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policy brief

No. 2023-4 (June)

Key Points

- The G20 has made tremendous progress toward creating an internationally compatible framework to measure the digital economy.
- Estimates from different methodologies demonstrate that the contribution of the digital economy is rising across the world
- The data infrastructure of developed and developing countries has a significant gap attributable to various factors, including a lack of data collection and processing capacity and differing national priorities for developing countries.
- We recommend a bifocal approach toward arriving at a common and comparable measure of the digital economy: (i) a short-term focus to bring developing countries up to speed on a basic measure of the digital economy and (ii) a long-term focus to create an all-encompassing, cross-country framework to measure the digital economy.

ISSN 2411-6734
DOI: https://doi.org/10.56506/ARAR9696

Toward a Common and Comparable Framework for Measuring the Digital Economy

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1. Introduction

The digital economy can be defined as the contribution to the gross domestic product (GDP) of any exchange or flow of economic value involving digital products and/or industries (Santos 2021). Its ever-evolving nature enables new and emerging technologies to be adopted into a series of applications. The spawning of digital media and platforms into e-commerce, gaming, entertainment, financial services, agriculture, and health care underlines its influence on various aspects of society and economic growth. However, capturing the transformative nature of the digital economy and measuring its contribution to the economy are challenging. Existing measurement frameworks for economic comparison of countries, such as GDP, cannot be directly adopted to measure the digital economy. The digital economy is dynamic, with an ever-evolving scope, cutting across various sectors of economic activity, social interactions, and governance. Standard statistical frameworks do not have a way to measure free goods and services, which are unique and important elements of the digital economy. Yet, as the growth and development strategies proposed by most countries give importance to "digital," it is imperative that the digital economy and its impact on growth and job creation can be measured reliably.

Measuring the digital economy is constrained by three interrelated-yet-independent issues: (i) the lack of a common definition across geographies, (ii) the absence of data on the digital economy, and (iii) the absence of an established framework to measure and compare the digital economy. The term "digital economy" does not have a standard or widely accepted definition. This also hinders the collection and reporting of data for a selected set of indicators that could define the digital economy. The current reporting mechanisms of statistics may not accurately capture the digital economy. The lack of capacity to collect data, underdeveloped data infrastructure, and differing priorities across nations mean consensus still eludes an established framework for measuring the digital economy (G20 2018, 2020).

This policy brief attempts to explain existing measurement methods for the digital economy, particularly focusing on the G20's efforts on the subject. It compares available estimates where possible, discusses implementation progress across nations,

and deliberates upon existing challenges. Finally, the policy brief concludes with recommendations outlining a short-term and long-term approach to developing a common framework for measuring the digital economy.

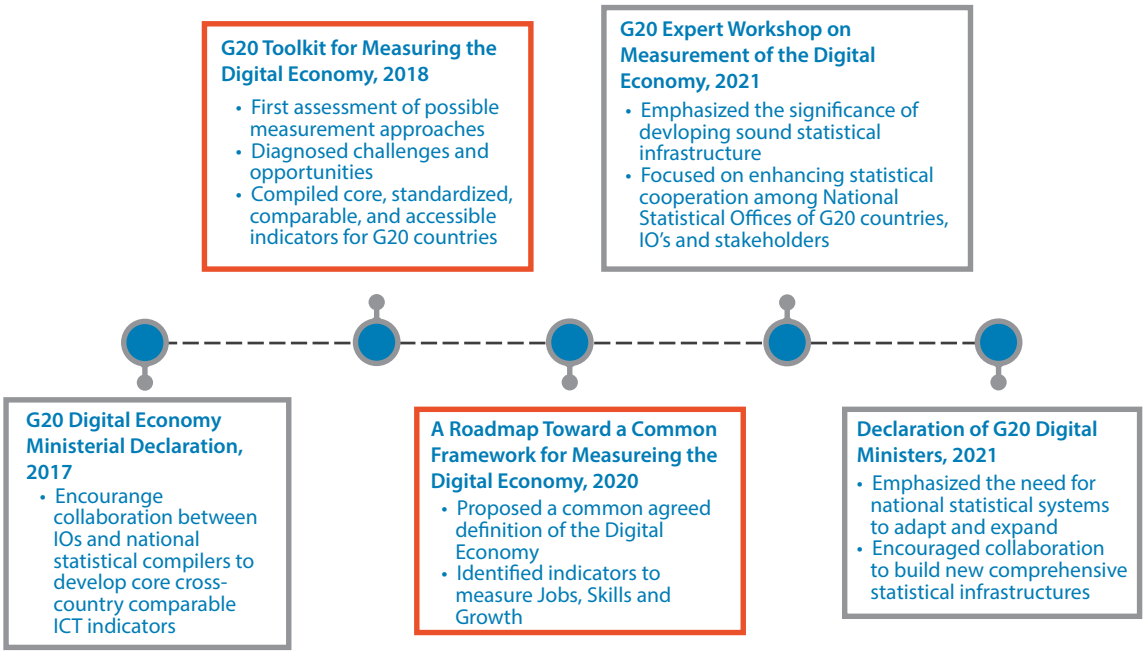
1.1 G20 Efforts toward Measuring the Digital Economy

The G20 recognized that addressing the measurement challenges presented by the digital economy requires international and multi-stakeholder dialogue and cooperation. Figure 1 outlines the timeline of G20's efforts toward measuring the digital economy. At the Hangzhou Summit in 2016, the G20 Digital Economy Task Force was established to deliberate and act on several aspects of the digital economy, including the challenge of measurement (G20 2016). The 2017 Digital Economy Ministerial Declaration emphasized the need for member states to collaborate with international organizations and reflect on the measurement of the digital economy in their national statistical frameworks. It also advocated for member states to define a set of common metrics that could be utilized for cross-country comparisons (G20 2017).

These advancements by the G20 resulted in the publication of the *G20 Toolkit for Measuring the Digital Economy* in 2018. The Argentine G20 presidency and international organizations led by the Organisation for Economic Co-operation and Development (OECD) collaborated to create the toolkit as the starting point of the measurement exercise. The toolkit focused on compiling existing indicators and methodologies to determine comparable digital economy indicators for G20 countries. It recognized that existing indicators were insufficient to capture the complexities of the digital economy and that prevailing measurement efforts often failed to reflect the impact of the digital economy (G20 2018).

To build on the G20's existing body of work, address the challenges already identified, and propose a clear path forward for measuring the digital economy, the G20 published *A Roadmap Toward a Common Framework for Measuring the Digital Economy* under Saudi Arabia's presidency in 2020. This roadmap displayed a range of indicators identified by reviewing data sources and methodologies from different G20 countries. It also introduced a set of wide-ranging indicators on "jobs, skills, and growth in the digital economy." The roadmap proposed a tiered definitional framework for the digital

Figure 1: Chronicling the G20's Efforts to Measure the Digital Economy



IO = international organization, ICT = information and communication technology.

Note: The orange outline indicates tangible outcome documents, while the gray outline indicates collaborative discussion outcomes and the delineation of priorities.

Sources: G20 (2017, 2018, 2020, 2021a, 2021b).

economy to allow for hitherto unrecorded aspects of the digital economy to be included (G20 2020).

In 2021, the roadmap was tested at a G20 Expert Workshop on Measurement of the Digital Economy held by Italy's national statistics office, the National Institute of Statistics (Istat), and the OECD (G20 2021a). The Declaration of G20 Digital Ministers under the Italian presidency recognized the need to adapt and expand their national statistical systems to accurately reflect the digitalization of economies and societies, including from a digital divide and gender perspective. It also emphasized the need for coordination and collaboration among member countries to build a new and comprehensive statistical infrastructure capable of monitoring digital economy developments (G20 2021b).

The G20 has made significant progress in facilitating collaborative thinking and action on defining and measuring the digital economy and encouraging its adoption by member states. However, concretizing these frameworks and bringing all countries up to speed are still pending. Adopting and implementing a concrete G20 framework to measure the digital economy will require a focused effort, especially considering the gaps in data collection capabilities and differences in priorities among countries.

2. A Review of Methodologies for Measuring the Digital Economy

2.1 From ICT to the Digital Economy

The journey to the measurement of the digital economy began with measuring information and communication technology or the ICT economy. Along with the formalized efforts of international organizations such as the United Nations Conference on Trade and Development, OECD, and International Telecommunication Union that worked toward a common framework and comparable indicators, several countries made unilateral efforts to estimate the size of their domestic ICT economies. ICT includes all types of hardware, supporting programs, and software that are the building blocks for digital solutions and applications. ICT no longer fits within the scope of a single industry as defined by industry classifications. The measurement and estimation are, therefore, published as satellite accounts. The United States (US) Bureau of Economic Analysis (BEA) defines satellite accounts as supplementary statistics that allow for analysis of a certain type of economic activity—such as travel, tourism, and the digital economy—that cuts across different sectors and cannot be encompassed into one industry. In 2017, the statistics office of South Africa published ICT satellite accounts for South Africa, using OECD's guidelines on measuring the information society. They estimated the ICT sector's direct contribution to be 3% of the GDP valued at Rand 108,662 and Rand 114,487 million in 2013 and 2014, respectively (Information and Communication Technology Satellite Account for South Africa. 2013 and 2014, 2017). Along similar lines, Malaysia's Information and Communication Technology Satellite Account estimated the contribution of the ICT industry and e-commerce to be 11.9% and 5.4% of GDP, respectively, in 2013 (Ramasamy et al. 2015). Several countries, including developed ones, such as the US and Australia, and developing countries, such as Chile, compiled ICT satellite accounts.

In 2018, the OECD developed a general satellite account framework for measuring the digital economy based on the work of an Advisory Group on Measuring GDP in a Digitalised Economy (Ahmad and Ribarsky 2018). The US BEA was the first-ever statistical authority to develop its national estimates of the digital economy (Barefoot et al. 2018) a few months ahead of the OECD. These indicators and methodologies became the foundation on which many other countries and international organizations have attempted to measure the digital economy's contribution. The framework was based on a conceptual definition of the digital economy, which dealt with identifying specific goods and services relevant to the digital economy and segregating industries responsible for producing those goods and services. This method was eventually updated a year later (Jolliff and Nicholson 2019), where data was revised per the new Industry Economic Accounts (Howells et al. 2018). However, just like the initial estimates, the revised ones included items categorized by BEA as "primary digital."

After BEA attempted to estimate the value of the US digital economy, other countries also tried to publish their estimates using these methods. The Australian Bureau of Statistics published a report measuring digital activities in Australia's economy (Australian Bureau of Statistics 2019). Statistics Canada posted the first set of digital economy estimates for Canada on 3 May 2019, while that for New Zealand was published in December 2019 (Miller and Grant 2019). BEA estimates and the OECD framework act as a de facto reference point for most countries.

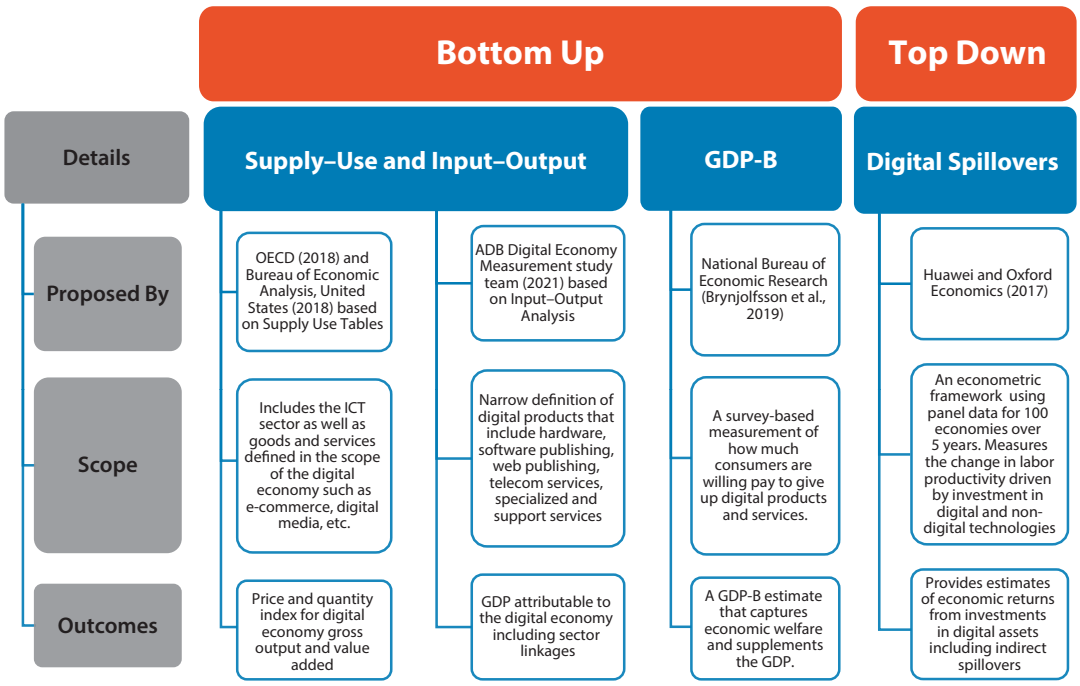
2.2 *Different Approaches to Measuring the Digital Economy*

The literature has well documented the measurement of the ICT economy and its contribution to growth. Different methodological approaches, including several econometric models (Barro 1997; Roller and Waverman 2001), were formulated to measure the impact of ICT (mobile, Internet, broadband, etc.). With improvements in connectivity and lowering device costs, applications have become more pervasive and data-intensive, giving further impetus to the digital economy. These technological developments have fundamentally changed how economies produce and consume, and have led to new developments in statistical standards, including definitions, data, and computation methodologies to enable cross-country comparisons of the digital economy. We divide the popular methodologies into the bottom-up and top-down approaches. As the phrase suggests, the bottom-up approach begins from micro units of firms and/or industries, which are aggregated to arrive at broad macro indicators. The top-down approach starts at the macro level using national economic data to arrive at micro-level (firm and/or industry) estimates. Ideally, these two approaches should lead to similar estimates of the digital economy. Figure 2 summarizes the two approaches.

Bottom-Up Approach: In the bottom-up approach, the methodologies measure each component of the digital economy, as defined in the scope, sometimes ranging from hardware to e-commerce and beyond, to be aggregated and arrive at a macro-level estimate. Among the popular methodological frameworks, the OECD/BEA framework, the ADB framework, and the GDP-B measure fall within the bottom–up category. The OECD/BEA and ADB use the input–output and supply–use tables for estimating the value of the digital economy. The GDP-B measure (Brynjolfsson et al. 2019) complements estimates based on existing national statistics to gauge the welfare contribution of the digital economy based on an analysis of benefits from the consumption of free digital goods and services.

Top-Down Approach: This approach is based on the understanding that all industries benefit from adopting digital technologies and that the productivity gains from investments in digital technologies trigger a chain of direct and indirect benefits. Huawei and Oxford Economics (2017) estimate these digital spillovers for the global digital economy by providing a breakdown of gains to developed and developing economies. According to their estimate, an investment of $1 in digital technologies has led to a $20 rise in GDP. For

Figure 2: The Bottom–Up vs. Top–Down Approaches to Measure the Digital Economy



Source: ADB (2021), Barefoot et al. (2018), Ahmad and Ribarsky (2018), Huawei and Oxford Economics (2017).

every $1 invested, the average return to GDP was about 6.7 times higher for digital investments than non-digital investments. There is a strong underlying belief that the actual size of the digital economy is far bigger than previously understood. While many countries have followed this established framework, countries like the People's Republic of China have developed their methodology to arrive at top-down measures of gains from the digital economy (Caixin 2017).

2.2.1 Comparison of Estimates for the Digital Economy

An analysis of estimates derived from these approaches finds a few key trends. Firstly, and obviously, the digital economy's contribution is steadily rising. The estimates based on the input–output and supply–use analysis from the ADB and OECD/BEA frameworks are within the same ballpark. However, we would expect OECD/BEA to be uniformly higher, given the broader scope of their definition. We discuss this aspect in more detail in the next subsection. The estimates from the top–down approach are relatively higher than the bottom–up numbers. Refer to Table 1 for a comparison of estimates.

Using the US as an example, the bottom estimates find that the digital economy's contribution increased from $1.1 trillion or 8.1% of GDP in 2010 to $1.8 trillion or 9% in 2018. In contrast, the top-down approach estimated the size of the US's digital economy to be $4.02 trillion in 2016. Similarly, for other developed countries such as Japan and the Republic of Korea (ROK), the bottom-up approach estimates for 2018 are $266 billion (4.5% of GDP) and $66 billion (5.1% of GDP), respectively, compared to $920 billion (18% of GDP) and $360 billion (24% of GDP) in the top-down approach for 2016. This pattern also holds true for developing countries like India. While the bottom-up estimates show a contribution of 5.6% to the total economy in 2014, the top-down estimate for 2016 doubles the estimated contribution to 10%. While the top-down estimates are universally higher, the factor of

Table 1: Comparison of Estimates for the Size of the Digital Economy across Select Countries using Bottom-Up vs. Top-Down Approaches

		Bottom–Up Approach (Digital Economy as a Share of GDP)		Top-Down Approach
Countries	Year	ADB Framework (in current prices)	BEA Framework	Huawei Oxford Economics (Digital Economy as a Share of GDP)
United States	2010	$1.1 trillion (8.1%)		
	2016			$4.02 trillion (21%)
	2018		$1.8 trillion (9%)	
	2019	$1.8 trillion (9.2%)		
People's Republic of China	2012	$369 billion (4.7%)		
	2013–2016		Share of value added (4.8%); Share of employment (2.6%) ICT value added was 10% over 2013–2016	
	2016			$1.49 trillion (13%)
India	2010	$ 85 billion (5.3%)		
	2014	$112 billion (5.6%)		
	2016			$230 billion (10%)
Japan	2011	$380 billion (6.4%)		
	2016			$920 billion (18%)
	2018	$266 billion (5.9%)		
Republic of Korea	2010	$47 billion (4.4%)		
	2016			$360 billion (24%)
	2018	$86 billion (5.1%)		

Sources: ADB (2021), Barefoot et al. (2018), Herrero and Xu (2018), and Huawei and Oxford Economics (2017).

increase is not uniform across countries and is difficult to categorize even between developed and developing countries. The spillover estimates are likely to be driven by levels of digital diffusion in the economy and its integration with traditional sectors, manufacturing and services. For example, in countries like Japan and the ROK, high levels of industrial digitization are likely to influence the spillover estimates, which are higher by a factor of almost four to five times in terms of contribution to GDP, compared to only twice for India. Please refer to Appendix 1 for estimates of other economies.

Since top-down approaches account for all possible spillovers, it is the broadest interpretation of the digital economy and probably captures linkages currently not measured through the input–output analysis. The estimates for digital spillovers used for comparison in this policy brief are from Huawei and Oxford Economics (2017), which includes emerging technologies such as cloud computing, the Internet of Things, and artificial intelligence within the scope of its definition. Using both methods simultaneously creates a system of checks and balances, both methodologically and in assessing the potential value of the digital economy. However, estimates from both methods are expected to converge over time.

2.2.2 A Deep Dive into the Bottom–Up Methodologies

The bottom-up approach comprises two main frameworks: ADB's input–output analysis (ADB 2021) and the OECD/BEA's supply–use framework (Figure 3). In the ADB framework, digital products are defined as goods and services associated with generating, processing, and/or storing digitized data, categorized into (i) hardware, (ii) software publishing, (iii) web publishing, (iv) telecommunication services, and (v) specialized and support services. The framework considers the narrowest possible definition of digital products and, thus, is limited in its ability to reflect the complete digital ecosystem and its impact. The framework uses readily available national accounts data for computation—the supply–use tables and the input–output tables. However, the accessibility to granular data is often limited. The main digital activities are identified using the UN Statistical Commission's Central Product Classification version 2. In addition to using Leontief coefficients, forward and backward linkages are used to measure the sector interdependencies directly.

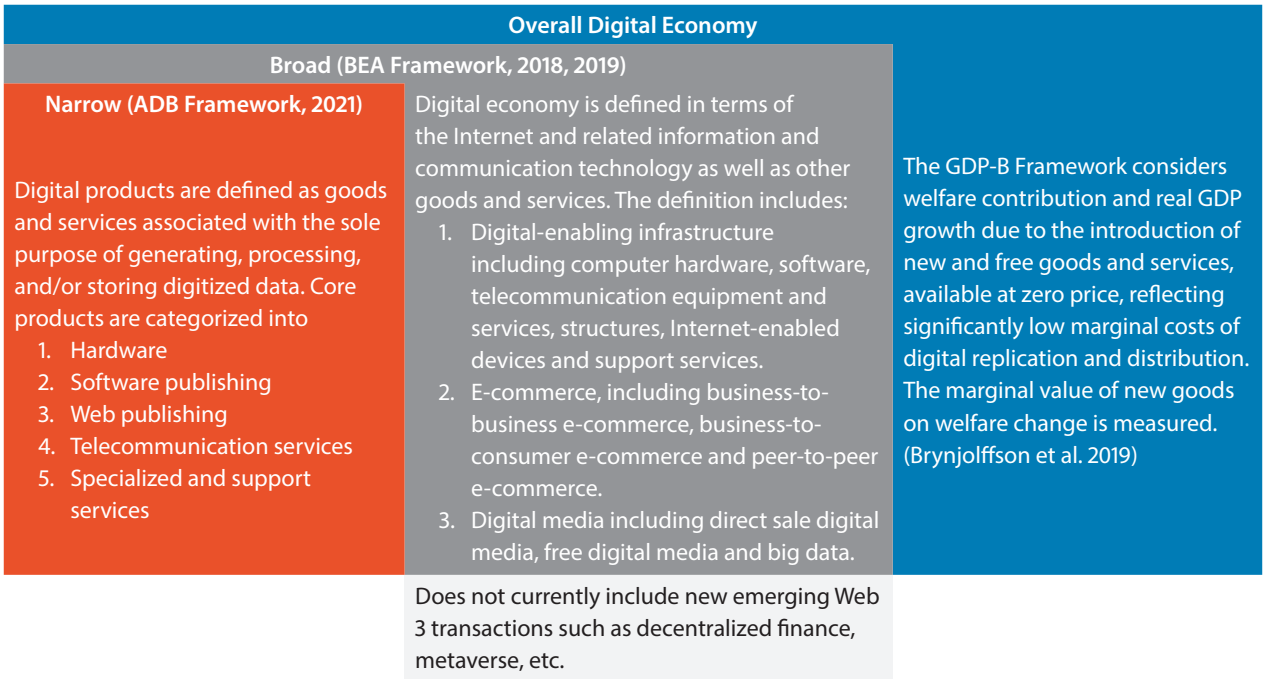
The US BEA uses a broader approach aligned with the OECD framework for defining the digital economy. The BEA approach is essentially a three-step process. It begins with devising a conceptual definition of the digital economy, then identifying specific goods and service categories relevant to the digital economy, and finally using the supply–use framework to estimate output, value-added, employment, and compensation. For computation, BEA excluded the digital portion of goods and services with both digital and non-digital components. In this framework, the digital economy includes the following:

- Digital-enabling infrastructure, including computer hardware, software, telecommunication equipment and services, structures, and Internet-enabled devices;
- E-commerce, including business-to-business e-commerce, business-to-consumer e-commerce, and peer-to-peer e-commerce;
- Digital media, including direct sale digital media, free digital media, and big data.

After identifying goods and services and their associated industries from the supply–use table, the price and quantity index for the digital economy—both gross output and value added— are computed. Appendix 2 details methodologies adopted by different economies to measure their digital economies.

Both these methods are within the scope of GDP measurement and are estimated using existing national statistics. Consequently, these approaches have been directly adopted by some governments or are being carried out by international organizations in partnership with different countries. However, there is scope for continuous improvement and upgradation of these measurement frameworks. The rapidly changing nature of technology and its applications imply that newer applications of Web 3, decentralized finance, and crypto may not be included yet in the definitional scope. Another limitation unique to the digital economy is the provisioning of free goods and services that are not necessarily captured in GDP estimates. The GDP-B measure quantifies the change in welfare from the consumption of free goods and services in the digital economy (Brynjolfsson et al. 2019). The valuation exercise is based on choice experiments that the authors conducted using common examples from the digital economy, such as the use of social media (Facebook), smartphone cameras, etc. In some sense, they complement the existing frameworks of ADB and BEA. Some academicians, however, disagree, stating that activities of business platforms are captured in statistical surveys, and advertising revenue from

Figure 3: Broadening the Scope of Measuring the Digital Economy



Sources: ADB (2021), Barefoot et al. (2018), Australian Bureau of Statistics (2019), Statistics Canada (2019), Miller and Grant (2019), Office for National Statistics (2022), Fritsch and Lichtblau (2020), Brynjolfsson et al. (2019).

the free provisioning of digital goods and services is captured in the national accounts estimates. However, as the measurement framework for the digital economy evolves, this aspect will need monitoring and consideration.

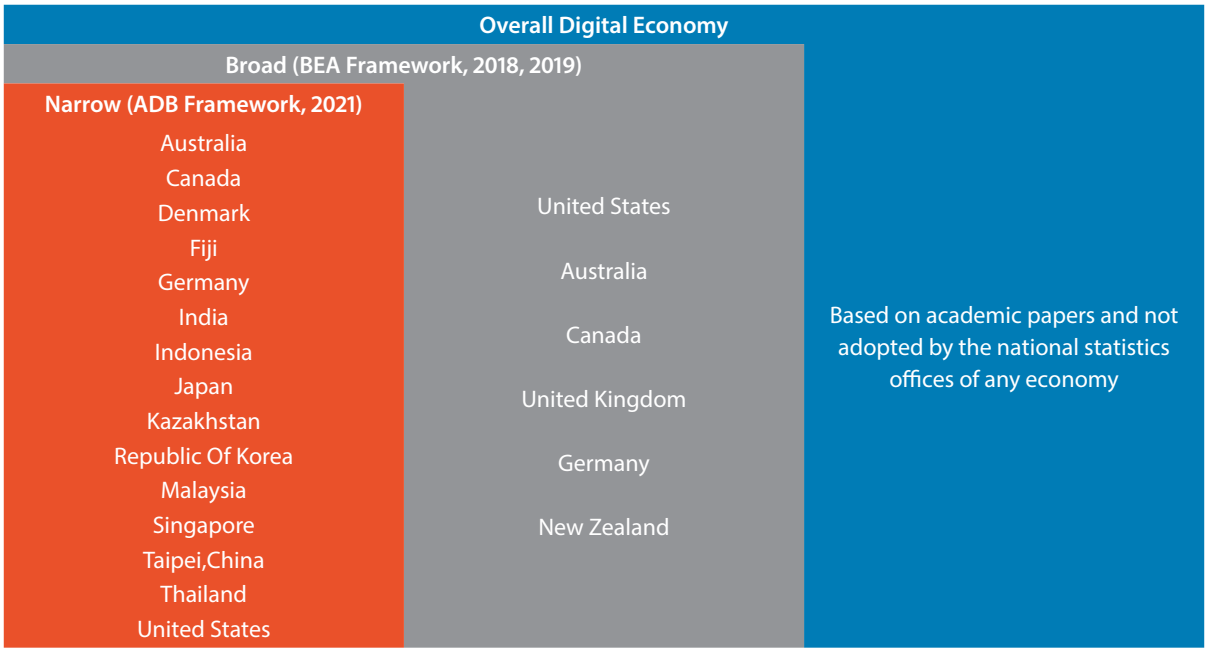
With the ADB, OECD, and BEA efforts, we now have a few acceptable frameworks that, in varying capacities, provide some measure of the digital economy. While narrow, the ADB framework has provided some measures of the digital economy for a host of developed and developing countries. The work by ADB also calls out the lack of data and institutional capacities to determine the value of the digital economy, even with the narrowest available definition. As shown in Figure 4, ADB's report is the only available source for a cross-economy comparison of the digital economy across developed and developing economies. A handful of developed economies have implemented the broader and more appropriate definition of the digital economy captured in the OECD/BEA framework. These free goods and services are still at the stage of academic exploration and have not been incorporated in the official statistics of any economy.

A visible gap indeed exists in the capacities of developing and developed economies in their ability to report data on the digital economy. A step-by-step approach is, therefore, advisable, where at least all economies are comparable on the narrow definition until capabilities are built for the broader definition. The broader definition will need to be refined to track developments in technology, including free goods and services, the prototype for which is currently an academic pursuit.

3. Summing Up

The G20, with the support of international organizations, has undoubtedly taken huge strides in attempting to measure the digital economy. There is also progress in standardizing these frameworks and making them applicable to all countries. However, as evident from the analysis, not only are there divides between the capabilities of the developed and developing countries because of a lack of data and capabilities, but there is also scope to continuously improve the existing methodologies for measuring the digital economy. We, therefore, recommend a bifocal approach toward

Figure 4: Measurement and Estimation of the Digital Economy



Sources: ADB (2021), Barefoot et al. (2018), Australian Bureau of Statistics (2019), Statistics Canada (2019), Miller and Grant (2019), Office for National Statistics (2022), Fritsch and Lichtblau (2020), Brynjolfsson et al. (2019).

achieving the target of a common and comparable measure of the digital economy.

1. Short-term approach – Bring all countries up-to-speed to report an estimate of the digital economy, at least for the narrow definition
2. Long-term approach – Develop and test the broader framework to arrive at a future-proof definition of the digital economy, which also accounts for free services and goods

Fulfilling the short-term approach requires acknowledgment of disparities between data infrastructures of developed and developing countries. Apart from differences in national priorities, a lack of capabilities and resources for implementing new data infrastructure is a barrier to international comparability (G20 2020). A coordinated multilateral and multi-stakeholder effort is required to overcome this impediment. International organizations and nations with mature statistical information systems can work with developing countries to foster institutional capacity and develop tools to upgrade the statistical infrastructure of developing countries that become responsive to new and evolving concepts introduced by the digital economy. A baseline definition and framework for measurement must become a reality for all countries. It would be reasonable to set a target for developing countries to measure and provide estimates for ADB's narrow definition by 2024.

As digitization permeates every sector and ingrains itself into daily life, measuring its dynamic features will become increasingly challenging. While all countries work toward the narrow definition of the digital economy, a simultaneous concerted effort is necessary to develop a measurement framework that tracks new digital applications enabled by technological development. This must also include assessing complementary empirical tools that allow the digital economy to measure free goods and services. It might also mean applying multiple measurement frameworks to compare and evaluate the progress and potential of the digital economy. Data infrastructures, including data collection mechanisms, will also need to evolve to measure emerging digital footprints, i.e., the vast amount of economic activity driven by digital technologies.

Appendix 1: Measuring the Digital Economy: Methodology

Economy	Method Used	Methodology	Data Used	Limitations
United States (2022)	Supply–Use Tables	The Supply–Use Tables were used to identify goods and services relevant to the digital economy. The three main categories are infrastructure, e-commerce, and priced digital services. In the case of the inclusion of digital and non-digital production for goods or services, external source data was used to isolate the digital activity.	USA BEA Supply–Use Tables	1) Data gaps that persist for priced digital services as estimates of online learning services are not included. 2) Values of digital economy structures are not calculated.
Australia (2019)	BEA approach to estimate digital activity using supply–use tables	Products and their industry sources were selected based on three broad digital activities (digital enabling infrastructure, digital media, and e-commerce). Inputs and outputs of digital activities were estimated.	The Australian Bureau of Statistics Supply–Use data (ABS Cat. No. 5217.0)	1) Non-inclusion of peer-to-peer transactions and emerging digitalized products like Uber transport service. 2) Digital trade is not visible from the production approach.
Canada (2019)	Satellite Accounts	Estimates were derived from the Canadian Supply–Use Framework following the same methods used by Statistics Canada for deriving other satellite accounts. Concepts and definitions of the digital economy were borrowed from US BEA 2018. OECD's 2017 proposed framework for satellite accounts for measuring digital economy was referred to.	Canadian Supply-Use Tables	1) Lack of data on the inputs specific to the production of digital and non-digital output is not precise. 2) It does not include the use of digital products in the production process. 3) The consumption of free media products is not included in the initial estimates. 4) Data were not measured as a distinct product or asset in GDP.
United Kingdom (2022)	Supply–Use Tables	1) A conceptual definition of the digital economy was developed based on the report by the Organisation for Economic Co-operation and Development (OECD) 2) The supply side of the Supply–Use Tables was used to expand products into their digital and non-digital components and calculate their output. 3) The domestic output table from the supply–use framework was used to explore the industries producing this output. The intermediate consumption table was used to estimate the corresponding gross value added.	United Kingdom Manufacturers' Sales by Product (PRODCOM) and the Annual Survey of Goods and Services (ASGS) were used in addition to the Digital Supply–Use Tables.	1) Product industry production relationship was assumed to be the same for digital and non-digital components. 2) The ratio of output to GVA for each industry is the same for each industry's digital and non-digital components. 3) Problems relating to data availability

continued on next page

Appendix 1 *table continued*

Economy	Method Used		Methodology	Data Used	Limitations
Germany (2020)	BEA Framework		1) Goods and services were identified per the Classification of Products by Activity provided by the Federal Statistical Office (Destatis). 2) Output of selected goods and services was selected based on the Supply–Use table. 3) Value added of the digital economy in Germany was derived. 4) Due to underestimation of digital value added, estimates were derived from external data of other sources outside the System of National Accounts (SNA).	Data from the Federal Statistical Office (Destatis 2017, 2019)	1) The BEA method underestimated the digital value. 2) There are limitations to availability of official data
People's Republic of China (PRC) (2017)	Input–Output Tables		1) Calculation for value added and employment following the OECD methodology 2) Segregate sectors to match with OECD definition into (i) digital manufacturing goods and (ii) digital services	PRC's Input–Output table (2012) and Population Census (2010)	1) The PRC industry classification does not follow the international standard - ISIC or NACE. 2) Lack of data 3) Could only measure value added of the ICT sector
New Zealand (2019)	Supply–Use Tables		The framework suggested by the OECD Informal Advisory Group on Measuring GDP in a Digital Economy was used. Products were classified into digitally ordered, platform enabled, and digitally delivered, using the New Zealand Supply–Use tables. The value for each product is included in the full value of production in the economy (maximum potential values). Own-account capital formation for software and information technology design and development-related services have been included. Products sold from retail trade and wholesale trade industries are recorded only as margin and not as the gross product value.	New Zealand Supply–Use Table	1) Data insufficiency to provide the level of detail required to adequately identify output from platform-enabled means.
ADB Proposed Framework and Estimates (2021)	Denmark Fiji India Indonesia Japan Kazakhstan Republic of Korea Malaysia Singapore Taipei,China Thailand	National Input–Output Tables	The proposed framework has defined the core of the digital economy and proposed a measurement method using value-based calculation. Definition: Digital products are goods and services with the main function of generating, processing, and storing digitized data. Method: The method has relied upon input–output analysis using Leontief coefficients (1936) as well as forward and backward linkages to measure the sector interdependencies directly in terms of value-added contributions.	Supply–Use tables from each country's published tables on their respective national statistics office	1) Limitations in the accessibility of granular data, which lead to the adoption of subordinate methods to extrapolate the required data. 2) Limitation due to the proposed definition of digital products leading to the exclusion of digitally dependent economies. Thus, value added by the sectors dependent on digital sectors is not accounted for. 3) Imports are excluded in the estimation leading to underestimation of the digital economy, especially for economies with digital sectors with high imports.

Appendix 2: Estimates of the Digital Economy

Economy	Time Frame	ADB Framework (in current prices)	BEA Framework
Australia	2010	Size of Digital Economy: $49 billion; 5.2% of the total economy	
	2016-2017		Domestic production of selected digital products was estimated at 5.7% ($93.5 billion). Digital activities accounted for about one-sixth of the total economic growth of Australia. Digital activity value added grew by 7.5% per annum.
	2018	Size of Digital Economy: $65 billion; 5.0% of the total economy	
Canada	2012	Size of Digital Economy: $85 billion; 5.0% of the total economy	
	2016	Size of Digital Economy: $79 billion; 5.6% of the total economy	
	2017		Nominal GDP: $109.7 billion (5.5% of total economy). The digital economy produced $207.7 billion worth of goods and services, accounting for 886,114 jobs.
United Kingdom	2016–2019		The digital economy was valued at 91.9 billion pounds in 2019. Digital products accounted for 4.6% of gross value added (GVA).
Germany	2010	Size of Digital Economy: $108 billion; 3.5% of the total economy	
	2016		Digital economy at basic prices valued at a total gross output of 257.7 billion euros, amounting to 4.5% of the total gross output of the German economy. Total value added was € 128 billion (4.5% of total economic GVA).
	2016	Size of Digital Economy: $107 billion; 3.5 of the total economy	
New Zealand	2015		For the fiscal year ending in March 2015, the value of gross output of New Zealand (NZ) that can be delivered digitally was NZ$27.9 billion and that for digitally ordered gross output was NZ$109.2 billion.
Denmark	2010	Size of Digital Economy: $14 billion; 5.1% of the total economy	
	2016	Size of Digital Economy: $13 billion; 4.9% of the total economy	
Fiji	2011	Size of Digital Economy: $178 million; 5.5% of the total economy	
	2015	Size of Digital Economy: $158 million; 4.4% of the total economy	
Indonesia	2010	Size of Digital Economy: $34 billion; 4.7% of the total economy	
	2014	Size of Digital Economy: $37 billion; 4.3% of the total economy	
Kazakhstan	2010	Size of Digital Economy: $2 billion; 3.7% of the total economy	
	2018	Size of Digital Economy: $3 billion; 2.4% of the total economy	
Malaysia	2010	Size of Digital Economy: $19 billion; 7.6% of the total economy	
	2015	Size of Digital Economy: $21 billion; 7.6% of the total economy	
Singapore	2010	Size of Digital Economy: $7 billion; 8.2% of the total economy	
	2015	Size of Digital Economy: $20 billion; 6.8% of the total economy	
Thailand	2010	Size of Digital Economy: $22 billion; 6.6% of the total economy	
	2015	Size of Digital Economy: $21 billion; 5.2% of the total economy	
Taipei,China	2016	Size of Digital Economy: $47 billion; 9.1% of the total economy	

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