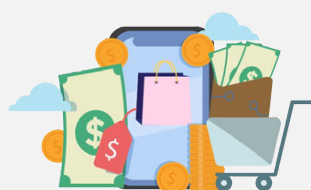


Measuring Singapore's Digital Economy: Experimental Estimates on Digital Industries

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Introduction



The digital economy has been a key driver of economic growth, reshaping how businesses produce goods and services, how consumers shop, and how financial services are delivered. As digital technologies become more deeply integrated across all sectors of the economy, understanding their contribution to economic activity has taken on greater importance. However, as digital activities span across many industries, their impact cannot be easily captured using conventional economic statistics. This has led to varying definitions and measurement approaches being adopted by National Statistics Offices (NSOs) and researchers, making cross-country comparisons challenging.

Recognising the need for internationally comparable estimates, the Organisation for Economic Co-operation and Development (OECD) published the 'Handbook on Compiling Digital Supply and Use Tables' (OECD Handbook) in November 2023, to provide guidance for countries to compile digital economy estimates using a consistent statistical framework. Built on the System of National Accounts (SNA) [1], the framework extends conventional Supply and Use Tables by measuring the digital economy from three complementary perspectives – **digital industries** (who produce), **digital products** (what are produced and consumed) and the **nature of the transaction** (how products are ordered and delivered). Together, these perspectives provide the foundation for the development of the Digital Economy Satellite Accounts (DESA) [2].

[1] The SNA is the internationally agreed standard for compiling measures of economic activity. It provides a coherent, consistent, and integrated set of macroeconomic accounts based on internationally agreed concepts, definitions, classifications, and accounting rules. Adopted by the United Nations Statistical Commission in March 2025, the 2025 SNA introduced a dedicated chapter on digitalisation for the first time. The chapter provides guidance on measuring digital industries, digital products, digital transactions and digital business models, as well as emerging aspects of the digital economy such as artificial intelligence (AI), reflecting the growing role of digitalisation in economic activity and improving its visibility within the national accounts framework. More details of the 2025 SNA and recent developments in the measurement of AI are available in this issue.

[2] DOS has also developed experimental digital trade estimates, with details available in this issue.

Advancing the Measurement of Singapore's Digital Economy

The Infocomm Media Development Authority (IMDA) publishes the annual 'Singapore Digital Economy (SGDE) Report' to provide a holistic assessment of the state and progress of Singapore's digital economy [3]. In their 2023 inaugural report, IMDA reviewed international approaches to measure the size of the digital economy and highlighted the OECD's proposed Digital Supply and Use framework, which provides the statistical foundation for compiling DESA.

Building on these international developments and IMDA's work to measure Singapore's annual digital economy, the Singapore Department of Statistics (DOS) has developed Singapore's first experimental DESA, in line with the international statistical framework. This ensures greater comparability across countries over time, as NSOs adapt to the international guidelines [4].

The experimental estimates for 2021 to 2023 offer additional insights into the industries driving digital transformation, helping policymakers, analysts and businesses to better understand Singapore's evolving digital landscape. As the DESA and SGDE approaches differ in their definitions, scope and methodology, their estimates are not directly comparable and should be viewed as complementary perspectives on Singapore's digital economy. This article focuses on the producer perspective of the digital economy and presents Singapore's experimental estimates of digital industries, their contributions to the overall economy and the key drivers underpinning the nation's digital transformation.

Digital Industries and Data Sources

Under the OECD Digital Supply and Use Tables framework, digital industries are broadly defined as industries that either produce goods and services enabling digitalisation or use digital technologies in their business models and/ or interactions with consumers. As digital industries span across conventional industry classifications, the OECD Handbook groups them into seven categories based on their respective roles in the digital economy (Figure 1).

The experimental estimates of digital industries are compiled by integrating data from surveys and administrative sources. These include annual business surveys conducted by DOS, the Monetary Authority of Singapore (MAS), the Economic Development Board (EDB) and the Building and Construction Authority (BCA), which provide data on the economic activities and performance of establishments across the Services, Manufacturing and Construction sectors.

The estimates also draw on IMDA's Annual Survey on Infocomm Usage by Enterprises (IU), which collects information on businesses' adoption and usage of digital technologies, together with administrative records that supplement information on firms' economic activities, industry classifications based on the Singapore Standard Industrial Classification (SSIC) codes and business operations. In addition, location data on retail and food and beverage services outlets are used to improve the identification of firms operating exclusively through online channels. By combining these complementary data sources, the estimates support more accurate identification and classification of digital industries, while maintaining consistency within the national accounts framework.

[3] In IMDA's SGDE reports, Singapore's digital economy is defined as the sum of two components: the gross value added (GVA) of the Information & Communications (I&C) sector, and the GVA generated from digitalisation across the rest of the economy. The latter is estimated using a growth accounting technique, which attributes firms' value added to returns from investments in and spending on digital capital. This methodology is developed jointly with the Lee Kuan Yew School of Public Policy from National University of Singapore. More details of the methodology are available in the [SGDE Report 2023](#).

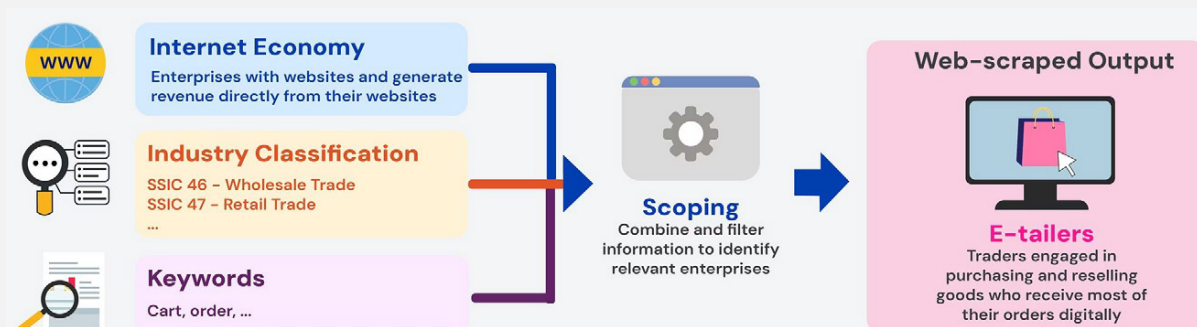
[4] Several NSOs, including those in Canada, Sweden, the Netherlands, the Republic of Korea, and Japan, have produced experimental GVA estimates of digital industries from reference year 2020 or earlier. Other economies, such as the United States of America, Mainland China, Malaysia, Thailand, and the Philippines, have developed country-specific approaches to measure the VA of digital industries, reflecting their respective economic structures, statistical systems and data availability.

Figure 1: Overview of the Digital Industries

While these data sources build a strong foundation for identifying digital industries, they do not always capture firms' digital business models. To address this gap, DOS supplemented the compilation process by leveraging web-scraped data from companies' websites. Drawing on methodologies employed by NSOs such as Statistics Netherlands, DOS undertook a project to collect and analyse website information using supervised machine learning [5]. The analysis helped identify firms with digital characteristics and business models, thereby improving the coverage and classification of the digital industries. One example is the identification of e-tailers. Web-scraped information capturing website features such as shopping carts and online ordering functions, was integrated with industry classification and other administrative data to identify traders receiving orders digitally through their own websites (Figure 2).

[5] Details on the use of web-based data sources to profile enterprises with internet presence are available in the article ['Experimental Use of Machine Learning and New Data Sources in Updating the Statistical Business Register'](#).

Figure 2: Web-scraping to Identify E-tailers

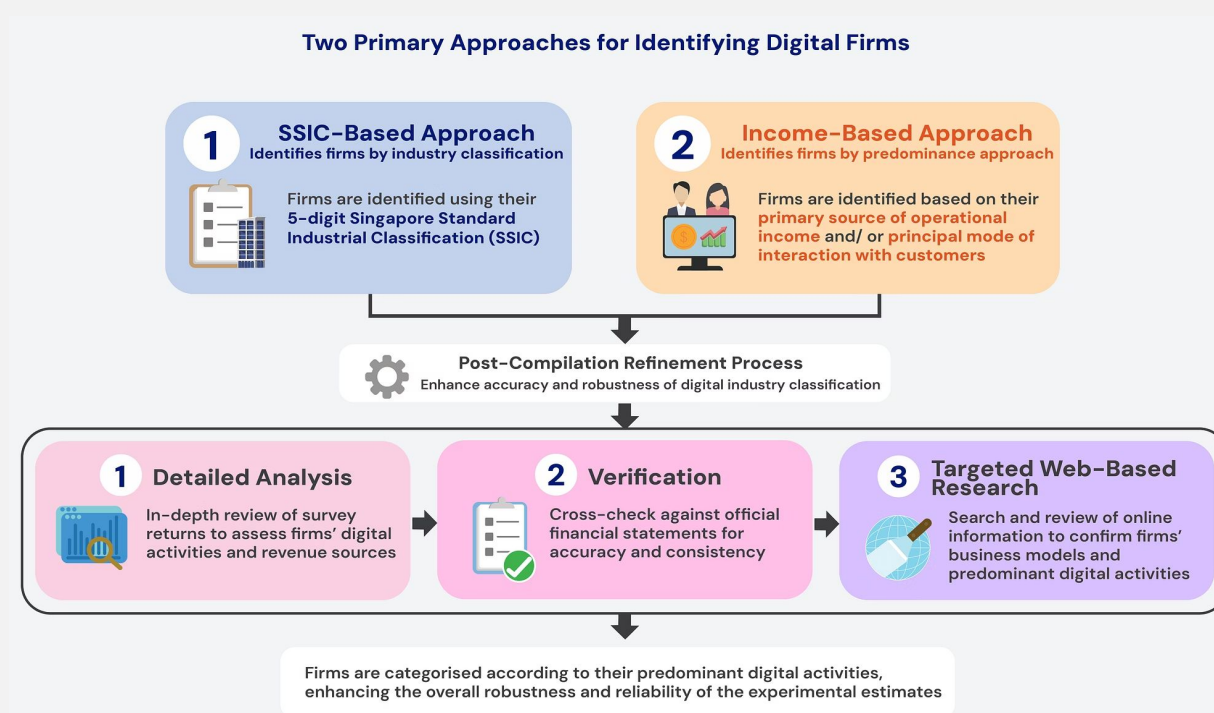


Methodology

The compilation methods for estimating digital industries fall broadly into two approaches, reflecting the primary ways for identifying digital businesses (Figure 3).

The first approach identifies firms based on their 5-digit SSIC codes, where firm classification provides a reliable indicator of digital activities. The second method applies the OECD's **predominance [6] approach**, which identifies firms based on their primary source of operational income and/ or principal mode of interaction with customers to distinguish firms that operate predominantly through digital channels from those that operate through both digital and physical business models.

Figure 3: Compilation Methods for Estimating Digital Industries



The initial compilation is followed by a refinement process to improve the accuracy of the classification. This involves detailed analysis of survey returns, verification against official financial statements, and targeted web-based research to ensure that the firms are categorised according to their predominant digital activities, thereby enhancing the overall robustness and reliability of the experimental estimates.

[6] Predominance is established where 50% or more of a firm's operational income is derived from e-commerce activities, and/ or where its principal mode of interaction with customers is through digital channels.

Key Findings

Digital industries continued to play an important role in Singapore's economy, accounting for more than 20% of Gross Domestic Product (GDP) between 2021 and 2023. In 2023, they contributed \$152.7 billion in GVA, an increase from the \$134.2 billion in 2021, while their share to the overall economy remained relatively stable over the same period (Figure 4).

Figure 4: GVA of Digital Industries, 2021-2023



In 2023, Singapore's digital industries generated more than \$150 billion in Gross Value Added (GVA), contributing over 20% of GDP.



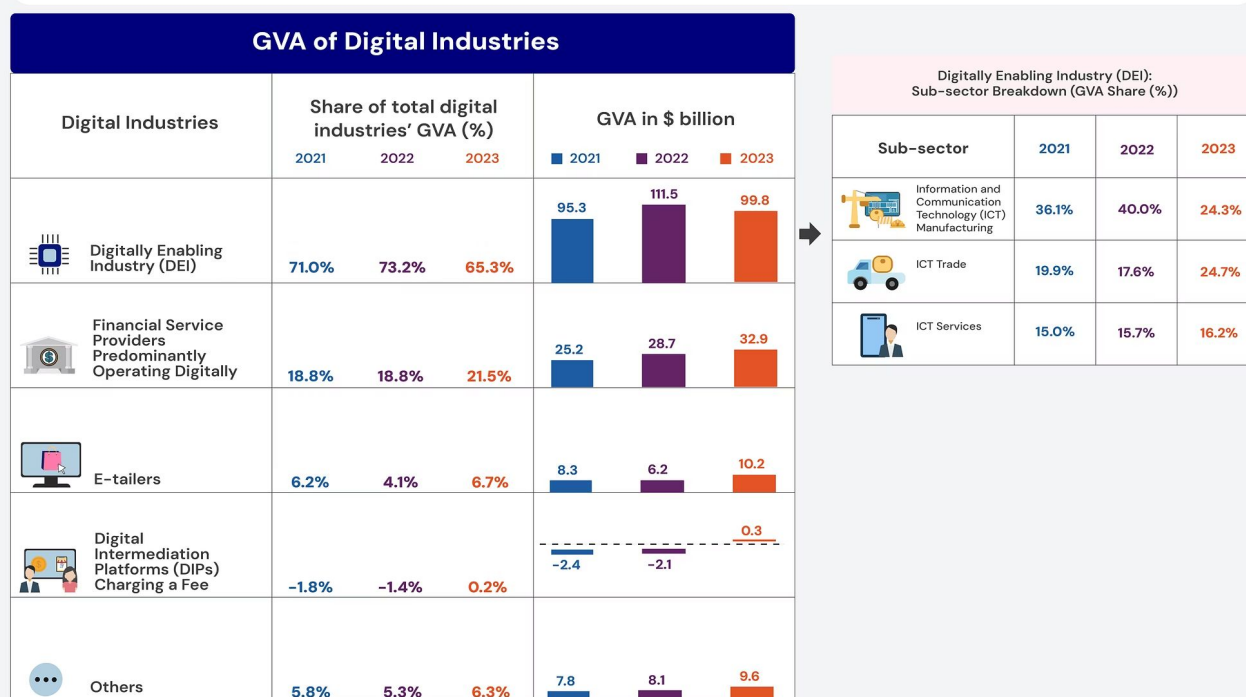
2021 GVA
\$134.2 billion
24.1%
of total GVA



2022 GVA
\$152.3 billion
22.7%
of total GVA



2023 GVA
\$152.7 billion
23.7%
of total GVA



Note: Figures may not add up to totals due to rounding.

The Digitally Enabling Industry (DEI), comprising ICT manufacturing, ICT trade and ICT services, remained the largest component of Singapore's digital industries. Between 2021 to 2023, the DEI accounted for around 70% of digital industries' GVA on average, with its GVA increasing from \$95.3 billion in 2021 to \$111.5 billion in 2022, before declining to \$99.8 billion in 2023.

The DEI's performance was largely shaped by developments in ICT manufacturing, particularly the semiconductors sector. Strong global demand for chips in 2021 and 2022, underpinned by developments in areas such as 5G, AI, cloud computing and data centres amid a global chip shortage, contributed to the strong performance. This contributed to an expansion in ICT manufacturing's share of digital industries' GVA from 36.1% in 2021 to 40.0% in 2022.

This growth reversed in 2023, as weaker global electronics demand and inventory drawdowns from earlier stockpiling weighed on semiconductor activity, shrinking its share to 24.3%. This decline was partly cushioned by ICT trade, whose share increased from 17.6% in 2022 to 24.7% in 2023, supported by strong wholesale sales of computer equipment, while ICT services remained broadly stable at 16.2%.

Beyond the DEI, other segments also recorded notable developments. Financial service providers predominantly operating digitally (FS) continued to expand, with GVA growing from \$25.2 billion (18.8%) in 2021 to \$32.9 billion (21.5%) in 2023. This reflected the continued adoption of digital technologies across Singapore's financial sector. Between 2021 and 2022, GVA for E-tailers declined due to the easing of COVID-19 restrictions where some consumer spending shifted back to physical stores, before rebounding to \$10.2 billion in 2023 amid continued growth in online spending.

Digital intermediation platforms (DIPs) charging a fee recorded negative GVA in 2021 and 2022, reflecting the impact of the pandemic on segments such as online travel. GVA turned positive in 2023, supported by the recovery of online travel marketplaces following the resumption of international travel, alongside improved performance among e-commerce platforms as they transitioned from rapid expansion towards more sustainable growth. Other digital industries recorded steady GVA growth over the period, reaching \$9.6 billion and accounting for 6.3% of digital industries' GVA in 2023.

In 2023, the DEI and digital financial services collectively accounted for 87% of digital industries' GVA, underscoring their central role in Singapore's digital industries. While the downturn in ICT manufacturing weighed on the DEI, stronger contributions from ICT trade, digital financial services and other digital activities helped cushion the impact. Consequently, GVA of Singapore's digital industries remained broadly stable at around \$153 billion in 2023, reflecting the sector's resilience amid changing global economic and technological conditions.

Conclusion

Singapore's digital industries played a significant role in our economy, generating over 20% of GDP in 2023. The Digital Enabling Industry (DEI), largely driven by semiconductor manufacturing, accounted for approximately two-thirds of the digital industries' gross value added, while financial services expanded steadily, reflecting the increasing adoption of digital technologies across the sector.

The development of Singapore's experimental DESA marks an important step in strengthening the measurement of the digital economy. By adopting an internationally recognised framework, the estimates provide a more comprehensive and comparable view of the industries driving digital transformation and their contributions to economic activity. While still experimental, they offer a valuable complement to existing measures of Singapore's digital economy.

Looking ahead, efforts are underway to expand DESA to cover other key aspects of the digital economy, including digital products and the nature of the transaction, with findings expected to be released next year.

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