UN-ECLAC, UNCTAD, and IMF Webinar

Measurement of the digital economy and trade in Latin America and the Caribbean

November 8-11, 2022

STATISTICS

Cloud Computing and Digital Platforms: Measurement Challenges

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Outline

1. Cloud Computing, the measurement challenges and some experimental indicators.
2. Digital Platforms, the measurement challenges and some experimental indicators.

(1.1) What is cloud computing?

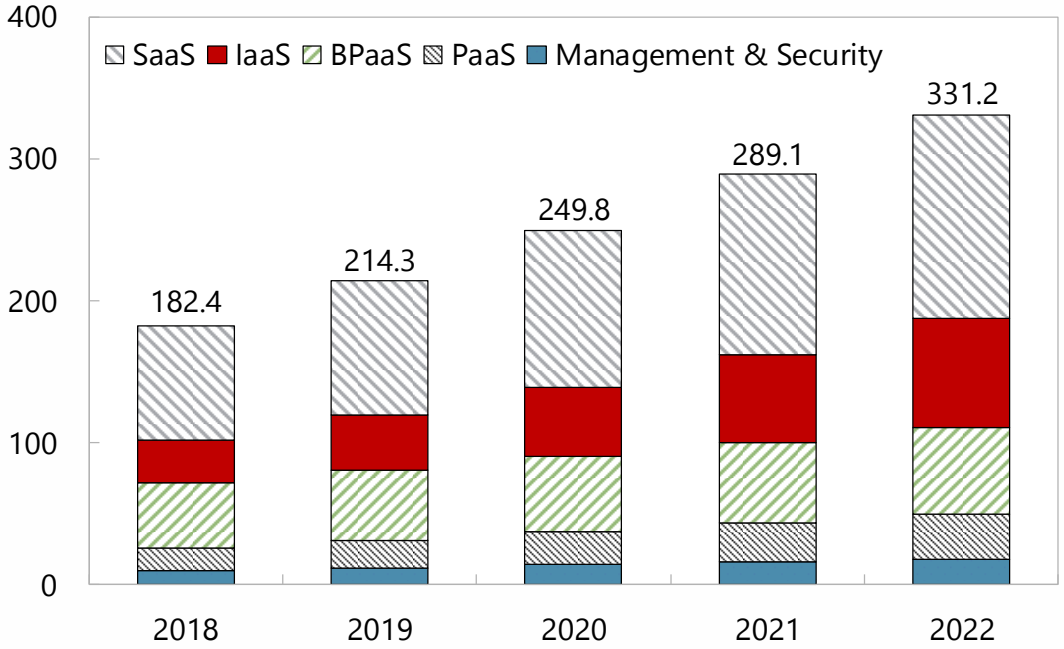
Cloud computing is the on-demand delivery of compute power, database, storage, applications, and other IT resources via the internet with pay-as-you-go pricing.

- At a very basic level cloud computing is a consolidation of the provision of IT services and a switch by firms (and households) from internal provision to market provision.

(1.1) What is Cloud Computing?

Figure 1. Global Cloud Computing Market Forecast

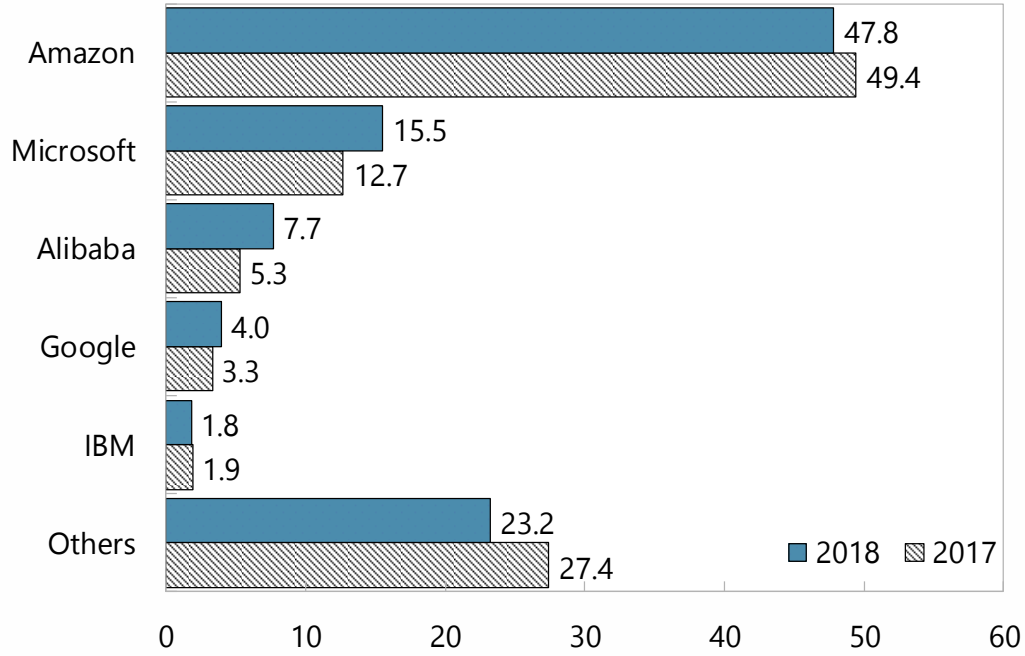
(Billions of U.S. Dollars)



Sources: Gartner (April 2019)

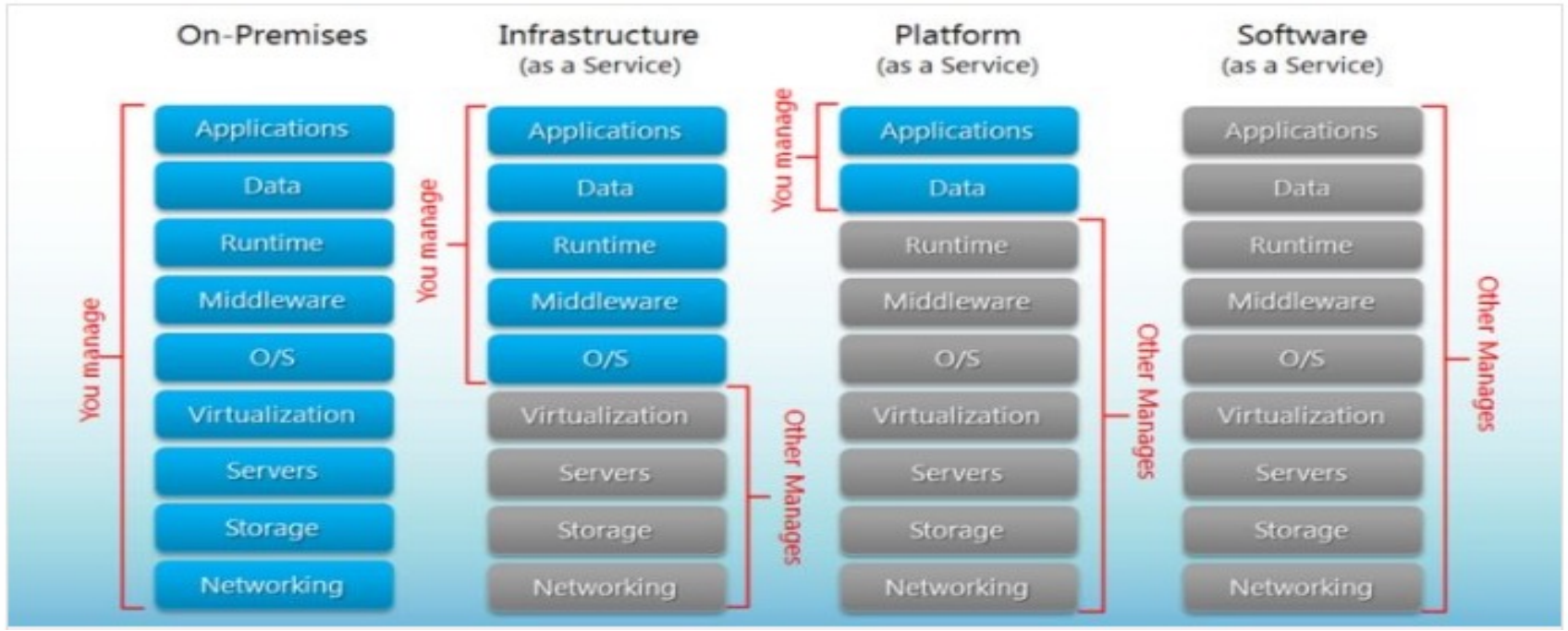
Figure 2. Global IaaS Cloud Computing Market Share

(Percent)



Sources: Gartner (July 2019)

(1.1) What is cloud computing?



- 5 essential characteristics:
  1. On-demand self-service
  2. Broad network access
  3. Resource pooling
  4. Rapid elasticity
  5. Measured usage

Source: U.S. National Institute of Standards and Technology

	AWS, Azure, Alibaba	Google App Engine, Windows Azure	Office 365, Salesforce
Sensitive internal systems	Computing and storage only	Developing software applications	Subscription access to standard software applications

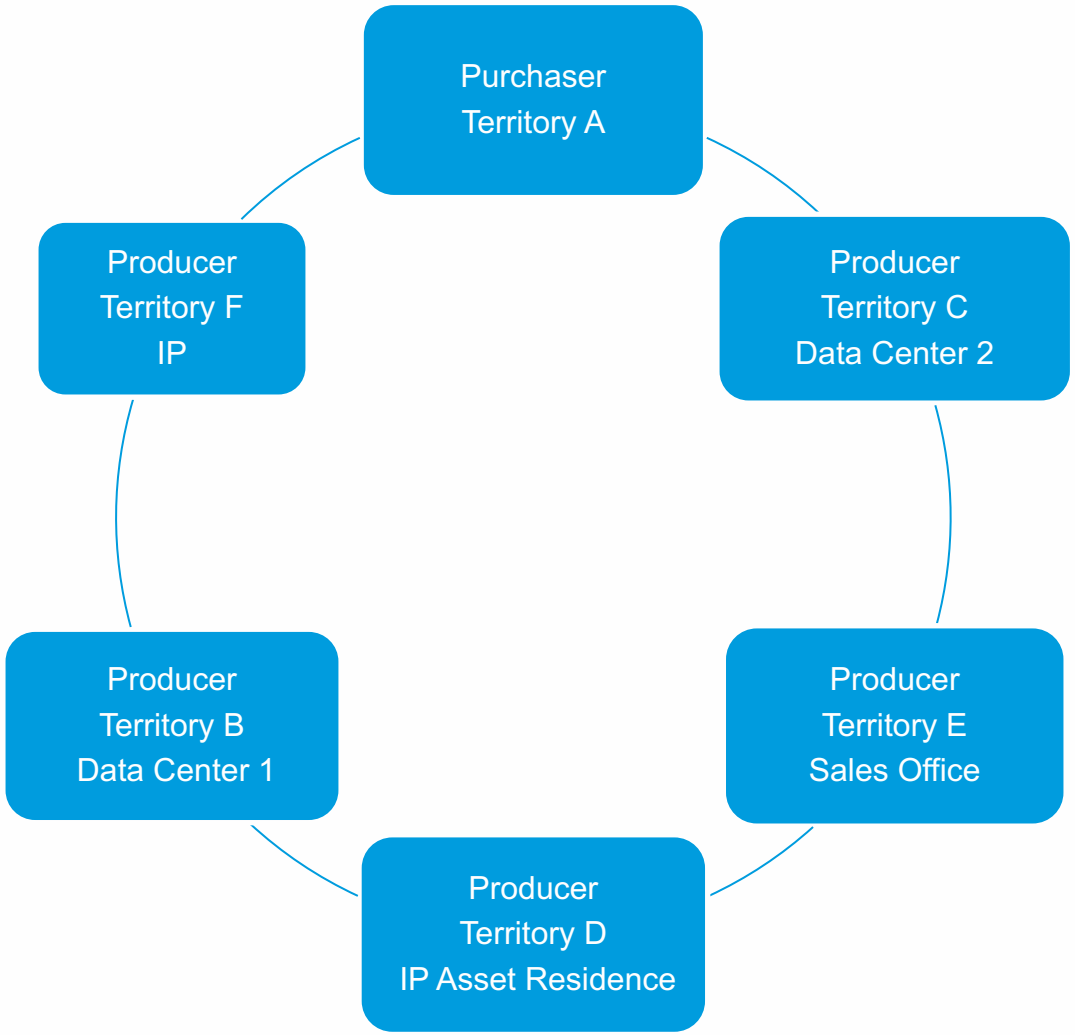
Source - https://www.hostingadvice.com/how-to/iaas-vs-paas-vs-saas/

(1.2) Measurement Challenges – Classifying Cloud Computing

- Phrases “cloud computing”, “IaaS”, “PaaS”, and “SaaS” do not appear in product and industry classifications
- Currently the activity of cloud computing firms is included in the *“Data processing, hosting, and related services”* industry with outdated activities such as data entry, data processing, timeshare on mainframes
- International Trade in Cloud computing services would be included in the general category “computer services”
- Since price, output, and trade statistics compilers follow standard classifications, there are almost no current official statistics on cloud computing as a distinct activity.

Information Service Activities
Data processing, hosting and related activities
Data processing, hosting and related activities
Web portals
Other information service activities
New agency activities
Other information service activities n.e.c.

(1.2) Measurement Challenges – Cross-border Flows



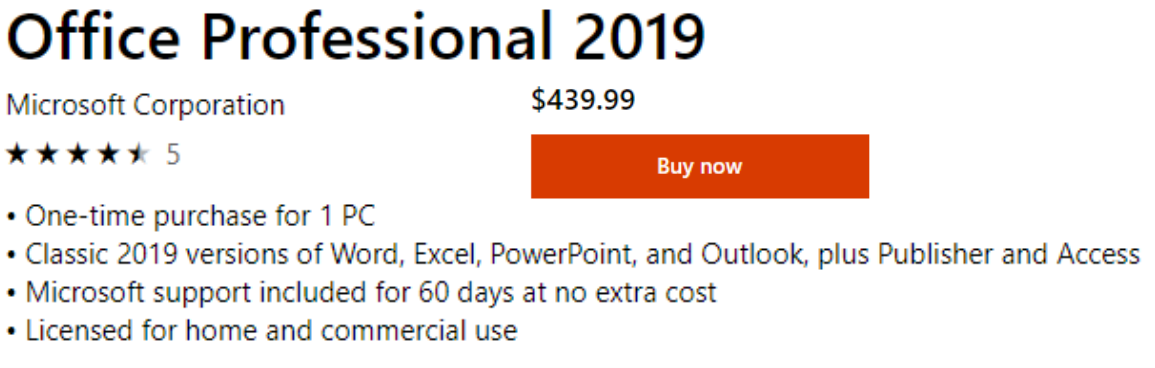
Microsoft 365 Cloud – Asia Pacific Customers

Service	Data Storage Location
Exchange Online	Hong Kong Japan Malaysia Singapore South Korea
OneDrive for Business	Hong Kong Singapore
SharePoint Online	Hong Kong Singapore

(1.2) Measurement Challenges – Assets or Service

- *2008 SNA* recommends:
  - Software licenses for perpetual or multi-year usage are capitalized as an asset and depreciated
  - Software licenses paid with regular periodic payments are recorded as payment of service

- SaaS models complicate this picture, for example:
  - 2-year commitment to access software on an as-needed basis
    - Paid based on usage
    - Paid based on monthly subscription
  - Varied combinations of subscription and usage fees



(1.2) Measurement Challenges – Pricing

Sales Cloud Pricing

Sell faster and smarter with any of our fully customizable CRM editions.

	Professional $ 100 USD/user/month**	Enterprise $ 175 USD/user/month**	Unlimited $ 325 USD/user/month**
Account, Contact, Lead, and Opportunity Management	✓	✓	✓
Case Management	✓	✓	✓
Service Console App(s)	✓	✓	✓
Service Contracts and Entitlements	✓	✓	✓
Lead Registration and Rules-Based Lead Scoring	✓	✓	✓
API and Automation	✗	✓	✓
24/7 Support and Configuration Services	✗	✗	✓

(1.3) Measuring Cloud Computing – Updating Classifications

- The ISIC (International Standard Industrial Classification System) and the CPC (Central Product Classification System) are currently being updated.

- Both updates are leaning towards creating specific industry and commodity classes related to cloud computing.

Proposed Update to the International Standard Industrial Classification

- Division 61 Telecommunications
- Division 62 Computer programming, consultancy and related activities
- Division 63 Computing infrastructure, data processing, hosting, and other information service activities
  - 6320: includes cloud infrastructure and platform provision (IaaS, PaaS), and cloud computing (except software publishing and computer systems design), whether or not in combination with infrastructure provision; distributed ledger (blockchain) technology data processing activities; and technical infrastructure provisioning services related to streaming.

(1.3) Measuring Cloud Computing – Identifying Suppliers and Use

- Supply of Cloud Services
  - Identify cloud computing service providers on national business registers
  - Collect information related to sales (by product, by client), investment, and operating costs.
- Use
  - Need to collect information on household use.
  - Need to update surveys to collect business expenses related to cloud computing services.
  - Need to update cross border surveys to collect international trade in cloud computing services.

Statistics Canada: Survey of Digital Technology and Internet Use - 2021

Cloud computing

34 In 2021, which of the following cloud computing services did this business use?

Select all that apply.

1: Cloud-based email
2: Cloud-based software
3: Processing power to run own software
4: Storage capacity
5: Cloud-based environment for application development, testing or deployment
6: Other
- Specify other cloud computing services
: OR
7: Don't know

35 In 2021, how much did this business spend on cloud computing services?

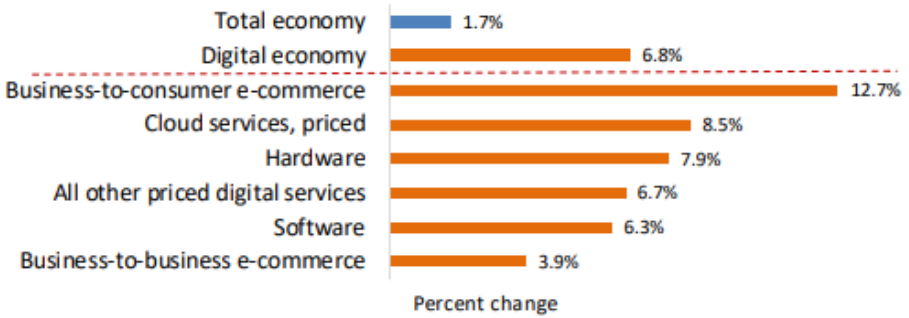
36 For which of the following reasons did this business use paid cloud computing services in 2021?

Select all that apply.

1: Lack of an alternative
2: To reduce overall business costs
3: Flexibility in accessing documents
4: Simplicity of deployment
5: Productivity gains
6: To improve information sharing and simplify decision making
7: Cyber security
8: To improve the work environment
9: Other

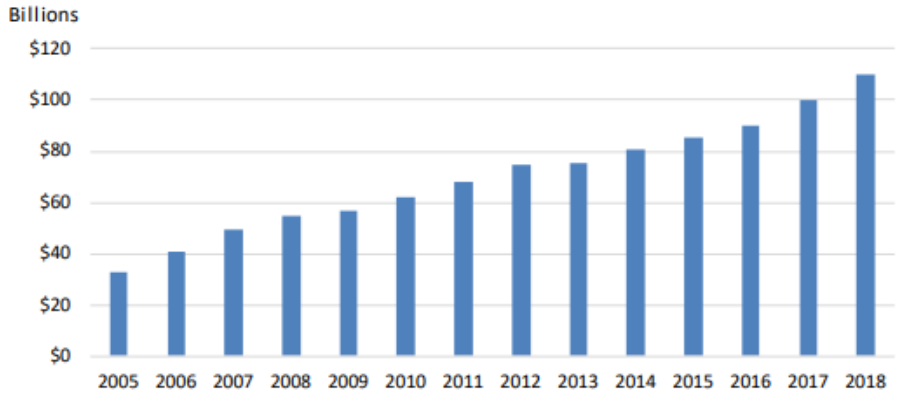
(3) Cloud Computing estimates – United States

Chart 6. Components of the Digital Economy: Real Value-Added Average Annual Growth, 2006–2018



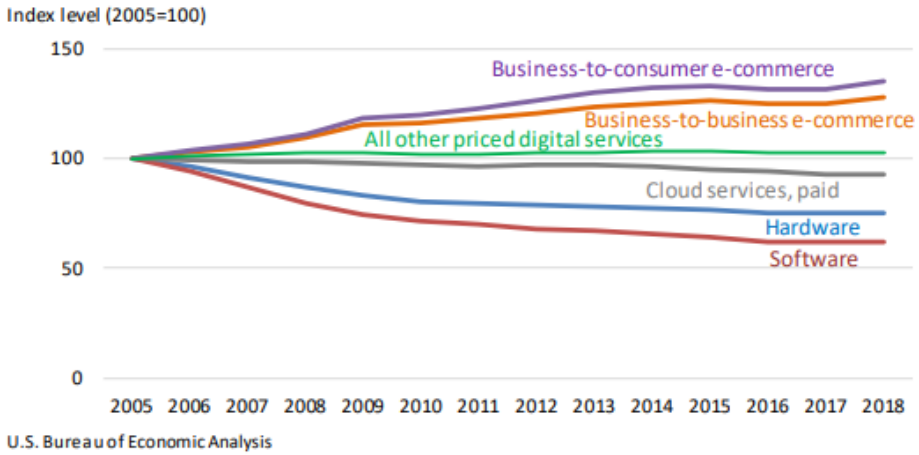
U.S. Bureau of Economic Analysis

Chart 4. Cloud Services, Paid, Current-Dollar Gross Output



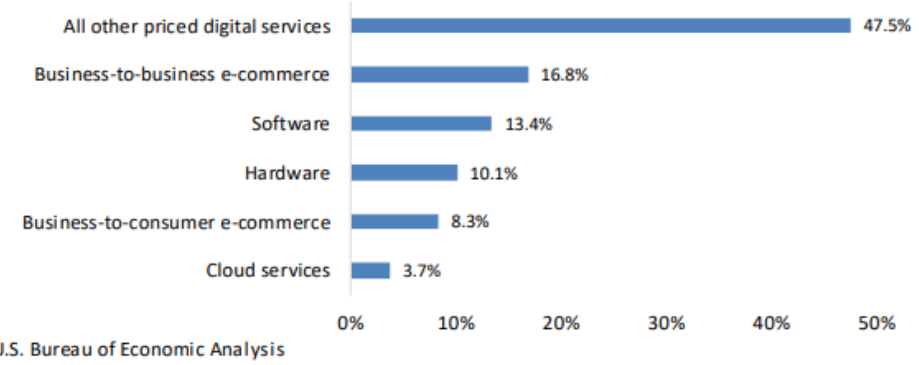
U.S. Bureau of Economic Analysis

Chart 9. Gross Output Price Indexes for Digital Economy Components



U.S. Bureau of Economic Analysis

Chart 5. Component Share of the Digital Economy, Current-Dollar Value Added, 2018



U.S. Bureau of Economic Analysis

https://www.bea.gov/system/files/2020-08/New-Digital-Economy-Estimates-August-2020.pdf

Digital Intermediary Platforms

(3) Digital Platforms - Definitions

- **Digital Intermediary Platforms** are online interfaces that facilitate, for a fee, the direct interaction between multiple buyers and multiple sellers, without the platform taking economic ownership of the goods or services that are being sold

- **Media Sharing Platforms** facilitate the sharing of cultural content between two or more groups, for a fee or free of charge.

- **Recreational Platforms** allow one or more individuals to engage in recreational activities including gaming and gambling.

(3.1) Digital Platforms - Definitions

- **Social Media Platforms** disseminate information over the Internet to a selected group of members. Social media platforms are used by people to publish their daily activities, comments and photos as well as re-publish information posted by others. Membership on the platform is generally free.

- **Funding Platforms** allows people to raise money for business projects or social / personal causes ranging from life events such as celebrations and graduations to challenging circumstances like accidents and illnesses.

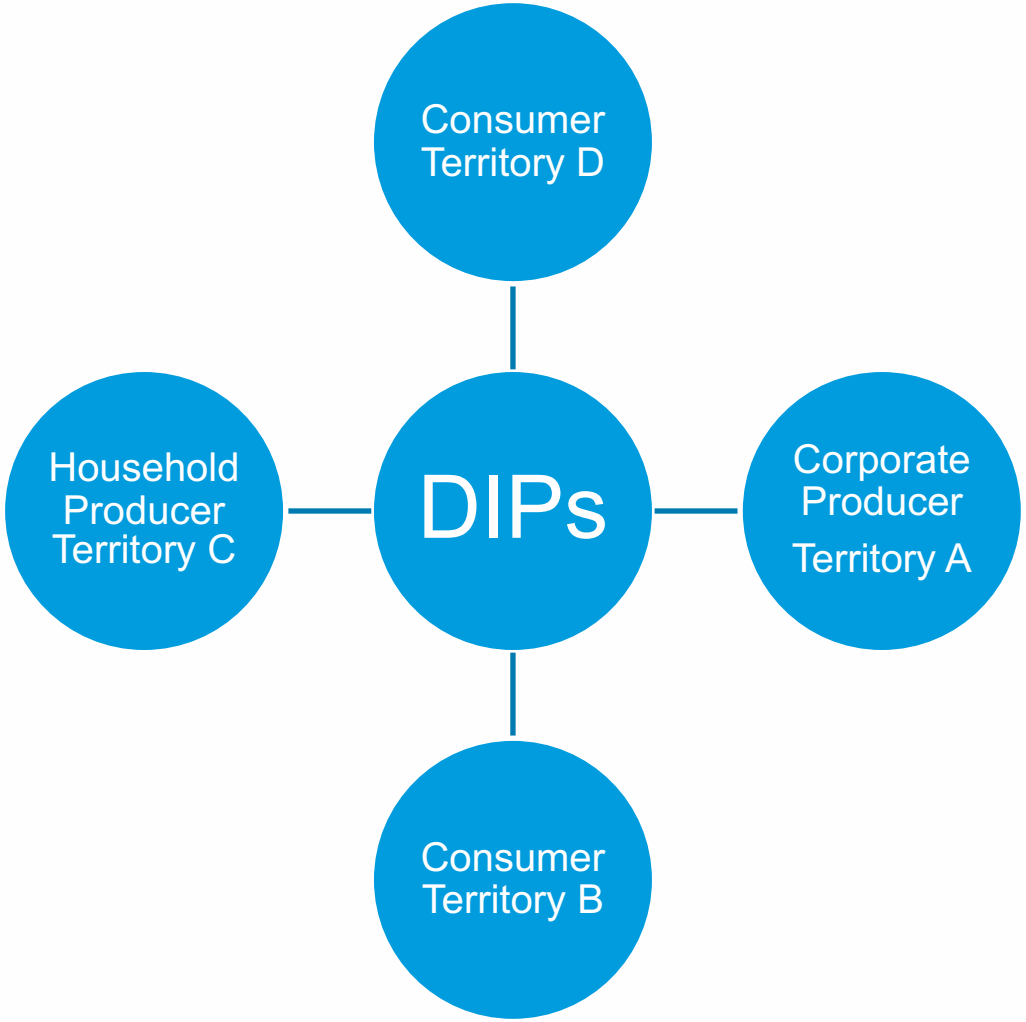
(3.1) Digital Intermediary Platforms

- ✓ **Digital Intermediary Platforms** (DIPs) are **businesses** that operate online interfaces that facilitate, for a fee, the direct interaction between multiple buyers and multiple sellers, without the platform taking economic ownership of the goods or services that are being sold (intermediated)
- ✓ DIPs are part of the formal economy and undertake market transactions like other economic units.
- ✓ While DIPs are measured in the same manner as other economic units, their **unique nature create several challenges for both producers and users of statistics**.

(3.2) Digital Platforms – Measurement Challenges

- Digital Intermediary Platforms create measurement challenges because:

  - ✓ Each transaction involves 3 or more parties
  - ✓ The transactors can be in different economic territories.
  - ✓ There is a greater likelihood that for some of the transactors this is a secondary activity (and therefore may not be fully registered – intentionally or by design).



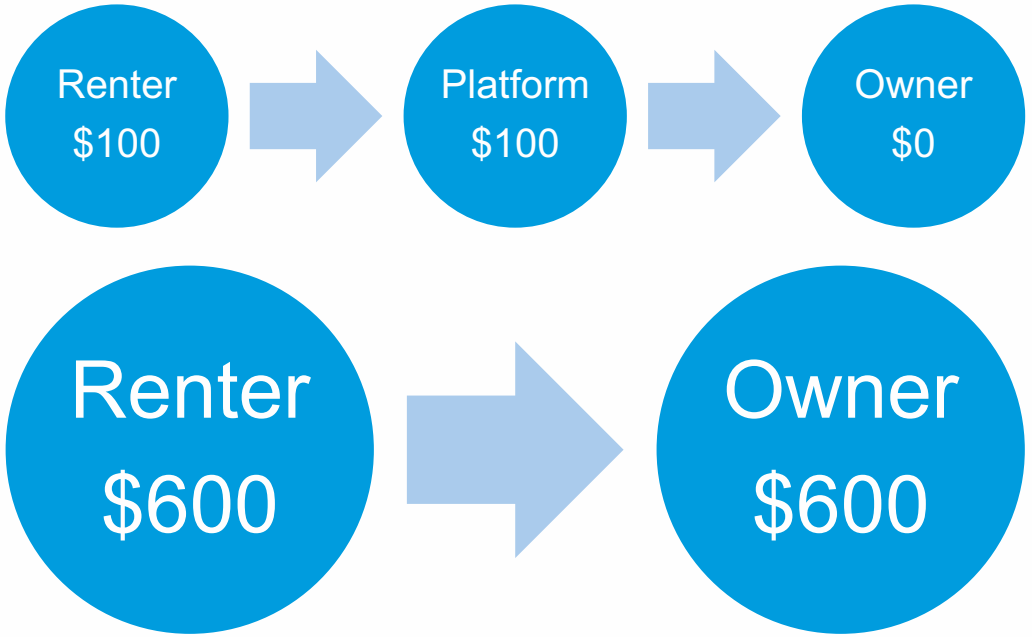
(3.2) Digital Platforms – Measurement Challenges (Recording)

- There are two possible ways to record the activity of the digital intermediary platform.
- Gross approach routes the entire transaction through the platform.
- Under this approach there is no direct transaction recorded between the producer and consumer.

Flow	Renter	Platform	Owner
Household Consumption	700		
Output		700	600
Intermediate Consumption		600	0
Value Added		100	600

(3.2) Digital Platforms – Measurement Challenges (Recording)

- There are two possible ways to record the activity of the digital intermediary platform.
- Net approach routes the intermediation fee through the platform and the peer-to-peer charges outside the platform.
- Under this approach a transaction is recorded between the producer and consumer.



Flow	Renter	Platform	Owner
Household Consumption	700		
Output		100	600
Intermediate Consumption			0
Value Added		100	600

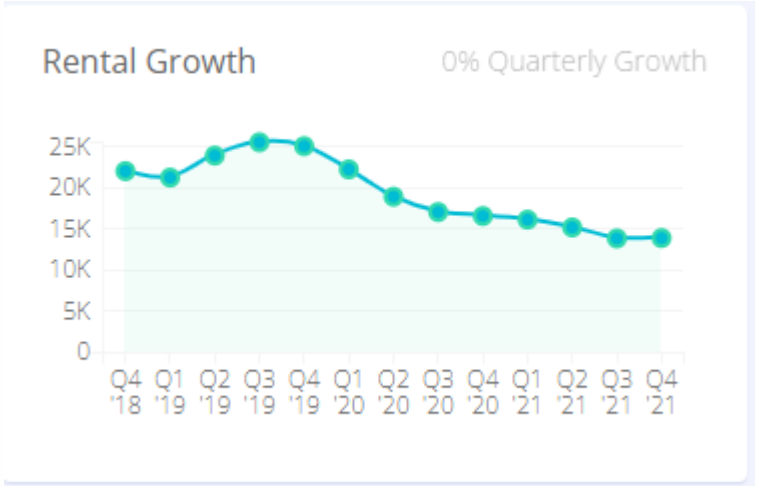
(3.2) Digital Platforms – Measurement challenges (classification)

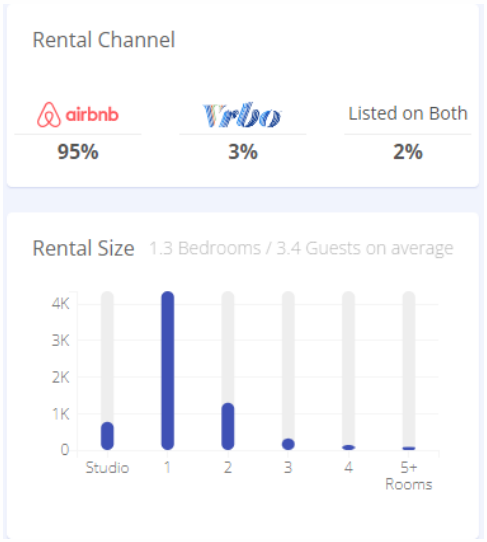
- Given DIPs emerged following the last updates of the industrial and product classification systems there is a lack of international guidance on how to present their activity. Two options are being considered.
  - Group all DIPs together regardless of the underlying product they are facilitating (e.g. Group UBER and AirBnB together).
  - Create a sub-group a separate class within the same division as the underlying product - formalise the current interim guidance they are facilitating.

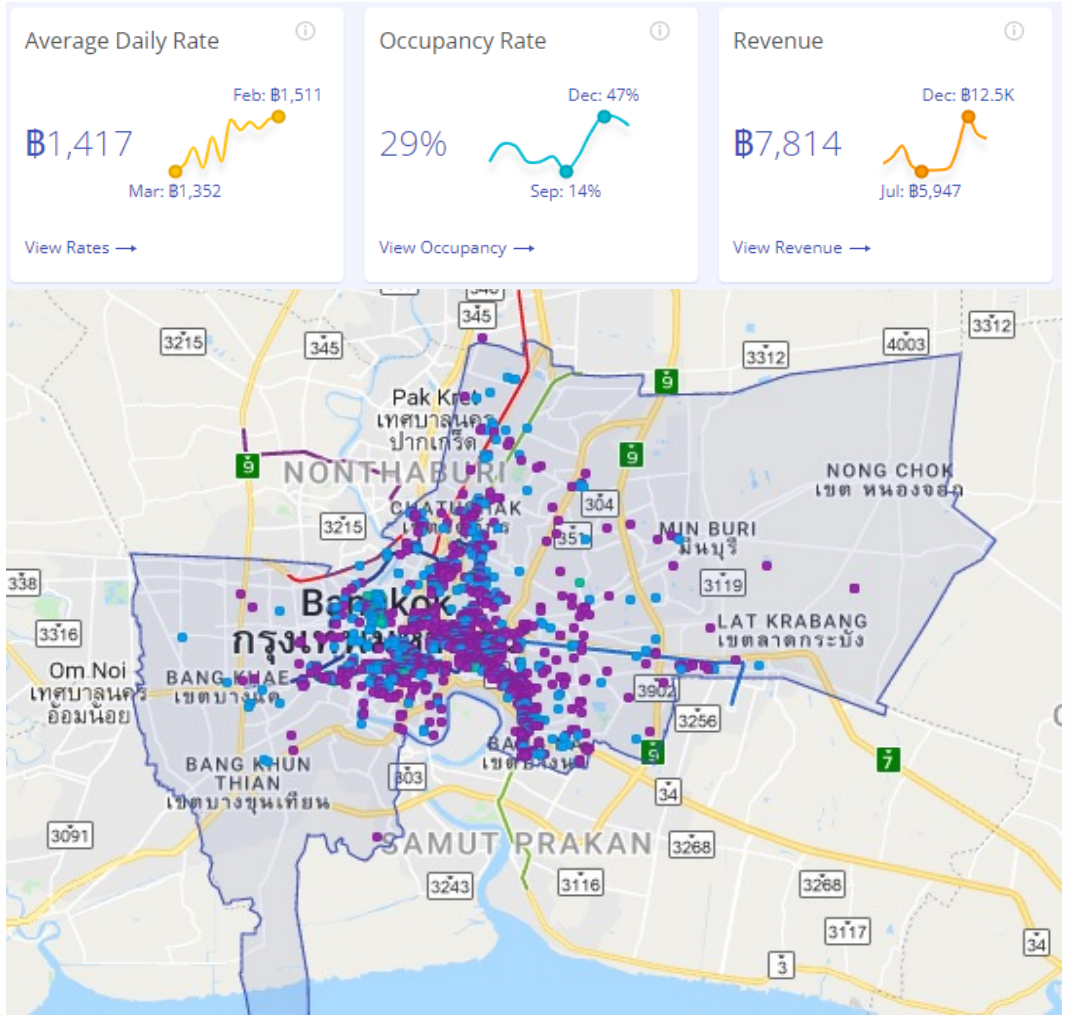
Digital Intermediary Platform Industry
DIPs facilitating accommodation services
DIPs facilitating ride services
DIPs facilitating financial services
DIPs facilitating food delivery surveys
Accommodation Services Industry
Hotel Industry
DIPs facilitating vacation rentals
Ride Services Industry
Taxi Services
DIPs facilitating ride services

(3.3) Digital Intermediary Platforms – Data Sources

- Given a significant amount of data can be acquired from the platform, private sector firms has developed analytical platforms that assist with quantifying the size and evolution of the market and the activity on the platform.







Short Term Rentals: Bangkok Thailand: Airdna: https://www.airdna.co/vacation-rental-data/app/th/default/bangkok/overview

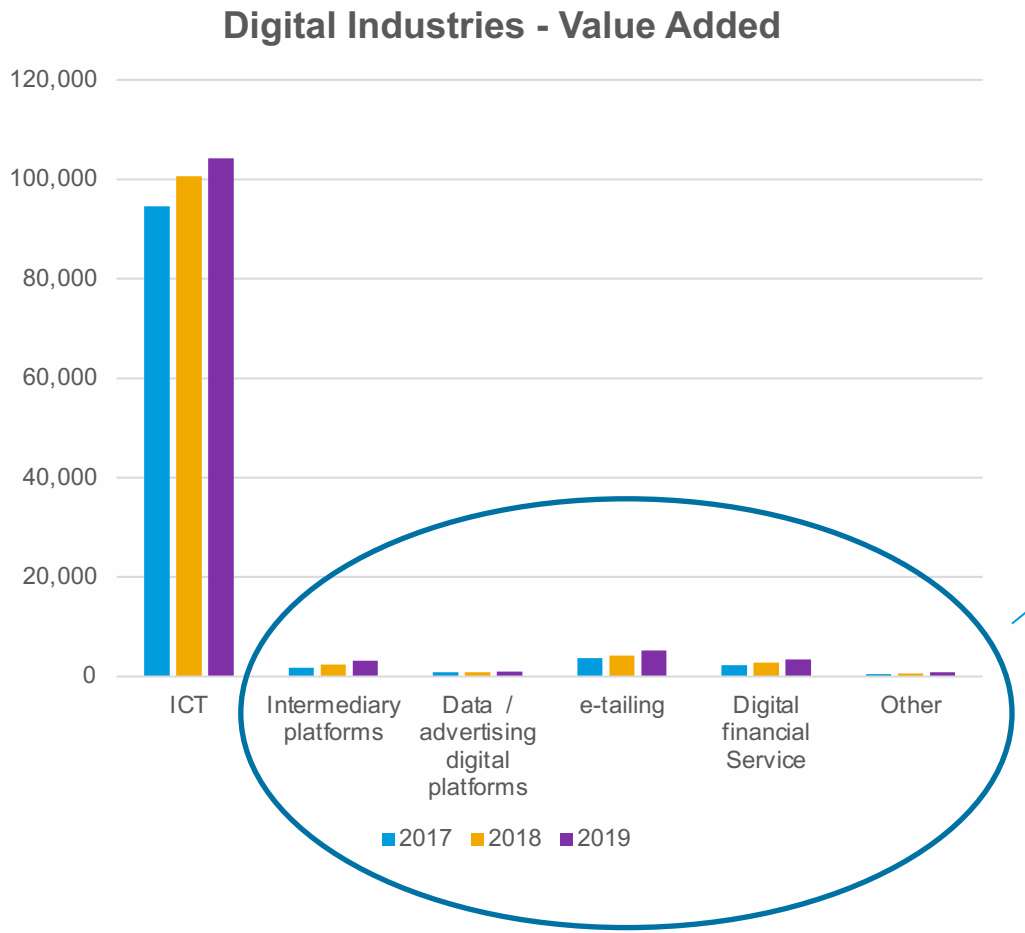
(3.3) Digital Intermediary Platforms – Data Sources

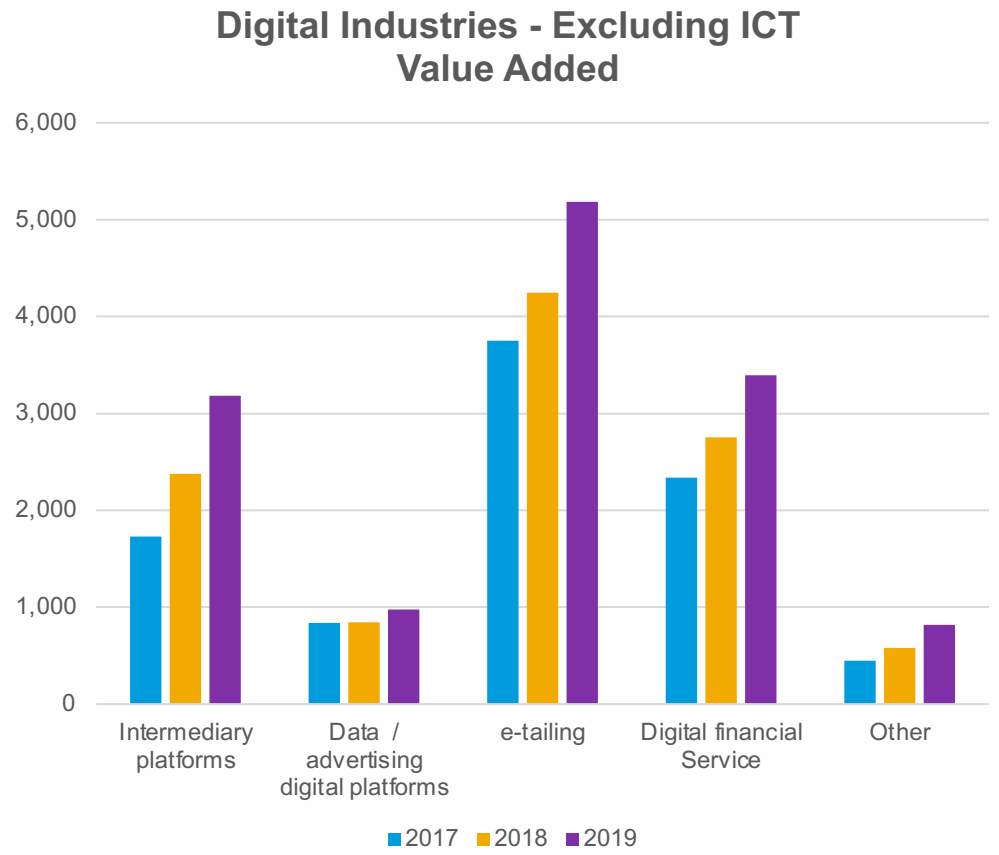
- Some countries have designed household surveys to estimate the production and consumption of DIP services.
- While rich in detail, the surveys are often costly and released with a significant time lag.

Age group	Total, 15 years and over	
Geography	Canada (map)	
Average expenditure on goods and services ordered over the Internet	2018	2020
	Dollars	
Total, average expenditure per person[5]	2,554[A]	3,376[A]
Digital goods or services[6]	346[A]	568[A]
Physical goods[7]	1,165[A]	2,336[A]
Peer-to-peer ride services[8]	341[A]	..
Peer-to-peer accommodation services[9]	1,101[A]	1,073[A]
Other services[10]	1,399[A]	1,048[A]

Statistics Canada: Canadian Internet Use Survey

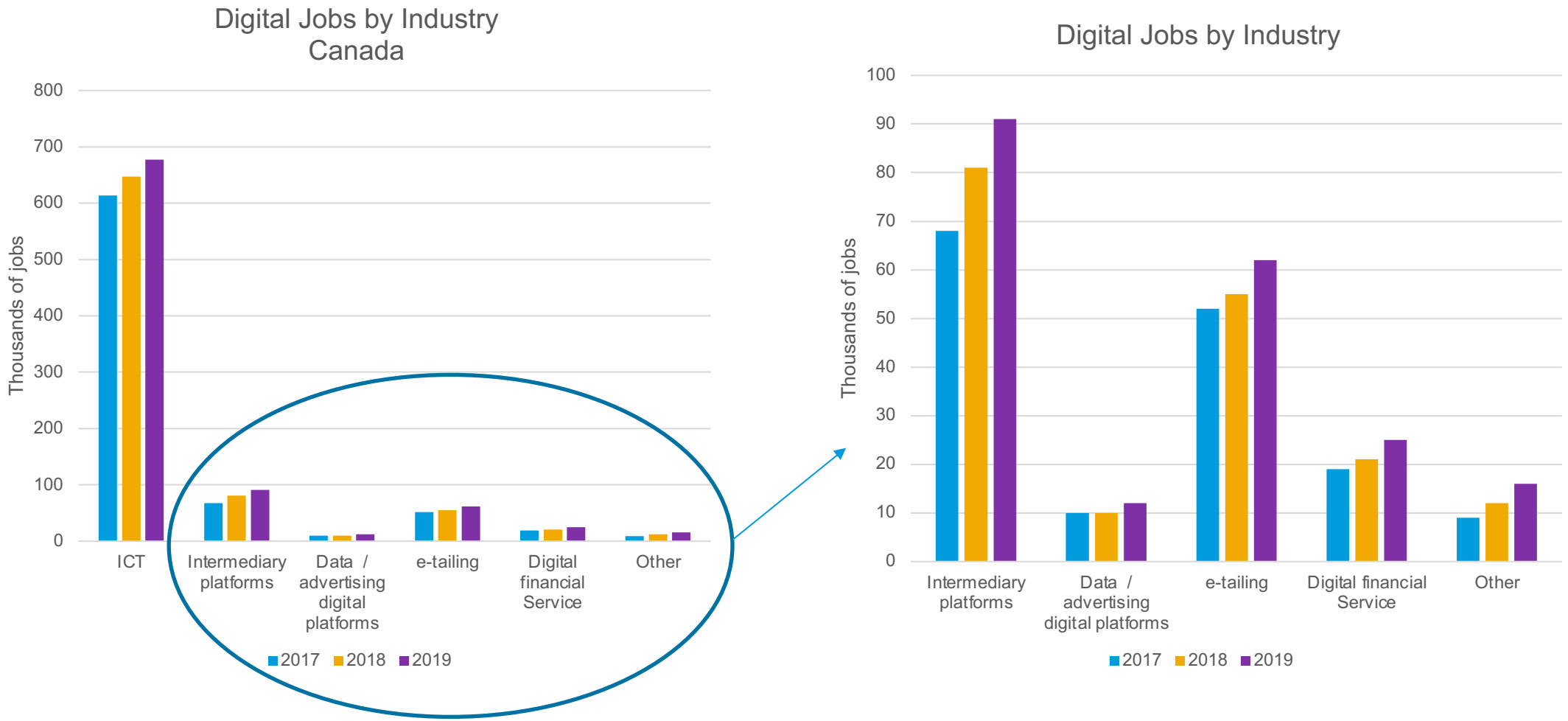
Some examples
Canada – Value Added





Statistics Canada Source: https://www150.statcan.gc.ca/n1/daily-quotidien/210420/t001a-eng.htm

Some examples
Canada – Digital Jobs



Source Statistics Canada: https://www150.statcan.gc.ca/n1/daily-quotidien/210420/t001a-eng.htm

(3.4) Digital Platforms – Media Sharing Platforms

- Media Sharing platforms such as YouTube have a similar business model to that of traditional Television Broadcasters.
- They sell advertising space to firms in exchange for the viewership that they have attracted by broadcasting the content on their platform.
- Most of this content is provided for free by the members of the platform.
- While the measurement of the platform is straightforward, some suggest that the consumption of this free content has value.

(3.4) Digital Platforms – Media Sharing Platforms

- Consider the accounts of a television broadcaster who produces and broadcasts a “Cooking show” compared to a Media sharing platform that broadcasts cooking videos uploaded by members. Assume that both platforms sell $100,000 in advertising time.

	TV Broadcaster	Media Sharing Platform
Output (Advertising Sales)	$100,000	$100,000
Intermediate Expenses		
Production Costs	$30,000	$0
Broadcasting costs	$30,000	$20,000
Value Added	$40,000	$80,000
Viewership	100,000 views	1,000,000 viewers

(3.4) Digital Platforms – Media Sharing Platforms

	TV Broadcaster	Media Sharing Platform
Output (Advertising Sales)	$100,000	$100,000
Intermediate Expenses		
Production Costs	$30,000	$0
Broadcasting costs	$30,000	$20,000
Value Added	$40,000	$80,000
Viewership	100,000 views	1,000,000 viewers

- The value added (profits) of the Media platform is greater than the broadcaster since the media platform does not need to pay for content and its distribution costs are lower.
- The question is – should / how do we account for the fact that so many more people view the content?