDI |
| ICT goods exports (% of total goods exports) | United Nations Conference on Trade and Development |
| ICT goods imports (% total goods imports) | United Nations Conference on Trade and Development |
| ICT service exports (% of service exports balance of payments (Bop) | International Monetary Fund |
| ICT service exports (BoP current USD) | International Monetary Fund |
| Inflation consumer prices (annual %) | International Monetary Fund |
| Investment in ICT with private participation (current USD) | WDI |
| Public private partnerships investment in ICT (current USD) | WDI |
| Real effective exchange rate index (2010 = 100) | WDI |
| Real interest rate (%) | IMF |
| Tax revenue (% of GDP) | IMF |
| Time required to start a business (days) | WDI |
| Trade (% of GDP) | WDI |
| Trade in services (% of GDP) | International Monetary Fund |
| Logistics performance index: Overall (1=low to 5=high) | WDI |
| Medium- and high-tech manufacturing value added (% manufacturing value added) | United Nations Industrial Development Organization |

**Regulatory and policy considerations**: Regulatory support is crucial for 5G. Policies that encourage investment in 5G infrastructure, ensure fair competition and set clear guidelines can accelerate 5G deployment and adoption.

Table 7: Variables and data sources for regulatory and policy considerations

| Metric | Source |
|---|---|
| E-government score | United Nations |
| Regulatory quality: estimate | WGI |
| Broadband services are part of universal service/access scheme | ITU |
| Cloud computing policies | ITU |
| Counterfeit policies for the ICT sector | ITU |

### Table 7: Variables and data sources for regulatory and policy considerations (continued)

| Metric | Source |
|---|---|
| Foreign ICT service providers treated differently in terms of taxation | ITU |
| National broadband plan exists | ITU |
| National development strategy, digital agenda or digital stimulus strategy, including broadband | ITU |
| National strategy policy or initiative focusing on emerging technologies | ITU |
| Restriction of foreign participation or ownership in the ICT sector | ITU |
| QoS regulatory framework- Services subject to QoS monitoring | ITU |

***Socio-cultural and political factors: Consumer readiness and mobile ownership; content and services; governance and stability***

**Consumer readiness and mobile ownership**: The readiness and eagerness of consumers to adopt new technologies play a vital role in the success of 5G. Factors such as mobile ownership, literacy and basic skills reflect the population's capability and willingness to embrace 5G services.

### Table 8: Variables and data sources for consumer readiness and mobile ownership

| Metric | Source |
|---|---|
| Consumer readiness | GSMA |
| Mobile ownership | GSMA |
| Basic skills | GSMA |
| Literacy | United Nations and UNESCO |
| School life expectancy | United Nations |
| Gender gap in mobile ownership | GSMA Intelligence, Gallup World Poll |
| Gender gap in mobile Internet | GSMA Intelligence, Gallup World Poll, DataReportal |
| Mobile-cellular subscriptions (per 100 people) | ITU DataHub |
| Households with Internet access at home* | ITU DataHub |
| Individuals using the Internet (% of population) | ITU DataHub |
| Mobile-cellular subscriptions | ITU DataHub |

**Content and services**: 5G is not just about speed; it is also about the revolutionary services and content it supports, from augmented reality to IoT applications. A rich ecosystem of digital content and services can drive 5G adoption by showcasing its potential benefits and applications.

### Table 9: Variables and data sources for content and services

| Metric | Source |
|---|---|
| Content and services | GSMA |
| Top-level domains per person | ZookNIC |
| Mobile social media penetration | DataReportal |
| Locally developed apps per person | Appfigures |
| Digital language support | Derivation |
| Language accessibility of top ranked apps | Appfigures, Ethnologue, GSMA Intelligence |

**Governance and stability**: The overall governance quality, political stability and transparency can influence the trust of investors and stakeholders in 5G projects. Stable regions with good governance are more likely to attract the investments needed for 5G deployment.

### Table 10: Variables and data sources for governance and stability

| Metric | Source |
|---|---|
| Gender equality | GSMA |
| Local relevance | GSMA |
| CPIA building human resources rating (1=low to 6=high) | WDI |
| CPIA business regulatory environment rating (1=low to 6=high) | WDI |
| CPIA property rights and rule-based governance rating (1=low to 6=high) | WDI |
| CPIA trade rating (1=low to 6=high) | WDI |
| CPIA transparency accountability and corruption in the public sector rating (1=low to 6=high) | WDI |
| Consumer price index (2010 = 100) | WDI |
| Government effectiveness: estimate | WDI |
| Political stability and absence of violence/terrorism: estimate | WGI |
| Rule of law: estimate | WGI |
| Strength of legal rights index (0=weak to 12=strong) | WDI |

# 4 Statistical and econometric analysis

The variable correlations for each enabler to 5G population coverage in 2022 are set out in Tables 11 to 20 below. In these tables, *'ALL'* refers to the 170 Member States for which data is available and *'ITU32'* refers to the 32 ITU Member States in the Asia and the Pacific region. The correlations presented are for 2022, 2017 and 2014. Correlations are not presented for categorical (non-numeric) variables.

Each table is followed, where required, by a cross-correlation dendrogram (Figures 5 to 9) providing a data visualization that combines cross-correlation and hierarchical clustering to reveal relationships and similarities among multiple variables. The cross-correlation dendrogram calculates cross-correlation values between pairs of variables to quantify their similarity and constructs a hierarchical tree structure called a dendrogram. In this dendrogram, signals with high cross-correlation values are grouped together early in the hierarchy, indicating strong similarities, while those with low cross-correlation values are grouped later or in separate branches, indicating weaker similarities. Cross-correlation dendrograms are employed here to recognize patterns and similarity of variables, thereby allowing the selection of the most important variables for regression analysis. See Appendix A for a detailed description of cross-correlation dendrograms.

***Technical and infrastructure readiness: infrastructure and network; spectrum and bandwidth; security and legislation; geographical and environmental factors***

Table 11: Variable correlations for infrastructure and network

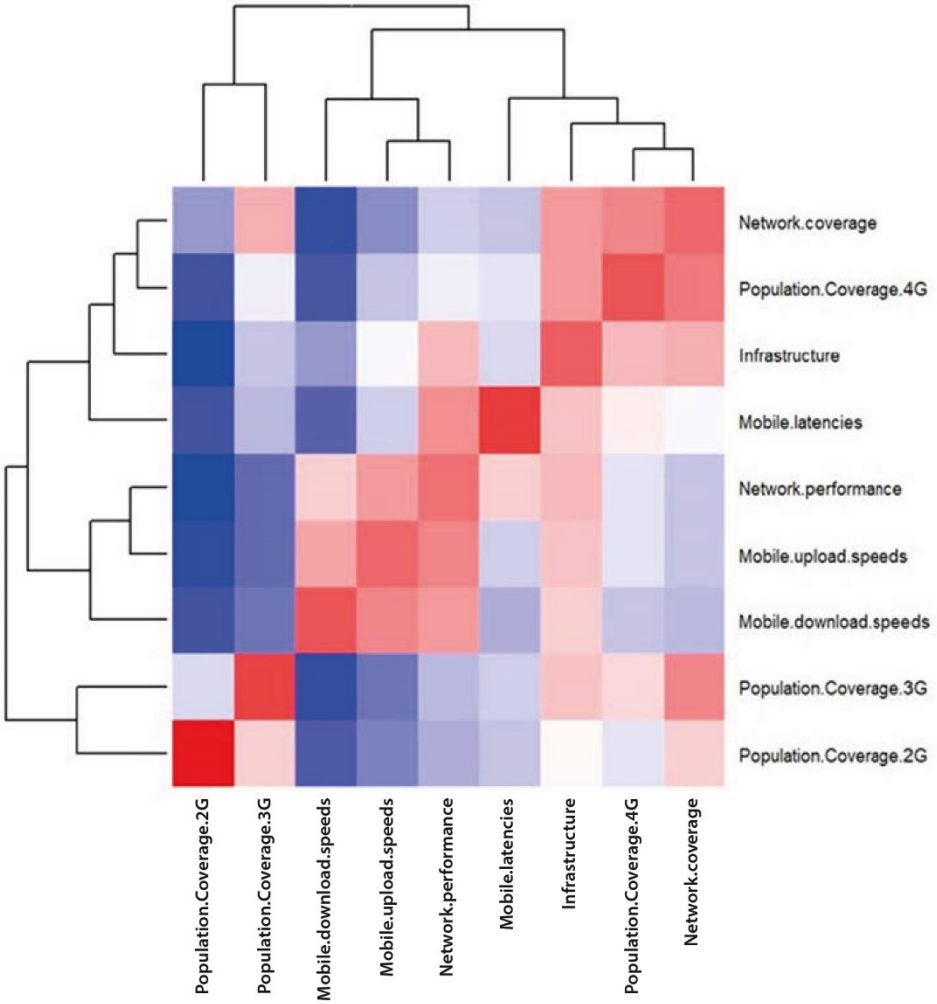
| Infrastructure and network | 2022 ALL | 2022 ITU32 | 2017 ALL | 2017 ITU32 | 2014 ALL | 2014 ITU32 |
|---|---|---|---|---|---|---|
| Cluster index | 0.73 | 0.76 | 0.70 | 0.77 | 0.73 | 0.79 |
| Infrastructure | 0.82 | 0.87 | 0.68 | 0.77 | 0.81 | 0.88 |
| Network coverage | 0.64 | 0.69 | 0.61 | 0.63 | 0.79 | 0.85 |
| Network performance | 0.80 | 0.75 | 0.63 | 0.67 | 0.70 | 0.73 |
| 2G population coverage | 0.29 | 0.41 | 0.36 | 0.52 | 0.40 | 0.49 |
| 3G population coverage | 0.38 | 0.46 | 0.45 | 0.43 | 0.59 | 0.64 |
| 4G population coverage | 0.43 | 0.39 | 0.64 | 0.63 | 0.84 | 0.90 |
| 5G population coverage | 1.00 | 1.00 | | | | |
| Mobile download speeds | 0.88 | 0.86 | 0.69 | 0.73 | 0.71 | 0.68 |
| Mobile upload speeds | 0.73 | 0.62 | 0.65 | 0.70 | 0.67 | 0.69 |
| Mobile latencies | 0.32 | 0.26 | 0.42 | 0.36 | 0.64 | 0.67 |
| Fixed-broadband subscriptions (per 100 people) | | | | | 0.75 | 0.83 |
| Secure Internet servers | | | 0.29 | 0.58 | 0.25 | 0.57 |
| Secure Internet servers (per 1 million people) | | | 0.59 | 0.45 | 0.61 | 0.58 |

### Table 11: Variable correlations for infrastructure and network (continued)

| Infrastructure and network | 2022 ALL | 2022 ITU32 | 2017 ALL | 2017 ITU32 | 2014 ALL | 2014 ITU32 |
|---|---|---|---|---|---|---|
| Population coverage by mobile network technology (at least 2G) | | | 0.26 | 0.32 | 0.31 | 0.45 |
| Population coverage by mobile network technology (at least 3G) | | | 0.33 | 0.33 | 0.44 | 0.44 |
| Population coverage by mobile network technology (at least 5G) | | | 0.89 | 0.49 | | |
| Population coverage by mobile network technology (at least LTE/ WiMAX) | | | 0.41 | 0.33 | 0.63 | 0.66 |

The cross-correlation dendrogram in Figure 5 shows three distinct clusters indicating variable selection for further analysis in the panel data regression.

### Figure 5: Cross-correlation dendrogram, infrastructure and network



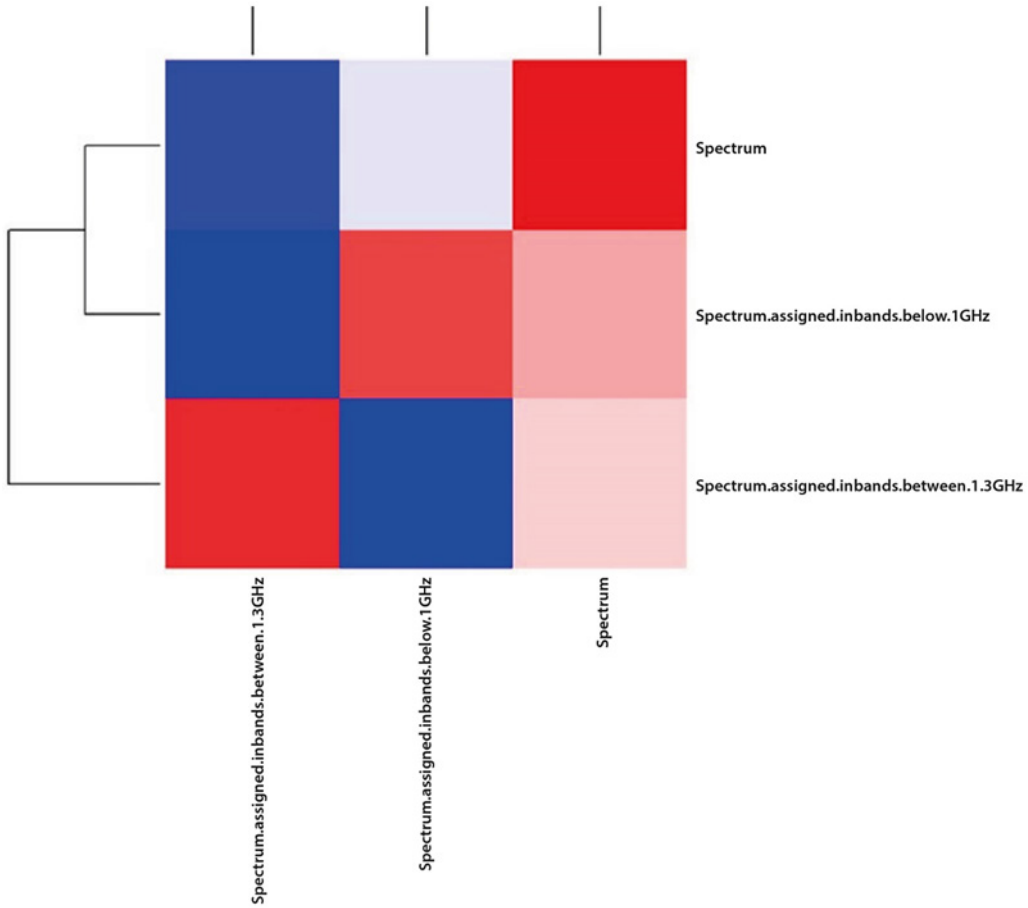

Source: ITU

## Table 12: Variable correlations for spectrum and bandwidth

| Spectrum and bandwidth | 2022 ALL | 2022 ITU32 | 2017 ALL | 2017 ITU32 | 2014 ALL | 2014 ITU32 |
|---|---|---|---|---|---|---|
| Spectrum | 0.71 | 0.74 | 0.56 | 0.65 | 0.56 | 0.71 |
| Spectrum assigned in bands below 1 GHz | 0.57 | 0.48 | 0.43 | 0.48 | 0.45 | 0.53 |
| Spectrum assigned in bands between 1-3 GHz | 0.61 | 0.67 | 0.58 | 0.68 | 0.55 | 0.67 |
| Spectrum assigned in bands between 3-6 GHz | 0.75 | 0.72 | | | | |
| Spectrum assigned in mmWave bands | 0.40 | 0.60 | | | | |
| Amount of spectrum licensed for IMT systems, in MHz | | | 0.37 | –0.48 | | |
| Amount of spectrum offered for IMT systems, in MHz | | | 0.03 | –0.32 | | |
| Digital dividend spectrum reallocated | | | | | | |
| IMT (3G/4G) spectrum assigned | | | | | | |
| Information on spectrum publicly available | | | | | | |
| International bandwidth usage | 0.24 | 0.25 | 0.26 | 0.38 | 0.27 | 0.66 |
| Lit/equipped international bandwidth capacity | 0.31 | 0.42 | 0.36 | 0.47 | 0.45 | 0.58 |
| National Table of Frequency Allocations | | | | | | |
| Spectrum licences, technology-neutral | | | | | | |
| Spectrum or licence fees subject to VAT | | | | | | |

Figure 6 contains a partial cross-correlation dendrogram for variables that capture spectrum and bandwidth.

Figure 6: Cross-correlation dendrogram, spectrum and bandwidth




Source: ITU

Table 13: Variable correlations for security and legislation

| Security and legislation | 2022 ALL | 2022 ITU32 | 2017 ALL | 2017 ITU32 | 2014 ALL | 2014 ITU32 |
|---|---|---|---|---|---|---|
| Cybersecurity index | 0.62 | 0.57 | 0.62 | 0.69 | 0.55 | 0.62 |
| Cybersecurity legislation/regulation exist | | | | | | |
| ICT consumer protection legislation | | | | | | |

Table 14: Variable correlations for geographical and environmental factors

| Geographical and environmental factors | 2022 ALL | 2022 ITU32 | 2017 ALL | 2017 ITU32 | 2014 ALL | 2014 ITU32 |
|---|---|---|---|---|---|---|
| Access to electricity (% of population) | | | 0.42 | 0.36 | 0.44 | 0.46 |
| Land area (sq. km) | | | 0.07 | 0.30 | 0.07 | 0.30 |
| Population, total | 0.03 | 0.07 | 0.04 | 0.08 | 0.04 | 0.08 |
| Surface area (sq. km) | | | 0.07 | 0.30 | 0.07 | 0.30 |
| Population density (people per sq. km of land area) | | | 0.24 | 0.31 | 0.24 | 0.31 |

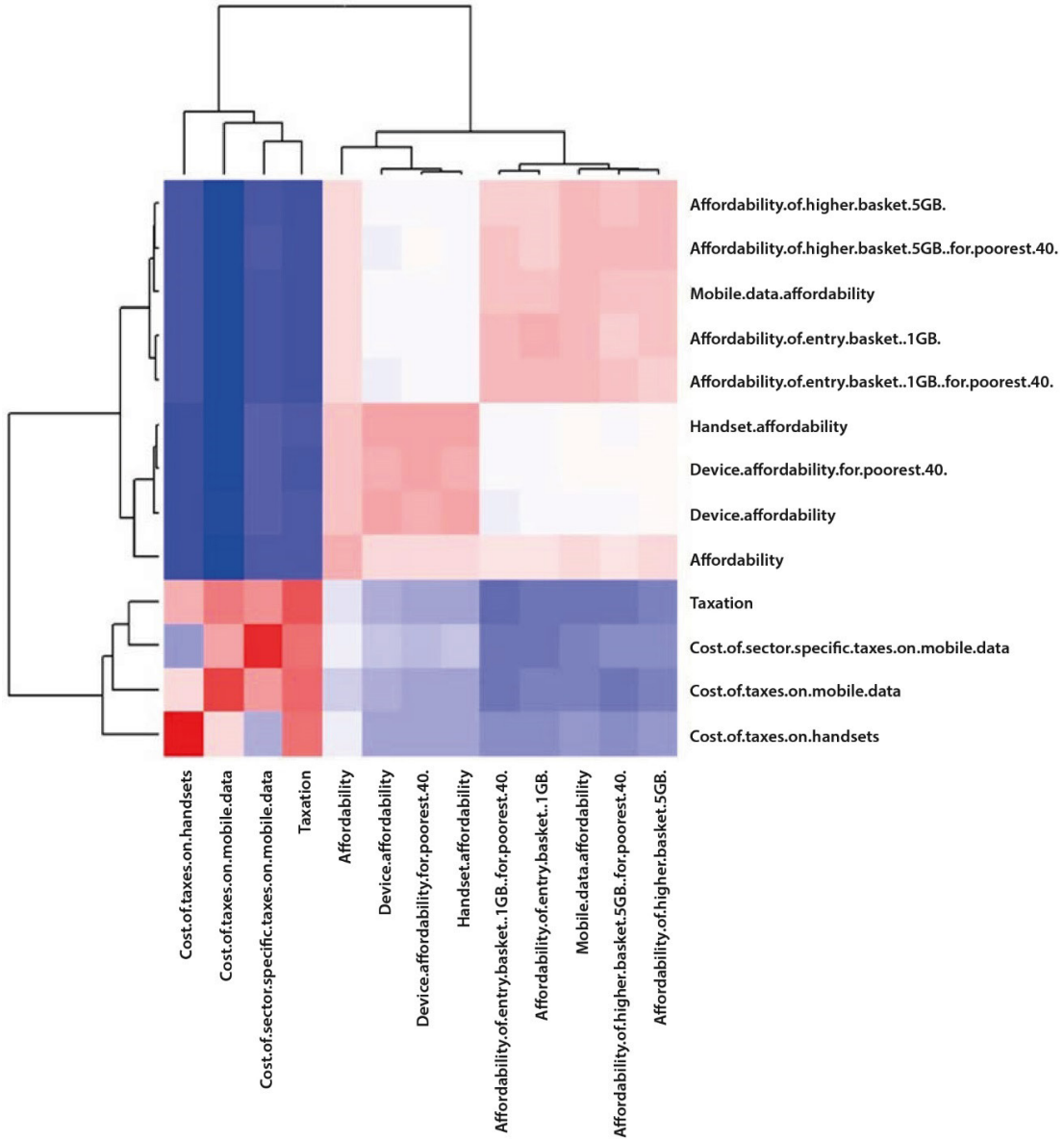
***Economic and regulatory factors: affordability and costs; economic and development indicators; regulatory and policy considerations***

Table 15: Variable correlations for affordability and costs

| Affordability and costs | 2022 ALL | 2022 ITU32 | 2017 ALL | 2017 ITU32 | 2014 ALL | 2014 ITU32 |
|---|---|---|---|---|---|---|
| Affordability | 0.69 | 0.61 | 0.66 | 0.66 | 0.68 | 0.63 |
| Mobile data affordability | 0.62 | 0.47 | 0.60 | 0.49 | 0.65 | 0.44 |
| Handset affordability | 0.68 | 0.48 | 0.63 | 0.61 | 0.63 | 0.64 |
| Taxation | 0.28 | 0.40 | 0.28 | 0.37 | 0.25 | 0.40 |
| Affordability of entry basket (1GB) | 0.56 | 0.36 | 0.55 | 0.41 | 0.60 | 0.38 |
| Affordability of higher basket (5GB) | 0.62 | 0.55 | 0.61 | 0.55 | 0.65 | 0.48 |
| Affordability of entry basket (1GB) for poorest 40% | 0.59 | 0.37 | 0.57 | 0.42 | 0.63 | 0.39 |
| Affordability of higher basket (5GB) for poorest 40% | 0.65 | 0.56 | 0.63 | 0.55 | 0.67 | 0.47 |
| Device affordability | 0.65 | 0.47 | 0.61 | 0.62 | 0.61 | 0.64 |
| Device affordability for poorest 40% | 0.70 | 0.49 | 0.65 | 0.61 | 0.65 | 0.63 |
| Cost of taxes on mobile data | 0.09 | 0.35 | 0.04 | 0.28 | 0.03 | 0.30 |
| Cost of taxes on handsets | 0.23 | 0.30 | 0.28 | 0.37 | 0.23 | 0.23 |
| Cost of sector-specific taxes on mobile data | 0.31 | 0.33 | 0.29 | 0.26 | 0.27 | 0.32 |
| Mobile data and voice high-consumption basket | –0.37 | –0.37 | | | | |
| Mobile data and voice low-consumption basket | –0.39 | –0.39 | | | | |

The cross-correlation dendrogram in Figure 7 shows three distinct clusters indicating variable selection for further analysis.

## Figure 7: Cross-correlation dendrogram, affordability and costs




Source: ITU

## Table 16: Variable correlations for economic and development indicators

| Economic and development indicators | 2022 ALL | 2022 ITU32 | 2017 ALL | 2017 ITU32 | 2014 ALL | 2014 ITU32 |
|---|---|---|---|---|---|---|
| GNI per capita (USD) | 0.71 | 0.71 | 0.71 | 0.71 | 0.65 | 0.65 |
| GDP per capita (constant 2015 USD) | 0.72 | 0.69 | 0.71 | 0.69 | 0.70 | 0.68 |
| GDP per capita PPP (constant 2017 international USD) | 0.76 | 0.61 | 0.76 | 0.61 | 0.74 | 0.60 |
| GNI per capita (constant 2015 USD) | 0.78 | 0.77 | 0.75 | 0.73 | 0.73 | 0.70 |
| GNI per capita PPP (constant 2017 international USD) | 0.83 | 0.82 | 0.79 | 0.61 | 0.79 | 0.58 |

Table 16: Variable correlations for economic and development indicators (continued)

| Economic and development indicators | 2022 ALL | 2022 ITU32 | 2017 ALL | 2017 ITU32 | 2014 ALL | 2014 ITU32 |
|---|---|---|---|---|---|---|
| Gini index | –0.40 | 0.27 | –0.38 | 0.07 | | |
| High-tech exports (% of manufactured exports) | 0.39 | 0.45 | 0.37 | 0.52 | | |
| Human capital index (scale 0-1) | 0.75 | 0.81 | | | | |
| ICT goods exports (% of total goods exports) | 0.37 | 0.47 | 0.36 | 0.53 | | |
| ICT goods imports (% total goods imports) | 0.40 | 0.53 | 0.37 | 0.52 | | |
| ICT service exports (% of service exports BoP) | 0.15 | –0.30 | 0.13 | –0.14 | 0.02 | –0.26 |
| ICT service exports (BoP current USD) | 0.26 | –0.01 | 0.35 | 0.06 | 0.34 | 0.00 |
| Inflation consumer prices (annual %) | –0.18 | –0.31 | –0.17 | –0.42 | –0.29 | –0.30 |
| Investment in ICT with private participation (current USD) | 0.10 | –0.13 | | | | |
| Public-private partnership investment in ICT (current USD) | –0.79 | –1.00 | | | | |
| Real effective exchange rate index (2010 = 100) | –0.13 | –0.26 | –0.04 | –0.16 | –0.05 | –0.06 |
| Real interest rate (%) | –0.12 | 0.26 | –0.14 | –0.48 | –0.20 | –0.41 |
| Tax revenue (% of GDP) | | | 0.23 | 0.10 | 0.21 | –0.06 |
| Time required to start a business (days) | | | –0.21 | –0.21 | –0.26 | –0.35 |
| Trade (% of GDP) | 0.46 | 0.28 | 0.39 | 0.16 | 0.37 | 0.17 |
| Trade in services (% of GDP) | 0.27 | 0.19 | 0.28 | 0.15 | 0.26 | 0.14 |
| Logistics performance index: Overall (1=low to 5=high) | 0.82 | 0.78 | | | 0.78 | 0.80 |
| Medium- and high-tech manufacturing value added (% manufacturing value added) | 0.65 | 0.66 | 0.64 | 0.66 | | |

### Table 17: Variable correlations for regulatory and policy considerations

| Regulatory and policy considerations | 2022 ALL Cs | 2022 ITU32 | 2017 ALL Cs | 2017 ITU32 | 2014 ALL Cs | 2014 ITU32 |
|---|---|---|---|---|---|---|
| E-government score | 0.65 | 0.75 | 0.66 | 0.69 | 0.65 | 0.74 |
| Regulatory quality: estimate | | | 0.72 | 0.70 | 0.71 | 0.69 |

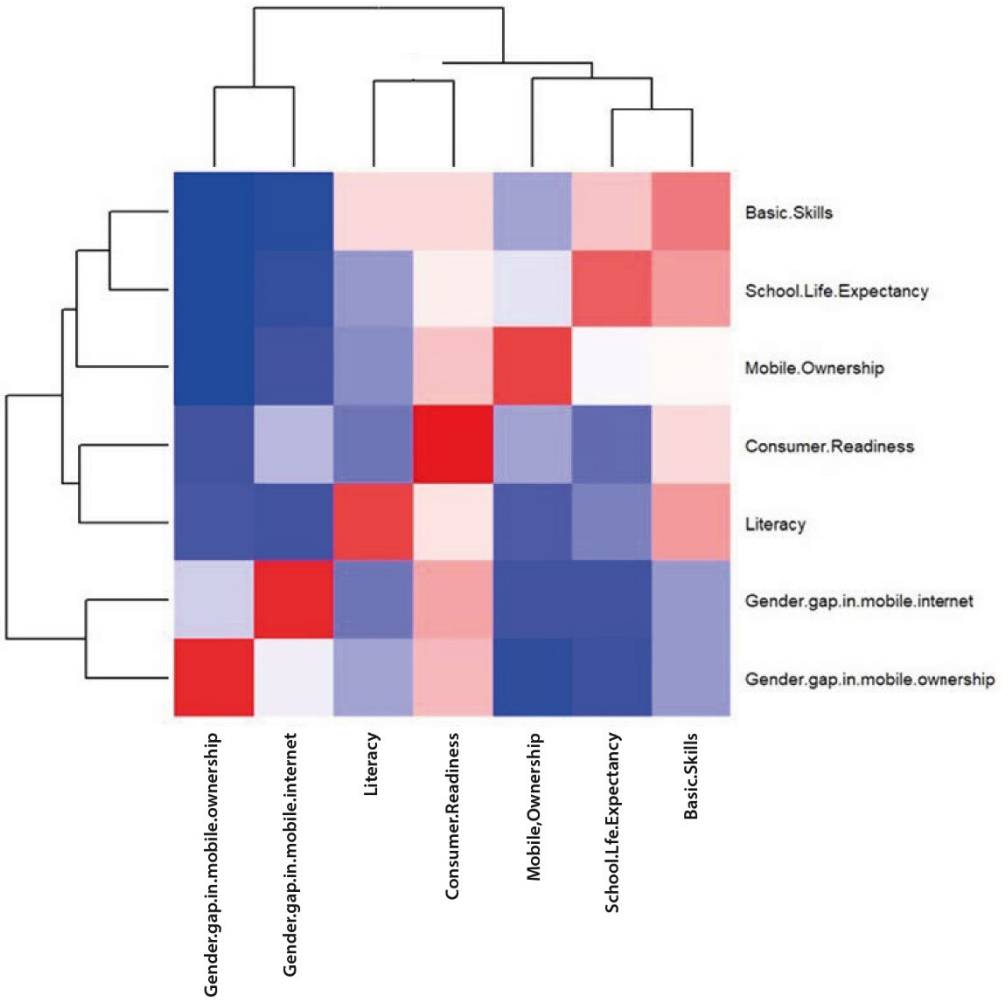
***Socio-cultural and political factors: consumer readiness and mobile ownership; content and services; governance and stability***

### Table 18: Variable correlations for consumer readiness and mobile ownership

| Consumer readiness and mobile ownership | 2022 ALL | 2022 ITU32 | 2017 ALL | 2017 ITU32 | 2014 ALL | 2014 ITU32 |
|---|---|---|---|---|---|---|
| Consumer readiness | 0.56 | 0.58 | 0.58 | 0.66 | 0.54 | 0.59 |
| Mobile ownership | 0.69 | 0.70 | 0.68 | 0.71 | 0.66 | 0.70 |
| Basic skills | 0.58 | 0.61 | 0.57 | 0.61 | 0.56 | 0.58 |
| Literacy | 0.44 | 0.42 | 0.45 | 0.45 | 0.45 | 0.47 |
| School life expectancy | 0.63 | 0.65 | 0.62 | 0.64 | 0.60 | 0.58 |
| Gender gap in mobile ownership | 0.35 | 0.35 | 0.38 | 0.49 | 0.30 | 0.36 |
| Gender gap in mobile Internet | 0.35 | 0.34 | 0.43 | 0.55 | 0.37 | 0.36 |
| Households with Internet access at home | | | 0.49 | 0.69 | 0.71 | 0.79 |
| Individuals using the Internet (% of population) | | | 0.68 | 0.67 | 0.73 | 0.77 |
| Mobile-cellular subscriptions | | | 0.07 | 0.12 | 0.08 | 0.13 |

The cross-correlation dendrogram in Figure 8 shows three distinct clusters indicating variable selection for further analysis.

Figure 8: Cross-correlation dendrogram, consumer readiness and mobile ownership



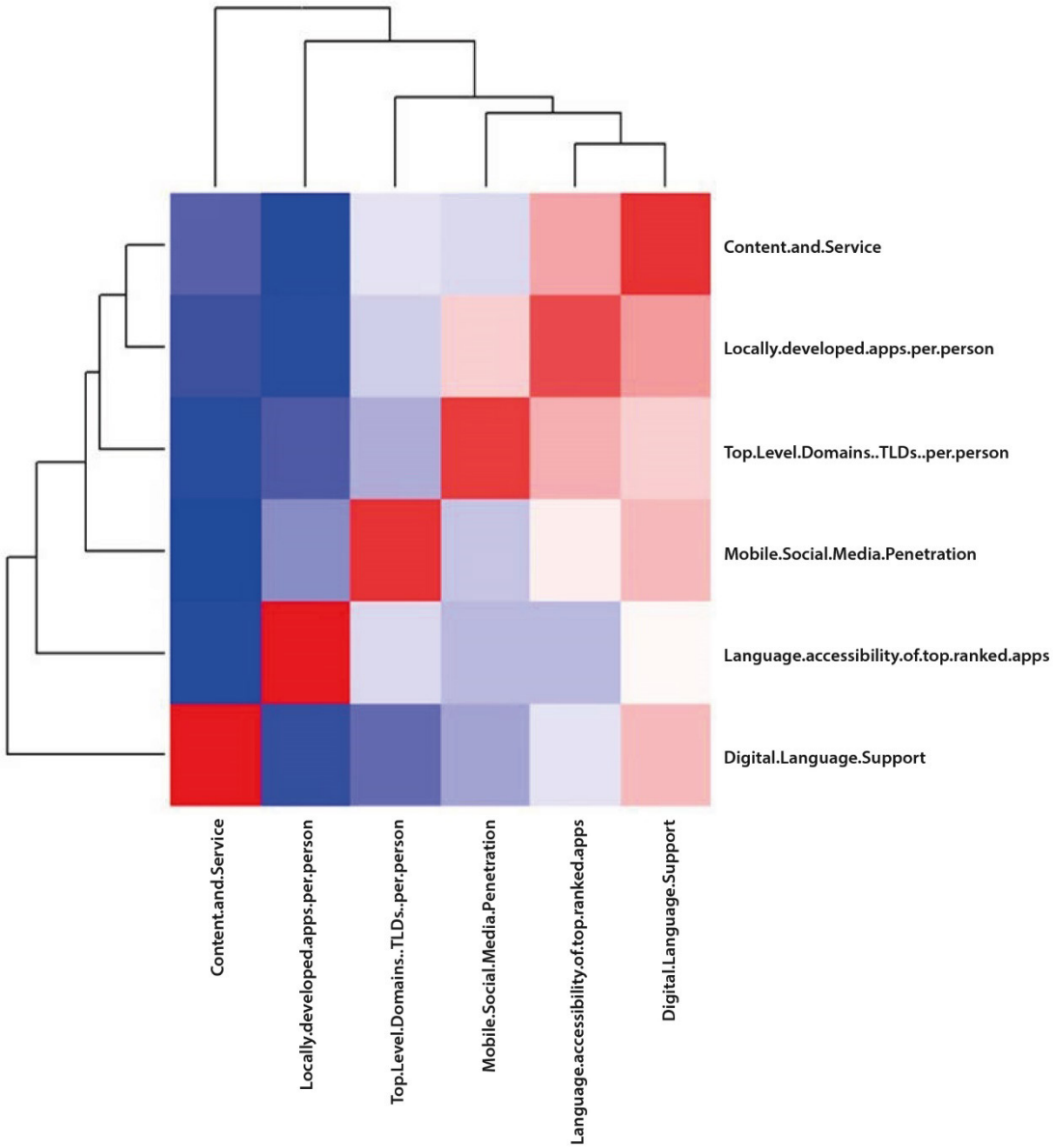

Source: ITU

Table 19: Variable correlations for content and services

| Content and services | 2022 ALL | 2022 ITU32 | 2017 ALL | 2017 ITU32 | 2014 ALL | 2014 ITU32 |
|---|---|---|---|---|---|---|
| Content and services | 0.70 | 0.70 | 0.69 | 0.75 | 0.68 | 0.72 |
| top-level domains per person | 0.61 | 0.45 | 0.61 | 0.46 | 0.61 | 0.48 |
| Mobile social media penetration | 0.64 | 0.64 | 0.55 | 0.64 | 0.59 | 0.55 |
| Locally developed apps per person | 0.63 | 0.47 | 0.67 | 0.61 | 0.68 | 0.61 |
| Digital language support | 0.39 | 0.49 | 0.40 | 0.53 | 0.40 | 0.53 |
| Language accessibility of top ranked apps | 0.42 | 0.50 | 0.44 | 0.53 | 0.45 | 0.58 |

Figure 9 contains the cross-correlation dendrogram for content and services.

## Figure 9: Cross-correlation dendrogram, content and services




Source: ITU

## Table 20: Variable correlations for governance and stability

| Governance and stability | 2022 ALL | 2022 ITU32 | 2017 ALL | 2017 ITU32 | 2014 ALL | 2014 ITU32 |
|---|---|---|---|---|---|---|
| Gender equality | 0.36 | 0.35 | 0.42 | 0.53 | 0.37 | 0.40 |
| Local relevance | 0.65 | 0.69 | 0.65 | 0.72 | 0.66 | 0.71 |
| CPIA building human resources rating (1=low to 6=high) | | | 0.22 | 0.35 | 0.24 | 0.45 |
| CPIA business regulatory environment rating (1=low to 6=high) | | | 0.15 | 0.30 | 0.14 | 0.32 |
| CPIA property rights and rule-based governance rating (1=low to 6=high) | | | 0.11 | 0.15 | 0.05 | 0.12 |

Table 20: Variable correlations for governance and stability (continued)

| Governance and stability | 2022 ALL | 2022 ITU32 | 2017 ALL | 2017 ITU32 | 2014 ALL | 2014 ITU32 |
|---|---|---|---|---|---|---|
| CPIA trade rating (1=low to 6=high) | | | 0.03 | 0.11 | –0.03 | 0.08 |
| CPIA transparency accountability and corruption in the public sector rating (1=low to 6=high) | | | 0.08 | 0.13 | –0.04 | –0.06 |
| Consumer price index (2010 = 100) | –0.11 | –0.55 | –0.11 | –0.30 | –0.30 | –0.27 |
| Government effectiveness: estimate | | | 0.72 | 0.67 | 0.73 | 0.71 |
| Political stability and absence of violence/ terrorism: estimate | | 0.45 | 0.25 | 0.48 | 0.23 | |
| Rule of law: estimate | | | 0.70 | 0.57 | 0.71 | 0.63 |
| Strength of legal rights index (0=weak to 12=strong) | | –0.01 | –0.11 | 0.08 | 0.03 | |

## 4.1 Regression analysis

The results of the panel data fixed-effects regression, unless specified, are indicated in Figures 10 to 17 and Tables 21 to 36, with ordinary least squares (OLS) being used due to data limitation.

The panel data fixed-effects model was applied with 5G population coverage as the main dependent variable. Since there are only about two years of data for 5G population coverage (2021 and 2020), the model as can be specified as:

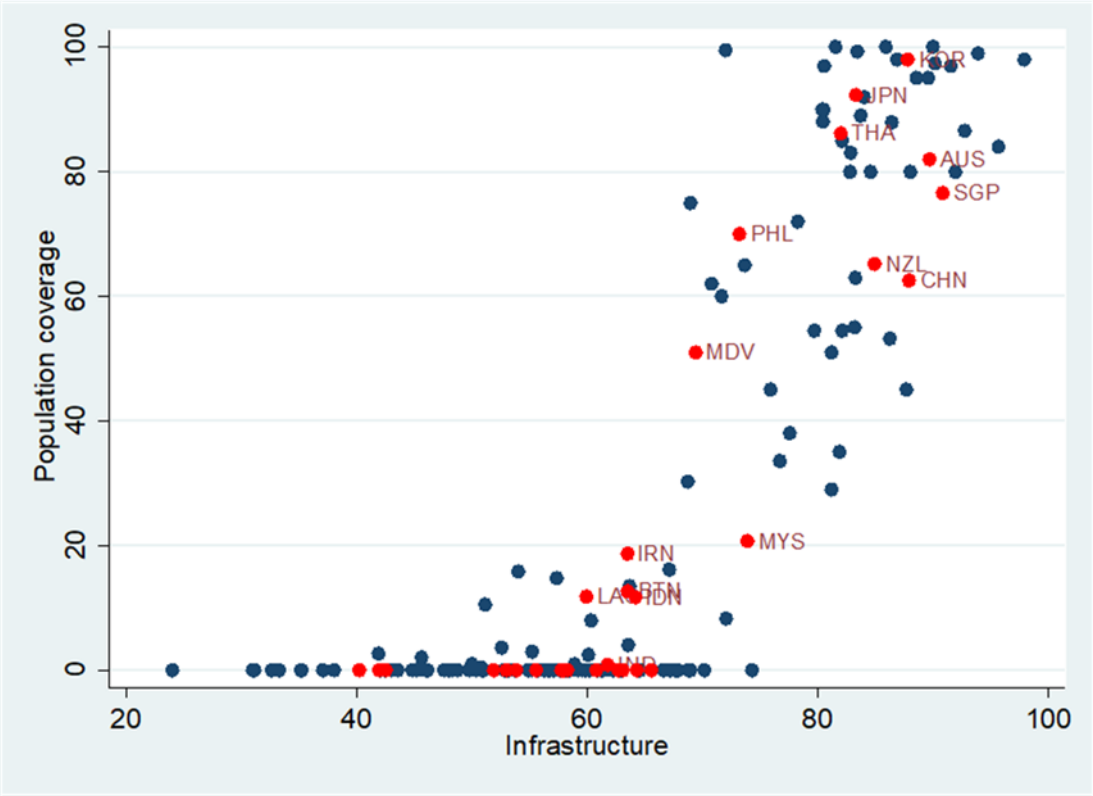
$$y_{it} = b_0 + d_1 d_{1t} + d_2 d_{2t} + b_1 x_{it} + a_i + e_{it}$$

where $d_{1t}$ and $d_{2t}$ are time dummies (indicator variables for 2021 and 2022, respectively); $x_{it}$ represents the explanatory variables capturing the 5G enablers, $a_i$ the country-specific fixed effect (time-invariant characteristic or unobserved heterogeneity), and $e_{it}$ the idiosyncratic error term. The main reason for using a panel data fixed-effects estimator is to correct for endogeneity caused by unobserved time-constant effects ($x_{it}$, $a_i$) = 0. See Appendix B for a detailed description of the panel data fixed-effect regression.

### *Technical and infrastructure readiness*

**Infrastructure and network**: Infrastructure index, network coverage, network performance, latencies and upload/download speeds

Figure 10: Scatter plot of 5G population coverage and infrastructure index




Source: ITU

Table 21: Panel data fixed-effects regression for infrastructure

| Infrastructure | Coefficient | P-value | | Coefficient | P-value |
|---|---|---|---|---|---|
| ALL | 2.2262 | 0.000 | ITU32 | 1.1129 | 0.010 |

Panel data fixed-effects regression, controlling for individual country characteristics, confirms that infrastructure is important as a 5G enabler both globally and in the Asia and the Pacific region.

Table 22: Panel data fixed-effects regression for network coverage/performance

| ALL | Coefficient | P-value | ITU32 | Coefficient | P-value |
|---|---|---|---|---|---|
| network coverage | 1.6159 | 0.008 | network coverage | .83405 | 0.070 |
| network performance | .37366 | 0.043 | network performance | .37366 | 0.043 |

However, when looking at network coverage (which is highly correlated to 4G population coverage and latency) and network performance (which is highly correlated to upload and download average speeds) in the same regression model, both are found to be important

enablers for 5G globally, but network coverage, while positively related, is not statistically significant for the region. This may be because of the smaller sample size (only two years of observation for 32 countries). A follow-up analysis with additional years, e.g. 2023 data, should improve statistical significance.

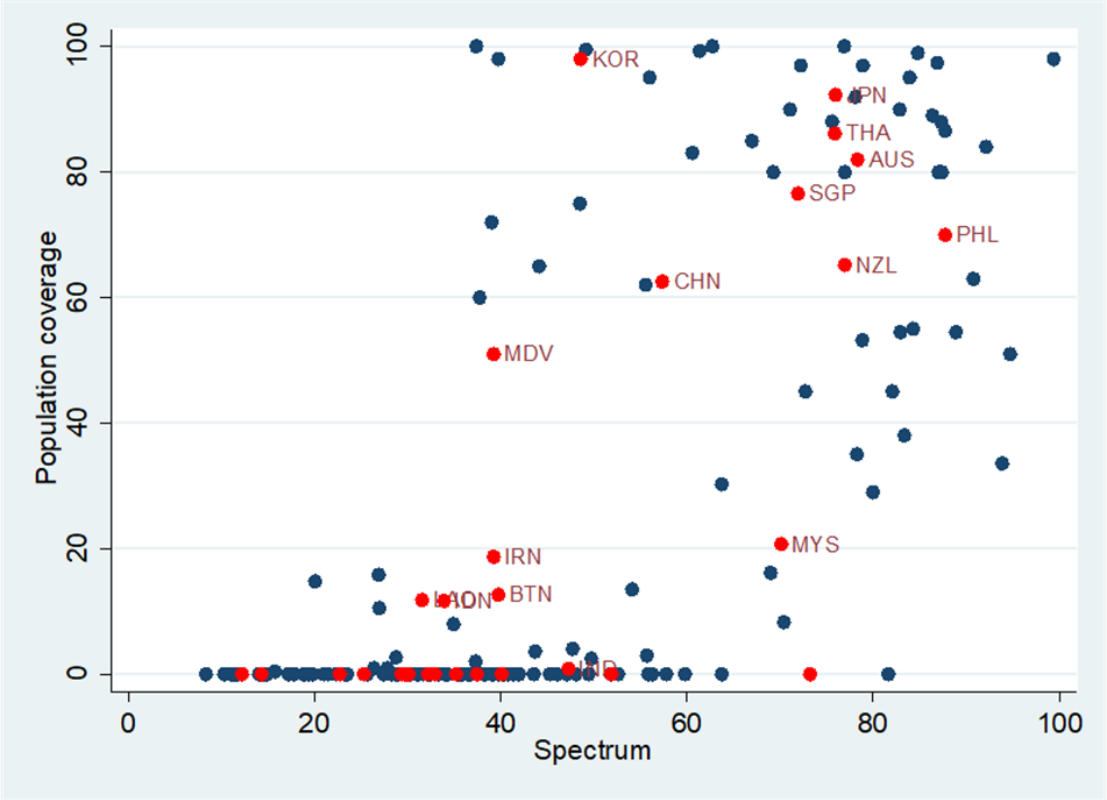
### Table 23: Panel data fixed-effects regression for population coverage, latencies and upload/download speeds

| ALL | Coefficient | P-value | ITU32 | Coefficient | P-value |
|---|---|---|---|---|---|
| pop coverage4G | .07345 | 0.050 | pop coverage4G | .08647 | 0.329 |
| mobile latencies | .03511 | 0.210 | mobile latencies | .01445 | 0.317 |
| mobile upload speeds | .18577 | 0.255 | mobile upload speeds | .08440 | 0.577 |
| mobile down-load speeds | .48257 | 0.006 | mobile download speeds | .44032 | 0.058 |

Lastly, the panel data regressions in Table 23 show the importance of mobile download speeds and 4G population coverage as 5G enablers globally, but mobile latency and upload speeds, although positive, do not seem to be as important. Interestingly, for the region, 4G population coverage is not so important as a 5G enabler.

**Spectrum and bandwidth: Spectrum index**

### Figure 11: Scatter plot of 5G population coverage and spectrum




Source: ITU

### Table 24: Panel data fixed-effects regression for spectrum

| Spectrum | Coefficient | P-value | | Coefficient | P-value |
|---|---|---|---|---|---|
| ALL | 0.98645 | 0.001 | ITU32 | 0.62399 | 0.024 |

As expected, spectrum and bandwidth exhibit a significant relationship with 5G adoption globally and in the region.

### Table 25: Panel data fixed-effects regression for spectrum assigned

| ALL | Coefficient | P-value | ITU32 | Coefficient | P-value |
|---|---|---|---|---|---|
| spectrum assigned in bands below 1GHz | .59 | 0.020 | spectrum assigned in bands below 1GHz | .61 | 0.016 |
| spectrum assigned in bands between 1 – 3 GHz | –.10 | 0.621 | spectrum assigned in bands between 13 | .032 | 0.401 |
| spectrum assigned in bands between 3 – 6 GHz | .29 | 0.029 | spectrum assigned in bands between 36 | .18 | 0.303 |
| spectrum assigned in mmWave bands | –.086 | 0.524 | spectrum assigned in mmWave bands | –.103 | 0.382 |

Note: Most countries have chosen the C-band and FDD bands for the mainstream 5G spectrum. The mmWave is usually reserved for hotspot areas.

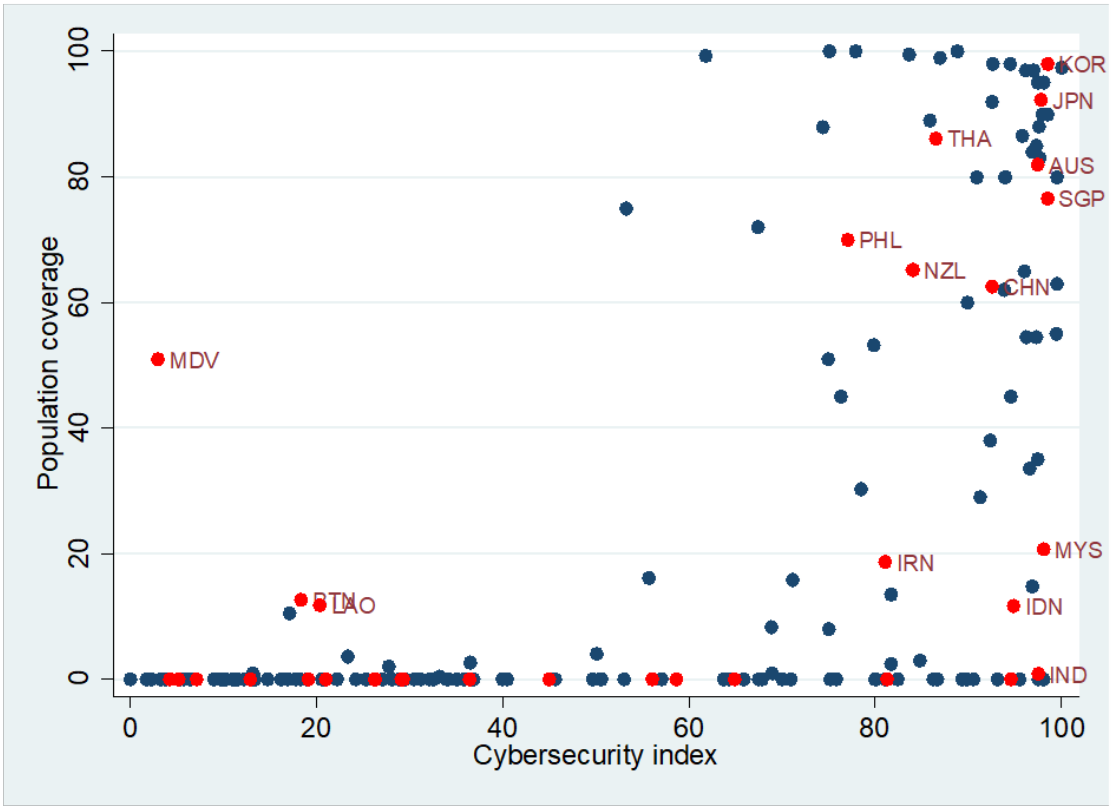
Taking a closer look, the amount of spectrum in bands below 1 GHz assigned to mobile network operators is positively related to 5G population coverage, while the empirical evidence on higher frequency bands is mixed at best. In fact, 5G spectrum auctions have attracted much attention from operators and this will greatly affect the success of 5G. Sufficient spectrum resources are the basis for successful 5G network construction and commercial use. The prerequisite for operators to put 5G into commercial use is to allocate sufficient low-, intermediate- and high-frequency spectrum.[13]

**Security and legislation: Cybersecurity index**

(Note: Simple regression analysis applied here as 2022 data unavailable)

[13] See, for example, Miller et al. (2022) and GSMA https://www.gsma.com/spectrum/5g-spectrum-guide/

## Figure 12: Scatter plot of 5G population coverage and cybersecurity




Source: ITU

## Table 26: Ordinary least squares regression for cybersecurity index

| ALL | Coefficient | P-value | ITU32 | Coefficient | P-value |
|---|---|---|---|---|---|
| cybersecurity index | .52016 | 0.000 | cybersecurity index | .49827 | 0.003 |

Arguably, cybersecurity is positively correlated with 5G adoption.

**Geographical and environmental factors**: Access to electricity (% of population), population total, population density (people per sq. km of land area)

(Note: 4G population coverage is used as a dependent variable in the absence of 2022 data for regressors)

## Table 27: Ordinary least squares regression for access to electricity, total population and population density

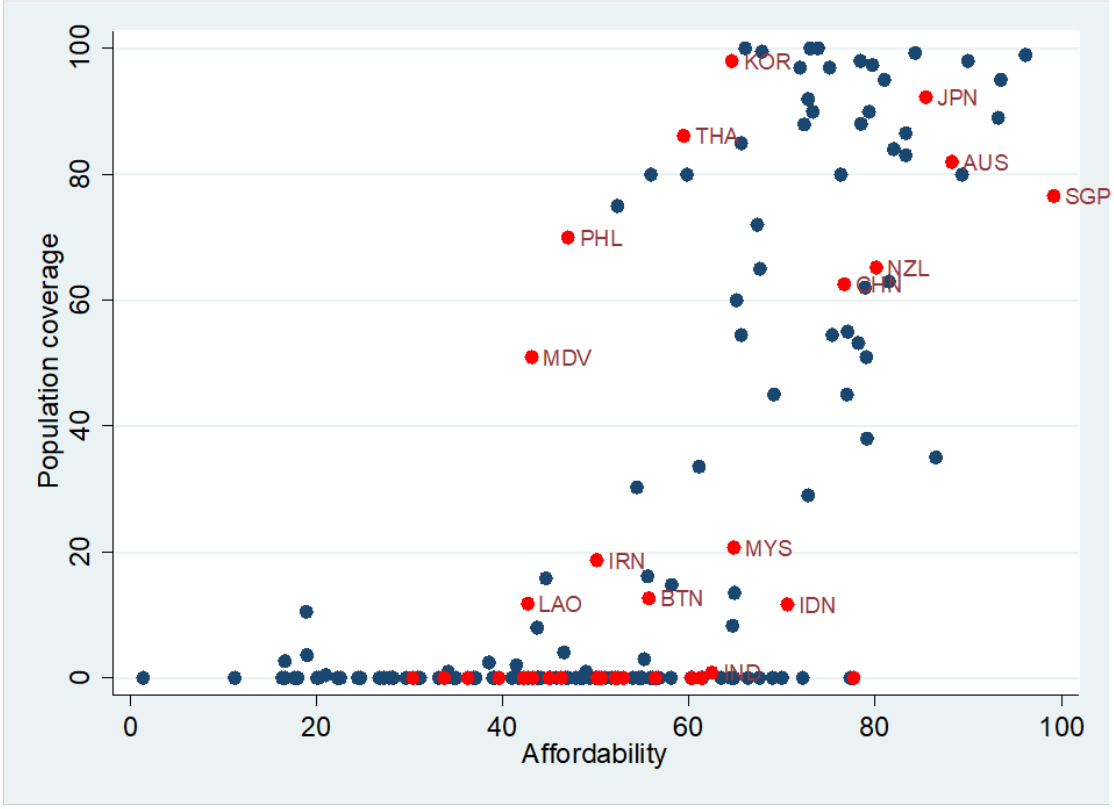
| ALL | Coeffi-cient | Standard error | P-value | ITU32 | Coeffi-cient | Standard error | P-value |
|---|---|---|---|---|---|---|---|
| access to electricity of population | 2.81 | .3042143 | 0.000 | access to electricity of population | 2.7 | .418065 | 0.000 |
| population total | 1.1e-06 | 5.04e-07 | 0.030 | population total | 8.2e-07 | 3.79e-07 | 0.037 |
| population density people per sqkm of | .11 | .0347568 | 0.002 | population density people per sqkm of | .09 | .0356331 | 0.016 |

Access to electricity, total population and population density are all important in shaping the 4G landscape and supposedly in promoting 5G technology adoption. Arguably, access to electricity is a foundational enabler, as electricity is essential for the widespread adoption of technology. A well-connected and properly electrified population is better positioned to embrace the benefits of 5G connectivity and its transformative applications. Additionally, the size and density of the population may play a pivotal role in determining the feasibility and potential reach of 4G as well as 5G networks. As more individuals are integrated into the digital ecosystem, opportunities for innovation and collaboration are heightened, fostering economic growth and societal progress. These factors, collectively, contribute to an environment conducive to unlocking the full potential of mobile technology and enabling a more connected and inclusive future.

### *Economic and regulatory factors*

**Affordability and costs:** Affordability index, affordability of 5G, handset and device affordability

Figure 13: Scatter plot of 5G population coverage and affordability




Source: ITU

Table 28: Panel data fixed-effects regression for affordability

| Affordability | Coefficient | P-value | | Coefficient | P-value |
|---|---|---|---|---|---|
| ALL | .71667 | 0.005 | ITU32 | .21182 | 0.293 |

While affordability typically stands out as a crucial factor in enabling the adoption of 5G technology, it is interesting to note that, although positively related, it is statistically insignificant for the region. Again, this could be due to the smaller number of observations and follow-up analysis with data from additional years (e.g. 2023 and beyond) should improve statistical

significance. It is worth mentioning that the dependent variable is 5G coverage, not adoption, and affordability is arguably more likely to impact adoption. Furthermore, the affordability measures here are based on MCI data, which are almost entirely for 3G and 4G. They may serve as a good proxy but should be interpreted with caution as they are not based primarily on 5G.[14]

When looking at data affordability, however, it is also clear that affordability of higher 5Gb is an important enabler for 5G globally but is not statistically significant for countries in the Asia and the Pacific region. This is the case even when considering affordability for the poorest 40 per cent.

### Table 29: Panel data fixed-effects regression for affordability of 5G

| ALL | Coefficient | P-value | ITU32 | Coeffi-cient | P-value |
|---|---|---|---|---|---|
| affordability 5 Gb | .290 | 0.033 | affordability 5 Gb | .485 | 0.098 |
| affordability 1 Gb | .061 | 0.695 | affordability 1 Gb | –.226 | 0.399 |
| affordability 5 Gb for poorest 40 per cent | .313 | 0.038 | affordability 5 Gb for poorest 40 per cent | .486 | 0.097 |
| affordability1 Gb for poorest 40 per cent | .060 | 0.704 | affordability 1 Gb for poorest 40 per cent | –.226 | 0.399 |

Similar results are found when considering handset and device affordability (Table 30). Although handset affordability is generally important globally as a 5G enabler, it is not statistically significant for the region, even for the poorest 40 per cent.[15]

### Table 30: Regression for handset and device affordability

| ALL | Coefficient | P-value | ITU32 | Coefficient | P-value |
|---|---|---|---|---|---|
| handset affordability | 2.976 | 0.001 | handset affordability | 2.330 | 0.081 |
| device affordability | –2.612 | 0.001 | device affordability | –2.235 | 0.069 |

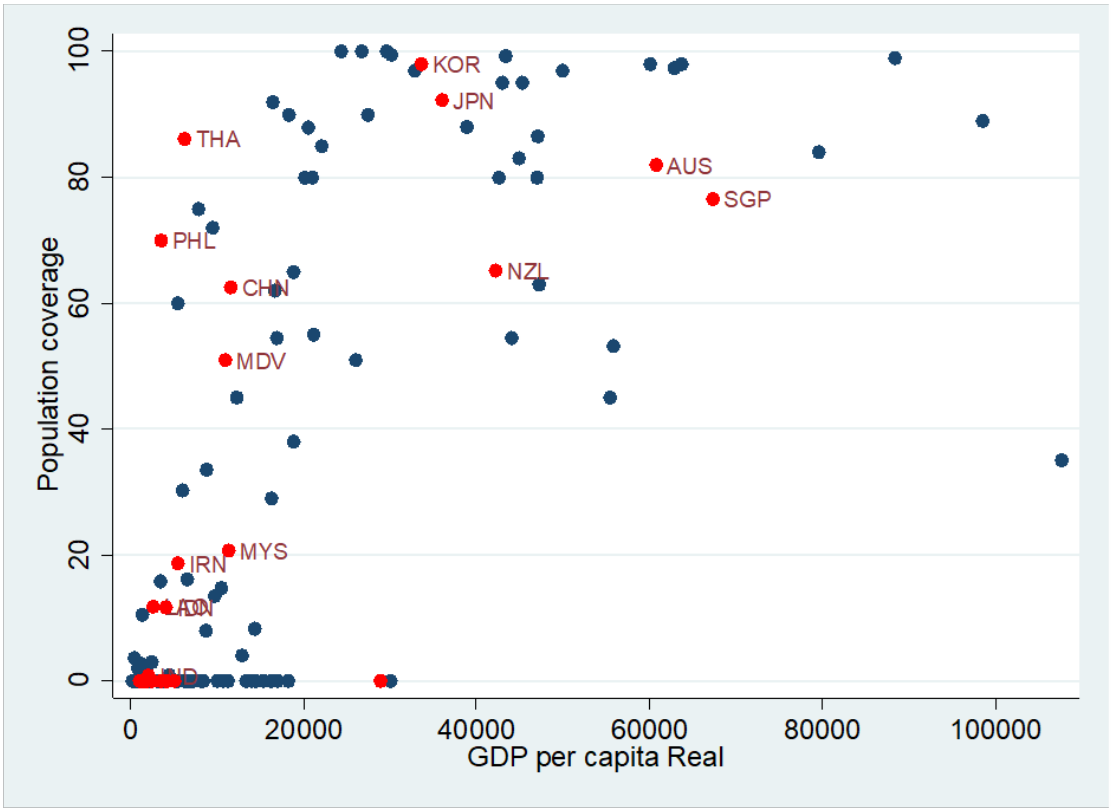
**Economic and development indicators:** GDP per capita (constant 2015 USD), high-technology exports (% of manufactured exports), ICT goods/services exports/imports

(Note: Regression analysis used because 2022 data are unavailable)

[14] The World Bank has an affordability threshold for broadband of 5% of average monthly income, while the GSMA sets the threshold at 2%, like ITU (see ITU, Achieving universal and meaningful digital connectivity in the decade of action. Aspirational targets for 2030, at https://www.itu.int/itu-d/meetings/statistics/wp-content/uploads/sites/8/2022/04/UniversalMeaningfulDigitalConnectivityTargets2030.pdf)

[15] Coefficients not reported here.

Figure 14: Scatter plot of 5G population coverage and real income per capita




Source: ITU

Table 31: Ordinary least squares regression for GDP per capita and high-tech exports

| 94 countries | Coefficient | P-value | ITU15 | Coefficient | P-value |
|---|---|---|---|---|---|
| GDP per capita real | .001 | 0.000 | GDP per capita real | .001 | 0.001 |
| high technology exports of manufacturing | .68 | 0.010 | high technology exports of manufac-turing | .54 | 0.212 |

Income per capita and international trade (not shown here) emerge as crucial factors influencing the 5G landscape. High-technology exports are a significant potential enabler but not, interestingly, in the region. While this might initially seem counter-intuitive, it suggests the need to integrate plans and strategies for industry digital development and the use of 5G to promote industry digitalization.

Table 32: Ordinary least squares regression for ICT exports/imports

| 115 countries | Coefficient | P-value | ITU20 | Coefficient | P-value |
|---|---|---|---|---|---|
| GDP per capita real | .001 | 0.000 | GDP per capita real | .001 | 0.039 |
| ICT goods exports of total goods exports | 1.386 | 0.003 | ICT goods exports of total goods exports | 1.35 | 0.108 |

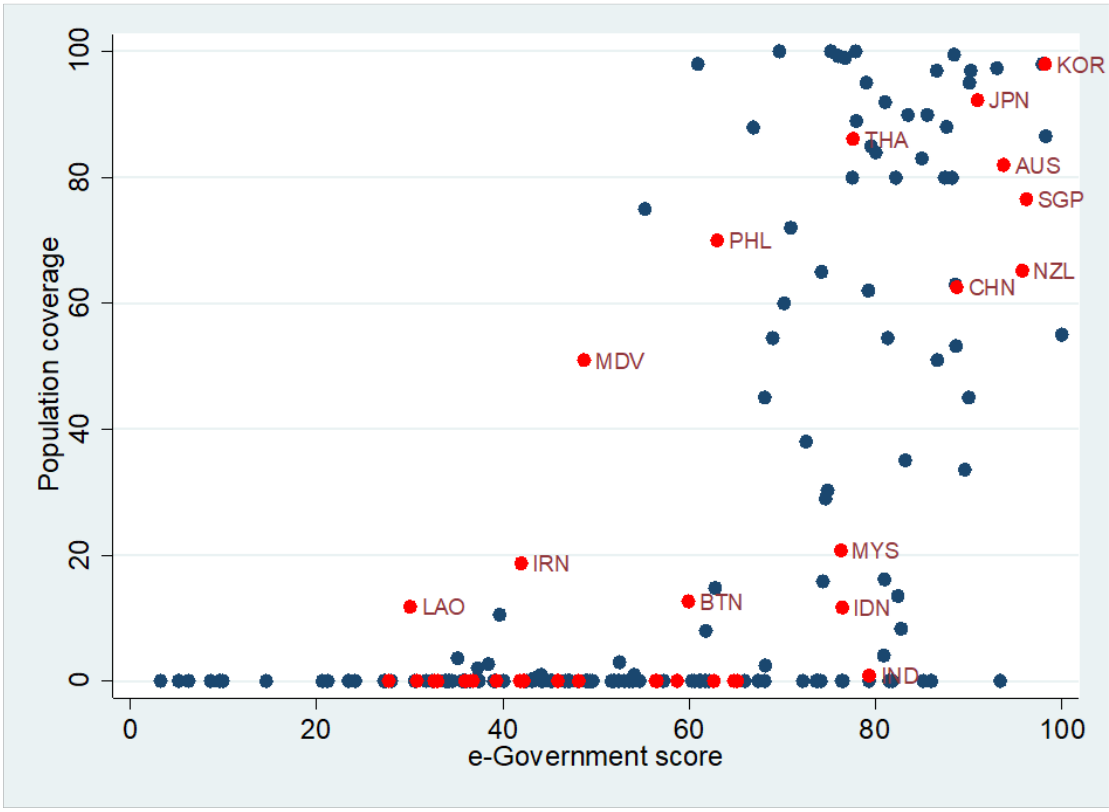
Table 32: Ordinary least squares regression for ICT exports/imports (continued)

| 115 countries | Coefficient | P-value | ITU20 | Coefficient | P-value |
|---|---|---|---|---|---|
| ICT goods imports total goods imports | –.40 | 0.582 | ICT goods imports total goods imports | –.70 | 0.725 |
| ICT service exports of service export | –.11 | 0.510 | ICT service exports of service export | –.43 | 0.290 |

Regression results suggest that ICT goods exports is a major enabler for 5G, but countries in the region seem not yet to have exploited this fully. Interestingly, neither imports of ICT goods nor export of ICT services is related to 5G usage. Although other macroeconomic variables, such as the real effective exchange rate, interest rates, inflation and the Gini coefficient, seem to have little impact on 5G usage, there is some suggestion (not shown here) that trade in services might promote 5G adoption in countries in the region.

**Regulatory and policy considerations:** E-government score, regulatory quality (estimate)

Figure 15: Scatter plot of 5G population coverage and e-governance




Source: ITU

Note: Regression analysis used.

### Table 33: Ordinary least squares regression for e-government score and regulatory quality

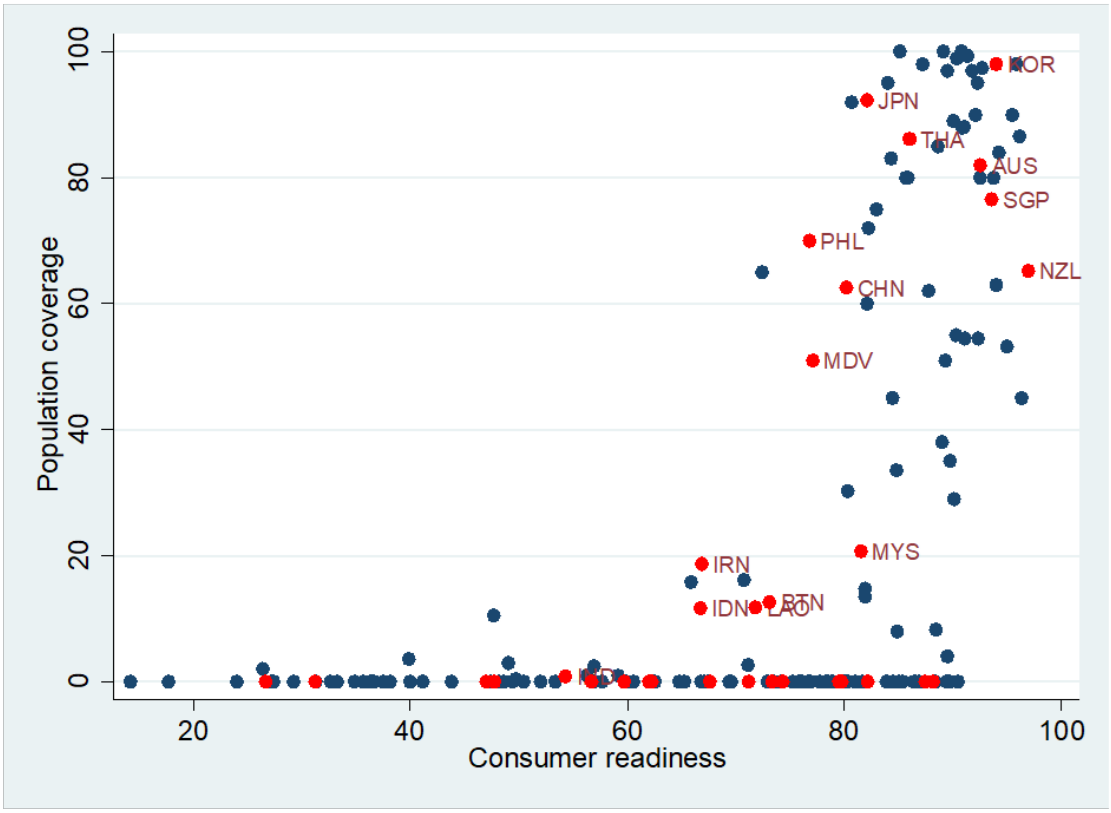
| ALL | Coefficient | P-value | ITU32 | Coefficient | P-value |
|---|---|---|---|---|---|
| e-government score | .249 | 0.049 | e-government score | .721 | 0.013 |
| regulatory quality estimate | 17.42 | 0.000 | regulatory quality estimate | 8.85 | 0.139 |

The importance of e-government and regulatory quality cannot be overstated in the context of 5G technology adoption. Although panel data fixed-effects regression does not show any significant relationship between e-governance and 5G adoption, regression analysis indicates a positive relationship, including regulatory quality, that is not as strong statistically for the region.

### Socio-cultural and political factors

**Consumer readiness and mobile ownership:** Consumer readiness index, mobile ownership, mobile-cellular subscriptions (per 100 people)

### Figure 16: Scatter plot of 5G population coverage and consumer readiness index




Source: ITU

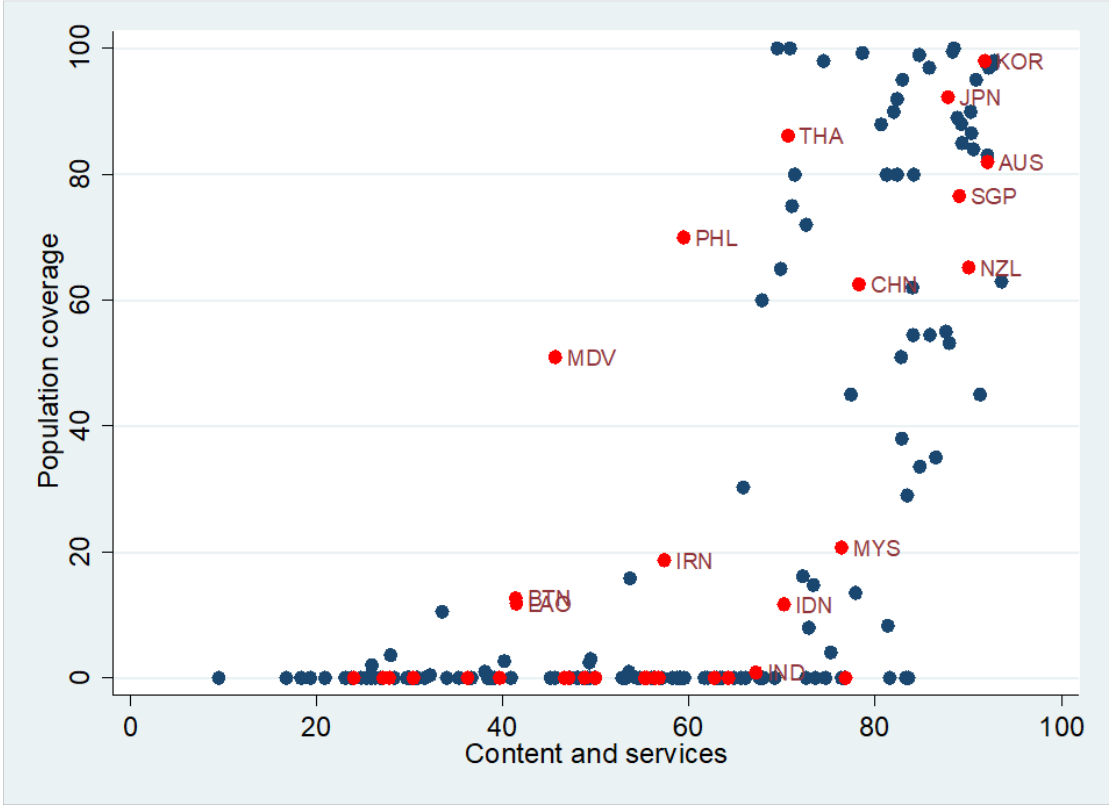
### Table 34: Panel data fixed-effects regression for consumer readiness and mobile ownership

| ALL | Coefficient | P-value | ITU32 | Coefficient | P-value |
|---|---|---|---|---|---|
| consumer readiness | .31250 | 0.162 | consumer readiness | -.01478 | 0.949 |
| mobile ownership | 2.7902 | 0.000 | mobile ownership | 2.1328 | 0.001 |

In the above regressions, although the GSMA consumer readiness index is not statistically significant in explaining 5G usage globally and in the region, mobile ownership is a highly significant 5G enabler. Other consumer characteristics, such as basic skills, literacy, school life expectancy, mobile-cellular subscriptions per 100 people, percentage of individuals using the Internet and mobile-cellular subscriptions were correlated with 4G and 5G population coverage. Consumer readiness and mobile ownership dynamics should play a pivotal role as enablers for the widespread adoption and success of 5G technology. General consumer engagement and mobile ownership drive demand for the advanced services and experiences that 5G offers.

**Content and services:** Content and services index and top-level domains (TLDs) per person

### Figure 17: Scatter plot of 5G population coverage and content and services index




Source: ITU

### Table 35: Panel data fixed-effects regression for content/services and top-level domains (TLDs)

| ALL | Coefficient | P-value | ITU32 | Coefficient | P-value |
|---|---|---|---|---|---|
| content and services | –1.73 | 0.023 | content and services | –2.22 | 0.004 |
| top level domains (TLDs) per person | 1.57 | 0.082 | top level domains (TLDs) per person | .67 | 0.264 |

Contrary to expectations, content and services, which encompass the availability of secure online content and services tailored to the local population, such as mobile social media penetration, intensity of locally developed apps, digital language support and language accessibility of top-ranked apps, appear to have a *negative* impact on 5G adoption. Only access to TLDs per person is positively related, but not statistically significant, to 5G population coverage. Despite the intuitive notion that accessible and relevant digital content should fuel 5G adoption, it seems that other underlying factors are more influential.

**Governance and stability:** Gender equality, local relevance, government effectiveness: estimate, rule of law: estimate, strength of legal rights index (0=weak to 12=strong)

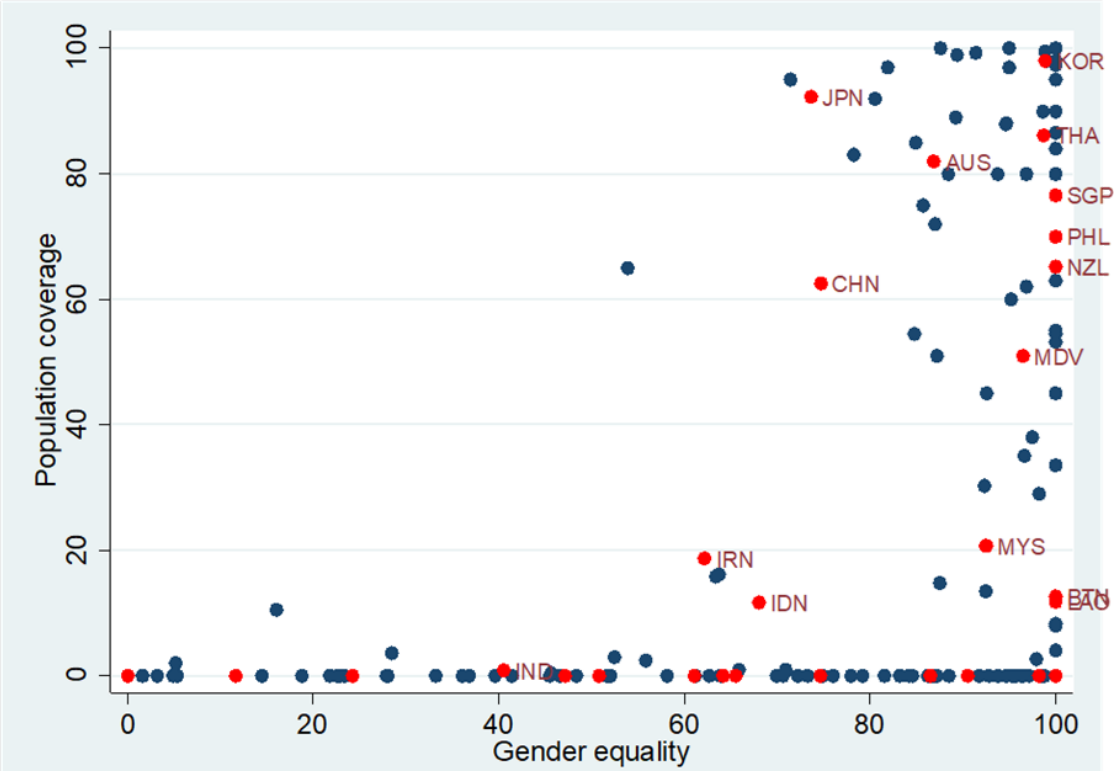
(Note: 4G population coverage is used as a dependent variable because the 2022 data for regressors are missing.)

### Table 36: Ordinary least squares regression for gender equality, government effectiveness and rule of law

| ALL | Coefficient | P-value | ITU32 | Coefficient | P-value |
|---|---|---|---|---|---|
| gender equality | .56 | 0.000 | gender equality | .53 | 0.042 |
| government effectiveness estimate | 7.07 | 0.482 | government effectiveness estimate | –2.00 | 0.872 |
| rule of law estimate | –14.98 | 0.266 | rule of law estimate | 67.97 | 0.005 |

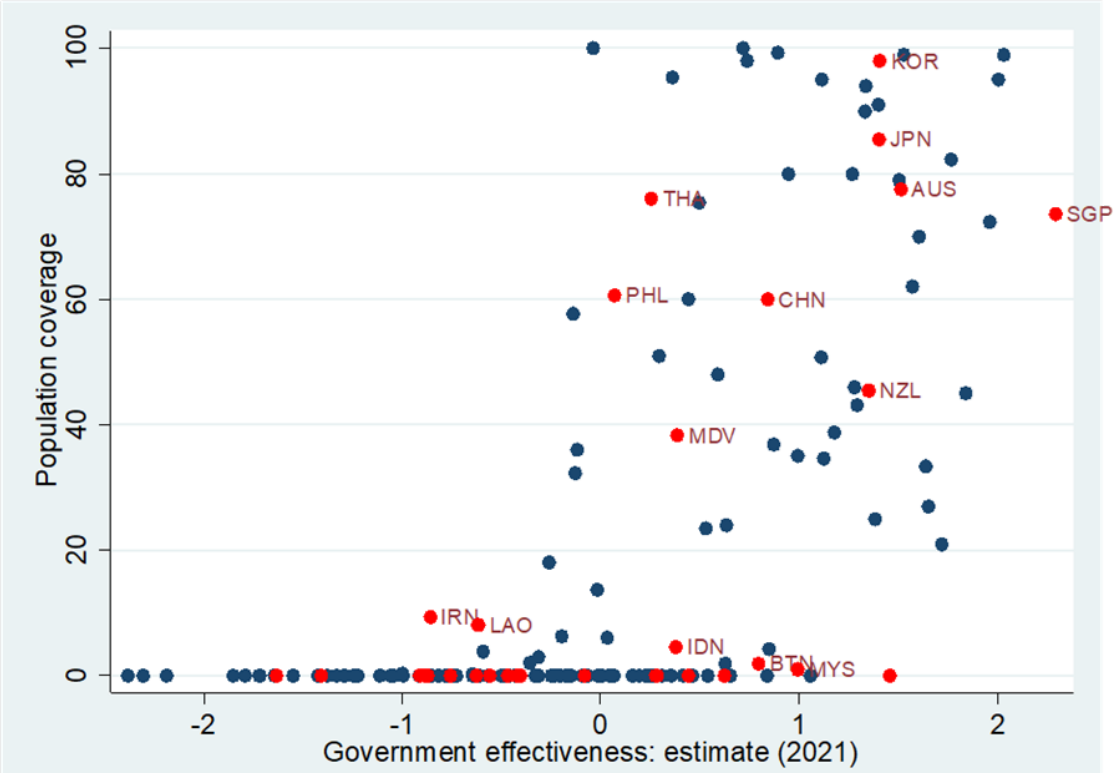
Interestingly, gender equality plays a critical role in the context of 4G/5G adoption.

Figure 18: Scatter plot of 5G population coverage and gender equality



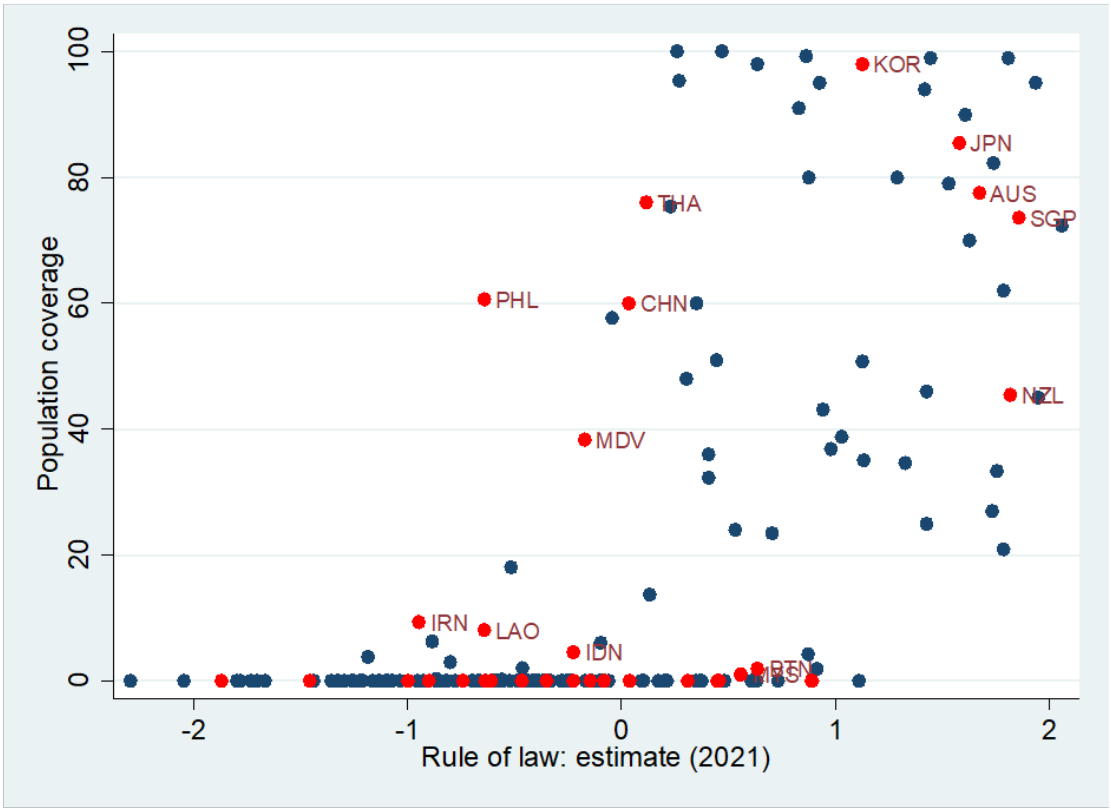

Source: ITU

Figure 19: Scatter plot of 5G population coverage and government effectiveness




Source: ITU

Figure 20: Scatter plot of 5G population coverage and rule of law




Source: ITU

## 4.2 Summary of results and robustness check

### Technical and infrastructure readiness

**Infrastructure and network**: The panel data fixed-effects regression analysis, which takes account of individual country characteristics, affirms that infrastructure plays a significant role as a 5G enabler, both at the global level and within the region. Robust infrastructure is crucial for supporting the roll-out and functionality of 5G networks. While network coverage and performance are vital enablers for 5G adoption on a global scale, the analysis is more nuanced for the region. Network coverage, highly correlated with 4G population coverage and latency, shows a positive relationship but lacks statistical significance for the region owing to the limited sample size. Expanding the data set to include more recent years, such as 2023, may enhance the statistical significance of these factors. Another explanation may be that most 5G deployments to date are non-stand-alone, which does not enable the low latency that is available on stand-alone 5G. This may also help explain why few enterprise services have been developed that leverage the low latency features.

**Spectrum and bandwidth**: The panel data regressions emphasize the importance of mobile download speeds and 4G population coverage as critical 5G enablers on a global level. However, mobile latency and upload speeds, while positively related, do not appear to carry the same level of importance. Interestingly, for the region, 4G population coverage is not as pivotal as a 5G enabler.

**Security and legislation**: Cybersecurity is fundamental in the 5G landscape. With the proliferation of connected devices and data-exchange possibilities, it is paramount to safeguard sensitive information and critical infrastructure. Robust cybersecurity measures protect personal privacy and shield businesses, governments and essential services from potential threats and breaches. They lay a secure foundation for 5G, fostering trust, enabling innovation, and ensuring a safer and more interconnected future.

**Geographical and environmental factors**: Access to electricity is important as it allows for a well-connected population to embrace 5G's benefits. Population size and density influence the feasibility and reach of 5G networks. As more individuals join the digital ecosystem, opportunities for innovation and economic growth increase, fostering a connected and inclusive future.

### Economic and regulatory factors

**Affordability and costs**: Although affordability typically plays a significant role in enabling the adoption of 5G technology on a global scale, regression analysis suggests that, while positively related, affordability is statistically insignificant for the region. This may be due to the limited number of observations; further analysis with data from additional years, such as 2023 and beyond, could enhance its statistical significance. Interestingly, this result holds true even when considering affordability for the poorest 40 per cent of the population.

**Economic and development indicators**: Income per capita and high-technology exports are major factors influencing the 5G landscape globally. However, for the region, high-technology exports do not exhibit the same level of significance, suggesting the need to integrate strategies for industry digital development and to leverage 5G for industry digitalization in the region. The export of ICT goods is found to be an important enabler for 5G adoption globally. Countries in the region appear not to have fully exploited this potential. Factors such as the real effective exchange rate, interest rates, inflation and income inequality (Gini coefficient) seem to have little impact on 5G adoption, indicating that these macroeconomic factors may not be primary drivers of 5G adoption. However, there are indications that trade in services may positively influence 5G adoption in the region.

**Regulator and policy considerations**: The importance of e-government and the quality of governance regulations cannot be overstated in the context of 5G adoption. While panel data fixed-effects regression does not show a significant relationship between e-governance and 5G adoption, it does identify a positive relationship, especially regarding regulatory quality. However, the statistical significance of regulatory quality is not as strong for the region, suggesting that there is room for improvement in regulatory frameworks.

### Socio-cultural and political factors

**Consumer readiness and mobile ownership**: While the GSMA consumer readiness index does not exhibit statistical significance in explaining 5G usage globally and in the region, mobile ownership is identified as a highly significant enabler of 5G adoption. Factors such as basic skills, literacy, school life expectancy, mobile-cellular subscriptions per 100 people, Internet usage and mobile-cellular subscriptions are correlated with 4G and 5G population coverage. Consumer readiness and mobile ownership dynamics are pivotal in driving the widespread adoption and success of 5G technology. Engaged and empowered consumers create demand for the advanced services and experiences offered by 5G, fostering innovation and industry evolution.

**Content and services**: Surprisingly, content and services, encompassing secure online content and services tailored to local conditions, appear to have a negative impact on 5G adoption. Metrics such as mobile social media penetration, the intensity of locally developed apps, digital language support and language accessibility of top-ranked apps exhibit unexpected correlations. This outcome underscores the complexity of the relationship between technology adoption and local dynamics. While the presence of locally created content might have been expected to promote adoption, other underlying factors seem to be more influential. Indeed, while the local creation of content might have been thought to facilitate adoption, the context is clearly more complex. This insight invites us to delve deeper into the specific nuances that contribute to this unexpected correlation and explore how it interacts with various aspects of the 5G ecosystem.

**Governance and stability**: Gender equality emerges as a critical factor in the context of 4G/5G adoption. Promoting gender equality is not only a matter of social justice, but also a strategic imperative for realizing the full potential of 5G transformative capabilities. Ensuring equal opportunities for women's participation and leadership in the technology sector unlocks diverse perspectives and skills that drive innovation and creativity. Gender-inclusive policies and practices lead to a more balanced and inclusive workforce, enabling holistic problem-solving and the development of solutions for all members of society. Addressing gender disparities in technology adoption reduces the digital divide and promotes a more equitable future where everyone benefits from 5G advancements.

## 4.3 Limitations

The empirical study has two main limitations: the panel data regression is limited to two years, 2021 and 2022, for which data on 5G population coverage is available; and only some Asia and the Pacific countries have adopted 5G technology. Because of those limitations, the analysis tends to find that the link between 5G coverage and several indicators in the region is statistically insignificant, whereas it is significant globally.

Both these limitations suggest that the regression results must be interpreted with care.

# 5 Policy recommendations

Based on the empirical findings, several policy recommendations are suggested here to effectively foster 5G adoption and its associated benefits. It should be emphasized, however, that 5G does not have to be a policy priority; governments need to consider the relevant advantages of multiple technologies and their complementarity when defining national technology policies, which would ideally be technology agnostic. Only if 5G is deemed to be necessary or to enable specific market dynamics based on an evidence-driven assessment should it be considered a policy priority and the recommendations considered.

The policy recommendations are divided into the same three groups of enablers.

### Technical and infrastructure readiness

**Infrastructure investment**: Building the right infrastructure plays a pivotal role in unleashing the transformative potential of any new technology and 5G is no exception. Infrastructure is the foundation upon which the promises of faster speeds, minimal latency and extensive connectivity can be realized. By strategically establishing this infrastructure, the way has been set for innovations that can enhance various aspects of peoples' lives, from enabling remote health-care services and advancing smart cities to facilitating seamless communication between devices. Ultimately, well-organized infrastructure is the key that opens doors to a more connected and efficient future, where the possibilities of 5G are harnessed to create positive impacts across diverse industries and communities. Policy-makers should prioritize substantial investments in building and upgrading communication infrastructure. This includes deploying high-speed networks, expanding coverage in urban and rural areas, and monitoring network coverage and experience indicators. Consideration should be given to using Universal Service Funds or financial support to improve 4G/5G coverage.

**Spectrum**: Effective spectrum management is crucial for 5G roll-out and adoption. Governments and regulatory bodies should continue establishing clear policies for spectrum allocation, including frequency bands and licensing models, to meet rising connectivity demands and foster innovation.

**Infrastructure accessibility**: Needless to say, governments should prioritize infrastructure development to ensure reliable access to electricity, especially in underserved areas, and consider population density in urban planning to optimize network coverage and connectivity. Access to electricity, total population and population density are all important in shaping the new technology landscape. For example, a well-connected and properly electrified population is better positioned to embrace the benefits of 5G connectivity and its transformative applications. Additionally, the size and density of the population may play a pivotal role in determining the feasibility and potential reach of 4G as well as 5G networks. As more individuals are integrated into the digital ecosystem, opportunities for innovation and collaboration are heightened, fostering economic growth and societal progress. These factors, collectively, contribute to an environment conducive to unlocking the full potential of mobile technology and enabling a more connected and inclusive future.

**Cybersecurity**: Cybersecurity is pivotal in the realm of 5G technology. As the transformative potential of 5G is embraced, it becomes imperative to ensure the utmost security and resilience in our digital landscape. With the exponential increase in connected devices and data-exchange possibilities, the importance of safeguarding sensitive information and critical infrastructure

cannot be overstated. Cybersecurity safeguards personal privacy and protects businesses, governments and critical services from potential threats and breaches. By prioritizing robust cybersecurity measures, a secure foundation has been created upon which 5G can flourish, fostering trust and confidence among users, enabling innovation, and paving the way for a safer and more connected future. Governments must ensure robust cybersecurity measures to build trust in the new technology. They must modernize legislative frameworks so that they can adapt to the evolving technological landscape. This is not limited to laws related to data protection, privacy and network security specific to 5G technology; it must also involve international cooperation in establishing frameworks to manage cross-border data flows and cyberthreats effectively.

### Economic and regulatory factors

**Affordability**: Affordability typically stands out as a crucial factor in enabling the adoption of any new technology, and there are occasional reports about the high price of 5G terminals in the region hindering increased 5G user penetration[16]. Although affordability was not found to be statistically significant for the region, perhaps owing to data limitations, policy-makers should nevertheless address the issue. Governments should design initiatives to make 5G services more affordable. Moreover, there is some indication that high taxation, which adds to costs, may work against 5G adoption in the region.

**Economic empowerment**: Policy-makers should emphasize policies that drive economic growth and increase income levels. This involves creating favourable business environments, promoting entrepreneurship and ensuring equitable wealth distribution to support 5G adoption.

**E-governance and regulatory reforms**: E-government initiatives hold the potential to reshape the way governments interact with citizens, businesses and other stakeholders. Moreover, by leveraging the capabilities of 5G, e-government services can become more efficient, accessible and responsive, enabling streamlined processes, faster service delivery and enhanced citizen engagement. This synergy between 5G and e-government has the power to drive digital transformation at a societal level, fostering transparency, accountability and inclusivity. As governments harness the capabilities of 5G to provide seamless online services, they pave the way for an empowered, connected and digitally literate population that can actively participate in the modern digital landscape. They should prioritize the development and implementation of robust e-governance strategies that leverage 5G for enhanced government services and transparency and focus on regulatory reforms to support 5G deployment and innovation.

### Socio-cultural and political factors

**Consumer readiness programmes**: Governments should focus on comprehensive initiatives designed to enhance public understanding of, and engagement with, 5G technology. This includes nationwide digital literacy campaigns across various media, hands-on workshops and seminars in local communities, integrating 5G into educational curricula, and public demonstrations showcasing real-life applications. It also includes the establishment of feedback platforms for consumer engagement and collaboration with telecommunication providers to facilitate access to 5G services. Efforts should aim to educate the public about 5G, its benefits and its applications, thereby boosting adoption rates and bridging the digital divide.

[16] See GSMA (2024).

**Content and services**: Given that content and services do not significantly impact 5G adoption as yet, policy-makers should reconsider their strategies in this area and gradually shift the emphasis towards enhancing other enablers while ensuring that content and services remain relevant and innovative, leveraging 5G technology. It may be too early to say, but as individuals embrace the potential of 5G-enabled applications, from augmented reality to IoT solutions, they will not only enrich their lives but also contribute to industry growth and evolution. Consumer-centric ownership will create a symbiotic relationship where the demand for 5G services fosters innovation, prompting businesses to develop and deliver cutting-edge products. This positive feedback loop should lead to a virtuous cycle of continuous advancement, shaping a future where individuals and industries thrive together in the realm of 5G possibilities.

**Gender equality initiatives**: Promoting inclusivity and gender equality in the technology sector through policies that encourage equal participation and representation of women is important to foster a diverse and innovative workforce, and to accelerate 5G adoption and balanced technological advancements. Embracing gender equality is not just a matter of social justice; it is a strategic imperative for realizing the full potential of 5G transformative capabilities. By ensuring equal opportunities for women's participation and leadership in the technology sector, a diverse range of perspectives and skills can drive innovation and creativity. Gender-inclusive policies and practices foster a balanced and inclusive workforce, leading to more holistic problem-solving and the development of solutions that cater to the needs of all members of society. Additionally, by addressing gender disparities in technology adoption, the digital divide can be bridged to create a more equitable future, where everyone can benefit from the advancements that come with 5G technology.

In conclusion, it is important that countries draw insights from the experiences of leading 5G countries and adopt strategies on, for example, the formulation of national mobile-broadband plans; quantify mobile-broadband development goals; introduce supporting policies; plan for industry digital development; and utilize 5G to facilitate industry digitalization. Moreover, it is important to put in place appropriate mechanisms for continuous monitoring and evaluation of identified enablers, to allow timely adjustments to strategies and policies based on emerging trends and changing dynamics, including regular mobile-broadband network quality evaluation. The above policy recommendations are meant to create a comprehensive framework that addresses the multifaceted nature of 5G adoption. By strategically focusing on the identified enablers and tailoring interventions to specific regional contexts, policy-makers can drive positive outcomes, fostering widespread 5G adoption and reaping the associated economic, social and technological benefits.

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# Appendices

## A Cross-correlation dendrograms

Cross-correlation dendrograms are a sophisticated statistical tool used to analyse the relationships between multiple time-series data sets. They offer a visual and quantitative method to understand how different data sets are interrelated, especially in terms of their time-lagged correlations. This method is particularly useful in fields like finance, meteorology and environmental science, where understanding the dynamic interplay between different variables over time is crucial.

### The concept of cross-correlation

At the heart of cross-correlation dendrograms is the concept of cross-correlation, which measures how two time-series data sets are related to each other at different time lags. Unlike simple correlation, cross-correlation takes into account the lead-lag relationships between data sets, enabling the identification of patterns that are not immediately apparent.

### Building a dendrogram

A dendrogram is a tree-like diagram that illustrates the arrangement of the clusters produced by hierarchical clustering. In the context of cross-correlation, it groups together time series that exhibit similar correlation patterns. Each branch of the dendrogram represents a time series, and the length of the branches reflects the degree of similarity in the cross-correlation patterns.

### Application in various fields

*Finance:* Traders and analysts use cross-correlation dendrograms to understand the relationships between different financial instruments, like stocks or commodities. This helps in portfolio diversification and risk management.

*Meteorology:* Meteorologists employ dendrograms to study the relationship between various climatic variables over time, aiding in weather prediction and climate modeling.

*Environmental science:* Researchers analyse the interdependencies between different environmental factors, such as pollution levels and temperature, to understand ecological dynamics.

### Interpreting a cross-correlation dendrogram

*Clusters identification:* The dendrogram clusters time series based on the similarity of their cross-correlation patterns. Closely located branches indicate a stronger correlation, often implying a direct or indirect relationship between the variables. In the report, they are matched by similar colouring.

*Time lag analysis:* By examining the cross-correlation at different time lags, one can infer causality or precedence among variables. For example, if a time lag consistently shows high correlation, it may suggest that one variable is a leading indicator of another.

### Challenges and considerations

*Data quality and length:* The reliability of a cross-correlation dendrogram heavily depends on the quality and length of the time-series data. Short or noisy data can lead to misleading correlations.

*Statistical significance:* It is crucial to test the statistical significance of the correlations to avoid spurious relationships.

*Complex interpretations:* While dendrograms provide a visual representation, interpreting them, especially in systems with numerous variables, can be complex and requires a deep understanding of the underlying processes.

### Conclusion

Cross-correlation dendrograms are a powerful tool for uncovering complex relationships in time-series data. Their ability to reveal hidden patterns and dependencies makes them invaluable in various scientific and financial analyses. However, careful consideration must be given to their interpretation, as the insights they provide are as much an art as a science.

## B Panel data analysis

This description provides a detailed understanding of the panel data fixed-effects regression model, covering its principles, applications, interpretation of results and use.

Panel data, or longitudinal data, refers to a data set that contains observations of multiple entities (individuals, firms, countries) over a period of time. This type of data structure allows for the analysis of dynamics that change over time within these entities.

### Fixed-effects model

The fixed-effects model is a statistical approach used in panel data analysis. It is designed to study the impact of variables that vary over time within an entity while controlling for all time-invariant characteristics of each entity. This model is particularly useful in cases where the goal is to analyse the cause-and-effect relationship between variables within the same entity.

### Key features of the fixed-effects model

*Entity-specific constants:* The model includes entity-specific constants (fixed effects) which capture all time-invariant characteristics of each entity. This eliminates the influence of any unobserved, time-invariant variables that might bias the results.

*Focus on within-entity variation:* The fixed-effects model analyses the variation within an entity over time; by contrast, random-effects models consider both within- and between-entity variations.

### Equation and estimation

The basic formula for a fixed-effects model can be represented as:

$$y_{it} = \alpha + \beta x_{it} + \mu_i + \epsilon_{it}$$

where $y_{it}$ is the dependent variable, $x_{it}$ represents the independent variables, $\mu_i$ is the unobserved individual effect and $E_{it}$ is the error term.

### Applications in various disciplines

*Economics:* The fixed-effects model is used to study the impact of policy changes or economic factors on specific groups, like the effect of education policy on student performance over time.

*Sociology:* The fixed-effects model analyses social phenomena, such as the impact of societal changes on individual behaviour.

*Public health:* Examines the effect of health interventions on patient outcomes over time.

### Interpreting the results of the fixed-effects model

*Coefficient interpretation:* The coefficients in a fixed-effects model represent the average effect of a one-unit change in the independent variable on the dependent variable, controlling for all time-invariant characteristics.

*Time-invariant variables:* Since these variables are absorbed by the entity-specific constants, they cannot be estimated directly in the fixed-effects model.

### Advantages and limitations

*Control for unobserved heterogeneity:* A major advantage of the fixed-effects model is its ability to control for unobserved heterogeneity, reducing omitted variable bias.

*Limited to within-entity analysis:* The model does not allow for the estimation of effects of time-invariant variables, which can be a limitation in some research contexts.

*Time-varying confounders:* The model assumes that time-varying confounders are adequately controlled, which may not always be the case.

### Conclusion

The panel data fixed-effects model is a robust statistical tool for analysing the dynamics of change within entities over time. Its strength lies in controlling for unobserved heterogeneity, making it invaluable for longitudinal studies across various fields. However, its application requires careful consideration of the assumptions and limitations of the model.

## C Variable descriptions

| Variable | Description |
|---|---|
| 2G population coverage | Population coverage for 2G networks is an important metric for telecommunication providers and regulators, as it indicates how many people within a given area can access basic mobile services using 2G technology. |
| 3G population coverage | 3G population coverage refers to the extent to which a 3G mobile network provides service to a specific population or geographic area. |
| 4G population coverage | 4G population coverage refers to the extent to which a 4G mobile network provides service to a specific population or geographic area. |
| 4G services commercially available | Means that 4G wireless communication services are offered and accessible to consumers and businesses as part of standard commercial service offerings provided by telecommunication companies or service providers. |
| 5G population coverage | 5G population coverage refers to the extent to which a 5G mobile network provides service to a specific population or geographic area. |
| Access to electricity (% of population) | The percentage of population with access to electricity. Electrification data are collected from industry, national surveys and international sources. |
| Affordability | The availability of mobile services and devices at price points that reflect the level of income across a national population. It consists of mobile tariffs, handset price, inequality and taxation. |
| Affordability of entry basket (1GB) | Mobile data affordability is now measured based on two rather than four baskets. From 2014 to 2018, the "entry" basket was based on a consumer using 100 MB of data per month and the "higher" basket on 500 MB of data. From 2019 to 2022, the entry basket was based on 1 GB of data and the higher basket on 5 GB. This approach is more flexible and reflects the increasing use of data by consumers over time, rather than continuing to track baskets that no longer reflect current consumption patterns |
| Affordability of entry basket (1GB) for poorest 40% | |
| Affordability of higher basket (5GB) | |
| Affordability of higher basket (5GB) for poorest 40% | |

(continued)

| Variable | Description |
|---|---|
| Amount of spectrum licensed for IMT systems in MHz | Refers to the total quantity of radio frequency spectrum that has been officially allocated or licensed by regulatory authorities or governments for use by IMT systems within a specific geographic area, such as a country or region. This metric is often expressed in MHz and is essential for assessing the availability and capacity of spectrum for mobile communications. |
| Amount of spectrum offered for IMT systems in MHz | Refers to the total quantity of radio frequency spectrum made available or offered by regulatory authorities or governments for potential use by IMT systems within a specific geographic area, such as a country or region. This metric is typically expressed in MHz. |
| Basic skills | Consists of adult literacy rate, school life expectancy, mean years of schooling and tertiary enrolment rate. |
| Broadband services are part of universal service/ access scheme | Broadband Internet services are included within a region or country's universal service or universal access framework. This means that efforts are being made to ensure that broadband Internet access is available to a significant portion, if not all, of the population, to promote digital inclusion and bridge the digital divide. |
| Cloud computing policies | A set of guidelines, rules and regulations established by organizations, governments or institutions to govern the use, management and security of cloud computing services and resources. Cloud computing policies are designed to ensure that cloud-based operations are conducted in a manner that aligns with the goals and objectives of an organization while addressing security, compliance and risk management concerns. |
| Consumer price index (2010 = 100) | The WDI Consumer Price Index is a measure used to track changes in the average prices of a basket of goods and services that are consumed by households. It is an important economic indicator that provides insight into inflation rates and purchasing power within a country. |
| Consumer readiness | Citizens with the awareness and skills needed to value and use the Internet. It consists of basic skills, gender equality and mobile ownership. |
| Content and services | The availability of secure online content and services that are accessible and relevant to the local population. The GSMA content and services enabler has three dimensions: local relevance, availability and online security. Local relevance measures the amount of content produced in a given country, including e-government services, web domains, social media and mobile applications. These are included because content that is created or developed within a country is likely to be relevant to many of the people living there. |

(continued)

| Variable | Description |
|---|---|
| Cost of sector-specific taxes on mobile data | High levels of taxation on mobile data and/or handsets increases the cost for the consumer. This can make those devices less affordable, especially for those on lower incomes. What is particularly distortive is the imposition of sector-specific taxes that apply only to mobile services and not to other goods or services. |
| Cost of taxes on hand-sets | |
| Cost of taxes on mobile data | |
| Counterfeit policies for the ICT sector | Counterfeit ICT products can include items such as counterfeit smartphones, tablets, computer hardware, software, networking equipment and accessories. They are often produced and sold to deceive consumers or infringe on intellectual property rights, and pose various risks, including security vulnerabilities and potential harm to end-users. |
| CPIA building human resources rating (1=low to 6=high) | The CPIA score in the World Bank WDI database is a numerical rating that evaluates a country's policy and institutional quality. It ranges from 1 to 6, with higher scores indicating better policy environments. These scores help assess a country's effectiveness in promoting sustainable development, with higher scores indicating favourable conditions for growth and poverty reduction, while lower scores suggest areas requiring policy reforms or institutional enhancements. |
| CPIA business regula-tory environment rating (1=low to 6=high) | |
| CPIA property rights and rule-based gover-nance rating (1=low to 6=high) | |
| CPIA trade rating (1=low to 6=high) | |
| CPIA transparency accountability and corruption in the public sector rating (1=low to 6=high) | |

(continued)

| Variable | Description |
|---|---|
| Cybersecurity index | The Global Cybersecurity Index is a trusted reference that measures the commitment of countries to cybersecurity at the global level, to raise awareness of the importance and different dimensions of the issue. As cybersecurity has a broad field of application, cutting across many industries and various sectors, each country's level of development or engagement is assessed along five pillars: legal measures, technical measures, organizational measures, capacity development and cooperation – and then aggregated into an overall score. |
| Cybersecurity legislation/regulations exist | Cybersecurity legislation and regulations are laws, rules and government policies enacted to address various aspects of cybersecurity. They are put in place to protect critical infrastructure, data, information systems and the digital assets of organizations and individuals from cyber threats and attacks. Cybersecurity legislation and regulations can vary significantly from one jurisdiction to another but generally aim to establish standards, requirements and mechanisms to enhance the security of cyberspace. |
| Device affordability | Device affordability in the context of average monthly GDP per capita refers to the ability of individuals or households within a specific country or region to purchase and use electronic devices based on their average income. It is a measure of how accessible and affordable electronic devices are to the average person in terms of their monthly income. |
| Device affordability for the poorest 40% | Refers to the ability of this lower-income segment to purchase and use electronic devices based on their average monthly income. It focuses on assessing whether these devices are within reach for the economically disadvantaged portion of the population. |
| Device pricing | Price of reference device in United States dollars. Of all the devices available with Internet capability, smartphones are generally the least expensive with characteristics that offer more than basic connectivity. Because of this, they serve an important role in providing people with meaningful connectivity – a crucial element in the development of digital economies. |
| Digital dividend spectrum reallocated | Refers to the process of reallocating and repurposing radio frequency spectrum that becomes available as a result of the transition from analogue to digital television broadcasting. This transition, often referred to as the "digital dividend", occurs when countries or regions switch from traditional analogue television broadcasting to digital terrestrial television broadcasting. |
| Digital language support | This metric is sourced from Derivation and provides a measure of the aggregated digital capabilities for all living languages within a country, based on the availability and accessibility of language-specific hardware/software support. |

(continued)

| Variable | Description |
|---|---|
| E-government score | The e-government score presents the state of e-government development. Along with an assessment of the website development patterns in a country, the e-government score incorporates the access characteristics, such as the infrastructure and educational levels, to reflect how a country is using information technologies to promote access and inclusion of its people. It is a composite measure of three important dimensions of e-government, namely: provision of online services, telecommunication connectivity and human capacity. |
| Electric power consumption (kWh per capita) | Electric power consumption per capita (kWh) is the production of power plants and combined heat and power plants less transmission, distribution, and transformation losses and own use by heat and power plants, divided by midyear population. |
| Fixed broadband subscriptions (per 100 people) | Refers to fixed subscriptions to high-speed access to the public Internet (a TCP/IP connection), at downstream speeds equal to, or greater than, 256 kbit/s. This includes cable modem, DSL, fibre-to-the-home/building, other fixed (wired)-broadband subscriptions, satellite broadband and terrestrial fixed wireless broadband. This total is measured irrespective of the method of payment. It excludes subscriptions that have access to data communications (including the Internet) via mobile-cellular networks. It should include fixed WiMAX and any other fixed wireless technologies. It includes both residential subscriptions and subscriptions for organizations. |
| Foreign ICT service providers treated differently in terms of taxation | Foreign ICT service providers are subject to distinct or varying tax regulations, rules or rates compared to domestic ICT service providers when conducting business in a particular country or jurisdiction. This differential treatment can have significant implications for how foreign ICT companies operate, report taxes and compete in the local market. |
| GDP per capita (constant 2015 USD) | GDP at purchaser's prices is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources. Data are in constant 2015 prices, expressed in United States dollars. Dollar figures for GDP are converted from domestic currencies using 2015 official exchange rates. For a few countries where the official exchange rate does not reflect the rate effectively applied to actual foreign exchange transactions, an alternative conversion factor is used. |
| GDP per capita PPP (constant 2017 international dollars) | GDP per capita based on PPP. PPP GDP is gross domestic product converted to international dollars using purchasing power parity rates. An international dollar has the same purchasing power over GDP as the United States dollar has in the United States. GDP at purchaser's prices is the sum of gross value added by all resident producers in the country plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources. Data are in constant 2017 international dollars. |

(continued)

| Variable | Description |
|---|---|
| Gender equality | Refers to the state or condition of equal access to and opportunities for both individuals of different genders, specifically, men and women. It involves the removal of discrimination and bias based on gender, ensuring that all individuals have the same rights, responsibilities and opportunities, regardless of their gender identity. |
| Gender gap in mobile internet | Refers to the disparity in access to and use of mobile internet services between men and women. It is a subset of the broader digital gender divide, focusing specifically on the differences in mobile internet usage patterns and access based on gender. |
| Gender gap in mobile ownership | Refers to the disparity in access to mobile phones and other mobile devices between men and women. It is a measure of how mobile technology is unequally distributed between genders, with one gender group having better access and ownership compared to the other. |
| Gini index | The Gini index, also known as the Gini coefficient or Gini ratio, is a measure of income inequality within a country or a region. It is often used to assess the distribution of wealth or income in the population. The Gini index ranges between 0 and 1, where 0 represents perfect equality (everyone has the same income) and 1 represents perfect inequality (one person has all the income) |
| GNI per capita (constant 2015 USD) | GNI per capita is gross national income divided by midyear population. GNI (formerly GNP) is the sum of value added by all resident producers plus any product taxes (less subsidies) not included in the valuation of output plus net receipts of primary income (compensation of employees and property income) from abroad. Data are in constant 2015 U.S. dollars. |
| GNI per capita PPP (constant 2017 international dollars) | GNI per capita based on PPP. PPP GNI is GNI converted to international dollars using purchasing power parity rates. An international dollar has the same purchasing power over GNI as a United States dollar has in the United States. GNI is the sum of value added by all resident producers plus any product taxes (less subsidies) not included in the valuation of output plus net receipts of primary income (compensation of employees and property income) from abroad. Data are in constant 2017 international dollars. |
| GNI per capita (USD) | GNI per capita is gross national income divided by midyear population. GNI (formerly GNP) is the sum of value added by all resident producers plus any product taxes (less subsidies) not included in the valuation of output plus net receipts of primary income (compensation of employees and property income) from abroad. |
| Government effectiveness: estimate | Government effectiveness captures perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government commitment to such policies. Estimate gives the country's score on the aggregate indicator, in units of a standard normal distribution, i.e. ranging from approximately-2.5 to 2.5. |

(continued)

| Variable | Description |
|---|---|
| Handset affordability | The MCI is particularly focused on connecting the unconnected, whereas the GSMA is interested in measuring the prices of entry-level handsets that allow users access to the Internet rather than high-end devices that are sold at premium prices. In order to obtain this data, Tarifica researched the cheapest handset available in each market with Internet-browsing capability. It could be a smartphone10 or a feature phone. Given that the performance of basic Internet mobile applications (such as basic video or social networking) is only functional with 3G and 4G, this analysis excluded devices with 2G and wireless access point connectivity. |
| High-technology exports (% of manufactured exports) | High-technology exports are products with a high degree of research and development, such as in the aerospace, computer, pharmaceutical, scientific instrument and electrical machinery sectors. |
| Households with Internet access at home | Refers to the proportion of households with Internet access at home. Access can be via a fixed or mobile network. If one member of the household has a mobile phone with an Internet connection and makes it available for all members, then it should be considered that the household has access to the Internet. |
| Human capital index (scale 0-1) | The Human Capital Index is a tool created by the World Bank to gauge and compare the development of human potential in different nations. It evaluates health and education factors to measure individuals' capacity for productive and fulfilling lives. It considers indicators such as child mortality rates and education quality to assess health and education components. The index typically has a range from 0 to 1, where higher values indicate better development of human capital. |
| ICT consumer protection legislation | Refers to laws and regulations that are put in place to safeguard the rights and interests of consumers in the context of ICT products and services. The laws are designed to ensure that consumers are treated fairly, provided with accurate information and protected from fraudulent or harmful practices on the part of businesses operating in the ICT sector. |
| ICT goods exports (% of total goods exports) | ICT goods exports include computers and peripheral equipment, communication equipment, consumer electronic equipment, electronic components and other IT goods (miscellaneous). |
| ICT goods imports (% total goods imports) | |
| ICT service exports (% of service exports BoP) | Information and communication technology service exports include computer and communications services (telecommunications and postal and courier services) and information services (computer data and news-related service transactions). |
| ICT service exports (BoP current USD) | ICT service exports include computer and communication services (telecommunication and postal/courier services) and information services (computer data and news-related service transactions). Data are in current United States dollars. |

(continued)

| Variable | Description |
|---|---|
| IMT (3G/4G) spectrum assigned | Measures the amount of radio spectrum that has been allocated or assigned to mobile operators or service providers for deploying 3G and 4G networks within a given region or country. It is a key indicator of a region or country 's readiness to support advanced mobile services and data connectivity. The availability of sufficient and appropriate spectrum is critical for ensuring the quality and capacity of mobile networks, as it directly affects the speed, coverage and performance of mobile-broadband services. |
| Individuals using the Internet (% of population) | Internet users are individuals who have used the Internet (from any location) in the previous three months via a computer, mobile phone, personal digital assistant, games machine, digital TV, etc. |
| Inflation consumer prices (annual %) | Inflation as measured by the consumer price index reflects the annual percentage change in the cost to the average consumer of acquiring a basket of goods and services that may be fixed or changed at specified intervals, such as yearly. The Laspeyres formula is generally used. |
| Information on spectrum publicly available | Related to spectrum harmonization, this refers to whether information on spectrum is publicly available. |
| Infrastructure | The availability of high-performance mobile Internet network coverage. It consists of network coverage, network performance, spectrum and other enabling infrastructure. |
| International bandwidth usage | Refers to average usage of all international links including fibre-optic cables, radio links and traffic processed by satellite ground stations and teleports to orbital satellites (expressed in Mbit/s) |
| Investment in ICT with private participation (current USD) | Investment in ICT with private participation is the value of commitments to ICT backbone infrastructure projects (including land-based and submarine cables) that have an active government component (e.g. the government is a contracting authority). These are projects that have reached financial closure and directly or indirectly serve the public, including operation and lease contracts, operation and management contracts with major capital expenditure, greenfield projects (in which a private entity or public-private joint venture builds and operates a new facility) and divestitures. Movable assets and small projects are excluded. |
| ITU | A specialized agency of the United Nations that is responsible for ICT-related issues. |
| Land area (sq. km) | Land area is a country's total area, excluding area under inland water bodies, national claims to continental shelf and exclusive economic zones. In most cases, the definition of inland water bodies includes major rivers and lakes. |

(continued)

| Variable | Description |
|---|---|
| Landlocked developing countries | Developing countries that do not have direct access to the sea. They often face transport and trade-related challenges wing to their landlocked geographical location. |
| Language accessibility of top-ranked apps | The indicator on language accessibility of top-ranked apps focuses on the most popular applications available in a country and measures the proportion of the population that can use them, whether in their first or second languages. For each application, the GSMA estimates the proportion of the population able to use the app based on the languages that it features. |
| Least developed countries | Countries that face significant economic and social challenges, characterized by low income, low human development and economic vulnerability. |
| Lit/equipped international bandwidth capacity | Refers to the total lit/equipped capacity of international links, namely fibre-optic cables, international radio links and satellite uplinks to orbital satellites in the end of the reference year (expressed in Mbit/s) |
| Literacy | A measure of the percentage of adults in a given population who can read and write with understanding a short, simple statement about their everyday life. It is a key indicator of a population's educational attainment and is used to assess the level of literacy or functional literacy of a specific age group. |
| Local relevance | Local relevance measures the amount of content produced in a given country, including e-government services, web domains, social media and mobile applications. These are included because content that is created or developed within a country is likely to be relevant to many of the people living there |
| Locally developed apps per person | Refers to the average number of mobile applications created or developed by an individual. This metric is typically used to understand the level of app development activity within a specific population or demographic group. |
| Logistics performance index: Overall (1=low to 5=high) | The Logistics Performance Index overall score reflects perceptions of a country's logistics based on efficiency of customs clearance process, quality of trade- and transport-related infrastructure, ease of arranging competitively priced shipments, quality of logistics services, ability to track and trace consignments, and frequency with which shipments reach the consignee as scheduled. The index ranges from 1 to 5, with a higher score representing better performance. |
| Medium- and high-tech manufacturing value added (% manufacturing value added) | The proportion of medium- and high-tech industry value added in total value added of manufacturing. The indicator is calculated as the share of the sum of the value added from medium- and high-tech industry economic activities to manufacturing value added. |

(continued)

| Variable | Description |
|---|---|
| Mobile-cellular subscriptions | Refers to the number of subscriptions to a public mobile-telephone service that provide access to the public switched telephone network using cellular technology. It includes the number of postpaid subscriptions and the number of active prepaid accounts |
| Mobile-cellular subscriptions (per 100 people) | Mobile-cellular telephone subscriptions are subscriptions to a public mobile-telephone service that provide access to the public switched telephone network using cellular technology. The indicator includes (and is split into) the number of postpaid subscriptions and the number of active prepaid accounts (i.e. used during the previous three months). It applies to all mobile-cellular subscriptions that offer voice communications. It excludes subscriptions via data cards or USB modems, subscriptions to public mobile data services, private trunked mobile radio, telepoint, radio paging and telemetry services. |
| Mobile data affordability | Mobile data affordability refers to the accessibility and cost-effectiveness of mobile data services for consumers. It is a measure of how easily people can access and use mobile data networks, typically for Internet connectivity and various online activities, without experiencing excessive financial burden. Mobile data affordability is a critical factor in determining the digital divide and the level of access to information and online services within a population or region. |
| Mobile data and voice high-consumption basket | Combined time-series data: from 2018 to 2020, the basket is based on a monthly usage of a minimum of 140 voice minutes, 70 SMSs and 1.5 GB of data using at least 3G technology. From 2021, the basket is based on a monthly usage of a minimum of 140 voice minutes, 70 SMSs and 2 GB of data using at least 3G technology. |
| Mobile data and voice low-consumption basket | Based on a monthly usage of a minimum of 70 voice minutes, 20 SMSs and 500 MB of data using at least 3G technology |
| Mobile download speeds | Mobile download speed refers to the rate at which data can be transmitted from the Internet or a remote server to a mobile device, such as a smartphone or tablet, through a mobile data network. It is typically measured in Mbit/s or Gbit/s for faster mobile network technologies. |
| Mobile latencies | Mobile latencies refer to the delay or lag that occurs when data is transmitted between a mobile device (such as a smartphone or tablet) and a network or server. It is a critical factor in determining the responsiveness and performance of mobile applications and services. |
| Mobile ownership | Refers to the percentage or proportion of a population or market that uses mobile devices, such as smartphones or tablets. This metric is often used to assess the adoption and usage of mobile technology in a specific region, industry or demographic group. |

(continued)

| Variable | Description |
|---|---|
| Mobile social media penetration | Refers to the percentage of mobile device users within a specific population or demographic group who access and use social media platforms on their mobile devices. It measures the extent to which people use mobile phones, smartphones or tablets to engage with social networking sites and apps. |
| Mobile upload speeds | Mobile upload speed refers to the rate at which data can be transmitted from a mobile device, such as a smartphone or tablet, to a remote server or location on the Internet using a mobile data network. Like upload speed on fixed broadband connections, mobile upload speed is measured in Mbit/s or Gbit/s for faster mobile network technologies. |
| National broadband plan exists | Refers to a government initiative or policy framework that outlines a comprehensive strategy for the development, expansion and improvement of broadband Internet infrastructure and access within a specific country. A national broadband plan is a strategic roadmap that typically addresses various aspects of broadband deployment and adoption, aiming to ensure that high-speed Internet is accessible to a significant portion of the population. |
| National development strategy digital agenda or digital stimulus strategy, including broadband | Refers to a comprehensive government plan or policy framework aimed at advancing the development and utilization of digital technologies and broadband infrastructure to foster economic growth, innovation and societal progress within a specific country. These strategies are typically designed to harness the potential of the digital economy, promote digital inclusion and ensure that the nation remains competitive in the global digital landscape. |
| National strategy policy or initiative focusing on emerging technologies | Refers to a deliberate and comprehensive government plan or framework to address and harness the potential of emerging and disruptive technologies within a specific country or region. These strategies or policies are designed to guide the development, adoption and regulation of technologies that have the potential to significantly impact various aspects of the economy, society and governance. |
| National Table of Frequency Allocations | Also referred to as the National Frequency Allocation Plan, this is a comprehensive document or regulatory framework created by a government or regulatory authority that specifies how radio frequency spectrum within a particular country is allocated and assigned for various uses, services and applications. The plan is a critical component of spectrum management and ensures the efficient and organized use of the radio frequency spectrum, which is a finite and valuable resource for telecommunications and other wireless services. |
| Network coverage | It consists of 2G population coverage, 3G population coverage, 4G population coverage and 5G population coverage. |
| Network performance | It consists of mobile download speeds, mobile upload speeds and latencies. |

(continued)

| Variable | Description |
|---|---|
| Political stability and absence of violence/ terrorism: estimate | Political stability and absence of violence/terrorism measures perceptions of the likelihood of political instability and/or politically motivated violence, including terrorism. Estimate gives the country's score on the aggregate indicator, in units of a standard normal distribution, i.e. ranging from approximately –2.5 to 2.5. |
| Population coverage by mobile network technology (at least 2G) | Refers to the percentage of inhabitants within range of a mobile-cellular signal, irrespective of whether they are subscribers or users. |
| Population coverage by mobile network technology (at least 3G) | Refers to the percentage of inhabitants that are within range of at least a 3G mobile-cellular signal, irrespective of whether they are subscribers. |
| Population coverage by mobile network technology (at least 5G) | Refers to the percentage of inhabitants that are within range of at least a 5G mobile-cellular signal, irrespective of whether they are subscribers. |
| Population coverage by mobile network technology (at least LTE/ WiMAX) | Refers to the percentage of inhabitants that are within range of at least a 4G/ LTE mobile-cellular signal, irrespective of whether they are subscribers. |
| Population density (people per sq. km of land area) | Population density is midyear population divided by land area in square kilometres. Population is based on the de facto definition of population, which counts all residents regardless of legal status or citizenship, except refugees not permanently settled in the country of asylum, who are generally considered part of the population of their country of origin. Land area is a country's total area, excluding area under inland water bodies, national claims to continental shelf and exclusive economic zones. In most cases, the definition of inland water bodies includes major rivers and lakes. |
| Population, total | Total population is based on the de facto definition of population, which counts all residents regardless of legal status or citizenship. The values shown are midyear estimates. |

(continued)

| Variable | Description |
|---|---|
| Public-private partnership investment in ICT (current USD) | The value of ICT backbone infrastructure projects (including land-based and submarine cables) that have an active government component (e.g. the government is a contracting authority). These are projects that have reached financial closure and directly or indirectly serve the public, including operation and management contracts with major capital expenditure and greenfield projects (in which a private entity or public-private joint venture builds and operates a new facility). It excludes divestitures and merchant projects. Movable assets and small projects are excluded. |
| QoS regulatory framework- Services subject to QoS monitoring | Refers to a set of rules, standards and regulations established by a government or regulatory authority to ensure that the telecommunication services provided within a country meet certain quality and performance criteria. The framework defines the expectations for the QoS offered by telecommunication operators and often includes provisions for monitoring and enforcing these standards. |
| Real effective exchange rate index (2010 = 100) | The nominal effective exchange rate (a measure of the value of a currency against a weighted average of several foreign currencies) divided by a price deflator or index of costs. |
| Real interest rate (%) | The lending interest rate adjusted for inflation as measured by the GDP deflator. The terms and conditions attached to lending rates differ by country, however, limiting their comparability. |
| Regulatory quality: estimate | Regulatory quality captures perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development. Estimate gives the country's score on the aggregate indicator, in units of a standard normal distribution, i.e. ranging from approximately – 2.5 to 2.5. |
| Restriction of foreign participation or ownership in the ICT sector | Refers to government policies or regulations that limit or control the extent to which foreign entities or individuals can invest in, own, operate or participate in ICT businesses and activities within a specific country or jurisdiction. Such restrictions are often put in place to safeguard national security, protect domestic industries, or address other economic and regulatory concerns. |
| Rule of law: estimate | Rule of law captures perceptions of the extent to which agents have confidence in and abide by the rules of society, in particular the quality of contract enforcement, property rights, the police and the courts, and the likelihood of crime and violence. Estimate gives the country's score on the aggregate indicator, in units of a standard normal distribution, i.e. ranging from approximately – 2.5 to 2.5. |
| School life expectancy | School life expectancy is a statistical measure used in the fields of education and demography to assess the average number of years a student entering the education system can expect to spend in school, based on the current age-specific enrolment ratios. It provides insights into the years of formal education a person is likely to receive in a particular country or region. |

(continued)

| Variable | Description |
|---|---|
| Secure Internet servers | The number of distinct, publicly trusted TLS/SSL certificates found in the Netcraft Secure Server Survey. The survey examines the use of encrypted transactions through extensive automated exploration, tallying the number of websites using HTTPS. This analysis relates to those sites found in the survey where the certificate is valid for the host name and has been issued from a publicly trusted root. The indicator refers to valid, third-party certificates. |
| Secure Internet servers (per 1 million people) | |
| Small island developing States | Countries that are small islands or low-lying coastal areas. They face unique challenges related to their vulnerability to climate change, limited resources and economic sustainability. |
| Spectrum | It consists of digital dividend spectrum, other spectrum below 1GHz, spectrum in bands 1-3GHz, spectrum in bands above 3GHz and spectrum in mmWave bands (above 24 GHz). |
| Spectrum assigned in bands below 1 GHz | In GSMA spectrum assignments, several variables play a crucial role in determining how the spectrum is allocated and used. These variables help define the characteristics and regulations for wireless communication services within these frequency ranges. Some key variables are frequency range, bandwidth, duplexing, channelization, guard bands, regulatory restrictions, service types and technology compatibility. It is important to note that the actual details of these variables can vary depending on the specific regulatory environment and the band in question. The GSMA and national regulatory authorities work together to define these variables to ensure efficient and interference-free wireless communication services. |
| Spectrum assigned in bands between 1-3 GHz | |
| Spectrum assigned in bands between 3-6 GHz | |
| Spectrum assigned in mmWave bands | |
| Spectrum licences, technology-neutral | Refers to a regulatory approach in the allocation and licensing of radio frequency spectrum that does not prescribe or restrict the specific technologies or services that can be deployed within the assigned spectrum. In other words, when spectrum licences are technology-neutral, the licence holders have the flexibility to use the allocated spectrum for a wide range of technologies and services, allowing them to adapt to evolving technological advancements and market demands. |
| Spectrum or licence fees subject to VAT | Means that fees paid for the acquisition or use of radio frequency spectrum or telecommunication licenses are liable for VAT in the context of taxation. VAT is a consumption tax that is typically applied to the value added at each stage of the supply chain, from production to distribution to the final consumer. When licence fees are subject to VAT, the entity paying for the licence is required to include the VAT amount in the total cost. |
| Strength of legal rights index (0=weak to 12=strong) | Measures the degree to which collateral and bankruptcy laws protect the rights of borrowers and lenders and thus facilitate lending. The index ranges from 0 to 12, with higher scores indicating laws that are better designed to expand access to credit. |

(continued)

| Variable | Description |
|---|---|
| Surface area (sq. km) | Surface area is a country's total area, including areas under inland bodies of water and some coastal waterways. |
| Taxation | The taxation indicators from GSMA are developed by estimating the proportion of the monthly cost of mobile data that are (i) accounted for by all taxes and (ii) accounted for by mobile-specific taxes. The third indicator is the proportion of the total cost of a device that is accounted for by all taxes. The reference prices used for mobile data are the 500 MB basket from 2014 to 2018 and the 1 GB basket from 2019 to 2022. The reference price for the device is the same price gathered as part of the indicators on handset affordability. |
| Tax revenue (% of GDP) | Tax revenue refers to compulsory transfers to the central government for public purposes. Certain compulsory transfers, such as fines, penalties and most social security contributions, are excluded. Refunds and corrections of erroneously collected tax revenue are treated as negative revenue. |
| Time required to start a business (days) | The number of calendar days needed to complete the procedures to legally operate a business. If a procedure can be speeded up at additional cost, the fastest procedure, independent of cost, is chosen. |
| TLDs per person | TLDs are the highest level of domain name in the hierarchical Domain Name System. They are the last segment of a domain name, appearing after the final dot (e.g. .com, .org, .net). TLDs are an essential part of Internet addressing, helping to organize and categorize websites and online resources. They play a role in defining a website identity and purpose on the web. The Internet Corporation for Assigned Names and Numbers oversees the management and allocation of TLDs on the Internet. |
| Trade (% of GDP) | Trade is the sum of exports and imports of goods and services measured as a share of GDP. |
| Trade in services (% of GDP) | Trade in services is the sum of service exports and imports divided by the value of GDP, all in current United States dollars. |

## D Asia and the Pacific region country score cards

Score cards are provided here for the 32 ITU Member States in the Asia and the Pacific region. They indicate:

- 5G- 2G population coverage (source: GSMA);
- basic economic data: real GDP per capita, trade (% of GDP) and annual inflation rate, real interest rates, tax revenue, time required to start a business, literacy, surface area, population and population density, rule of law (source: WDI, WGI and ITU DataHub);
- the variables used to capture 5G enablers: affordability, infrastructure, spectrum, consumer readiness, content and services, cybersecurity, e-government index, gender equality, mobile latencies (source: ITU DataHub, GSMA WDI, WGI).

See section 4 in the text and Appendix C above for the exact source and detailed description of variables.

Country

Afghanistan

5G population coverage (%)

0.00

## Basic economic facts

| Year | GDP per capita PPP (constant USD) | Trade (% of GDP) | Inflation (annual %) |
|---|---|---|---|
| 2014 | 2,144 | | 4.67 |
| 2015 | 2,109 | | -0.66 |
| 2016 | 2,101 | | 4.38 |
| 2017 | 2,096 | | 4.98 |
| 2018 | 2,061 | | 0.63 |
| 2019 | 2,080 | | 2.30 |

| Population coverage 2G | 3G | 4G | 5G | Year |
|---|---|---|---|---|
| 88.60 | 35.00 | 0.00 | | 2014 |
| 89.00 | 37.89 | 0.00 | | 2015 |
| 89.20 | 41.01 | 0.00 | | 2016 |
| 89.40 | 46.00 | 4.00 | | 2017 |
| 90.00 | 55.00 | 7.00 | | 2018 |
| 90.00 | 60.00 | 22.00 | | 2019 |
| 90.00 | 62.44 | 36.81 | | 2020 |
| 90.00 | 64.97 | 53.89 | 0.00 | 2021 |
| 90.00 | 70.00 | 71.89 | 0.00 | 2022 |

| Year | Real interest rate (%) | Rule of law: estimate | Tax revenue (% of GDP) | Time required to start a business (days) | Literacy | Surface area (sq. km) | Population total | Population density |
|---|---|---|---|---|---|---|---|---|
| 2017 | 12.14 | -1.58 | 9.90 | 8.50 | 43.00 | 652,860.00 | 35,643,418 | 54.65 |

## 5G enablers

| Year | Affordability | Infrastructure | Spectrum | Consumer readiness | Content and services | Cybersecurity index | e-Government score | Gender equality | Mobile latencies |
|---|---|---|---|---|---|---|---|---|---|
| 2014 | 12.99 | 19.49 | 30.86 | 22.48 | 22.21 | 26.50 | 18.11 | 0.00 | 0.00 |
| 2015 | 18.02 | 20.60 | 30.86 | 23.26 | 23.00 | 25.83 | 24.27 | 0.00 | 0.00 |
| 2016 | 17.86 | 22.74 | 30.86 | 23.95 | 24.61 | 25.17 | 30.44 | 0.00 | 11.84 |
| 2019 | 21.39 | 33.72 | 30.86 | 25.44 | 23.87 | 11.45 | 35.87 | 0.00 | 42.93 |
| 2018 | 17.82 | 31.31 | 30.86 | 25.12 | 24.00 | 17.70 | 30.56 | 0.00 | 49.84 |
| 2020 | 24.06 | 37.53 | 30.86 | 25.84 | 25.26 | 5.20 | 41.18 | 0.00 | 51.66 |
| 2017 | 18.03 | 30.37 | 30.86 | 24.52 | 24.56 | 24.50 | 30.50 | 0.00 | 56.24 |
| 2021 | 26.96 | 38.12 | 25.32 | 26.22 | 24.62 | 5.20 | 34.44 | 0.00 | 66.32 |
| 2022 | 30.33 | 42.51 | 25.32 | 26.69 | 24.03 | 5.20 | 27.70 | 0.00 | 69.08 |

Country

Australia

5G population coverage (%)

82.00

## Basic economic facts

| Year | GDP per capita PPP (constant USD) | Trade (% of GDP) | Inflation (annual %) |
|---|---|---|---|
| 2014 | 47,240 | 42.47 | 2.49 |
| 2015 | 47,568 | 41.62 | 1.51 |
| 2016 | 48,109 | 40.82 | 1.28 |
| 2017 | 48,400 | 41.95 | 1.95 |
| 2018 | 49,053 | 43.39 | 1.91 |
| 2019 | 49,379 | 45.83 | 1.61 |
| 2020 | 48,748 | 44.23 | 0.85 |
| 2021 | 49,774 | 39.87 | 2.86 |
| 2022 | 50,998 | 45.75 | 6.59 |

| Population coverage 2G | 3G | 4G | 5G | Year |
|---|---|---|---|---|
| 99.00 | 99.50 | 95.00 | | 2014 |
| 99.00 | 99.50 | 96.90 | | 2015 |
| 99.00 | 99.50 | 98.00 | | 2016 |
| 99.30 | 99.50 | 99.00 | | 2017 |
| 99.40 | 99.50 | 99.20 | | 2018 |
| 99.40 | 99.50 | 99.20 | | 2019 |
| 99.50 | 99.50 | 99.20 | | 2020 |
| 99.50 | 99.50 | 99.50 | 77.50 | 2021 |
| 99.50 | 99.50 | 99.50 | 82.00 | 2022 |

| Year | Real interest rate (%) | Rule of law: estimate | Tax revenue (% of GDP) | Time required to start a business (days) | Literacy | Surface area (sq. km) | Population total | Population density |
|---|---|---|---|---|---|---|---|---|
| 2019 | 1.65 | 1.73 | 23.41 | 2.00 | 99.00 | 7,741,220.00 | 25,340,217 | 3.29 |

## 5G enablers

| Year | Affordability | Infrastructure | Spectrum | Consumer readiness | Content and services | Cybersecurity index | e-Government score | Gender equality | Mobile latencies |
|---|---|---|---|---|---|---|---|---|---|
| 2014 | 89.32 | 68.63 | 68.64 | 87.77 | 82.57 | 76.50 | 92.91 | 89.01 | 67.65 |
| 2015 | 87.64 | 71.98 | 68.64 | 87.75 | 83.68 | 78.47 | 95.37 | 89.01 | 75.94 |
| 2016 | 92.00 | 75.65 | 68.64 | 92.61 | 84.66 | 80.43 | 97.83 | 98.08 | 82.75 |
| 2019 | 91.75 | 83.60 | 83.74 | 93.62 | 89.34 | 93.24 | 95.97 | 93.98 | 85.85 |
| 2017 | 92.60 | 81.02 | 83.74 | 92.08 | 85.62 | 82.40 | 97.52 | 93.21 | 86.32 |
| 2018 | 87.67 | 82.11 | 83.74 | 90.44 | 87.51 | 89.00 | 97.22 | 86.25 | 87.38 |
| 2020 | 90.46 | 85.78 | 83.74 | 92.75 | 91.92 | 97.47 | 94.71 | 89.49 | 88.25 |
| 2022 | 88.23 | 89.76 | 78.36 | 92.52 | 92.03 | 97.47 | 93.80 | 86.88 | 89.84 |
| 2021 | 90.25 | 89.26 | 77.41 | 94.16 | 92.35 | 97.47 | 94.26 | 92.12 | 89.90 |

Country

Bangladesh

5G population coverage (%)

0.00

## Basic economic facts

| Year | GDP per capita PPP (constant USD) | Trade (% of GDP) | Inflation (annual %) |
|---|---|---|---|
| 2014 | 4,119 | 44.51 | 6.99 |
| 2015 | 4,337 | 42.09 | 6.19 |
| 2016 | 4,589 | 31.33 | 5.51 |
| 2017 | 4,831 | 30.00 | 5.70 |
| 2018 | 5,124 | 32.51 | 5.54 |
| 2019 | 5,467 | 31.58 | 5.59 |
| 2020 | 5,591 | 26.27 | 5.69 |
| 2021 | 5,911 | 27.72 | 5.55 |
| 2022 | 6,263 | 33.78 | 7.70 |

| Population coverage 2G | 3G | 4G | 5G | Year |
|---|---|---|---|---|
| 99.00 | 50.00 | 4.41 | | 2014 |
| 99.00 | 71.00 | 5.94 | | 2015 |
| 99.40 | 90.00 | 7.99 | | 2016 |
| 99.47 | 92.55 | 10.76 | | 2017 |
| 99.47 | 94.54 | 79.00 | | 2018 |
| 99.60 | 95.40 | 93.10 | | 2019 |
| 99.60 | 95.54 | 97.40 | | 2020 |
| 99.62 | 95.54 | 98.10 | 0.00 | 2021 |
| 99.63 | 95.54 | 98.30 | 0.00 | 2022 |

| Year | Real interest rate (%) | Rule of law: estimate | Tax revenue (% of GDP) | Time required to start a business (days) | Literacy | Surface area (sq. km) | Population total | Population density |
|---|---|---|---|---|---|---|---|---|
| 2019 | 5.69 | -0.63 | 7.64 | 19.50 | 74.68 | 147,570.00 | 165,516,222 | 1,271.54 |

## 5G enablers

| Year | Affordability | Infrastructure | Spectrum | Consumer readiness | Content and services | Cybersecurity index | e-Government score | Gender equality | Mobile latencies |
|---|---|---|---|---|---|---|---|---|---|
| 2014 | 41.82 | 23.85 | 28.76 | 40.92 | 34.12 | 29.40 | 34.65 | 32.56 | 5.03 |
| 2015 | 43.84 | 31.68 | 28.76 | 42.49 | 38.38 | 37.07 | 48.48 | 32.56 | 33.41 |
| 2016 | 42.88 | 37.73 | 26.81 | 35.17 | 42.10 | 44.73 | 62.32 | 2.67 | 52.27 |
| 2017 | 48.09 | 41.64 | 26.81 | 35.31 | 45.82 | 52.40 | 70.39 | 0.00 | 73.23 |
| 2019 | 43.70 | 57.98 | 28.89 | 37.93 | 49.17 | 66.89 | 69.83 | 1.16 | 76.14 |
| 2018 | 51.93 | 54.86 | 28.89 | 36.44 | 46.99 | 52.50 | 78.47 | 0.00 | 77.11 |
| 2020 | 45.15 | 59.93 | 28.89 | 44.21 | 54.56 | 81.27 | 61.18 | 17.89 | 81.67 |
| 2021 | 43.36 | 56.98 | 27.92 | 43.67 | 55.75 | 81.27 | 63.20 | 14.06 | 82.02 |
| 2022 | 43.18 | 60.81 | 37.42 | 47.72 | 55.25 | 81.27 | 65.21 | 24.21 | 83.20 |

Country

Bhutan

## Basic economic facts

| Year | GDP per capita PPP (constant USD) | Trade (% of GDP) | Inflation (annual %) |
|---|---|---|---|
| 2014 | 9,349 | 96.33 | 8.27 |
| 2015 | 9,877 | 97.88 | 4.55 |
| 2016 | 10,588 | 83.41 | 3.22 |
| 2017 | 10,987 | 81.21 | 4.96 |
| 2018 | 11,234 | 84.19 | 2.72 |
| 2019 | 11,797 | 82.13 | 2.73 |
| 2020 | 10,547 | 75.92 | 5.63 |
| 2021 | 10,908 | 84.56 | 7.35 |
| 2022 | | | 5.64 |

5G population coverage (%)

12.61

| Population coverage 2G | 3G | 4G | 5G | Year |
|---|---|---|---|---|
| 98.00 | 49.35 | 10.72 | | 2014 |
| 98.00 | 65.54 | 22.97 | | 2015 |
| 98.00 | 74.93 | 44.09 | | 2016 |
| 98.00 | 81.27 | 71.33 | | 2017 |
| 98.00 | 87.97 | 85.00 | | 2018 |
| 98.00 | 90.00 | 85.00 | | 2019 |
| 98.00 | 90.00 | 85.00 | | 2020 |
| 98.00 | 90.00 | 85.00 | 1.95 | 2021 |
| 98.00 | 90.00 | 85.00 | 12.61 | 2022 |

| Year | Real interest rate (%) | Rule of law: estimate | Tax revenue (% of GDP) | Time required to start a business (days) | Literacy | Surface area (sq. km) | Population total | Population density |
|---|---|---|---|---|---|---|---|---|
| 2019 | 12.98 | 0.61 | 15.64 | 12.00 | 68.76 | 38,390.00 | 767,459 | 20.12 |

## 5G enablers

| Year | Affordability | Infrastructure | Spectrum | Consumer readiness | Content and services | Cybersecurity index | e-Government score | Gender equality | Mobile latencies |
|---|---|---|---|---|---|---|---|---|---|
| 2014 | 48.58 | 23.20 | 25.33 | 59.42 | 21.46 | 11.80 | 24.41 | 80.14 | 0.00 |
| 2015 | 48.84 | 33.59 | 25.33 | 60.13 | 26.76 | 14.50 | 28.15 | 80.14 | 43.01 |
| 2016 | 49.81 | 42.11 | 36.76 | 61.26 | 32.07 | 17.20 | 31.88 | 80.14 | 47.90 |
| 2017 | 53.62 | 54.13 | 48.19 | 63.07 | 35.31 | 19.90 | 40.94 | 83.01 | 67.52 |
| 2018 | 54.27 | 58.90 | 48.19 | 64.02 | 37.30 | 18.10 | 50.00 | 83.01 | 68.47 |
| 2019 | 48.77 | 63.44 | 48.19 | 67.26 | 38.74 | 18.22 | 59.12 | 90.11 | 80.28 |
| 2020 | 54.64 | 63.42 | 48.19 | 70.01 | 43.39 | 18.34 | 68.24 | 95.45 | 83.26 |
| 2021 | 54.47 | 60.16 | 39.71 | 71.05 | 43.13 | 18.34 | 64.10 | 95.45 | 86.93 |
| 2022 | 55.70 | 63.52 | 39.71 | 73.09 | 41.40 | 18.34 | 59.96 | 100.00 | 89.51 |

Country

Brunei Darussalam

5G population coverage (%)

0.00

## Basic economic facts

| Year | GDP per capita PPP (constant USD) | Trade (% of GDP) | Inflation (annual %) |
|---|---|---|---|
| 2014 | 63,131 | 102.42 | -0.21 |
| 2015 | 62,170 | 89.89 | -0.49 |
| 2016 | 59,981 | 87.32 | -0.28 |
| 2017 | 60,173 | 85.18 | -1.26 |
| 2018 | 59,650 | 93.90 | 1.03 |
| 2019 | 61,424 | 108.51 | -0.39 |
| 2020 | 61,604 | 110.29 | 1.94 |
| 2021 | 60,127 | 147.12 | 1.73 |
| 2022 | 58,670 | 146.97 | 3.68 |

| Population coverage 2G | 3G | 4G | 5G | Year |
|---|---|---|---|---|
| 97.00 | 90.00 | 10.72 | | 2014 |
| 97.00 | 90.00 | 22.97 | | 2015 |
| 97.00 | 90.00 | 44.09 | | 2016 |
| 98.74 | 90.00 | 68.70 | | 2017 |
| 99.29 | 90.00 | 83.91 | | 2018 |
| 99.06 | 90.00 | 85.00 | | 2019 |
| 99.00 | 90.00 | 85.00 | | 2020 |
| 99.00 | 90.00 | 85.00 | 0.00 | 2021 |
| 99.00 | 90.00 | 85.00 | 0.00 | 2022 |

| Year | Real interest rate (%) | Rule of law: estimate | Tax revenue (% of GDP) | Time required to start a business (days) | Literacy | Surface area (sq. km) | Population total | Population density |
|---|---|---|---|---|---|---|---|---|
| 2019 | 9.14 | 0.61 | | 5.50 | 97.34 | 5,770.00 | 438,048 | 83.12 |

## 5G enablers

| Year | Affordability | Infrastructure | Spectrum | Consumer readiness | Content and services | Cybersecurity index | e-Government score | Gender equality | Mobile latencies |
|---|---|---|---|---|---|---|---|---|---|
| 2015 | 69.87 | 35.01 | 22.48 | 68.79 | 48.70 | 42.93 | 43.47 | 75.43 | 26.93 |
| 2016 | 70.92 | 41.14 | 22.48 | 70.48 | 53.28 | 47.67 | 50.73 | 77.86 | 42.91 |
| 2014 | 73.42 | 34.89 | 22.48 | 69.57 | 44.27 | 38.20 | 36.22 | 78.13 | 43.05 |
| 2017 | 70.96 | 49.95 | 22.48 | 72.22 | 57.66 | 52.40 | 61.47 | 80.45 | 73.05 |
| 2018 | 73.34 | 54.24 | 22.48 | 73.43 | 61.50 | 62.40 | 72.22 | 82.24 | 78.31 |
| 2019 | 69.08 | 56.72 | 28.00 | 73.36 | 62.82 | 59.24 | 67.88 | 80.52 | 80.36 |
| 2020 | 73.32 | 58.41 | 28.00 | 77.34 | 62.50 | 56.07 | 63.53 | 90.36 | 86.56 |
| 2021 | 75.30 | 59.12 | 22.67 | 81.50 | 63.49 | 56.07 | 61.12 | 100.00 | 91.71 |
| 2022 | 77.69 | 64.34 | 22.67 | 82.17 | 62.71 | 56.07 | 58.71 | 100.00 | 93.03 |

Country

Cambodia

## Basic economic facts

| Year | GDP per capita PPP (constant USD) | Trade (% of GDP) | Inflation (annual %) |
|---|---|---|---|
| 2014 | 3,378 | 129.61 | 3.86 |
| 2015 | 3,565 | 127.86 | 1.22 |
| 2016 | 3,762 | 126.95 | 3.02 |
| 2017 | 3,973 | 124.79 | 2.91 |
| 2018 | 4,218 | 124.90 | 2.46 |
| 2019 | 4,464 | 123.56 | 1.94 |
| 2020 | 4,276 | 123.50 | 2.94 |
| 2021 | 4,355 | 132.21 | 2.92 |
| 2022 | 4,531 | 162.41 | 5.34 |

5G population coverage (%)

0.00

| Population coverage 2G | 3G | 4G | 5G | Year |
|---|---|---|---|---|
| 99.00 | 83.69 | 15.00 | | 2014 |
| 99.00 | 90.00 | 42.00 | | 2015 |
| 99.00 | 90.00 | 63.00 | | 2016 |
| 99.00 | 90.00 | 76.58 | | 2017 |
| 99.00 | 90.00 | 93.00 | | 2018 |
| 99.00 | 90.00 | 93.00 | | 2019 |
| 99.00 | 90.00 | 93.00 | | 2020 |
| 99.00 | 90.00 | 96.20 | 0.00 | 2021 |
| 99.60 | 90.00 | 98.00 | 0.00 | 2022 |

| Year | Real interest rate (%) | Rule of law: estimate | Tax revenue (% of GDP) | Time required to start a business (days) | Literacy | Surface area (sq. km) | Population total | Population density |
|---|---|---|---|---|---|---|---|---|
| 2019 | | -0.94 | 19.73 | 99.00 | 82.78 | 181,040.00 | 16,207,746 | 91.82 |

## 5G enablers

| Year | Affordability | Infrastructure | Spectrum | Consumer readiness | Content and services | Cybersecurity index | e-Government score | Gender equality | Mobile latencies |
|---|---|---|---|---|---|---|---|---|---|
| 2014 | 41.87 | 35.03 | 38.61 | 46.85 | 32.77 | 11.80 | 17.32 | 41.19 | 16.24 |
| 2015 | 43.88 | 46.16 | 38.61 | 48.10 | 35.46 | 17.30 | 11.20 | 41.19 | 56.22 |
| 2016 | 48.86 | 51.87 | 38.61 | 49.58 | 38.24 | 22.80 | 5.07 | 42.09 | 69.24 |
| 2019 | 44.82 | 61.20 | 39.94 | 55.07 | 46.16 | 17.61 | 35.15 | 51.88 | 75.85 |
| 2017 | 49.30 | 56.28 | 39.94 | 50.69 | 42.00 | 28.30 | 15.04 | 42.57 | 76.29 |
| 2018 | 51.48 | 60.70 | 39.94 | 52.23 | 42.81 | 16.10 | 25.00 | 45.12 | 77.88 |
| 2020 | 45.57 | 62.13 | 36.61 | 52.49 | 50.37 | 19.12 | 45.29 | 41.16 | 79.46 |
| 2022 | 50.57 | 58.27 | 29.29 | 61.96 | 48.78 | 19.12 | 41.81 | 64.15 | 85.28 |
| 2021 | 45.90 | 58.09 | 29.29 | 53.56 | 51.25 | 19.12 | 43.55 | 41.49 | 85.76 |

Country

China

5G population coverage (%)

62.53

## Basic economic facts

| Year | GDP per capita PPP (constant USD) | Trade (% of GDP) | Inflation (annual %) |
|---|---|---|---|
| 2014 | 11,851 | 44.91 | 1.92 |
| 2015 | 12,612 | 39.46 | 1.44 |
| 2016 | 13,399 | 36.89 | 2.00 |
| 2017 | 14,244 | 37.63 | 1.59 |
| 2018 | 15,134 | 37.57 | 2.07 |
| 2019 | 15,978 | 35.89 | 2.90 |
| 2020 | 16,297 | 34.75 | 2.42 |
| 2021 | 17,658 | 37.30 | 0.98 |
| 2022 | 18,188 | 38.14 | 1.97 |

| Population coverage 2G | 3G | 4G | 5G | Year |
|---|---|---|---|---|
| 99.46 | 98.00 | 71.00 | | 2014 |
| 99.50 | 98.00 | 95.00 | | 2015 |
| 99.50 | 98.00 | 99.00 | | 2016 |
| 99.50 | 98.00 | 99.00 | | 2017 |
| 99.50 | 98.00 | 99.00 | | 2018 |
| 99.90 | 98.00 | 99.00 | | 2019 |
| 99.90 | 98.00 | 99.00 | | 2020 |
| 99.90 | 98.00 | 99.00 | 60.00 | 2021 |
| 99.90 | 98.00 | 99.00 | 62.53 | 2022 |

| Year | Real interest rate (%) | Rule of law: estimate | Tax revenue (% of GDP) | Time required to start a business (days) | Literacy | Surface area (sq. km) | Population total | Population density |
|---|---|---|---|---|---|---|---|---|
| 2019 | 3.02 | -0.24 | 8.49 | 8.60 | 97.00 | 9,600,013.00 | 1,407,745,000 | 149.37 |

## 5G enablers

| Year | Affordability | Infrastructure | Spectrum | Consumer readiness | Content and services | Cybersecurity index | e-Government score | Gender equality | Mobile latencies |
|---|---|---|---|---|---|---|---|---|---|
| 2014 | 68.44 | 52.06 | 46.90 | 65.87 | 57.89 | 44.10 | 60.63 | 57.60 | 37.24 |
| 2015 | 69.05 | 64.95 | 50.24 | 67.02 | 61.23 | 50.20 | 68.72 | 57.60 | 62.73 |
| 2016 | 69.39 | 69.09 | 50.24 | 68.79 | 66.00 | 56.30 | 76.81 | 59.24 | 69.84 |
| 2017 | 70.24 | 72.78 | 50.24 | 82.70 | 67.87 | 62.40 | 81.46 | 96.40 | 76.96 |
| 2018 | 71.79 | 73.19 | 54.24 | 84.90 | 74.47 | 82.80 | 86.11 | 99.03 | 81.74 |
| 2019 | 65.37 | 74.90 | 54.24 | 86.24 | 76.71 | 87.67 | 88.35 | 100.00 | 83.44 |
| 2020 | 70.76 | 83.83 | 54.24 | 75.86 | 76.76 | 92.53 | 90.59 | 65.69 | 88.42 |
| 2022 | 76.66 | 87.96 | 57.36 | 80.15 | 78.29 | 92.53 | 88.76 | 74.72 | 88.54 |
| 2021 | 68.53 | 87.94 | 57.36 | 77.50 | 77.65 | 92.53 | 89.68 | 68.50 | 89.12 |

Country

Fiji

5G population coverage (%)

0.00

## Basic economic facts

| Year | GDP per capita PPP (constant USD) | Trade (% of GDP) | Inflation (annual %) |
|---|---|---|---|
| 2014 | 11,411 | 110.81 | 0.52 |
| 2015 | 11,904 | 101.19 | 1.37 |
| 2016 | 12,179 | 97.17 | 3.86 |
| 2017 | 12,822 | 97.02 | 3.35 |
| 2018 | 13,311 | 103.24 | 4.08 |
| 2019 | 13,241 | 106.68 | 1.77 |
| 2020 | 10,967 | 71.74 | -2.60 |
| 2021 | 10,359 | 81.88 | 0.16 |
| 2022 | 11,963 | 107.85 | 4.52 |

| Population coverage 2G | 3G | 4G | 5G | Year |
|---|---|---|---|---|
| 88.00 | 96.00 | 61.22 | | 2014 |
| 88.00 | 96.00 | 65.00 | | 2015 |
| 88.00 | 96.00 | 87.08 | | 2016 |
| 96.00 | 96.00 | 96.00 | | 2017 |
| 96.00 | 96.00 | 96.00 | | 2018 |
| 98.00 | 96.00 | 96.00 | | 2019 |
| 98.00 | 96.00 | 96.00 | | 2020 |
| 98.00 | 96.00 | 96.00 | 0.00 | 2021 |
| 98.00 | 97.00 | 96.00 | 0.00 | 2022 |

| Year | Real interest rate (%) | Rule of law: estimate | Tax revenue (% of GDP) | Time required to start a business (days) | Literacy | Surface area (sq. km) | Population total | Population density |
|---|---|---|---|---|---|---|---|---|
| 2019 | 3.70 | 0.47 | 22.74 | 40.00 | 99.10 | 18,270.00 | 918,465 | 50.27 |

## 5G enablers

| Year | Affordability | Infrastructure | Spectrum | Consumer readiness | Content and services | Cybersecurity index | e-Government score | Gender equality | Mobile latencies |
|---|---|---|---|---|---|---|---|---|---|
| 2014 | 40.73 | 47.78 | 43.43 | 78.57 | 30.89 | 5.90 | 39.37 | 97.15 | 15.43 |
| 2015 | 43.93 | 55.00 | 43.43 | 78.97 | 33.89 | 11.33 | 40.34 | 93.40 | 56.35 |
| 2016 | 48.64 | 61.65 | 43.43 | 79.87 | 35.71 | 16.77 | 41.30 | 90.94 | 70.25 |
| 2017 | 48.67 | 66.11 | 43.43 | 82.03 | 41.02 | 22.20 | 43.57 | 93.95 | 79.12 |
| 2018 | 47.69 | 66.26 | 43.43 | 79.71 | 42.93 | 19.40 | 45.83 | 84.07 | 79.72 |
| 2019 | 45.49 | 68.13 | 43.43 | 81.99 | 45.04 | 24.24 | 48.21 | 87.70 | 80.36 |
| 2020 | 43.10 | 69.09 | 43.43 | 83.60 | 47.55 | 29.08 | 50.59 | 89.03 | 84.58 |
| 2021 | 42.74 | 63.40 | 35.19 | 84.85 | 48.40 | 29.08 | 49.36 | 89.61 | 88.34 |
| 2022 | 46.26 | 65.56 | 35.19 | 88.20 | 47.10 | 29.08 | 48.13 | 98.25 | 89.59 |

Country

India

5G population coverage (%)

0.81

## Basic economic facts

| Year | GDP per capita PPP (constant USD) | Trade (% of GDP) | Inflation (annual %) |
|---|---|---|---|
| 2014 | 5,071 | 48.92 | 6.67 |
| 2015 | 5,412 | 41.92 | 4.91 |
| 2016 | 5,790 | 40.08 | 4.95 |
| 2017 | 6,112 | 40.74 | 3.33 |
| 2018 | 6,436 | 43.62 | 3.94 |
| 2019 | 6,617 | 39.91 | 3.73 |
| 2020 | 6,172 | 37.80 | 6.62 |
| 2021 | 6,677 | 45.67 | 5.13 |
| 2022 | 7,096 | 49.37 | 6.70 |

| Population coverage 2G | 3G | 4G | 5G | Year |
|---|---|---|---|---|
| 93.46 | 61.14 | 28.85 | | 2014 |
| 94.00 | 73.89 | 49.30 | | 2015 |
| 95.00 | 79.67 | 72.50 | | 2016 |
| 96.00 | 88.00 | 75.00 | | 2017 |
| 97.00 | 94.00 | 95.00 | | 2018 |
| 97.00 | 98.15 | 98.00 | | 2019 |
| 99.06 | 98.56 | 98.53 | | 2020 |
| 99.06 | 98.78 | 98.53 | 0.00 | 2021 |
| 99.21 | 98.82 | 98.67 | 0.81 | 2022 |

| Year | Real interest rate (%) | Rule of law: estimate | Tax revenue (% of GDP) | Time required to start a business (days) | Literacy | Surface area (sq. km) | Population total | Population density |
|---|---|---|---|---|---|---|---|---|
| 2018 | 5.36 | 0.02 | 12.02 | 16.50 | 74.40 | 3,287,260.00 | 1,369,003,306 | 460.45 |

## 5G enablers

| Year | Affordability | Infrastructure | Spectrum | Consumer readiness | Content and services | Cybersecurity index | e-Government score | Gender equality | Mobile latencies |
|---|---|---|---|---|---|---|---|---|---|
| 2014 | 41.61 | 28.04 | 18.25 | 46.04 | 50.55 | 70.60 | 54.33 | 34.50 | 11.43 |
| 2015 | 53.29 | 37.81 | 28.38 | 46.96 | 52.39 | 69.83 | 64.48 | 34.50 | 28.12 |
| 2016 | 54.03 | 47.47 | 33.21 | 49.09 | 53.98 | 69.07 | 74.64 | 37.34 | 49.23 |
| 2018 | 63.58 | 56.93 | 33.21 | 40.36 | 58.35 | 71.90 | 95.14 | 6.08 | 66.60 |
| 2017 | 48.08 | 52.22 | 33.21 | 41.73 | 55.96 | 68.30 | 84.89 | 11.61 | 67.07 |
| 2019 | 56.34 | 59.45 | 33.21 | 44.17 | 62.68 | 84.70 | 90.22 | 16.95 | 71.22 |
| 2020 | 59.37 | 60.52 | 33.21 | 52.81 | 66.77 | 97.50 | 85.29 | 42.00 | 76.63 |
| 2021 | 62.95 | 56.97 | 29.70 | 52.04 | 66.89 | 97.50 | 82.32 | 35.43 | 79.02 |
| 2022 | 62.42 | 61.81 | 47.26 | 54.31 | 67.21 | 97.50 | 79.34 | 40.52 | 79.73 |

Country

Indonesia

5G population coverage (%)

11.65

## Basic economic facts

| Year | GDP per capita PPP (constant USD) | Trade (% of GDP) | Inflation (annual %) |
|---|---|---|---|
| 2014 | 9,759 | 48.08 | 6.39 |
| 2015 | 10,122 | 41.94 | 6.36 |
| 2016 | 10,519 | 37.42 | 3.53 |
| 2017 | 10,942 | 39.36 | 3.81 |
| 2018 | 11,397 | 43.07 | 3.20 |
| 2019 | 11,858 | 37.63 | 3.03 |
| 2020 | 11,516 | 32.97 | 1.92 |
| 2021 | 11,859 | 40.20 | 1.56 |
| 2022 | 12,410 | 45.39 | 4.21 |

| Population coverage 2G | 3G | 4G | 5G | Year |
|---|---|---|---|---|
| 87.90 | 89.30 | 10.03 | | 2014 |
| 87.90 | 90.00 | 22.00 | | 2015 |
| 87.90 | 91.00 | 53.00 | | 2016 |
| 87.90 | 92.00 | 85.00 | | 2017 |
| 98.60 | 95.00 | 92.00 | | 2018 |
| 98.71 | 94.75 | 95.00 | | 2019 |
| 98.71 | 94.75 | 96.00 | | 2020 |
| 98.71 | 94.75 | 96.00 | 4.61 | 2021 |
| 98.71 | 95.24 | 96.00 | 11.65 | 2022 |

| Year | Real interest rate (%) | Rule of law: estimate | Tax revenue (% of GDP) | Time required to start a business (days) | Literacy | Surface area (sq. km) | Population total | Population density |
|---|---|---|---|---|---|---|---|---|
| 2019 | 8.63 | -0.32 | 9.75 | 12.60 | 95.83 | 1,916,907.00 | 269,582,878 | 143.58 |

## 5G enablers

| Year | Affordability | Infrastructure | Spectrum | Consumer readiness | Content and services | Cybersecurity index | e-Government score | Gender equality | Mobile latencies |
|---|---|---|---|---|---|---|---|---|---|
| 2014 | 44.67 | 28.51 | 22.86 | 56.66 | 44.48 | 47.10 | 36.22 | 55.59 | 1.84 |
| 2015 | 44.47 | 39.62 | 40.29 | 56.80 | 45.33 | 45.53 | 36.23 | 55.59 | 36.59 |
| 2016 | 44.06 | 49.21 | 40.29 | 57.25 | 48.78 | 43.97 | 36.23 | 52.52 | 60.23 |
| 2017 | 47.88 | 57.73 | 42.29 | 64.65 | 50.30 | 42.40 | 46.59 | 72.48 | 71.53 |
| 2018 | 63.17 | 61.75 | 43.62 | 62.64 | 59.33 | 77.60 | 56.94 | 64.10 | 74.49 |
| 2019 | 61.01 | 62.87 | 42.29 | 64.88 | 64.72 | 86.24 | 62.59 | 69.05 | 75.38 |
| 2020 | 57.87 | 64.94 | 42.29 | 63.66 | 67.96 | 94.88 | 68.24 | 62.71 | 82.35 |
| 2021 | 62.73 | 61.77 | 33.40 | 69.50 | 70.55 | 94.88 | 72.34 | 77.86 | 84.77 |
| 2022 | 70.59 | 64.19 | 33.90 | 66.71 | 70.19 | 94.88 | 76.44 | 68.06 | 86.14 |

Country

Islamic Republic of Iran

5G population coverage (%)

18.71

## Basic economic facts

| Year | GDP per capita PPP (constant USD) | Trade (% of GDP) | Inflation (annual %) |
|---|---|---|---|
| 2014 | 14,539 | 45.35 | 16.61 |
| 2015 | 14,011 | 39.42 | 12.48 |
| 2016 | 14,969 | 40.39 | 7.25 |
| 2017 | 15,163 | 44.74 | 8.04 |
| 2018 | 14,629 | 58.38 | 18.01 |
| 2019 | 14,084 | 50.75 | 39.91 |
| 2020 | 14,432 | 43.81 | 30.59 |
| 2021 | 15,005 | 44.37 | 43.39 |

| Population coverage 2G | 3G | 4G | 5G | Year |
|---|---|---|---|---|
| 94.00 | 27.14 | 4.00 | | 2014 |
| 94.20 | 38.90 | 14.00 | | 2015 |
| 94.20 | 76.84 | 35.00 | | 2016 |
| 96.50 | 83.17 | 61.22 | | 2017 |
| 96.50 | 90.00 | 78.00 | | 2018 |
| 96.50 | 90.00 | 81.00 | | 2019 |
| 96.50 | 91.00 | 82.00 | | 2020 |
| 96.90 | 92.00 | 82.00 | 9.29 | 2021 |
| 96.50 | 92.00 | 83.00 | 18.71 | 2022 |

| Year | Real interest rate (%) | Rule of law: estimate | Tax revenue (% of GDP) | Time required to start a business (days) | Literacy | Surface area (sq. km) | Population total | Population density |
|---|---|---|---|---|---|---|---|---|
| 2019 | | -0.75 | | 72.50 | 87.46 | 1,745,150.00 | 86,564,202 | 53.35 |

## 5G enablers

| Year | Affordability | Infrastructure | Spectrum | Consumer readiness | Content and services | Cybersecurity index | e-Government score | Gender equality | Mobile latencies |
|---|---|---|---|---|---|---|---|---|---|
| 2014 | 44.37 | 24.61 | 36.91 | 57.14 | 35.88 | 29.40 | 37.01 | 56.09 | 23.73 |
| 2015 | 47.27 | 28.11 | 36.91 | 57.63 | 43.35 | 36.07 | 35.17 | 56.09 | 23.73 |
| 2016 | 56.93 | 45.37 | 36.91 | 61.11 | 44.79 | 42.73 | 33.33 | 62.51 | 62.89 |
| 2018 | 51.54 | 58.90 | 36.91 | 72.04 | 57.49 | 64.10 | 63.19 | 89.58 | 75.20 |
| 2017 | 57.69 | 53.71 | 36.91 | 61.88 | 52.46 | 49.40 | 48.26 | 61.78 | 76.91 |
| 2019 | 48.15 | 62.51 | 36.91 | 64.39 | 57.02 | 72.59 | 61.01 | 63.62 | 82.54 |
| 2020 | 41.15 | 63.42 | 36.91 | 73.94 | 60.21 | 81.07 | 58.82 | 89.13 | 84.68 |
| 2022 | 50.10 | 63.49 | 39.25 | 66.85 | 57.36 | 81.07 | 41.96 | 62.19 | 84.78 |
| 2021 | 43.93 | 61.61 | 39.25 | 73.13 | 63.24 | 81.07 | 50.39 | 83.33 | 84.91 |

Country

Japan

5G population coverage (%)

92.32

## Basic economic facts

| Year | GDP per capita PPP (constant USD) | Trade (% of GDP) | Inflation (annual %) |
|---|---|---|---|
| 2014 | 39,740 | 37.43 | 2.76 |
| 2015 | 40,403 | 35.43 | 0.80 |
| 2016 | 40,728 | 31.31 | -0.13 |
| 2017 | 41,444 | 34.42 | 0.48 |
| 2018 | 41,764 | 36.61 | 0.99 |
| 2019 | 41,654 | 35.22 | 0.47 |
| 2020 | 39,990 | 31.37 | -0.02 |
| 2021 | 41,035 | 36.94 | -0.23 |
| 2022 | 41,641 | | 2.50 |

| Population coverage 2G | 3G | 4G | 5G | Year |
|---|---|---|---|---|
| 99.90 | 100.00 | 99.00 | | 2014 |
| 99.90 | 100.00 | 99.00 | | 2015 |
| 99.90 | 100.00 | 99.00 | | 2016 |
| 99.90 | 100.00 | 99.40 | | 2017 |
| 99.90 | 100.00 | 99.80 | | 2018 |
| 99.90 | 100.00 | 99.90 | | 2019 |
| 99.90 | 100.00 | 99.90 | | 2020 |
| 99.90 | 100.00 | 99.90 | 85.48 | 2021 |
| 99.90 | 100.00 | 99.90 | 92.32 | 2022 |

| Year | Real interest rate (%) | Rule of law: estimate | Tax revenue (% of GDP) | Time required to start a business (days) | Literacy | Surface area (sq. km) | Population total | Population density |
|---|---|---|---|---|---|---|---|---|
| 2019 | | 1.53 | | 11.20 | 99.00 | 377,974.00 | 126,633,000 | 347.42 |

## 5G enablers

| Year | Affordability | Infrastructure | Spectrum | Consumer readiness | Content and services | Cybersecurity index | e-Government score | Gender equality | Mobile latencies |
|---|---|---|---|---|---|---|---|---|---|
| 2014 | 64.89 | 59.94 | 68.27 | 75.68 | 71.78 | 70.60 | 94.49 | 83.81 | 24.54 |
| 2015 | 61.45 | 64.01 | 70.27 | 76.66 | 76.16 | 73.27 | 91.08 | 83.81 | 43.97 |
| 2016 | 62.36 | 67.30 | 70.27 | 76.43 | 77.90 | 75.93 | 87.68 | 79.90 | 60.54 |
| 2017 | 61.88 | 69.49 | 70.27 | 82.73 | 79.54 | 78.60 | 91.41 | 95.04 | 68.52 |
| 2018 | 68.96 | 72.10 | 70.27 | 78.27 | 82.91 | 88.00 | 95.14 | 77.62 | 72.84 |
| 2019 | 73.18 | 74.31 | 72.94 | 82.14 | 84.43 | 92.91 | 92.87 | 84.98 | 74.13 |
| 2020 | 81.05 | 76.97 | 72.94 | 79.50 | 87.32 | 97.82 | 90.59 | 72.56 | 79.47 |
| 2022 | 85.43 | 83.33 | 75.94 | 82.07 | 87.83 | 97.82 | 90.94 | 73.65 | 81.42 |
| 2021 | 83.65 | 80.44 | 75.94 | 86.09 | 88.66 | 97.82 | 90.77 | 88.09 | 81.56 |

Country

Republic of Korea

5G population coverage (%)

98.00

## Basic economic facts

| Year | GDP per capita PPP (constant USD) | Trade (% of GDP) | Inflation (annual %) |
|---|---|---|---|
| 2014 | 37,967 | 90.61 | 1.27 |
| 2015 | 38,829 | 79.13 | 0.71 |
| 2016 | 39,815 | 73.60 | 0.97 |
| 2017 | 40,957 | 77.12 | 1.94 |
| 2018 | 41,966 | 78.99 | 1.48 |
| 2019 | 42,759 | 75.76 | 0.38 |
| 2020 | 42,397 | 69.03 | 0.54 |
| 2021 | 44,232 | 80.49 | 2.50 |
| 2022 | 45,467 | 96.78 | 5.09 |

| Population coverage 2G | 3G | 4G | 5G | Year |
|---|---|---|---|---|
| 99.90 | 99.00 | 100.00 | | 2014 |
| 99.90 | 99.00 | 100.00 | | 2015 |
| 99.90 | 99.00 | 100.00 | | 2016 |
| 99.90 | 99.00 | 100.00 | | 2017 |
| 99.90 | 99.00 | 100.00 | | 2018 |
| 99.90 | 99.00 | 100.00 | | 2019 |
| 99.90 | 99.00 | 100.00 | | 2020 |
| 99.90 | 99.00 | 100.00 | 98.00 | 2021 |
| 99.90 | 99.00 | 100.00 | 98.00 | 2022 |

| Year | Real interest rate (%) | Rule of law: estimate | Tax revenue (% of GDP) | Time required to start a business (days) | Literacy | Surface area (sq. km) | Population total | Population density |
|---|---|---|---|---|---|---|---|---|
| 2019 | 4.32 | 1.19 | 15.20 | 8.00 | 98.80 | 100,400.00 | 51,764,822 | 530.38 |

## 5G enablers

| Year | Affordability | Infrastructure | Spectrum | Consumer readiness | Content and services | Cybersecurity index | e-Government score | Gender equality | Mobile latencies |
|---|---|---|---|---|---|---|---|---|---|
| 2014 | 62.87 | 61.98 | 41.80 | 82.00 | 74.26 | 70.60 | 97.64 | 74.74 | 40.97 |
| 2015 | 69.47 | 69.72 | 41.80 | 82.05 | 82.41 | 73.13 | 95.92 | 74.74 | 78.06 |
| 2016 | 69.84 | 73.99 | 45.80 | 83.94 | 83.92 | 75.67 | 94.20 | 74.74 | 81.88 |
| 2017 | 70.54 | 74.14 | 45.80 | 90.39 | 84.89 | 78.20 | 96.06 | 91.39 | 83.19 |
| 2018 | 73.16 | 74.85 | 45.80 | 91.24 | 87.37 | 87.30 | 97.92 | 92.74 | 85.47 |
| 2020 | 65.95 | 86.91 | 45.80 | 93.80 | 90.84 | 98.52 | 100.00 | 98.89 | 86.09 |
| 2019 | 63.39 | 76.44 | 45.80 | 92.43 | 89.08 | 92.91 | 98.96 | 95.52 | 86.82 |
| 2022 | 64.63 | 87.85 | 48.60 | 93.97 | 91.75 | 98.52 | 98.26 | 98.90 | 87.80 |
| 2021 | 66.39 | 88.46 | 50.52 | 89.86 | 91.23 | 98.52 | 99.13 | 86.67 | 89.50 |

Country

Lao P.D.R

## Basic economic facts

| Year | GDP per capita PPP (constant USD) | Trade (% of GDP) | Inflation (annual %) |
|---|---|---|---|
| 2014 | 6,146 | 99.06 | 4.13 |
| 2015 | 6,499 | 85.80 | 1.28 |
| 2016 | 6,851 | 75.09 | 1.60 |
| 2017 | 7,211 | | 0.83 |
| 2018 | 7,546 | | 2.04 |
| 2019 | 7,840 | | 3.32 |
| 2020 | 7,764 | | 5.10 |
| 2021 | 7,847 | | 3.76 |
| 2022 | 7,948 | | 22.96 |

5G population coverage (%)

11.79

| Population coverage 2G | 3G | 4G | 5G | Year |
|---|---|---|---|---|
| 94.00 | 40.58 | 0.00 | | 2014 |
| 94.00 | 53.19 | 14.40 | | 2015 |
| 94.00 | 69.72 | 29.86 | | 2016 |
| 94.00 | 77.32 | 53.36 | | 2017 |
| 94.00 | 83.69 | 71.04 | | 2018 |
| 94.00 | 90.00 | 82.00 | | 2019 |
| 95.00 | 90.00 | 90.00 | | 2020 |
| 95.00 | 90.00 | 96.80 | 8.05 | 2021 |
| 95.00 | 90.28 | 98.00 | 11.79 | 2022 |

| Year | Real interest rate (%) | Rule of law: estimate | Tax revenue (% of GDP) | Time required to start a business (days) | Literacy | Surface area (sq. km) | Population total | Population density |
|---|---|---|---|---|---|---|---|---|
| 2019 | | -0.95 | | 173.00 | 86.27 | 236,800.00 | 7,212,053 | 31.25 |

## 5G enablers

| Year | Affordability | Infrastructure | Spectrum | Consumer readiness | Content and services | Cybersecurity index | e-Government score | Gender equality | Mobile latencies |
|---|---|---|---|---|---|---|---|---|---|
| 2014 | 35.55 | 26.09 | 38.44 | 54.60 | 26.39 | 5.90 | 14.17 | 64.58 | 28.16 |
| 2015 | 35.22 | 32.91 | 38.44 | 55.97 | 30.09 | 17.00 | 21.22 | 64.58 | 45.29 |
| 2016 | 40.79 | 40.56 | 38.44 | 57.14 | 34.97 | 28.10 | 28.26 | 64.58 | 60.67 |
| 2018 | 44.56 | 53.61 | 38.44 | 68.00 | 36.19 | 19.50 | 16.67 | 93.67 | 75.34 |
| 2017 | 42.57 | 49.25 | 38.44 | 60.50 | 39.06 | 39.20 | 22.47 | 72.56 | 76.11 |
| 2019 | 28.25 | 58.04 | 39.78 | 64.53 | 38.38 | 19.92 | 18.04 | 82.86 | 77.80 |
| 2020 | 34.98 | 59.10 | 39.78 | 63.13 | 40.06 | 20.34 | 19.41 | 77.03 | 79.95 |
| 2021 | 39.40 | 56.56 | 31.54 | 70.69 | 41.44 | 20.34 | 24.73 | 97.94 | 82.01 |
| 2022 | 42.67 | 59.97 | 31.54 | 71.78 | 41.43 | 20.34 | 30.05 | 100.00 | 83.98 |

Country

Malaysia

5G population coverage (%)

20.67

## Basic economic facts

| Year | GDP per capita PPP (constant USD) | Trade (% of GDP) | Inflation (annual %) |
|---|---|---|---|
| 2014 | 23,328 | 138.31 | 3.14 |
| 2015 | 24,151 | 131.37 | 2.10 |
| 2016 | 24,860 | 126.90 | 2.09 |
| 2017 | 25,935 | 133.16 | 3.87 |
| 2018 | 26,836 | 130.40 | 0.88 |
| 2019 | 27,674 | 123.03 | 0.66 |
| 2020 | 25,831 | 116.83 | -1.14 |
| 2021 | 26,333 | 130.57 | 2.48 |
| 2022 | 28,315 | 140.75 | 3.38 |

| Population coverage 2G | 3G | 4G | 5G | Year |
|---|---|---|---|---|
| 95.20 | 88.00 | 33.00 | | 2014 |
| 95.40 | 92.00 | 71.00 | | 2015 |
| 96.00 | 95.00 | 85.00 | | 2016 |
| 96.00 | 95.00 | 92.00 | | 2017 |
| 95.80 | 95.00 | 93.00 | | 2018 |
| 95.80 | 95.00 | 93.23 | | 2019 |
| 96.70 | 95.00 | 94.00 | | 2020 |
| 96.70 | 95.00 | 94.46 | 1.00 | 2021 |
| 98.50 | 96.35 | 96.35 | 20.67 | 2022 |

| Year | Real interest rate (%) | Rule of law: estimate | Tax revenue (% of GDP) | Time required to start a business (days) | Literacy | Surface area (sq. km) | Population total | Population density |
|---|---|---|---|---|---|---|---|---|
| 2019 | 4.80 | 0.52 | 11.94 | 17.50 | 94.90 | 330,241.00 | 32,804,020 | 99.84 |

## 5G enablers

| Year | Affordability | Infrastructure | Spectrum | Consumer readiness | Content and services | Cybersecurity index | e-Government score | Gender equality | Mobile latencies |
|---|---|---|---|---|---|---|---|---|---|
| 2014 | 61.97 | 41.42 | 48.65 | 70.82 | 63.67 | 76.50 | 67.72 | 84.06 | 19.91 |
| 2015 | 60.45 | 52.05 | 48.65 | 71.25 | 65.65 | 80.77 | 69.73 | 84.06 | 38.15 |
| 2016 | 61.20 | 62.69 | 65.60 | 72.27 | 69.13 | 85.03 | 71.74 | 82.38 | 61.11 |
| 2017 | 58.47 | 66.90 | 65.60 | 72.63 | 71.88 | 89.30 | 80.31 | 78.86 | 77.27 |
| 2018 | 57.85 | 67.20 | 58.05 | 75.87 | 74.08 | 89.30 | 88.89 | 86.66 | 80.21 |
| 2019 | 62.77 | 69.84 | 60.38 | 74.54 | 75.71 | 93.68 | 87.09 | 80.74 | 81.43 |
| 2020 | 60.16 | 70.96 | 60.38 | 82.04 | 77.93 | 98.06 | 85.29 | 100.00 | 85.02 |
| 2021 | 56.17 | 65.74 | 47.43 | 82.61 | 78.68 | 98.06 | 80.80 | 98.32 | 87.50 |
| 2022 | 64.83 | 73.93 | 70.13 | 81.53 | 76.41 | 98.06 | 76.30 | 92.52 | 87.97 |

Country

Mongolia

5G population coverage (%)

0.00

## Basic economic facts

| Year | GDP per capita PPP (constant USD) | Trade (% of GDP) | Inflation (annual %) |
|---|---|---|---|
| 2014 | 11,108 | 109.32 | 12.25 |
| 2015 | 11,135 | 89.65 | 5.74 |
| 2016 | 11,059 | 101.06 | 0.73 |
| 2017 | 11,432 | 115.93 | 4.30 |
| 2018 | 12,052 | 126.36 | 6.82 |
| 2019 | 12,458 | 124.40 | 7.30 |
| 2020 | 11,667 | 112.84 | 3.80 |
| 2021 | 11,668 | 119.10 | 7.35 |
| 2022 | 12,052 | 144.95 | 15.15 |

| Population coverage 2G | 3G | 4G | 5G | Year |
|---|---|---|---|---|
| 99.00 | 69.09 | 0.00 | | 2014 |
| 99.00 | 95.00 | 0.00 | | 2015 |
| 99.00 | 95.00 | 6.90 | | 2016 |
| 99.00 | 95.00 | 21.00 | | 2017 |
| 99.00 | 95.00 | 45.00 | | 2018 |
| 100.00 | 95.00 | 59.00 | | 2019 |
| 100.00 | 95.00 | 78.54 | | 2020 |
| 100.00 | 95.00 | 85.00 | 0.00 | 2021 |
| 100.00 | 95.00 | 85.46 | 0.00 | 2022 |

| Year | Real interest rate (%) | Rule of law: estimate | Tax revenue (% of GDP) | Time required to start a business (days) | Literacy | Surface area (sq. km) | Population total | Population density |
|---|---|---|---|---|---|---|---|---|
| 2019 | 6.39 | -0.24 | 16.85 | 12.00 | 98.79 | 1,564,116.00 | 3,232,430 | 2.08 |

## 5G enablers

| Year | Affordability | Infrastructure | Spectrum | Consumer readiness | Content and services | Cybersecurity index | e-Government score | Gender equality | Mobile latencies |
|---|---|---|---|---|---|---|---|---|---|
| 2014 | 53.83 | 31.99 | 47.07 | 83.03 | 46.22 | 41.20 | 61.42 | 100.00 | 19.47 |
| 2015 | 54.05 | 42.12 | 47.07 | 83.51 | 46.72 | 35.07 | 56.43 | 100.00 | 61.32 |
| 2021 | 49.12 | 61.33 | 73.19 | 86.81 | 55.20 | 26.20 | 57.79 | 100.00 | 66.95 |
| 2019 | 49.94 | 63.47 | 85.16 | 85.05 | 52.96 | 36.35 | 56.33 | 100.00 | 68.97 |
| 2020 | 44.75 | 67.10 | 85.16 | 86.01 | 53.22 | 26.20 | 52.94 | 100.00 | 69.93 |
| 2017 | 56.15 | 55.63 | 85.16 | 82.94 | 48.49 | 22.80 | 55.58 | 100.00 | 70.95 |
| 2018 | 52.62 | 60.31 | 85.16 | 84.05 | 54.64 | 46.50 | 59.72 | 100.00 | 71.04 |
| 2016 | 57.29 | 51.30 | 76.78 | 81.70 | 46.63 | 28.93 | 51.45 | 100.00 | 72.78 |
| 2022 | 60.26 | 63.12 | 73.19 | 87.48 | 55.44 | 26.20 | 62.63 | 100.00 | 78.20 |

Country

Myanmar

## Basic economic facts

| Year | GDP per capita PPP (constant USD) | Trade (% of GDP) | Inflation (annual %) |
|---|---|---|---|
| 2014 | 3,659 | 40.53 | 4.95 |
| 2015 | 3,748 | 44.95 | 9.45 |
| 2016 | 4,110 | 53.92 | 6.93 |
| 2017 | 4,313 | 61.02 | 4.57 |
| 2018 | 4,556 | 62.45 | 6.87 |
| 2019 | 4,830 | 60.69 | 8.83 |

5G population coverage (%)

0.00

| Population coverage 2G | 3G | 4G | 5G | Year |
|---|---|---|---|---|
| 73.00 | 50.00 | 0.00 | | 2014 |
| 73.00 | 78.00 | 0.00 | | 2015 |
| 95.00 | 87.00 | 7.20 | | 2016 |
| 94.83 | 89.96 | 28.48 | | 2017 |
| 94.83 | 91.89 | 54.00 | | 2018 |
| 95.15 | 93.92 | 80.00 | | 2019 |
| 96.30 | 93.92 | 92.60 | | 2020 |
| 96.70 | 93.73 | 93.00 | 0.00 | 2021 |
| 96.70 | 94.00 | 94.00 | 0.00 | 2022 |

| Year | Real interest rate (%) | Rule of law: estimate | Tax revenue (% of GDP) | Time required to start a business (days) | Literacy | Surface area (sq. km) | Population total | Population density |
|---|---|---|---|---|---|---|---|---|
| 2019 | 9.16 | -1.06 | 6.44 | 7.00 | 89.07 | 676,590.00 | 53,040,212 | 81.26 |

## 5G enablers

| Year | Affordability | Infrastructure | Spectrum | Consumer readiness | Content and services | Cybersecurity index | e-Government score | Gender equality | Mobile latencies |
|---|---|---|---|---|---|---|---|---|---|
| 2014 | 35.98 | 18.95 | 23.14 | 42.84 | 24.09 | 38.20 | 2.36 | 54.50 | 0.00 |
| 2015 | 37.58 | 27.26 | 24.48 | 49.70 | 26.68 | 34.23 | 9.15 | 54.50 | 22.63 |
| 2016 | 42.55 | 36.52 | 27.14 | 49.43 | 28.69 | 30.27 | 15.94 | 50.06 | 46.74 |
| 2017 | 52.43 | 47.05 | 40.67 | 45.02 | 29.67 | 26.30 | 19.43 | 31.69 | 60.89 |
| 2021 | 53.48 | 57.76 | 32.17 | 55.99 | 36.86 | 36.41 | 28.31 | 49.90 | 66.12 |
| 2018 | 59.60 | 57.32 | 40.67 | 48.16 | 30.49 | 17.20 | 22.92 | 36.31 | 72.11 |
| 2019 | 51.30 | 63.67 | 40.67 | 53.18 | 33.28 | 26.81 | 24.40 | 46.96 | 79.74 |
| 2020 | 54.68 | 67.05 | 40.67 | 53.17 | 38.84 | 36.41 | 25.88 | 44.21 | 82.56 |
| 2022 | 39.60 | 62.73 | 32.17 | 56.66 | 36.19 | 36.41 | 30.73 | 50.78 | 84.37 |

Country

Republic of Nepal

5G population coverage (%)

0.00

## Basic economic facts

| Year | GDP per capita PPP (constant USD) | Trade (% of GDP) | Inflation (annual %) |
|---|---|---|---|
| 2014 | 3,152 | 45.98 | 8.36 |
| 2015 | 3,260 | 46.67 | 7.87 |
| 2016 | 3,245 | 42.12 | 8.79 |
| 2017 | 3,496 | 44.64 | 3.63 |
| 2018 | 3,719 | 48.45 | 4.06 |
| 2019 | 3,922 | 49.25 | 5.57 |
| 2020 | 3,762 | 40.92 | 5.05 |
| 2021 | 3,854 | 43.05 | 4.09 |

| Population coverage 2G | 3G | 4G | 5G | Year |
|---|---|---|---|---|
| 80.62 | 80.44 | 0.00 | | 2014 |
| 80.62 | 87.07 | 0.00 | | 2015 |
| 82.00 | 90.00 | 0.00 | | 2016 |
| 91.97 | 90.00 | 15.50 | | 2017 |
| 92.47 | 90.00 | 17.92 | | 2018 |
| 92.47 | 90.00 | 51.52 | | 2019 |
| 92.47 | 90.00 | 62.27 | | 2020 |
| 93.00 | 90.00 | 76.55 | 0.00 | 2021 |
| 93.00 | 90.00 | 88.00 | 0.00 | 2022 |

| Year | Real interest rate (%) | Rule of law: estimate | Tax revenue (% of GDP) | Time required to start a business (days) | Literacy | Surface area (sq. km) | Population total | Population density |
|---|---|---|---|---|---|---|---|---|
| 2019 | | -0.54 | 19.81 | 22.50 | 68.98 | 147,180.00 | 28,832,496 | 201.13 |

## 5G enablers

| Year | Affordability | Infrastructure | Spectrum | Consumer readiness | Content and services | Cybersecurity index | e-Government score | Gender equality | Mobile latencies |
|---|---|---|---|---|---|---|---|---|---|
| 2014 | 27.80 | 29.12 | 30.03 | 47.29 | 30.86 | 11.80 | 15.75 | 38.71 | 19.61 |
| 2015 | 29.98 | 35.29 | 30.03 | 48.06 | 34.46 | 17.03 | 27.80 | 38.71 | 55.08 |
| 2016 | 32.65 | 38.11 | 30.03 | 47.74 | 37.53 | 22.27 | 39.86 | 33.57 | 68.59 |
| 2017 | 39.77 | 42.55 | 30.03 | 49.05 | 41.69 | 27.50 | 54.30 | 34.45 | 73.90 |
| 2018 | 25.45 | 43.22 | 30.03 | 61.56 | 43.79 | 26.00 | 68.75 | 68.92 | 74.25 |
| 2019 | 31.68 | 51.28 | 37.08 | 60.89 | 45.93 | 35.50 | 54.38 | 63.40 | 78.00 |
| 2020 | 28.29 | 54.70 | 37.08 | 54.53 | 49.45 | 44.99 | 40.00 | 40.01 | 82.60 |
| 2021 | 28.69 | 54.96 | 29.85 | 65.59 | 50.25 | 44.99 | 42.96 | 69.85 | 85.42 |
| 2022 | 36.18 | 57.74 | 29.85 | 73.36 | 49.96 | 44.99 | 45.92 | 90.57 | 87.13 |

Country

New Zealand

5G population coverage (%)

65.17

## Basic economic facts

| Year | GDP per capita PPP (constant USD) | Trade (% of GDP) | Inflation (annual %) |
|---|---|---|---|
| 2014 | 40,351 | 55.16 | 1.23 |
| 2015 | 41,015 | 54.92 | 0.29 |
| 2016 | 41,628 | 52.51 | 0.65 |
| 2017 | 42,205 | 54.21 | 1.85 |
| 2018 | 42,917 | 55.80 | 1.60 |
| 2019 | 43,273 | 54.38 | 1.62 |
| 2020 | 42,052 | 43.98 | 1.71 |
| 2021 | 44,042 | 48.20 | 3.94 |
| 2022 | 44,880 | | 7.17 |

| Population coverage 2G | 3G | 4G | 5G | Year |
|---|---|---|---|---|
| 97.00 | 99.00 | 74.44 | | 2014 |
| 97.00 | 99.00 | 90.00 | | 2015 |
| 98.00 | 99.00 | 94.00 | | 2016 |
| 98.00 | 99.00 | 98.00 | | 2017 |
| 98.00 | 99.00 | 98.00 | | 2018 |
| 98.00 | 99.00 | 98.00 | | 2019 |
| 98.00 | 99.00 | 98.00 | | 2020 |
| 98.50 | 99.00 | 98.00 | 45.44 | 2021 |
| 98.25 | 99.00 | 98.00 | 65.17 | 2022 |

| Year | Real interest rate (%) | Rule of law: estimate | Tax revenue (% of GDP) | Time required to start a business (days) | Literacy | Surface area (sq. km) | Population total | Population density |
|---|---|---|---|---|---|---|---|---|
| 2019 | | 1.88 | 28.14 | 0.50 | 99.00 | 267,710.00 | 4,979,200 | 18.91 |

## 5G enablers

| Year | Affordability | Infrastructure | Spectrum | Consumer readiness | Content and services | Cybersecurity index | e-Government score | Gender equality | Mobile latencies |
|---|---|---|---|---|---|---|---|---|---|
| 2014 | 87.29 | 63.33 | 71.24 | 89.52 | 79.91 | 73.50 | 84.25 | 100.00 | 58.93 |
| 2015 | 85.48 | 72.73 | 80.24 | 89.85 | 80.99 | 72.93 | 89.23 | 100.00 | 70.61 |
| 2016 | 86.63 | 76.16 | 80.24 | 91.82 | 82.68 | 72.37 | 94.20 | 100.00 | 77.63 |
| 2019 | 76.58 | 79.37 | 80.24 | 92.05 | 86.86 | 81.47 | 94.04 | 93.08 | 79.68 |
| 2017 | 86.82 | 77.73 | 80.24 | 92.11 | 83.68 | 71.80 | 94.67 | 100.00 | 80.26 |
| 2018 | 87.13 | 78.66 | 80.24 | 93.26 | 84.98 | 78.90 | 95.14 | 98.80 | 80.48 |
| 2020 | 81.62 | 81.49 | 80.24 | 96.30 | 88.75 | 84.04 | 92.94 | 100.00 | 83.28 |
| 2021 | 81.91 | 79.74 | 70.23 | 93.73 | 90.14 | 84.04 | 94.37 | 90.69 | 84.83 |
| 2022 | 80.12 | 84.97 | 76.98 | 96.94 | 90.01 | 84.04 | 95.79 | 100.00 | 85.02 |

Country

Pakistan

5G population coverage (%)

0.00

## Basic economic facts

| Year | GDP per capita PPP (constant USD) | Trade (% of GDP) | Inflation (annual %) |
|---|---|---|---|
| 2014 | 4,404 | 30.90 | 7.19 |
| 2015 | 4,553 | 27.65 | 2.53 |
| 2016 | 4,747 | 24.70 | 3.77 |
| 2017 | 4,892 | 25.47 | 4.09 |
| 2018 | 5,113 | 27.63 | 5.08 |
| 2019 | 5,158 | 28.91 | 10.58 |
| 2020 | 5,004 | 26.72 | 9.74 |
| 2021 | 5,232 | 27.05 | 9.50 |
| 2022 | 5,452 | 32.32 | 19.87 |

| Population coverage 2G | 3G | 4G | 5G | Year |
|---|---|---|---|---|
| 78.00 | 33.00 | 7.00 | | 2014 |
| 81.50 | 46.00 | 16.00 | | 2015 |
| 86.00 | 67.00 | 27.00 | | 2016 |
| 87.00 | 72.00 | 67.00 | | 2017 |
| 88.00 | 72.90 | 68.60 | | 2018 |
| 88.70 | 76.60 | 68.73 | | 2019 |
| 88.80 | 76.70 | 68.80 | | 2020 |
| 88.82 | 78.10 | 75.40 | 0.00 | 2021 |
| 89.40 | 79.90 | 76.40 | 0.00 | 2022 |

| Year | Real interest rate (%) | Rule of law: estimate | Tax revenue (% of GDP) | Time required to start a business (days) | Literacy | Surface area (sq. km) | Population total | Population density |
|---|---|---|---|---|---|---|---|---|
| 2019 | 2.93 | -0.67 | | 16.50 | 60.00 | 796,100.00 | 223,293,280 | 289.66 |

## 5G enablers

| Year | Affordability | Infrastructure | Spectrum | Consumer readiness | Content and services | Cybersecurity index | e-Government score | Gender equality | Mobile latencies |
|---|---|---|---|---|---|---|---|---|---|
| 2014 | 42.03 | 19.18 | 28.59 | 21.42 | 26.13 | 17.60 | 32.28 | 0.00 | 0.00 |
| 2015 | 43.16 | 28.33 | 28.59 | 22.46 | 29.96 | 26.63 | 32.45 | 0.00 | 36.24 |
| 2016 | 42.97 | 37.50 | 34.31 | 23.14 | 32.54 | 35.67 | 32.61 | 0.00 | 48.23 |
| 2017 | 42.44 | 48.59 | 35.64 | 24.30 | 36.12 | 44.70 | 43.73 | 0.00 | 66.53 |
| 2018 | 46.18 | 51.04 | 35.64 | 25.17 | 37.47 | 40.70 | 54.86 | 0.00 | 69.88 |
| 2019 | 38.19 | 54.44 | 35.64 | 25.85 | 40.97 | 52.79 | 58.90 | 1.23 | 77.90 |
| 2020 | 39.65 | 56.56 | 35.64 | 27.89 | 45.23 | 64.88 | 62.94 | 5.26 | 83.11 |
| 2022 | 50.30 | 55.61 | 29.65 | 31.19 | 46.65 | 64.88 | 56.58 | 11.61 | 85.13 |
| 2021 | 47.02 | 54.51 | 29.65 | 31.17 | 47.14 | 64.88 | 59.76 | 12.24 | 85.39 |

Country

Papua New Guinea

5G population coverage (%)

0.00

## Basic economic facts

| Year | GDP per capita PPP (constant USD) | Trade (% of GDP) | Inflation (annual %) |
|---|---|---|---|
| 2014 | 3,670 | | 5.22 |
| 2015 | 3,813 | | 6.00 |
| 2016 | 3,924 | | 6.67 |
| 2017 | 3,967 | | 5.42 |
| 2018 | 3,865 | | 4.37 |
| 2019 | 3,948 | | 3.93 |
| 2020 | 3,742 | | 4.87 |
| 2021 | 3,670 | | 4.48 |

| Population coverage 2G | 3G | 4G | 5G | Year |
|---|---|---|---|---|
| 89.00 | 35.44 | 5.79 | | 2014 |
| 89.00 | 46.46 | 7.76 | | 2015 |
| 89.00 | 58.31 | 10.40 | | 2016 |
| 89.00 | 61.22 | 13.95 | | 2017 |
| 89.00 | 64.29 | 18.70 | | 2018 |
| 89.00 | 67.00 | 25.06 | | 2019 |
| 89.00 | 67.00 | 36.30 | | 2020 |
| 89.00 | 73.00 | 65.00 | 0.00 | 2021 |
| 89.00 | 76.00 | 74.00 | 0.00 | 2022 |

| Year | Real interest rate (%) | Rule of law: estimate | Tax revenue (% of GDP) | Time required to start a business (days) | Literacy | Surface area (sq. km) | Population total | Population density |
|---|---|---|---|---|---|---|---|---|
| 2019 | 7.51 | -0.79 | 13.02 | 41.00 | 72.00 | 462,840.00 | 9,542,486 | 21.07 |

## 5G enablers

| Year | Affordability | Infrastructure | Spectrum | Consumer readiness | Content and services | Cybersecurity index | e-Government score | Gender equality | Mobile latencies |
|---|---|---|---|---|---|---|---|---|---|
| 2014 | 38.19 | 23.44 | 37.37 | 45.95 | 16.78 | 11.80 | 0.79 | 56.38 | 3.10 |
| 2015 | 36.37 | 28.33 | 37.37 | 45.57 | 19.65 | 10.10 | 8.73 | 54.19 | 18.13 |
| 2017 | 40.85 | 34.91 | 37.37 | 43.03 | 21.09 | 6.70 | 21.87 | 41.67 | 25.94 |
| 2016 | 40.64 | 33.21 | 37.37 | 44.10 | 20.38 | 8.40 | 16.67 | 46.86 | 29.72 |
| 2018 | 42.56 | 41.22 | 37.37 | 44.09 | 22.96 | 13.10 | 27.08 | 43.30 | 41.56 |
| 2019 | 41.31 | 46.62 | 48.61 | 44.15 | 24.26 | 19.72 | 24.72 | 41.89 | 46.86 |
| 2022 | 52.08 | 51.92 | 40.12 | 46.99 | 27.80 | 26.33 | 32.63 | 47.14 | 58.17 |
| 2020 | 44.60 | 51.45 | 48.61 | 44.64 | 26.44 | 26.33 | 22.35 | 41.54 | 61.94 |
| 2021 | 50.98 | 51.06 | 40.12 | 44.58 | 27.32 | 26.33 | 27.49 | 40.39 | 64.11 |

Country

Philippines

5G population coverage (%)

**70.00**

## Basic economic facts

| Year | GDP per capita PPP (constant USD) | Trade (% of GDP) | Inflation (annual %) |
|---|---|---|---|
| 2014 | 6,918 | 57.47 | 3.60 |
| 2015 | 7,235 | 59.14 | 0.67 |
| 2016 | 7,616 | 61.78 | 1.25 |
| 2017 | 8,002 | 68.17 | 2.85 |
| 2018 | 8,366 | 72.16 | 5.31 |
| 2019 | 8,732 | 68.84 | 2.39 |
| 2020 | 7,773 | 58.17 | 2.39 |
| 2021 | 8,096 | 63.48 | 3.93 |
| 2022 | 8,582 | 72.42 | 5.82 |

| Population coverage 2G | 3G | 4G | 5G | Year |
|---|---|---|---|---|
| 99.00 | 92.00 | 48.25 | | 2014 |
| 99.00 | 93.00 | 67.29 | | 2015 |
| 99.00 | 93.00 | 80.00 | | 2016 |
| 99.00 | 93.00 | 88.20 | | 2017 |
| 99.00 | 93.00 | 99.00 | | 2018 |
| 99.00 | 93.00 | 99.00 | | 2019 |
| 99.00 | 93.00 | 99.00 | | 2020 |
| 99.00 | 93.00 | 99.00 | 60.60 | 2021 |
| 99.00 | 93.00 | 99.00 | 70.00 | 2022 |

| Year | Real interest rate (%) | Rule of law: estimate | Tax revenue (% of GDP) | Time required to start a business (days) | Literacy | Surface area (sq. km) | Population total | Population density |
|---|---|---|---|---|---|---|---|---|
| 2019 | 6.35 | -0.55 | 14.49 | 33.00 | 96.28 | 300,000.00 | 110,380,804 | 370.19 |

## 5G enablers

| Year | Affordability | Infrastructure | Spectrum | Consumer readiness | Content and services | Cybersecurity index | e-Government score | Gender equality | Mobile latencies |
|---|---|---|---|---|---|---|---|---|---|
| 2014 | 35.71 | 43.73 | 63.33 | 71.02 | 40.69 | 35.30 | 48.03 | 100.00 | 0.00 |
| 2015 | 35.98 | 50.21 | 78.38 | 71.62 | 45.04 | 43.33 | 57.35 | 100.00 | 0.00 |
| 2016 | 46.98 | 54.99 | 81.24 | 72.68 | 49.32 | 51.37 | 66.67 | 100.00 | 12.35 |
| 2017 | 48.68 | 61.86 | 82.67 | 73.37 | 53.14 | 59.40 | 77.43 | 100.00 | 48.56 |
| 2018 | 53.85 | 67.84 | 96.00 | 73.59 | 56.62 | 64.30 | 88.19 | 98.02 | 57.18 |
| 2019 | 50.16 | 69.04 | 96.00 | 74.75 | 57.25 | 70.65 | 80.57 | 100.00 | 62.84 |
| 2020 | 51.51 | 70.33 | 95.33 | 75.73 | 60.53 | 77.00 | 72.94 | 100.00 | 73.19 |
| 2021 | 47.89 | 70.97 | 87.75 | 76.26 | 60.54 | 77.00 | 67.99 | 100.00 | 83.41 |
| 2022 | 47.01 | 73.25 | 87.75 | 76.77 | 59.41 | 77.00 | 63.03 | 100.00 | 86.42 |

Country

Samoa

5G population coverage (%)

0.00

## Basic economic facts

| Year | GDP per capita PPP (constant USD) | Trade (% of GDP) | Inflation (annual %) |
|---|---|---|---|
| 2014 | 5,646 | 80.50 | -0.41 |
| 2015 | 5,811 | 74.63 | 0.72 |
| 2016 | 6,215 | 75.21 | 1.30 |
| 2017 | 6,239 | 74.01 | 1.75 |
| 2018 | 6,140 | 78.93 | 4.20 |
| 2019 | 6,346 | 83.33 | 0.98 |
| 2020 | 6,062 | 77.48 | -1.57 |
| 2021 | 5,534 | 60.89 | 3.13 |
| 2022 | 5,116 | 65.02 | 10.96 |

| Population coverage 2G | 3G | 4G | 5G | Year |
|---|---|---|---|---|
| 97.00 | 75.08 | 0.00 | | 2014 |
| 97.00 | 87.81 | 0.00 | | 2015 |
| 97.00 | 95.00 | 35.00 | | 2016 |
| 96.75 | 95.76 | 69.43 | | 2017 |
| 97.00 | 96.77 | 84.39 | | 2018 |
| 97.00 | 97.80 | 91.42 | | 2019 |
| 97.00 | 98.00 | 98.00 | | 2020 |
| 97.00 | 98.00 | 98.00 | 0.00 | 2021 |
| 97.00 | 98.00 | 98.00 | 0.00 | 2022 |

| Year | Real interest rate (%) | Rule of law: estimate | Tax revenue (% of GDP) | Time required to start a business (days) | Literacy | Surface area (sq. km) | Population total | Population density |
|---|---|---|---|---|---|---|---|---|
| 2019 | 7.32 | 1.16 | 24.43 | 9.00 | 99.10 | 2,840.00 | 211,905 | 76.22 |

## 5G enablers

| Year | Affordability | Infrastructure | Spectrum | Consumer readiness | Content and services | Cybersecurity index | e-Government score | Gender equality | Mobile latencies |
|---|---|---|---|---|---|---|---|---|---|
| 2014 | 33.05 | 23.86 | 17.30 | 73.61 | 49.93 | 17.60 | 24.41 | 100.00 | 0.00 |
| 2015 | 32.05 | 25.98 | 17.30 | 72.93 | 48.96 | 13.33 | 29.23 | 96.66 | 0.00 |
| 2016 | 37.19 | 37.26 | 17.30 | 75.29 | 51.83 | 9.07 | 34.06 | 100.00 | 22.44 |
| 2017 | 36.83 | 50.63 | 17.30 | 75.54 | 53.57 | 4.80 | 34.04 | 98.25 | 63.81 |
| 2019 | 33.73 | 58.89 | 17.30 | 77.47 | 63.02 | 33.02 | 30.25 | 99.90 | 70.36 |
| 2018 | 36.62 | 56.96 | 17.30 | 76.79 | 58.31 | 36.70 | 34.03 | 100.00 | 76.56 |
| 2020 | 33.23 | 60.34 | 17.30 | 78.27 | 63.41 | 29.33 | 26.47 | 100.00 | 82.59 |
| 2022 | 42.28 | 57.77 | 14.26 | 79.75 | 64.22 | 29.33 | 35.92 | 100.00 | 88.33 |
| 2021 | 31.48 | 60.27 | 14.26 | 79.17 | 63.67 | 29.33 | 31.20 | 100.00 | 89.65 |

Country

Singapore

5G population coverage (%)

76.56

## Basic economic facts

| Year | GDP per capita PPP (constant USD) | Trade (% of GDP) | Inflation (annual %) |
|---|---|---|---|
| 2014 | 87,703 | 360.47 | 1.03 |
| 2015 | 89,248 | 329.47 | -0.52 |
| 2016 | 91,271 | 303.14 | -0.53 |
| 2017 | 95,334 | 316.48 | 0.58 |
| 2018 | 98,280 | 325.20 | 0.44 |
| 2019 | 98,455 | 321.70 | 0.57 |
| 2020 | 94,910 | 332.77 | -0.18 |
| 2021 | 107,741 | 333.34 | 2.30 |
| 2022 | 108,036 | 336.86 | 6.12 |

| Population coverage 2G | 3G | 4G | 5G | Year |
|---|---|---|---|---|
| 99.00 | 100.00 | 100.00 | | 2014 |
| 100.00 | 100.00 | 100.00 | | 2015 |
| 100.00 | 100.00 | 100.00 | | 2016 |
| 100.00 | 100.00 | 100.00 | | 2017 |
| 100.00 | 100.00 | 100.00 | | 2018 |
| 100.00 | 100.00 | 100.00 | | 2019 |
| 100.00 | 100.00 | 100.00 | | 2020 |
| 100.00 | 100.00 | 100.00 | 73.57 | 2021 |
| 100.00 | 100.00 | 100.00 | 76.56 | 2022 |

| Year | Real interest rate (%) | Rule of law: estimate | Tax revenue (% of GDP) | Time required to start a business (days) | Literacy | Surface area (sq. km) | Population total | Population density |
|---|---|---|---|---|---|---|---|---|
| 2019 | 5.46 | 1.87 | 13.15 | 1.50 | 97.48 | 726.00 | 5,703,569 | 7,965.88 |

## 5G enablers

| Year | Affordability | Infrastructure | Spectrum | Consumer readiness | Content and services | Cybersecurity index | e-Government score | Gender equality | Mobile latencies |
|---|---|---|---|---|---|---|---|---|---|
| 2014 | 90.49 | 63.56 | 43.99 | 83.50 | 79.30 | 67.60 | 99.21 | 92.80 | 57.42 |
| 2015 | 89.60 | 68.75 | 43.99 | 83.65 | 81.25 | 75.90 | 98.16 | 92.80 | 69.07 |
| 2016 | 90.80 | 74.00 | 52.37 | 82.52 | 84.87 | 84.20 | 97.10 | 84.22 | 78.04 |
| 2017 | 91.11 | 81.77 | 75.37 | 86.45 | 87.49 | 92.50 | 97.86 | 91.25 | 86.80 |
| 2018 | 90.55 | 83.76 | 75.37 | 89.96 | 86.66 | 89.80 | 98.61 | 98.26 | 89.00 |
| 2019 | 80.61 | 83.07 | 75.37 | 91.01 | 88.37 | 94.16 | 97.54 | 98.89 | 89.17 |
| 2020 | 94.97 | 84.44 | 75.37 | 92.35 | 90.05 | 98.52 | 96.47 | 100.00 | 92.00 |
| 2021 | 98.10 | 85.72 | 71.96 | 93.48 | 89.73 | 98.52 | 96.34 | 100.00 | 92.63 |
| 2022 | 99.14 | 90.91 | 71.96 | 93.58 | 89.02 | 98.52 | 96.20 | 100.00 | 92.73 |

Country

Solomon Islands

5G population coverage (%)

0.00

## Basic economic facts

| Year | GDP per capita PPP (constant USD) | Trade (% of GDP) | Inflation (annual %) |
|---|---|---|---|
| 2014 | 2,557 | 93.45 | 5.17 |
| 2015 | 2,535 | 87.76 | -0.57 |
| 2016 | 2,610 | 85.42 | 0.51 |
| 2017 | 2,625 | 86.59 | 0.49 |
| 2018 | 2,633 | 88.50 | 3.46 |
| 2019 | 2,617 | 83.00 | 1.63 |
| 2020 | 2,469 | 64.18 | 2.96 |
| 2021 | 2,397 | 65.40 | -0.12 |
| 2022 | 2,248 | 73.73 | 5.52 |

| Population coverage 2G | 3G | 4G | 5G | Year |
|---|---|---|---|---|
| 91.00 | 14.27 | 0.00 | | 2014 |
| 91.00 | 19.00 | 0.00 | | 2015 |
| 91.00 | 19.00 | 0.00 | | 2016 |
| 93.00 | 25.00 | 19.00 | | 2017 |
| 94.00 | 45.00 | 20.00 | | 2018 |
| 95.00 | 58.99 | 22.51 | | 2019 |
| 95.00 | 66.98 | 25.34 | | 2020 |
| 95.00 | 72.50 | 28.52 | 0.00 | 2021 |
| 95.00 | 78.48 | 30.38 | 0.00 | 2022 |

| Year | Real interest rate (%) | Rule of law: estimate | Tax revenue (% of GDP) | Time required to start a business (days) | Literacy | Surface area (sq. km) | Population total | Population density |
|---|---|---|---|---|---|---|---|---|
| 2019 | 9.24 | -0.10 | 22.23 | 9.00 | 97.00 | 28,900.00 | 674,993 | 24.12 |

## 5G enablers

| Year | Affordability | Infrastructure | Spectrum | Consumer readiness | Content and services | Cybersecurity index | e-Government score | Gender equality | Mobile latencies |
|---|---|---|---|---|---|---|---|---|---|
| 2014 | 25.55 | 19.15 | 46.29 | 58.51 | 11.83 | 2.90 | 5.51 | 74.50 | 0.00 |
| 2015 | 25.89 | 20.21 | 46.29 | 57.51 | 18.08 | 5.10 | 11.09 | 69.16 | 0.00 |
| 2019 | 27.80 | 35.20 | 63.43 | 59.99 | 23.55 | 6.59 | 28.33 | 71.38 | 0.00 |
| 2017 | 36.87 | 25.19 | 46.29 | 60.28 | 20.71 | 9.50 | 20.49 | 73.95 | 3.05 |
| 2018 | 28.31 | 33.41 | 63.43 | 59.62 | 20.38 | 6.10 | 24.31 | 71.16 | 10.32 |
| 2016 | 38.02 | 25.40 | 46.29 | 58.04 | 20.38 | 7.30 | 16.67 | 68.46 | 37.11 |
| 2022 | 33.73 | 40.26 | 51.86 | 62.21 | 27.14 | 7.08 | 36.76 | 74.69 | 47.50 |
| 2020 | 33.64 | 44.54 | 63.43 | 62.08 | 25.59 | 7.08 | 32.35 | 76.54 | 57.73 |
| 2021 | 37.93 | 41.80 | 51.86 | 60.30 | 26.51 | 7.08 | 34.56 | 69.83 | 68.90 |

Country

Sri Lanka

5G population coverage (%)

0.00

## Basic economic facts

| Year | GDP per capita PPP (constant USD) | Trade (% of GDP) | Inflation (annual %) |
|---|---|---|---|
| 2014 | 11,768 | | 3.18 |
| 2015 | 12,207 | 46.92 | 3.77 |
| 2016 | 12,771 | 46.47 | 3.96 |
| 2017 | 13,545 | 47.14 | 7.70 |
| 2018 | 13,753 | 49.81 | 2.14 |
| 2019 | 13,639 | 49.43 | 3.53 |
| 2020 | 12,939 | 37.03 | 6.15 |
| 2021 | 13,251 | 41.26 | 7.01 |
| 2022 | 12,200 | 46.52 | 49.72 |

| Population coverage 2G | 3G | 4G | 5G | Year |
|---|---|---|---|---|
| 98.00 | 79.13 | 22.97 | | 2014 |
| 99.00 | 85.99 | 44.09 | | 2015 |
| 98.96 | 93.26 | 68.70 | | 2016 |
| 99.00 | 95.00 | 84.31 | | 2017 |
| 99.00 | 95.00 | 91.00 | | 2018 |
| 99.00 | 95.00 | 93.00 | | 2019 |
| 99.00 | 95.00 | 94.00 | | 2020 |
| 99.00 | 95.00 | 95.00 | 0.00 | 2021 |
| 99.00 | 96.00 | 95.00 | 0.00 | 2022 |

| Year | Real interest rate (%) | Rule of law: estimate | Tax revenue (% of GDP) | Time required to start a business (days) | Literacy | Surface area (sq. km) | Population total | Population density |
|---|---|---|---|---|---|---|---|---|
| 2019 | 7.10 | 0.06 | 10.90 | 8.00 | 92.25 | 65,610.00 | 21,803,000 | 352.43 |

## 5G enablers

| Year | Affordability | Infrastructure | Spectrum | Consumer readiness | Content and services | Cybersecurity index | e-Government score | Gender equality | Mobile latencies |
|---|---|---|---|---|---|---|---|---|---|
| 2014 | 52.51 | 33.99 | 41.67 | 50.09 | 44.66 | 41.20 | 65.35 | 30.26 | 0.00 |
| 2015 | 55.10 | 42.42 | 41.67 | 50.79 | 45.94 | 41.43 | 65.29 | 30.26 | 27.52 |
| 2016 | 52.50 | 51.61 | 41.67 | 51.78 | 46.80 | 41.67 | 65.22 | 30.39 | 53.79 |
| 2017 | 60.85 | 57.48 | 41.67 | 56.17 | 48.42 | 41.90 | 65.94 | 41.81 | 75.08 |
| 2018 | 63.18 | 59.73 | 41.67 | 52.86 | 51.26 | 46.60 | 66.67 | 30.09 | 76.26 |
| 2019 | 52.68 | 60.70 | 41.67 | 66.34 | 54.36 | 52.63 | 69.22 | 68.33 | 79.11 |
| 2020 | 59.42 | 60.37 | 41.67 | 55.60 | 57.69 | 58.65 | 71.76 | 33.95 | 80.46 |
| 2021 | 51.30 | 55.30 | 32.92 | 56.60 | 58.15 | 58.65 | 64.10 | 34.57 | 82.72 |
| 2022 | 56.44 | 57.99 | 32.92 | 67.62 | 56.34 | 58.65 | 56.44 | 65.54 | 85.94 |

Country

Thailand

5G population coverage (%)

86.14

## Basic economic facts

| Year | GDP per capita PPP (constant USD) | Trade (% of GDP) | Inflation (annual %) |
|---|---|---|---|
| 2014 | 15,509 | 130.91 | 1.90 |
| 2015 | 15,919 | 124.84 | -0.90 |
| 2016 | 16,393 | 120.58 | 0.19 |
| 2017 | 17,008 | 120.89 | 0.67 |
| 2018 | 17,669 | 120.84 | 1.06 |
| 2019 | 17,997 | 109.69 | 0.71 |
| 2020 | 16,866 | 97.80 | -0.85 |
| 2021 | 17,087 | 117.24 | 1.23 |
| 2022 | 17,507 | 133.91 | 6.08 |

| Population coverage 2G | 3G | 4G | 5G | Year |
|---|---|---|---|---|
| 97.00 | 97.00 | 62.50 | | 2014 |
| 97.00 | 98.00 | 80.00 | | 2015 |
| 97.00 | 98.00 | 98.00 | | 2016 |
| 98.00 | 98.00 | 98.00 | | 2017 |
| 98.00 | 98.00 | 98.00 | | 2018 |
| 98.00 | 98.00 | 98.00 | | 2019 |
| 98.00 | 98.00 | 98.00 | | 2020 |
| 98.80 | 98.00 | 98.00 | 76.00 | 2021 |
| 98.80 | 98.10 | 98.00 | 86.14 | 2022 |

| Year | Real interest rate (%) | Rule of law: estimate | Tax revenue (% of GDP) | Time required to start a business (days) | Literacy | Surface area (sq. km) | Population total | Population density |
|---|---|---|---|---|---|---|---|---|
| 2019 | 3.04 | 0.11 | 14.66 | 6.00 | 93.88 | 513,120.00 | 71,307,763 | 139.58 |

## 5G enablers

| Year | Affordability | Infrastructure | Spectrum | Consumer readiness | Content and services | Cybersecurity index | e-Government score | Gender equality | Mobile latencies |
|---|---|---|---|---|---|---|---|---|---|
| 2014 | 63.60 | 50.91 | 48.62 | 72.61 | 49.17 | 41.20 | 44.09 | 91.13 | 47.73 |
| 2015 | 67.48 | 56.84 | 53.41 | 76.19 | 53.22 | 50.27 | 49.58 | 91.13 | 59.98 |
| 2016 | 69.01 | 64.46 | 53.41 | 76.16 | 58.10 | 59.33 | 55.07 | 87.55 | 76.68 |
| 2017 | 67.21 | 66.02 | 53.41 | 79.49 | 61.52 | 68.40 | 59.48 | 94.95 | 81.45 |
| 2018 | 65.46 | 66.16 | 48.74 | 81.56 | 65.38 | 79.60 | 63.89 | 98.08 | 84.76 |
| 2019 | 66.35 | 72.11 | 65.89 | 77.88 | 68.19 | 83.05 | 71.65 | 84.42 | 86.24 |
| 2020 | 65.81 | 80.23 | 87.12 | 82.24 | 70.74 | 86.50 | 79.41 | 93.93 | 87.88 |
| 2021 | 62.74 | 79.00 | 75.91 | 83.97 | 71.85 | 86.50 | 78.52 | 95.72 | 88.93 |
| 2022 | 59.43 | 82.05 | 75.91 | 86.00 | 70.62 | 86.50 | 77.63 | 98.75 | 89.70 |

Country

Timor-Leste

## Basic economic facts

| Year | GDP per capita PPP (constant USD) | Trade (% of GDP) | Inflation (annual %) |
|---|---|---|---|
| 2014 | 3,198 | 82.75 | 0.85 |
| 2015 | 3,229 | 59.92 | 0.65 |
| 2016 | 3,287 | 59.94 | -1.47 |
| 2017 | 3,138 | 58.24 | 0.52 |
| 2018 | 3,071 | 64.49 | 2.29 |
| 2019 | 3,738 | 70.86 | 0.96 |

5G population coverage (%)

0.00

| Population coverage 2G | 3G | 4G | 5G | Year |
|---|---|---|---|---|
| 96.00 | 75.48 | 0.00 | | 2014 |
| 96.00 | 82.03 | 0.00 | | 2015 |
| 96.00 | 89.14 | 0.00 | | 2016 |
| 96.50 | 95.00 | 12.00 | | 2017 |
| 96.50 | 95.00 | 24.88 | | 2018 |
| 96.50 | 95.00 | 47.39 | | 2019 |
| 96.50 | 95.00 | 69.09 | | 2020 |
| 96.50 | 95.00 | 83.98 | 0.00 | 2021 |
| 96.50 | 95.00 | 90.00 | 0.00 | 2022 |

| Year | Real interest rate (%) | Rule of law: estimate | Tax revenue (% of GDP) | Time required to start a business (days) | Literacy | Surface area (sq. km) | Population total | Population density |
|---|---|---|---|---|---|---|---|---|
| 2019 | 9.85 | -1.11 | 22.86 | 13.00 | 69.00 | 14,870.00 | 1,280,438 | 86.11 |

## 5G enablers

| Year | Affordability | Infrastructure | Spectrum | Consumer readiness | Content and services | Cybersecurity index | e-Government score | Gender equality | Mobile latencies |
|---|---|---|---|---|---|---|---|---|---|
| 2014 | 31.82 | 27.75 | 37.10 | 43.14 | 13.84 | 0.00 | 20.47 | 37.93 | 0.00 |
| 2015 | 32.26 | 29.18 | 37.10 | 46.62 | 20.18 | 1.13 | 21.11 | 40.06 | 0.00 |
| 2016 | 36.12 | 31.61 | 37.10 | 47.41 | 22.97 | 2.27 | 21.74 | 39.51 | 10.00 |
| 2017 | 34.36 | 42.27 | 37.10 | 48.75 | 26.49 | 3.40 | 26.49 | 41.46 | 61.31 |
| 2018 | 39.97 | 44.87 | 37.10 | 50.38 | 29.66 | 8.20 | 31.25 | 44.31 | 63.20 |
| 2019 | 29.72 | 49.37 | 37.10 | 53.30 | 29.56 | 6.23 | 37.69 | 50.86 | 69.70 |
| 2021 | 44.11 | 52.51 | 29.64 | 55.78 | 31.14 | 4.26 | 41.72 | 51.56 | 82.42 |
| 2022 | 52.95 | 53.02 | 29.64 | 59.69 | 30.42 | 4.26 | 39.31 | 61.05 | 82.44 |
| 2020 | 40.83 | 55.77 | 37.10 | 56.20 | 30.05 | 4.26 | 44.12 | 55.84 | 83.86 |

Country

Tonga

5G population coverage (%)

0.00

## Basic economic facts

| Year | GDP per capita PPP (constant USD) | Trade (% of GDP) | Inflation (annual %) |
|---|---|---|---|
| 2014 | 5,553 | 74.92 | 2.51 |
| 2015 | 5,645 | 81.45 | -1.05 |
| 2016 | 6,039 | 84.95 | 2.58 |
| 2017 | 6,257 | 87.97 | 7.52 |
| 2018 | 6,288 | 87.59 | 5.03 |
| 2019 | 6,344 | 87.17 | 1.18 |
| 2020 | 6,357 | 85.53 | -0.35 |
| 2021 | 6,143 | 73.37 | 5.64 |
| 2022 | | | 10.97 |

| Population coverage 2G | 3G | 4G | 5G | Year |
|---|---|---|---|---|
| 86.00 | 45.33 | 10.00 | | 2014 |
| 86.00 | 86.86 | 21.44 | | 2015 |
| 92.00 | 90.39 | 41.14 | | 2016 |
| 95.00 | 94.06 | 66.12 | | 2017 |
| 98.00 | 95.00 | 80.37 | | 2018 |
| 98.00 | 95.00 | 90.00 | | 2019 |
| 99.00 | 95.00 | 95.00 | | 2020 |
| 99.00 | 95.00 | 95.00 | 0.00 | 2021 |
| 99.00 | 95.00 | 95.00 | 0.00 | 2022 |

| Year | Real interest rate (%) | Rule of law: estimate | Tax revenue (% of GDP) | Time required to start a business (days) | Literacy | Surface area (sq. km) | Population total | Population density |
|---|---|---|---|---|---|---|---|---|
| 2019 | 0.34 | 0.50 | | 16.00 | 99.40 | 750.00 | 104,951 | 145.77 |

## 5G enablers

| Year | Affordability | Infrastructure | Spectrum | Consumer readiness | Content and services | Cybersecurity index | e-Government score | Gender equality | Mobile latencies |
|---|---|---|---|---|---|---|---|---|---|
| 2014 | 47.94 | 19.78 | 17.30 | 74.40 | 44.29 | 8.80 | 34.65 | 100.00 | 0.00 |
| 2016 | 50.44 | 36.93 | 17.30 | 76.34 | 50.51 | 22.40 | 36.96 | 100.00 | 0.00 |
| 2022 | 50.17 | 41.93 | 14.26 | 79.51 | 56.77 | 20.95 | 32.96 | 100.00 | 0.00 |
| 2015 | 47.83 | 32.71 | 17.30 | 75.24 | 47.71 | 15.60 | 35.80 | 100.00 | 1.62 |
| 2017 | 51.76 | 46.01 | 17.30 | 76.98 | 54.55 | 29.20 | 42.09 | 100.00 | 34.46 |
| 2018 | 52.14 | 52.27 | 17.30 | 77.45 | 54.97 | 20.80 | 47.22 | 100.00 | 56.60 |
| 2019 | 54.37 | 52.70 | 17.30 | 77.94 | 56.28 | 20.88 | 42.44 | 100.00 | 56.70 |
| 2021 | 49.33 | 51.72 | 14.26 | 79.17 | 58.85 | 20.95 | 35.31 | 100.00 | 68.80 |
| 2020 | 50.14 | 55.05 | 17.30 | 78.55 | 58.51 | 20.95 | 37.65 | 100.00 | 72.26 |

Country

Vanuatu

5G population coverage (%)

0.00

## Basic economic facts

| Year | GDP per capita PPP (constant USD) | Trade (% of GDP) | Inflation (annual %) |
|---|---|---|---|
| 2014 | 2,918 | 105.39 | 0.80 |
| 2015 | 2,859 | 113.05 | 2.48 |
| 2016 | 2,922 | 109.54 | 0.84 |
| 2017 | 3,031 | 105.52 | 3.08 |
| 2018 | 3,045 | 98.34 | 2.33 |
| 2019 | 3,070 | 99.38 | 2.76 |
| 2020 | 2,849 | 62.97 | 5.33 |
| 2021 | 2,800 | 60.47 | 2.34 |

| Population coverage 2G | 3G | 4G | 5G | Year |
|---|---|---|---|---|
| 93.00 | 42.17 | 0.00 | | 2014 |
| 93.00 | 54.75 | 0.00 | | 2015 |
| 93.00 | 70.93 | 17.72 | | 2016 |
| 95.00 | 76.85 | 35.50 | | 2017 |
| 98.00 | 83.19 | 62.09 | | 2018 |
| 98.00 | 90.04 | 72.07 | | 2019 |
| 98.00 | 95.00 | 83.67 | | 2020 |
| 98.00 | 95.00 | 90.00 | 0.00 | 2021 |
| 98.00 | 96.00 | 91.00 | 0.00 | 2022 |

| Year | Real interest rate (%) | Rule of law: estimate | Tax revenue (% of GDP) | Time required to start a business (days) | Literacy | Surface area (sq. km) | Population total | Population density |
|---|---|---|---|---|---|---|---|---|
| 2019 | 6.55 | 0.22 | 17.59 | 18.00 | 88.03 | 12,190.00 | 304,404 | 24.97 |

## 5G enablers

| Year | Affordability | Infrastructure | Spectrum | Consumer readiness | Content and services | Cybersecurity index | e-Government score | Gender equality | Mobile latencies |
|---|---|---|---|---|---|---|---|---|---|
| 2014 | 34.85 | 17.72 | 14.99 | 62.47 | 27.78 | 14.70 | 7.87 | 89.53 | 0.00 |
| 2015 | 34.04 | 19.91 | 14.99 | 62.29 | 30.40 | 14.27 | 12.27 | 85.78 | 0.00 |
| 2016 | 37.94 | 31.11 | 14.99 | 61.91 | 33.00 | 13.83 | 16.67 | 81.59 | 41.73 |
| 2018 | 47.12 | 45.08 | 14.99 | 60.29 | 36.71 | 9.80 | 43.75 | 73.21 | 58.24 |
| 2019 | 40.14 | 49.02 | 14.99 | 65.14 | 38.29 | 11.34 | 38.64 | 86.23 | 64.29 |
| 2017 | 38.51 | 39.94 | 14.99 | 61.10 | 35.63 | 13.40 | 30.21 | 77.20 | 65.38 |
| 2021 | 39.77 | 51.49 | 12.21 | 66.44 | 40.03 | 12.88 | 37.91 | 86.69 | 71.11 |
| 2020 | 40.91 | 53.09 | 14.99 | 65.28 | 39.47 | 12.88 | 33.53 | 84.91 | 73.38 |
| 2022 | 44.96 | 53.88 | 12.21 | 71.17 | 39.63 | 12.88 | 42.28 | 100.00 | 84.30 |

Country

Viet Nam

5G population coverage (%)

0.00

## Basic economic facts

| Year | GDP per capita PPP (constant USD) | Trade (% of GDP) | Inflation (annual %) |
|---|---|---|---|
| 2014 | 7,642 | 135.41 | 4.08 |
| 2015 | 8,091 | 144.91 | 0.63 |
| 2016 | 8,546 | 145.41 | 2.67 |
| 2017 | 9,051 | 160.98 | 3.52 |
| 2018 | 9,636 | 164.66 | 3.54 |
| 2019 | 10,252 | 164.70 | 2.80 |
| 2020 | 10,451 | 163.25 | 3.22 |
| 2021 | 10,628 | 186.47 | 1.83 |
| 2022 | 11,397 | | 3.16 |

| Population coverage 2G | 3G | 4G | 5G | Year |
|---|---|---|---|---|
| 94.00 | 53.19 | 0.00 | | 2014 |
| 94.00 | 69.72 | 0.00 | | 2015 |
| 94.00 | 77.32 | 5.00 | | 2016 |
| 94.00 | 90.00 | 95.00 | | 2017 |
| 99.50 | 90.59 | 95.00 | | 2018 |
| 99.60 | 95.00 | 95.00 | | 2019 |
| 99.80 | 95.00 | 95.00 | | 2020 |
| 99.80 | 95.00 | 97.00 | 0.00 | 2021 |
| 99.80 | 98.00 | 98.00 | 0.00 | 2022 |

| Year | Real interest rate (%) | Rule of law: estimate | Tax revenue (% of GDP) | Time required to start a business (days) | Literacy | Surface area (sq. km) | Population total | Population density |
|---|---|---|---|---|---|---|---|---|
| 2019 | 5.16 | -0.03 | | 16.00 | 95.75 | 331,310.00 | 95,776,716 | 305.58 |

## 5G enablers

| Year | Affordability | Infrastructure | Spectrum | Consumer readiness | Content and services | Cybersecurity index | e-Government score | Gender equality | Mobile latencies |
|---|---|---|---|---|---|---|---|---|---|
| 2014 | 64.95 | 24.26 | 37.89 | 66.11 | 51.11 | 32.40 | 41.73 | 80.82 | 0.00 |
| 2015 | 64.41 | 31.86 | 37.89 | 67.17 | 52.23 | 29.77 | 49.49 | 80.82 | 36.32 |
| 2016 | 66.89 | 39.50 | 37.89 | 68.07 | 54.22 | 27.13 | 57.25 | 80.29 | 71.05 |
| 2018 | 57.03 | 60.89 | 37.89 | 61.57 | 68.87 | 69.30 | 73.61 | 56.52 | 83.89 |
| 2017 | 68.45 | 59.26 | 37.89 | 69.10 | 56.86 | 24.50 | 65.43 | 80.96 | 84.31 |
| 2019 | 60.74 | 63.02 | 37.89 | 69.81 | 73.07 | 81.95 | 69.45 | 79.35 | 84.52 |
| 2020 | 55.37 | 65.10 | 37.89 | 72.63 | 77.00 | 94.59 | 65.29 | 85.47 | 86.29 |
| 2021 | 59.77 | 60.97 | 30.07 | 74.93 | 77.95 | 94.59 | 65.07 | 89.84 | 87.37 |
| 2022 | 61.33 | 62.78 | 30.07 | 74.30 | 76.80 | 94.59 | 64.84 | 86.51 | 88.63 |

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