DEN
Digital Economy
Navigator

THE
DIGITAL ECONOMY NAVIGATOR

A human-centric approach to digital economy maturity

First edition 2024

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FOREWORD

In this era of unprecedented technological advancements, the digital revolution has emerged as a formidable force, reshaping industries, economies, societies, and our lives more rapidly than ever before.

In light of this, it is my great privilege to introduce to you the Digital Economy Navigator (DEN), a revolutionary, unified, data-driven framework providing a groundbreaking framework poised to redefine our understanding of digital economies and propel efforts towards designing an inclusive and sustainable global digital economy.

The DEN report represents a milestone in our collective journey toward harnessing the opportunities of the digital age and safeguarding our societies against its challenges. In an increasingly interconnected world, it offers a fresh perspective on the transformative capabilities of the digital economy, delving into aspects often overlooked in traditional statistical assessments.

We aim for DEN to serve as a strategic tool to understand the nuanced dynamics of the transition into a mature digital economy. This is explored across three dimensions: Digital Society, Digital Business, and Digital Enablers. While this allows us to gauge the digital advancements across nations with varying income strata, it also prompts a broader conversation about social inclusion, gender equity, and the imperative for digital cooperation to achieve prosperity.

As we delve into the findings, it will become evident that the digital economy is not merely an abstract concept, but a tangible force that permeates every aspect of our lives. From the ways we communicate and collaborate, to the operation of businesses, and the governance of nations, the digital realm has seamlessly woven itself into the fabric of our existence. So, in our pursuit of digital cooperation, we present this report as a roadmap, offering practical insights for all countries to traverse the complexities of the digital era. It is a resource meticulously designed to guide decision-makers, including policymakers, toward a digital future where opportunities are universally accessible.

Yet, amidst this digital revolution, we must also acknowledge the profound responsibility that accompanies it. This report highlights the imperative of fostering an environment that nurtures innovation while safeguarding the values that define us as a society. As we witness the exponential rise of AI, blockchain technology, quantum computing, and the Internet of Things, among others, we must ensure that the digital economy is built on a foundation of ethical principles to ensure inclusivity, and sustainability.

I extend my deepest gratitude to the team of experts, researchers, and analysts whose unwavering dedication and commitment to excellence have brought this report to fruition. Their rigorous research and tireless efforts have not only unraveled the complexities of the digital economy but have also paved the way for a comprehensive overview that will undoubtedly shape the future of numerous industries.

I invite you to join us in embracing the groundbreaking power of digital transformation. Let us embark on this innovative journey together to seize the opportunities afforded by the digital economy, while remaining vigilant in addressing its challenges. Together, we can forge a future that harnesses the full potential of digital innovation, uplifting and empowering individuals, businesses, and nations to thrive in our interconnected world.

Without further ado, and with great honor, I present to you the Digital Economy Navigator report, a testament to the DCO's unwavering commitment to enabling digital prosperity for all.

Deemah AlYahya

Secretary-General

The Digital Cooperation Organization

PREFACE

The digital economy is a powerful engine driving countries to boost prosperity and address societal challenges.
It profoundly shapes our daily lives, and changes constantly in ways that are both complex and fast moving. To fully harness its potential, and overcome the challenges it poses, we must first understand and measure its maturity.

The Digital Economy Navigator (DEN) is the first comprehensive global study to address digital economy maturity from a user-centric point of view. While existing reports focus on specific aspects like business transformation or e-government, the DEN is uniquely ambitious in that it covers a broad array of indicators and topics, offering a holistic view.

Our journey began with a thorough review of key areas such as infrastructure, access, inclusivity, and trust, assessing over 60 indices. From these insights, we designed the DEN, a tool that emphasizes human and societal dimensions—such as gender gaps—alongside economic considerations.

With a combination of established quantitative indicators, and a groundbreaking global survey of over 27,000 digital technology users across 50 countries, the DEN offers a robust assessment of digital economy maturity. Developed and tested in workshops with input from national and international policymakers, the DEN stands as a dynamic tool ready to evolve with the digital landscape.

As a result of this comprehensive approach, the DEN provides a well-rounded assessment of how a wide selection of countries compare in the maturity of their digital economies. Our approach was tested and developed in workshops with national and international policymakers, while our final choice of indicators was validated by a high-level expert group.

Because the DEN encompasses so many aspects of the digital economy, we anticipate that it will be well-placed to evolve alongside the inevitable changes in how digital technologies affect growth and societal well-being in coming editions. For future editions of the DEN we look forward to ensuring balance between relevance and the ability to draw meaningful comparisons over time.

By using the DEN, countries can identify trends, best practices, and tools for improvement, aiding in the development of effective policies and capacity-building efforts. The DEN furthers the DCO's mission by equipping countries with the insights and opportunities needed to promote both inclusivity and prosperity.

Alaa Abdulaal

Chief of Digital Economy Foresight
The Digital Cooperation Organization

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EXECUTIVE SUMMARY

This report presents the findings of the Digital Economy Navigator (DEN), a global assessment tool that enables countries to better understand the paths toward digital economy maturity, find opportunities for growth, and benchmark progress over time.

This is the first edition of the DEN, which will evolve over time to capture the changing nature of the digital economy.

The Navigator systematically examines the complex interplay between technologies and economic structures, and how it varies across nations. By identifying gaps and highlighting good practices in peer countries, the DEN can drive policy agendas and inform on capacity-building efforts. In an era defined by rapid technological progress, it is crucial that a range of stakeholders understand these dynamics.

A mature digital economy is important in any country—not only to provide more economic opportunities, but also to make services more inclusive, and solve broader societal challenges.

The DEN sets out to be the broadest, most comprehensive measure of national digital economy maturity on a global scale. It defines the digital economy widely as economic activity reliant on, or significantly enhanced or enabled by, digital technologies and their applications. This includes activities that advance human well-being and lead to social or environmental benefits.

Based on this definition, the DEN comprises ten pillars, organized into three dimensions:

Digital Enablers

- Digital Infrastructure
- Digital Capabilities
- Digital Regulation and Public Administration
- Digital Finance

Digital Business

- ICT Core Business
- Industry Digital Transformation
- Digital Innovation

Digital Society

- Digital for Health and Education
- Digital for Work and Training
- Digital for Social Inclusion

The Navigator assesses these pillars in 50 countries around the world, to help them appreciate and leverage the unique characteristics of their national digital economy.

By focusing on strengths and areas for improvement, it supports countries to "navigate" the challenges and opportunities of the digital economy. It identifies best practices in each pillar and provides actionable insights that support targeted improvements.

The DEN also establishes maturity levels, which allows countries to understand how far they are from the next stage of their digital economy journey. The maturity level is based on 102 indicators, of which 60 are secondary data collected from publicly available sources, and 42 are primary data derived from a proprietary online survey.

In conclusion, the DEN aims to inform and facilitate strategic discussions among the various stakeholders involved in strengthening the digital economy at the country and international level. The insights revealed across the ten pillars and corresponding sub-pillars and indicators can inform national priorities for policy development and investment planning.

OVERALL FINDINGS

The DEN reveals a diverse picture of digital economy maturity across pillars.

The DEN introduces a new, five-level classification of digital economy maturity: *nascent*, *emerging*, *transitioning*, *advanced* and *frontier*. As shown in Figure ES1, across the 50 countries all but one pillar is beyond the *nascent* level on average—an encouraging global result.

Health and Education, Regulation and Public Administration, and Social Inclusion stand out as the strongest pillars, being *advanced* on average. They also show signs of global convergence, with more moderate variability in scores than other pillars. Work and Training, Capabilities, Finance, and Infrastructure average *transitioning* status. Finance and Infrastructure exhibit greater geographical variability than Work and Training and Capabilities.

More development is needed on Industry Digital Transformation and ICT Core Business, which have *emerging* status on average, with particularly strong geographic differences for ICT Core Business. The Digital Innovation pillar is *nascent* on average. It also exhibits high geographic variability, indicating that innovation is concentrated in certain hubs.

In a thriving global digital economy from which all nations can benefit, countries advance as both consumers and producers of digital technologies. The DEN scores are strongly, positively correlated with income level, indicating both that high-income countries tend to have greater digital economy maturity, and greater digital economy maturity is associated with higher income.

However, the DEN scores also show digital leapfrogging among low-income countries, some of which do well in pillars where the digital economy can provide solutions to fill important societal needs, such as Digital for Health and Education and Digital for Work and Training.

As it covers 50 countries drawn from across the world, the DEN allows for a snapshot of digital economy maturity at a regional level.

North America notably is at the *frontier* in Digital Infrastructure, Finance, Health and Education, and Regulation and Public Administration, reflecting a sophisticated financial system and strong government capacity. It is also ahead of other regions on the ICT Core Business pillar, albeit its overall score for this pillar remains rather low.

Latin America and the Caribbean displays strengths in Digital for Health and Education, and notably in Social Inclusion, Digital for Work and Training, and Regulation and Public Administration. Similar to other regions, it performs less well in business-related pillars, notably in ICT Core Business and Digital Innovation.

Europe and Central Asia stands out for strong results in pillars related to Health and Education, Finance, Regulation and Public Administration, Social Inclusion, and Infrastructure. It scores especially strongly in Social Inclusion relative to other regions. The region has the most favorable environment and regulation to support social inclusion, digital social connectivity, and civic engagement.

The Middle East and North Africa has strengths in the Digital for Work and Training pillar, where it is the second strongest region, as well as in the Digital for Health and Education pillar. The DEN results suggest room for improvement in business use and adoption of digital technologies, with the ICT Core Business and Digital Innovation pillars classed as *nascent*.

Sub-Saharan Africa features only one *advanced* pillar, Digital for Health and Education, and has good results in Digital for Work and Training as well as Regulation and Public Administration. Among the region's largest gaps— Industry Digital Transformation, Digital Infrastructure, Digital Innovation, and ICT Core Business—Digital Infrastructure is the most important to address, because, if closed, it can unlock progress in other areas.

South Asia shows strengths in Digital for Health and Education and Digital for Work and Training. At the same time, there is room for learning from practices elsewhere, notably in Digital for Social Inclusion, as most other regions perform better. Room for improvement also persists in the five other pillars classed as *nascent*, most of which are related to the business sector.

East Asia and Pacific shows strong average results in Digital for Health and Education, Regulation and Public Administration, Infrastructure, Finance, Social Inclusion, and Digital Capabilities, but challenges remain in Industry Digital Transformation and Digital Innovation.
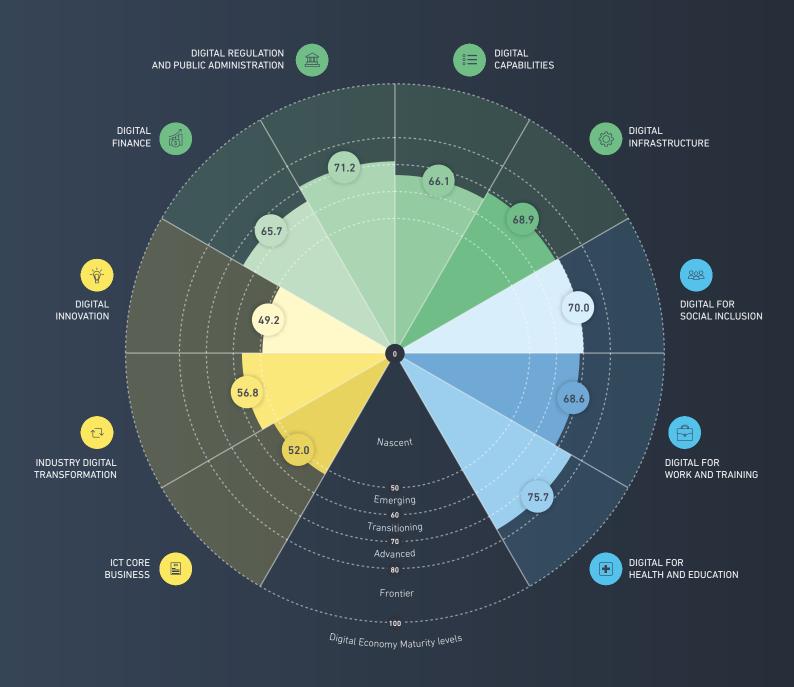
Figure ES1. Average global performance across pillars.
(Scores 0-100 where 100 is the maximum)

DIGITAL REGULATION AND PUBLIC ADMINISTRATION — 71.2
DIGITAL CAPABILITIES — 66.1
DIGITAL FINANCE — 65.7
DIGITAL INFRASTRUCTURE — 68.9
DIGITAL FOR SOCIAL INCLUSION — 70.0
DIGITAL INNOVATION — 49.2
DIGITAL FOR WORK AND TRAINING — 68.6
INDUSTRY DIGITAL TRANSFORMATION — 56.8
DIGITAL FOR HEALTH AND EDUCATION — 75.7
ICT CORE BUSINESS — 52.0

Nascent
50 — Emerging
60 — Transitioning
70 — Advanced
80 — Frontier
100
Digital Economy Maturity levels

KEY AREAS FOR IMPROVEMENT

Digital Enablers

- Despite global progress on digital infrastructure, gaps persist. Enhancing internet speeds and promoting affordability through competitive market policies are key priorities.

- While over 98.6% of people who responded to the DEN survey have at least one basic Information and Communication Technology (ICT) skill, advanced and cybersecurity skills need further development—only about a third of respondents (36.3%) use digital devices for programming—especially among underserved populations.

- Low-income countries have the most room for improvement on regulation. Data suggest that the priorities should include expanding digital administrative operations, updating regulatory frameworks, and enhancing transparency. Progress in these areas can boost public sector efficiency and individual engagement.

- Although 70% of respondents have used digital payments (50% in Sub-Saharan Africa), many geographic areas remain underserved in digital payments. Enhancing banking infrastructure, promoting financial inclusion, and addressing risks in digital payment systems are crucial for inclusive economic growth.

Digital Business

- Technology production is concentrated in North America, East Asia and Pacific, and Europe and Central Asia.[1] To boost global convergence, it is essential for other regions to develop holistic programs that support the emergence of competitive technology manufacturing and services sectors.

- Progress in Industry Digital Transformation is uneven. To counter this, the expansion of digital services to reach all areas of a nation, improving market conditions for e-commerce, and supporting the digitalization of small businesses should be priorities.

- Digital Innovation is *nascent* in most countries measured by the DEN, with higher innovation capacity concentrated in a few regions, notably in North America and Europe and Central Asia. Room for improvement exists with respect to startup ecosystems, scientific output, venture capital availability, and the development of national artificial intelligence (AI) strategies, especially in low- and lower-middle-income countries.

Digital Society

- The advances in Digital for Health and Education solutions driven by the COVID-19 pandemic have ensured a good level of access and use of digital solutions. Indeed, 80% of the DEN survey respondents had participated in a remote interaction with a doctor. Challenges remain with respect to gender differences in access and use and broad digital offerings to make access equitable for all.

- More economies are adopting digital tools for work and training, with over 50% of respondents using digital technology to access study courses. This is especially the case in South Asia. Room for improvement remains with respect to support for gig workers, flexibility and e-learning, and the digitalization of tools to find work.

- Although digital inclusion is high in most regions, and over 95% of respondents use technology to stay in touch with family or friends, key areas for further development include closing gender and disability gaps, addressing rural-urban divides, and supporting vibrant online civil societies.

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1. *In Europe and Central Asia, the share of ICT Services exports amounts to 17.7% of total exports.*

To drive global maturity, country stakeholders should focus on the following key areas:

Governments

Scale up digital capabilities building.

Prioritize digital literacy and expand opportunities for advanced ICT education to prepare people for the digital economy, maximizing their opportunities while protecting them from risks related to digital technologies, such as cybercrime.

Facilitate digital transformation at micro, small, and medium-sized enterprises (MSMEs)

Provide support in training, financial resources, incentives and technology access for MSMEs, which are the economic engine of many developing countries but often lack the resources to go digital.

Enhance internet infrastructure and access.

Invest in internet, data, and electricity infrastructure, particularly in underserved regions, to improve internet affordability and access. This is the fundamental enabler of all other digital economy pillars.

Businesses

Digitalize to stay competitive.

Invest in digital adoption, innovation, and integration of new technologies to avoid falling behind, and to leapfrog where possible by circumventing the limitations of traditional infrastructure.

Support emerging talent and capabilities.

Collaborate with governments to nurture startup ecosystems and participate in creating national policy initiatives for emerging technologies such as AI.

Prioritize cybersecurity.

Implement data protection policies and provide cybersecurity training for all employees. As essential pillars of societal security, companies play a critical role in safeguarding against cyber threats.

Individuals

Engage in digital learning.

Participate in ICT education, digital literacy programs, and cybersecurity training to enhance opportunities in the digital economy and minimize risks.

Support policy initiatives.

Advocate for improved work conditions in the gig economy and participate in policy development, particularly for flexible work arrangements, digital rights and digital inclusion.

Engage digitally with communities.

Actively participate in local and national government platforms. A vibrant digital civil society depends on people's voices being heard.

ABOUT THIS REPORT

This report is a comprehensive guide to the Digital Economy Navigator (DEN), providing a detailed analysis into its various dimensions and components.

Policymakers, businesses, and other stakeholders can use this report to understand the DEN, its findings, and the implications for digital economy development.

It offers an important resource for strategic, evidence-based policymaking to tackle the challenges and opportunities for developing digital economy maturity with innovative solutions. This report provides in-depth analysis of the DEN results by pillars, global and regional trends, and gaps, as well as recommendations for improvement.

The findings build on classifications of digital economy maturity of each of the DEN pillar scores to help countries better understand where they are on the digital economy journey, how far off they are from the next level, and how to traverse the challenges and opportunities that impact the digital economy.

The DEN has three overarching objectives:

01.

Benchmarking tool

To track progress of digital economy development worldwide, regionally and by country.

02.

Driving policy agenda

To identify strengths and areas for improvement at the country level to inform the policy agenda as well as areas for collaboration at regional and global levels.

03.

Capacity-building platform

To improve digital economy development where gaps have been identified.

The DEN will evolve over time to capture the rapidly changing nature of the digital economy. The core business of ICT is only a partial measure of the digital economy—its impact on the rest of the economy is far more critical.

As traditional industries develop, the digital economy will grow to encompass all industries: eventually, *the digital economy will be the economy*.

The digital economy will in fact grow and continue to change as new technologies are introduced, with society adapting and evolving with them. The concept of technological change is embodied in the Navigator in two ways:

01.

The DEN measures not just how a country's population uses technologies, but also how technology affects people. While the overall objective of the DEN will remain in future editions, technologies and applications will evolve and be measured by how they contribute to the digital economy.

02.

The DEN is designed as a multi-year examination with an explicit methodology of change: the introduction of new indicators, survey data, and countries will strike a balance between relevance and comparison over time.

The report is structured into five sections:

01.

The first section introduces the DEN, contextualizes it, and outlines its value for countries' development and prosperity.

02.

The second addresses the development of the DEN framework, data collection methods, and country coverage.

03.

The third section explores key findings and insights derived from the multidimensional approach, regional analysis, and pillar-level analysis, discussing digital economy maturity classifications.

04.

The fourth presents a conclusion and recommendations.

05.

The final section includes detailed country profiles and a methodological annex.

ACKNOWLEDGEMENTS

01
INTRODUCING THE DIGITAL ECONOMY NAVIGATOR

INTRODUCING THE DIGITAL ECONOMY NAVIGATOR

Advanced and emerging technologies have the potential to catalyze countries' development, spurring their own innovation ecosystems as well as transforming how people live.

With emerging general-purpose digital technologies such as artificial intelligence (AI) reaching implementation stage, the level of digital economy maturity will increase in significance as a differentiator for countries' overall economic development.

Technology reshapes businesses, creating new opportunities and innovations. Within the digital economy, there is the potential to profoundly alter individuals' daily experiences, elevate their overall quality of life, and address various societal challenges, including sustainability. However, the transformative power of digital technologies is not without its disruptions; unprepared countries and societies risk experiencing adverse effects on their economies and the natural environment. This dynamic landscape prompts policymakers to grapple with the imperative of strategically leveraging digitalization to ensure a positive and sustainable impact for their population: but how can countries achieve this?

It is increasingly important to be able to measure the complex and fast-moving phenomenon of digital economy development from a people-centric point of view.

Countries that effectively navigate this landscape gain a competitive advantage, as the maturity of the digital economy will profoundly impact their role in global trade, innovation, and leadership. A mature digital economy not only fosters innovation and economic opportunity, but it also enables more equitable distribution and inclusive access to services and opportunities, as well as providing scalable solutions to fundamental societal challenges, such as education and healthcare. Measuring the maturity of the digital economy and its impacts can enable policymakers, businesses, and researchers to make informed decisions that harness its potential for the betterment of societies and economies alike.

The Digital Cooperation Organization (DCO) is an intergovernmental organization that aims to enable digital prosperity for all by accelerating the inclusive and sustainable growth of the digital economy. It developed the Digital Economy Navigator (DEN) to establish a knowledge and data platform with the aim of impacting policy agendas to enable digital economies to thrive.

The DEN measures digital economy maturity through a combination of established quantitative indicators and a comprehensive global survey of 27,081 respondents in 50 countries. The Navigator serves as a guiding tool that allows countries to identify gaps and best practices, drive policy agendas for countries and international actors, and creates a platform for capacity building.

Furthermore, it develops a unique digital economy classification system with five distinct maturity levels, allowing the audience to understand the current state, identify strengths and areas for improvement, and, with future editions, monitor growth and progress over time.

The DEN arrives at a pivotal moment in the evolution of global technology. In recent years, generative AI tools have rapidly advanced, leading to transformative breakthroughs and widespread adoption. These advancements have unlocked a wide range of new applications, making technology more accessible for everyday tasks and significantly enhancing individual empowerment and efficiency. AI is not only reshaping industries but also redefining the global socio-economic landscape by driving unprecedented levels of innovation and productivity.

However, while AI-driven technologies hold immense potential to address societal challenges and stimulate economic growth, there is a growing concern that innovation may become concentrated in certain regions. This could exacerbate the digital divide as other countries continue to struggle with inadequate infrastructure, posing significant barriers to their participation in the digital economy. This disparity underscores the urgent need to assess the maturity of digital economies across different regions to ensure that technological innovation is inclusive and widely distributed.

Ensuring that all countries can actively participate in the digital economy is not only essential for their own economic development but also vital for global stability and equity.

Digital economy: the economic activity reliant on, significantly enhanced, or enabled by digital technologies and their applications. This includes activities that increase human well-being and lead to social or environmental benefits.

The maturity of a nation's digital economy directly influences its capacity to address critical challenges, such as improving education, reducing poverty, and combating climate change. Digital technologies are increasingly recognized as key enablers of progress toward the United Nations Sustainable Development Goals (SDGs), offering innovative solutions that can drive change on a global scale. It has been estimated that digital technologies can directly accelerate achievement of 70% of the SDGs, including climate action (SDG 13), education (SDG 4), and poverty alleviation (SDG 1).[2] Without inclusive digital growth, disparities between countries will widen, undermining global efforts to achieve these shared objectives.

In addition, the world has largely returned to normal after the COVID-19 pandemic, an event with significant implications for the global digital economy. Lockdowns disrupted "business as usual", accelerating digital adoption in various aspects of life, including government interactions, work and business continuity, education, healthcare, and socialization. While many activities have reverted to pre-pandemic methods, a digital shift has become permanent. Digitalization is increasingly recognized as essential for resilience in an uncertain world marked by geopolitical, climatic, and public health risks. The post-pandemic landscape thus offers an opportunity to assess progress, recalibrate policies, and prepare for future challenges.

The DEN can serve as an invaluable instrument for governments, guiding them in formulating strategic roadmaps to enhance their digital economies. While various studies have sought to measure different aspects of the digital economy, a comprehensive global measure of digital economy maturity—particularly from a people-centric perspective—has been notably absent from the literature.

Existing assessments vary widely in scope and definition, with some focusing narrowly on core information and communication technology (ICT) sectors, while others explore specific fields such as AI development, mobile connectivity, or internet security.

The Digital Economy Navigator (DEN) is based on a composite assessment that measures factors and policies that enable the digital economy of a country to drive economic prosperity, sustainability, inclusion, and better quality of life.

The DEN adopts a holistic approach, defining the digital economy in an inclusive manner that encompasses both the digital society and its impact on people. This approach provides a forward-looking perspective on how the digital economy can contribute to sustainable national growth and societal well-being, addressing the needs of current and future generations in alignment with the UN SDGs and the principle of intergenerational equity. By identifying geographic disparities and offering insights into how to bridge them, the DEN aligns with the DCO's mission to enable countries to achieve higher levels of economic prosperity, inclusion, and sustainability.

In conclusion, the DEN emerges not just as a tool for measuring digital economy maturity, but also as a strategic framework for fostering global digital inclusion. By guiding policy agendas and capacity-building efforts, it has the potential to shape a more equitable and sustainable digital future for all.

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2. https://www.undp.org/press-releases/digital-technologies-directly-benefit-70-percent-sdg-targets-say-itu-undp-and-partners

HOW IS THE DEN DIFFERENT?

The DEN is the first tool to:

01.

Adopt a comprehensive approach to and a broad definition of the digital economy;

02.

Employ a resolutely people-centric approach by assessing the impact on 27,081 connected users of the digital economy through a dedicated survey;

03.

Provide countries with a tool to identify digital economy strengths and areas for improvement, contribute to the policy agenda, and allow for capacity building goals;

04.

Measure the impact of digital technologies not only on the economy, but also on businesses and society at large, defining the maturity of the digital economy.

The DEN covers a wide range of indicators, including **Digital Enablers** (Infrastructure, Skills, Regulations and Public Administration, and Finance), **Digital Business** (both the core ICT industry and the more traditional industries altered by Digital Transformation and Innovation), and **Digital Dociety** (from both individual and community perspectives, spanning Health and Education, Work and Training, and Social Inclusion considerations).

02

THE DIGITAL ECONOMY NAVIGATOR FRAMEWORK

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DEVELOPMENT OF THE DEN FRAMEWORK

The DEN's framework development involved four stages:

01.

Literature review

02.

Benchmarking of existing digital economy studies, including a thematic space analysis

03.

Collection of inputs from national and international stakeholders

04.

High-level expert panel reviews

The literature review identified four key factors in the digital economy: inclusivity, access, infrastructure, and the trust environment. How these factors impact economies depend on their income levels: high-income countries tend to emphasize inclusivity by aiming to integrate their population across all income levels into the digital economy, while emerging economies prioritize internet access and developing essential infrastructure.

The review also identified challenges to building resilience in the digital economy—most notably, the absence or incomplete enforcement of universal and clear legal and regulatory frameworks that support competition and risk management.[3] Furthermore, the review evidenced that social objectives should be considered equal to economic factors. Both aspects are integral components of digital economy maturity.

For example, a gender gap persists due to the ongoing disparity in access to digital skills training, which negatively impacts the likelihood of women actively participating in the digital economy.[4] This not only reinforces gender inequality but also underscores the importance of addressing barriers to training access to ensure equitable participation and empowerment for women in the digital realm. These challenges also present opportunities for transformative change, such as promoting successful women entrepreneurs in the digital space.[5]

Emerging economies can leverage the experiences of developed countries, with the European Union (EU) serving as a model for establishing robust regulatory frameworks that safeguard gender equality in the digital space.

The DEN framework was designed to align with the review's key findings. It strongly emphasized social aspects, highlighting inclusivity and gender parity alongside more traditional economic aspects such as digital infrastructure and innovation. This comprehensive approach provides a well-rounded assessment of a country's digital economy maturity.

The second stage of the DEN framework was benchmarking comparable studies and indices. This exercise reviewed over 60 digital economy reviews and composite indicators that study digital economy-related topics, which were assessed across three scoring criteria: comprehensive relevance and scope, continuity in publishing and established reputation, and country coverage. The benchmarking exercise included a thematic space analysis, which identified the conceptual pillars measured in each study and how frequently they are included across the studies. Mapped against the digital economy trends, this underlined thematic areas that are commonly covered ("red oceans") and less or not yet covered ("blue oceans"). The DEN framework aims to cover both categories.

Once the benchmarking was complete, several workshops were organized to engage national and international experts to identify digital economy priorities in the countries measured by the DEN, as well as from the perspective of international organizations. The workshops served the goal to gather inputs and suggestions along the research process, from concepts to be included in the Navigator to indicators to measure such concepts.

Finally, subject-matter experts were invited to a high-level panel to review the DEN framework and its related indicators during both the conceptual and measurement phases. The expert panel reviews contributed to the overall comprehensiveness of the framework and provided valuable insights and feedback on statistical approaches to measure various aspects of the DEN. The full list of experts is available in the Acknowledgements section of this report.

3. OECD (2023), "Policy Dimensions: Trust", OECD Going Digital Toolkit. Available at: https://goingdigital.oecd.org/en/dimension/trust
4. Da Graça Carvalho, M. (2020) "REPORT on closing the digital gender gap: women's participation in the digital economy", European Parliament 2019/2168(INI).
    Available at: https://www.europarl.europa.eu/doceo/document/A-9-2020-0232_EN.html
5. United States Agency for International Development, (2023) "Women in the Digital Economy Fund". Available at: https://www.usaid.gov/digital-development/gender-digital

DIMENSIONS AND PILLARS

The design of the DEN framework follows the OECD/JRC's guidelines on the construction of composite indicators,[6] which present a hierarchical structure divided into dimensions, pillars, and indicators.

The DEN conceptualizes the digital economy as having three dimensions: **Digital Business**, **Digital Society**, and **Digital Enablers**, as illustrated in Figure 1.

Digital Business and Digital Society are the building blocks of a prosperous and sustainable economy: businesses drive prosperity, while society impacts human well-being and economic sustainability.

Together, these dimensions capture key elements of digital service supply and demand that contribute to the maturity of the digital economy. Digital Enablers are fundamental factors that support Digital Business and Digital Society to thrive.

While all dimensions are interlinked, especially in the digital space, Digital Enablers can be thought of as the pre-conditions for Digital Business and Digital Society to achieve the highest possible performance.

Their interdependencies will play out differently for each country based on their relative contexts, which should be considered when interpreting results.

Given a low score in one of these dimensions (e.g., Digital Society), policymakers can aim to improve specific components of that dimension (e.g., digital workforce), or a related enabler that can improve that dimension (e.g., digital skills). Figure 1 presents the ten pillars that, together, constitute the three dimensions. Each pillar is composed of multiple sub-pillars (factors) that contain indicators.[7]

The following subsections define these pillars and their factors.

6. OECD, European Union and European Commission, Joint Research Centre. (2008). Handbook on constructing composite indicators: methodology and user guide. OECD publishing.
7. The full methodology and list of indicators are presented in the Annex.
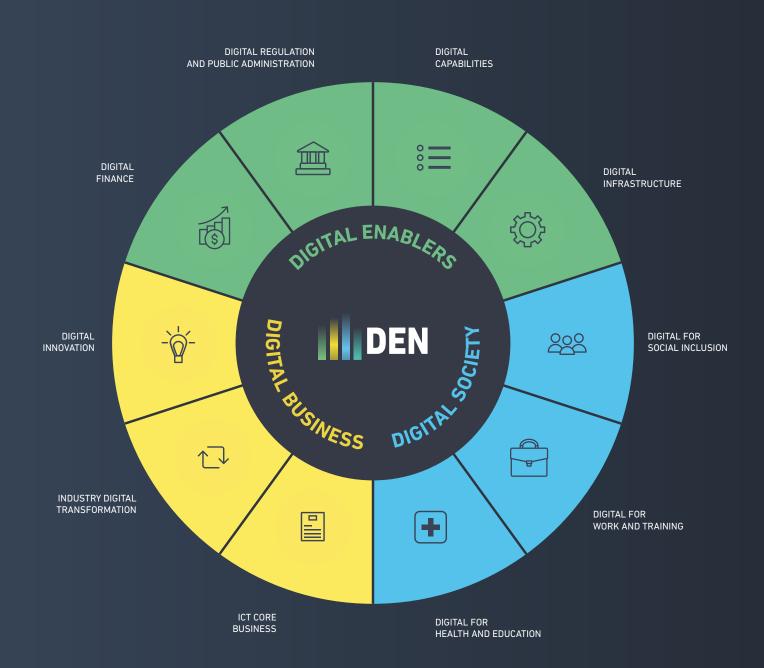
Figure 1. The DEN framework

DIGITAL ENABLERS DIMENSION

The Digital Enablers dimension covers digital infrastructure, capabilities, public administration, and finance aspects, which form the foundation for a digital ecosystem that encompasses business and society.

It describes a dynamic and interconnected network of digital entities, including platforms, applications, users, and data sources, working collaboratively to create a technologically interdependent environment. Enablers within this ecosystem are the technological and organizational components that facilitate its functionality.

This intricate web of interdependence allows for the efficient flow of information, innovation, and services. The criticality of a robust digital ecosystem lies in its ability to foster innovation, enhance efficiency, and drive economic growth.

It serves as the backbone for digital transformation, enabling businesses and societies to adapt to rapidly evolving technological landscapes. In an era where digital technologies underpin various aspects of our lives, the vitality of a resilient and well-orchestrated digital ecosystem cannot be overstated.

The following pillars comprise the Digital Enablers dimension:

Digital Infrastructure

is the telecommunications and internet infrastructure that enables people and businesses to access digital activities. It is measured by broadband access coverage, speed, and affordability. None of the other pillars can exist without digital infrastructure.

Digital Capabilities

includes the competencies of individuals to participate in the digital economy to their full potential. Increased digital literacy and preparedness helps the population to thrive in the digital ecosystem and makes them more likely to engage.

Digital Regulation and Public Administration

focuses on establishing and regulating the digital environment for effective governance. It encompasses the regulatory framework and fundamental administrative operations necessary for the efficient functioning of digital activities within a country. Greater adoption of digital regulations and streamlined administrative processes can enhance transparency, improve productivity, and foster greater engagement.

Digital Finance

covers the access to, and use of, digital banking and other financial activities that contribute to developing the wider digital economy. Digital Finance can help bring people out of poverty and reduce inequalities.

The Digital Enablers dimension is composed of the Digital Infrastructure, Digital Capabilities, Digital Regulation and Public Administration, and Digital Finance pillars. They form the foundation for both Digital Business and Digital Society within an economy.

DIGITAL BUSINESS DIMENSION

To comprehend the essence of the Digital Business dimension, it is imperative to delve into the pillars of Digital Innovation, transformation, and the economic activities of ICT producers and users.

These pillars collectively shape the landscape of modern enterprises, driving a fundamental shift in how the private sector interacts with the evolving digital ecosystem. Digital Innovation stands at the forefront, fostering creativity and driving the development of groundbreaking solutions. Concurrently, Industry Digital Transformation emerges as a defining force, propelling businesses toward adaptability and future-ready states

Moreover, the ICT industry and its strategic integration also play a pivotal role in not only optimizing operations but also in transforming traditional business models. Scrutinizing the intricate interplay between these pillars unravels the economic landscape where businesses operate in the digital era.

These pillars comprise the Digital Business dimension:

ICT Core Business

captures the level of economic activity of the producers of digital technologies and services (hardware and software) and the businesses heavily reliant on digital technologies. These businesses form the core of the internet economy, enabling the growing use of digital platforms and the creation of more efficient services and products better tailored to consumers.

Industry Digital Transformation

measures the degree to which traditional industries are being transformed by digital inputs (technologies and services). Industry Digital Transformation is a huge opportunity for growth in many businesses.

Digital Innovation

covers how a country supports the use of digital technology for new products, services, and business models. It includes the startup environment and frontier research. Digital innovation is imperative for businesses to survive in the fast-paced digital economy.

Digital Business is the economic activity of private sector companies that provide digital services, or that are transformed by them, along with the disruptive role of digital innovation.

DIGITAL SOCIETY DIMENSION

Assessing the societal dimensions of the digital economy—encompassing health, work, education, and social inclusion—is crucial for understanding the comprehensive impacts of technological advancements on human welfare.

Examining the digital economy's influence on health illuminates the accessibility and quality of healthcare services in the contemporary era. Work-related metrics provide insights into the changing landscape of employment, including shifts in job structures, required skills, and employment opportunities. Metrics related to education gauge the efficacy of digital tools in shaping learning experiences and expanding educational accessibility.

Furthermore, the technological progress that has transformed healthcare and education has notably made these vital services more accessible to a broader demographic, benefiting people worldwide. Telehealth initiatives, for instance, leverage technology to extend healthcare services to remote or underserved areas, thereby enhancing health outreach. As digital platforms foster connectivity, they play a pivotal role in advancing women's empowerment, offering avenues for education, economic participation, and social engagement.

Through a systematic assessment of these societal dimensions, stakeholders can make informed decisions, cultivating a digital economy that not only prospers economically but also revolutionizes traditional sectors and contributes to overall well-being through a more inclusive and empowered society.

The following pillars comprise the Digital Society dimension:

Digital for Health and Education

measures how digital technologies are employed in healthcare and education to improve outcomes for individuals. The value of digital access to these services was highlighted during the COVID-19 pandemic, which illustrated the cost of the digital divide and the urgency of closing it.

Digital for Work and Training

captures how digital technologies and services can empower the workforce, transform the workplace, and provide new income opportunities.

Digital for Social Inclusion

measures how digital technologies and services impact civic life as well as the connectivity and inclusion of all people in the digital society. The fast-paced emergence of digital technologies offers opportunities for inclusive economic, social, and political growth.

Digital Society includes activities reliant on, or significantly enhanced by, digital inputs that create social benefits and thereby increase human well-being.

DATA

The DEN includes 102 indicators, of which 60 are national statistics obtained from secondary data sources and 42 are primary data indicators.

These are obtained from a proprietary online survey, and used to measure multiple aspects of the digital economy (see Figure 2). The box on this page explores their key features and limitations.

The 60 secondary data indicators are sourced from databases of organizations such as the International Telecommunications Union, the World Bank, and the United Nations (for the full list of indicators, see the Annex). The selection criteria for the secondary data include:

- Publication by reputable sources

- Clarity and specificity of the concept measured

- Relevance to and coherence with the DEN framework

- Country coverage

- Comparability across countries

- Timeliness and regularity of updates

The 42 primary source indicators come from a proprietary online survey of 27,081 respondents (aged 18 and above) implemented across the 50 countries measured by the DEN.

Scope and limitations

Secondary data indicators

Given the dynamic nature of the digital economy, some concepts measured in the DEN may evolve rapidly. Only data from 2020 onwards are used to exclude potentially outdated information. Secondary data collection was concluded by July 31st 2024.

For some indicators, data availability is constrained due to low country coverage. Indicators were only included if they were available for at least 75% of countries covered by the DEN. For missing data (for indicators above the country coverage threshold), a data-driven imputation strategy was used (see the Annex for more details).

Primary data indicators

The survey included a sample of each country's online population rather than its entirety. This aligns with the objective of measuring the digital economy and society of each country, with the results being carefully interpreted through the lens of the survey scope.

Respondents from different countries may respond to questions more positively or negatively based on cultural factors. To mitigate this issue—which is a common occurrence in all surveys—the research team worked with experts and the survey company to carefully translate and localize the questionnaire.

Each country had between 500 and 1,000 respondents,[8] balanced across gender and age groups.

The survey was targeted to those already online to gather insights from their experience as participants in the digital economy. This also allowed the DEN to measure aspects that secondary source data cannot capture.

Survey questions were primarily drawn from validated surveys and adapted when necessary, following standard survey design principles, such as objectivity, quantifiability, specificity, consistency and conciseness.[9] It was designed in English and translated and localized into 22 languages. The expert reviews contributed to both the survey design, questionnaire validation, and analysis of the survey data (for the full survey questionnaire and corresponding list of indicators, see the Annex).

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8. *Depending on the country's population size.*
9. *Dillman, D.A., Smyth, J.D., and Christian, L.M. (2014). Internet, Mail, and Mixed-mode Surveys: The Tailored Design Method. Hoboken, NJ: John Wiley & Sons.*

102
indicators

42
Primary data

60
Secondary data
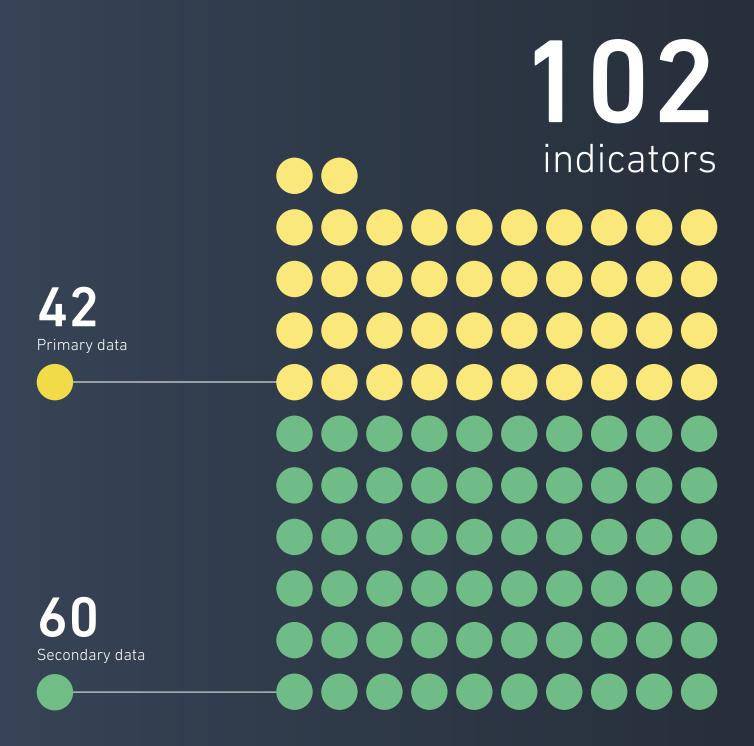
Figure 2. Composition of the DEN indicators

DIGITAL ECONOMY MATURITY LEVELS

Understanding the nuances of countries' digital economy maturity requires a structured analysis of their performance.

The DEN introduces a comprehensive maturity classification system with five categories, which are based on the pillars' scores (ranging from 0 to 100). This system enables comparative analysis of digital economy development across regions, time, and societal segments, highlighting strengths and areas for improvement.

By identifying where a country stands, stakeholders can better target initiatives to foster digital growth and innovation. This classification captures a snapshot of the current state and serves as a forward-looking tool, guiding countries in their quest for digital excellence.

In summary, this scheme not only highlights current standings. It also offers a roadmap for countries to enhance their digital economy maturity—fostering a global landscape where innovation and progress thrive—and identifies opportunities for cooperation.

Maturity levels (based on scores 0 to 100, where 100 is highest)

Frontier (80-100)

This level signifies leadership in pillars of digital economy, such as innovation, technological adoption, digital infrastructure, or digital inclusion. Countries in this range are global benchmarks for digital standards and best practices. Their experience can provide a blueprint for other countries to accelerate the development of their digital economies.

Advanced (70-79.9)

Countries in this level perform well in terms of digital economy maturity, but there remain some opportunities for further enhancement and optimization. This maturity level may also indicate that there are some disparities that still need to be closed.

Transitioning (60-69.9)

Indicates a decisive stage of development of digital economies. Countries have made significant strides but are still working on solidifying their digital economies. *Transitioning* maturity may also point to the existence of greater disparities or lack of convergence.

Emerging (50-59.9)

Usually refers to countries that are in the process of building their digital economies. They have foundational elements in place but need more development to reach higher maturity levels. Compared with the *transitioning* level, geographic or social disparities may be stronger.

Nascent (0-49.9)

Countries with this designation are at the early stages of their digital economy journey. They are generally focusing on establishing the basic elements of digital infrastructure and policy to foster future growth.

COUNTRY COVERAGE

The first edition of the DEN measures the digital economy maturity of 50 countries (see Table 1).

In selecting countries, it aimed to strike a balance between ensuring diversity across regions and income levels and considering factors such as the availability of statistical indicators, survey feasibility, and the inclusion of both DCO Member States as of May 2023,[10] and G20 member countries.[11]

Future iterations of the DEN are expected to expand on this list over the coming years.

Table 1. The 50 countries measured by the DEN[12]

EUROPE AND CENTRAL ASIA

- Cyprus (CYP)
- Denmark (DNK)
- Estonia (EST)
- Finland (FIN)
- France (FRA)
- Germany (DEU)
- Ireland (IRL)
- Italy (ITA)
- Netherlands (NLD)
- Poland (POL)
- Spain (ESP)
- Sweden (SWE)
- Switzerland (CHE)
- Türkiye (TUR)
- United Kingdom (GBR)

MIDDLE EAST AND NORTH AFRICA

- Bahrain (BHR)
- Djibouti (DJI)
- Egypt (EGY)
- Jordan (JOR)
- Kuwait (KWT)
- Mororcco (MAR)
- Oman (OMN)
- Qatar (QAT)
- Saudi Arabia (SAU)
- Tunisia (TUN)
- United Arab Emirates (ARE)

EAST ASIA AND PACIFIC

- Australia (AUS)
- China (CHN)
- Indonesia (IDN)
- Japan (JPN)
- Korea, Republic of (KOR)
- Malaysia (MYS)
- Philippines (PHL)
- Singapore (SGP)
- Thailand (THA)

SUB-SAHARAN AFRICA

- The Gambia (GMB)
- Ghana (GHA)
- Kenya (KEN)
- Mauritius (MUS)
- Nigeria (NGA)
- Rwanda (RWA)
- South Africa (ZAF)

SOUTH ASIA

- India (IND)
- Pakistan (PAK)

LATIN AMERICA AND CARIBBEAN

- Argentina (ARG)
- Brazil (BRA)
- Chile (CHL)
- Mexico (MEX)

NORTH AMERICA

- Canada (CAN)
- United States of America (USA)

10. DCO Member States in May 2023 when country selection was done: Cyprus, Bahrain, Djibouti, The Gambia, Ghana, Jordan, Kuwait, Morocco, Nigeria, Oman, Pakistan, Rwanda, Saudi Arabia. Qatar was included and became a member later.
11. The only exception to the G20 member countries is Russia, for which survey data collection was not feasible.
12. The DEN uses the country names as defined by the UN and the global regions as defined by the World Bank.

03

SNAPSHOT OF DIGITAL ECONOMY MATURITY

OVERALL DEN RESULTS

A varied picture of digital economy maturity

The DEN is a pioneering effort to holistically measure digital economy maturity across a diverse sample of countries and regions.

It also introduces a new classification of digital economy maturity levels based on pillar scores, which range from 0 to 100: **nascent**, **emerging**, **transitioning**, **advanced** and **frontier**.

In this first edition, global averages in the DEN reveal a diverse global landscape of digital economy maturity across ten pillars (see Figure 3). The most mature pillars (*advanced*) are Health and Education, Regulation and Public Administration, and Social Inclusion, showing significant global progress and with many countries even reaching *frontier* status. Work and Training, Capabilities, Finance, and Infrastructure are *transitioning* pillars, indicating substantial development. However, these also feature notable geographic disparities, especially in critical infrastructure. *Emerging* Industry Digital Transformation and ICT Core Business reflect uneven progress, with significant gaps. Digital Innovation, the only *nascent* pillar, shows the great geographic variability, underscoring the need for more inclusive and widespread global support.

The ten pillars analyzed in this report capture the key components of the digital economy, each comprising indicators that measure critical factors, drivers, and outcomes. The following sections will explore each pillar in detail and provide targeted recommendations

to address key gaps. This analysis will reveal strengths, trends, areas for improvement, and existing disparities.

Advanced pillars

- DIGITAL FOR HEALTH AND EDUCATION
- DIGITAL REGULATION AND PUBLIC ADMINISTRATION
- DIGITAL FOR SOCIAL INCLUSION

Digital for Health and Education, Digital Regulation and Public Administration, and Digital for Social Inclusion stand out as the strongest pillars. These are classed as *advanced* due to their considerable progress worldwide, although there remain some gaps. Furthermore, in all three pillars, 20% or more of the countries included in the DEN are classed as *frontier*, offering valuable lessons and best practices for others to adopt. Two of these pillars also show signs of global convergence, with moderate score variability, compared with other areas of the report.

Transitioning pillars

- DIGITAL FOR WORK AND TRAINING
- DIGITAL CAPABILITES
- DIGITAL FINANCE
- DIGITAL INFRASTRUCTURE

Digital for Work and Training, Digital Capabilities, Digital Finance, and Digital Infrastructure are in the *transitioning* level, indicating ongoing progress but with further development needed. While Digital for Work and Training and Digital Capabilities show moderate geographic variability,

Digital Finance and Digital Infrastructure exhibit greater disparity. For example, the difference between the top and bottom scores in Digital Infrastructure is significant (59 points on a scale of 0 to 100), highlighting critical geographic gaps that need attention—which is particularly important to address, given that infrastructure is a key enabler of all other digital dimensions.

Emerging pillars

- INDUSTRY DIGITAL TRANSFORMATION
- ICT CORE BUSINESS

Industry Digital Transformation and ICT Core Business are categorized as *emerging*, indicating a long journey ahead for digital economy maturity in most countries. ICT Core Business in particular shows significant geographic disparities and recorded some of the more modest country scores among all pillars, suggesting that some countries have very limited capacity in this area.

Nascent pillar

- DIGITAL INNOVATION

Digital Innovation is the only pillar classified as *nascent* and exhibits a high geographic variability, indicating a concentration of innovation output. For a thriving global digital economy where every nation can benefit, it is essential that countries advance not only as consumers but also as creators.
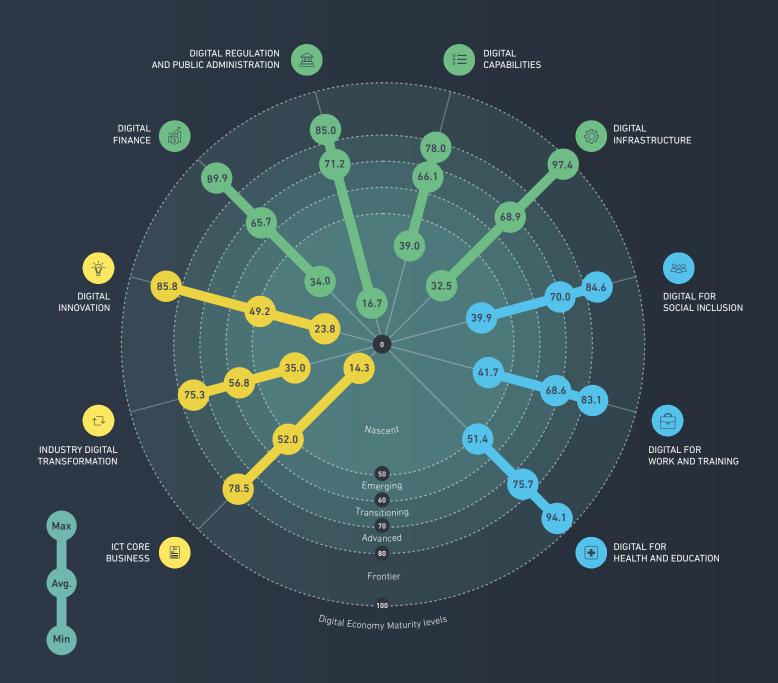
Figure 3. Overall results across DEN countries.
(Scores 0-100 where 100 is the maximum)

Identifying an association between income level and digital economy maturity

Correlation analysis was conducted using aggregated scores from the DEN and data on country income level. A strong positive correlation is observed between income level and digital economy maturity, meaning that higher income countries tend to also have higher digital economy maturity. Conversely, it also indicates that countries with higher overall digital economy maturity have higher income levels, since correlation does not mean causation.

However, the DEN scores also show digital leapfrogging among lower income countries, some of which do well in pillars where the digital economy can provide solutions to fill important societal needs, such as Digital for Health and Education, and Digital for Work and Training.

As seen in Figure 4, **high-income countries** lead in most pillars, particularly in Digital Infrastructure (*frontier*), while they still have room for improvement in areas like ICT Core Business and Industry Digital Transformation.

Upper-middle-income countries have strengths in Health and Education, Work and Training and Social Inclusion, but are still developing in areas like digital innovation.

Lower-middle-income countries show significant gaps, with half the pillars in *nascent* status, though they show remarkable accomplishments in Health and Education, and Work and Training. These areas of strength present

opportunities for leapfrogging in these countries by supporting the development of innovative digital solutions to local needs that can subsequently be applied elsewhere.

Low-income countries face the greatest challenges, with six *nascent* pillars, except Health and Education, Work and Training (*transitioning*), Regulation and Public Administration and Social Inclusion (*emerging*).

This offers additional insights into where, on a global scale, efforts and targeted interventions should be placed to close the most pressing gaps in the digital economy.

DIGITAL REGULATION
AND PUBLIC ADMINISTRATION

DIGITAL
CAPABILITIES

DIGITAL
FINANCE

DIGITAL
INFRASTRUCTURE

DIGITAL
INNOVATION

DIGITAL FOR
SOCIAL INCLUSION

INDUSTRY DIGITAL
TRANSFORMATION

DIGITAL FOR
WORK AND TRAINING

ICT CORE
BUSINESS

DIGITAL FOR
HEALTH AND EDUCATION

Nascent

Emerging

Transitioning

Advanced

Frontier

Digital Economy Maturity levels

| L | Low income | LM | Lower-middle income | UM | Upper-middle income | H | High income |

Figure 4. Maturity levels in the DEN pillars by income group[13]

13. *Countries are classified based on the World Bank's income categories (low, lower-middle, upper-middle, and high) as outlined in the yearly updated World Development Indicators. All relevant measures, data, and visualizations for the 2024 version are available at: https://datatopics.worldbank.org/world-development-indicators/the-world-by-income-and-region.html*

REGIONAL ANALYSIS

The digital economy maturity of each region varies across different pillars, and each region has a distinct digital economy maturity profile.

Figure 5 illustrates these variations, highlighting where further attention is needed. Further regional analysis is included in the following sections of this report.

● East Asia and Pacific

The East Asia and Pacific region shows its strongest performance in the Digital for Health and Education pillar. This region demonstrates an *advanced* level of maturity across six key pillars: Digital for Health and Education, Digital Regulation and Public Administration, Digital Finance, Digital for Social Inclusion, Digital Capabilities, and Digital Infrastructure. However, it remains in a *transitioning* level in pillars such as Digital for Work and Training and ICT Core Business operations. The Industry Digital Transformation and Digital Innovation pillars—while showing signs of *emerging* maturity—highlight the critical areas that require targeted efforts to elevate overall maturity. These areas represent the most urgent priorities for enhancing the region's digital landscape.

● Europe and Central Asia

The Europe and Central Asia region is *frontier* in Digital Infrastructure and *advanced* in four pillars: Digital for Health and Education, Digital Finance, Digital Regulation and Public Administration, and Digital for Social Inclusion, in which the region is particularly ahead of the curve. It is *transitioning* in all other pillars. It has the most favorable environment and regulation to support digital inclusion, digital social connectivity and civic engagement.

● Latin America and Caribbean

The Latin America and Caribbean region boasts its strongest performance in the Digital for Health and Education pillar. This region is *advanced* in four pillars: Digital for Health and Education, Digital for Social Inclusion, Digital for Work and Training, and Digital Regulation and Public Administration. It is *emerging* in Industry Digital Transformation. It features two *nascent* pillars, ICT Core Business and Digital Innovation, indicating areas with room for improvement.

● North America

The North America region is a leader across most pillars. The region sits at the *frontier* in Digital Finance, Digital for Health and Education, Digital Regulation and Public Administration, as well as Digital Infrastructure. It is *advanced* in five other pillars and *transitioning* only in ICT Core Business (but still world-leading in this regard).

● Middle East and North Africa
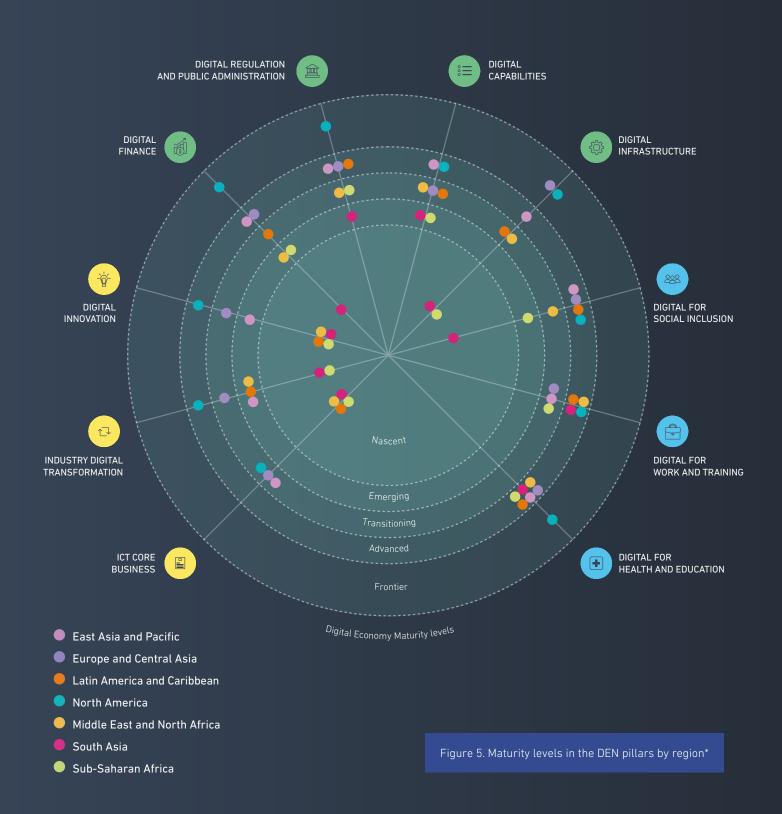
The Middle East and North Africa region demonstrates strength in Digital for Work and Training. It is *advanced* in Digital for Work and Training and Digital for Health and Education. It is the second strongest region in Digital for Work and Training, with efforts to reduce gender gaps in digital access to opportunities and promoting positive impacts from the gig economy. There are two *nascent* pillars, ICT Core Business and Digital Innovation, which deserve further attention.

● South Asia

South Asia is the leading region in the Digital for Work and Training pillar. This region is *advanced* in two pillars: Digital for Health and Education and Digital for Work and Training. With two *emerging* pillars and six *nascent* ones, there are multiple areas that deserve attention to improve digital economy maturity such as Digital Innovation.

● Sub-Saharan Africa

Sub-Saharan Africa is showing notable progress in Digital for Health and Education. This region is classed as *advanced* in Digital for Health and Education, *transitioning* in Digital for Work and Training, and Digital Regulation and Public Administration. All other pillars are either *emerging* (three of them) or *nascent* (four). Given present limitations and the importance for other pillars, Digital Infrastructure should be a key area for improvement.

DIGITAL REGULATION
AND PUBLIC ADMINISTRATION

DIGITAL
CAPABILITIES

DIGITAL
FINANCE

DIGITAL
INFRASTRUCTURE

DIGITAL
INNOVATION

DIGITAL FOR
SOCIAL INCLUSION

INDUSTRY DIGITAL
TRANSFORMATION

DIGITAL FOR
WORK AND TRAINING

ICT CORE
BUSINESS

DIGITAL FOR
HEALTH AND EDUCATION

Nascent

Emerging

Transitioning

Advanced

Frontier

Digital Economy Maturity levels

● East Asia and Pacific
● Europe and Central Asia
● Latin America and Caribbean
● North America
● Middle East and North Africa
● South Asia
● Sub-Saharan Africa

Figure 5. Maturity levels in the DEN pillars by region*

Regional groups are based on the 50 countries included in the DEN. See Table 1 for the detailed group composition.

DIGITAL ENABLERS
01: DIGITAL INFRASTRUCTURE

This pillar depicts a world that is transitioning. Progress is underway, but there are important gaps to fill for establishing the foundations for the digital economy.

The focus for improvement should be investing in internet speeds and coverage in underserved regions, while maintaining market conditions for affordability.

Digital Infrastructure is fundamental to a country's progress toward digital economy maturity, serving as the backbone for all digital activities and enabling individuals and businesses to participate in the digital economy.

A key component of this pillar is reliable and inclusive digital access, which in turn hinges on coverage, encompassing variables like electricity, mobile services, and internet speed Affordability is also crucial, as the cost of smartphones, broadband, and mobile services (3G, 4G, and 5G) must be within reach for most people to ensure widespread access. Additionally, data infrastructure, including internet exchange points and data centers, is essential for storing, processing, and exchanging digital information, and further enabling the development of advanced technologies like AI, cloud computing, and the Internet of Things (IoT).

There is still need for convergence across regions, with attention needed on internet coverage and speeds

With an average score of 69 (out of 100), the sample of 50 countries included in the DEN can be classed as *transitioning* overall. However, they are close to graduating into the advancing level. This means there is progress underway in developing the necessary infrastructure for the digital economy but there are still significant gaps to fill. Encouragingly, a large proportion of countries (30%) are classed as *frontier* or *advanced* (22%), but there is still a significant segment in the *emerging* (22%) and *nascent* categories (12%). With a maximum score of 97 contrasting with a minimum of 32, scores in this pillar also exhibit a significant degree of variation across countries compared with the other pillars—which points to the existence of important geographical differences. Network coverage among the DEN countries is fairly high on average (>90%) for 3G and 4G, but drops off significantly for 5G (59.3%).

North America, and Europe and Central Asia lead in this pillar, with a strong performance in coverage and affordability indicators. Smartphone affordability in these regions averages 1.7 and 4.6 times the average monthly income, respectively, which is fairly low in comparison to South Asia (40.2) and Sub-Saharan Africa (27.1). These regions are followed by East Asia and Pacific, and Latin America and the Caribbean. Meanwhile, the regions with the most room for improvement are South Asia and Sub-Saharan Africa (see Figure 6). Network coverage is particularly a challenge in the two Sub-Saharan African countries included in the DEN, as only 15% of their populations are covered by a 5G network. Encouragingly, some progress in affordability has been noted: according to a 2023 report, South Asia is one of the regions with the most affordable mobile data plans.[14] Improvements in 5G affordability have been reported in Sub-Saharan Africa too, but it is the only region in the world where the cost of 1GB of data as a percentage of monthly GDP per capita exceeds 2%. [15]

In addition to geographical disparities, this pillar also features important contrasts across indicators. Across all countries on average, affordability and coverage are rather strong. However, broadband bandwidth shows room for improvement globally. Beyond ensuring universal internet coverage, the quality of the connection is also important for economic development. A study supported across 116 countries found that faster mobile broadband speeds correlate with a notable increase in labor productivity.[16] Using data from 274 Chinese cities, another study found that broadband speed significantly boosts innovation, measured as the number of patent applications.[17]
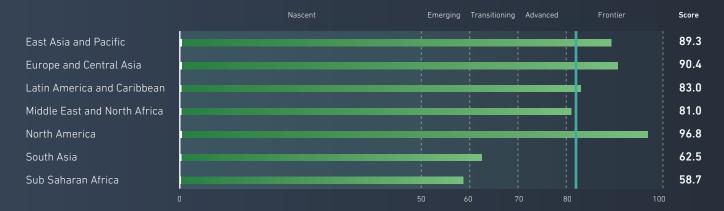
14. https://www.gsma.com/r/wp-content/uploads/2023/10/State-of-Mobile-Internet-Connectivity-2023-South-Asia.pdf
15. https://www.gsma.com/r/wp-content/uploads/2022/10/State-of-Mobile-Internet-Connectivity-2022-Sub-Saharan-Africa.pdf
16. https://www.ericsson.com/en/blog/2022/6/why-faster-mobile-networks-mean-faster-productivity
17. https://www.sciencedirect.com/science/article/pii/S2405844022039809
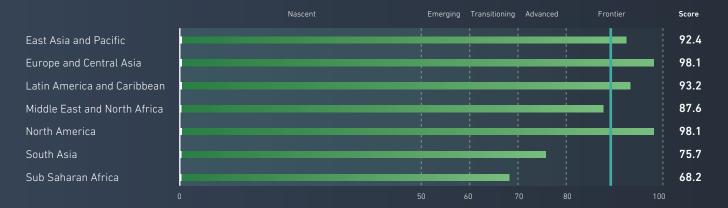
Coverage

Region	Nascent	Emerging	Transitioning	Advanced	Frontier	Score
East Asia and Pacific						**89.3**
Europe and Central Asia						**90.4**
Latin America and Caribbean						**83.0**
Middle East and North Africa						**81.0**
North America						**96.8**
South Asia						**62.5**
Sub Saharan Africa						**58.7**

Affordability

Region	Nascent	Emerging	Transitioning	Advanced	Frontier	Score
East Asia and Pacific						**92.4**
Europe and Central Asia						**98.1**
Latin America and Caribbean						**93.2**
Middle East and North Africa						**87.6**
North America						**98.1**
South Asia						**75.7**
Sub Saharan Africa						**68.2**

Data Infrastructure

Region	Nascent	Emerging	Transitioning	Advanced	Frontier	Score
East Asia and Pacific						**31.1**
Europe and Central Asia						**60.1**
Latin America and Caribbean						**19.3**
Middle East and North Africa						**23.2**
North America						**61.6**
South Asia						**3.0**
Sub Saharan Africa						**17.6**

Figure 6. Performance across Digital Infrastructure sub-pillars by region
(Scores 0-100 where 100 is the maximum)

━━ = DEN Average

DIGITAL ENABLERS
01: DIGITAL INFRASTRUCTURE

Recommendations for boosting Digital Infrastructure

Driving internet coverage in underserved regions.

A starting point for governments should be the development of comprehensive, time-bound broadband plans with specific targets and strategies to guide effective broadband deployment at a large scale. Research shows that well-designed plans have a number of characteristics. They assess population needs, evaluate existing infrastructure, set internet coverage goals, drive accessibility targeting digital divides, foster affordability, promote local content, digitalize essential services, review regulations, encourage the entry of new market players, and enhance digital literacy and security.[18] [19]

Improving internet speeds across the board.

Enhancing internet speeds requires, among multiple factors, strengthening data infrastructure. Developing national infrastructure such as internet exchange points (IXPs) and colocation data centers can reduce costs and improve service quality.[20] Local IXPs improve efficiency by routing local traffic through domestic servers, reducing capital outflows, and enabling internet service providers to cache popular content locally. This leads to lower broadband costs and faster access for users.[21]

Promote affordability, especially in low-income settings.

While improving affordability is difficult for governments, it has been shown that this can be achieved through mechanisms that promote infrastructure sharing, public-private partnerships, and fostering a competitive market with multiple service providers.[22] Infrastructure sharing cuts costs and environmental impact by reducing duplication and using existing resources, while public-private partnerships help extend network coverage and leverage both public and private strengths. Effective market policies can be used to simplify licensing, regulate pricing, and ensure high standards; while updated regulations can foster competition, attract investment, and support a secure, reliable internet infrastructure.[23]

18. https://www.itu.int/hub/publication/d-stg-sg01-01-2-2021/
19. https://repositorio.cepal.org/server/api/core/bitstreams/57ff2925-b621-47d3-b30f-01bf16090a64/content
20. https://blogs.worldbank.org/en/opendata/improving-data-infrastructure-helps-ensure-equitable-access-poor-people-poor-countries
21. https://www.itu.int/hub/publication/d-stg-sg01-01-2-2021/
22. https://blogs.worldbank.org/en/eastasiapacific/how-can-indonesia-improve-quality-its-internet-services-and-universalize-access
23. https://www.itu.int/hub/publication/d-stg-sg01-01-2-2021/
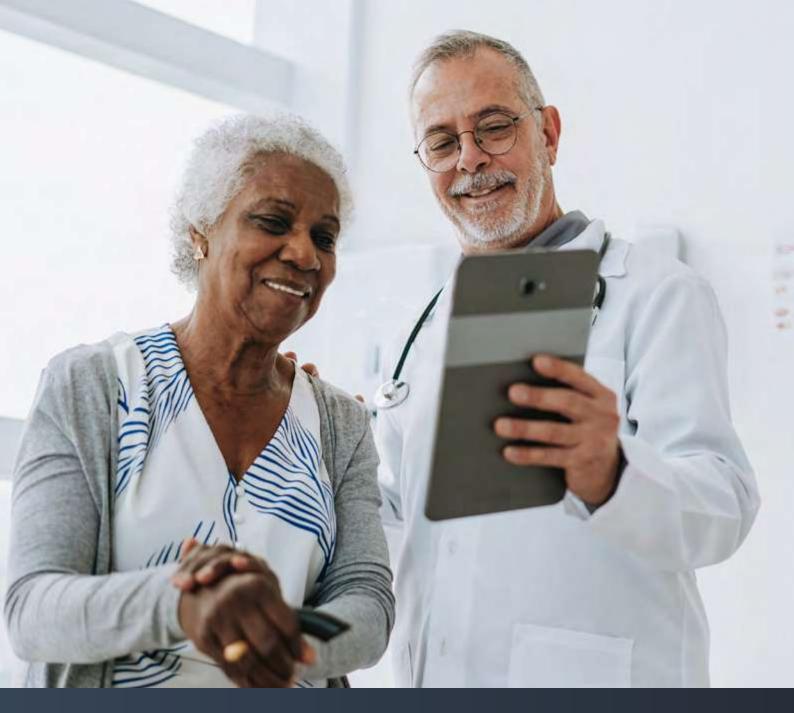
Country practice in focus: Brazil's expansion of internet provision

Brazil has been recognized for its improvements in internet provision, with mobile internet penetration growing from 54% in 2017 to 67% in 2022.

To tackle the coverage gap, several measures are being implemented: spectrum license obligations, infrastructure sharing, converting fines into investments, and regional initiatives such as Alô Minas (installing 4G or higher technology in cities in the state of Minas Gerais, which is aided with tax incentives).

There have also been recent strategies involving the Telecommunications Services Universalization Fund[24] and updated spectrum license renewal rules.[25]

24 *Fundo de Universalização dos Serviços de Telecomunicações.*
25 *https://www.gsma.com/latinamerica/wp-content/uploads/2023/03/EN-We-Care-Usage-Brazil-v8.pdf*

DIGITAL ENABLERS
02: DIGITAL CAPABILITIES

With overall transitioning maturity, this pillar exhibits global progress but particular fields and territories show some room for improvement.

The world is converging in attaining basic ICT skills, but it is a different story when it comes to advanced skills (from software management to programming). Cybersecurity skills also need a boost around the world.

The Digital Capabilities pillar encompasses the skills and abilities that people need to fully engage in and benefit from the digital economy.

The Digital Capabilities pillar encompasses the skills and abilities that people need to fully engage in and benefit from the digital economy. These capabilities are crucial for enhancing a country's digital economy maturity. Digital literacy and skills, across all segments of the population, serve as fundamental catalysts that unlock access to online information and learning resources, facilitate social interactions, and help evaluate online content. Increased digital literacy fosters deeper engagement within the digital ecosystem.

Digital privacy and risk awareness, including aspects of personal skills and capacity development,[26] empower individuals to engage in the digital world by granting them control over their personal information, ensuring secure interactions, and mitigating risks for their communities. There is some convergence on basic digital skills, but efforts should be placed on fostering advanced ICT skills and cybersecurity skills.

The average global score for this pillar is 66 out of 100, which indicates a *transitioning* maturity level. It also features the largest share of countries (46%). Although there are no *frontier* countries, only 2% are *nascent*, as shown in Figure 7. This suggests some convergence around the world. Supporting this, the difference between the maximum and minimum scores in this pillar is moderate (79 vs 39) and score variability across countries is low.

North America is the leading region in this pillar, followed by Europe and Central Asia, and East Asia and Pacific (all *advanced*). The Middle East and North Africa and Latin America and the Caribbean both achieve intermediate performance (*transitioning*). South Asia and Sub-Saharan Africa, with the same score, display the most room for improvement (*emerging*).

Certain indicators exhibit a higher degree of global convergence than others. For instance, basic digital literacy remains robust across most regions, reflecting a foundational level of digital competence. Indeed, over 98.6% of people who responded to the DEN survey have at least one basic ICT skill.

However, there is considerable variability in advanced digital literacy scores, which tend to be lower. Only about a third of respondents (36.3%) use digital devices for programming and the metric of university graduates from ICT programs reveals significant room for improvement on average and pronounced regional disparities. The gap between leading regions, such as North America and East Asia and Pacific, compared with Latin America and the Caribbean, South Asia, and Sub-Saharan Africa, is particularly stark. This discrepancy underscores a critical area for targeted intervention to enhance digital economy maturity, emphasizing the need to strengthen advanced digital skills and education in less developed regions.

ICT education, which is part of the broader category of science, technology, engineering, and mathematics (STEM) education is crucial for developing a highly skilled workforce capable of driving technological innovation and economic growth. Historically, the US and Europe have led in STEM education, but in recent decades, other regions around the world have made significant strides in this area.[27] Malaysia and Tunisia have some of the highest shares of STEM graduates in tertiary education (around 40%). India, with 34%, leads in total STEM graduates worldwide due to its large population. Other countries with strong STEM education numbers include the UAE, Germany, Belarus, and South Korea.[28] Considering the share of university graduates who have completed ICT programs specifically, data included in the DEN reveals leadership of countries such as Australia, Finland, Saudi Arabia, Ireland and Singapore.

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26. *Measured in the DEN with capacity development pillar from the ITU Cybersecurity Index.*
27. *https://cset.georgetown.edu/article/the-global-distribution-of-stem-graduates-which-countries-lead-the-way/*
28. *https://www.weforum.org/agenda/2023/03/which-countries-students-are-getting-most-involved-in-stem*

Digital Literacy, Skills, and Talent

Region	Score
	Nascent			Emerging	Transitioning	Advanced		Frontier	**Score**

East Asia and Pacific — **74.7**

Europe and Central Asia — **73.8**

Latin America and Caribbean — **67.3**

Middle East and North Africa — **68.7**

North America — **78.5**

South Asia — **56.9**

Sub Saharan Africa — **56.4**

0   50   60   70   80   100

Digital Privacy and Risk Awareness

East Asia and Pacific — **65.5**

Europe and Central Asia — **66**

Latin America and Caribbean — **55**

Middle East and North Africa — **60.7**

North America — **68.8**

South Asia — **59.5**

Sub Saharan Africa — **59**

0   50   60   70   80   100

Figure 7. Performance across Digital Capabilities sub-pillars by region
(Scores 0-100 where 100 is the maximum)

▬▬ = DEN Average

DIGITAL ENABLERS
02: DIGITAL CAPABILITIES

Skills for protecting personal data is another area for improvement across the board, with a low score globally and relatively little variation across geographies. The world also needs to step up with regard to internet security incidents prevention skills, which attains a low score across all regions against the backdrop of rising threats: over 50% of respondents have experienced at least one cybersecurity incident. The actions and skills of individuals collectively make up for an important part of a society's resilience to cybercrime. Highlighting the importance of cybersecurity on a global scale, the estimated annual cost of cybercrime to the global economy was €5.5 trillion (approximately $6 trillion) in 2020, double the amount calculated for 2015, according to the European Commission.[29]

Recommendations for boosting Digital Capabilities

Developing advanced ICT skills, from theory to practice.

Boosting ICT education involves aligning curricula with real-world challenges, adopting modern teaching methods, and investing in teacher training. Promoting ICT education through campaigns is important to drive interest and address enrollment barriers. Supporting entrepreneurship and innovation through incubators, innovation hubs, science centers and startup programs provides practical opportunities for applying ICT skills, fostering creativity and collaboration.[30]

Improving cybersecurity skills across population segments.

To advance cybersecurity skills, a comprehensive strategy including formal education and lifelong learning is essential. Developing countries should assess needs, implement action plans, build partnerships, and monitor progress. Effective multi-stakeholder partnerships can leverage private sector expertise and online platforms. Governments should incentivize roles in cybersecurity, offer training scholarships, and support career pipelines. Addressing gender biases and promoting women in cybersecurity are also crucial.[31]

29. https://www.europarl.europa.eu/topics/en/article/20211008STO14521/cybersecurity-why-reducing-the-cost-of-cyberattacks-matters
30. https://blogs.worldbank.org/en/education/empowering-africas-future-prioritizing-stem-skills-youth-and-economic-prosperity
31 https://documents1.worldbank.org/curated/en/099111023150023703/pdf/P17785208994aa06d08eca094513904323a.pdf

Country practice in focus: Saudi Arabia's national effort to grow ICT skills

Saudi Arabia offers an example of the strength of Middle Eastern countries in ICT education programs. It features the highest share of graduates in ICT programs in the sample of 50 countries covered by the DEN (along with Australia and Finland). Saudi Vision 2030, the government's economic strategy, aims to train 40% of the workforce in data and AI skills and to increase technology spending to over 20% of the national budget by 2025.[32]

32. https://oxfordbusinessgroup.com/reports/saudi-arabia/2023-report/ict/digital-drive-strong-government-support-and-foreign-investment-are-helping-the-kingdoms-tech-industry-to-grow-overview/

DIGITAL ENABLERS

03: DIGITAL REGULATION AND PUBLIC ADMINISTRATION

This pillar displays significant progress worldwide with global maturity classed as advanced *and numerous countries at the* frontier *level.*

Digital regulation is advancing around the world, but there is still room to expand the role of digital public administrations, which could benefit developing economies significantly.

Digital Regulation and Public Administration encompasses the transformation of public administrative operations and the regulatory landscape of the digital economy.

Digital technologies allow governments to better serve their populations and allows them in turn to be more engaged, and vigilant, with the workings of the public sector. This pillar looks into metrics examining progress on digitalizing administrative tasks, digital ID systems, and promoting transparency. Meanwhile, robust and comprehensive governance lays the foundation for trust, safety, transparency, and competitiveness, which are essential for digital ecosystems.

These conditions enable stakeholders, including individuals and businesses, to engage productively, transact securely, and thrive. This pillar also examines metrics on regulatory quality, protecting data and consumers, combating cybercrime and protecting intellectual property, and legal frameworks for ICT and digital businesses.

Digital regulation is advancing, but there is significant room to expand digital administrative operations around the world

This pillar exhibits substantial maturity across the 50-country sample, attaining an average score of 71 out of 100, which places it at the *advanced* level. Notably, 24% of the countries are classified as *frontier*, and 34% as *advanced*. In contrast, the proportion of countries categorized as *emerging* and *nascent* is relatively small, at 6% and 4% respectively. While score variability among countries is moderate compared with other pillars, geographic disparities remain evident. For instance, the gap between the highest and lowest country scores is significant (85 and 17), highlighting the uneven distribution of digital economy maturity across regions.

North America, at the *frontier* level, has the strongest performance in this pillar. It is followed by Europe and Central Asia, East Asia and Pacific, and Latin America and the Caribbean, which are all *advanced*.

The Middle East and North Africa is classed as *transitioning* together with Sub-Saharan Africa. South Asia, the only *emerging* region, shows the most room for improvement (see Figure 8).

Digital regulation indicators attain a strong performance globally, but there is substantial geographic variation. There is an important difference between the scores of leading countries within North America and South Asia, for example. Furthermore, there are marked contrasts when comparing the metrics included in this component. Data and consumer protection is quite advanced across the board (*frontier* on average) but it masks geographic gaps, with South Asia recording low scores and some room for improvement in the Middle East and North Africa. Overall regulatory quality is a metric that needs more attention, particularly in South Asia, Sub-Saharan Africa and Latin America and the Caribbean.

Encouragingly, India, the largest country in South Asia, is making progress in digital regulation. In August 2023, its parliament enacted the Digital Personal Data Protection Act, 2023, marking the country's first comprehensive personal data protection law. The law updates data protection by easing business obligations and enhancing government authority. It applies to both Indian and foreign entities, mandates user consent, and emphasizes transparency. The Act enforces stricter rules for major data handlers, revises data localization, establishes the Data Protection Board, and includes measures to block non-compliant services.[33]

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33. https://carnegieendowment.org/research/2023/10/understanding-indias-new-data-protection-law?lang=en

Digital Public Administration

	Nascent		Emerging	Transitioning	Advanced		Frontier		**Score**

Region	Score
East Asia and Pacific	**63.2**
Europe and Central Asia	**65.6**
Latin America and Caribbean	**65.5**
Middle East and North Africa	**57.8**
North America	**65**
South Asia	**62.9**
Sub Saharan Africa	**53.3**

0   50   60   70   80   100

Digital Regulation

	Nascent		Emerging	Transitioning	Advanced		Frontier		**Score**

Region	Score
East Asia and Pacific	**84.5**
Europe and Central Asia	**92.1**
Latin America and Caribbean	**75.8**
Middle East and North Africa	**70.8**
North America	**96**
South Asia	**55.8**
Sub Saharan Africa	**72.6**

0   50   60   70   80   100

Figure 8. Performance across Digital Regulation and Public Administration sub-pillars by region
(Scores 0-100 where 100 is the maximum)

━━━ = DEN Average

DIGITAL ENABLERS
03: DIGITAL REGULATION AND PUBLIC ADMINISTRATION

Scores of digital public administration indicators show some room for improvement across countries (*transitioning* overall), with contrasts. Digital Administrative Operations shows robust development around the world (*advanced* on average). Here, the strongest area globally is digital public procurement (eProcurement),[34] which is highly developed across the board—all regions are *frontier*, except Sub-Saharan Africa, at *advanced*. The metrics on digital ID and licensing and open data and transparency evidence room for growth around the world, despite some areas of strength in North America and Europe and Central Asia (especially in open data). Closing the gap in implementing digital administrative operations in developing countries is essential. The benefits of digital government tools are well-documented: it enhances cost-effectiveness in public operations, resulting in significant savings in procurement, tax collection, and customs, while improving individual engagement, especially in remote areas. Additionally, e-government fosters transparency, accountability, combats corruption, and strengthens democracy.[35]

Recommendations for boosting Digital Regulation and Public Administration

Developing national strategies for digital administrative operations.

Recent experiences highlight the need for strong internet infrastructure, skilled government personnel, and the effective digitalization of public finance and administrative processes for individuals. Secure digital ID systems have proven to be crucial for streamlined access. National digital strategies should also emphasize data interoperability and cross-government cooperation to avoid the creation of disjointed systems. Digital transformation should align with broader public sector reforms, and active public participation should be encouraged.[36]

Updating regulatory frameworks for the digital economy.

Best practices include regulatory simplification, such as streamlining business registration procedures and creating integrated services (such as "one-stop-shop" platforms) to improve interactions between businesses and government. It is also crucial to strengthen institutions in charge of introducing and enforcing regulations. Lastly, transparency and engagement should be supported, considering open consultations on new regulations, public access to reliable regulatory information, efficient grievance mechanisms, and feedback loops to address implementation gaps.[37]

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34. *Defined as the use of electronic systems and tools to conduct public procurement processes, such as publishing tender notices, receiving bids, evaluating proposals, awarding contracts, and monitoring performance.*
35. *https://documents1.worldbank.org/curated/en/317081468164642250/pdf/320450egovhandbook01public12002111114.pdf*
36. *https://www.ey.com/en_gl/insights/international-development/how-governments-in-developing-countries-can-close-the-digital-gap*
37. *https://documents1.worldbank.org/curated/en/753291501065430312/pdf/117750-BRI-PUBLIC-GGPTACJointOfferingonGoodRegulatoryPractices.pdf*
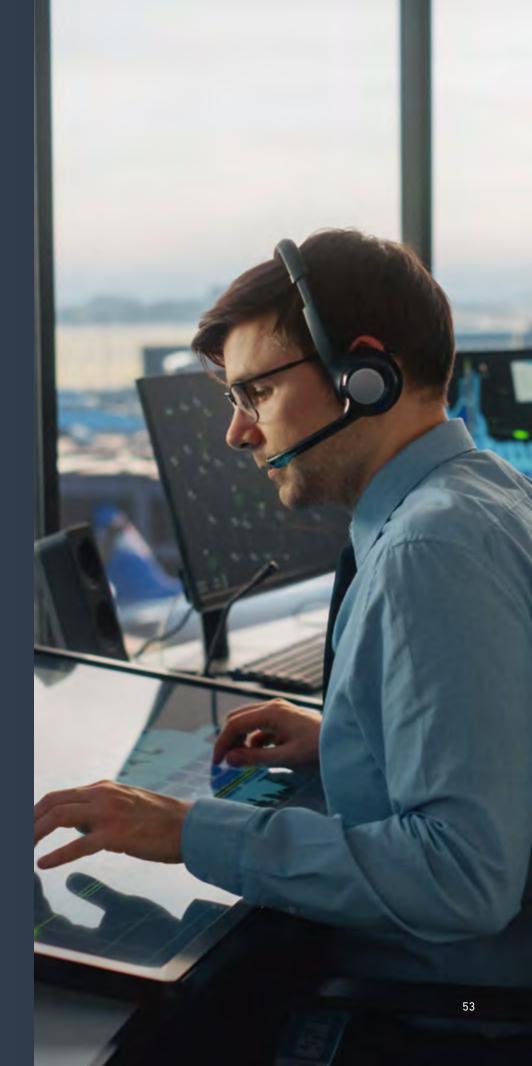
Country practice in focus: Denmark's comprehensive e-government

Denmark's success in digital public administration is due to strong citizen-government trust, which supports effective digital communication and service delivery. The unified digital key system, NemID (EasyID), offers secure access to over 100 services.[38] Other key factors include intergovernmental cooperation and strategic planning. Its 2022-25 digital strategy, for example, addresses climate change, labor shortages, and advancing digital technology.[39]

38. *https://denmark.dk/innovation-and-design/ denmarks-digital-success*
39. *https://en.digst.dk/policy/the-danish-digi- tal-journey/*

DIGITAL ENABLERS
04: DIGITAL FINANCE

This pillar has achieved a **transitioning** *status globally, pointing to significant gaps still to be addressed due to regional disparities.*

The rise and ubiquity of digital payments contrasts with limitations in traditional banking systems. Efforts should go into supporting national financial infrastructure and continuing to reach underserved populations with digital solutions.

This pillar explores the access to and utilization of digital banking and financial services.

These are vital components of the broader digital economy. Digital Finance holds transformative potential by empowering individuals to engage in the market, democratizing access to resources, and streamlining transactions and savings—financial inclusion altogether can alleviate poverty and reduce socio-economic disparities. This pillar evaluates the maturity of financial systems, essential for supporting entrepreneurship, digital innovation and national projects, and examines mobile payment systems that revolutionize transactions, especially in regions with limited traditional banking infrastructure.

Additionally, this pillar assesses the extent of financial inclusion and accessibility to digital solutions.

Regional disparities are found in traditional banking systems, but there is growing convergence in digital solutions

With a global average score of 66 out of 100, Digital Finance maturity is broadly classified as *transitioning*, indicating progress while highlighting significant gaps that need to be addressed. It is promising that 26% of countries have reached the *frontier* level of maturity, offering valuable insights and models for other nations to emulate and enhance their digital finance capabilities. Although most countries fall within the *emerging* to *advanced* maturity levels, a notable 22% are still classified as *nascent*. The scores for this pillar exhibit considerable geographic variation, with a pronounced disparity between the highest and lowest scores (90 vs 34), underscoring the uneven development of Digital Finance across regions.

North America is the leader in this pillar with a significant edge over the next best region, Europe and Central Asia. These are followed by East Asia and Pacific, and Latin America and the Caribbean. South Asia, the Middle East and North Africa, and Sub-Saharan Africa show considerable room for improvement and exhibit a similar performance. Figure 9 analyzes the pillar by its components.

The development of financial systems emerges as a relatively lagging metric globally, characterized by pronounced disparities. While North America is positioned at the *frontier*, the least developed regions score at half or less of this benchmark, highlighting significant regional inequalities. In contrast, mobile payment systems demonstrate a higher level of global advancement, generally falling within the *transitioning* level or above.
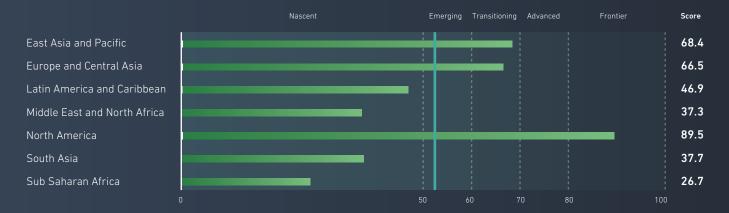
However, strong disparities persist, particularly in individuals' experiences with making digital payments. On the other hand, digital merchant payments exhibit greater consistency across regions, suggesting more widespread adoption of this aspect of digital finance. These findings point to both the progress and the challenges in achieving equitable financial system development worldwide.

Data included in the DEN demonstrates widespread use of online payments for goods and services (or digital merchant payments). Across all countries, around 70% of people surveyed had used online payments, with little regional differences. Even in less developed regions, such as Sub-Saharan Africa, 50% of respondents reported using such methods.
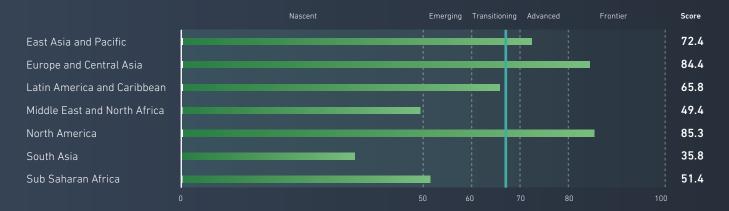
Access to digital banking and finance is an area with *advanced* maturity on average. Promisingly, geographic variation is moderate, pointing to this being an area of convergence globally. Within it, the rural-urban gap of digital merchant payments has a strong score and little variation, with all regions of the world classed as *advanced* or above.

General Financial System Maturity

	Nascent	Emerging	Transitioning	Advanced	Frontier	Score
East Asia and Pacific						**68.4**
Europe and Central Asia						**66.5**
Latin America and Caribbean						**46.9**
Middle East and North Africa						**37.3**
North America						**89.5**
South Asia						**37.7**
Sub Saharan Africa						**26.7**

0   50   60   70   80   100

Mobile Payments Systems

	Nascent	Emerging	Transitioning	Advanced	Frontier	Score
East Asia and Pacific						**72.4**
Europe and Central Asia						**84.4**
Latin America and Caribbean						**65.8**
Middle East and North Africa						**49.4**
North America						**85.3**
South Asia						**35.8**
Sub Saharan Africa						**51.4**

0   50   60   70   80   100

Access to Digital Banking and Finance

	Nascent	Emerging	Transitioning	Advanced	Frontier	Score
East Asia and Pacific						**74.2**
Europe and Central Asia						**86.9**
Latin America and Caribbean						**76.9**
Middle East and North Africa						**69.5**
North America						**84.8**
South Asia						**75.3**
Sub Saharan Africa						**73.1**

0   50   60   70   80   100

Figure 9. Performance across Digital Finance sub-pillars by region
(Scores 0-100 where 100 is the maximum)

━━ = DEN Average

DIGITAL ENABLERS
04: DIGITAL FINANCE

Access to online banking services is also strong, with similar characteristics. An area for improvement overall is the difference in digital payments made between the richest and the poorest, which is globally classed as *transitioning* and with high geographic variation—scores are particularly low in Sub-Saharan Africa, and Latin America and the Caribbean.

Recommendations for boosting Digital Finance

Continue to develop strong banking infrastructure and foundations.

This is a complex undertaking, as the financial sector comprises layers of institutions, markets, and regulations. Development of the financial system aims to reduce costs related to information and transactions, improving functions like investment allocation and risk management.

This enhancement supports economic growth, reduces poverty and inequality, aids SMEs, and boosts productivity. Regulation is vital, as ineffective policies can lead to severe consequences.[40] Developing countries can be supported by multilateral development banks in this process.[41]

Support digital financial inclusion for underserved populations.

Accelerators for digital platforms include investing in mobile broadband infrastructure, especially in remote areas. Moreover, expanding agent networks for cash transactions, advancing digital identification systems, promoting open application programming interfaces (APIs) for better software interaction, establishing legal and regulatory frameworks that support broad access to digital financial services and competitive ecosystems and improving access to government data platforms.[42] Designing inclusive digital payment systems requires addressing various risks to ensure they reach and benefit underserved groups, including women and those with low financial or technological capability. High user awareness and financial literacy are crucial, particularly for groups historically lacking access to education.[43]

40. https://www.worldbank.org/en/publication/gfdr/gfdr-2016/background/financial-development
41. https://www.brookings.edu/articles/bridging-the-great-finance-divide-in-developing-countries/
42. https://blogs.worldbank.org/en/voices/expanding-digital-financial-services-can-help-developing-economies-cope-crisis-now-and-boost-growth-later
43. https://www.csis.org/analysis/developing-inclusive-digital-payment-systems
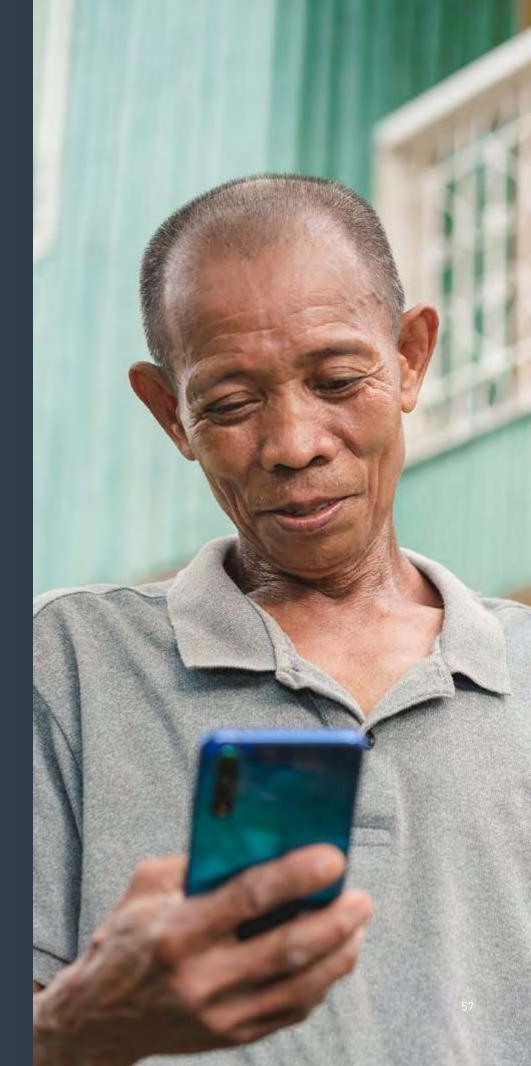
Country practice in focus: The Philippines' GCash mobile wallet

Innovation in financial digital platforms is global. GCash, a leading Philippine mobile wallet launched by Globe Telecom in 2004, had over 66 million users domestically (about 83% of the adult population) and processed Php 3 trillion ($54 billion) in transactions in just the first half of 2022. Its growth, boosted by regulatory support from the central bank and early digital adoption in 2012, accelerated during the COVID-19 pandemic. Offering e-commerce payments, insurance, and investments, GCash is a key player in financial inclusion and innovation, and has become an international reference.[44] [45]

44. *https://embiggengroup.com/insights/ven-ture-building-success-stories-gcash/*
45. *https://papers.ssrn.com/sol3/papers.cfm?ab-stract_id=4871527#*

DIGITAL BUSINESS
05: ICT CORE BUSINESS

This pillar shows emerging maturity worldwide, featuring a geographic concentration of technology producers.

To support global convergence in technology production, holistic programs should be put in place to support digital ecosystems, including infrastructure, financing, and education.

This pillar assesses the economic activity of producers of digital technologies and services, encompassing both hardware and software, along with telecommunications—a sector that is heavily dependent on these technologies.

These industries serve as the backbone of the internet economy, where competitive companies drive the growth and enhancement of digital platforms and a wide array of digital products and services. The activities of these industries are crucial to the overall economic strength of nations and the robustness of their digital economies.

This pillar specifically examines metrics related to the hardware and software industries, such as exports and imports, as well as the telecommunications industry, focusing on revenue and usage.

Technology producers are geographically concentrated, calling for a need to support technology ecosystems in less developed regions

With a global average score of 52 out of 100, countries included in the DEN can collectively be classed as *emerging* in this pillar. There is considerable variation across countries, and the gap between the top and bottom scores is significant (78 vs 14).

Furthermore, the top-scoring country only achieves *advanced* status and there are no *frontier* countries. The largest proportion of countries (44%) are classed as *nascent* and only 8% are *advanced*. The leading regions are North America, followed by East Asia and Pacific, and Europe and Central Asia, all classed as *transitioning*. All other regions are *nascent*.

The hardware industry component has the lowest scores in this pillar. Medium- and high-tech exports is a metric showing great geographic disparity, pointing to the concentration of technology production in specific hubs.

The three leading regions in this pillar also stand out here, with a large margin of superiority over the others. Latin America and the Caribbean is *nascent*, close to barely achieving *emerging* classification, driven by activity in Mexico.

The software industry also shows a great deal of geographic disparity. In terms of ICT service exports, South Asia exhibits strong leadership—34.5% of service exports are in ICT, against 17.7% in Europe and 5.7% in Sub-Saharan Africa.
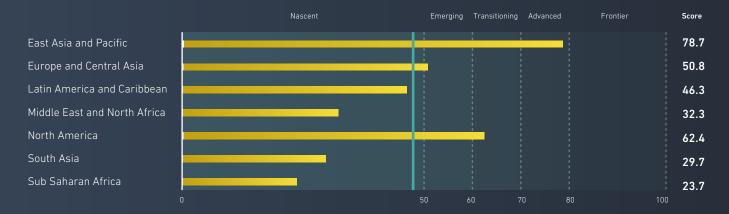
An encouraging sign of global convergence, the number of GitHub developers is slightly more consistent across regions. Here, only Sub-Saharan Africa is *nascent*, although it is very close to the *emerging* maturity level.

A similar situation of geographic disparity is seen for the telecommunications industry, as highlighted in Figure 10. Revenue from this industry is significantly higher in North America than in the other regions. Indicators on telecommunications usage also exhibit strong geographic disparities.
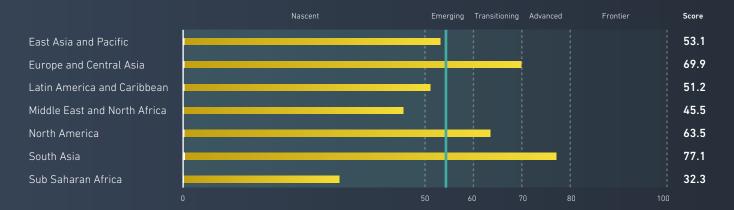
Mobile internet subscriptions are overall stronger across the board than fixed broadband, and they show more convergence. However, there are important gaps in South Asia. Sub-Saharan Africa, with low penetration of broadband subscriptions, compensates with a significantly higher maturity in mobile subscriptions.

Hardware

	Nascent		Emerging	Transitioning	Advanced		Frontier	Score
East Asia and Pacific								**78.7**
Europe and Central Asia								**50.8**
Latin America and Caribbean								**46.3**
Middle East and North Africa								**32.3**
North America								**62.4**
South Asia								**29.7**
Sub Saharan Africa								**23.7**

0   50   60   70   80   100

Software

	Nascent		Emerging	Transitioning	Advanced		Frontier	Score
East Asia and Pacific								**53.1**
Europe and Central Asia								**69.9**
Latin America and Caribbean								**51.2**
Middle East and North Africa								**45.5**
North America								**63.5**
South Asia								**77.1**
Sub Saharan Africa								**32.3**

0   50   60   70   80   100

Telecommunications

	Nascent		Emerging	Transitioning	Advanced		Frontier	Score
East Asia and Pacific								**60.8**
Europe and Central Asia								**60.4**
Latin America and Caribbean								**50.8**
Middle East and North Africa								**56.6**
North America								**72.0**
South Asia								**18.9**
Sub Saharan Africa								**33.4**

0   50   60   70   80   100

Figure 10. Performance across ICT Core Business sub-pillars by region
(Scores 0-100 where 100 is the maximum)

━━ = DEN Average

DIGITAL BUSINESS
05: ICT CORE BUSINESS

ICT industries—notably in low-income countries—rely on the foundations examined in pillar 1 on Digital Infrastructure (for example, strong data infrastructure and internet coverage).[46] Sub-Saharan Africa and South Asia stand out for less developed infrastructure than other regions analyzed by the DEN. Initiatives such as the World Bank's $25 billion Digital Moonshot Initiative—which seeks to connect every individual, business, and government in Africa by 2030, advancing the African Union's Digital Transformation Agenda and promoting local innovation—can support ICT business growth.[47]

Recommendations for boosting ICT Core Business

Supporting ICT sectors through holistic government strategies.

Holistic strategies may consider building smart cities, promoting digital literacy, and integrating ICT objectives into national development plans. Strengthening leadership and institutional capabilities in ICT national promotion, regulating privacy and cybersecurity, and supporting local industries are important measures too.[48]

Industry strategies should be supported with foundational aspects.

Foundational aspects include improving infrastructure, investing in STEM education, and increasing R&D expenditure. All these measures will enable countries and their industries to be competitive in the global scene. Financing limitations can be overcome through public-private partnerships, South-South cooperation, and blended finance.[49]

46. https://www.weforum.org/agenda/2022/01/least-developed-countries-ldc-technology
47. https://www.weforum.org/agenda/2020/09/here-are-4-technology-trends-from-emerging-economies
48. https://blogs.worldbank.org/en/digital-development/how-can-developing-countries-make-most-digital-revolution
49. https://blogs.worldbank.org/en/digital-development/how-can-developing-countries-make-most-digital-revolution

Country practice in focus: Rwanda's drive to boost its ICT sector

Rwanda has made notable strides in advancing its ICT sector. In 2021, the Rwanda Innovation Fund was launched through a public-private partnership between the government and Angaza Capital to support innovative companies addressing regional challenges.

In the same year, Swedish investment fund Norrsken Foundation opened its first hub outside Scandinavia in Kigali, aiming to host 1,000 entrepreneurs in its first year. The country's digital ambitions include satellite programs like Rwa-Sat-1 with Japan and plans for new constellations.[50]

In 2022, Rwanda launched the Centre for the Fourth Industrial Revolution with the World Economic Forum to enhance digital governance and innovation, working on data privacy legislation and AI policy.[51]

50. *https://www.itu.int/hub/2022/06/kigali-rwan-da-digital-development-milestones/*
51. *https://www.weforum.org/agenda/2022/03/rwanda-leveraging-the-fourth-industrial-revolution-to-strengthen-post-covid-resilience/*

DIGITAL BUSINESS
06: INDUSTRY DIGITAL TRANSFORMATION

There's still room for growth in this pillar with regard to Industry Digital Transformation, but some global convergence is visible in the widespread use of digital applications for everyday transactions.

Efforts for improvement should focus on expanding the availability of essential digital services in underserved regions and strengthening the conditions for e-commerce.

This pillar measures the extent to which traditional industries are being transformed by digital technologies and services.

This transformation represents a significant growth opportunity for many businesses, allowing them to diversify their offerings and reach new markets. Meanwhile, it represents huge improvements in efficiency for customers and supply chains. Specifically, the DEN examines indicators on digital platform use in sectors such as transportation, travel and leisure, health, education, finance, and professional services. It also evaluates indicators related to the activity of digital business services, namely domain registrations and e-commerce dynamism.

Global convergence is visible in the use of applications for everyday transactions, but there are still some gaps in essential services

With an average score of 57 (out of 100) the sample of 50 countries can be considered *emerging* in this pillar. This depicts a picture of progress in Industry Digital Transformation that is still consolidating worldwide. The largest proportion of countries are classed as *emerging* (40%), while 20% are *nascent*. There are still no *frontier* countries. Geographic variation is not as high as in other pillars but there is still a considerable gap between the top and the bottom country scores (75 vs. 35).

North America is the only region classed as *advanced*. It is followed by Europe and Central Asia, reaching *transitioning* maturity. Sub-Saharan Africa and South Asia are *nascent*, the other regions are classified as *emerging*.

Indicators measuring digital platform use show a robust performance, with overall *transitioning* maturity. Furthermore, there are signs of global convergence, as score variation is relatively moderate (see Figure 11). No region is classed as either *frontier* or *nascent*. Among the different digital applications considered, the most frequently used platforms are those for financial services, followed by travel and leisure. Healthcare is the least used type.
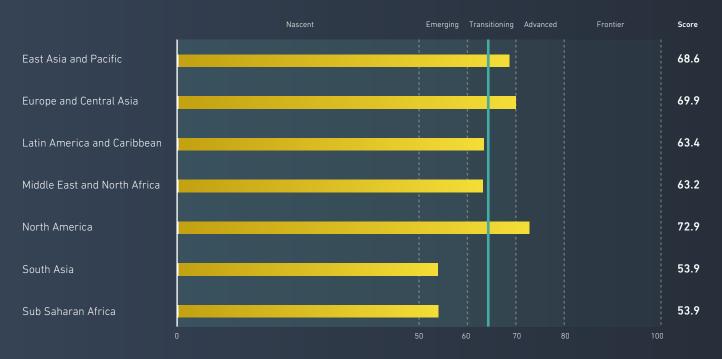
From a regional perspective, Sub-Saharan Africa, Latin America and the Caribbean, and South Asia could benefit from a boost to digital education and health services. Digital solutions can help bypass traditional barriers to accessing essential services. They are vital for billions of people in developing settings by offering access to education, health services, and economic opportunities. The applications in areas like education are numerous. In Nigeria, for example, the World Bank has tested digital literacy apps on smartphones that have had a positive impact in school attendance and learning outcomes.[52]

Digital business services metrics attain a weaker performance overall. Domain registrations in particular achieve *nascent* maturity across most regions except for North America and Europe and Central Asia. E-commerce participation shows some convergence, with South Asia and East Asia and Pacific even surpassing North America and Europe and Central Asia. Considering the scope of e-commerce purchases, Latin America and the Caribbean and the Middle East and North Africa also show considerable progress, with the second and third strongest regional scores. These are positive findings, as e-commerce can bridge market gaps and create jobs. It can also reduce inequality by connecting rural areas with the conveniences and low prices enjoyed in cities. For example, China's success in using e-commerce to boost incomes and welfare, particularly in rural areas, demonstrates its potential for similar impacts in developing countries.[53]

52. https://blogs.worldbank.org/en/digital-development/mobile-based-solutions-can-strengthen-human-capital-gains-disrupted-covid-19
53. https://www.worldbank.org/en/news/press-release/2019/11/23/e-commerce-can-boost-job-creation-and-inclusive-growth-in-developing-countries

Digital Platforms Use

	Nascent		Emerging	Transitioning	Advanced		Frontier	Score

Region	Score
East Asia and Pacific	**68.6**
Europe and Central Asia	**69.9**
Latin America and Caribbean	**63.4**
Middle East and North Africa	**63.2**
North America	**72.9**
South Asia	**53.9**
Sub Saharan Africa	**53.9**

0   50   60   70   80   100

Digital Business Services

Region	Score
East Asia and Pacific	**48.9**
Europe and Central Asia	**58.0**
Latin America and Caribbean	**43.7**
Middle East and North Africa	**40.3**
North America	**71.1**
South Asia	**45.3**
Sub Saharan Africa	**38.9**

0   50   60   70   80   100

Figure 11. Performance across Industry Digital Transformation sub-pillars by region
(Scores 0-100 where 100 is the maximum)

━━ = DEN Average

DIGITAL BUSINESS
06: INDUSTRY DIGITAL TRANSFORMATION

Recommendations for boosting Industry Digital Transformation

Boost digital solutions for essential industries in underserved regions.

Governments should consider both the availability of digital solutions (supply) and the awareness and uptake by the local population (demand). To boost supply, energy, and connectivity, infrastructure should be enhanced so these tools can reach all corners of the country. To boost demand, apps should include local content, while awareness of their existence and benefits should be promoted through campaigns.[54]
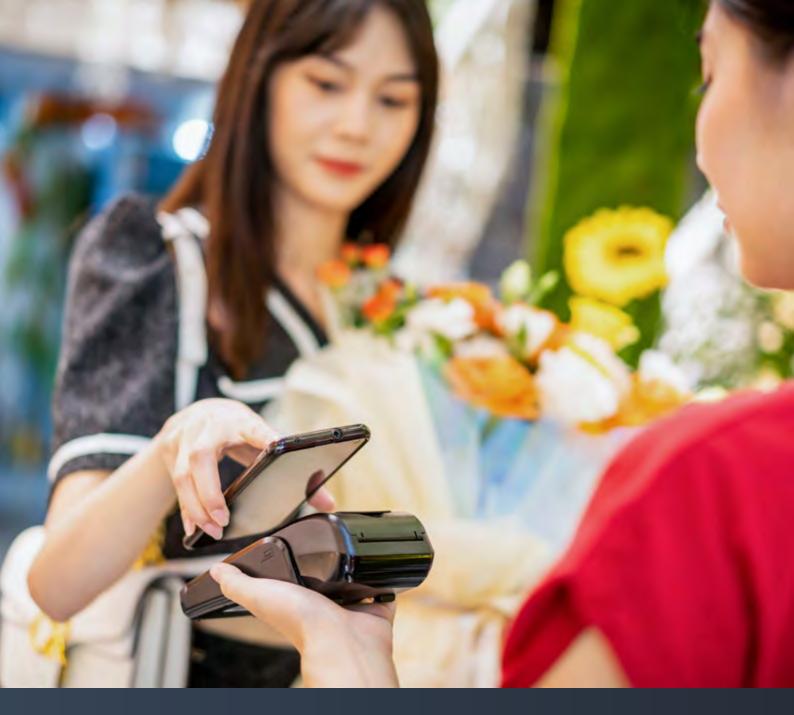
Develop the conditions for e-commerce worldwide.

Measures include updating policies to improve payment systems and internet access, expanding connectivity, upgrading logistics, and enhancing e-payment systems to support cross-border transactions. Additionally, managing data effectively by adopting best practices, increasing foreign direct investment (FDI) in tech, coaching small businesses for digitalization and investment readiness, and fostering public-private partnerships can also support e-commerce growth.[55] Other factors include investing in education and skills to improve human capital and upgrading infrastructure.[56]

54. https://blogs.worldbank.org/en/digital-development/mobile-based-solutions-can-strengthen-human-capital-gains-disrupted-covid-19
55. https://www.weforum.org/agenda/2019/09/8-ways-to-help-african-e-commerce-fulfil-its-potential/
56. https://www.worldbank.org/en/news/press-release/2019/11/23/e-commerce-can-boost-job-creation-and-inclusive-growth-in-developing-countries

Country practice in focus: China's successful WeChat

China's WeChat, one of the world's most successful apps with 889 million monthly active users, has disrupted multiple industries and serves as a global inspiration.

It integrates messaging, social networking, and payments into a single platform. Key features include text, voice, and video messaging, Moments for sharing updates and photos, Official Accounts for businesses and celebrities, WeChat Pay for transactions and bill payments, and Mini Programs for accessing services without leaving the app. WeChat has set a benchmark for multifunctional apps.[57]

57. https://www.ycombinator.com/library/3t-how-wechat-grew-to-be-the-1-app-in-the-world

DIGITAL BUSINESS
07: DIGITAL INNOVATION

A nascent maturity pillar, it shows the emergence of startup ecosystems around the world, but there is geographic concentration of the most advanced knowledge.

Efforts for improvement should focus on creating favorable environments for innovation to flourish in regions with historic lags.

This pillar evaluates how effectively a country leverages technology to drive the development of new products, services, and business models.

In today's rapidly evolving digital economy, innovation is not only a competitive advantage but also a necessity for survival and growth. Businesses that fail to adapt risk being overtaken by more digitally advanced competitors.

This pillar is divided into two key components: the startup ecosystem and *frontier* research. The startup ecosystem reflects the vibrancy of the entrepreneurial environment, marked by the number and growth rate of startups and the availability of financing options.

Frontier research assesses the country's commitment to pushing technological and scientific boundaries, measured by patents, scientific publications, and computing resources.

There is an emergence of dynamic startup ecosystems around the world, but there is a concentration of frontier research geographically

With a global average score of 49 out of 100, the aggregate of countries included in the DEN can be considered *nascent*. These results, nevertheless, mask strong geographic disparities, with 60% of countries in the sample classed as *nascent* and 16% as *transitioning*. Encouragingly, 8% of countries are *frontier*, with an equal proportion of *advanced*.

From a regional perspective it is possible to infer a concentration of innovation in certain hubs. North America is the leader in this pillar (*advanced*), followed by Europe and Central Asia, and East Asia and Pacific (*transitioning* and *emerging*, respectively). All other regions are classed as *nascent* (see Figure 12).

The digital startup environment is *emerging* across the board, with moderate geographic disparities. Here, except for the three leading regions, all others are classed as *nascent*. Among these, the most developed one is the Middle East and North Africa.

Its score is near the *emerging* maturity level and it is making significant strides, suggesting a dynamic shift in the global startup landscape.

The Middle East and North Africa is witnessing progress in the growth of innovative companies and venture capital (VC) availability. The region saw record VC investments of $4.8 billion in 2022, driven by local conditions, a growing entrepreneurial ecosystem, and opportunities in fintech and telemedicine.[58] Based on data included in the DEN, Saudi Arabia is a key player, regionally and globally. Among the 50 countries assessed, it had the third highest growth of innovative companies and the second highest VC availability.

Digital research and development (R&D) is *nascent* across the board, and geographic disparities are strong. Except for the three leading regions (North America, Europe and Central Asia, and East Asia and Pacific), others show signs of very *nascent* research environments. There are, however, some positive stories. The metric for journal publications in the field of computer science shows progress in South Asia, the Middle East and North Africa, and, to some extent, in Latin America and the Caribbean—a sign of global convergence (all above the *nascent* maturity level). Despite these advances, patent applications and computing resources are still predominantly concentrated in the three *frontier* regions.

Digital Startup Environment

	Nascent		Emerging	Transitioning	Advanced		Frontier	Score
East Asia and Pacific								**55.6**
Europe and Central Asia								**61.2**
Latin America and Caribbean								**42.4**
Middle East and North Africa								**48.4**
North America								**70.7**
South Asia								**33.0**
Sub Saharan Africa								**42.3**

0　　　　　　　　　　　50　　60　　70　　80　　　　100

Digital Research & Development

	Nascent		Emerging	Transitioning	Advanced		Frontier	Score
East Asia and Pacific								**51.3**
Europe and Central Asia								**71.7**
Latin America and Caribbean								**25.7**
Middle East and North Africa								**28.3**
North America								**76.0**
South Asia								**27.2**
Sub Saharan Africa								**19.5**

0　　　　　　　　　　　50　　60　　70　　80　　　　100

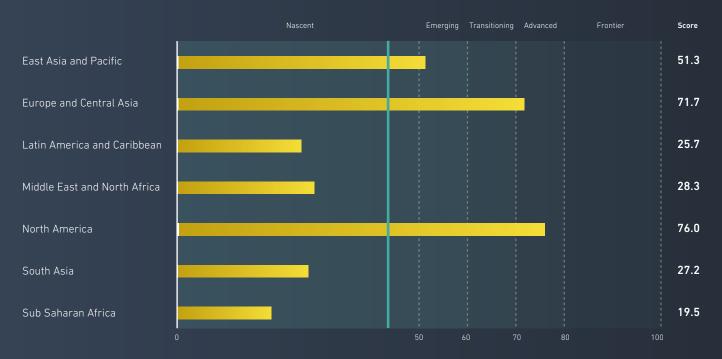Figure 12. Performance across Digital Innovation sub-pillars by region
(Scores 0-100 where 100 is the maximum)

━━ = DEN Average

DIGITAL BUSINESS
07: DIGITAL INNOVATION

A UN report revealed that while a few low- and lower-middle-income countries excel in adopting frontier technologies like AI and 5G, most are falling behind.

India and the Philippines stood out for their strong industry presence and skilled workforce. India performs well in R&D due to its abundant, skilled population and large local market, which attracts multinational investment.

The Philippines also excels in this industry due to significant FDI in high-tech manufacturing, strong supply chains, pro-business policies, and a skilled English-speaking workforce.[59]

Based on data included in the DEN, India also outperforms in journal publications in the field of computer science (classed as *advanced* in this metric).

Recommendations for boosting Digital Innovation

Stimulate the growth of startup and knowledge ecosystems.

Governments can promote VC inflows with measures such as favorable tax treatments. They can also implement regulatory sandboxes—controlled environments where companies can test new products or business models under regulatory supervision. The public sector is often an important driver of business, and it can stimulate local innovation by hiring local tech suppliers to support their operations.[60] Lastly, science, technology, and innovation objectives should be integrated into national plans and industrial strategies.[61]

Supporting the emergence of intelligent technologies in low- and lower-middle-income countries.

It is clear that AI is becoming crucial for economic strength worldwide, yet the AI value chain is concentrated in a few nations, raising equity issues. Developing countries should consider effective national AI strategies. These should align with the country's priorities, address demographic challenges, and invest in key industries. They must also include SMART[62] objectives, promote collaboration among academia, industry, and government, and emphasize international cooperation for equitable progress.[63] Other key considerations include building robust digital infrastructure, investing in skills development from basic literacy to advanced research, and exploring sector-specific advantages such as ICT outsourcing, tourism, and AI-enhanced customized services.[64]

59. https://unctad.org/press-material/few-developing-countries-overperform-frontier-technologies-most-lag-behind-un-report
60. https://development.asia/insight/why-singapores-ecosystem-technology-startups-among-best
61. https://unctad.org/press-material/few-developing-countries-overperform-frontier-technologies-most-lag-behind-un-report
62. SMART stands for Specific, Measurable, Achievable, Relevant, and Time-Bound
63. https://www.weforum.org/agenda/2022/12/how-countries-can-build-an-effective-ai-strategy/
64. https://blogs.worldbank.org/en/digital-development/tipping-the-scales--ai-s-dual-impact-on-developing-nations
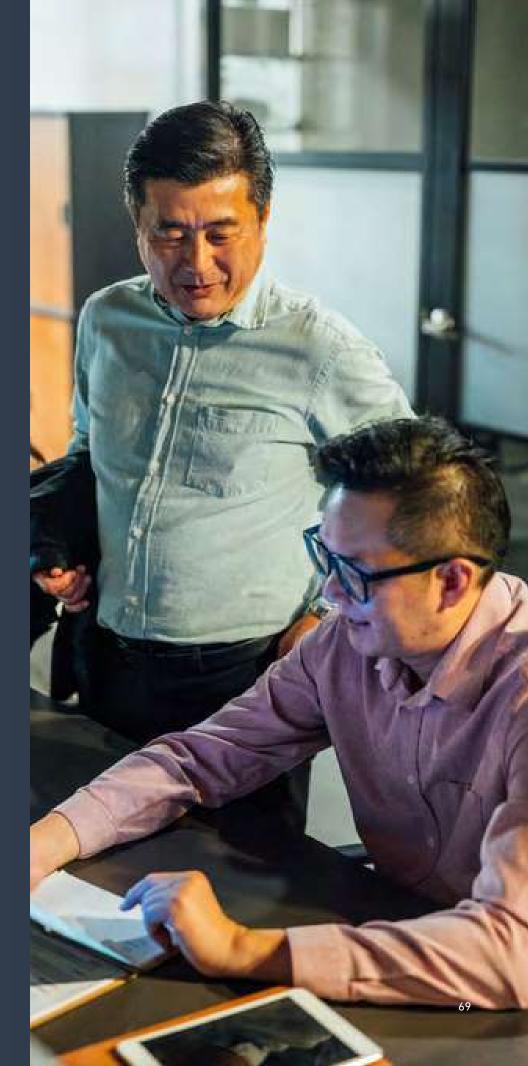
Country practice in focus: Singapore's factors for startup dynamism

Singapore's vibrant startup ecosystem thrives due to strong government support, favorable regulations, low taxes, and a high-quality education system. Government grants and co-investment models boost venture capital, while programs like the Licensing Experimentation and Adaptation Programme foster innovation in sectors such as telemedicine. Robust infrastructure, global market access, and high demand for technology solutions drive growth. Research centers and sector-specific incubators, such as EduSpaze and SPEAR, provide critical support. The presence of large foreign companies and numerous technology events further enhance Singapore's reputation as a top hub for startups.[65]

65. https://development.asia/insight/why-sin-gapores-ecosystem-technology-start-ups-among-best

DIGITAL SOCIETY
08: DIGITAL FOR HEALTH AND EDUCATION

There are signs of global convergence in this pillar in the adoption of Digital for Health and Education tools, with innovation emerging in all regions.

Facing infrastructure limitations, developing countries should aim to leverage digital technology to advance health and education. The global pandemic was a driver for innovative tools, but some gaps remain, including gender disparities.

This pillar assesses the impact of digital technologies in health and education services, focusing on their role in empowering citizens and enhancing individual well-being.

The COVID-19 pandemic underscored the critical need for universal digital access to ensure the reliable delivery of essential services. In underserved areas, where traditional infrastructure may be lacking, digital solutions can bridge gaps and extend reach. The DEN evaluates several key factors, including regulatory and policy frameworks, access and participation levels, and gender disparities in digital health and education.

Global convergence is seen in the adoption of Digital for Health and Education tools, but gender disparities remain

With an average score of 76 out of 100, countries covered by the DEN are in the *advanced* level. This pillar demonstrates substantial global maturity, with moderate variability in scores indicating a trend toward global convergence. The lowest country score in the sample (51) reflects that there is ongoing progress even in the least mature countries. With 36% of countries classed as *frontier* and 38% as *advanced*, there are many experiences and best practices for other countries to learn from. Encouragingly, there are no countries classed as *nascent*. North America is classed as *frontier* and all other regions are *advanced*, making this one of the pillars of the DEN showing the greatest convergence across regions.

The digital for health component attains a *frontier* maturity globally, although there is some geographic variability. The Middle East and North Africa, as well as Sub-Saharan Africa display some areas with potential for improvement, notably advancing a digital health framework for data protection, privacy, confidentiality and device compliance. Globally, indicators in this pillar point to robust progress in areas such as access to digital health and in closing gender gaps in digital health access. Based on survey data from the DEN, across the 50 countries examined, 80% of individuals on

average had participated in a remote interaction with a doctor in the last 12 months, with little regional variation.
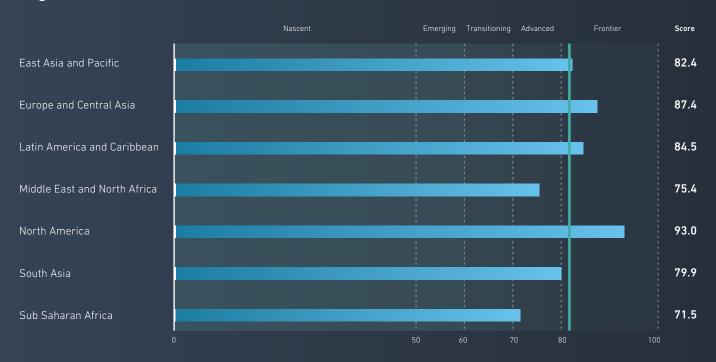
The COVID-19 pandemic accelerated the use of digital health tools in developing countries, addressing challenges like disease surveillance, contact tracing, and telemedicine. Emerging health tools have also supported chronic disease management, therapeutic adherence, and boosted healthcare system resilience. Examples include CommCare (Burkina Faso), SORMAS, mDoc (Nigeria), Turn.io (South Africa), SmartHealth (Uganda), CarePay and Project ECHO (Kenya), Babyl and WelTel (Rwanda), DHIS2 (Sri Lanka), and NCOVI and Bluezone (Vietnam).[66] Education shows less progress overall compared with the health sector, with the aggregate of countries classed as *advanced*, with moderate geographic disparity. Here, the regions with the most catching up to do are the Middle East and North Africa, and Latin America and the Caribbean. Both regions could focus their efforts on closing gender gaps in access to digital education, as highlighted by Figure 13.

As a leading global voice in education, UNESCO views digital innovation as vital for upholding education as a human right, especially during crises like COVID-19. The organization makes an emphasis on integrating technology with human resources and on addressing gender disparities. The UNESCO-Huawei Technology Enabled Open Schools for All, for example, introduces girls to technology, provides ICT and AI training, and supports their educational advancement to enhance female representation in these fields.[67]

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66. https://www.mckinsey.com/industries/healthcare/our-insights/unlocking-digital-healthcare-in-lower-and-middle-income-countries
67. https://www.unesco.org/en/digital-education/need-know?hub=84636

Digital for Health

	Nascent			Emerging	Transitioning	Advanced		Frontier		**Score**
East Asia and Pacific										**82.4**
Europe and Central Asia										**87.4**
Latin America and Caribbean										**84.5**
Middle East and North Africa										**75.4**
North America										**93.0**
South Asia										**79.9**
Sub Saharan Africa										**71.5**

0   50   60   70   80   100

Digital for Education

	Nascent			Emerging	Transitioning	Advanced		Frontier		**Score**
East Asia and Pacific										**72.8**
Europe and Central Asia										**71.9**
Latin America and Caribbean										**65.5**
Middle East and North Africa										**65.4**
North America										**72.4**
South Asia										**74.7**
Sub Saharan Africa										**71.4**

0   50   60   70   80   100

Figure 13. Performance across Digital for Health and Education sub-pillars by region
(Scores 0-100 where 100 is the maximum)

━━━ = DEN Average

DIGITAL SOCIETY
08: DIGITAL FOR HEALTH AND EDUCATION

Recommendations for boosting Digital for Health and Education

Support digital health solutions in underserved regions.

Governments should develop digital health strategies that consider several essential factors. Partnerships should be pursued with a wide range of stakeholders to ensure scale and reach: this includes collaborating with private health providers and community organizations. Technologies should be adaptable so that existing systems can be leveraged and updates to local needs made efficiently. User-centered design is crucial to ensure that populations properly benefit from these tools and thus adopt them.[68]

Deploying digital education tools to close divides.

The World Bank advocates five key principles for deploying digital education tools. First, clarify the purpose by ensuring technology addresses specific educational challenges and aligns with a clear vision. Second, design solutions for scalability, making them flexible, user-centered, and equitable. Third, empower teachers by ensuring technology enhances rather than replaces their role. Fourth, engage the entire ecosystem by involving all stakeholders to integrate and sustain EdTech solutions. Finally, adopt a data-driven approach, using transparent standards and interoperable data systems to support informed decision-making.[69]

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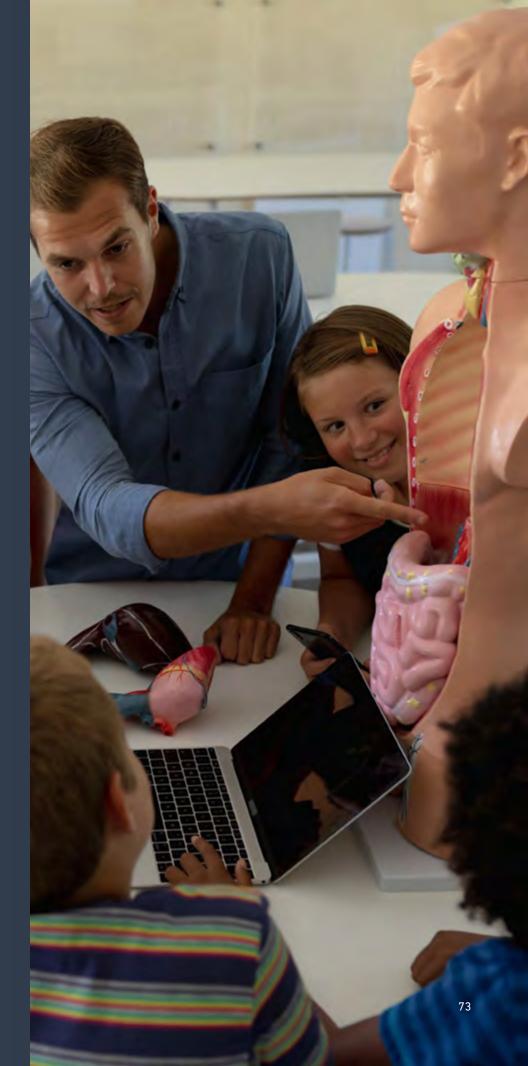
68. https://www.mckinsey.com/industries/healthcare/our-insights/unlocking-digital-healthcare-in-lower-and-middle-income-countries#/
69. https://www.worldbank.org/en/topic/edutech#2

Country practice in focus: Türkiye's digital training platform for teachers

Türkiye's Digital Ecosystem for Teacher Training aims to enhance digital skills among teachers, benefiting 18 million students.

Funded by the EU and implemented by UNICEF with the Ministry of National Education, the project will initially train 200,000 educators in eight provinces, expanding to one million nationwide. Running until 2026, the project offers an online platform with 120 hours of digital skills training. This initiative prepares students for a digital economy, addressing the need for new jobs driven by digital technologies and improving education quality.[70]

70. https://www.unicef.org/turkiye/en/press-re-
    leases/new-initiative-help-ensure-chil-
    dren-learn-digital-skills-modern-workforce

DIGITAL SOCIETY
09: DIGITAL FOR WORK AND TRAINING

Around the world, there are signs of convergence in adoption of digital tools for work and training, with strengths in developing economies.

Focus for improvement in this area should be placed on establishing conditions to protect gig economy workers and promote flexible work arrangements.

Digital technologies have transformed the way we work and learn.

They have enabled remote work, enhanced collaboration, and streamlined job searching and matching. Additionally, they have laid the foundation for the gig economy, offering populations access to new opportunities. Digital tools have also introduced flexible learning options, with e-learning platforms make upskilling and reskilling more accessible. This pillar examines how these technologies empower the workforce, reshape workplaces, and create new income opportunities. It focuses on metrics related to digitally enabled access to opportunities (employment, training, and related gender gaps) and the adoption of digital workplace tools (workplace digitalization, work flexibility, and their gender disparities).

There is global convergence on the adoption of digital tools, but measures to protect workers should be promoted.

An average score of 69 (out of 100) in this pillar means that, collectively, the countries examined in the DEN can be classed as *transitioning*, demonstrating considerable progress, but there are some gaps to fill. Most countries in the sample achieve *transitioning* or *advanced* maturity (40% in each group). Positively, only 2% are in the *nascent* level, while 6% can be considered as *frontier*. Indicating global convergence, score variability across countries is one of the lowest across all pillars (measured by standard deviation). Indeed, all regions achieve *transitioning* or *advanced* maturity levels.

Unlike other areas of the study, performance is strongest in regions with a high concentration of low- and lower-middle-income economies, as portrayed in Figure 14. South Asia attains the highest average score, followed by the Middle East and North Africa and Latin America and the Caribbean. Europe and Central Asia, a leading region in other pillars, shows the most room for growth.
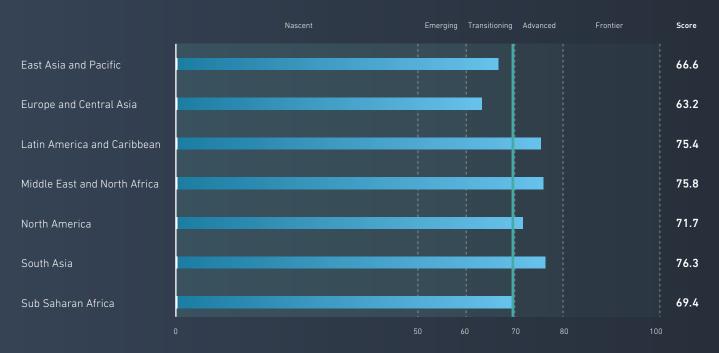
The digitally enabled access to opportunities component shows strong maturity across the world. Indeed, 50% of respondents have accessed study courses through digital technologies. South Asia, the Middle East and North Africa, and Latin America and the Caribbean stand out as *advanced*.

Globally, there are strong signs of progress in closing gender gaps in digitally enabled access to employment. In contrast, the impact of the online gig economy on working conditions is an area with potential for improvement across the board. It achieves *emerging* maturity globally, with little geographic variability.

The gig economy, accounting for up to 12% of the global labor market, offers a potential path out of poverty and greater participation for women and youth in developing countries. A World Bank report notes that while developed countries dominate gig worker demand, developing countries, such as those in Sub-Saharan Africa, are seeing faster growth, with a 130% increase in job postings compared with 14% in North America in 2016-20.[71] Based on data included in the DEN, developing regions such as South Asia and Sub-Saharan Africa also face the most challenges regarding the perceived negative impact of the gig economy on working conditions.

Continued on page 80.

71. https://www.worldbank.org/en/news/press-release/2023/09/07/demand-for-online-gig-work-rapidly-rising-in-developing-countries

Digitally-enabled Access to Opportunities

	Nascent	Emerging	Transitioning	Advanced	Frontier	Score
East Asia and Pacific						**66.6**
Europe and Central Asia						**63.2**
Latin America and Caribbean						**75.4**
Middle East and North Africa						**75.8**
North America						**71.7**
South Asia						**76.3**
Sub Saharan Africa						**69.4**

0   50   60   70   80   100

Digital Workplace

	Nascent	Emerging	Transitioning	Advanced	Frontier	Score
East Asia and Pacific						**68.1**
Europe and Central Asia						**62.4**
Latin America and Caribbean						**68.2**
Middle East and North Africa						**74.7**
North America						**69.1**
South Asia						**76.1**
Sub Saharan Africa						**66.4**

0   50   60   70   80   100

Figure 14. Performance across Digital for Work and Training sub-pillars by region
(Scores 0-100 where 100 is the maximum)

━━ = DEN Average
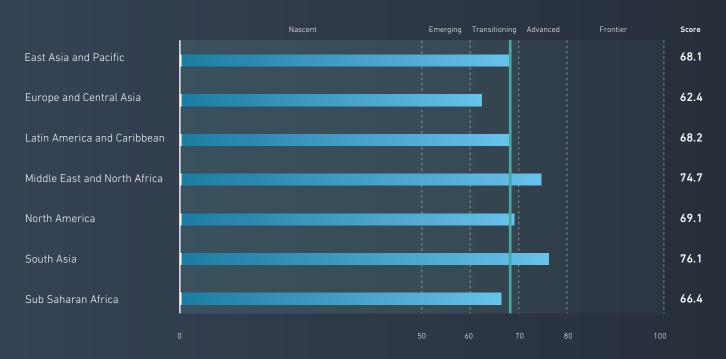
DIGITAL SOCIETY
09: DIGITAL FOR WORK AND TRAINING

The digital workplace component similarly shows consistent maturity across the countries examined, with South Asia, and the Middle East and North Africa taking the lead. Digital training at work achieves *advanced* maturity globally, with Latin America and the Caribbean, and South Asia showing remarkable strength. Flexibility of working arrangements shows room for improvement across countries, however. On average, the sample of countries attains *emerging* maturity status, with moderate variability. But, in particular, Latin America, Sub-Saharan Africa, and South Asia show room for improvement.

A 2021 review measured the potential for remote work in developing countries, finding that less than 10% of urban jobs could be done from home. The study revealed significant disparities, with low-wage, self-employed workers, and those with less education having the least ability to work remotely.[72] In emerging economies, most employment is concentrated in manual and physical jobs within agriculture and manufacturing. For instance, only 12% of the workforce in India can work remotely effectively due to the dominance of sectors like retail services and agriculture, despite its reputation for high-tech and financial services.[73] Data included in the DEN highlights that the flexibility of working arrangements has room for improvement, especially in Latin America and the Caribbean and Sub-Saharan Africa.

Recommendations for boosting Digital for Work and Training

Improving conditions for gig economy workers.

Social protection for gig workers is essential, as many lack benefits and face unstable incomes. Innovative solutions, such as matching contributions to retirement savings and new forms of collective bargaining, aim to support gig workers. To reap the benefits of online gig work, it is also crucial to close remaining digital divides, providing internet access to those still offline and building digital skills.[74]

Reviewing working arrangements to promote well-being.

Governments should consider national policies on flexible work, and the "right to be disconnected", which have been reported to improve well-being when using digital technology at work

72. https://cepr.org/voxeu/columns/working-home-developing-countries
73. https://www.mckinsey.com/featured-insights/future-of-work/whats-next-for-remote-work-an-analysis-of-2000-tasks-800-jobs-and-nine-countries
74. https://blogs.worldbank.org/en/voices/promise-and-peril-online-gig-work-developing-countries

Country practice in focus: Nigeria's Jumia supporting gig workers

Launched in 2012 in Nigeria,[75] Jumia, Africa's largest e-commerce platform, operates in 16 countries.

To overcome low online retail penetration, Jumia created J-Force, a network of 10,000 commission-based sales agents in Nigeria who assist offline customers with e-commerce.

Jumia supports these agents with training in customer service and e-commerce, offers opportunities for advancement, and provides competitive earnings of $100-300 per month.

Additionally, agents can improve their income through roles in Jumia Food and receive continuous support and professional development.[76]

75. https://www.jumia.com.ng/fragment/contents/sp-about_us/?lang=en#anchistory
76. https://www.bii.co.uk/en/labour-standards/can-the-gig-economy-help-to-create-jobs-in-africa/

DIGITAL SOCIETY
10: DIGITAL FOR SOCIAL INCLUSION

This pillar shows consistent levels of social engagement across all regions of the world.

Focus for improvement should be placed on closing gender and disability gaps, as well as supporting dynamic online civil societies.

This pillar highlights how digital technologies are transforming civic life by democratizing information access, fostering dialogue, and creating economic and social opportunities, thus promoting a fair and participatory environment.

However, it is crucial to focus on reaching traditionally underserved groups to prevent them from being left behind in the digital world. This pillar examines metrics on internet access, digital inclusion (urban-rural, gender, and disability gaps), and social connectivity and civic engagement (usage for social connections and civil society).

An average global score of 70 (out of 100) points to significant progress in this pillar, with the aggregate of countries classed as *advanced*.

Consistent levels of digital social engagement across all regions of the world.

Measured by standard deviation, score variability is moderate compared with other pillars—20% of countries have achieved *frontier* maturity and 40% are *advanced*, while only 6% are *nascent*.

Europe and Central Asia, North America, Latin America and the Caribbean, and East Asia and Pacific are all classed as *advanced*. They are followed by the Middle East and North Africa (*transitioning*) and Sub-Saharan Africa (*emerging*). South Asia, the only *nascent* region, shows room for improvement.

The digital inclusion component shows robust progress around the world, although with some geographic disparities (see Figure 15). There are still notable rural-urban gaps in basic ICT skills to overcome in regions like South Asia and the Middle East and North Africa. Gender gaps in internet usage are particularly pronounced in South Asia and Sub-Saharan Africa. Barriers for disabled people have room for improvement in Latin America and the Caribbean, the Middle East and North Africa, and Sub-Saharan Africa (in the two latter regions the absence of web accessibility laws is an area that deserves increased attention). A positive story is a robust performance across all regions in the gender gap of basic ICT skills.

International partnerships can help raise visibility on digital inclusion and drive action. The World Economic Forum's EDISON Alliance aims to boost digital inclusion for 1 billion people by 2025, focusing on healthcare, finance, and education. By January 2024, the alliance had reached 784 million people, with notable success in South Asia and Africa, and continues to advance inclusion through partnerships and regional networks.[77]
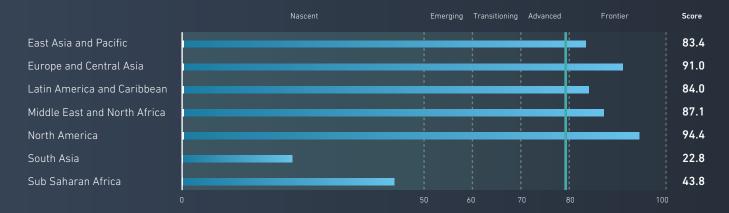
Digital social connectivity and civic engagement is strong across countries (nearly *advanced* maturity on average), with modest score variability, pointing to global convergence. In fact, four of the seven regions are *advanced*. Across all regions there is a strong usage of the internet to connect with family and friends and gender differences in this regard are limited. However, civil societal participation is an area for improvement across countries. Although all regions are above the *nascent* maturity level, there are areas with growth potential in the Middle East and North Africa, Sub-Saharan Africa, and South Asia (more than in the other regions).

Japan and Singapore showcase innovative people-centric digital strategies. Japan's Society 5.0 focuses on a human-centered approach, enhancing safety, well-being, and digital inclusion through user-friendly tech, subsidized devices, and digital literacy programs. Singapore's REACH (Reaching Everyone for Active Citizenry@Home) employs both digital and traditional methods to gather public feedback, ensuring policies align with people's needs.[78]
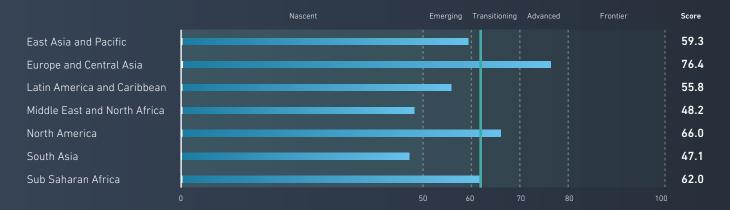
77. *https://www.weforum.org/impact/digital-inclusion/*
78. *https://www.undp.org/policy-centre/singapore/publications/access-empowerment-digital-inclusion-dynamic-world*

Internet Access

	Nascent		Emerging	Transitioning	Advanced	Frontier	Score
East Asia and Pacific							**83.4**
Europe and Central Asia							**91.0**
Latin America and Caribbean							**84.0**
Middle East and North Africa							**87.1**
North America							**94.4**
South Asia							**22.8**
Sub Saharan Africa							**43.8**

0 · 50 · 60 · 70 · 80 · 100

Digital Inclusion

	Nascent		Emerging	Transitioning	Advanced	Frontier	Score
East Asia and Pacific							**59.3**
Europe and Central Asia							**76.4**
Latin America and Caribbean							**55.8**
Middle East and North Africa							**48.2**
North America							**66.0**
South Asia							**47.1**
Sub Saharan Africa							**62.0**

0 · 50 · 60 · 70 · 80 · 100

Digital Society Connectivity & Civic Engagement

	Nascent		Emerging	Transitioning	Advanced	Frontier	Score
East Asia and Pacific							**70.0**
Europe and Central Asia							**65.5**
Latin America and Caribbean							**76.2**
Middle East and North Africa							**66.8**
North America							**65.3**
South Asia							**75.6**
Sub Saharan Africa							**73.8**

0 · 50 · 60 · 70 · 80 · 100

Figure 15. Performance across Digital for Social Inclusion sub-pillars by region
(Scores 0-100 where 100 is the maximum)

▬ = DEN Average

DIGITAL SOCIETY
10: DIGITAL FOR SOCIAL INCLUSION

Recommendations for boosting Digital for Social Inclusion

Fostering digital inclusion to close remaining gaps.

Ensuring access to affordable hardware, connectivity, and quality learning opportunities is crucial for digital inclusion. Digital technologies should enhance public policy participation and civic engagement while building trust and maintaining information integrity. Strategies must be tailored to the socio-cultural contexts of communities for maximum effectiveness.[79] Governments should focus on investing for improved connectivity and building trust through strong data protection.[80]

Supporting a dynamic digital civil society.

Collaboration among public, private, and community stakeholders is key to ensuring information integrity, which helps to create trust and widespread usage of digital technologies by all. Promoting open data platforms fosters transparency and innovation. Individuals should be encouraged to share their experiences, and community leaders recognized. Businesses must develop inclusive products, invest in underserved areas, and adopt responsible practices. Supporting civil society organizations in implementing targeted, locally informed interventions should also be considered.[81]
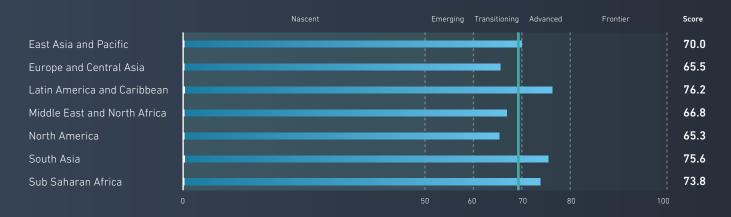
79. https://www.undp.org/policy-centre/singapore/publications/access-empowerment-digital-inclusion-dynamic-world
80. https://blogs.worldbank.org/en/voices/digital-inclusion-unlocks-more-resilient-recovery-all
81. https://www.undp.org/policy-centre/singapore/publications/access-empowerment-digital-inclusion-dynamic-world

Country practice in focus: Chile's drive to close rural gaps

Managed by the Undersecretary of Telecommunications, Chile's Telecommunications Development Fund reduces the urban-rural digital divide by subsidizing deployment costs and incentivizing infrastructure expansion in remote areas.

Since 2010, the "All Chile Connected" initiative has provided 3G/4G access to over 2,000 underserved communities, enhancing mobile internet coverage and bridging the digital gap.[82]

82. https://www.undp.org/policy-centre/singapore/publications/access-empowerment-digital-inclusion-dynamic-world

DIGITAL FOR SUSTAINABILITY
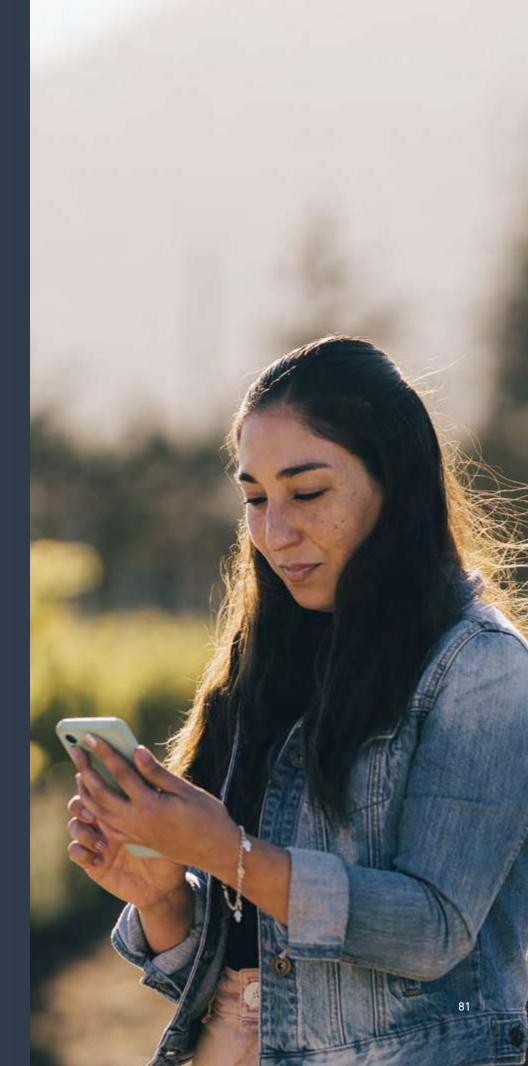
In future editions of the DEN, we hope to include an additional pillar: Digital for Sustainability.

This pillar would examine a country's adoption of innovative digital practices that promote environmental and ecological sustainability.

It was not possible to include Digital for Sustainability in this inaugural edition due to the lack of data. However, what we could find points to a remarkable performance among low- and lower-middle-income economies. Their online population excels in using digital solutions to reduce their ecological footprint—for example, using apps to carpool, buy public transport tickets, and measure electricity usage. These countries also generate significantly lower amounts of e-waste per capita compared with their higher income counterparts.

These promising results emphasize that countries across the income spectrum can be committed to environmental stewardship and play a pivotal role in fostering a more sustainable digital future.

Digital for Sustainability will be an exciting avenue for future research as more data become available. As people spend more time digitally connected, countries should focus on accelerating the adoption of digital sustainability practices to ensure a more sustainable future for all.

04

CONCLUSION AND RECOMMENDATIONS

CONCLUSION

The DEN report is a comprehensive exploration of global digital economy maturity.

It delves into ten pillars of the digital economy, each representing specific factors, drivers and outcomes that require separate examination, to evaluate a diverse selection of 50 economies from across the globe. It identifies strengths, areas for improvement, geographic disparities, global and regional trends, lessons learned, and best practices, and offers recommendations for improvement.

The DEN's classification of digital economy maturity levels—*frontier*, *advanced*, *transitioning*, *emerging*, and *nascent*—highlights that digital economy maturity is a journey. Countries should see their current status as a stepping stone to further development, and strive to learn from the experience of countries at the next maturity level.

Beyond assessing individual countries at the pillar level, the DEN highlights global and regional achievements in each pillar, while also pointing out geographical disparities in performance. The significant disparities uncovered by the DEN underscore the need for international cooperation and stress the importance of equity in areas such as infrastructure. Such measures are crucial to maximizing benefits and mitigating risks across the global digital economy.

The DEN reveals that, on average, three pillars are advanced globally—Digital for Health and Education, Digital for Social Inclusion, and Digital Regulation and Public Administration.

Technologies are widely used to achieve positive social impact, despite concerns about risks, and developing countries have especially large potential for further impact if they can overcome infrastructure and financing limitations. To capitalize on this potential, it is essential to incentivize VC funding for targeted innovations, create mission-driven programs that address societal challenges, and collect data on the needs of underserved populations.

Transitioning pillars globally are Digital for Work and Training, Digital Capabilities, Digital Finance, and Digital Infrastructure, with the latter two exhibiting particular geographic disparities.

As of 2023, an estimated 2.6 billion people—about a third of the global population—remained offline.[83] Improving infrastructure is crucial to close gaps in internet coverage and quality, and enable these individuals to participate fully in the digital economy.

International cooperation will be essential to overcome resource limitations in the least developed countries.

Advancing the maturity of the digital economy is increasingly a necessity to achieve global objectives such as those set out in the SDGs.

For example, telehealth is enhancing healthcare access, the IoT is optimizing agriculture and industry, digital platforms are expanding education to marginalized groups, and connectivity is transforming commerce and communication globally.[84] The efforts of countries such as Brazil to close connectivity gaps through a combination of investments and regulatory approaches serve as a valuable example for others.

Emerging pillars around the world, where substantial work is still needed, are Industry Digital Transformation and ICT Core Business.

Geographic disparities in ICT Core Business highlight the need for countries to enhance their technology ecosystems and foster local innovation to rise higher in the value chain and move beyond being only consumers in the digital economy. The DEN points to promising initiatives in developing countries such as Rwanda, while global platforms such as GitHub facilitate the emergence and participation of talent across borders.

83. https://www.itu.int/itu-d/reports/statistics/2023/10/10/ff23-internet-use/
84. https://www.undp.org/sites/g/files/zskgke326/files/2023-09/SDG%20Digital%20Acceleration%20Agenda_2.pdf

The one nascent pillar—Digital Innovation—also has high score variability.

This indicates how global innovation output is concentrated and highlighting the need for targeted initiatives to stimulate innovation across more countries. There are promising stories, such as the rise of the Middle East and North Africa as an innovation hub, contributions from South Asia to computer science, and dynamic local technology industries in India and the Philippines.

Regional conclusions

In terms of regions, **North America** and **Europe and Central Asia** are classed as *advanced* or *frontier* when considering all pillars together.

East Asia and Pacific is *advanced* in Digital for Health and Education, Digital Regulation and Public Administration, Digital Finance, Digital for Social Inclusion, and Digital Capabilities, with areas for improvement in Digital Industry Transformation and Digital Innovation.

Latin America and the Caribbean has strengths in Digital for Health and Education, Digital for Social Inclusion, Digital for Work and Training and Digital Regulation and Public Administration, and faces challenges in ICT Core Business and Digital Innovation.

The Middle East and North Africa has strengths in Digital for Work and Training and Digital for Health and Education, but ICT Core Business and Digital Innovation remain *nascent*.

South Asia also shows progress in Digital for Health and Education, and Digital for Work and Training, but faces more pressing challenges, with six pillars classed as *nascent*.

Sub-Saharan Africa's most urgent gaps are in Industry Digital Transformation, Digital Infrastructure, Digital Innovation, and ICT Core Business.

RECOMMENDATIONS

The DEN has been designed with the understanding that multiple stakeholders will need to come together to drive digital economy maturity.

Actions from governments, businesses, and individuals in each country are needed to move onto the next level. The DEN report serves as a guide for informed decision-making, offering priority recommendations for each stakeholder group:

Businesses

Digitalize to stay competitive.

Businesses, especially incumbents and SMEs, must embrace digitalization to avoid falling behind. They should invest in R&D and integrate new technologies. Industry associations should engage with governments to help shape supportive digital transformation policies and programs.

Support emerging talent and capabilities.

In collaboration with governments, businesses should actively support startup ecosystems, participating in incubators and accelerators that stimulate local tech talent. They should also participate in developing national AI strategies aligned with local priorities.

Create inclusive digital solutions.

Businesses can help expand digital solutions in underserved areas through user-centric design and customized content. Public-private partnerships and initiatives such as coaching for small businesses can support the growth of e-commerce.

Support workers' well-being.

Businesses can help improve the conditions of gig economy workers, for example by offering opportunities for advancement in companies, training, fair compensation, or matching contributions to retirement savings.

Take cybersecurity seriously.

As important actors in cybersecurity, businesses should adopt data protection policies and offer appropriate training to employees.

Governments

Scale up digital capabilities.

Governments should build digital literacy and awareness of online risks among their population. They should promote advanced ICT education and modernize curricula to match the needs of the digital economy.

Facilitate MSME digital transformation.

These enterprises tend to lack the financial means, skills, or awareness of market trends to embark on transformation projects. For a more inclusive digital economy, governments should offer them support in access to training, finance, and technology.

Enhance internet infrastructure and access.

Governments must prioritize investments in internet, data, and electricity infrastructure, especially in underserved regions. Internet affordability can be improved through infrastructure sharing, public-private partnerships, and increased competition among service providers.

Bridge digital divides and promote civic engagement.

Governments should address gaps in internet access for groups such as women, rural populations and disabled people. They should ensure strong data protection to generate trust, and support digital civic engagement.

Boost digital innovation through increased VC funding.

This is vital for driving innovation. Developing countries should establish VC funds for the digital economy, simplify investment regulations, and attract both local and international investors. Governments should fund innovation hubs, incubators, and accelerators.

Follow the multistakeholder approach.

When designing and implementing their digital economy journey, governments should follow a multistakeholder approach and involve businesses, civil society and individuals to achieve stronger and more cohesive outcomes.

Enact forward-looking policies and regulations.

Updating regulatory frameworks is key to fostering a dynamic digital economy. Governments should promote market competitiveness, offer tax incentives for innovation and use regulatory sandboxes to test new technologies. They should pursue efficiency and transparency through digitalizing government services.

Support digital solutions for key services such as health and education.

Governments should support digital health solutions in underserved regions by fostering multi-stakeholder partnerships and adaptable, user-centered technologies. Digital education initiatives should set clear goals, design scalable solutions, and empower teachers.

Individuals

Engage in digital learning.

Individuals, especially students and underrepresented groups, should take advantage of opportunities in ICT education and digital literacy programs. Participating in lifelong learning and cybersecurity training can enhance their opportunities in the digital economy.

Support policy initiatives.

Workers, particularly those in the gig economy, can organize and advocate for improved work conditions, including social protections. Workers can participate in policy development, for example in policies for flexible work arrangements and the "right to be disconnected".

Engage digitally with communities.

Individuals can actively participate in shaping a vibrant digital civil society by making their voices heard in local and national government platforms such as public consultations. They can organize and advocate for improved participation channels and infrastructure investment.

Spread digital literacy.

People can volunteer and support digital literacy efforts working with underserved and vulnerable populations.

In conclusion, the digital economy poses ongoing challenges and opportunities for governments, businesses, and individuals.

Governments across countries must stay abreast of technological advancements and develop inclusive, forward-thinking policies that are suited to their economic contexts and create favorable conditions for competitiveness and innovation. Businesses should embrace opportunities to digitalize, become more efficient, and innovate. Individuals should focus on acquiring the skills to seize opportunities and manage risks.

Coordinated efforts are needed to build robust digital economies while managing the impacts of emerging technologies and promoting inclusive growth. The DEN report highlights significant disparities across countries, however, none of the countries achieves the highest maturity level across all pillars.

In a globally interconnected digital economy, cooperation across countries and stakeholders is critical to bridge digital divides and ensure that all countries can fulfil the promise of digital technologies and progress toward the SDGs.

The DCO is proud to introduce the DEN to help governments identify and close gaps. It will continue to evolve the Navigator over time to highlight progress and incorporate emerging trends of the digital economy.

To learn more about the DCO and its other initiatives, visit:
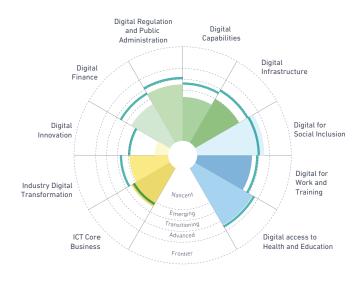
dco.org/key-dco-initiatives

05
COUNTRY DATA SUMMARIES

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ARGENTINA

■ DEN Average (N=50)
Scores 0-100 where 100 is the maximum

Digital Enablers

Digital Infrastructure	**59.9**
Coverage	80.6
Affordability	87.9
Data Infrastructure	11.3
Digital Capabilities	**53.7**
Digital Literacy, Skills and Talent	63.5
Digital Privacy and Risk Awareness	43.9
Digital Regulation and Public Administration	**65.3**
Digital Public Administration	62.7
Digital Regulation	67.9
Digital Finance	**54.7**
General Financial System Maturity	30.6
Mobile Payments Systems	62.6
Access to Digital Banking and Finance	70.8

Digital Business

ICT Core Business	**54.5**
Hardware	47.4
Software	61.8
Telecommunications	54.1
Industry Digital Transformation	**49.0**
Digital Platforms Use	61.1
Digital Business Services	36.9
Digital Innovation	**25.9**
Digital Startup Environment	32.0
Digital Research & Development	19.7

Digital Society

Digital for Health and Education	**74.2**
Digital for Health	86.3
Digital for Education	62.0
Digital for Work and Training	**63.8**
Digitally-enabled Access to Opportunities	73.6
Digital Workplace	54.1
Digital for Social Inclusion	**75.1**
Internet Access	86.5
Digital Inclusion	69.5
Digital Social Connectivity & Civic Engagement	69.4

AUSTRALIA

■ DEN Average (N=50)
Scores 0-100 where 100 is the maximum

Digital Enablers

Digital Infrastructure	**92.5**
Coverage	89.5
Affordability	99.2
Data Infrastructure	88.8
Digital Capabilities	**76.1**
Digital Literacy. Skills and Talent	84.8
Digital Privacy and Risk Awareness	67.5
Digital Regulation and Public Administration	**81.4**
Digital Public Administration	64.6
Digital Regulation	98.1
Digital Finance	**88.9**
General Financial System Maturity	90.9
Mobile Payments Systems	87.0
Access to Digital Banking and Finance	88.9

Digital Business
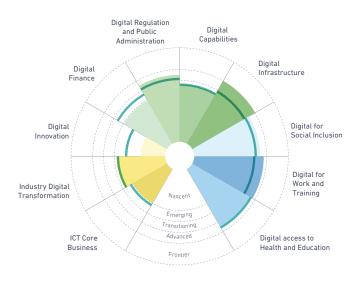
ICT Core Business	**54.0**
Hardware	30.8
Software	60.8
Telecommunications	70.4
Industry Digital Transformation	**60.6**
Digital Platforms Use	71.0
Digital Business Services	50.2
Digital Innovation	**66.0**
Digital Startup Environment	70.6
Digital Research & Development	61.4

Digital Society

Digital for Health and Education	**85.1**
Digital for Health	90.9
Digital for Education	79.4
Digital for Work and Training	**70.8**
Digitally-enabled Access to Opportunities	68.2
Digital Workplace	73.4
Digital for Social Inclusion	**73.2**
Internet Access	93.6
Digital Inclusion	66.0
Digital Social Connectivity & Civic Engagement	59.9

BAHRAIN

DEN Average (N=50)

Scores 0-100 where 100 is the maximum

Digital Enablers

Digital Infrastructure	**80.2**
Coverage	93.6
Affordability	96.2
Data Infrastructure	50.8

Digital Capabilities	**66.1**
Digital Literacy, Skills and Talent	71.3
Digital Privacy and Risk Awareness	60.9

Digital Regulation and Public Administration	**75.0**
Digital Public Administration	66.4
Digital Regulation	83.5

Digital Finance	**59.4**
General Financial System Maturity	46.4
Mobile Payments Systems	65.8
Access to Digital Banking and Finance	65.9

Digital Business
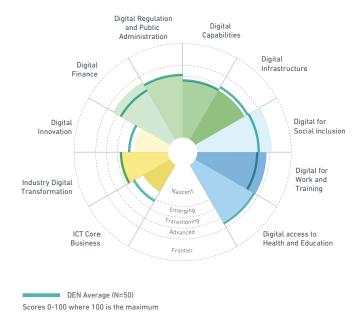
ICT Core Business	**49.9**
Hardware	23.6
Software	51.9
Telecommunications	74.2

Industry Digital Transformation	**58.0**
Digital Platforms Use	69.5
Digital Business Services	46.5

Digital Innovation	**35.8**
Digital Startup Environment	47.2
Digital Research & Development	24.4

Digital Society

Digital for Health and Education	**74.9**
Digital for Health	88.0
Digital for Education	61.8

Digital for Work and Training	**77.4**
Digitally-enabled Access to Opportunities	78.4
Digital Workplace	76.4

Digital for Social Inclusion	**73.9**
Internet Access	100.0
Digital Inclusion	42.7
Digital Social Connectivity & Civic Engagement	79.0

BRAZIL

DEN Average (N=50)

Scores 0-100 where 100 is the maximum

Digital Enablers
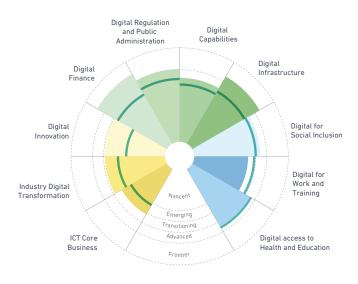
Digital Infrastructure	**65.9**
Coverage	86.1
Affordability	94.0
Data Infrastructure	17.6

Digital Capabilities	**66.0**
Digital Literacy, Skills and Talent	67.9
Digital Privacy and Risk Awareness	64.1

Digital Regulation and Public Administration	**71.1**
Digital Public Administration	68.0
Digital Regulation	74.2

Digital Finance	**74.2**
General Financial System Maturity	66.2
Mobile Payments Systems	73.7
Access to Digital Banking and Finance	82.7

Digital Business

ICT Core Business	**42.2**
Hardware	36.3
Software	57.7
Telecommunications	32.6

Industry Digital Transformation	**57.9**
Digital Platforms Use	62.6
Digital Business Services	53.2

Digital Innovation	**44.4**
Digital Startup Environment	53.7
Digital Research & Development	35.2

Digital Society

Digital for Health and Education	**74.5**
Digital for Health	79.1
Digital for Education	69.9

Digital for Work and Training	**77.2**
Digitally-enabled Access to Opportunities	76.9
Digital Workplace	77.5

Digital for Social Inclusion	**82.1**
Internet Access	80.3
Digital Inclusion	80.0
Digital Social Connectivity & Civic Engagement	86.0

🇨🇦 CANADA

DEN Average (N=50)

Scores 0-100 where 100 is the maximum

Digital Enablers

Digital Infrastructure	84.9
Coverage	95.2
Affordability	97.8
Data Infrastructure	61.7
Digital Capabilities	**72.3**
Digital Literacy, Skills and Talent	77.3
Digital Privacy and Risk Awareness	67.3
Digital Regulation and Public Administration	**80.3**
Digital Public Administration	63.8
Digital Regulation	96.8
Digital Finance	**87.6**
General Financial System Maturity	87.4
Mobile Payments Systems	86.4
Access to Digital Banking and Finance	88.9

Digital Business
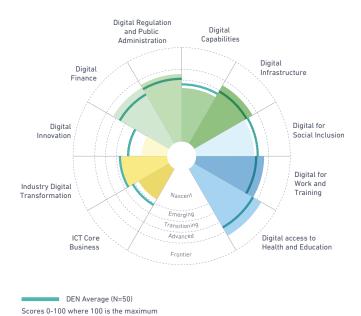
ICT Core Business	61.7
Hardware	49.4
Software	67.4
Telecommunications	68.4
Industry Digital Transformation	**68.7**
Digital Platforms Use	69.9
Digital Business Services	67.4
Digital Innovation	**69.5**
Digital Startup Environment	70.3
Digital Research & Development	68.7

Digital Society

Digital for Health and Education	74.5
Digital for Health	88.6
Digital for Education	60.4
Digital for Work and Training	**63.0**
Digitally-enabled Access to Opportunities	62.8
Digital Workplace	63.2
Digital for Social Inclusion	**74.0**
Internet Access	92.5
Digital Inclusion	73.6
Digital Social Connectivity & Civic Engagement	55.9

🇨🇱 CHILE

DEN Average (N=50)

Scores 0-100 where 100 is the maximum

Digital Enablers

Digital Infrastructure	75.3
Coverage	89.2
Affordability	96.3
Data Infrastructure	40.4
Digital Capabilities	**62.7**
Digital Literacy, Skills and Talent	71.0
Digital Privacy and Risk Awareness	54.5
Digital Regulation and Public Administration	**75.6**
Digital Public Administration	64.7
Digital Regulation	86.5
Digital Finance	**73.0**
General Financial System Maturity	50.4
Mobile Payments Systems	77.0
Access to Digital Banking and Finance	91.4

Digital Business
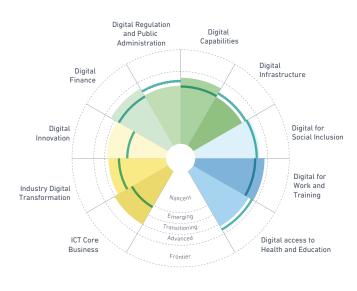
ICT Core Business	45.9
Hardware	16.3
Software	48.4
Telecommunications	73.0
Industry Digital Transformation	**55.7**
Digital Platforms Use	70.9
Digital Business Services	40.5
Digital Innovation	**36.7**
Digital Startup Environment	43.8
Digital Research & Development	29.5

Digital Society

Digital for Health and Education	84.6
Digital for Health	88.0
Digital for Education	81.1
Digital for Work and Training	**75.9**
Digitally-enabled Access to Opportunities	76.7
Digital Workplace	75.1
Digital for Social Inclusion	**66.8**
Internet Access	92.6
Digital Inclusion	36.6
Digital Social Connectivity & Civic Engagement	71.1

🇨🇳 CHINA

DEN Average (N=50)

Scores 0-100 where 100 is the maximum

Digital Enablers

Digital Infrastructure	65.3
Coverage	99.1
Affordability	94.9
Data Infrastructure	1.8

Digital Capabilities	74.2
Digital Literacy. Skills and Talent	78.6
Digital Privacy and Risk Awareness	69.8

Digital Regulation and Public Administration	66.8
Digital Public Administration	61.7
Digital Regulation	71.8

Digital Finance	74.2
General Financial System Maturity	63.4
Mobile Payments Systems	85.9
Access to Digital Banking and Finance	73.4

Digital Business

ICT Core Business	70.2
Hardware	90.6
Software	61.8
Telecommunications	58.2

Industry Digital Transformation	66.5
Digital Platforms Use	74.0
Digital Business Services	59.1

Digital Innovation	67.9
Digital Startup Environment	70.6
Digital Research & Development	65.2
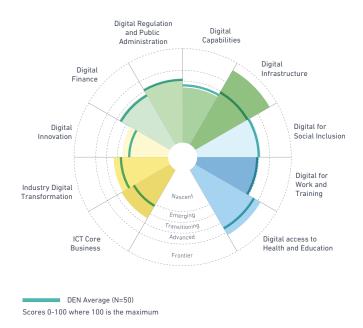
Digital Society

Digital for Health and Education	72.3
Digital for Health	88.3
Digital for Education	56.4

Digital for Work and Training	77.2
Digitally-enabled Access to Opportunities	75.5
Digital Workplace	78.9

Digital for Social Inclusion	72.7
Internet Access	71.9
Digital Inclusion	70.2
Digital Social Connectivity & Civic Engagement	76.1

🇨🇾 CYPRUS

DEN Average (N=50)

Scores 0-100 where 100 is the maximum

Digital Enablers

Digital Infrastructure	92.4
Coverage	89.7
Affordability	97.4
Data Infrastructure	90.1

Digital Capabilities	64.1
Digital Literacy. Skills and Talent	67.2
Digital Privacy and Risk Awareness	61.1

Digital Regulation and Public Administration	71.8
Digital Public Administration	59.1
Digital Regulation	84.6

Digital Finance	67.5
General Financial System Maturity	50.8
Mobile Payments Systems	73.0
Access to Digital Banking and Finance	78.6

Digital Business

ICT Core Business	64.9
Hardware	28.4
Software	93.2
Telecommunications	73.0

Industry Digital Transformation	63.5
Digital Platforms Use	59.4
Digital Business Services	67.6
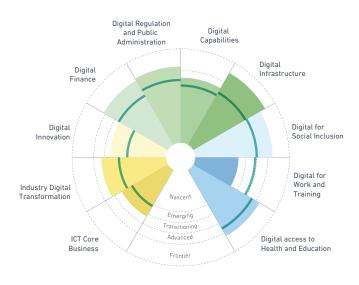
Digital Innovation	55.7
Digital Startup Environment	59.3
Digital Research & Development	52.1

Digital Society

Digital for Health and Education	82.8
Digital for Health	83.5
Digital for Education	82.2

Digital for Work and Training	69.5
Digitally-enabled Access to Opportunities	68.4
Digital Workplace	70.7

Digital for Social Inclusion	71.9
Internet Access	89.0
Digital Inclusion	73.1
Digital Social Connectivity & Civic Engagement	53.7

DENMARK

DEN Average (N=50)

Scores 0-100 where 100 is the maximum

Digital Enablers

Digital Infrastructure	89.7
Coverage	99.8
Affordability	98.7
Data Infrastructure	70.5

Digital Capabilities	73.4
Digital Literacy. Skills and Talent	78.4
Digital Privacy and Risk Awareness	68.3

Digital Regulation and Public Administration	83.6
Digital Public Administration	69.2
Digital Regulation	98.0

Digital Finance	81.9
General Financial System Maturity	66.5
Mobile Payments Systems	87.4
Access to Digital Banking and Finance	91.7

Digital Business

ICT Core Business	62.9
Hardware	54.5
Software	61.1
Telecommunications	73.1

Industry Digital Transformation	72.9
Digital Platforms Use	78.8
Digital Business Services	67.1

Digital Innovation	65.0
Digital Startup Environment	63.7
Digital Research & Development	66.2

Digital Society
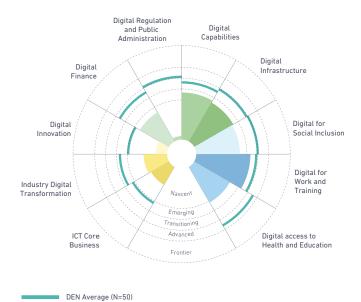
Digital for Health and Education	83.7
Digital for Health	92.9
Digital for Education	74.5

Digital for Work and Training	53.2
Digitally-enabled Access to Opportunities	47.3
Digital Workplace	59.0

Digital for Social Inclusion	84.6
Internet Access	98.5
Digital Inclusion	75.5
Digital Social Connectivity & Civic Engagement	79.8

DJIBOUTI

DEN Average (N=50)

Scores 0-100 where 100 is the maximum

Digital Enablers

Digital Infrastructure	54.9
Coverage	49.7
Affordability	62.7
Data Infrastructure	52.3

Digital Capabilities	56.8
Digital Literacy. Skills and Talent	64.0
Digital Privacy and Risk Awareness	49.5

Digital Regulation and Public Administration	16.7
Digital Public Administration	7.4
Digital Regulation	26.1

Digital Finance	44.4
General Financial System Maturity	13.9
Mobile Payments Systems	56.2
Access to Digital Banking and Finance	63.1

Digital Business
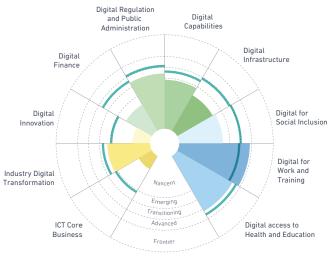
ICT Core Business	32.7
Hardware	26.7
Software	28.0
Telecommunications	43.3

Industry Digital Transformation	35.0
Digital Platforms Use	47.7
Digital Business Services	22.2

Digital Innovation	23.8
Digital Startup Environment	41.2
Digital Research & Development	6.5

Digital Society

Digital for Health and Education	51.4
Digital for Health	41.4
Digital for Education	61.3

Digital for Work and Training	63.3
Digitally-enabled Access to Opportunities	60.4
Digital Workplace	66.2

Digital for Social Inclusion	53.6
Internet Access	56.3
Digital Inclusion	47.5
Digital Social Connectivity & Civic Engagement	57.2

EGYPT

DEN Average (N=50)
Scores 0-100 where 100 is the maximum

Digital Enablers

Digital Infrastructure	51.1
Coverage	71.4
Affordability	78.0
Data Infrastructure	3.8

Digital Capabilities	58.5
Digital Literacy. Skills and Talent	51.5
Digital Privacy and Risk Awareness	65.6

Digital Regulation and Public Administration	64.3
Digital Public Administration	59.9
Digital Regulation	68.7

Digital Finance	41.1
General Financial System Maturity	30.9
Mobile Payments Systems	21.3
Access to Digital Banking and Finance	71.2
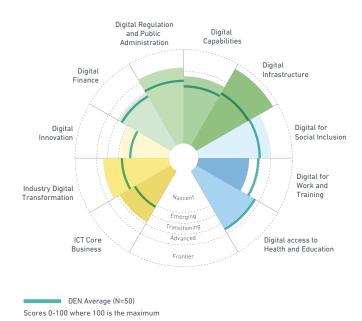
Digital Business

ICT Core Business	27.5
Hardware	26.0
Software	35.5
Telecommunications	21.1

Industry Digital Transformation	52.8
Digital Platforms Use	69.5
Digital Business Services	36.0

Digital Innovation	29.6
Digital Startup Environment	38.6
Digital Research & Development	20.7

Digital Society

Digital for Health and Education	72.1
Digital for Health	84.3
Digital for Education	59.8

Digital for Work and Training	78.4
Digitally-enabled Access to Opportunities	78.4
Digital Workplace	78.4

Digital for Social Inclusion	53.6
Internet Access	65.3
Digital Inclusion	31.7
Digital Social Connectivity & Civic Engagement	63.9

ESTONIA

DEN Average (N=50)
Scores 0-100 where 100 is the maximum

Digital Enablers
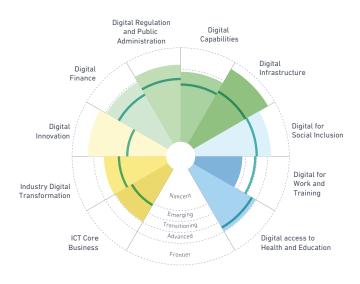
Digital Infrastructure	94.9
Coverage	91.4
Affordability	98.4
Data Infrastructure	95.0

Digital Capabilities	75.3
Digital Literacy. Skills and Talent	82.1
Digital Privacy and Risk Awareness	68.6

Digital Regulation and Public Administration	83.4
Digital Public Administration	70.1
Digital Regulation	96.6

Digital Finance	69.0
General Financial System Maturity	25.2
Mobile Payments Systems	88.2
Access to Digital Banking and Finance	93.6

Digital Business

ICT Core Business	68.0
Hardware	48.2
Software	85.2
Telecommunications	70.5

Industry Digital Transformation	74.1
Digital Platforms Use	81.4
Digital Business Services	66.7

Digital Innovation	59.1
Digital Startup Environment	75.9
Digital Research & Development	42.4

Digital Society

Digital for Health and Education	75.2
Digital for Health	96.8
Digital for Education	53.6

Digital for Work and Training	60.2
Digitally-enabled Access to Opportunities	70.0
Digital Workplace	50.3

Digital for Social Inclusion	80.4
Internet Access	91.5
Digital Inclusion	91.9
Digital Social Connectivity & Civic Engagement	57.8

FINLAND

DEN Average (N=50)
Scores 0-100 where 100 is the maximum

Digital Enablers

Digital Infrastructure	92.8
Coverage	94.9
Affordability	99.3
Data Infrastructure	84.1

Digital Capabilities	77.9
Digital Literacy. Skills and Talent	84.5
Digital Privacy and Risk Awareness	71.3

Digital Regulation and Public Administration	84.4
Digital Public Administration	70.3
Digital Regulation	98.4

Digital Finance	78.9
General Financial System Maturity	64.6
Mobile Payments Systems	84.0
Access to Digital Banking and Finance	88.1

Digital Business
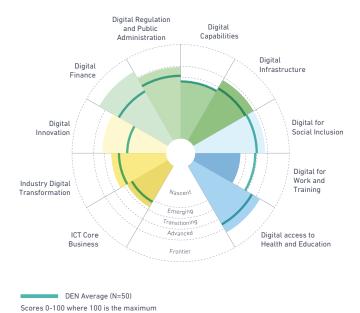
ICT Core Business	69.4
Hardware	44.0
Software	98.2
Telecommunications	65.9

Industry Digital Transformation	70.6
Digital Platforms Use	81.2
Digital Business Services	60.0

Digital Innovation	85.4
Digital Startup Environment	70.8
Digital Research & Development	100.0

Digital Society

Digital for Health and Education	79.6
Digital for Health	88.8
Digital for Education	70.4

Digital for Work and Training	56.8
Digitally-enabled Access to Opportunities	55.2
Digital Workplace	58.5

Digital for Social Inclusion	83.1
Internet Access	91.9
Digital Inclusion	75.0
Digital Social Connectivity & Civic Engagement	82.5

FRANCE

DEN Average (N=50)
Scores 0-100 where 100 is the maximum

Digital Enablers

Digital Infrastructure	77.6
Coverage	95.2
Affordability	99.7
Data Infrastructure	37.9

Digital Capabilities	66.4
Digital Literacy. Skills and Talent	67.5
Digital Privacy and Risk Awareness	65.3

Digital Regulation and Public Administration	79.3
Digital Public Administration	66.1
Digital Regulation	92.5

Digital Finance	86.6
General Financial System Maturity	81.5
Mobile Payments Systems	89.9
Access to Digital Banking and Finance	88.5

Digital Business
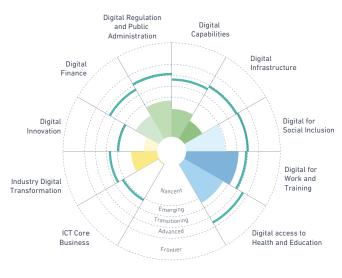
ICT Core Business	57.4
Hardware	52.4
Software	55.6
Telecommunications	64.2

Industry Digital Transformation	63.9
Digital Platforms Use	69.1
Digital Business Services	58.8

Digital Innovation	72.1
Digital Startup Environment	58.8
Digital Research & Development	85.4

Digital Society

Digital for Health and Education	84.3
Digital for Health	96.2
Digital for Education	72.5

Digital for Work and Training	55.0
Digitally-enabled Access to Opportunities	62.4
Digital Workplace	47.7

Digital for Social Inclusion	77.7
Internet Access	83.5
Digital Inclusion	87.6
Digital Social Connectivity & Civic Engagement	62.0

THE GAMBIA

DEN Average (N=50)

Scores 0-100 where 100 is the maximum

Digital Enablers

Digital Infrastructure	32.5
Coverage	36.4
Affordability	40.9
Data Infrastructure	19.4

Digital Capabilities	39.0
Digital Literacy. Skills and Talent	33.2
Digital Privacy and Risk Awareness	44.7

Digital Regulation and Public Administration	46.8
Digital Public Administration	29.3
Digital Regulation	64.2

Digital Finance	38.3
General Financial System Maturity	10.7
Mobile Payments Systems	26.2
Access to Digital Banking and Finance	78.1

Digital Business

ICT Core Business	14.3
Hardware	9.7
Software	11.4
Telecommunications	21.9

Industry Digital Transformation	37.3
Digital Platforms Use	49.0
Digital Business Services	25.7

Digital Innovation	25.7
Digital Startup Environment	41.2
Digital Research & Development	10.2

Digital Society

Digital for Health and Education	54.8
Digital for Health	63.9
Digital for Education	45.7

Digital for Work and Training	61.5
Digitally-enabled Access to Opportunities	55.2
Digital Workplace	67.8

Digital for Social Inclusion	49.4
Internet Access	42.8
Digital Inclusion	39.0
Digital Social Connectivity & Civic Engagement	66.2

GERMANY

DEN Average (N=50)

Scores 0-100 where 100 is the maximum

Digital Enablers

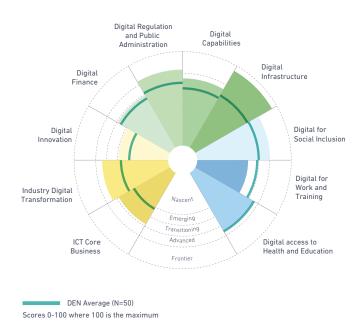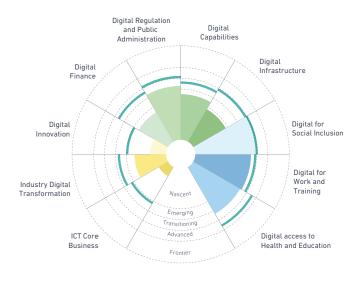| Digital Infrastructure	77.9
Coverage	88.8
Affordability	99.0
Data Infrastructure	45.9

Digital Capabilities	68.7
Digital Literacy. Skills and Talent	71.5
Digital Privacy and Risk Awareness	65.9

Digital Regulation and Public Administration	80.6
Digital Public Administration	64.1
Digital Regulation	97.1

Digital Finance	83.0
General Financial System Maturity	70.2
Mobile Payments Systems	88.6
Access to Digital Banking and Finance	90.2

Digital Business

ICT Core Business	61.9
Hardware	66.2
Software	60.9
Telecommunications	58.5

Industry Digital Transformation	58.2
Digital Platforms Use	59.6
Digital Business Services	56.8

Digital Innovation	69.3
Digital Startup Environment	44.5
Digital Research & Development	94.2

Digital Society

Digital for Health and Education	69.8
Digital for Health	89.6
Digital for Education	50.1

Digital for Work and Training	57.1
Digitally-enabled Access to Opportunities	62.2
Digital Workplace	52.1

Digital for Social Inclusion	72.5
Internet Access	90.6
Digital Inclusion	58.0
Digital Social Connectivity & Civic Engagement	68.9

🇬🇭 GHANA

━━━ DEN Average (N=50)

Scores 0-100 where 100 is the maximum

Digital Enablers

Digital Infrastructure	48.0
Coverage	60.4
Affordability	77.3
Data Infrastructure	6.3

Digital Capabilities	55.4
Digital Literacy. Skills and Talent	51.9
Digital Privacy and Risk Awareness	59.0

Digital Regulation and Public Administration	63.0
Digital Public Administration	52.7
Digital Regulation	73.3

Digital Finance	44.8
General Financial System Maturity	17.8
Mobile Payments Systems	53.8
Access to Digital Banking and Finance	62.8

Digital Business
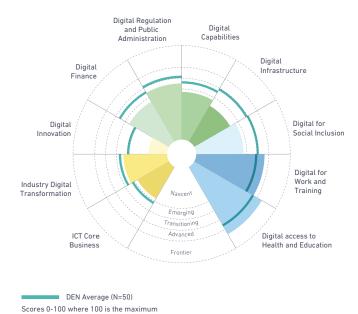
ICT Core Business	23.4
Hardware	17.6
Software	25.9
Telecommunications	26.7

Industry Digital Transformation	42.6
Digital Platforms Use	51.9
Digital Business Services	33.4

Digital Innovation	28.1
Digital Startup Environment	40.5
Digital Research & Development	15.7

Digital Society

Digital for Health and Education	63.3
Digital for Health	70.2
Digital for Education	56.4

Digital for Work and Training	64.7
Digitally-enabled Access to Opportunities	59.4
Digital Workplace	70.0

Digital for Social Inclusion	68.6
Internet Access	62.3
Digital Inclusion	70.7
Digital Social Connectivity & Civic Engagement	72.7

🇮🇳 INDIA

━━━ DEN Average (N=50)

Scores 0-100 where 100 is the maximum

Digital Enablers

Digital Infrastructure	51.5
Coverage	69.2
Affordability	81.4
Data Infrastructure	3.9

Digital Capabilities	57.3
Digital Literacy. Skills and Talent	53.1
Digital Privacy and Risk Awareness	61.5

Digital Regulation and Public Administration	65.1
Digital Public Administration	65.7
Digital Regulation	64.4

Digital Finance	55.8
General Financial System Maturity	53.4
Mobile Payments Systems	44.0
Access to Digital Banking and Finance	70.1

Digital Business
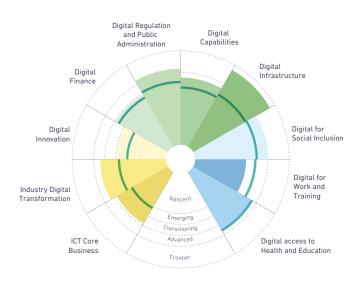
ICT Core Business	47.1
Hardware	40.9
Software	80.2
Telecommunications	20.1

Industry Digital Transformation	53.6
Digital Platforms Use	54.6
Digital Business Services	52.6

Digital Innovation	30.5
Digital Startup Environment	29.2
Digital Research & Development	31.8

Digital Society

Digital for Health and Education	85.1
Digital for Health	89.4
Digital for Education	80.7

Digital for Work and Training	76.3
Digitally-enabled Access to Opportunities	75.4
Digital Workplace	77.2

Digital for Social Inclusion	57.1
Internet Access	29.3
Digital Inclusion	54.9
Digital Social Connectivity & Civic Engagement	86.9

INDONESIA

DEN Average (N=50)

Scores 0-100 where 100 is the maximum

Digital Enablers

Digital Infrastructure	54.8
Coverage	67.9
Affordability	85.2
Data Infrastructure	13.2

Digital Capabilities	72.2
Digital Literacy. Skills and Talent	76.6
Digital Privacy and Risk Awareness	67.8

Digital Regulation and Public Administration	69.9
Digital Public Administration	64.1
Digital Regulation	75.7

Digital Finance	53.5
General Financial System Maturity	36.4
Mobile Payments Systems	44.9
Access to Digital Banking and Finance	79.2

Digital Business

ICT Core Business	42.6
Hardware	42.4
Software	44.3
Telecommunications	41.1

Industry Digital Transformation	59.4
Digital Platforms Use	73.4
Digital Business Services	45.4

Digital Innovation	37.0
Digital Startup Environment	57.3
Digital Research & Development	16.8

Digital Society
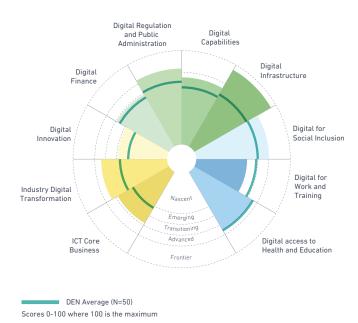
Digital for Health and Education	85.4
Digital for Health	87.0
Digital for Education	83.7

Digital for Work and Training	72.4
Digitally-enabled Access to Opportunities	77.6
Digital Workplace	67.2

Digital for Social Inclusion	55.9
Internet Access	61.5
Digital Inclusion	39.3
Digital Social Connectivity & Civic Engagement	66.7

IRELAND

DEN Average (N=50)

Scores 0-100 where 100 is the maximum

Digital Enablers
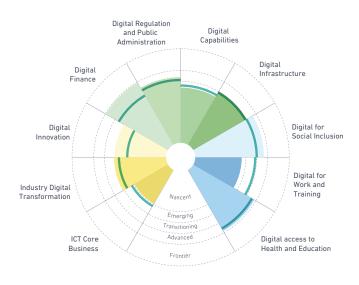
Digital Infrastructure	86.4
Coverage	85.3
Affordability	99.7
Data Infrastructure	74.3

Digital Capabilities	75.3
Digital Literacy. Skills and Talent	83.0
Digital Privacy and Risk Awareness	67.6

Digital Regulation and Public Administration	81.1
Digital Public Administration	65.4
Digital Regulation	96.8

Digital Finance	80.4
General Financial System Maturity	62.5
Mobile Payments Systems	88.2
Access to Digital Banking and Finance	90.7

Digital Business

ICT Core Business	68.6
Hardware	70.3
Software	100.0
Telecommunications	35.6

Industry Digital Transformation	52.4
Digital Platforms Use	60.9
Digital Business Services	43.8

Digital Innovation	66.2
Digital Startup Environment	61.8
Digital Research & Development	70.5

Digital Society

Digital for Health and Education	70.7
Digital for Health	56.8
Digital for Education	84.6

Digital for Work and Training	63.8
Digitally-enabled Access to Opportunities	60.3
Digital Workplace	67.3

Digital for Social Inclusion	81.9
Internet Access	94.5
Digital Inclusion	87.1
Digital Social Connectivity & Civic Engagement	64.1

🇮🇹 ITALY

DEN Average (N=50)
Scores 0-100 where 100 is the maximum

Digital Enablers

Digital Infrastructure	70.2
Coverage	81.7
Affordability	98.3
Data Infrastructure	30.5

Digital Capabilities	64.2
Digital Literacy. Skills and Talent	66.4
Digital Privacy and Risk Awareness	62.0

Digital Regulation and Public Administration	73.8
Digital Public Administration	63.3
Digital Regulation	84.3

Digital Finance	79.4
General Financial System Maturity	76.7
Mobile Payments Systems	86.0
Access to Digital Banking and Finance	75.4

Digital Business
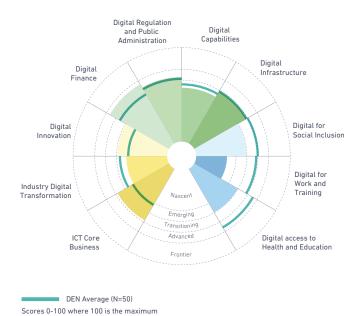
ICT Core Business	49.3
Hardware	41.7
Software	48.4
Telecommunications	57.7

Industry Digital Transformation	61.3
Digital Platforms Use	66.1
Digital Business Services	56.4

Digital Innovation	60.7
Digital Startup Environment	58.9
Digital Research & Development	62.6

Digital Society

Digital for Health and Education	78.3
Digital for Health	77.4
Digital for Education	79.2

Digital for Work and Training	56.2
Digitally-enabled Access to Opportunities	68.8
Digital Workplace	43.6

Digital for Social Inclusion	76.6
Internet Access	83.8
Digital Inclusion	83.3
Digital Social Connectivity & Civic Engagement	62.6

🔴 JAPAN

DEN Average (N=50)
Scores 0-100 where 100 is the maximum

Digital Enablers

Digital Infrastructure	68.8
Coverage	90.8
Affordability	96.3
Data Infrastructure	19.4

Digital Capabilities	63.0
Digital Literacy. Skills and Talent	63.1
Digital Privacy and Risk Awareness	62.9

Digital Regulation and Public Administration	72.9
Digital Public Administration	52.6
Digital Regulation	93.2

Digital Finance	76.4
General Financial System Maturity	88.8
Mobile Payments Systems	80.8
Access to Digital Banking and Finance	59.6

Digital Business
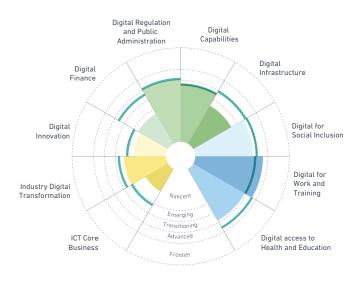
ICT Core Business	68.2
Hardware	80.0
Software	47.7
Telecommunications	76.9

Industry Digital Transformation	51.0
Digital Platforms Use	57.4
Digital Business Services	44.6

Digital Innovation	59.1
Digital Startup Environment	34.9
Digital Research & Development	83.3

Digital Society

Digital for Health and Education	59.8
Digital for Health	57.6
Digital for Education	62.0

Digital for Work and Training	41.7
Digitally-enabled Access to Opportunities	25.8
Digital Workplace	57.6

Digital for Social Inclusion	59.7
Internet Access	81.1
Digital Inclusion	40.3
Digital Social Connectivity & Civic Engagement	57.6

JORDAN

DEN Average (N=50)
Scores 0-100 where 100 is the maximum

Digital Enablers

Digital Infrastructure	53.8
Coverage	79.0
Affordability	72.8
Data Infrastructure	9.5

Digital Capabilities	66.6
Digital Literacy. Skills and Talent	74.7
Digital Privacy and Risk Awareness	58.4

Digital Regulation and Public Administration	70.7
Digital Public Administration	65.3
Digital Regulation	76.2

Digital Finance	45.4
General Financial System Maturity	35.9
Mobile Payments Systems	28.5
Access to Digital Banking and Finance	71.6

Digital Business

ICT Core Business	37.3
Hardware	31.1
Software	32.0
Telecommunications	48.8

Industry Digital Transformation	52.2
Digital Platforms Use	64.3
Digital Business Services	40.1

Digital Innovation	42.9
Digital Startup Environment	49.6
Digital Research & Development	36.3

Digital Society

Digital for Health and Education	68.2
Digital for Health	77.0
Digital for Education	59.3

Digital for Work and Training	75.8
Digitally-enabled Access to Opportunities	77.6
Digital Workplace	73.9

Digital for Social Inclusion	66.5
Internet Access	88.1
Digital Inclusion	45.9
Digital Social Connectivity & Civic Engagement	65.6

KENYA

DEN Average (N=50)
Scores 0-100 where 100 is the maximum

Digital Enablers
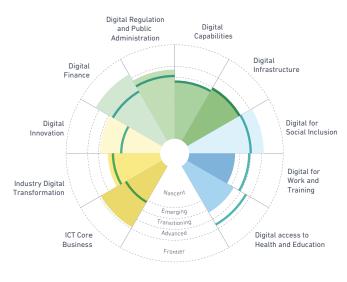
Digital Infrastructure	44.9
Coverage	55.4
Affordability	69.9
Data Infrastructure	9.3

Digital Capabilities	59.7
Digital Literacy. Skills and Talent	58.4
Digital Privacy and Risk Awareness	61.1

Digital Regulation and Public Administration	68.3
Digital Public Administration	63.9
Digital Regulation	72.6

Digital Finance	50.8
General Financial System Maturity	16.5
Mobile Payments Systems	61.3
Access to Digital Banking and Finance	74.6

Digital Business

ICT Core Business	33.7
Hardware	17.7
Software	49.3
Telecommunications	34.2

Industry Digital Transformation	53.9
Digital Platforms Use	60.6
Digital Business Services	47.2

Digital Innovation	26.3
Digital Startup Environment	39.8
Digital Research & Development	12.8

Digital Society

Digital for Health and Education	74.2
Digital for Health	67.4
Digital for Education	81.0

Digital for Work and Training	71.0
Digitally-enabled Access to Opportunities	78.8
Digital Workplace	63.1

Digital for Social Inclusion	54.6
Internet Access	26.1
Digital Inclusion	60.9
Digital Social Connectivity & Civic Engagement	76.7

KOREA, REPUBLIC OF

DEN Average (N=50)

Scores 0-100 where 100 is the maximum

Digital Enablers

Digital Infrastructure	70.2
Coverage	98.3
Affordability	96.5
Data Infrastructure	15.9

Digital Capabilities	67.1
Digital Literacy. Skills and Talent	74.0
Digital Privacy and Risk Awareness	60.3

Digital Regulation and Public Administration	77.1
Digital Public Administration	65.5
Digital Regulation	88.6

Digital Finance	84.0
General Financial System Maturity	81.8
Mobile Payments Systems	90.1
Access to Digital Banking and Finance	80.2

Digital Business
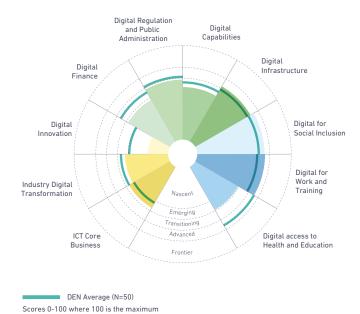
ICT Core Business	78.5
Hardware	91.0
Software	61.2
Telecommunications	83.2

Industry Digital Transformation	61.5
Digital Platforms Use	73.9
Digital Business Services	49.1

Digital Innovation	68.8
Digital Startup Environment	51.7
Digital Research & Development	86.0

Digital Society

Digital for Health and Education	62.9
Digital for Health	65.5
Digital for Education	60.3

Digital for Work and Training	55.6
Digitally-enabled Access to Opportunities	54.7
Digital Workplace	56.5

Digital for Social Inclusion	82.0
Internet Access	96.8
Digital Inclusion	78.3
Digital Social Connectivity & Civic Engagement	70.9

KUWAIT

DEN Average (N=50)

Scores 0-100 where 100 is the maximum

Digital Enablers

Digital Infrastructure	72.1
Coverage	98.6
Affordability	98.5
Data Infrastructure	19.3

Digital Capabilities	61.8
Digital Literacy. Skills and Talent	68.7
Digital Privacy and Risk Awareness	54.9

Digital Regulation and Public Administration	68.6
Digital Public Administration	60.8
Digital Regulation	76.5

Digital Finance	57.9
General Financial System Maturity	40.0
Mobile Payments Systems	64.6
Access to Digital Banking and Finance	69.2

Digital Business
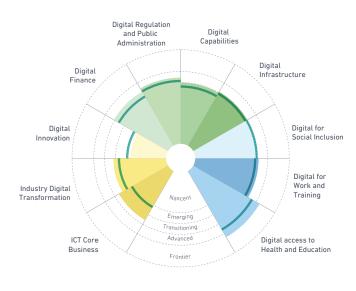
ICT Core Business	57.0
Hardware	19.7
Software	85.2
Telecommunications	66.1

Industry Digital Transformation	53.0
Digital Platforms Use	59.9
Digital Business Services	46.2

Digital Innovation	31.9
Digital Startup Environment	44.8
Digital Research & Development	19.1

Digital Society

Digital for Health and Education	59.2
Digital for Health	78.8
Digital for Education	39.6

Digital for Work and Training	75.8
Digitally-enabled Access to Opportunities	77.4
Digital Workplace	74.3

Digital for Social Inclusion	75.3
Internet Access	99.6
Digital Inclusion	47.2
Digital Social Connectivity & Civic Engagement	79.1

🇲🇾 MALAYSIA

DEN Average (N=50)

Scores 0-100 where 100 is the maximum

Digital Enablers

Digital Infrastructure	70.8
Coverage	91.9
Affordability	97.5
Data Infrastructure	24.6

Digital Capabilities	69.7
Digital Literacy. Skills and Talent	68.8
Digital Privacy and Risk Awareness	70.7

Digital Regulation and Public Administration	74.3
Digital Public Administration	63.4
Digital Regulation	85.2

Digital Finance	70.9
General Financial System Maturity	72.7
Mobile Payments Systems	69.0
Access to Digital Banking and Finance	70.9

Digital Business

ICT Core Business	65.6
Hardware	92.5
Software	52.0
Telecommunications	52.3

Industry Digital Transformation	61.9
Digital Platforms Use	71.5
Digital Business Services	52.4

Digital Innovation	46.3
Digital Startup Environment	60.7
Digital Research & Development	31.8

Digital Society
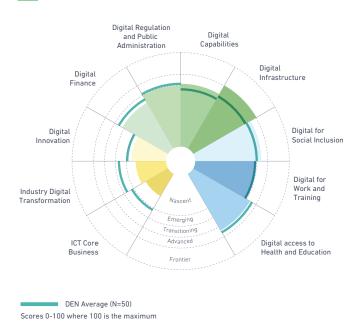
Digital for Health and Education	83.8
Digital for Health	91.9
Digital for Education	75.7

Digital for Work and Training	71.7
Digitally-enabled Access to Opportunities	76.1
Digital Workplace	67.3

Digital for Social Inclusion	69.7
Internet Access	97.1
Digital Inclusion	43.2
Digital Social Connectivity & Civic Engagement	68.8

🇲🇺 MAURITIUS

DEN Average (N=50)

Scores 0-100 where 100 is the maximum

Digital Enablers
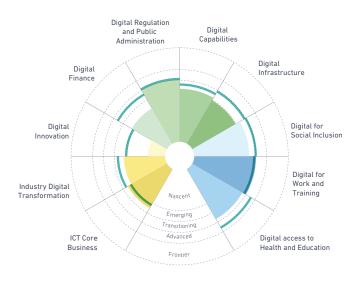
Digital Infrastructure	80.5
Coverage	82.9
Affordability	93.1
Data Infrastructure	65.5

Digital Capabilities	71.2
Digital Literacy. Skills and Talent	73.1
Digital Privacy and Risk Awareness	69.3

Digital Regulation and Public Administration	69.7
Digital Public Administration	53.2
Digital Regulation	86.1

Digital Finance	62.1
General Financial System Maturity	49.3
Mobile Payments Systems	58.6
Access to Digital Banking and Finance	78.5

Digital Business

ICT Core Business	37.2
Hardware	17.2
Software	46.9
Telecommunications	47.5

Industry Digital Transformation	41.3
Digital Platforms Use	50.5
Digital Business Services	32.2

Digital Innovation	45.3
Digital Startup Environment	52.2
Digital Research & Development	38.4

Digital Society

Digital for Health and Education	73.7
Digital for Health	78.8
Digital for Education	68.7

Digital for Work and Training	69.3
Digitally-enabled Access to Opportunities	74.0
Digital Workplace	64.7

Digital for Social Inclusion	74.2
Internet Access	69.4
Digital Inclusion	77.3
Digital Social Connectivity & Civic Engagement	75.9

🇲🇽 MEXICO

— DEN Average (N=50)

Scores 0-100 where 100 is the maximum

Digital Enablers

Digital Infrastructure	59.5
Coverage	76.0
Affordability	94.7
Data Infrastructure	7.9

Digital Capabilities	62.2
Digital Literacy. Skills and Talent	66.9
Digital Privacy and Risk Awareness	57.5

Digital Regulation and Public Administration	70.5
Digital Public Administration	66.6
Digital Regulation	74.5

Digital Finance	51.0
General Financial System Maturity	40.2
Mobile Payments Systems	50.0
Access to Digital Banking and Finance	62.7

Digital Business

ICT Core Business	55.1
Hardware	85.4
Software	36.6
Telecommunications	43.3

Industry Digital Transformation	51.4
Digital Platforms Use	58.8
Digital Business Services	44.1

Digital Innovation	29.3
Digital Startup Environment	40.1
Digital Research & Development	18.5

Digital Society

Digital for Health and Education	66.7
Digital for Health	84.4
Digital for Education	49.0

Digital for Work and Training	70.3
Digitally-enabled Access to Opportunities	74.4
Digital Workplace	66.2

Digital for Social Inclusion	64.0
Internet Access	76.5
Digital Inclusion	37.0
Digital Social Connectivity & Civic Engagement	78.5

🇲🇦 MOROCCO

— DEN Average (N=50)

Scores 0-100 where 100 is the maximum

Digital Enablers

Digital Infrastructure	51.3
Coverage	59.8
Affordability	90.4
Data Infrastructure	3.6

Digital Capabilities	55.5
Digital Literacy. Skills and Talent	54.6
Digital Privacy and Risk Awareness	56.3

Digital Regulation and Public Administration	68.8
Digital Public Administration	62.7
Digital Regulation	74.9

Digital Finance	42.1
General Financial System Maturity	35.1
Mobile Payments Systems	27.3
Access to Digital Banking and Finance	64.0

Digital Business
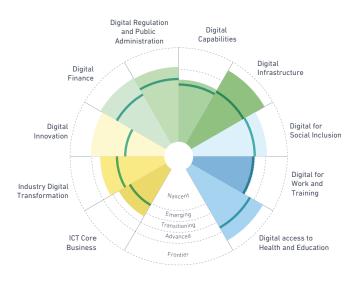
ICT Core Business	48.5
Hardware	49.5
Software	47.0
Telecommunications	49.2

Industry Digital Transformation	42.1
Digital Platforms Use	47.8
Digital Business Services	36.4

Digital Innovation	44.9
Digital Startup Environment	45.7
Digital Research & Development	44.1

Digital Society

Digital for Health and Education	65.1
Digital for Health	57.3
Digital for Education	72.9

Digital for Work and Training	69.0
Digitally-enabled Access to Opportunities	70.3
Digital Workplace	67.7

Digital for Social Inclusion	71.7
Internet Access	87.4
Digital Inclusion	70.7
Digital Social Connectivity & Civic Engagement	57.0

NETHERLANDS

DEN Average (N=50)

Scores 0-100 where 100 is the maximum

Digital Enablers

Digital Infrastructure	91.3
Coverage	98.0
Affordability	98.6
Data Infrastructure	77.1
Digital Capabilities	**70.6**
Digital Literacy. Skills and Talent	73.4
Digital Privacy and Risk Awareness	67.8
Digital Regulation and Public Administration	**82.3**
Digital Public Administration	66.3
Digital Regulation	98.3
Digital Finance	**83.1**
General Financial System Maturity	70.9
Mobile Payments Systems	86.2
Access to Digital Banking and Finance	92.1

Digital Business
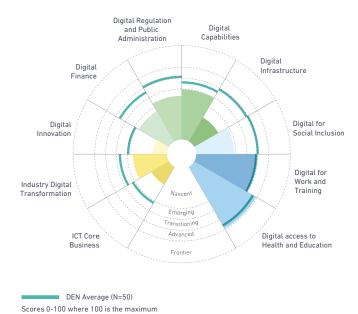
ICT Core Business	63.8
Hardware	60.2
Software	71.0
Telecommunications	60.2
Industry Digital Transformation	**72.3**
Digital Platforms Use	77.3
Digital Business Services	67.3
Digital Innovation	**80.9**
Digital Startup Environment	64.7
Digital Research & Development	97.0

Digital Society

Digital for Health and Education	89.5
Digital for Health	97.5
Digital for Education	81.6
Digital for Work and Training	**69.9**
Digitally-enabled Access to Opportunities	61.0
Digital Workplace	78.8
Digital for Social Inclusion	**81.3**
Internet Access	96.3
Digital Inclusion	93.1
Digital Social Connectivity & Civic Engagement	54.6

NIGERIA

DEN Average (N=50)

Scores 0-100 where 100 is the maximum

Digital Enablers

Digital Infrastructure	39.0
Coverage	50.2
Affordability	64.4
Data Infrastructure	2.3
Digital Capabilities	**59.6**
Digital Literacy. Skills and Talent	65.7
Digital Privacy and Risk Awareness	53.5
Digital Regulation and Public Administration	**53.7**
Digital Public Administration	48.2
Digital Regulation	59.3
Digital Finance	**45.6**
General Financial System Maturity	22.1
Mobile Payments Systems	40.6
Access to Digital Banking and Finance	74.1

Digital Business

ICT Core Business	32.3
Hardware	48.7
Software	27.9
Telecommunications	20.4
Industry Digital Transformation	**44.9**
Digital Platforms Use	44.8
Digital Business Services	45.0
Digital Innovation	**26.5**
Digital Startup Environment	39.6
Digital Research & Development	13.3

Digital Society

Digital for Health and Education	79.1
Digital for Health	74.7
Digital for Education	83.4
Digital for Work and Training	**69.0**
Digitally-enabled Access to Opportunities	75.9
Digital Workplace	62.1
Digital for Social Inclusion	**48.4**
Internet Access	19.5
Digital Inclusion	54.3
Digital Social Connectivity & Civic Engagement	71.4

OMAN

DEN Average (N=50)
Scores 0-100 where 100 is the maximum

Digital Enablers

Digital Infrastructure	68.6
Coverage	89.1
Affordability	91.9
Data Infrastructure	24.7

Digital Capabilities	69.4
Digital Literacy. Skills and Talent	76.0
Digital Privacy and Risk Awareness	62.9

Digital Regulation and Public Administration	68.3
Digital Public Administration	66.6
Digital Regulation	69.9

Digital Finance	54.8
General Financial System Maturity	38.4
Mobile Payments Systems	59.8
Access to Digital Banking and Finance	66.3

Digital Business

ICT Core Business	41.2
Hardware	26.1
Software	41.4
Telecommunications	56.1

Industry Digital Transformation	56.8
Digital Platforms Use	68.2
Digital Business Services	45.5

Digital Innovation	38.4
Digital Startup Environment	55.6
Digital Research & Development	21.2

Digital Society

Digital for Health and Education	77.0
Digital for Health	74.4
Digital for Education	79.6

Digital for Work and Training	79.2
Digitally-enabled Access to Opportunities	80.9
Digital Workplace	77.4

Digital for Social Inclusion	63.9
Internet Access	94.1
Digital Inclusion	33.3
Digital Social Connectivity & Civic Engagement	64.3

PAKISTAN

DEN Average (N=50)
Scores 0-100 where 100 is the maximum

Digital Enablers

Digital Infrastructure	42.6
Coverage	55.7
Affordability	70.0
Data Infrastructure	2.1

Digital Capabilities	59.2
Digital Literacy. Skills and Talent	60.7
Digital Privacy and Risk Awareness	57.6

Digital Regulation and Public Administration	53.7
Digital Public Administration	60.1
Digital Regulation	47.2

Digital Finance	43.4
General Financial System Maturity	22.0
Mobile Payments Systems	27.5
Access to Digital Banking and Finance	80.6

Digital Business

ICT Core Business	36.7
Hardware	18.5
Software	74.0
Telecommunications	17.8

Industry Digital Transformation	45.5
Digital Platforms Use	53.2
Digital Business Services	37.9

Digital Innovation	29.6
Digital Startup Environment	36.7
Digital Research & Development	22.5

Digital Society

Digital for Health and Education	69.6
Digital for Health	70.5
Digital for Education	68.7

Digital for Work and Training	76.2
Digitally-enabled Access to Opportunities	77.3
Digital Workplace	75.1

Digital for Social Inclusion	39.9
Internet Access	16.2
Digital Inclusion	39.4
Digital Social Connectivity & Civic Engagement	64.2

PHILIPPINES

DEN Average (N=50)
Scores 0-100 where 100 is the maximum
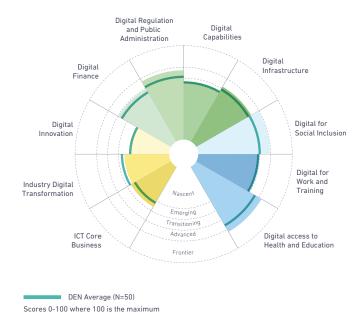
Digital Enablers

Digital Infrastructure	53.0
Coverage	79.9
Affordability	72.7
Data Infrastructure	6.4

Digital Capabilities	68.5
Digital Literacy. Skills and Talent	77.9
Digital Privacy and Risk Awareness	59.1

Digital Regulation and Public Administration	68.7
Digital Public Administration	64.6
Digital Regulation	72.9

Digital Finance	45.3
General Financial System Maturity	37.9
Mobile Payments Systems	39.9
Access to Digital Banking and Finance	58.0

Digital Business

| ICT Core Business	64.5
Hardware	100.0
Software	55.0
Telecommunications	38.4

Industry Digital Transformation	50.9
Digital Platforms Use	55.2
Digital Business Services	46.6

Digital Innovation	24.2
Digital Startup Environment	36.3
Digital Research & Development	12.1

Digital Society

Digital for Health and Education	80.6
Digital for Health	71.2
Digital for Education	89.9

Digital for Work and Training	77.9
Digitally-enabled Access to Opportunities	78.0
Digital Workplace	77.8

Digital for Social Inclusion	73.3
Internet Access	69.0
Digital Inclusion	68.3
Digital Social Connectivity & Civic Engagement	82.6

POLAND

DEN Average (N=50)
Scores 0-100 where 100 is the maximum

Digital Enablers
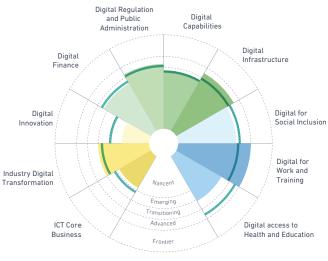
Digital Infrastructure	71.7
Coverage	87.8
Affordability	97.3
Data Infrastructure	30.0

Digital Capabilities	67.0
Digital Literacy. Skills and Talent	70.1
Digital Privacy and Risk Awareness	63.9

Digital Regulation and Public Administration	77.2
Digital Public Administration	71.0
Digital Regulation	83.4

Digital Finance	69.3
General Financial System Maturity	43.1
Mobile Payments Systems	81.6
Access to Digital Banking and Finance	83.2

Digital Business

ICT Core Business	56.0
Hardware	50.5
Software	66.2
Telecommunications	51.1

Industry Digital Transformation	54.5
Digital Platforms Use	62.9
Digital Business Services	46.1

Digital Innovation	49.7
Digital Startup Environment	44.0
Digital Research & Development	55.4

Digital Society

Digital for Health and Education	82.6
Digital for Health	89.5
Digital for Education	75.7

Digital for Work and Training	69.2
Digitally-enabled Access to Opportunities	69.4
Digital Workplace	69.0

Digital for Social Inclusion	79.5
Internet Access	83.0
Digital Inclusion	78.7
Digital Social Connectivity & Civic Engagement	76.6

QATAR

DEN Average (N=50)
Scores 0-100 where 100 is the maximum

Digital Enablers

Digital Infrastructure	74.5
Coverage	98.2
Affordability	97.4
Data Infrastructure	27.9

Digital Capabilities	67.2
Digital Literacy. Skills and Talent	69.1
Digital Privacy and Risk Awareness	65.2

Digital Regulation and Public Administration	73.2
Digital Public Administration	63.0
Digital Regulation	83.3

Digital Finance	63.7
General Financial System Maturity	53.0
Mobile Payments Systems	68.8
Access to Digital Banking and Finance	69.4

Digital Business

ICT Core Business	47.3
Hardware	30.9
Software	44.6
Telecommunications	66.4

Industry Digital Transformation	60.2
Digital Platforms Use	75.3
Digital Business Services	45.1

Digital Innovation	38.6
Digital Startup Environment	52.6
Digital Research & Development	24.6

Digital Society

Digital for Health and Education	61.5
Digital for Health	82.3
Digital for Education	40.7

Digital for Work and Training	80.2
Digitally-enabled Access to Opportunities	81.2
Digital Workplace	79.2

Digital for Social Inclusion	66.8
Internet Access	100.0
Digital Inclusion	36.2
Digital Social Connectivity & Civic Engagement	64.2

RWANDA

DEN Average (N=50)
Scores 0-100 where 100 is the maximum

Digital Enablers

Digital Infrastructure	32.5
Coverage	51.0
Affordability	42.1
Data Infrastructure	4.3

Digital Capabilities	56.6
Digital Literacy. Skills and Talent	52.6
Digital Privacy and Risk Awareness	60.6

Digital Regulation and Public Administration	71.3
Digital Public Administration	64.6
Digital Regulation	77.9

Digital Finance	45.9
General Financial System Maturity	15.9
Mobile Payments Systems	51.7
Access to Digital Banking and Finance	70.1

Digital Business
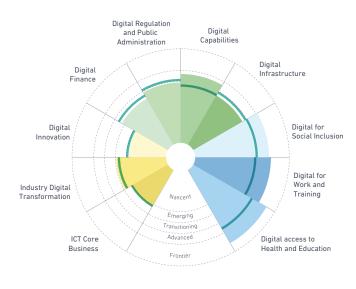
ICT Core Business	22.2
Hardware	9.3
Software	20.6
Telecommunications	36.7

Industry Digital Transformation	45.7
Digital Platforms Use	58.4
Digital Business Services	32.9

Digital Innovation	31.4
Digital Startup Environment	43.3
Digital Research & Development	19.5

Digital Society

Digital for Health and Education	75.9
Digital for Health	66.2
Digital for Education	85.5

Digital for Work and Training	63.3
Digitally-enabled Access to Opportunities	67.0
Digital Workplace	59.6

Digital for Social Inclusion	57.2
Internet Access	18.1
Digital Inclusion	76.4
Digital Social Connectivity & Civic Engagement	77.0

SAUDI ARABIA

DEN Average (N=50)

Scores 0-100 where 100 is the maximum

Digital Enablers

Digital Infrastructure	65.7
Coverage	90.1
Affordability	91.5
Data Infrastructure	15.6

Digital Capabilities	76.7
Digital Literacy. Skills and Talent	84.3
Digital Privacy and Risk Awareness	69.2

Digital Regulation and Public Administration	68.9
Digital Public Administration	67.4
Digital Regulation	70.5

Digital Finance	62.5
General Financial System Maturity	44.2
Mobile Payments Systems	67.1
Access to Digital Banking and Finance	76.3

Digital Business
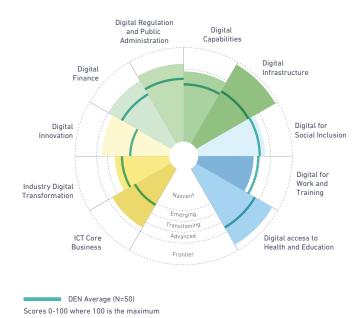
ICT Core Business	52.1
Hardware	38.5
Software	39.2
Telecommunications	78.6

Industry Digital Transformation	59.3
Digital Platforms Use	75.5
Digital Business Services	43.2

Digital Innovation	47.7
Digital Startup Environment	52.6
Digital Research & Development	42.8

Digital Society

Digital for Health and Education	91.2
Digital for Health	97.8
Digital for Education	84.6

Digital for Work and Training	83.1
Digitally-enabled Access to Opportunities	84.8
Digital Workplace	81.5

Digital for Social Inclusion	81.3
Internet Access	100.0
Digital Inclusion	74.4
Digital Social Connectivity & Civic Engagement	69.5

SINGAPORE

DEN Average (N=50)

Scores 0-100 where 100 is the maximum

Digital Enablers

Digital Infrastructure	97.4
Coverage	94.9
Affordability	99.3
Data Infrastructure	98.1

Digital Capabilities	78.0
Digital Literacy. Skills and Talent	83.5
Digital Privacy and Risk Awareness	72.6

Digital Regulation and Public Administration	85.0
Digital Public Administration	71.7
Digital Regulation	98.3

Digital Finance	79.6
General Financial System Maturity	70.4
Mobile Payments Systems	84.1
Access to Digital Banking and Finance	84.4

Digital Business
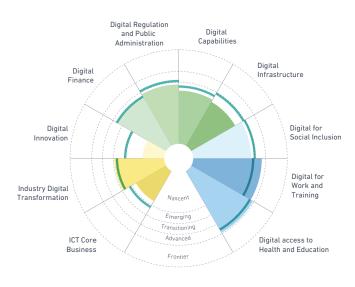
ICT Core Business	75.8
Hardware	99.5
Software	61.1
Telecommunications	66.7

Industry Digital Transformation	63.4
Digital Platforms Use	79.0
Digital Business Services	47.8

Digital Innovation	75.2
Digital Startup Environment	71.6
Digital Research & Development	78.8

Digital Society

Digital for Health and Education	94.1
Digital for Health	95.6
Digital for Education	92.5

Digital for Work and Training	64.4
Digitally-enabled Access to Opportunities	69.5
Digital Workplace	59.3

Digital for Social Inclusion	74.8
Internet Access	92.9
Digital Inclusion	65.8
Digital Social Connectivity & Civic Engagement	65.8

🇿🇦 SOUTH AFRICA

DEN Average (N=50)
Scores 0-100 where 100 is the maximum

Digital Enablers

Digital Infrastructure	60.0
Coverage	74.4
Affordability	89.6
Data Infrastructure	15.9

Digital Capabilities	62.3
Digital Literacy. Skills and Talent	59.9
Digital Privacy and Risk Awareness	64.7

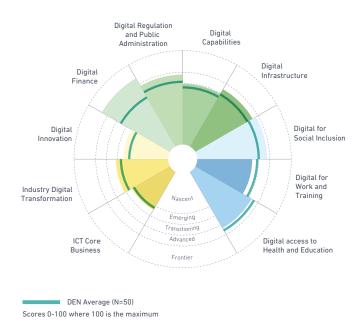| Digital Regulation and Public Administration	68.0
Digital Public Administration	61.1
Digital Regulation	75.0

Digital Finance	65.3
General Financial System Maturity	54.6
Mobile Payments Systems	67.8
Access to Digital Banking and Finance	73.6

Digital Business

ICT Core Business	45.5
Hardware	45.9
Software	44.0
Telecommunications	46.5

Industry Digital Transformation	59.1
Digital Platforms Use	62.6
Digital Business Services	55.6

Digital Innovation	33.2
Digital Startup Environment	39.5
Digital Research & Development	26.8

Digital Society

Digital for Health and Education	79.0
Digital for Health	79.2
Digital for Education	78.9

Digital for Work and Training	76.5
Digitally-enabled Access to Opportunities	75.8
Digital Workplace	77.2

Digital for Social Inclusion	66.6
Internet Access	68.4
Digital Inclusion	55.0
Digital Social Connectivity & Civic Engagement	76.5

🇪🇸 SPAIN

DEN Average (N=50)
Scores 0-100 where 100 is the maximum

Digital Enablers

Digital Infrastructure	74.3
Coverage	91.3
Affordability	98.7
Data Infrastructure	32.8

Digital Capabilities	69.4
Digital Literacy. Skills and Talent	72.1
Digital Privacy and Risk Awareness	66.6

Digital Regulation and Public Administration	77.8
Digital Public Administration	68.6
Digital Regulation	87.1

Digital Finance	86.0
General Financial System Maturity	80.3
Mobile Payments Systems	86.5
Access to Digital Banking and Finance	91.2

Digital Business
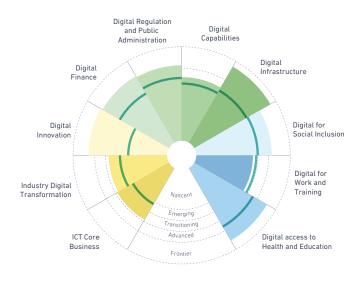
ICT Core Business	53.7
Hardware	43.4
Software	60.0
Telecommunications	57.9

Industry Digital Transformation	61.5
Digital Platforms Use	68.5
Digital Business Services	54.5

Digital Innovation	54.4
Digital Startup Environment	60.4
Digital Research & Development	48.4

Digital Society

Digital for Health and Education	73.3
Digital for Health	94.6
Digital for Education	52.1

Digital for Work and Training	64.0
Digitally-enabled Access to Opportunities	68.7
Digital Workplace	59.3

Digital for Social Inclusion	77.7
Internet Access	94.3
Digital Inclusion	70.0
Digital Social Connectivity & Civic Engagement	68.7

🇸🇪 SWEDEN

DEN Average (N=50)
Scores 0-100 where 100 is the maximum

Digital Enablers

Digital Infrastructure	94.2
Coverage	94.7
Affordability	98.2
Data Infrastructure	89.6
Digital Capabilities	**72.0**
Digital Literacy. Skills and Talent	79.4
Digital Privacy and Risk Awareness	64.5
Digital Regulation and Public Administration	**82.9**
Digital Public Administration	68.4
Digital Regulation	97.4
Digital Finance	**84.2**
General Financial System Maturity	77.5
Mobile Payments Systems	85.9
Access to Digital Banking and Finance	89.2

Digital Business
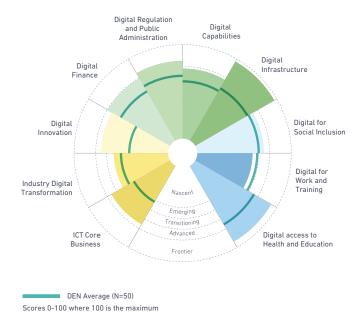
ICT Core Business	68.4
Hardware	59.9
Software	81.2
Telecommunications	64.0
Industry Digital Transformation	**67.2**
Digital Platforms Use	75.6
Digital Business Services	58.8
Digital Innovation	**85.8**
Digital Startup Environment	71.7
Digital Research & Development	99.9

Digital Society

Digital for Health and Education	90.5
Digital for Health	97.4
Digital for Education	83.5
Digital for Work and Training	**65.6**
Digitally-enabled Access to Opportunities	55.8
Digital Workplace	75.3
Digital for Social Inclusion	**82.9**
Internet Access	94.6
Digital Inclusion	90.9
Digital Social Connectivity & Civic Engagement	63.1

🇨🇭 SWITZERLAND

DEN Average (N=50)
Scores 0-100 where 100 is the maximum

Digital Enablers

Digital Infrastructure	92.4
Coverage	96.5
Affordability	99.2
Data Infrastructure	81.4
Digital Capabilities	**66.9**
Digital Literacy. Skills and Talent	69.5
Digital Privacy and Risk Awareness	64.2
Digital Regulation and Public Administration	**80.3**
Digital Public Administration	63.5
Digital Regulation	97.1
Digital Finance	**89.9**
General Financial System Maturity	93.9
Mobile Payments Systems	85.7
Access to Digital Banking and Finance	90.1

Digital Business
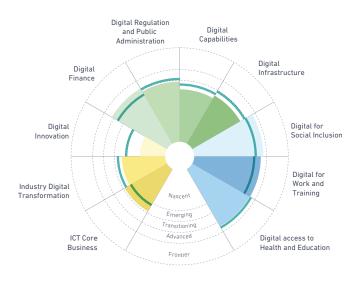
ICT Core Business	63.4
Hardware	52.3
Software	64.9
Telecommunications	73.0
Industry Digital Transformation	**64.0**
Digital Platforms Use	73.3
Digital Business Services	54.7
Digital Innovation	**82.1**
Digital Startup Environment	66.6
Digital Research & Development	97.7

Digital Society

Digital for Health and Education	72.1
Digital for Health	75.9
Digital for Education	68.3
Digital for Work and Training	**61.6**
Digitally-enabled Access to Opportunities	53.3
Digital Workplace	69.9
Digital for Social Inclusion	**71.6**
Internet Access	96.6
Digital Inclusion	61.2
Digital Social Connectivity & Civic Engagement	56.8

THAILAND

DEN Average (N=50)
Scores 0-100 where 100 is the maximum

Digital Enablers

Digital Infrastructure	64.5
Coverage	91.6
Affordability	90.4
Data Infrastructure	11.5

Digital Capabilities	61.7
Digital Literacy. Skills and Talent	64.7
Digital Privacy and Risk Awareness	58.6

Digital Regulation and Public Administration	68.8
Digital Public Administration	60.8
Digital Regulation	76.8

Digital Finance	72.1
General Financial System Maturity	73.1
Mobile Payments Systems	70.2
Access to Digital Banking and Finance	72.9

Digital Business

ICT Core Business	58.4
Hardware	81.2
Software	34.1
Telecommunications	60.1

Industry Digital Transformation	53.2
Digital Platforms Use	61.8
Digital Business Services	44.6

Digital Innovation	36.5
Digital Startup Environment	47.0
Digital Research & Development	26.0

Digital Society

Digital for Health and Education	74.3
Digital for Health	93.1
Digital for Education	55.4

Digital for Work and Training	74.7
Digitally-enabled Access to Opportunities	74.4
Digital Workplace	75.1

Digital for Social Inclusion	77.0
Internet Access	86.9
Digital Inclusion	62.6
Digital Social Connectivity & Civic Engagement	81.5

TUNISIA

DEN Average (N=50)
Scores 0-100 where 100 is the maximum

Digital Enablers

Digital Infrastructure	50.8
Coverage	61.5
Affordability	84.7
Data Infrastructure	6.2

Digital Capabilities	61.5
Digital Literacy. Skills and Talent	65.4
Digital Privacy and Risk Awareness	57.5

Digital Regulation and Public Administration	57.5
Digital Public Administration	47.1
Digital Regulation	68.0

Digital Finance	34.0
General Financial System Maturity	23.5
Mobile Payments Systems	16.0
Access to Digital Banking and Finance	62.6

Digital Business
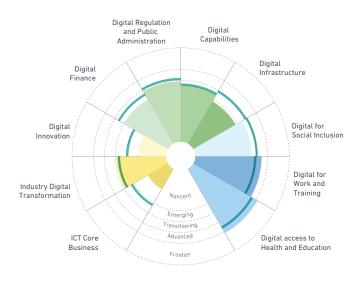
ICT Core Business	43.5
Hardware	42.8
Software	45.1
Telecommunications	42.7

Industry Digital Transformation	36.6
Digital Platforms Use	40.7
Digital Business Services	32.4

Digital Innovation	38.7
Digital Startup Environment	43.0
Digital Research & Development	34.3

Digital Society

Digital for Health and Education	65.6
Digital for Health	56.9
Digital for Education	74.3

Digital for Work and Training	65.1
Digitally-enabled Access to Opportunities	65.2
Digital Workplace	64.9

Digital for Social Inclusion	54.3
Internet Access	67.3
Digital Inclusion	39.8
Digital Social Connectivity & Civic Engagement	55.8

TÜRKIYE

DEN Average (N=50)

Scores 0-100 where 100 is the maximum

Digital Enablers

Digital Infrastructure	58.4
Coverage	72.3
Affordability	89.1
Data Infrastructure	13.9

Digital Capabilities	65.4
Digital Literacy. Skills and Talent	68.8
Digital Privacy and Risk Awareness	62.0

Digital Regulation and Public Administration	69.1
Digital Public Administration	65.6
Digital Regulation	72.5

Digital Finance	60.5
General Financial System Maturity	50.0
Mobile Payments Systems	65.6
Access to Digital Banking and Finance	66.0

Digital Business

ICT Core Business	34.9
Hardware	30.5
Software	42.0
Telecommunications	32.1

Industry Digital Transformation	59.0
Digital Platforms Use	67.0
Digital Business Services	51.1

Digital Innovation	39.0
Digital Startup Environment	46.4
Digital Research & Development	31.5

Digital Society

Digital for Health and Education	81.6
Digital for Health	88.3
Digital for Education	75.0

Digital for Work and Training	74.5
Digitally-enabled Access to Opportunities	75.0
Digital Workplace	74.0

Digital for Social Inclusion	65.3
Internet Access	82.5
Digital Inclusion	37.4
Digital Social Connectivity & Civic Engagement	76.1

UNITED ARAB EMIRATES

DEN Average (N=50)

Scores 0-100 where 100 is the maximum

Digital Enablers

Digital Infrastructure	80.1
Coverage	99.8
Affordability	99.3
Data Infrastructure	41.3

Digital Capabilities	71.8
Digital Literacy. Skills and Talent	76.4
Digital Privacy and Risk Awareness	67.3

Digital Regulation and Public Administration	75.5
Digital Public Administration	69.7
Digital Regulation	81.2

Digital Finance	67.1
General Financial System Maturity	48.6
Mobile Payments Systems	68.1
Access to Digital Banking and Finance	84.5

Digital Business
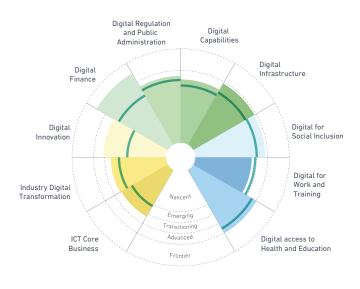
ICT Core Business	55.8
Hardware	40.5
Software	51.0
Telecommunications	76.0

Industry Digital Transformation	63.4
Digital Platforms Use	76.7
Digital Business Services	50.1

Digital Innovation	49.4
Digital Startup Environment	61.8
Digital Research & Development	37.0

Digital Society

Digital for Health and Education	88.4
Digital for Health	91.1
Digital for Education	85.8

Digital for Work and Training	80.6
Digitally-enabled Access to Opportunities	79.8
Digital Workplace	81.5

Digital for Social Inclusion	80.2
Internet Access	100.0
Digital Inclusion	60.7
Digital Social Connectivity & Civic Engagement	79.8

🇬🇧 UNITED KINGDOM

Digital Regulation and Public Administration
Digital Capabilities
Digital Finance
Digital Infrastructure
Digital Innovation
Digital for Social Inclusion
Industry Digital Transformation
Digital for Work and Training
ICT Core Business
Digital access to Health and Education

Nascent
Emerging
Transitioning
Advanced
Frontier

— DEN Average (N=50)
Scores 0-100 where 100 is the maximum

Digital Enablers

Digital Infrastructure	**78.4**
Coverage	88.1
Affordability	99.3
Data Infrastructure	47.8
Digital Capabilities	**71.7**
Digital Literacy. Skills and Talent	73.0
Digital Privacy and Risk Awareness	70.4
Digital Regulation and Public Administration	**75.0**
Digital Public Administration	53.2
Digital Regulation	96.8
Digital Finance	**89.3**
General Financial System Maturity	83.6
Mobile Payments Systems	89.9
Access to Digital Banking and Finance	94.5

Digital Business

ICT Core Business	**63.2**
Hardware	59.9
Software	60.9
Telecommunications	68.8
Industry Digital Transformation	**64.3**
Digital Platforms Use	68.2
Digital Business Services	60.5
Digital Innovation	**71.3**
Digital Startup Environment	70.9
Digital Research & Development	71.8

Digital Society
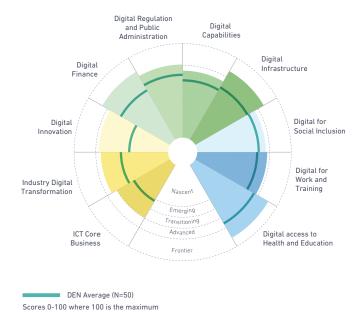
Digital for Health and Education	**80.5**
Digital for Health	85.9
Digital for Education	75.0
Digital for Work and Training	**65.4**
Digitally-enabled Access to Opportunities	70.4
Digital Workplace	60.4
Digital for Social Inclusion	**77.8**
Internet Access	94.1
Digital Inclusion	83.8
Digital Social Connectivity & Civic Engagement	55.4

🇺🇸 UNITED STATES

Digital Regulation and Public Administration
Digital Capabilities
Digital Finance
Digital Infrastructure
Digital Innovation
Digital for Social Inclusion
Industry Digital Transformation
Digital for Work and Training
ICT Core Business
Digital access to Health and Education

Nascent
Emerging
Transitioning
Advanced
Frontier

— DEN Average (N=50)
Scores 0-100 where 100 is the maximum

Digital Enablers

Digital Infrastructure	**86.1**
Coverage	98.5
Affordability	98.5
Data Infrastructure	61.4
Digital Capabilities	**75.0**
Digital Literacy. Skills and Talent	79.6
Digital Privacy and Risk Awareness	70.4
Digital Regulation and Public Administration	**80.7**
Digital Public Administration	66.1
Digital Regulation	95.3
Digital Finance	**85.5**
General Financial System Maturity	91.7
Mobile Payments Systems	84.1
Access to Digital Banking and Finance	80.6

Digital Business

ICT Core Business	**70.2**
Hardware	75.4
Software	59.7
Telecommunications	75.6
Industry Digital Transformation	**75.3**
Digital Platforms Use	75.8
Digital Business Services	74.7
Digital Innovation	**77.2**
Digital Startup Environment	71.1
Digital Research & Development	83.3

Digital Society

Digital for Health and Education	**90.9**
Digital for Health	97.5
Digital for Education	84.4
Digital for Work and Training	**77.8**
Digitally-enabled Access to Opportunities	80.6
Digital Workplace	75.0
Digital for Social Inclusion	**76.5**
Internet Access	96.4
Digital Inclusion	58.4
Digital Social Connectivity & Civic Engagement	74.6

ANNEX

DETAILED DEN FRAMEWORK

Dimension 1: Digital Enablers

⚙ Digital Infrastructure

A. Coverage

1.01 Access to electricity

I. Mobile broadband coverage

1.02 Population covered by 3G network
1.03 Population covered by 4G network
1.04 Population covered by 5G network

II. Broadband bandwidth

1.05 Fixed broadband speed
1.06 Mobile internet speed

B. Affordability

1.07 Smartphone affordability
1.08 Fixed broadband cost
1.09 Mobile broadband cost

C. Data Infrastructure

1.10 Number of internet exchange points
1.11 Number of data centers

≔ Digital Capabilities

A. Digital Literacy, Skills and Talent

2.01 Adult literacy rate

I. Basic digital literacy

2.02 Ability to perform basic digital operations
2.03 Basic ICT skills
2.04 Education system to teach digital and technological skills

II. Advanced digital literacy

2.05 Advanced ICT skills
2.06 University graduates in ICT programs

B. Digital Privacy and Risk Awareness

I. Protecting personal data

2.07 Personal data protection skills
2.08 Businesses personal data protection

II. Cybersecurity

2.09 Cybersecurity capacity development
2.10 Internet security incidents exposure
2.11 Internet security incidents prevention

🏛 Digital Regulation and Public Administration

A. Digital Public Administration

I. Digital administrative operations

3.01 Online payment of any government taxes, bills or fees
3.02 Online permitting applications
3.03 eProcurement

II. Digital ID and licensing

3.04 Access to digital ID or driving license
3.05 Digital licensing requests

III. Open data and transparency

3.06 Open data
3.07 Online public records requests

B. Digital Regulation

3.07 Overall regulatory quality

I. Data and consumer protection

3.08 Data protection & privacy legislations
3.09 Existence of consumer protection laws

II. Cybercrime and intellectual property

3.10 Existence of cybercrime legislations
3.11 Strength of intellectual property rights

III. ICT & digital business regulation

3.12 ICT companies regulations
3.13 Market openness for ISP companies
3.14 Digital transformation regulation
3.15 Existence of e-commerce laws

Dimension 1: Digital Enablers

Digital Finance

A. General Financial System Maturity

4.01 Financial system development
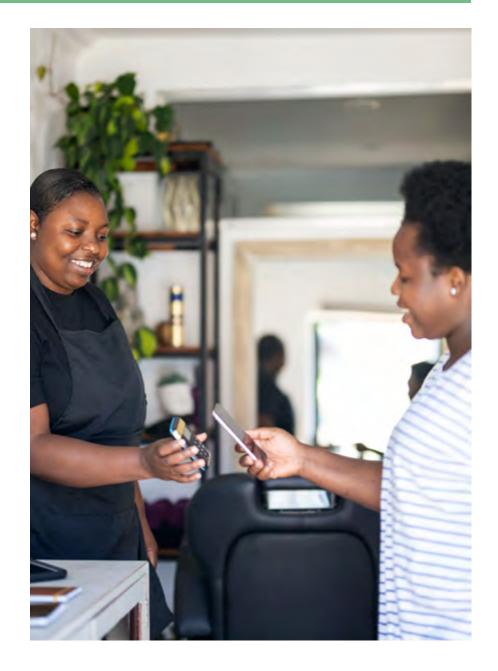
B. Mobile Payments Systems

4.02 Made digital payments
4.03 Digital merchant payments

C. Access to Digital Banking and Finance

4.04 Access to online banking services

I. Socioeconomic divide in access to digital finance

4.05 Difference in digital payments made between the richest and the poorest
4.06 Rural-urban gap of digital merchants payment

Dimension 2: Digital Business

📑 ICT Core Business

A. Hardware

5.01 Medium & high-tech exports (% of manufactured exports)

5.02 ICT goods imports (% of total imports)

B. Software

5.03 ICT service exports (% of service exports, BoP)

5.04 GitHub users per million people

C. Telecommunications

5.05 Revenue from all telecommunication services

I. Broadband bandwidth usage per internet user

5.06 Fixed broadband bandwidth usage per internet user

5.07 Mobile internet bandwidth usage per internet user

II. Broadband subscribers

5.08 Fixed broadband subscribers (per 100 people)

5.09 Mobile cellular subscribers (per 100 people)

↻ Industry Digital Transformation

A. Digital Platforms Use

6.01 Use of digital platforms for providing transportation, mobility and logistics

6.02 Use of digital platforms for providing hotels, restaurants, and leisure activities services

6.03 Use of digital platforms for providing care and healthcare services

6.04 Use of digital platforms for providing education services

6.05 Use of digital platforms for providing financial services

6.06 Use of digital platforms for providing professional services including technology support

B. Digital Business Services

6.07 Domain registrations

6.08 Frequency of e-commerce participation

6.09 Scope of e-commerce purchases

💡 Digital Innovation

A. Digital Startup Environment

7.01 New business density

7.02 Growth of innovative companies

7.03 Venture capital availability

B. Digital Research & Development

7.04 PCT patent applications

7.05 Journal publications in the field of computer science

7.06 High-performance computing resources

Dimension 3: Digital Society

Digital for Health and Education

A. Digital for Health

I. Legal framework, policy and compliance

8.01 Digital health framework for data protection, privacy, confidentiality and device compliance

II. Access to digital health

8.02 Booking a doctor consult online

8.03 Participating in a remote interaction with a doctor

III. Gender gaps in digital health access

8.04 Booking a doctor consult online: gender gap

8.05 Participating in a remote interaction with a doctor: gender gap

B. Digital for Education

I. Digital access to education

8.06 Digital access to education

II. Access to online resources and training for studies

8.07 Access to online resources to study effectively

8.08 Digital training for studies

III. Gender gaps in digital education

8.09 Digital access to education: gender gap

8.10 Access to online resources to study effectively: gender gap

8.11 Digital training for studies: gender gap

Digital for Work and Training

A. Digitally-enabled Access to Opportunities

I. Digital access to employment and training

9.01 Digitally-enabled access to employment

9.02 Online work-related training

II. Gender gaps in digital access to opportunities

9.03 Digitally-enabled access to employment: gender gap

9.04 Online work-related training: gender gap

III. Gig economy working conditions

9.05 Impact of the online gig economy on working conditions

B. Digital Workplace

I. Workplace digitalization

9.06 Digitalization of the workplace

9.07 Digital training at work

II. Gender gaps in workplace digitalization

9.08 Digitalization of the workplace: gender gap

9.09 Digital training at work: gender gap

III. Flexible workplace

9.10 Flexibility of working arrangements

Digital for Social Inclusion

A. Internet Access

10.01 Share of people with access to the Internet

B. Digital inclusion

I. Rural population

10.02 Rural-urban gap of basic ICT skills

II. Gender gap in internet access

10.03 difference between male and female in percentage of population using internet

10.04 Gender gap of basic ICT skills

III. Disabilities

10.05 Presence of web accessibility laws

10.06 Universal access/service policy

C. Digital Social Connectivity & Civic Engagement

I. Digital social connections

10.07 Connection with family and friends

10.08 Meeting new people

II. Civil society digital participation

10.09 E-Participation Index

10.10 Digital social activism

III. Gender gaps in digital social connectivity

10.11 Connection with family and friends: gender gap

10.12 Meeting new people: gender gap

10.13 Digital social activism: gender gap

SECONDARY DATA INDICATORS

Indicator number	Indicator (unit)	Source | Year	Definition
1.01	Access to electricity (percentage of population)	The World Bank | 2022	Defined as the availability and provision of electrical power to households, communities, and businesses, allowing them to use electrical appliances and devices for various purposes.
1.02	Population Covered by 3G Network (percentage of population)	International Telecommunication Union (ITU) | 2023	Defined as the percentage of inhabitants that are within range of at least a 3G mobile-cellular signal, irrespective of whether or not they are subscribers. This is calculated by dividing the number of inhabitants that are covered by at least a 3G mobile-cellular signal by the total population and multiplying by 100.[85]
1.03	Population Covered by 4G Network (percentage of population)	International Telecommunication Union (ITU) | 2023	Defined as the percentage of inhabitants that are within range of at least a 4G/LTE mobile-cellular signal, irrespective of whether or not they are subscribers. This is calculated by dividing the number of inhabitants that are covered by at least a 4G/LTE mobile-cellular signal by the total population and multiplying by 100.[86]
1.04	Population Covered by 5G Network (percentage of population)	International Telecommunication Union (ITU) | 2023	Defined as the percentage of inhabitants that are within range of at least a 5G mobile-cellular signal, irrespective of whether or not they are subscribers. This is calculated by dividing the number of inhabitants that are covered by at least a 5G mobile-cellular signal by the total population and multiplying by 100.[87]

85. *Definition taken directly from International Telecommunication Union (2010), "Definitions of World Telecommunication/ICT Indicators". Available at: Microsoft Word - TelecomICT Indicators Definition_March2010_for web.doc (itu.int).*
86. *Ibid.*
87. *Ibid.*

Indicator number	Indicator (unit)	Source | Year	Definition
1.05	Fixed broadband speed (Mbps*)	Ookla | 2024	Defined as the speed at which data are transferred between a user's device and a fixed point on the internet. Fixed broadband speed is measured in megabits per second (Mbps) for both download and upload speed. Download speed refers to how fast data can be transferred from the internet to a user's device, while upload speed refers to how fast data can be transferred from a user's device to the internet.
1.06	Mobile internet speed (Mbps*)	Ookla | 2024	Defined as the speed at which data are transferred between a user's device and a cellular tower or other point on a mobile network. Mobile internet speed is measured in megabits per second (Mbps) for both download and upload speed. Download speed refers to how fast data can be transferred from the mobile network to a user's device, while upload speed refers to how fast data can be transferred from a user's device to the mobile network.
1.07	Smartphone affordability (ratio of smartphone cost to average income)	Alliance for Affordable Internet (A4AI) | 2022	Defined as the price of the cheapest smartphone in the country, expressed as a percentage of the average monthly income in that country.
1.08	Fixed broadband cost (GNIpc)	International Telecommunication Union (ITU) | 2023	Defined as the price of a monthly subscription to an entry-level fixed-broadband plan. It is calculated as a percentage of a country's average monthly GNI per capita and is also presented in US dollars and purchasing power parities (PPPs). [88]
1.09	Mobile broadband cost (GNIpc)	International Telecommunication Union (ITU) | 2023	Defined as the price of the data-only mobile broadband basket, based on a monthly usage of a minimum of 2GB, expressed as percentage of gross national income per capita.[89]

88. *Definition taken directly from International Telecommunication Union, "ICT Price Basket Methodology". Available at: ICT Price Basket Methodology (itu.int)*
89. *Definition taken directly from International Telecommunication Union, (2021) "The affordability of ICT services". Available at: The affordability of ICT services 2021 (itu.int)*

Indicator number	Indicator (unit)	Source | Year	Definition
1.10	Number of internet exchange points (rescaled per million population**)	IXP Database (IXPDB) | 2024	Defined as the physical infrastructure that allows different internet service providers to exchange internet traffic between their networks. Internet exchange points (IXPs) can reduce the cost and latency of internet connectivity by keeping local traffic local instead of routing it through international links.
1.11	Number of data centers (rescaled per million population**)	Data Center Map | 2024	Defined as the number of facilities within a country that house servers, storage devices, and networking equipment that store and process data.
2.01	Adult literacy rate (percentage of population)	The World Bank | 2022	Defined as the percentage of people ages 15 and above who can both read and write, as well as understand a short, simple statement about their everyday life.
2.04	Education system to teach digital and technological skills (survey score)	World Economic Forum Executive Opinion Survey | 2022	In your country, how well does the current education system meet the skills needs of a competitive economy? Digital and technology skills [1 = Not at all; 7 = To a great extent]
2.06	University graduates in ICT programs (share of total graduates, rescaled per million population***)	United Nations Educational, Scientific and Cultural Organization | 2022	Defined as the share of total number of university graduates who have completed ICT programs during their education.
2.08	Businesses personal data protection (survey score)	World Economic Forum Executive Opinion Survey | 2022	In your country, to what extent is there effective regulation that protects personal data held by private companies? [1 = Not at all; 7 = To a great extent]

Indicator number	Indicator (unit)	Source | Year	Definition
2.09	Cybersecurity capacity development (composite score)	International Telecommunication Union (ITU) | 2020	Capacity development pillar from the ITU Cybersecurity Index.[90]
3.03	eProcurement (yes/no)	The World Bank | 2022	Defined as the use of electronic systems and tools to conduct public procurement processes, such as publishing tender notices, receiving bids, evaluating proposals, awarding contracts, and monitoring performance.
3.06	Open data (composite score)	Open Data Inventory | 2022	The Open Data Inventory (ODIN) assesses the coverage and openness of official statistics to identify gaps, promote open data policies, improve access, and encourage dialogue between national statistical offices (NSOs) and data users.
3.08	Overall regulatory quality (composite score)	World Bank | 2022	Defined as the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development. It is measured by an aggregate indicator that captures perceptions of the incidence of market-unfriendly policies such as price controls, inadequate bank supervision, and burdensome regulations on foreign trade and business development.[91]
3.09	Data protection & privacy legislations (yes/draft/no)	United Nations Conference on Trade and Development (UNCTAD) | 2024	Defined as a body of legal rules that regulates the collection, processing, storage, transfer, and use of personal data by public or private entities. Data protection and privacy legislations aim to protect the rights and freedoms of individuals with regard to their personal data, such as their right to access, rectify, erase, or object to the processing of their data.

90. *Definition taken directly from International Telecommunication Union, (2020) Global Cybersecurity Index. Available at: Global Cybersecurity Index 2020 (itu.int)*
91. *Definition taken directly from International Telecommunication Union, (2020) Global Cybersecurity Index. Available at: Global Cybersecurity Index 2020 (itu.int)*

Indicator number	Indicator (unit)	Source | Year	Definition
3.10	Existence of consumer protection laws (yes/draft/no)	United Nations Conference on Trade and Development (UNCTAD) | 2024	Defined as a body of legal rules and regulations that protect consumers from unfair or deceptive practices by businesses or other actors in the market. Consumer protection laws may cover various aspects of consumer transactions, such as product safety, quality standards, warranties, contracts, advertising, pricing, competition, dispute resolution, and redress mechanisms.
3.11	Existence of cybercrime legislations (yes/draft/no)	United Nations Conference on Trade and Development (UNCTAD) | 2024	Defined as a body of legal rules and regulations that address criminal activities committed in the digital realm or through the use of computer systems and networks. Cybercrime legislation offers a framework to combat various forms of criminal activities in the digital space, such as hacking, identity theft, online fraud, cyberbullying, and the spread of malware.
3.12	Strength of intellectual property rights (composite score)	Property Rights Alliance | 2023	Defined as legal protections granted to individuals or entities for their intellectual inventions. They grant exclusive legal control over the use, reproduction, distribution, and exploitation of these inventions.
3.13	ICT companies regulation (composite score)	International Telecommunication Union (ITU) | 2022	A composite score based on countries' ICT regulatory landscape.
3.14	Market openness for ISP companies (no/partial/full)	International Telecommunication Union (ITU) | 2022	Defined as the degree of competition and regulatory conditions within a country's telecommunications and internet service market, including various factors such as entry barriers, access to infrastructure, regulatory framework, transparency and fairness, or consumer rights.
3.15	Digital transformation regulation (composite score)	International Telecommunication Union (ITU) | 2023	This indicator is based on the G5 regulation benchmark of the ITU that emphasizes collaboration between governments, regulators, industry, and other stakeholders to enable digital transformation.

Indicator number	Indicator (unit)	Source | Year	Definition
3.16	Existence of eCommerce laws (yes/no)	United Nations Conference on Trade and Development (UNCTAD) | 2024	Defined as a body of legal rules and regulations that facilitate e-commerce by providing a legal framework for recognizing electronic communications, electronic records, and electronic signatures.
4.01	Financial system development (composite score)	IMF | 2021	This composite indicator measures how developed financial institutions and financial markets are in terms of their depth, access, and efficiency. These indices are aggregated into an overall index of financial development.[92]
4.02	Made digital payments (percentage of population)	The World Bank | 2021	Defined as the percentage of respondents above 15 years old who report using a debit or credit card, a mobile phone, or mobile money to make a payment from an account; or who report using the internet to pay bills or to buy something online or in a store in the past year. This includes respondents who report paying bills or sending remittances directly from a financial institution account or through a mobile money account in the past year.
4.05	Difference in digital payments made between the richest and the poorest (absolute difference in percentage)	The World Bank | 2021	Defined as the difference between the percentage of respondents above 15 years old falling in the highest 60% within-economy household income quintile versus lowest 40% within-economy household income quintile who report using a debit or credit card, a mobile phone, or mobile money to make a payment from an account; or who report using the internet to pay bills or to buy something online or in a store in the past year. This includes respondents who report paying bills or sending remittances directly from a financial institution account or through a mobile money account in the past year.
5.01	Medium and high-tech exports (percentage of manufactured exports)	United Nations Industrial Development Organization (UNIDO), Competitive Industrial Performance (CIP) database | 2022	Defined as the percentage of merchandise exports that are classified as medium and high-technology products. Medium and high-technology products are products with high R&D intensity, such as aerospace, computers, pharmaceuticals, scientific instruments, and electrical machinery.

92. *Definition taken directly from IMF, (2023) Financial Development Index. Available at: https://db.nomics.world/IMF/FDI*

Indicator number	Indicator (unit)	Source | Year	Definition
5.02	ICT goods imports (percentage of total imports)	UNCTAD | 2022	Defined as the percentage of total merchandise imports that are classified as information and communication technology (ICT) goods. ICT goods include telecommunications equipment, computers and peripheral equipment, electronic components, audio and video equipment, and other ICT goods.
5.03	ICT services exports (percentage of service exports, BoP)	UNCTAD | 2023	Defined as the value of exports of ICT services in current US dollars. ICT services include computer and information services, telecommunications services, and other information services.
5.04	GitHub developers per million people (rescaled per million population**)	GitHub (user-created repository at https://github.com/gayanvoice/top-github-users | 2024	The developers metric represents the number of developer accounts on GitHub in a given economy. This count excludes users that are bots or otherwise flagged as "spammy" within GitHub internal systems.
5.05	Revenue from all telecommunication services (rescaled per PPP$, GDP millions**)	International Telecommunication Union (ITU) | 2022	Defined as the average revenue per person generated by all telecommunication services in a given country or region. Telecommunication services include fixed telephone, mobile cellular, fixed broadband, mobile broadband, and other telecommunication services.
5.06	Fixed broadband bandwidth usage per internet user (MB)	International Telecommunication Union (ITU) | 2023	Defined as the amount of data transmitted and received by an individual over a fixed broadband connection, measured in megabytes. Fixed broadband encompasses high-speed internet usage delivered through wired technologies such as cable, fiber-optic, or Ethernet.
5.07	Mobile internet bandwidth usage per internet user (MB)	International Telecommunication Union (ITU) | 2023	Defined as the amount of data transmitted and received by an individual over a mobile internet connection domestically, measured in megabytes. This encompasses internet access via wireless networks such as cellular technology.

Indicator number	Indicator (unit)	Source | Year	Definition
5.08	Fixed broadband subscription (per 100 people) (percentage of population)	International Telecommunication Union (ITU) | 2023	Refers to fixed subscriptions to high-speed access to the public Internet (Transmission Control Protocol/ Internet Protocol connection), at downstream speeds equal to, or greater than, 256 kbit/s. This includes cable modem, Digital Subscriber Line (DSL), fiber-to-the-home/building, other fixed (wired)-broadband subscriptions, satellite broadband, and terrestrial fixed wireless broadband.[93]
5.09	Mobile cellular subscription (per 100 people) (percentage of population)	International Telecommunication Union (ITU) | 2023	Defined as subscriptions to a public mobile telephone service that provides access to the PSTN–public switched telephone network, a combination of telephone networks used worldwide–using cellular technology. The indicator applies to all mobile cellular subscriptions that offer voice communications.[94]
6.01	Use of digital platforms for providing transportation, mobility and logistics (survey score)	World Economic Forum Executive Opinion Survey | 2022	In your country, to what extent are digital platforms**** used to provide the following services: transportation, mobility, and logistics? [1=Not at all, 7=To a great extent]
6.02	Use of digital platform for providing hotels, restaurants and leisure activities services (survey score)	World Economic Forum Executive Opinion Survey | 2022	In your country, to what extent are digital platforms**** used to provide the following service: Hotels, restaurants, and leisure activities? [1=Not at all, 7=To a great extent]
6.03	Use of digital platforms for providing care and healthcare services (survey score)	World Economic Forum Executive Opinion Survey | 2022	In your country, to what extent are digital platforms**** used to provide the following service: Care and healthcare? [1=Not at all, 7=To a great extent]
6.04	Use of digital platform for providing education services (survey score)	World Economic Forum Executive Opinion Survey | 2022	In your country, to what extent are digital platforms**** used to provide the following service? Education [1=Not at all, 7=To a great extent]
6.05	Use of digital platform for providing financial services (survey score)	World Economic Forum Executive Opinion Survey | 2022	In your country, to what extent are digital platforms**** used to provide the following service? Financial [1=Not at all, 7=To a great extent]

93. *Definition taken directly from International Telecommunication Union, "World Telecommunication/ICT Indicators Database". Available at: https://databank.worldbank.org/metadataglossary/all/series*
94. *Ibid.*

Indicator number	Indicator (unit)	Source | Year	Definition
6.06	Use of digital platforms for providing professional services including technology support (survey score)	World Economic Forum Executive Opinion Survey | 2022	In your country, to what extent are digital platforms**** used to provide the following service: professional services including technology support? [1=Not at all, 7=To a great extent]
6.07	Domain registrations (rescaled per PPP$ GDP millions**)	Domain Name Stat | 2024	Defined as the number of registered domain names under various top-level domains (TLDs). TLDs are segments of domain names that appear at the end of web addresses, such as .com, .org, .net, .edu, etc. Domain registrations reflect the number of active domain names at a given point in time.
7.01	New business density (new registrations per 1,000 people aged 15-64*)	The World Bank | 2022	New limited liability corporations (or its equivalent) registered in the calendar year per 1,000 people ages 15-64.
7.02	Growth of innovative companies (survey score)	World Economic Forum Executive Opinion Survey | 2022	In your country, to what extent do new companies with innovative ideas grow rapidly and can disrupt established firms in their markets? [1 = Not at all; 7 = To a great extent]
7.03	Venture capital availability (survey score)	World Economic Forum Executive Opinion Survey | 2022	In your country, how easy is it for start-up entrepreneurs with innovative but risky projects to obtain equity funding? [1 = Extremely difficult; 7 = Extremely easy]
7.04	PCT patent applications (rescaled per PPP$ GDP billions**)	World Intellectual Property Organization | 2023	Defined as applications filed under the Patent Cooperation Treaty (PCT), an international patent law treaty that provides a unified procedure for filing patent applications in 157 countries. PCT patent applications allow applicants to seek patent protection internationally for their inventions, while delaying the costs and complexities of national patent filings.
7.05	Journal publications in the field of computer science (rescaled per PPP$ GDP billions**)	Scimago Journal and Country Rank | 2023	Refers to articles and research papers published in academic journals dedicated to topics in the field of computer science and related sub-fields.
7.06	High-performance computing resources (rescaled per PPP$ GDP billions**)	TOP500 | 2024	Defined as computing systems that have exceptional processing power, memory capacity, and speed, enabling them to perform complex calculations and simulations at high levels of performance. High-performance computing resources are ranked based on the LINPACK benchmark, which measures the floating-point computing power of a system by solving a dense system of linear equations.

Indicator number	Indicator (unit)	Source | Year	Definition
8.01	Digital health framework for data protection, privacy, confidentiality and device compliance (composite score)	Digital Health Monitor | 2023	Composite indicator from pillar 3 of the Digital Health Monitor, measuring the presence of a law on data security relevant to digital health, the presence a law to protect individual privacy, governing ownership, consent, access and sharing of individually identifiable digital health data, and the presence of protocols, policies, frameworks or accepted processes governing the clinical and patient care use of connected medical devices and health services.
9.05	Impact of the online gig economy on working conditions (survey score)	World Economic Forum Executive Opinion Survey | 2022	In your country, what is the impact of the online gig economy on working conditions (e.g. working time, remuneration stability)? [1=Significantly worsens working conditions; 7=Significantly improves working conditions]
9.10	Flexibility of working arrangements (survey score)	World Economic Forum Executive Opinion Survey | 2022	In your country, to what extent do companies offer flexible working arrangements such as remote, hybrid and part-time work? [1=Not at all; 7= To a great extent]
10.01	Internet access (percentage)	International Telecommunication Union (ITU) | 2023	Refers to the proportion of individuals who accessed the Internet from any location in the last three months. Access can be via a fixed or mobile network.[95]
10.03	Gender gap in population using the internet (percentage)	International Telecommunication Union (ITU) | 2022	Defined as the percentage of the male population using the Internet access minus the percentage of the female population using the Internet.
10.05	Presence of web accessibility laws (yes/no)	W3C Web Accessibility Initiative | 2023	Defined as a body of legal rules and regulations related to web accessibility that require or encourage websites and web applications to be accessible and usable by people with disabilities.
10.06	Universal access/service policy (yes/no)	International Telecommunication Union (ITU) | 2022	Defined as whether a country has a policy or a legal framework that aims to provide universal access or service to ICTs for all citizens, especially those in rural, remote, and underserved areas.
10.09	E-Participation Index (composite score)	United Nations Department of Economic and Social Affairs | 2022	The E-Participation Index (EPI) is a supplementary index to the United Nations E-Government Survey that measures the extent and quality of online citizen participation in public policymaking. The EPI is composed of three components: e-information, e-consultation, and e-decision making. These reflect different levels of engagement between governments and citizens through online platforms.

*   Denotes a logarithmic transformation was applied to mitigate the impact of outliers.

**   Indicators that were not originally rescaled by a size unit have been rescaled using each country's PPP$ GDP millions or billions, or per million population (from the World Development Indicators database, World Bank Group), and log-transformed.

*** Indicators rescaled by each country's per million population, from the World Development Indicators database, World Bank Group

****Digital platforms refer to services and labor markets available through a digital interface, often focused on short-term contracts and task-based work.

PRIMARY DATA INDICATORS

Source: DEN Survey 2023

Indicator number	Indicator	Survey question
	Digital Society Digital for Social Inclusion	**1.** In the last 12 months, have you used a digital device to engage in any of the following activities? **Yes (1)** **No (0)**
10.07: a **10.11: a** **10.08: b** **10.12: b** **10.10: c** **10.13: c**	**10.07** Connection with family and friends **10.11** Connection with family and friends: gender gap **10.08** Meeting new people **10.12** Meeting new people: gender gap **10.10** Digital social activism **10.13** Digital social activism: gender gap	**a.** Stay connected with family, friends, and colleagues **b.** Meet new people **c.** Engage in or organize action around an important issue (e.g. political, social, cultural). **d.** Engage in or organize action around a sustainability issue (e.g. recycling schemes, energy conservation projects, reforestation initiatives)
2.02	**Digital Enablers** Digital Capabilities **2.02** Ability to perform basic digital operations	**2.** To what extent do you feel confident performing the following actions online using (any of) your digital devices? **I.** Not confident at all **II.** A little confident **III.** Somewhat confident **IV.** Generally confident **V.** Completely confident. **a.** Using a web browser **b.** Communicating with relatives, friends, or colleagues **c.** Using social media (e.g. Facebook, Instagram, X (formerly Twitter), WeChat, TikTok, etc.) **d.** Protecting your personal data (e.g. by means of passwords) **e.** Protecting your device from viruses or other possible computer infections

Indicator number	Indicator	Survey question
	Digital Enablers	ICT stands for information and communications technology.
	Digital Capabilities	**3.** Which of the following ICT tasks are you able to perform on (any of) your digital devices?
2.03: a-f	**2.03** Basic ICT skills	
2.05: g-i	**2.05** Advanced ICT skills	**Yes (1)**
		No (0)
	Digital Society	**a.** Send emails with attached files (e.g. documents, pictures, videos)
	Digital for Social Inclusion	**b.** Post messages online (e.g. social media, chat rooms, newsgroups or forums)
10.02: a-f	**10.02** Rural-urban gap of basic ICT skills	**c.** Transfer files between devices (e.g. Airdrop, WeTransfer, digital cameras, mobile phone)
10.04: a-f	**10.04** Gender gap of basic ICT skills	**d.** Use word processing software (e.g. Microsoft Word)
		e. Use spreadsheet software (e.g. Microsoft Excel)
		f. Use software for creating presentations (e.g. Microsoft PowerPoint)
		g. Download, install, or change settings of software, apps, or device operating systems
		h. Create a website using website builders (e.g. WordPress, Squarespace)
		i. Computer programming using a specialized language (e.g. PHP, Python, C++ , html, CSS).
	Digital Society	**5.** In the last 12 months, have you used any of the following online healthcare services (including for mental health)?
	Digital for Health and Education	**Yes (1)**
8.02: a	**8.02** Booking a doctor consult online)	**No (0)**
8:04: a	**8.04** Booking a doctor consult online: gender gap	**a.** Online booking system to schedule a medical appointment
8.03: b	**8.03** Participating in a remote interaction with a doctor	**b.** Remote medical consultation (e.g. via video conferencing, or other communications media)
8.05: b	**8.05** Participating in a remote interaction with a doctor: gender gap	**c.** Patient portals—e.g. for managing prescriptions, test results, uploading medical information, tracking progress
		d. Doctor-prescribed wearable devices (e.g. sleep monitors, blood pressure checks, monitors of vital signs, remote biometrics scanners, and tracking drug efficiency).
		5.1 Follow-up question for each answered with Yes (1)
		How satisfied are you with the service?
		I. Very dissatisfied
		II. Somewhat dissatisfied
		III. Neither satisfied nor dissatisfied
		IV. Somewhat satisfied
		V. Very satisfied.
		5.2. Follow up question for each answered with No (0)
		Why have you not used this service?
		I. I did not need to use it
		II. It is not available where I live.
		III. I do not have access due to lacking an internet connection, or the necessary digital devices.
		IV. The service is too complicated to use.
		V. Other reason(s).

Indicator number	Indicator	Survey question
	Digital Enablers	6. In the last 12 months, have you used any of the following digital government services?
	Digital Regulation and Public Administration	**Yes (1)** **No (0)**
3.01: a	**3.01** Online payment of any government taxes, bills or fees	**a.** Online payment of taxes, government bills or fees (e.g. traffic violation, vehicle registration fees, import duties).
3.02: d	**3.02** Online permitting applications	**b.** Digital ID or digital driving license
3.04: b	**3.04** Access to digital ID or driving license	**c.** Online administrative licensing requests (e.g. residency, business licenses)
3.05: c	**3.05** Digital licensing requests	**d.** Online permit applications (e.g. construction permits, parking permits, recreational permits).
3.07: e	**3.07** Online public records requests	**e.** Online public records requests
		f. Accessed information about sustainability-related services (e.g. waste and recycling, energy efficiency, biodiversity protection and management).
		6.1 Follow-up question for each answered with Yes (1).
		How effective did you find the online service to be?
		I. Very ineffective **II.** Ineffective **III.** Neither ineffective nor effective **IV.** Effective **V.** Very effective.
		6.2 Follow up question for each answered with No (0).
		Why have you not used this service?
		I. I did not need to use it **II.** It is not available where I live. **III.** I do not have access due to lacking an internet connection, or the necessary digital devices. **IV.** The service is too complicated to use. **V.** Other reason(s).

Indicator number	Indicator	Survey question
	Digital Society Digital for Health and Education	**7.** Select one of the below options for each question.
8.06: a	**8.06** Digital access to education	**I.** Not at all
8.07: d	**8.07** Access to online resources to study effectively	**II.** Very little **III.** Somewhat
8.08: c	**8.08** Digital training for studies	**IV.** Very much/well
8.09: a	**8.09** Digital access to education: gender gap	**V.** Completely
8.10: c	**8.10** Access to online resources to study effectively: gender gap	**VI.** I don't know/ Not applicable.
8.11: c	**8.11** Digital training for studies: gender gap	**a.** In the last 12 months, to what extent, if any, have digital technologies allowed you to access employment/study courses?
	Digital Society Digital for Work and Training	**b.** In the last 12 months, to what extent, if any, has your employer/education provider been introducing new digital technologies into the workplace?
9.01: a	**9.01** Digitally-enabled access to employment	**c.** To what extent, if any, do you feel appropriately trained to use digital technologies to work/study?
9.03: a	**9.03** Digitally-enabled access to employment: gender gap	**d.** To what extent, if any, do you have access to the digital resources you need to perform your job/studies effectively (e.g. communication and collaboration platforms, such as Slack, Microsoft Teams, or enterprise tools such as CRM, HR, or ERP software)?
9.06: b	**9.06** Digitalization of the workplace	**e.** To what extent, if any, have digital technologies improved your productivity or effectiveness at work/school.
9.08: b	**9.08** Digitalization of the workplace: gender gap	
9.07: c	**9.07** Digital training at work	
9.09: c	**9.09** Digital training at work: gender gap	
	Digital Society Digital for Work and Training	**8.** In the last 12 months, which of the following work- and/or education-related digital activities have you engaged in?
9.02: a	**9.02** Online work-related training	**Yes (1)** **No (0)** **Does not apply**
9.04: a	**9.04** Online work-related training: gender gap	**a.** Online training/education course leading to a certificate or formal degree **b.** Online collaboration with colleagues/peers on a work- and/or education-related task **c.** Automating education- and/or work-related tasks using generative AI **d.** Automated tasks in word processing spreadsheet or design software (e.g. writing standardized text for emails, retrieving and updating data using spreadsheets) **e.** Looking for and/or applying for jobs online.

Indicator number	Indicator	Survey question

2.07	**Digital Enablers**
	
	Digital Capabilities
	
	2.07 Personal data protection skills
		Cyber-crime often involves the exploitation of personal data shared online, through activities like phishing, financial fraud, or identity theft.
		
		9. Which of the following strategies, if any, do you use to protect yourself against cyber-crime? (Select all that apply)
		
		   a. Making sure emails/links/attachments are from a trustworthy source before opening them
		   b. Making sure only necessary personal details are publicly visible (by adjusting privacy settings on digital devices, using social media accounts or apps in private mode)
		   c. Avoiding public Wi-Fi to access or transfer sensitive information
		   d. Using password manager software
		   e. Installing security software/a firewall
		   f. Other cyber-safety measure
		   g. I don't take any active cyber-safety measures.

2.10	**Digital Enablers**
	
	Digital Capabilities
	
	2.10 Internet security incidents exposure
		10. In the last 12 months, have you experienced any of the following internet security incidents?
		
		Yes (1)
		No (0)
		
		   a. Loss of information, time, or damage to device, due to virus (e.g. Trojan, or worm)
		   b. Cyber-bullying and/or other privacy violations (e.g. abuse of pictures, videos, personal data uploaded online)
		   c. Financial loss as a result of receiving fraudulent messages (phishing) or getting redirected to fake websites asking for personal information (pharming)
		   d. Financial loss due to fraudulent credit or debit card use
		   e. Received information that personal data was involved in a cybersecurity breach
		   f. Experienced a ransomware attack on computer or a service.

2.11	**Digital Enablers**
	
	Digital Capabilities
	
	2.11 Internet security incidents prevention
		11. Which of the following actions do you take to prevent the security incident(s) mentioned in the previous question? (Select all that apply)
		
		   a. Changed password(s)
		   b. Installed/subscribed to protection software
		   c. Stopped providing personal information on social networks
		   d. Notified an authority (e.g. police, data protection authority, bank)
		   e. Started carefully reading terms and conditions for online services
		   f. Other action taken (optional)
		   g. No actions taken.

Indicator number	Indicator	Survey question

6.08
 	
4.03
4.06
	Digital Business
	
	Industry Digital Transformation
	
	    6.08 Frequency of e-commerce participation
	
	Digital Enablers
	
	Digital Finance
	
	    4.03 Digital merchant payments
	
	    4.06 Rural-urban gap of digital merchants' payments
		12. How frequently do you purchase goods or services online?
		
		    a. Never
		    b. Less than once a month
		    c. Once a month
		    d. Several times a month
		    e. Several times a week
		    f. Every day.
		
		12.1 Follow up if not (a) Never; how do you pay for online goods or services?
		
		    a. Exclusively online
		    b. Sometimes online, depending on the seller
		    c. Never online, only on delivery.

6.09	**Digital Business**
	
	Industry Digital Transformation
	
	    6.09 Scope of e-commerce purchases
		Ask if the answer to Q12 is not (a) Never:
		
		13. In the last 12 months, which of the following types of goods/products have you purchased online?
		
		Yes (1)
		
		No (0)
		
		    a. Books, magazines or newspapers
		    b. Clothing, footwear, accessories
		    c. Cosmetics and beauty products
		    d. Entertainment media (e.g. movies, images, video games, music products)
		    e. Computer software (includes upgrades and paid apps, but not games)
		    f. Financial products (including shares and insurance)
		    g. Food, groceries, alcohol, or tobacco
		    h. Medicine
		    i. Tickets or bookings for entertainment events (sports, theater, concerts, etc.)
		    j. Travel products (travel tickets, accommodation, vehicle hire, etc.)
		    k. Other, please specify:

4.04: e	**Digital Enablers**
	
	Digital Finance
	
	    4.04 Access to online banking services
		Ask if the answer to Q16 is not (a) Never:
		
		14. In the last 12 months, which of the following online services have you used, if any?
		
		Yes (1)
		
		No (0)
		
		    a. Entertainment platforms (e.g. for streaming music, movies and TV shows; reading or listening to books or podcasts)
		    b. Communication platforms/tools to make voice or video calls, send or receive messages and/or emails
		    c. Social networking platforms (e.g. Facebook, X (formerly Twitter), Instagram, TikTok)
		    d. News media websites
		    e. Online banking services
		    f. Online shopping sites to buy goods (e.g. groceries, clothing, gifts)
		    g. Platforms or sites to arrange/buy services (e.g. travel bookings)
		    h. Well-being services (nutrition, meditation, exercise)
		    i. Other, please specify:

TECHNICAL NOTES ON THE DEN CALCULATION

To calculate the pillar scores, two types of data are utilized: quantitative and survey-based data.

Both types undergo four distinct steps of data transformation before they are converted into DEN scores. Figure 16 below offers a concise overview of these four data transformation steps.

Figure 16. Data transformation steps

Step 1.

First, the minimum and maximum values for each indicator are calculated. For indicators with natural or theoretical boundaries, these serve as the series limits. Where boundaries are absent, winsorization is applied at the 5th and 95th percentiles. For some indicators, a logarithmic transformation follows winsorization to further address skewness and scale, ensuring more consistent data series.

Step 2.

After addressing outliers, skewness, and scaling, indicators are normalized using min-max normalization, standardizing the data range for each indicator between 0 and 100. Normalized scores are then assigned to each country based on their proportional performance for each indicator.

Step 3.

DEN uses diverse data sources, resulting in some missing data for certain indicators or countries. To remedy this, the k-Nearest Neighbor (kNN) method is employed, imputing missing values by averaging those of the nearest neighbors, identified by the top correlated indicators within the same pillar. This approach ensures a complete and robust dataset for analyses.

Step 4.

The process is concluded by assigning equal weight to each indicator in the DEN, ensuring that each is given the same importance in determining the overall pillar scores. Pillar-level scores are computed by averaging the individual indicator scores.

Step 1: Calculating the minimum and maximum values for each indicator

1.1
Treatment of Indicators with Natural/Theoretical Boundaries

1.1.1
Defining Natural/Theoretical Boundaries

Indicators with natural or theoretical boundaries, such as survey questions, policy indicators (0/1), or quantitative indicators expressed as percentages (0-100) follow an intuitive normalization process.

1.1.2
Minimum and Maximum as Boundaries

For such indicators, the natural or theoretical boundaries are considered as the minimum and maximum values of their respective data series. This approach ensures that these indicators are normalized within their predefined limits.

1.2
Winsorization for Indicators without Natural/Theoretical Boundaries

1.2.1
Identifying Indicators without Natural/Theoretical Boundaries

Indicators lacking natural or theoretical boundaries require a different approach to normalization.

1.2.2
Winsorization

For these indicators, winsorization is employed. This process involves utilizing the full dataset, including non-DEN countries, from 2020 until the most recent year,[96] to identify the 5th and 95th percentiles of the data distribution. These values are then set as, respectively, the minimum and maximum values for the normalization.

1.2.3
Managing Outliers

Winsorization is implemented to mitigate the impact of outliers on both tails of the distribution. Any data points falling below the 5th percentile are assigned 0 (the minimum normalized value), while those exceeding the 95th percentile are assigned 100 (the maximum normalized) value. This approach ensures that extreme values do not unduly influence normalization.

1.3
Logarithmic transformation

1.3.1
Identifying Indicators for Logarithmic Transformation

Indicators with significant skewness or wide-ranging values are selected for logarithmic transformation.

1.3.2
Formula

The transformation is applied after winsorization where applicable, to handle zero values.

$$\text{Log - transformed value} = \ln(\text{raw value} + 1)$$

1.3.3
Purpose and Effect on Distribution

Logarithmic transformation is applied to indicators with significant skewness or non-linearity, stabilizing variance and reducing skewness. This enhances data suitability for analysis, especially for indicators spanning several orders of magnitude, ensuring balanced values and improved comparability across countries and datasets.

Step 2: Normalization

2.1
Choice of Normalization Method

The data normalization method chosen in a navigator depends on the conceptual framework and the characteristics of the data employed. Given the presence of categorical data (e.g. policy indicators) within the quantitative data in the DEN, the preferred normalization method is min-max scaling.

2.2
Linear Scale Normalization with Min-max Scaling

Linear scale normalization using min-max scaling transforms a dataset's values to a specified range by linearly transforming each data point based on the minimum and maximum values in the dataset. This approach makes sure that the normalized scores of all indicators are comparable (DEN range is 0-100).

$$\text{Normalized value} = \frac{(\text{Raw value} - \text{Min. value})}{(\text{Max. value} - \text{Min. value})} \times 100$$

96. *Secondary data was collected until the 31st of July 2024.*

Step 3: Imputing missing data

DEN relies on a wide range of data sources, and it is natural to have data missing for a few countries for some indicators. Missing data can pose a significant challenge to the construction of a robust and unbiased composite indicator and needs to be handled carefully. Thus, it is essential to address missing data systematically to ensure the validity and reliability of the results. Indicators with missing data for 25 percent or more of the countries are excluded from the DEN. For the remaining indicators, missing data are imputed using the k-Nearest Neighbors imputation method, which is well-suited within the context of DEN.

3.1
DEN approach

For imputing missing data, the DEN adopts the k-Nearest Neighbors approach, enhanced with some data-driven improvements. This is the step-by-step process:

3.1.1
Identifying relevant indicators:

First, the top three indicators that are most correlated with the indicator with missing data are identified within the same pillar. These indicators must also have data available for the countries for which missing data is imputed.

3.1.2
Finding nearest neighbor countries:

Next, the average Euclidean distance between the country in question and all other countries is calculated for each of the indicators selected in step one. This is done to identify the top three countries that are statistically nearest to the country in question based on the selected indicators. It is worth keeping in mind that these neighboring countries will vary for each indicator.

3.1.3
Replacing missing values:

With the three nearest neighbor countries determined in step 2, the missing values can now be replaced. The imputed values are simply computed for each indicator and for each country with a missing data point, as the average value of that indicator across the country's three nearest neighbors.

This enhanced k-nearest neighbors method with data-driven adjustments efficiently handles missing data while maintaining statistical relevance and data completeness for the DEN.[97]

Step 4: Weightings and construction of averages

4.1
Weightings

When aggregating different indicators into each pillar and then the different pillars into the dimension score, a choice needs to be made in terms of their relative weight. In the DEN, each indicator and pillar are assigned an equal weighting factor of one, meaning that they all contribute equally to the overall score of the composite indicator. This approach offers several distinct advantages over arbitrary weights. First and foremost, it promotes simplicity and transparency in the calculation, as stakeholders can easily understand that every indicator carries the same level of importance. This transparency makes it easier for policymakers, businesses, and researchers to interpret and utilize the DEN findings. Additionally, equal weighting ensures that no single pillar exhibits a disproportionate influence, thereby reducing the potential for bias induced by specific indicators.[98]

4.2
Construction of averages

After the weighting process, to derive the pillar-level scores, the scores of the individual indicators are simply averaged within each pillar. Subsequently, the pillar scores are aggregated into DEN dimensions, thus producing a multidimensional compass that reflects a nation's digital economy development level comprehensively.

97. Nardo, M., et al. (2005) "Handbook on Constructing Composite Indicators: Methodology and User Guide", OECD Statistics Working Papers, No. 2005/03, OECD Publishing, Paris, https://doi.org/10.1787/533411815016, p.52-58.
98. Ibid.

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Navigator

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