Indian Experience in Measuring

Digital Economy

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Outline

- Measurement Frameworks
  - ADB
  - OECD (including Digital SUTs)
- Indian Context
  - Data availability
  - Compilation options
- A Few Examples of Measuring Digital economy
  - Based on ADB Methodology, Machine Learning & OECD Framework

Measurement Frameworks

Core Digital

- ✓ Core digital products into five main product groupings: (i) hardware (ii) software publishing (iii) web publishing (iv) telecommunications services (v) specialized and support services

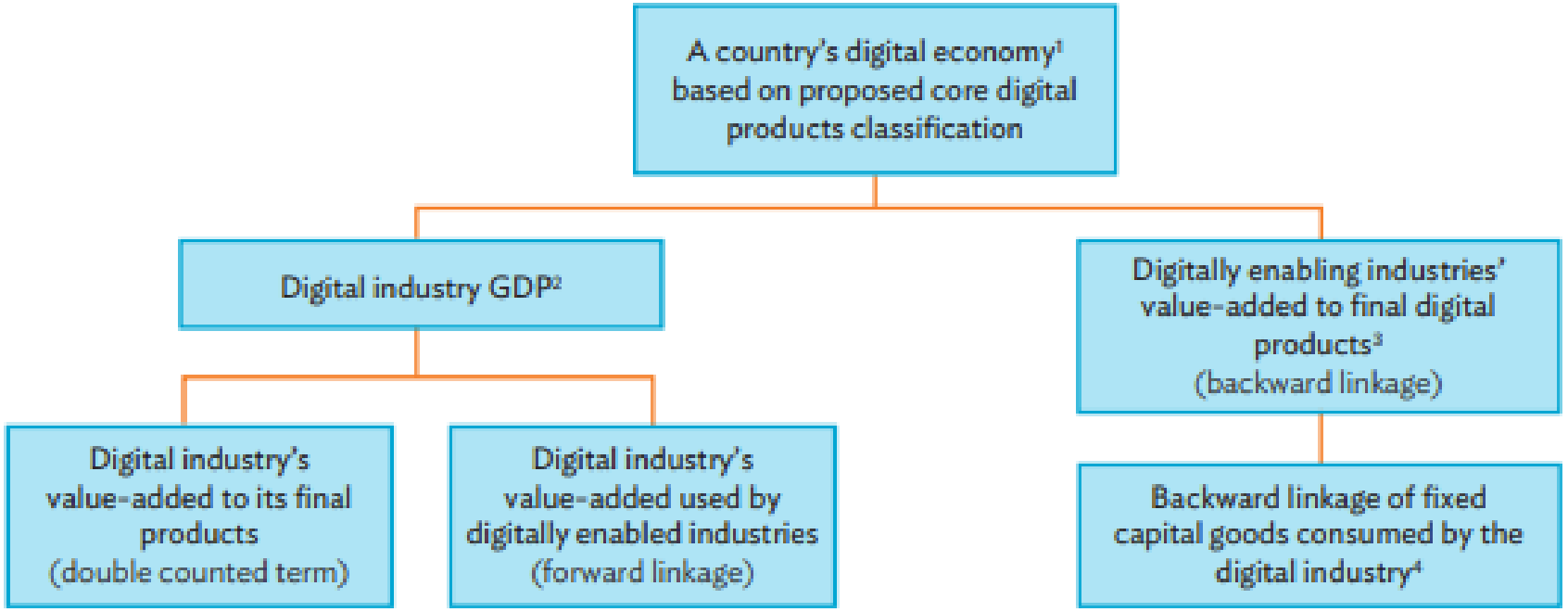
- ✓ Industries in accordance to National Industrial Classification with (NIC)-2008 have been identified to cover the core digital products which basically includes the ICT, Content and Media sector

- ✓ Digital GVA (Y_i , $i = 1,2, \dots, D$) of i^{th} sector would be,

$$Y_I = X_i * \frac{A_i}{A_i + B_i}$$

X_i is the GVA of i^{th} sector ;
A_i is the number of workers in core digital industries corresponding to i^{th} sector;
$(A_i + B_i)$ be the number of total workers in i^{th} sector;
D =123

Methodology of the Digital Economy Measurement Framework, using Leontief (1936) coefficients: ADB



$$\mathrm{GDP}_{\mathrm{digital}} = \mathbf{i}^{\mathrm{T}}\hat{\mathbf{v}}\mathbf{B}\hat{\mathbf{y}}\boldsymbol{\varepsilon}_1 + \mathbf{i}^{\mathrm{T}}(\hat{\mathbf{v}}\mathbf{B}\hat{\mathbf{y}})^{\mathrm{T}}\boldsymbol{\varepsilon}_1 - [\mathrm{diag}(\hat{\mathbf{v}}\mathbf{B}\hat{\mathbf{y}})]^{\mathrm{T}}\boldsymbol{\varepsilon}_1 + (\mathbf{i} - \boldsymbol{\varepsilon}_1)^{\mathrm{T}}\hat{\mathbf{v}}\mathbf{B}\hat{\mathbf{y}}\hat{\mathbf{r}}\boldsymbol{\varepsilon}_2$$

(i) backward linkages; (ii) forward linkages; (iii) the double-counted term and (iv) the nondigital products it capitalizes.

Source : ADB

OECD Approach

OECD classification based on the characteristics of the transactions

OECD 1	OECD 2	OECD 3	OECD 4	OECD 5	OECD 6	OECD 7
Digital Enabling Industry (DEI)	Digital Intermediary Platforms (primarily fee-based)	Digital Intermediary Platforms (primarily and revenue -based)	Firms dependent on intermediary platforms	E-tailers	Digital only firms providing financial and insurance services	Other producers operating only digitally

Digital SUTs add a bifurcation of digital ordering and delivery for each items, apart from the seven digital industries
This framework doesn't consider backward linkages. Digital ordering and selling is reported for each item in SUTs
Mode of conduct of business isn't explicitly considered in ADB Framework, though it might feature in forward linkages through SUT/IOTs

Indian Context : Data & Compilation

Data Sources

- Administrative data : No markers
  - Government
  - Corporations
- Survey data : Insufficient information
  - Organised sector (Annual Survey of Industries, Annual Survey of Services Sector)
  - Unincorporated sector / household sector (Annual Survey of Unincorporated Sector Enterprises)
  - Periodic Labor Force Survey

Annual Survey of Industries

Block K: Information and Communication technology (ICT) usage		
Sl. No.	**ICT indicator**	***yes-1, no-2***
1.	Did the factory use computer/s during FY 2023-24?	
2.	Did the factory use the internet during FY 2023-24?	
3.	Did the factory have a website as on the date of survey?	
4.	Did the factory receive orders via the internet during FY 2023-24?	
5.	Did the factory place orders for business purpose via the internet during FY 2023-24?	
6.	Did the factory connect to the internet either by a. Narrowband or b. Fixed broadband or c. Mobile broadband during FY 2023-24?	
7.	Does the factory have a local area network (LAN) as on the date of survey?	

code for the major activity during the reference period (2 digit and 5-digit as per NIC 2008) special codes: cab driver operating under aggregators OLA/UBER/MERU/Rapido, etc.- 49227, chit fund – 64193, Self-Help Group (engaged in financial intermediation) – 64309, investment club – 64921, activities of private moneylenders – 64929, renting of building for residential purpose-68108, renting of building for commercial purpose-68109, activities of electrician, plumber, etc. – 81309, activities of delivery services – 96099, religious activities of individuals – 94919,

Annual Survey of Unincorporated Sector Enterprises

[13] particulars of use of information and communication technology (ICT) by the establishment (if entry in item 222 or item 223 is '1')		
main items	item no.	(yes-1, no-2)
(1)	(2)	(3)
does the establishment have a web presence as on the date of survey?	1301	
does the establishment have an intranet as on the date of survey?	1302	
did the establishment receive orders for goods or services (that is, make sales) via the Internet during reference period of last 365 days?	1303	
did the establishment place orders for goods or services (that is, make purchases) via the Internet during reference period of last 365 days?	1304	
how did the establishment connect to the Internet during reference period of last 365 days?		
Narrowband	1305	
fixed broadband	1306	
mobile broadband	1307	
does the establishment have a local area network (LAN) as on the date of survey?	1308	
does the establishment have an extranet as on the date of survey?	1309	
for which of the following activities did the establishment use the Internet during reference period of last 365 days?		
sending and receiving e-mail	1311	
telephoning over the Internet/VoIP, including video conferencing	1312	
getting information about goods and services	1313	
getting information from general government organizations	1314	
interacting with general government organizations	1315	
internet banking	1316	
accessing other financial services	1317	
providing customer services	1318	
delivering products online	1319	
internal or external recruitment	1321	
staff training	1322	
are you willing to participate in a monthly survey?	1323	
can you supply information by email/ portal?	1324	
		number
average number of persons employed who routinely used computers during reference period of last 365 days.	1325	
average number of persons employed who routinely used the Internet at work during reference period of last 365 days.	1326	

Compilation Options

- Official Statistics
- Experimental Indices
- Studies awarded by the Government
- Individual efforts :
  - Indian Association for Research in National Income and Wealth

Example 1: Core Digital +Forward Linkage

- ✓ Core digital economy excludes (ADB, 2021),
  - Digitally Enabling products : The components and accessories which supports digital goods and services and considered necessary in the production of digital products
  - Digitally Enabled products: The products which use digital products as components or accessories
- ✓ Estimation of the share of GVA of digitally dependent industries is mediated indirectly through Digital Occupation

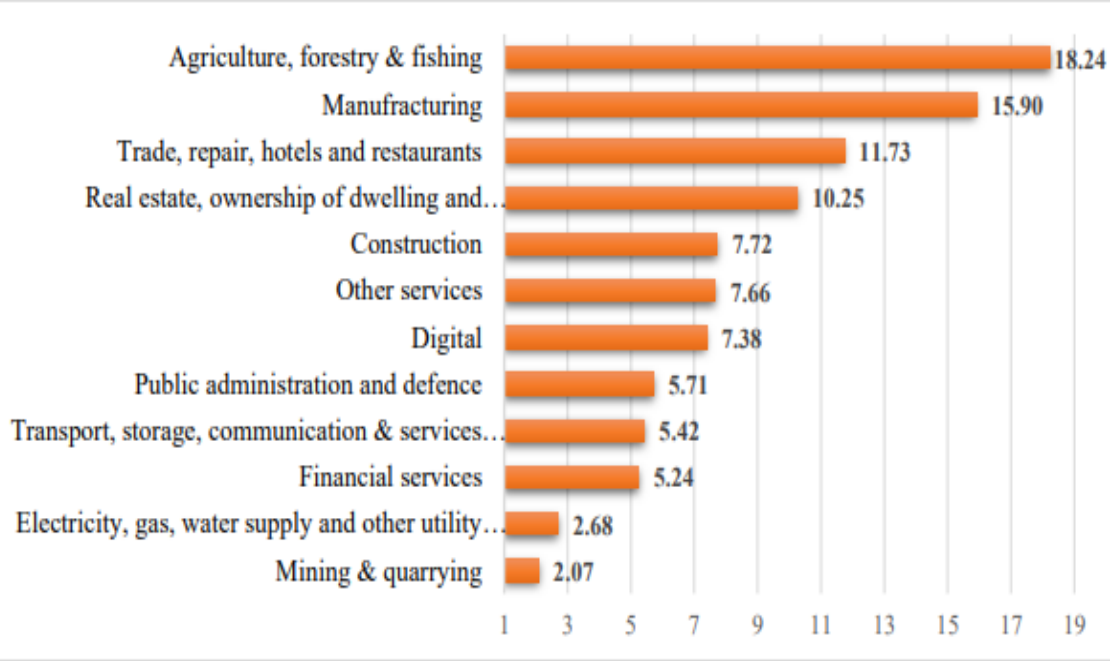
Digital Occupation

1. • **213**: Computing Professionals (Computer Systems Designers and Analysts; Computer Programmers; Computer Professionals, n.e.c.)
2. • **312**: Computer Associate Professionals (Computer Assistants; Computer Equipment Operators; Industrial Robot Controllers)
3. • **313**: Optical and Electronic Equipment Operator
4. • **411**: Secretaries and Data Entry Operators
5. • **817**: Automated Assembly Line and Industrial Robot Operators

Results

GVA and share in GVA 2017-18

Sector	Gross Value Added (GVA)		
	Total	Core Digital	Total Digital
Agriculture, forestry & fishing	2829826	0	1821
Mining & quarrying	336109	0	14601
Manufacturing	2566623	76421	100976
Electricity, gas, water supply and other utility services	425718	0	9701
Construction	1200414	2698	3545
Trade, repair, hotels and restaurants	1881395	59961	63249
Transport, storage, communication & services related to broadcasting	997528	147952	157526
Financial services	846194	0	33685
Real estate, ownership of dwelling and professional services	2281018	679294	692100
Public administration and defence	945082	0	59862
Other services	1195759	0	7433
Total	**15505665**	**966327**	**1144500**
Share %		**6.23**	**7.38**

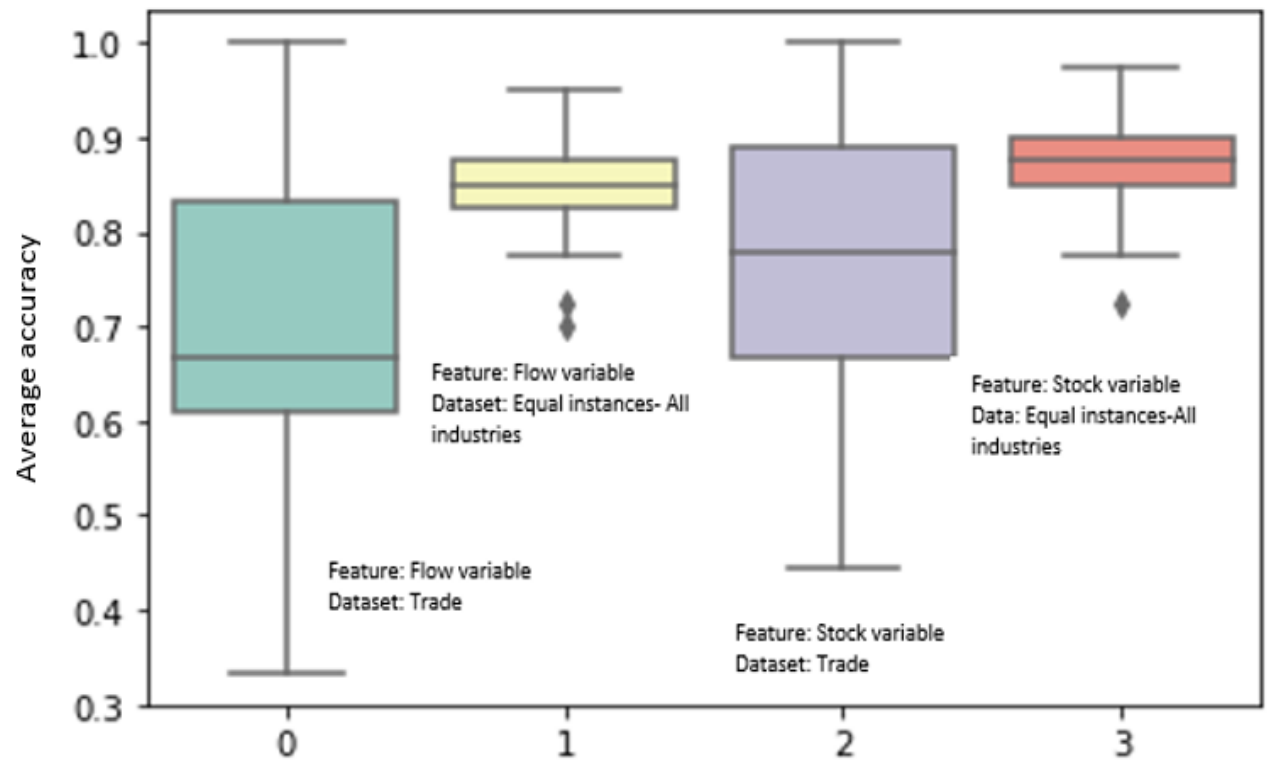


Example 2 : Core Digital + Forward Linkage(ML)

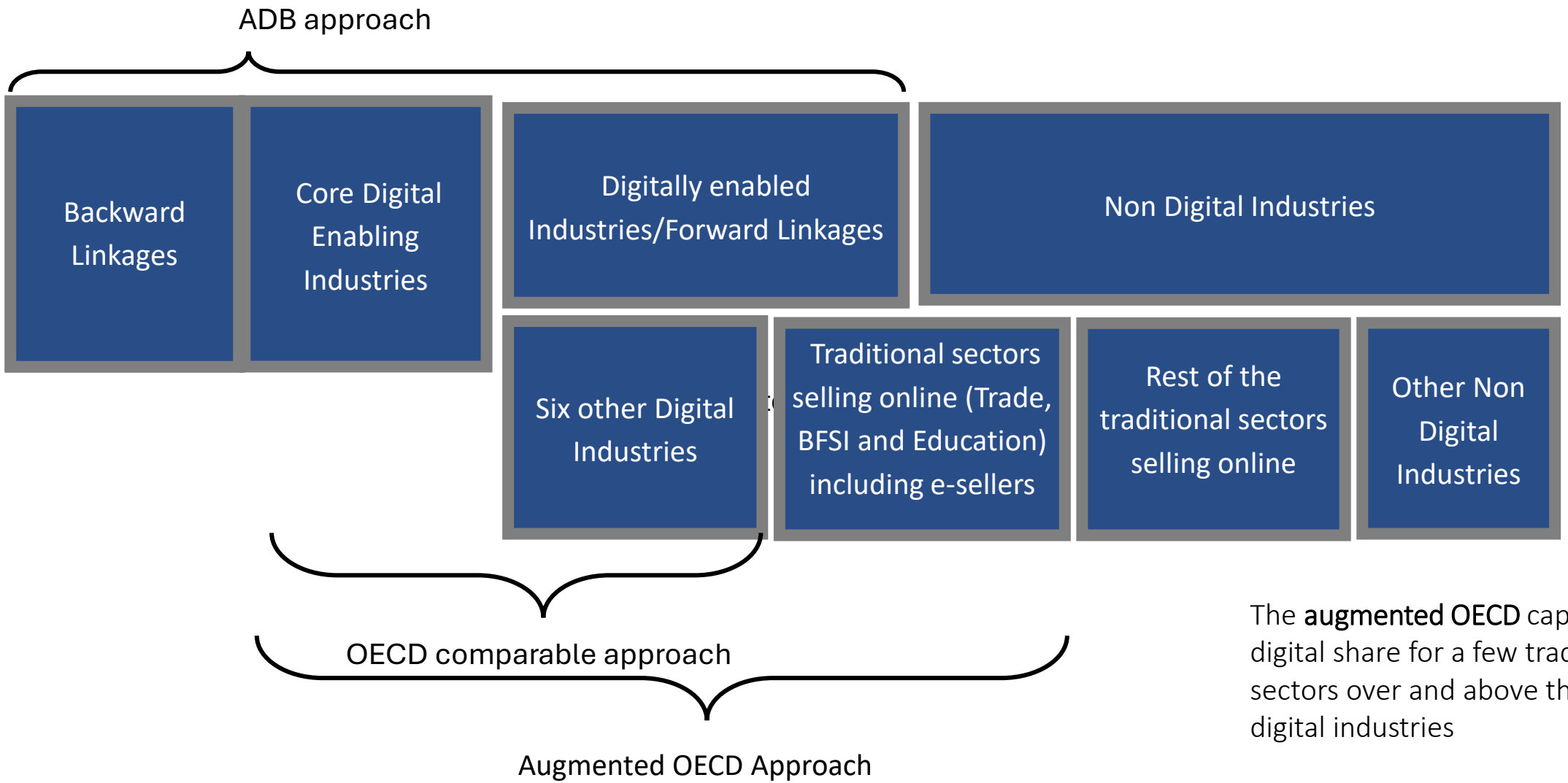
- Digital entities differ from brick & mortar companies :
  - Differences in their **stocks (Balance Sheet) : Fixed assets, inventory**
  - And **flows (P/L accounts)** related variables: Revenue from sale of goods/services, Cost of material consumed, purchase of stock in trade
- **Supervised machine learning classification algorithm**
- **Random forest classifier (Trade media and finance)**
- **Issues :**
  - Limited sample size (known cases required for supervised learning)
  - Different models: retailers (buying products, maintaining inventory etc) and marketplace (just receiving commission on sales through platforms).

Segregation: (ML Algorithms)

Performance of Random Forest Classifier : Different options



Example 3 : Study for MeitY by ICRIER



The **augmented OECD** captures the digital share for a few traditional sectors over and above the OECD digital industries

ADB Approach

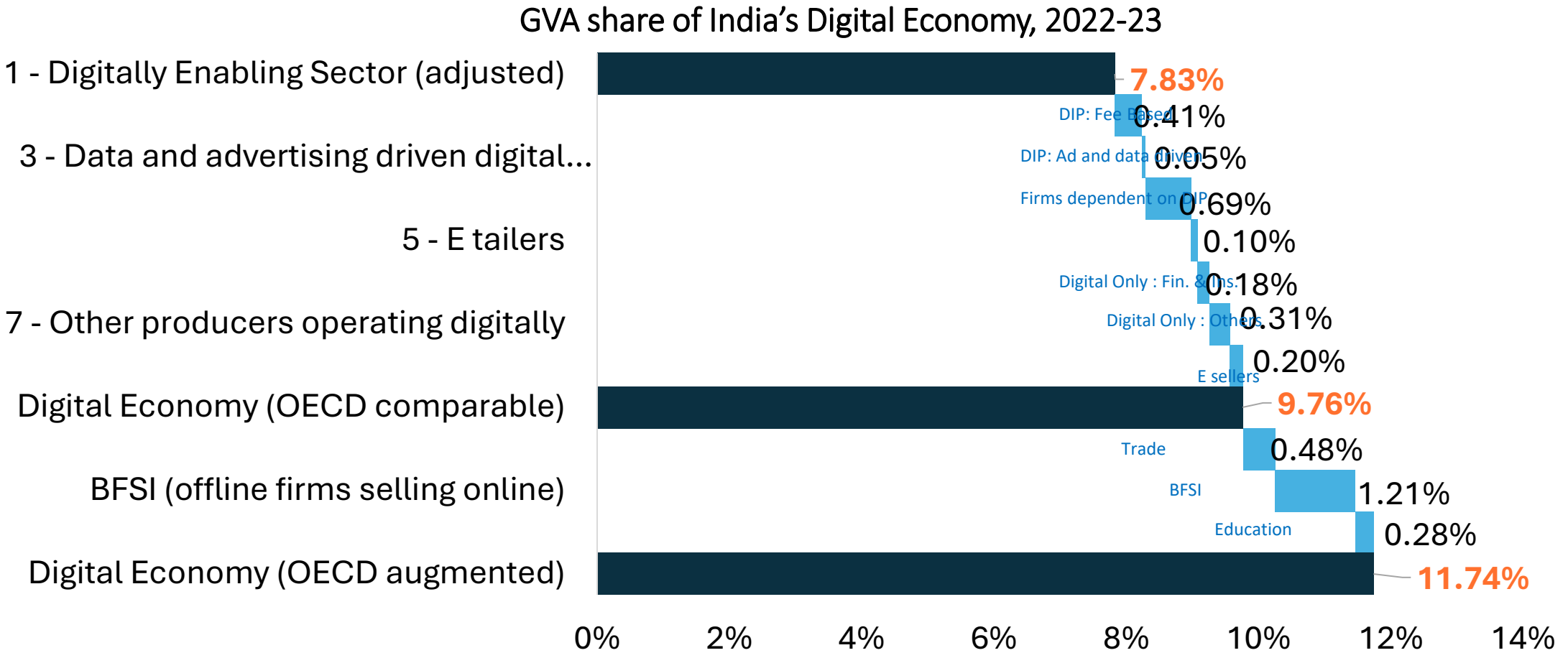
- Core Digital Industries:
  - Consumer Electronics and Optical Equipment
  - Telecommunication
  - Computer and ICT services
- GDP of the digital economy is the sum of:
  - GVA of core digital industries
  - value-added by non-digital industries as enablers of the digital economy (backward linkages)

ICRIER estimation based on ADB approach

- Created a new disaggregated Input Output Table (IOT)
- More recent using India's 2019-20 Supply Use Table (SUT)
- More disaggregated (66 x 66) therefore more accurate
- Updated estimates for 2022 using the ADB IOT (35 x 35) based on 2018-19 SUT
- India's digital economy is 8.95 per cent of country GVA

Core digital industries			ADB's 35 X 35 IOT	India's 66 X 66 IOT
Main Activity Group	**Code**	**Industry**	**Industry**	**Industry**
Hardware	2620	Manufacture of computers and peripheral equipment	Electrical and Optical Equipment (P)	Manufacturing of computer and peripheral equipment
	2680	Manufacture of magnetic and optical media		Manufacturing of Electronic component, consumer electronics, magnetic and optical media (P)
Telecommunications services	61	Telecommunications services	Post and Telecommunication (P)	Communications (P)
Specialized and support services	62	Computer programming services, consulting, and other related services	Renting of Machinery and Equipment and Other Business Activities (P)	Computer Related Services
	6311	Data processing, hosting and related activities		
Web publishing	6312	Web portals		
Software publishing	5820	Software publishing		

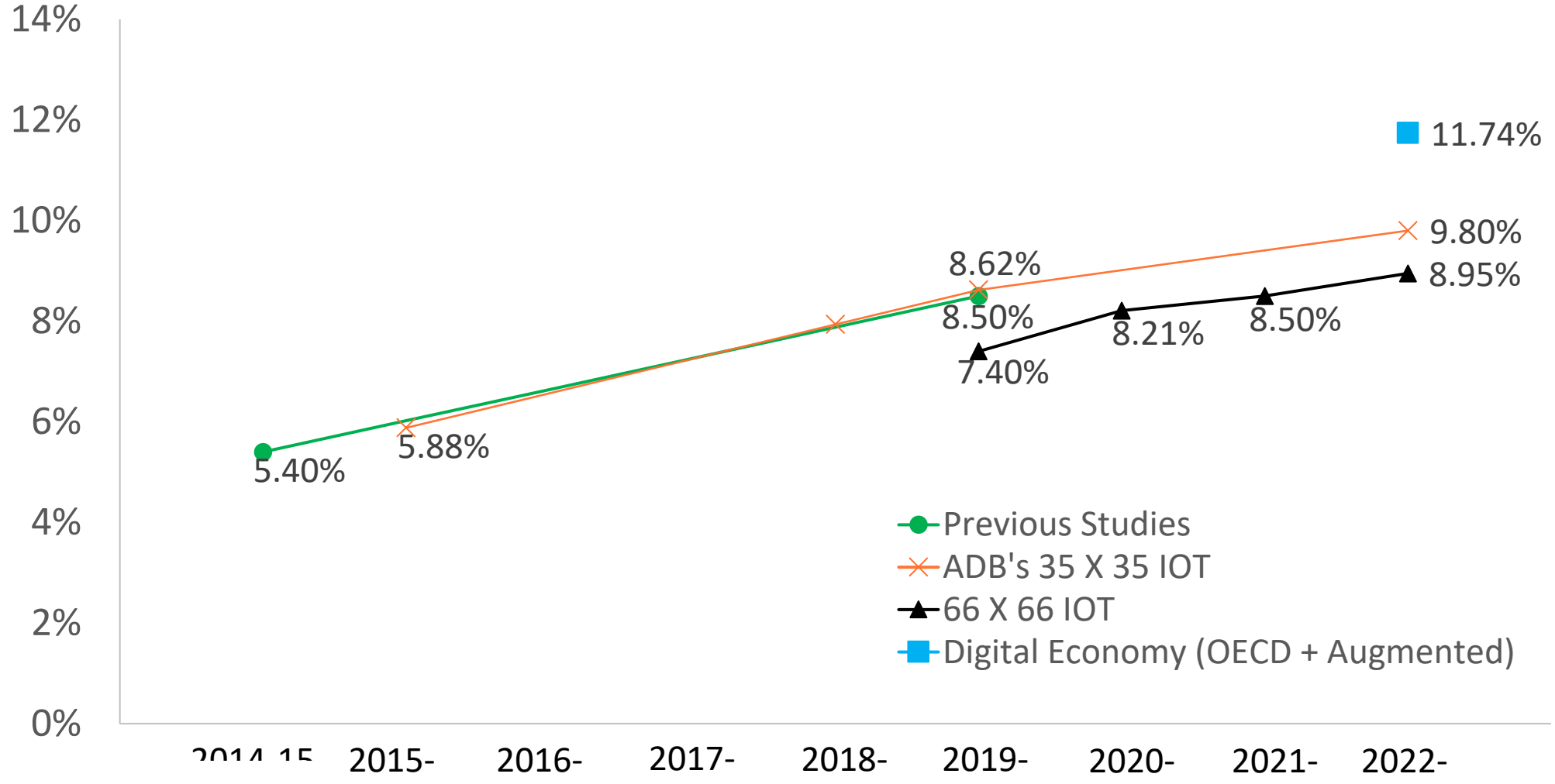
Digital economy accounted for nearly 12% of national output in 2022-23



Source: ICRIER

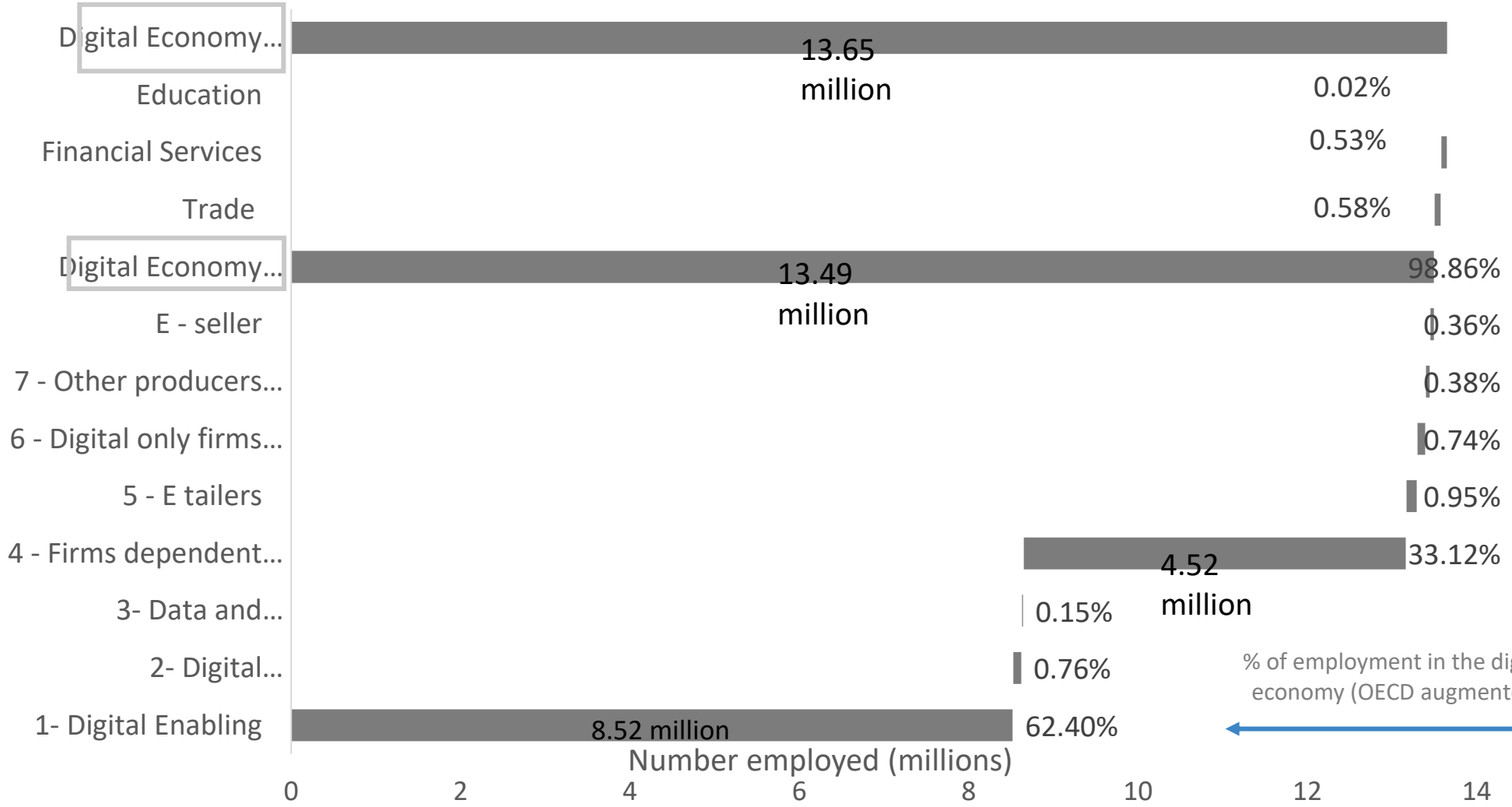
Digital GVA: Rs. 28.94 lakh crore (USD 368 billion) : Augmented OECD

Steady increase in share of the digital economy



Source: ICRIER

Digital economy employs nearly 2.4 per cent of work force



The structure of employment for the digital economy appears to be bimodal

- About 33 per cent are gig workers
- Remaining 67 per cent mix of manufacturing workers, managers, engineers, and other professionals

Men comprise 80% of employment in the digital enabling industry

Source: ICRIER

Data Sources and Assumptions : GVA

- Digital Enabling : NSO
- DIP: Tracxn data base
- Firms dependent on DIP: Adjustments in GMV for (avg. commission rates of DIP by sectors), avg profit margins of MSME from survey applied to remaining GMV
- Gig workers (shared mobility platforms): Commission of aggregators subtracted from firms revenue.
- Content creators/influencers: Reported income of youtubers
- Augmented OECD : Survey

Data Sources and Assumptions : Employment

- Digital Enabling : PLFS(NSO)
- Rest except Firms dependent on DIPs: Company profiling and EPFO database
- Firms dependent on DIPs : Websites of DIPs, study reports (Youtube content creators), Fairwork (2020)
- Other sellers selling online: Share of such firms which sell online to total firms in ASUSE(NSO), accordingly share in employment adjusted for share in revenue through digital orders using percentage (22.58%) is estimated from a survey that estimates the share of e-commerce sales in total sales for MSMEs

Data Gaps

- A universal data base of digital intermediaries and platforms, including fintech companies is not available, delayed supply-use-table (SUT) , Data on gig workers

Recommendations

- Enterprise surveys to estimate the extent of digital ordering and delivery of product and services , imports and exports etc.
- Questions on digital activities in employment surveys like the PLFS to measure extent of digitalization of employment including gig workers
- Expand household surveys to collect information on expenditure that is digitally ordered.

Findings

- India's digital economy stood at 11.74 per cent of the economy's GVA in 2022-23, the latest year for which disaggregated national accounts data is available. This is equivalent to ~ Rs.28.94 lakh crore (~ USD 368 billion) in GVA.
- In 2022-23, the digital economy accounted for 13.36 million workers, or 2.37 per cent of India's estimated work force. Men comprised 80 per cent of the employment in the digital enabling industry, implying that the gender gap is worse than for the rest of the economy.

Thanks

Link of ICRIER Study
https://www.meity.gov.in/static/uploads/2025/01/5ff397f9e8152d5562ed4cef1a6b767b.pdf