



# Globalise to Localise

Exporting at Scale and Deepening the Ecosystem are  
Vital to Higher Domestic Value Addition in Electronics



**ICEA**

INDIA CELLULAR  
& ELECTRONICS  
ASSOCIATION

Inspire.Enable.Lead



**Digital India**  
Power To Empower



# **Globalise to Localise**

**Exporting at Scale and Deepening the Ecosystem are  
Vital to Higher Domestic Value Addition in Electronics**

First published in 2022

by

**INDIAN COUNCIL FOR RESEARCH ON INTERNATIONAL  
ECONOMIC RELATIONS (ICRIER)**

Core 6-A, 4th Floor, India Habitat Centre, Lodhi Road, New Delhi- 110003.

Tel: 91-11-43112400

www.icrier.org.

ALL RIGHTS RESERVED.

No part of this book shall be reproduced, stored in a retrieval system, or transmitted by any means, electronic, mechanical, photocopying, recording, or otherwise, without the prior written permission of the copyright holder(s) and/or the publishers.

***Disclaimer:***

Opinions and recommendations in the report are exclusively of the author(s) and not of any other individual or institution including ICRIER. This report has been prepared in good faith on the basis of information available at the date of publication. All interactions and transactions with industry sponsors and their representatives have been transparent and conducted in an open, honest and independent manner as enshrined in ICRIER Memorandum of Association. ICRIER does not accept any corporate funding that comes with a mandated research area which is not in line with ICRIER's research agenda. The corporate funding of an ICRIER activity does not, in any way, imply ICRIER's endorsement of the views of the sponsoring organization or its products or policies. ICRIER does not conduct research that is focused on any specific product of service provided by the corporate sponsor.

© 2022

Copyright: Indian Council for Research on International Economic Relations (ICRIER).

*Globalise to Localise*

*Exporting at Scale and Deepening the Ecosystem are Vital to Higher Domestic Value Addition in Electronics*

by **DEEPAK MISHRA, NEHA GUPTA, SANYA DUA, AND SANJNA AGARWAL**

RAJEEV CHANDRASEKHAR  
राजीव चंद्रशेखर



Minister of State  
Electronics & Information Technology,  
Skill Development and Entrepreneurship  
Government of India

राज्य मंत्री  
इलेक्ट्रॉनिक्स और सूचना प्रौद्योगिकी,  
कौशल विकास और उद्यमशीलता मंत्रालय  
भारत सरकार

22<sup>nd</sup> August, 2022

### Foreword

Electronics is the second largest globally traded product category in the world. Demand for Electronics has been growing as the world is digitizing rapidly. In the last few decades, the electronics trade has been dominated by China, but the world has entered a new era in the post-Covid phase. There are deep and long-term changes currently underway in Global Economy, Trade and the growing power of Technology in future of all economies. Disruptions in supply chains during the Covid-19 pandemic - and more recently, as a consequence of the Russia-Ukraine conflict - have exposed the risks and fragility in current trade and supply chains which are, in turn, driving deep changes in those Global Value Chains.



Amongst the changes underway, the most significant are the changes in Global Value chains of Electronics and Tech products. It is obvious that the world's consuming nations and consumers seek Trusted Value Chains for Electronics products. The opportunity for India is to become that trusted partner to the world as a source of Technology products and services.

Post 2014, as a result of the Honorable Prime Minister Shri Narendra Modi's vision, India gradually rebuilt the Electronics Manufacturing Eco-system. India's 'Make in India' programme has catalyzed an otherwise weak manufacturing economy and given it new momentum, opportunities, and expansion. During the period between 2014 to 2020 (pre-Covid), electronics manufacturing grew almost 250% in India.

To further catalyze this momentum, Prime Minister Modi launched a series of Production Linked Incentive (PLI) schemes with incentives of US\$20 Billion that have created significant expansion of investments, units and jobs in the sector - with almost all major global EMS and Electronics leaders having set up factories in different parts of India. India is today the world's second largest manufacturer of mobile phones in the world. During Covid, Prime Minister Modi launched the *Atmanirbhar Bharat* economic policies with a focus on "Local for Global" - making for the world - and set ambitious goals for Electronics Manufacturing of US\$300 billion including exports of US\$120 billion by 2025-26, up from the current US\$75 billion. These are ambitious, but necessary targets, given the size of the opportunity and the competition for these opportunities from other countries.

Cont.....



कार्यालय : इलेक्ट्रॉनिक्स निकेतन, 6, सी.जी.ओ. कॉम्प्लेक्स, नई दिल्ली-110003. दूरभाष : 011-24368757-58 फैक्स : 011-24360958  
Office : Electronics Niketan, 6, C.G.O. Complex, New Delhi-110003, Tel : 011-24368757-58, Fax : 011-24360958  
E-mail : rc@gov.in, Website : www.meity.gov.in

[www.meity.gov.in](https://www.meity.gov.in) @rajeev\_gov @Rajeev\_Gov @rajeev\_chandrasekhar @RajeevChandrasekharMP @rajeev\_chandrasekhar





सत्यमेव जयते

## Continuation Sheet

The study by the Indian Council for Research on International Economic Relations (ICRIER), in collaboration with India Cellular & Electronics Association (ICEA) makes a timely contribution to this discussion. It explores ways to increase total Domestic Value Addition (DVA) in the electronics sector and recommends several trade and industrial policies that could transform India from a moderate to a major exporter of electronics manufacturing products.

The study contains many useful and interesting findings. Although the electronics sector is the first recipient of the PLI scheme, exporting at scale to the global market and increasing the share of DVA cannot be simultaneously pursued in the absence of a competitive domestic ecosystem of components and suppliers - which is why India's \$300 billion electronics strategy is referred to as "Broadening and Deepening" Electronics Manufacturing in India. The study recommends pursuing these two goals sequentially, i.e., by adopting the mantra of *'first globalise, then localise'*.

I extend my compliments to the ICRIER and ICEA teams for this Report on the electronics sector by focusing on the key matter of Domestic Value Addition and Exports – indeed a much-needed study at a time when we are celebrating 'Azadi Ka Amrit Mahotsav' and working energetically to realize the Honorable Prime Minister's vision of India as a trusted hub for Electronics Manufacturing.

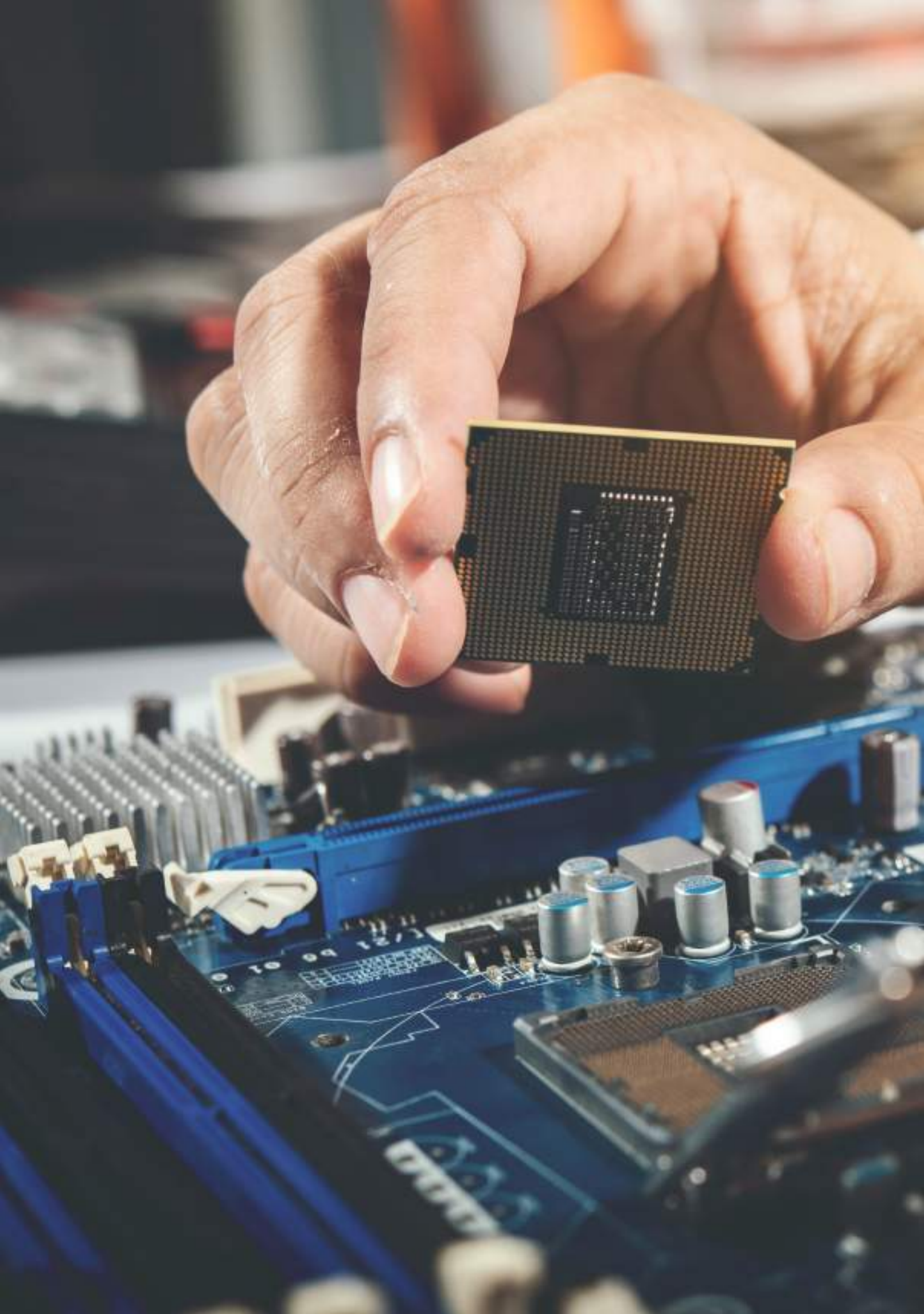
This study will enable both the Government and industry to better address many of the concerns facing the electronics sector. Achieving the scale of exports and production will not only help the sector to grow domestically, but also meet the goal of the government's 'Make in India for the World' programme and achieve the target of a trillion-dollar digital economy by 2025-26.

**Rajeev Chandrasekhar**

# ABSTRACT

---

With China exporting more than \$900 billion worth of electronic products annually, and Vietnam's exports exceeding \$100 billion, Indian policymakers are rightly concerned about the country's electronics exports languishing around \$15 billion. But rather than giving into the narrative that India has missed the manufacturing-led growth process, the government has adopted a number of trade and industrial policy initiatives to make the country a global production and exports hub. The electronics sector has been at the forefront of this strategy, being the first recipient of the Production Linked Incentive (PLI) scheme. Will this bold but unconventional strategy work? Drawing on the experience of successful electronics exporting nations, this study finds that the chance of success depends crucially on how the two broad goals – exporting at scale to the global market (globalise) and increasing the share of domestic value addition (localise) – are pursued. Trying to achieve both simultaneously is unlikely to succeed in the absence of a competitive domestic ecosystem of ancillary suppliers. The study therefore proposes that India should adopt the mantra of “*first globalise, then localise,*” a strategy also pursued by China and Vietnam. Implementing it will require two fundamental changes in the existing policy regime. First, the electronics sector should be able to source inputs from the lowest cost suppliers anywhere in the world until it achieves a global scale, which implies temporarily suspending localisation requirements, removing duties on intermediate items, and accelerating integration through bilateral and regional FTAs. Second, the priority of the industrial policy should be about creating a competitive domestic ecosystem of ancillary suppliers – by improving business climate, removing unnecessary regulations, helping with technology transfer and supporting services, training of workers, better sharing of market information, investment in R&D, and targeted fiscal incentives – through cooperative collaboration with the state governments and the private sector.







# CONTENTS

---

Acknowledgement

---

Abbreviations

---

Section 1: The imperatives to build a globally competitive electronics sector	1
Section 2: Two ways to increase domestic value addition	7
Section 3: Domestic value addition: Some stylized facts	11
Section 4: SCALE and DVA: Short-run vs long-run dynamics	15
Section 5: Policy options to support the “first globalise, then localise” approach	23
Section 6: Way Forward	33
Appendix 1	35
Appendix 2	38
Appendix 3	41
Appendix 4	42
References	44

---



# ACKNOWLEDGEMENT

---

This report has been prepared by ICRIER staff members comprising Deepak Mishra, Neha Gupta, Sanya Dua, and Sanjna Agarwal.

We would like to offer gratitude to His Excellency Shri Rajeev Chandrasekhar, Minister of State for Electronics and Information Technology, Skill Development and Entrepreneurship, for writing the Foreword and for his advice and guidance during the preparation of the study.

Advice and comments from Shankar Acharya, Poonam Gupta, Rana Hasan, and Harsha Vardhan Singh are gratefully acknowledged.

The authors would like to thank officials at the Ministry of Electronics & Information Technology (MeitY), Government of India, and Shri Devraj Singh, Vice-President, Electronics Sector Skills Council of India (ESSCI) for providing technical details and policy inputs. They would also like to recognise the suggestions made by Rajesh Sharma and Rahul Taneja from the India Cellular and Electronics Association (ICEA). The inputs received from industry bodies and private players informed and enriched the discussion. The study was funded by a grant from the India Cellular and Electronics Association (ICEA).

The authors would like to acknowledge the comments received from ICRIER's faculty members consisting of Radhicka Kapoor, Arpita Mukherjee, Saon Ray, Nisha Taneja, and Tanu Goyal.

The team would like to apologise to any individual or organisation that may have contributed this work but were inadvertently omitted from this list.

# ABBREVIATIONS

5G	Fifth Generation
ADB	Asian Development Bank
BCD	Basic Custom Duty
BRICS	Brazil, Russia, India, China, South Africa
DVA <sub>ratio</sub>	Domestic Value Addition Ratio
EMC	Electronics Manufacturing Clusters
FDI	Foreign Direct Investment
FTAs	Free Trade Agreements
FVA	Foreign Value Addition
FY	Financial Year/Fiscal Year
GDP	Gross Domestic Product
GNI	Gross National Income
GoI	Government of India
GST	Goods and Services Tax
GVCs	Global Value Chains
HITDZs	High Information Technology Development Zones
ICIO	Inter-Country Input-Output
ICT	Information and Communication Technology
I-O	Input-Output
IT	Information Technology
ITA	Information Technology Agreement
ITIs	Industrial Training Institutes
LCR	Local Content Requirement
MFN	Most Favoured Nation
MII	Make in India
MNCs	Multinational Corporations
MNEs	Multinational Enterprises
MOCI	Ministry of Commerce & Industry
NIEs	Newly Industrialising Economies
NETIB	National Electronic and Telecommunication Industry Bases
NIC	National Industrial Classification
NMP	National Manufacturing Policy
NPE	National Policy on Electronics



OECD	Organisation for Economic Co-operation and Development
OEMs	Original Equipment Manufacturers
OLS	Ordinary Least Square
P&Cs	Parts and Components
PCB	Printed Circuit Board
PCBA	Printed Circuit Board Assembly
PLI	Production Linked Incentive
PM	Prime Minister
PMP	Phased Manufacturing Programme
R&D	Research and Development
RBI	Reserve Bank of India
SEC	Specified Electronic Components
SEV	Samsung Electronics Vietnam
SEZs	Special Economic Zones
SIDP	Supporting Industry Development Programme
SPECS	Scheme for Promotion of Manufacturing of Electronic Components and Semiconductors
TDZs	Technological Development Zones
TiVA	Trade in Value Added
UNCTAD	United Nations Conference on Trade and Development
USD/US\$	United States Dollars
USB	Universal Serial Bus
VA	Value Added
WITS	World Integrated Trade Solution
WTO	World Trade Organization

# 1

## **THE IMPERATIVES TO BUILD A GLOBALLY COMPETITIVE ELECTRONICS SECTOR**

---

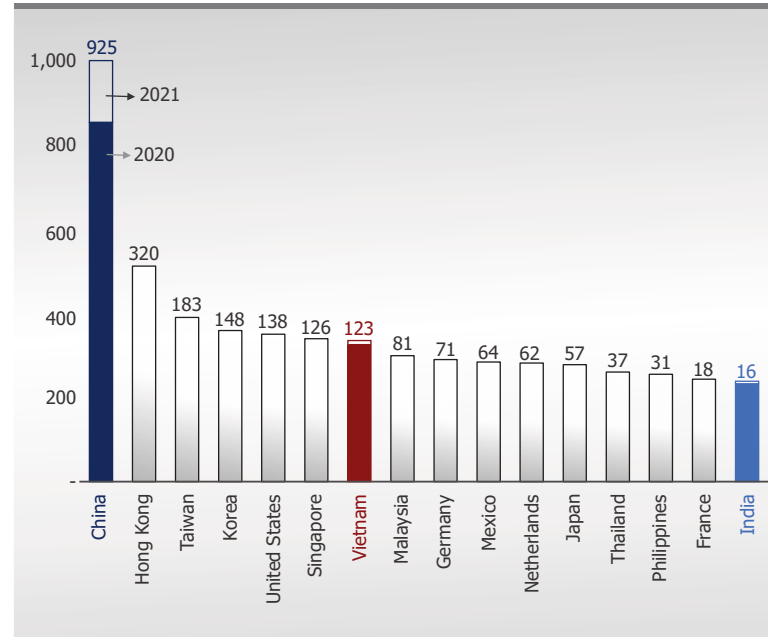


It is humbling to know that China exports nearly \$900 billion worth of electronic products annually, while India manages to do around \$15 billion. Not just China, but most East Asian countries have scored a march over India when it comes to electronics exports: \$320 billion by Hong Kong, \$183 billion by Taiwan, \$148 billion by South Korea, \$126 billion by Singapore and \$123 billion by Vietnam (Panel A, Figure 1). The last one is the most striking: both India and Vietnam exported similar value of electronic items in 2010; but over the next ten years, Vietnam's exports surged to become 9 times that of India's (Panel B, Figure 1). India's less than satisfactory performance is particularly surprising given its relatively strong track record in exporting selected manufacturing items such as auto parts, engineering goods, gems and jewellery, and pharmaceuticals.<sup>1</sup>

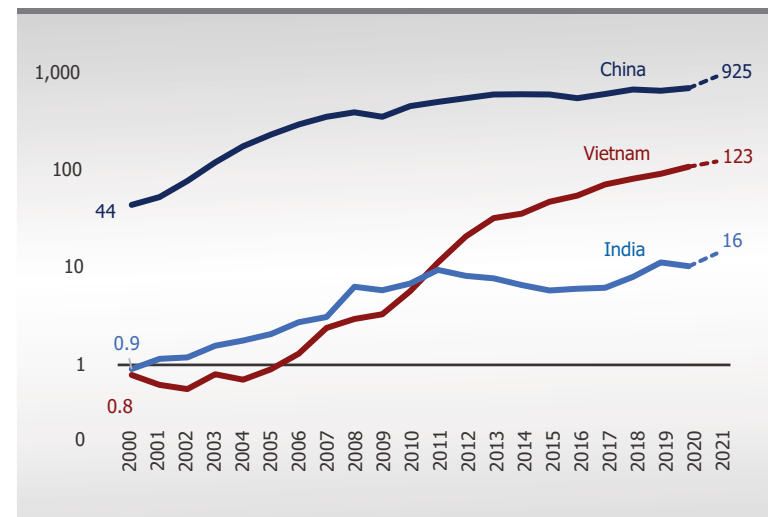
India's electronics sector has not only struggled to compete globally, but also to survive at home (Box 1). The electronics manufacturing as a share of national output has stagnated during the last two decades (Panel A, Figure 2). Another indicator the governments track, namely, the ratio of domestic value addition to total value addition (henceforth,  $DVA_{ratio}$ ), has also been low.<sup>2</sup> For example, in 2018, China's  $DVA_{ratio}$  in electronics production was 38 per cent – i.e., 38 per cent of the value added was generated within China – compared to 18 per

**Figure 1: India has remained a minor player in the global electronics trade**

Panel A: World's top fifteen exporters of electronic products and India, 2020/2021 (in \$ billion)



Panel B: Electronics exports from China and Vietnam have surged, while India has stagnated, 2000-21 (in \$ billion)



Source: CEIC, RBI, and ICRER staff

Note: Data are for calendar year. Data for all the countries except India are from CEIC. For India, data is from Export-Import Data Bank, Ministry of Commerce & Industry, GoI. For China and Vietnam, the 2021 data are extrapolated based on growth rate provided by CEIC using country's national source.

<sup>1</sup> For example, in 2021, India exported \$105, \$38 and \$25 billion worth of engineering goods, gems and jewellery, and pharmaceuticals respectively (PIB, Government of India, 2022a; 2022b; 2022c; 2022d).

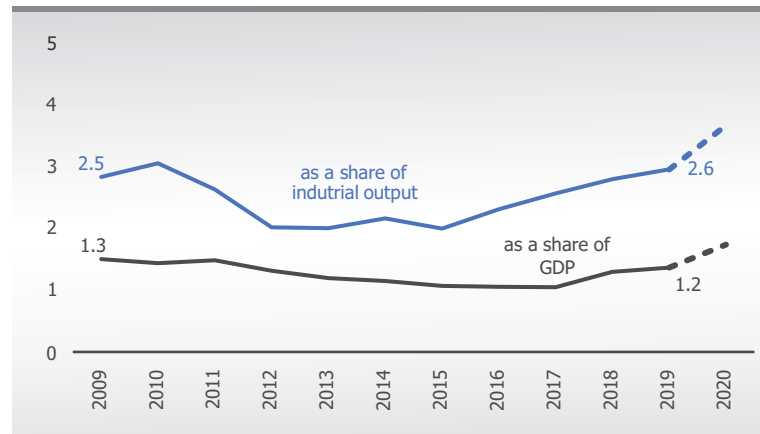
<sup>2</sup>  $DVA_{ratio}$  is defined as the ratio of domestic value addition to total value addition. It is worth noting that what matters for growth and job creation is DVA and not  $DVA_{ratio}$ , an issue we will get into more details later in this study.

cent in India. In fact, all the top 15 electronic exporters in the world except Netherlands and Hong Kong have higher  $DVA_{ratio}$  than India (Panel B, Figure 2). A combination of low exports and low  $DVA_{ratio}$  has meant that India's electronics sector was on a secular decline. Recent policy changes and the Covid-19 pandemic – the latter increasing the demand for electronic devices to work from home – appear to have led to a turnaround.

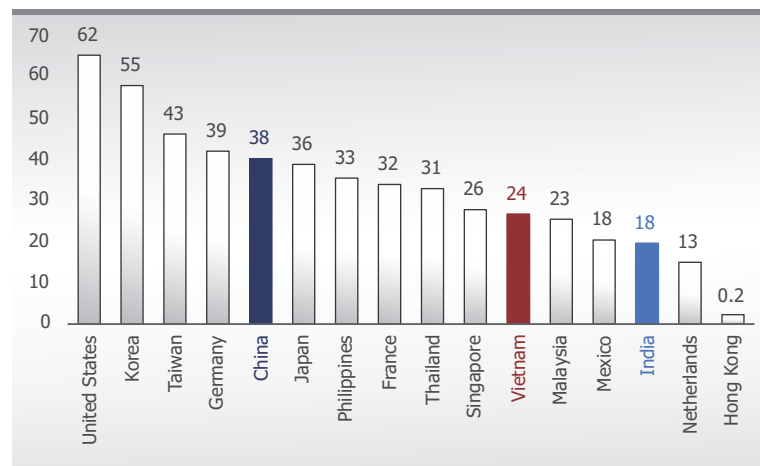
The underperformance of the electronics sector has been a matter of national concern for several reasons. First, growing demand and insufficient production has meant that four-fifths of domestic demand is met through imports, making the sector one of the largest contributors to the country's trade deficit (Panel A, Figure 3). Second, in the absence of a competitive electronics manufacturing sector, India has missed the opportunity to create millions of high-paying jobs. For example, 14 million Chinese are directly employed in the electronics sector, compared to 140-210 thousand in India. Even the Philippines has 21 times more workers in the electronics sector

**Figure 2: The contribution of electronics sector to India's growth has been modest**

Panel A: Electronics manufacturing output (as a % of sector and aggregate output)



Panel B:  $DVA_{ratio}$  in world's top fifteen electronics exporters and India (in %), 2018



Source: CEIC, RBI Database, OECD-WTO Trade in Value Added Database, ICRIER staff

### Box 1: Definition of electronics sector

For this study, the electronic sector is defined to include products such as mobile phones, personal computers, laptops, tablets, servers, and their parts/components, headphones/speakers, earphones, storage devices, data communication equipment, printed circuit boards (PCBs), PCB assembly, integrated circuits, USB cables, display panels of TVs, etc. In technical terms, it covers NIC code 261-264 (excluding electrical equipment and appliances) and includes products in HS codes 8443, 8470-71, 8473, 8501, 8504-06, 8511, 8516-19, 8522-23, 8525-29, 8531-44.



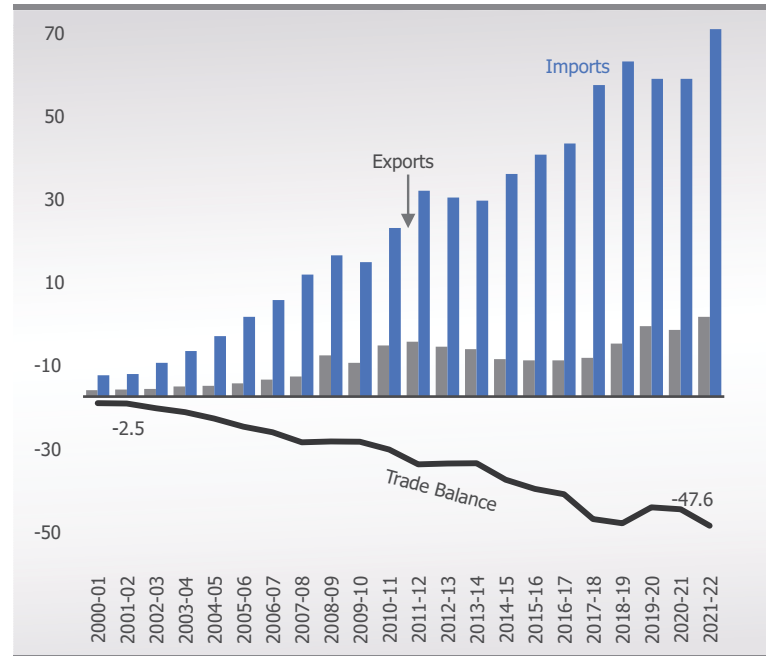
than India does (Panel B, Figure 3). Third, according to GoI, *the electronics industry permeates all sectors of the economy* and is important for the development of other strategic sectors such as telecom (5G), Internet of Things (IoTs), solar panels, and electric vehicles, and therefore excessive reliance on a few select countries for imports has given rise to new security and geo-political concerns.<sup>3</sup>

Instead of succumbing to the narrative that India has missed the manufacturing-led growth process, successive governments have tried to revive the sector.<sup>4</sup> The current government has gone the farthest by adopting several bold, and at times unconventional, policies to make India a global production and exports hub. These include the Make in India initiative (2014), the Phased Manufacturing Programme (2017), the National Policy on Electronics (2019), and most importantly, the Production Linked Incentive Scheme (2020).

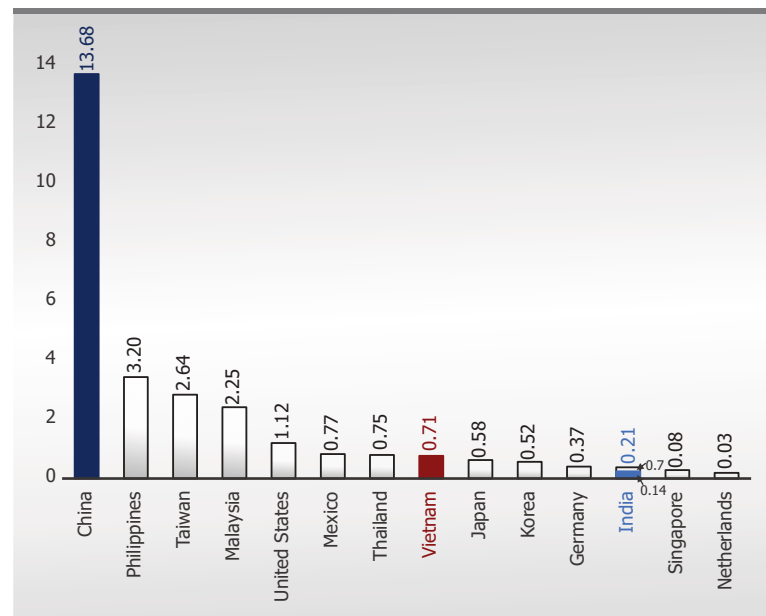
Along with sectoral policies, India has also improved its ranking in several global indices measuring Competitiveness or the Ease of Doing Business. Underpinning these improvements are myriad micro and macro changes: ease of regulations, implementation of GST, reduction in corporate tax rates, removal of retrospective taxation, key legislative provisions (e.g., bankruptcy law), skill improvement programmes, and

**Figure 3: Lack of competitiveness in the electronics sector has meant growing trade deficit and lower job creation**

Panel A: India’s exports, imports and trade balance in electronics sector, 2001-02 to 2021-22 (in \$ billion)



Panel B: Employment in the electronics sector in top fifteen electronics exporters and India, 2018 (in million)



Source: RBI Database, CEIC, OECD Trade in Employment (TiE) Database  
 Note: Value 0.21 million for India is from ICEA.

3 MeitY, Government of India (2021a)

4 See the large body of literature under the rubric ‘premature deindustrialization’ including Rodrik (2015). Some of the policies announced by the UPA government to boost electronics manufacturing include the National Manufacturing Policy (2011) and the National Policy on Electronics (2012).

changes in the scale and quality of physical and digital infrastructure. On trade policy, the picture is rather mixed: on one hand, Free Trade Agreements (FTAs) have been signed with Australia and UAE in record time, and negotiations are underway with UK and European Union; but on the other hand, there has been steady increase in custom duties across a wide range of products over the last three years.

Will the current effort to revive the electronic sector succeed? Drawing on the experience of successful electronic exporting nations, the answer is a conditional yes: it is achievable, but not without some fundamental changes to the existing policies. We show that the government, in fact, is pursuing two inter-related goals simultaneously: increasing the scale of exports to the global market (*globalise*) and boosting the ratio of

domestic value addition (*localise*). While this is the same approach pursued by several successful electronics exporting nations, especially China and Vietnam, there is one crucial difference. Instead of trying to achieve both simultaneously, they have approached them sequentially.

In the short-run, they have adopted policies that encourage companies to achieve global scale, even if it means using fewer local contents.

In parallel, China and Vietnam have taken steps to build a globally competitive ecosystem of ancillary suppliers, which takes time and focused collaborative efforts. Thus, in the medium- to long-run, these countries are in a stronger position to insist that firms achieve both greater scale and have more domestic contents.



Drawing lessons from successful East Asian countries, we propose that India should consider adopting the mantra of “*first globalise, then localise*” in the case of the electronics sector. Implementing such an approach will require two fundamental changes in the existing policy regime. First, the electronics sector should be able to source inputs from the lowest cost suppliers anywhere in the world until it achieves a global scale. This implies temporarily suspending localisation requirements, removing duties on intermediate items and accelerating integration through FTAs. Second, the priority in industrial policy should be to create a competitive domestic ecosystem of ancillary suppliers, and not just of the final goods producers – by improving the business climate, removing unwarranted regulations, introducing technology transfer

programmes, training workers, better sharing of market information, investment in R&D, and targeted fiscal incentives – for both domestic and foreign firms.

The rest of the report is organised as follows: Section II examines the trade and industrial policies to better understand their underlying objectives. Section III examines how  $DVA_{ratio}$  has evolved over time and across countries, both at the aggregate level as well as for the electronics sector. Section IV shows that in the short-run, policies to encourage localisation may impede globalisation, but in the medium-term the two objectives can be jointly pursued. Section V provides policy recommendations to make India a global hub for electronics manufacturing and exports. Finally, Section VI contains concluding remarks.





# 2

## TWO WAYS TO INCREASE DOMESTIC VALUE ADDITION

---





The core motivation to revive the electronics sector is to increase its contribution to India's economic development. Policymakers around the world see international trade as a means to generate faster growth, create more jobs and reduce macro imbalance. The indicator they often use to assess their performance is the Domestic Value Addition (DVA). It is estimated as the sum total of the value of all domestic inputs – labour, capital, management and other services, etc. – used in the production process. The eventual goal of policymakers is to increase DVA, under the

assumption that the increase would translate into more output and jobs. Although increasing DVA is a common practice, Indian policymakers have gone further to simultaneously influence the two components that make up the DVA, namely the quantum or scale of exports or production (SCALE), and the domestic contents per unit of production,  $DVA_{ratio}$ . As shown in Box 2, using the logic that higher domestic contents at the unit level means more value addition in the aggregate, India has simultaneously tried to boost SCALE and  $DVA_{ratio}$  (RATIO) (see Box 3 for the three main definitions of  $DVA_{ratio}$ ).

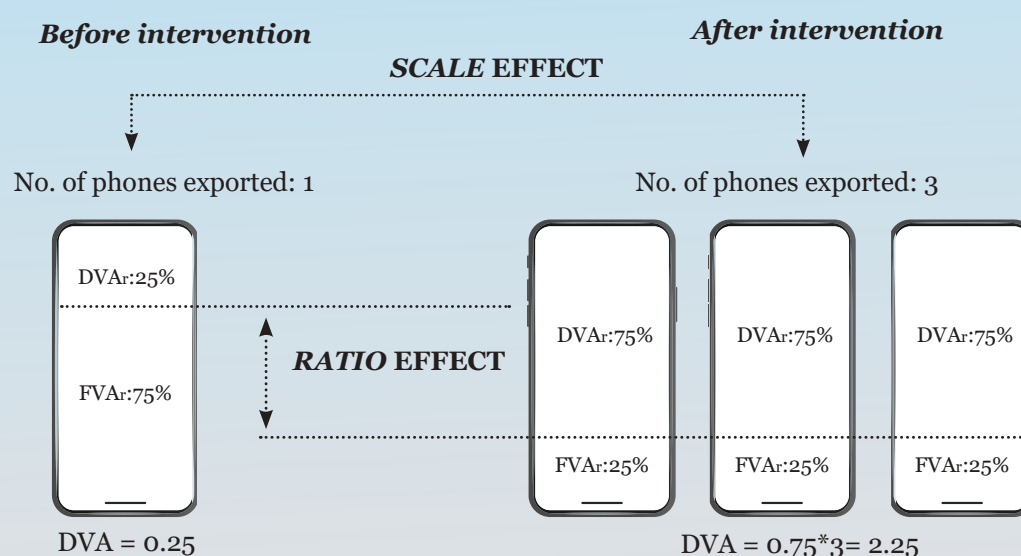
### Box 2: The twin push to export more and use more domestic inputs

$$DVA = \text{Total Exports} * DVA_{ratio}$$

where,

DVA refers to the total value of domestic inputs used in exports; and  $DVA_{ratio}$  refers to the domestic value addition per unit of output (or total demand).

To increase DVA of smart phones, one could increase the number of smart phones exported (say from 1 to 3, as shown below) or increase the  $DVA_{ratio}$  in each smart phone, say from 25 per cent to 75 per cent. By this logic, if both SCALE and RATIO can be increased at the same time, it would lead to an even higher DVA and hence, faster job creation as shown below.



Note: DVAr is the ratio of domestic value addition and FVAr is that of the foreign value addition

Policy measures to revive the electronics sector can be grouped into three broad categories: those intended to increase SCALE, those meant to raise  $DVA_{ratio}$ , and the ones that are expected to do both. For example, according to GoI, the

Production Linked Incentive (PLI) scheme was rolled out to effectively integrate India's manufacturing capabilities with the demands of global supply chains (i.e., to achieve SCALE) and to promote domestic value addition through

indigenous production (i.e.,  $DVA_{ratio}$ ).<sup>5</sup> While not a requirement, the PLI scheme is expected to increase  $DVA_{ratio}$  for mobile phones from 15-20 per cent to 35-40 per cent (Table 1).<sup>6</sup> Similarly, policies adopted under the Phased Manufacturing Programme (PMP), public procurement norms and successive Union Budgets are aimed at encouraging substitution of imported inputs with domestic production (also see Appendix 1).

In order to simultaneously produce more and use more local content, a critical assumption needs to hold true, namely, policies to increase  $DVA_{ratio}$  should not adversely affect the goal of achieving SCALE and vice-versa. In other words, the government hopes that both objectives can be simultaneously pursued. In the next two sections, we examine the validity of this assumption, in the short- and long-run.

**Table 1: Classifying policy measures based on their intended objective**

Increase SCALE
<ul style="list-style-type: none"> <li>• <b>National Policy on Electronics (2019 – revamped NPE-12):</b> US\$400 billion by 2025, including US\$110 billion exports of mobile phones</li> <li>• <b>Remission of Duties and Taxes on Exported Products (2021):</b> Reimbursement relief of duties/taxes to exporters on 8,555 tariff lines</li> <li>• <b>PM Gati Shakti (2022):</b> To ease business &amp; exports, proposed Economic Zones, 38 EMCs (by 2024-25)</li> </ul>
Increase $DVA_{ratio}$
<ul style="list-style-type: none"> <li>• <b>Union Budgets FY17/18-FY22/23</b> have gradually increased the basic custom duty (BCD) rates viz. on mobile phones (15% in FY17/18 to 20% + 10% welfare cess in FY20/21); on PCBA (10% in FY18/19 to 20% in FY20/21); on parts of chargers and sub-parts of mobiles such as PCBA, Camera Module Connectors, Moulded Plastics for chargers, etc. in FY21/22 (concession on camera lens in FY22/23)</li> <li>• <b>Phased Manufacturing Programme (PMP-2017) for cellular mobile handsets &amp; sub-assemblies/parts/sub-parts:</b> Involves progressive rise in BCD on parts, namely, chargers, adapters, battery pack, PCBA, camera modules, touch panels, vibrator of mobile for domestic manufacturing (to reach \$230bn) [mobile production gradually shifted from SKD to CKD]</li> <li>• <b>Public Procurement norms for electronics (2020):</b> Local suppliers to get preference in all government purchases for 50% or more localisation rate</li> </ul>
Increase both SCALE & $DVA_{ratio}$
<ul style="list-style-type: none"> <li>• <b>National Manufacturing Policy (2011):</b> Manufacturing sector to contribute at least 25% to GDP by 2022 and to increase <math>DVA</math> as well as technological depth</li> <li>• <b>Make in India (MII) Initiative (2014):</b> Focus on investment, innovation &amp; skills to make India a global manufacturing hub; <i>Foreign Trade Policy (2015-20)</i> launched to support MII for more exports &amp; GVCs participation, &amp; incentivise <math>DVA</math></li> </ul>

5 MeitY, Government of India (2021a)

6 As per the MeitY, Government of India (2021b), the Guidelines on Large Electronics do incorporate provisions on projections for  $DVA_{ratio}$  and review of  $DVA_{ratio}$  amongst others (clauses 8.7 and 9.5.6), and the forms in which the relevant information is to be provided include the need to provide information based on which  $DVA_{ratio}$  can be calculated (Annexure 6 of the Guideline). As per the MeitY, Government of India (2021c), the PLI scheme for IT Hardware also includes  $DVA$  (see clause 3.6 of the Guideline). There are other PLI schemes which specify  $DVA_{ratio}$  as a condition for getting the subsidy, but large electronics is not one of them.

- **Production Linked Incentive (PLI) Scheme (Smart phones, 2020 & IT Hardware, 2021):** Provides financial incentives for boosting domestic manufacturing and attracting large investments (domestic & foreign):
  - For Mobile Phones & Specified Electronic Components (SEC) (range of 4-6% on incremental sales of goods manufactured in India;  $DVA_{ratio}$  is expected to rise to 35-40% (from 15-20%) for phones and to 45-50% (SEC); exports to reach INR 6.5 lakh Cr)
  - Laptops, Tablets, PCs, Servers (incentive range 4-2%/1%);  $DVA_{ratio}$  is expected to rise to 25-30% (from 10-15%); exports to reach INR 0.6 lakh Cr)
- **Make in India for the World (2021):** To meet \$400 billion export target and to bring down import-bill; MII-2014 revamped (to promote manufacturing & make India self-sufficient); Aims at 'Local goes Global' – PM's August 2021 Speech emphasised expansion of exports and developing sector-wise champions for GVCs

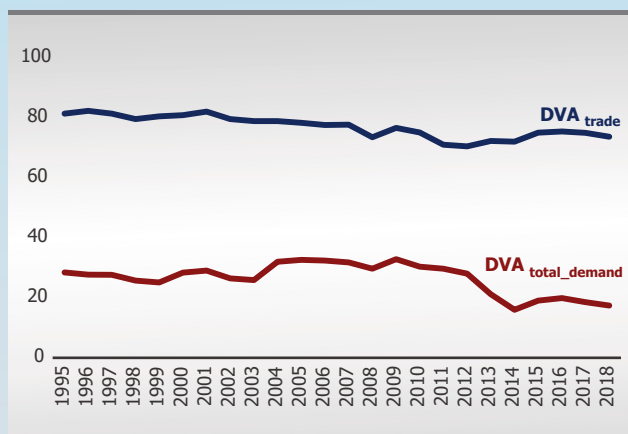
### Box 3: Measuring the ratio of Domestic Value Addition ( $DVA_{ratio}$ )

There are different ways  $DVA_{ratio}$  is defined in the literature. We illustrate below three of those definitions including the one that the best captures what the GoI is trying to influence.

**$DVA_{trade}$ :** The most commonly used definition is the trade-based measure where DVA in exports is measured as the exported value added that has been generated anywhere in the domestic economy (i.e., not just by the exporting industry) as a share of gross exports. This definition is not very relevant in the Indian context, since GoI is trying to increase the  $DVA_{ratio}$  for exports as well as for domestic production.

**$DVA_{output}$ :** The output-based measure of DVA is the exported value added that has been generated anywhere in the domestic economy as a share of GDP of the economy. This definition also does not correctly reflect the GoI's priorities since the numerator captures only the DVA of exports.

**$DVA_{total\_demand}$ :** This is a demand-based definition of  $DVA_{ratio}$  that has been developed for this study as it properly captures the GoI's policy objectives. The exact definition has also been used by Das, Kallummal, and Banerjee (2020). This is defined as the ratio of DVA of the electronics sector to the Total Demand (i.e., export demand plus domestic consumption, namely, exports plus consumption by households, government and private business) facing the sector. Thus, if a country does not use any foreign inputs in its production and yet is able to fully meet its total demand, then the  $DVA_{ratio}$  will be 1. The lower the ratio, the lower is domestic value addition. This definition is closest to the  $DVA_{ratio}$  adopted in the PLI scheme: net sales turnover minus value of non-originating material and services used in manufacturing divided by net sales turnover. By this definition, around **18 per cent** of the total value in electronics industry in India is produced domestically.



# 3

## **DOMESTIC VALUE ADDITION: SOME STYLISTED FACTS**

---

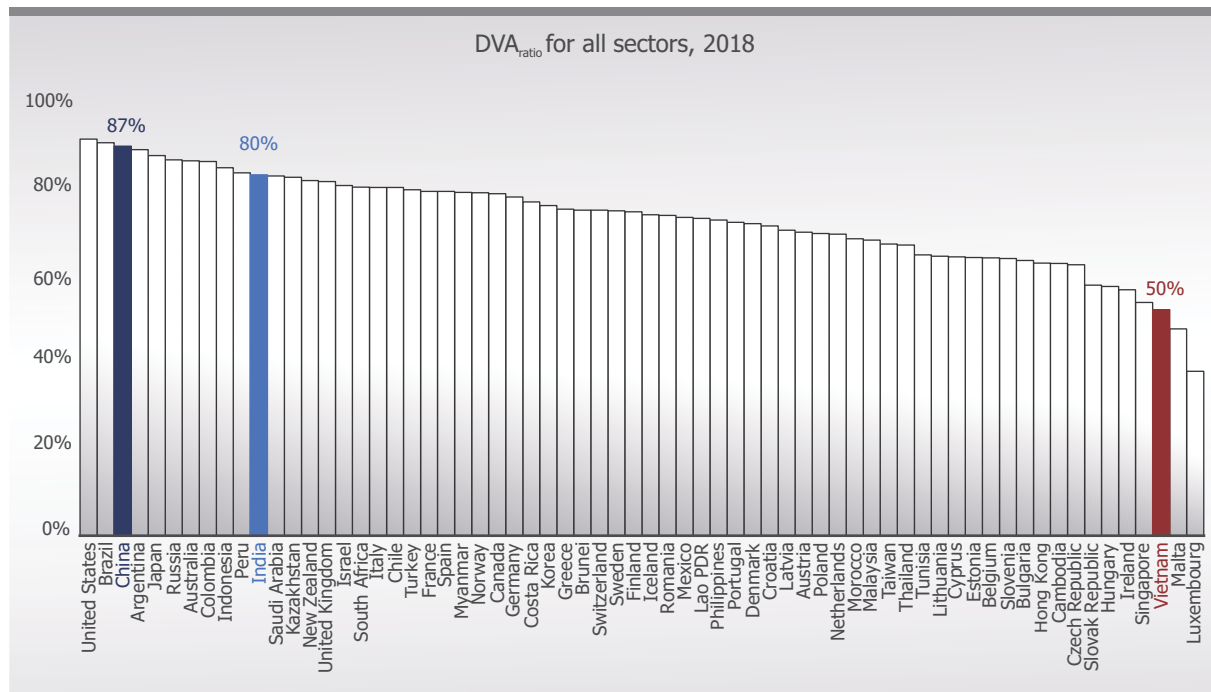


From a cross-country perspective, India's aggregate  $DVA_{ratio}$  is quite high. As shown in Figure 4, India's  $DVA_{ratio}$  for all sectors is estimated to be 80 per cent, compared to 87 per cent for China. At the top end of the  $DVA_{ratio}$  spectrum are the countries that either have large domestic markets (e.g., China and India) or specialise in natural resources or agricultural products (e.g., Argentina, Russia, Australia, Saudi Arabia, Kazakhstan, and South Africa) or both (e.g., USA, Brazil, and Indonesia). At the bottom end of the spectrum are countries that are either small or are successful exporters of manufacturing products (e.g., Luxembourg,

Malta, Vietnam, Singapore, Ireland, Hong Kong, etc.). These stylised facts are along the expected lines:<sup>7</sup> large countries tend to use more domestic inputs by virtue of their size (and vice-versa for small countries), while producers of natural resources or agricultural products tend to use more domestic inputs relative to countries that specialise in manufacturing products.

In contrast to a high ratio at the aggregate level, India's  $DVA_{ratio}$  in the electronics sector is one of the lowest in the world. The first thing to note is that electronics  $DVA_{ratio}$  (Figure 5) is almost always lower than aggregate  $DVA_{ratio}$  (Figure 4). This is

**Figure 4: As expected, being a large country, India's  $DVA_{ratio}$  is relatively high by global standards**



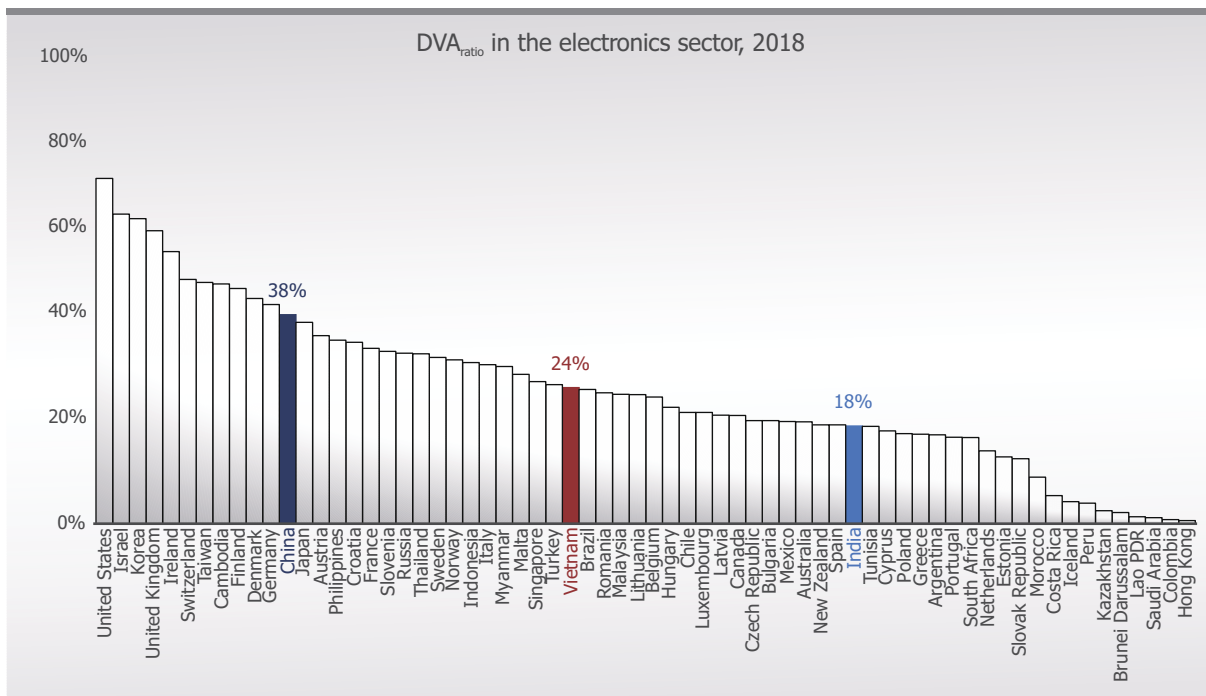
Source: OECD-WTO Trade in Value Added Database (Nov 2021)

because the production of electronics is highly specialised and occurs mostly through GVCs. Therefore, a typical exporting country produces only a small part of the GVC within its borders, while importing many of the intermediate inputs from the rest of the world. India's  $DVA_{ratio}$  at 18 per cent is low; when compared to Vietnam (24 per cent) and China (38 per cent). Industrial

countries, which tend to hold many of the design and product patents for electronics products, such as the USA, Israel, Korea, the UK, Switzerland, Taiwan, Ireland, Germany and Japan, etc., have high  $DVA_{ratio}$ . Until recently, India neither held many patents nor was the global assembly hub of electronic products, and therefore, had to live with very low  $DVA_{ratio}$ .

<sup>7</sup> These intuitive results provide an indirect validation of the way  $DVA_{ratio}$  has been constructed for this study.

**Figure 5: India's DVA<sub>ratio</sub> in electronics exports is at the lower end of the global scale**

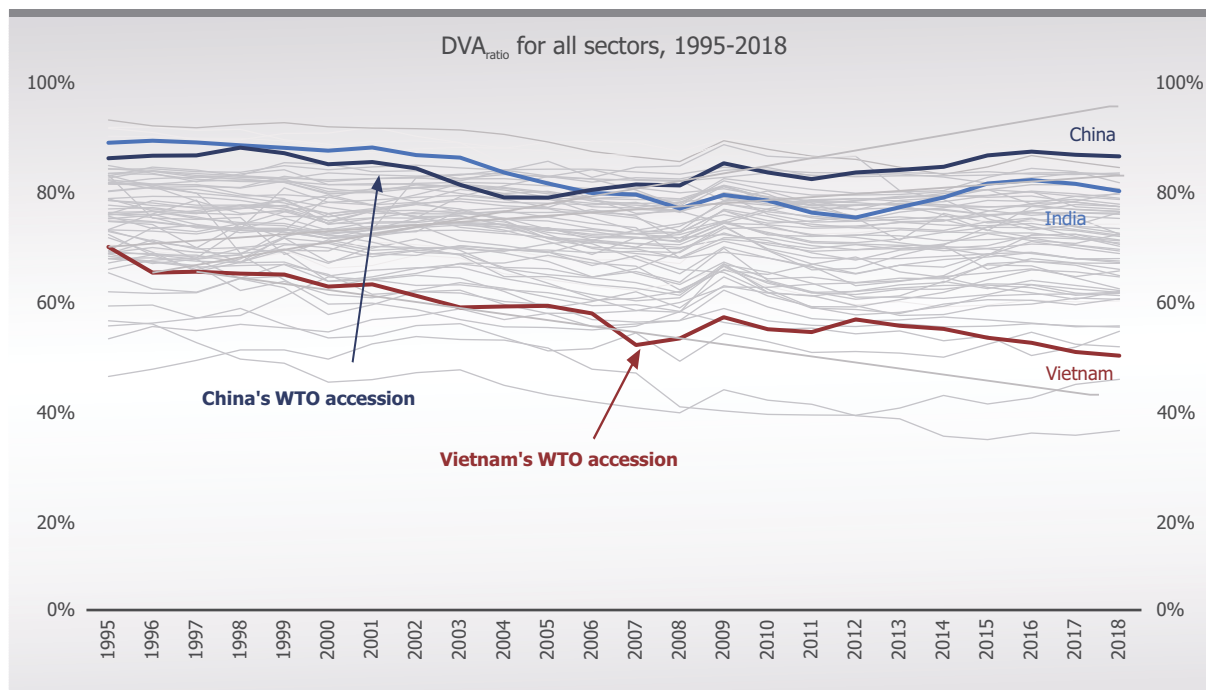


Source: OECD-WTO Trade in Value Added Database (Nov 2021)

The above discussion holds two important policy implications. First, both from a cross-country as well as a cross-sector perspective, India's

DVA<sub>ratio</sub> for the electronics sector is low. So, GoI's ongoing effort to increase this ratio is not entirely misguided. But at the same time, given that

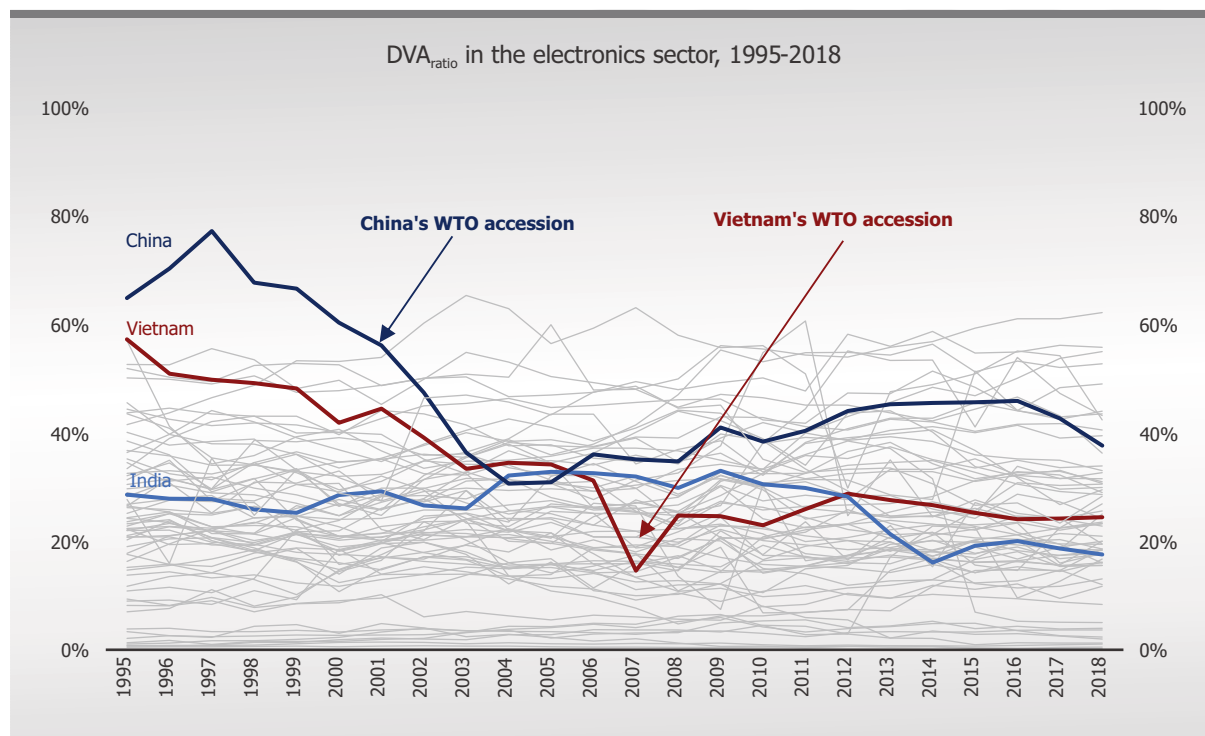
**Figure 6: India's DVA<sub>ratio</sub> has reduced marginally over time but from a very high level**



Source: OECD-WTO Trade in Value Added Database (Nov 2021)

Note: Each grey line represent a country.



**Figure 7: India's  $DVA_{ratio}$  for the electronics sector has been relatively low and stable**

Source: CEIC Database, OECD-WTO Trade in Value Added Database

Note: Each grey line represent a country.

intermediate inputs criss-cross national borders, sometimes several times, any credible attempt to increase  $DVA_{ratio}$  cannot be done in isolation but will require linking India's electronic producers, both intermediate and final goods producers, to the global supply chains.

With global integration in vogue until recently, aggregate  $DVA_{ratio}$  has declined over time and across most countries (Figure 6). India's aggregate  $DVA_{ratio}$  has been relatively high but on a modestly declining trend, from 89 per cent in 1995 to 80 per cent in 2018. China's aggregate  $DVA_{ratio}$  was as high as India in the 1990s, but fell steadily around the time of its accession to the WTO and has gone up since then. Vietnam's aggregate  $DVA_{ratio}$  was relatively low to start with and fell further during its accession to WTO in 2007 and has continued its gradual decline.

While aggregate  $DVA_{ratio}$  has been relatively static,  $DVA_{ratio}$  for the electronics sector has fluctuated

considerably over time and across countries (Figure 7). Take China, whose  $DVA_{ratio}$  fell from 77 per cent in 1997 to 31 per cent in 2004 and rose back to 46 per cent in 2016, it has been exhibiting a non-linear path over these years. Similarly, Vietnam's electronics  $DVA_{ratio}$  fell from 57 per cent in 1995 to 13 per cent in 2007 – the year of its accession to WTO – and rose back to 24 per cent by 2018. In contrast, India's  $DVA_{ratio}$  has been low throughout the period, with limited year-to-year variations. Two observations are in order. First, it seems both China and Vietnam have lowered their local content requirements (LCRs), and thereby lowered their  $DVA_{ratio}$ , to attract investment and gain entry into the WTO.<sup>8</sup> Second, while lowering  $DVA_{ratio}$  can be achieved quickly, increasing it takes time. That's partly because, lowering LCR can be achieved through a mere policy change, while increasing  $DVA_{ratio}$  would require the country to build a competitive ecosystem of investors and suppliers, which takes time and requires focused collaborative effort.

<sup>8</sup> Tong, Kokko, and Seric (2019)

# 4

## SCALE AND DVA: SHORT-RUN VERSUS LONG-RUN DYNAMICS

---



We are trying to find out whether countries have managed to simultaneously increase SCALE and  $DVA_{ratio}$ , since this is what India is trying to achieve. We put this hypothesis to test in two ways. First, we examine the evidence at the cross-country level, seeing how the relationship between these two variables vary across countries. Second, we examine the same relationship over time, specifically focusing on successful East Asian countries. The results are discussed in the next two sub-sections.

### Cross-country evidence

Cross-country experience shows that countries with higher SCALE tend to have lower  $DVA_{ratio}$ . Figure 8 compares countries' export performance with  $DVA_{ratio}$  at the aggregate level. The relationship is found to be significantly negative. Successful exporting nations such as Germany, Korea, Malaysia, Thailand and Vietnam have lower  $DVA_{ratio}$  than India. China, like India, has a high  $DVA_{ratio}$  and low export to GDP ratio. This inverse relationship between SCALE and  $DVA_{ratio}$  does raise questions on any country's ability to

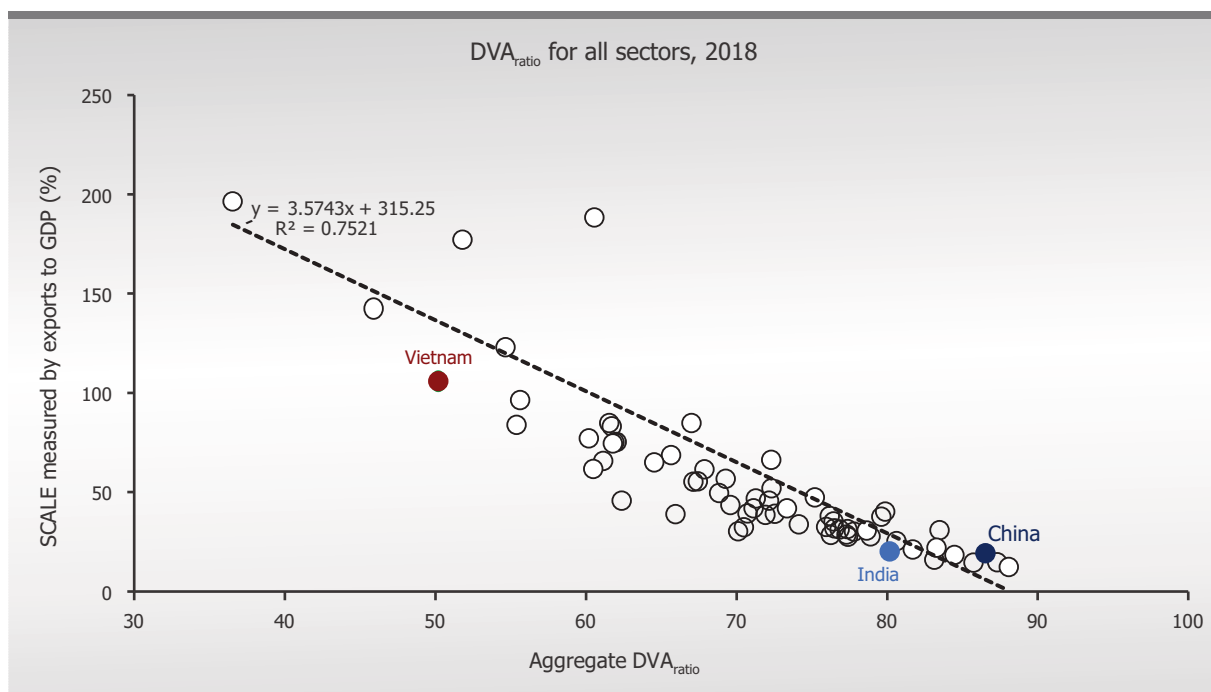
increase both, although this is based on aggregate data.

Further econometric analysis confirms the finding that SCALE and  $DVA_{ratio}$  are negatively correlated at the cross-country level. The regression analysis is based on 51 countries for which data are available. Table 2 shows the regression results for electronics sector. The dependent variable is  $DVA_{ratio}$  and the five independent variables in the basic regression equation are exports to GDP ratio (proxy for SCALE), the share of industrial employment (electronics) in total employment, the share of electronics production in GDP, a dummy variable with a value of 1 for natural resource exporters, and the GDP of the country.

The econometric analysis highlights the following five points (Table 2):

- (i) Countries with higher electronic exports (as a share of GDP) have lower  $DVA_{ratio}$  and this relationship is statistically highly significant.
- (ii) At the same time, countries with higher industrial employment (as a share of total employment) and higher production of

**Figure 8: Countries with lower  $DVA_{ratio}$  tend to export more and vice-versa**



Source: World Bank, OECD-WTO Trade in Value Added Database

**Table 2: Regression results show strong perverse correlation between SCALE and  $DVA_{ratio}$** 

<i>Dependent variable: <math>DVA_{ratio}</math> in the electronics sector</i>		
<b>Explanatory variable</b>	<b>Relationship between dependent and explanatory variables</b>	<b>Interpretation</b>
SCALE: Electronics exports (% of GDP)	Negative and highly significant	Countries that export more tend to have lower level of localisation
Employment in electronics sector (% tot. employment)	Positive and highly significant	Countries with higher employment in electronics sector are associated with higher local contents
Production of electronics (% of GDP)	Positive and highly significant	Countries with higher production in electronics sector, which means higher capability, are associated with higher local contents
Natural Resource Dummy	Positive but not significant	After controlling for other variables, natural resource exporting countries have higher $DVA_{ratio}$
GDP (US\$ bn)	Positive and marginally significant	On average, large countries have higher domestic contents
ITA-1 Dummy	Positive and marginally significant	Countries that are signatories to the ITA-1 have a higher localisation rate, which means higher industrial capability, than countries that are not part of ITA-1
Logistics Performance Index	Positive but not significant	Better logistics can increase localisation, but the effect is not statistically significant
Ease of Doing Business Index	Positive but not significant	Improved business climate is positively associated with localisation rate, but effect is not significant

Source: Appendix 3 (A dummy variable is used in regression analysis to represent absence and presence of sub-groups of any category, viz. if a country is rich in natural resource, the dummy variable takes the value of 1; and if it is not rich in natural resources, the dummy takes a value of 0)

electronics (as a share of GDP) have higher  $DVA_{ratio}$  and these relationships are also statistically significant.

- (iii) Structural variables such as the size of the economy (measured by GDP in \$) or natural resource intensity are not statistically important in explaining the variation in  $DVA_{ratio}$  across countries.
- (iv) Countries that are signatories to the first Information Technology Agreement (ITA-1) have higher  $DVA_{ratio}$  than countries that did not participate in it, which means at least

at the cross-country level, ITA participation does not seem to be indicating lower  $DVA_{ratio}$ .<sup>9</sup> This result does not lend to support the finding of Das, Kallummal, and Banerjee (2020) that countries such as India's domestic computer and electronic industry declined after the country started implementing ITA-1. That's because, many countries that signed ITA-1 also had higher industrial capability. So, India's problem is not so much that it's a signatory of ITA-1, but that it has not been successful in developing a strong industrial capability.

<sup>9</sup> India's experience with the ITA has been highly unfavourable, according to Ministry of Commerce & Industry, Government of India. In its report, Ministry of Commerce & Industry, Government of India (n.d.) said that "India's experience with the ITA was most discouraging, which almost wiped out the IT industry from India. The real gainer from that agreement has been China which raised its global market share from 2% to 14% between 2000-2011 (sic)".

- (v) Countries that have undertaken credible domestic reforms to lower the cost of doing business and improve logistics also have higher  $DVA_{ratio}$ , though the relationship is not statistically significant.

The inverse correlation between SCALE and  $DVA_{ratio}$  – increasing one could result in a decline in the other – is not only empirically valid, but also intuitively convincing. The explanation lies in the way modern Global Value Chains (GVCs) work, where countries specialise in a small part of the GVC and import large amounts of intermediate inputs from the rest of the world. So, greater participation in GVC means smaller  $DVA_{ratio}$  and higher SCALE and vice-versa. Using the experience of Japan, South Korea and Taiwan, Dollar, Khan, and Pei (2019) provide a compelling analysis of why high  $DVA_{ratio}$  in exports should not be the objective of any trade policy.

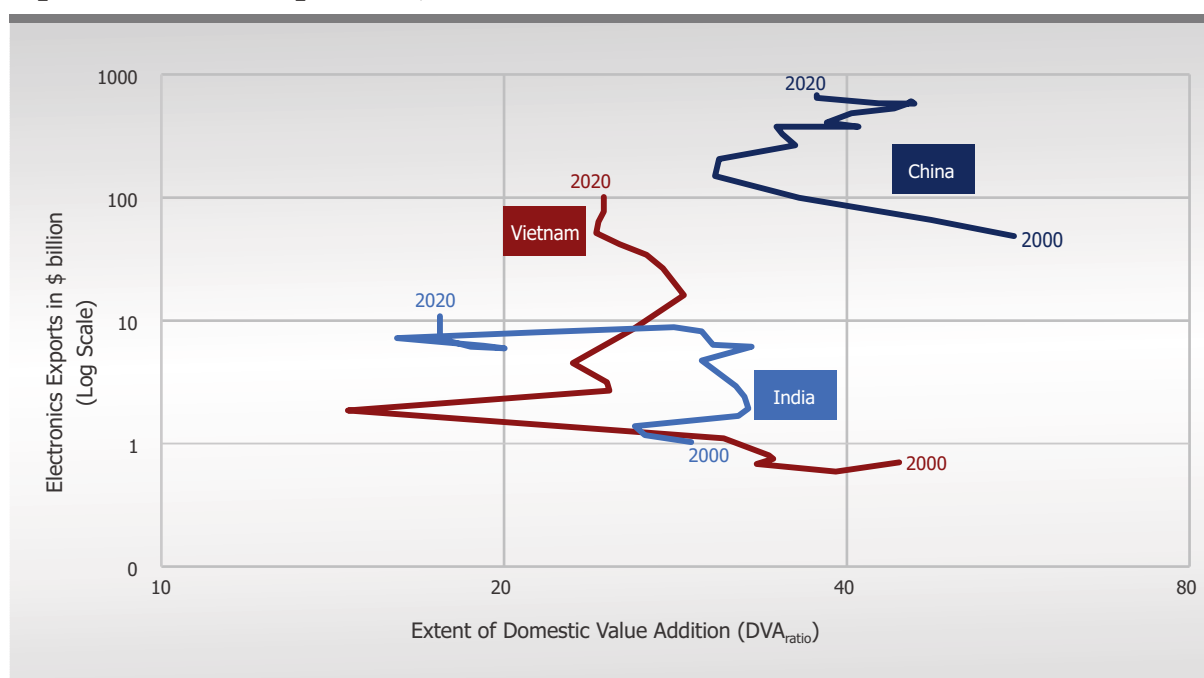
### The narrative changes in a dynamic setting

Could the relationship between SCALE and  $DVA_{ratio}$  be any different at the sectoral level or

in a dynamic setting? This is important as the electronics sector is considerably different from other sectors in the economy, especially when it comes to the role of GVCs. India and China are on opposite spectrums of the electronics trade, with China exhibiting high SCALE and high  $DVA_{ratio}$ , while India has low SCALE and low  $DVA_{ratio}$ . So, we need to understand not just China's current status, but also how it got there. Understanding the dynamic relationship between the two variables is critical to finding the right strategy for India.

Unlike the robust linear association between SCALE and  $DVA_{ratio}$ , the relationship appears much less linear in a dynamic setting. As Figure 9 shows, China, India and Vietnam appear to have pursued very different paths in supporting the growth of their electronics sector. For example, in 2000, Vietnam was in the low SCALE and low  $DVA_{ratio}$  quadrant. Between 2000 and 2007, its  $DVA_{ratio}$  fell while SCALE increased, implying a negative relationship between the two. However, after 2007, and more recently after 2016, SCALE and  $DVA_{ratio}$  appear to be moving in the same

**Figure 9: China, India and Vietnam have pursued different approaches to boost their exports of electronic products, 2000-20**



Source: CEIC Database, OECD-WTO Trade in Value Added (TiVA) Database

Note: DVA shares for 2019 & 2020 are assumed to be same as that of 2018



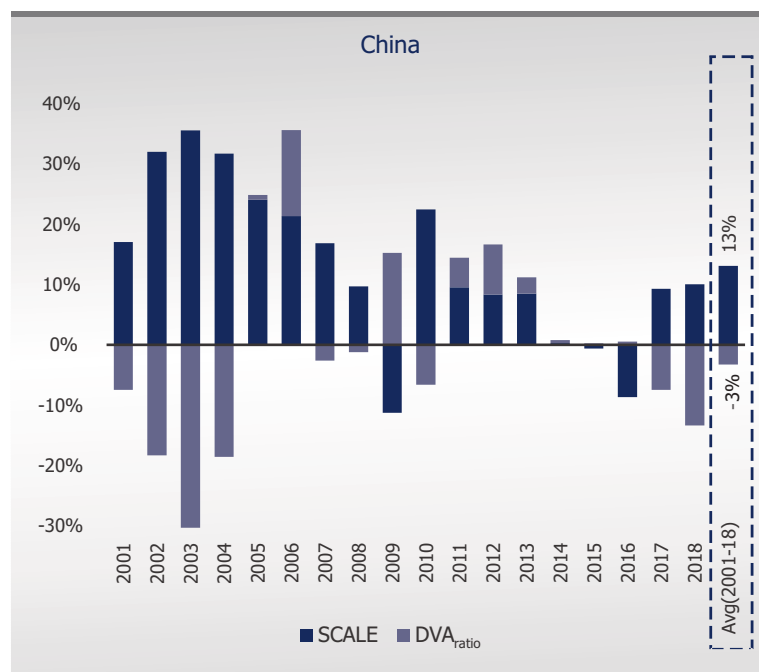
direction. In case of China, SCALE and  $DVA_{ratio}$  moved in opposite direction between 2000 and 2005, and only after 2015, one sees both variables moving in the same direction. The path pursued by India, however, seems an exact opposite of China and Vietnam. In the beginning of the period, when SCALE was low, India chose to increase its  $DVA_{ratio}$ , denying producers the incentive to build to SCALE. So, after 2009, when  $DVA_{ratio}$  fell, there was hardly any response from the sector and SCALE declined further (especially after the exit of Nokia in 2014).

In the long-run, the contribution of SCALE to the total domestic value addition is many-fold higher than the contribution of  $DVA_{ratio}$ . This point is illustrated in Figure 10. In China, in the initial years, more than 100 per cent of total DVA was contributed by SCALE, while  $DVA_{ratio}$  contribution was negative. After 2005, the contribution of  $DVA_{ratio}$  became positive, but couldn't be sustained after 2015. In fact, during 2000-18 period, China's DVA grew by 11 per cent annually, while SCALE grew by 13 per cent and  $DVA_{ratio}$  fell by 3 per cent annually (Panel A, Figure 10). In Vietnam, almost all growth has come from SCALE (20 per cent growth annually), while  $DVA_{ratio}$  contribution on average has been negative (-6 per cent annually) (Panel B, Figure 10).

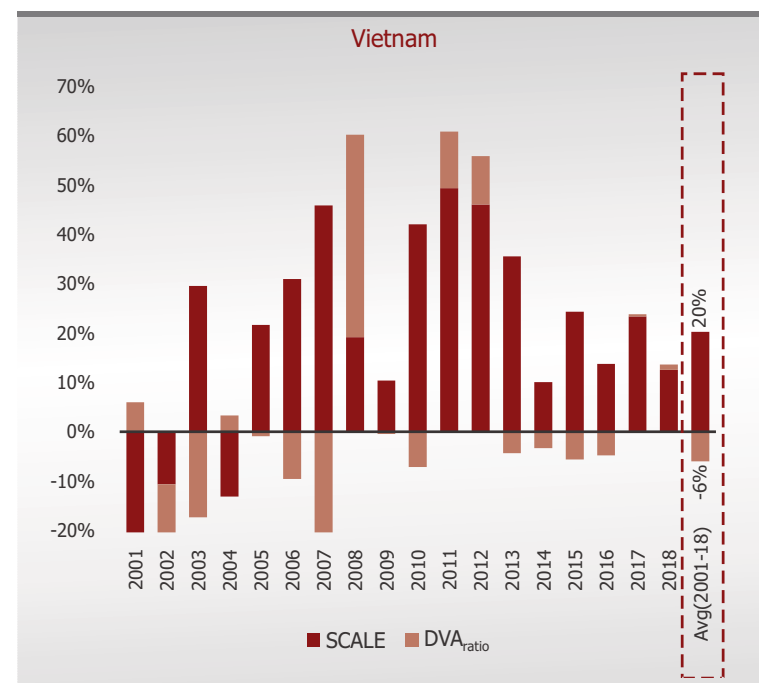
Successful electronic exporters in East Asia have all followed the same rulebook, namely to try to first achieve SCALE (see Box 4 and Figure 11) before tinkering with

**Figure 10: While contribution of  $DVA_{ratio}$  in total DVA has been positive in some years, the long-run average contribution is still negative for China and Vietnam**

Panel A: In China, growth initially came from SCALE and later from  $DVA_{ratio}$ , though overall the former dominates

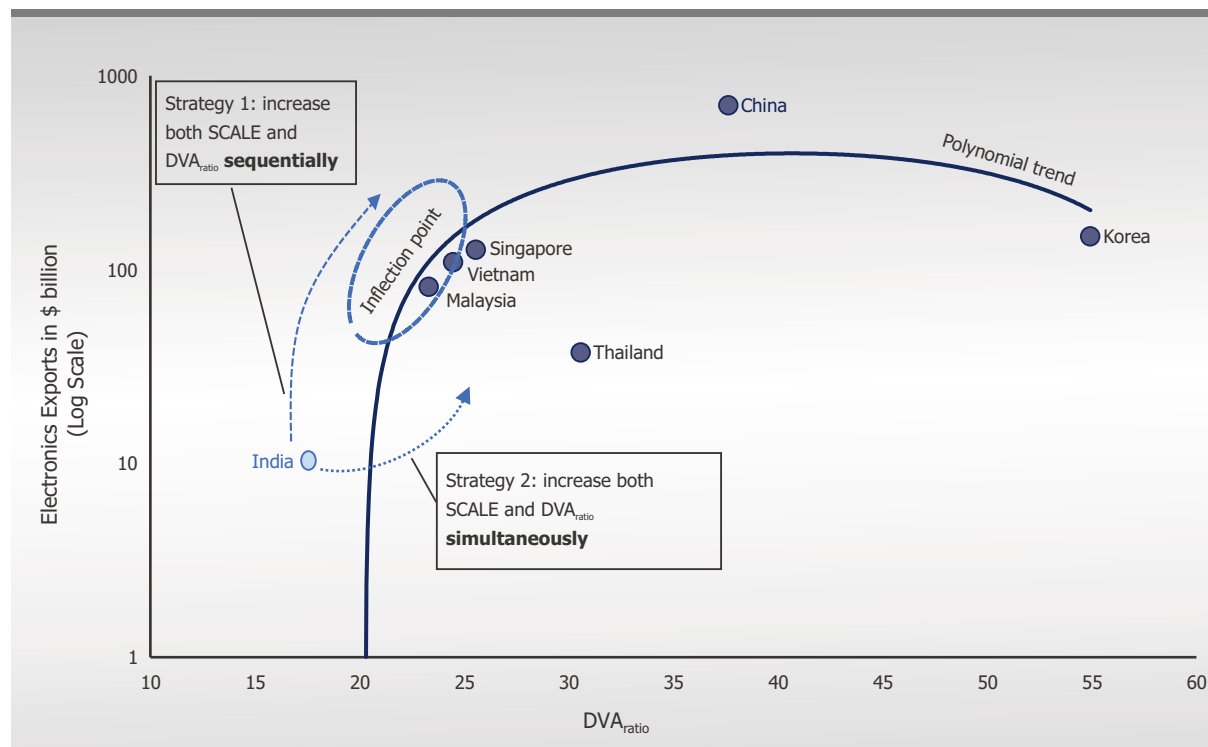


Panel B: In Vietnam, almost entire growth has come from SCALE, though after 2016,  $DVA_{ratio}$  has risen



Source: CEIC and ICRIER staff

**Figure 11: Successful countries have first achieved SCALE before increasing  $DVA_{ratio}$**



Source: World Bank, OECD-WTO Trade in Value Added Database

Note:  $DVA$  for 2019 & 2020 same as 2018; Trendline is from 2010 to 2020

#### Box 4: Why global scale should be measured by exports and not domestic production?

In this study, while referring to global scale, we always refer to exports. Why not think of scale with regard to domestic production?

Such a distinction does not make any difference for small open economies (e.g., Singapore or Vietnam), where exports and domestic production are quite similar in magnitude. But in large economies such as India, domestic production can be large, while exports may be small, as is the case with electronics exports. And that's possible since a large country can produce large quantities domestically within a protected economy.

For example, from 1984 till 1990, India's electronic industry output grew eightfold in six years, registering an average annual growth of over 40 per cent. Companies such as Sharp, Videocon, Onida, Uptron, Keltron, ET&T and others grew to be strong competitors, making over 1.3 million television sets, calculators, etc. But since these productions occurred under a tariff-wall, Indian TVs were either of poor quality or of higher price, relative to their global peers. So, when India liberalized its economy, the entire industry collapsed. This is why global scale should be measured by how much the sector exports and not how much it produces.

$DVA_{ratio}$ . The relationship appears inelastic at the beginning, i.e., the  $DVA_{ratio}$  is fairly low until they achieve the minimum threshold for global SCALE, which according to Figure 11 could be anywhere between \$30 and \$70 billion.

Countries that have exceeded this threshold aim to get their  $DVA_{ratio}$  up. China announced its “Made in China” policy in 2015 when it had achieved a scale of \$400 billion of electronics exports. Korea has succeeded in increasing both SCALE and  $DVA_{ratio}$  but only after building a strong domestic

ecosystem of ancillary suppliers. Thailand, which has maintained a higher  $DVA_{ratio}$ , has lost out on new investments to countries such as Vietnam and Cambodia.

Therefore, India, with an extremely low base, needs to single-mindedly focus on achieving a SCALE of at least \$30 billion of exports. Only after crossing this threshold, and assuming it makes a parallel effort to build the domestic ecosystem, will it be in a position to insist on higher local content.





The analysis so far can be summarised as follows. First, the idea that SCALE and  $DVA_{ratio}$  can be simultaneously increased, when seen from a cross-country perspective, **has little empirical support**. Second, the relationship between SCALE and  $DVA_{ratio}$  appears to evolve over time – in the initial years, they seem to have an inverse relationship, while in the medium to long-term, and with appropriate policies, they can move together. Third, successful electronic exporting nations have sequentially pursued, first achieving

global scale (*globalise*) then increasing local content (*localise*). And finally, trade agreements and domestic reforms, especially the ease of doing business and logistics reforms, could lead to higher SCALE and higher  $DVA_{ratio}$  in the long-run. When a country develops a reasonably strong ecosystem of ancillary and original equipment manufacturers (OEMs), it is in a much stronger position to boost localisation. This is the approach China has successfully followed and Vietnam is trying to replicate.



# 5

## **POLICY OPTIONS FOR THE “FIRST GLOBALISE, THEN LOCALISE” APPROACH**

---



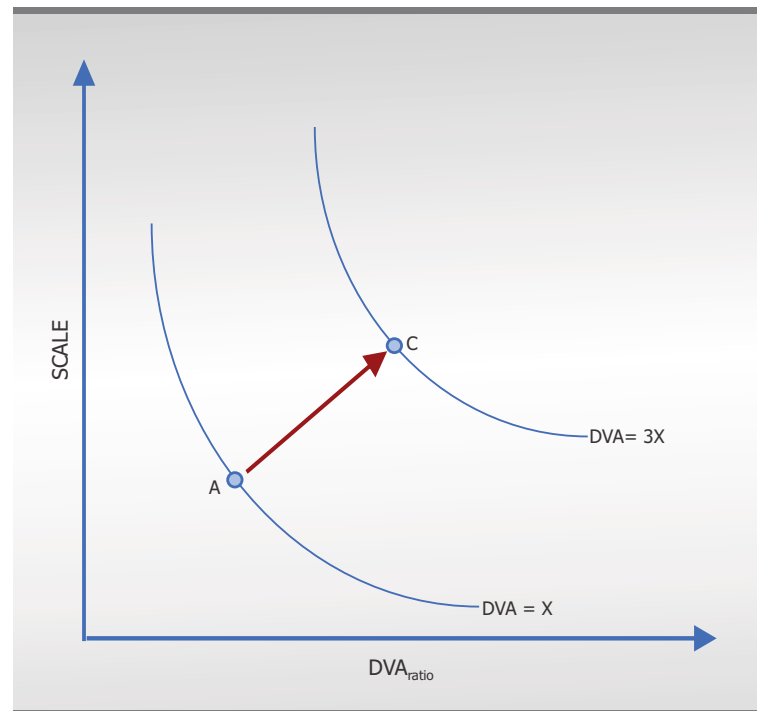


After years of hesitation, India is determined to compete to become a global manufacturing and export hub, especially in the electronics sector. Such ambition is justified on at least three counts. First, given the *servicification* of the manufacturing process, and the fact that Covid-19 pandemic has accelerated digitalization around the world, India appears to be in an advantageous position to capture a larger part of the electronics supply chain that is related to research, design, and development. Second, in recent years, India's capacity and commitment to implement domestic reforms has significantly increased. This means the Indian economy can now gain a lot more from external liberalisation than was the case when India suffered from policy paralysis. Finally, despite a relatively large domestic market, India needs to rapidly increase its share in global exports to achieve its ambition of producing \$300 billion worth of electronic goods and to become a trillion-dollar digital economy by 2025-26. In short, exporting to the global market is no more a luxury but an imperative.

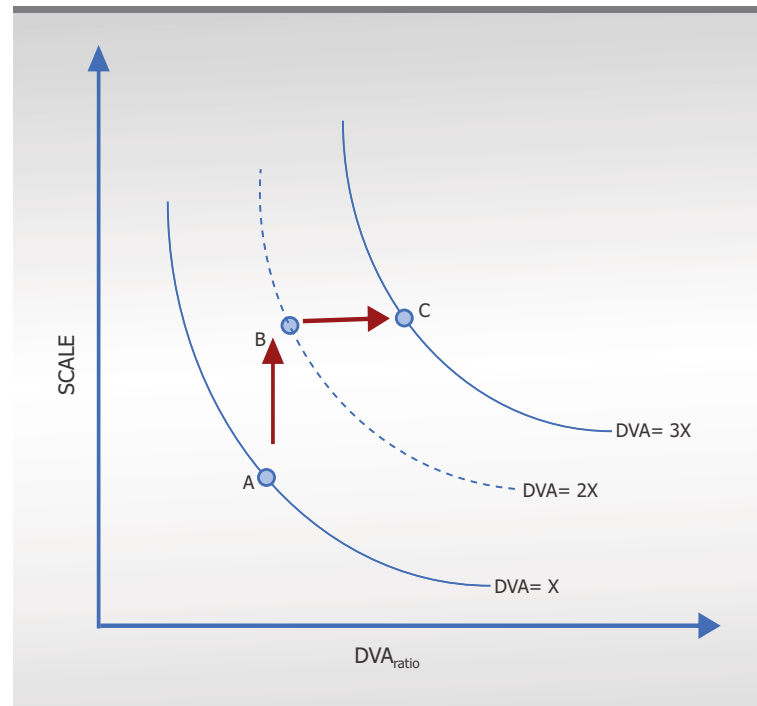
What exactly do we mean by India adopting the mantra of 'first globalise and then localise?' This is illustrated in Figure 12. As demonstrated earlier, there is a negative relationship between SCALE and  $DVA_{ratio}$ , which is why the curves in Figure 12 are downward sloping. The approach

**Figure 12: One destination, two paths**

Panel A: Current approach



Panel B: Proposed approach



Source: ICRIER staff

followed by the government is to increase SCALE and  $DVA_{ratio}$  simultaneously. This means the economy is expected to move from point A to point C in the long-run, increasing total DVA from X to 3X, as shown in Panel A of Figure 12. The approach adopted by the East Asian countries, which we are advocating here for India, is illustrated in Panel B of Figure 12. In this approach, the transition happens in two phases and sequentially. In the first phase, the economy moves from A to B, and so, SCALE increases keeping  $DVA_{ratio}$  constant. In the second phase, the economy moves from B to C, where the primary emphasis is to increase  $DVA_{ratio}$ .

While the destination is the same under both the scenarios – from point A to C – the policy underpinning the two approaches are very different. To achieve both goals simultaneously, GoI has been implementing all policies available at its disposal at the same time, hoping that some will result in more exports and others will lead to more local contents. The limitation of such an approach is that some of the policies promoting import substitution will undermine the effect of policies encouraging export promotion, thereby diminishing the overall impact of policies.

Taking a cue from the playbook of the East Asian countries, India should adopt the mantra of *'first globalise and then localise,'* where policies reinforce rather than offset one another's impact. The immediate and only goal in the short-run should be to build an electronics industry of global scale, say with annual exports of \$30 billion, and support this goal by eliminating policies that discourage scale. Simultaneously, it needs to articulate a strategy to develop the domestic ecosystem that involves a technology upgradation programme, sourcing fairs, supporting industry development programme and workers training at scale. The ecosystem strategy needs to be implemented with clear targets and timeline for tier I and II suppliers. As exports rise and the

domestic ecosystem grows, GoI should encourage, and at times require, firms to increase local contents. What these specific policies are and how they could be implemented are described in Box 5.

## Reduction or rollback of custom duties on intermediate inputs

Historically, India's tariff policy has been set by the Finance Ministry, with the primary goal of maximising revenue. This may have served the interest of the treasury, but not necessarily the long-term growth of the industry. A revenue maximising approach to custom duties is likely to underestimate the long-term benefits to the economy from trade, through increased productivity, job creation, and positive spill-overs from a competitive electronics sector to the rest of the economy.<sup>10</sup>

In recent years, the basic custom duties (BCDs) on many electronic intermediate inputs, as well as final products, have been raised (see Table 3). For example, the 2021-22 Union Budget increased BCD from 0 to 2.5 per cent for PCBA, camera modules, connectors, inputs for lithium-ion battery; 10-15 per cent for PCBA and moulded plastics for chargers/adapters; and to 10 per cent for parts of mobile chargers. As per Union Budget 2022-23, BCD will be calibrated to boost the production of wearable and hearable devices; for instance, in case of headphones, earphones, etc., the custom duty rates have been increased from 15 per cent to 20 per cent, with effect from May 1, 2022. Similarly, PMP has increased BCD on a number of intermediate inputs during the 2016-17 to 2019-20 period. Such changes in BCD could lead to an inverted duty structure (where intermediate inputs face higher duty than final products) and unintended consequences on the cost-structure of a GVC intensive sector.

In times of trade wars, changing geopolitical dynamics, and supply chain disruptions, India's goal should be to diversify its input source so

10 Goldberg et al. (2010); Topalava and Khandelwal (2011) for India; Kasahara and Rodrigue (2008) for Chile; Amity and Konings (2007) for Indonesia; Feng, Li, and Swenson (2016); Bas (2012) – these studies show how reduction in tariffs of imported inputs help in productivity gains in domestic industries, manufacturing, job creation, export growth, etc. (particularly in the case of developing countries).

### Box 5: Policy options to support the strategy to 'first globalise, then localise'

1

#### I. Policies to achieve global scale

- Promote bilateral and regional FTAs
- Reduce or rollback custom duties on intermediate inputs
- Temporarily suspend policies that insist on local content like PMP
- Temporarily remove place-based restriction on intermediate inputs
- Targeted and temporary fiscal incentives like PLI programme



2

#### II. Policies to increase local content

- Announce a strategy to develop the domestic ecosystem that involves a technology upgradation assistance programme, sourcing fairs, supporting industry development programme and workers training at scale
- Set clear targets and timeline for upgrading domestic suppliers to tier I and II suppliers



3

#### III. Policies that are important for both scale and local contents

- Macro-fiscal stability
- Competitive exchange rate
- Ease of doing business
- Lowering/reducing regulatory burden and reducing cost of transport and logistics



**Table 3: India's custom duties on intermediate inputs for electronics are relatively high compared to countries it is competing within the global market, 2020**

HS Item	Product Name	India	China	EU-27	Malaysia	Philippines	Thailand	Singapore	USA
847130	Portable automatic data-processing machine (PCs, Laptop)	0	0	0	0	0	0	0	0
851712	Telephones for cellular network	22	0	0	0	0	0	0	0
851770	Populated, Loaded PCBs	16.5-22	0	0	0	0	0	0	0
854231	Processors and controllers	0	1.15	0	0	0	0	0	0
854239	Other Electronic integrated circuits, other than Amplifiers, Memories	0	0.7	0	0	0	0	0	0

Source: WITS, Industry Estimates

Note: (1) India's tariffs in 2020 and 2022 are the same for each HS category. (2) The Indian estimates are for effective tariffs, i.e., including a Social Welfare Charge of 10% on the basic custom duty. (3) Two HS categories of 2020 have changed since January 01, 2022 (Items under category 851712 of 2020 are now under 851713 and 851714, and category 851770 of 2020 is now 851779).

that more of the final goods are assembled in the country. To take advantage of the current opportunities, decision makers should consider rolling back custom duties on intermediate electronic products and phasing out schemes such as PMP that have become a barrier to the industry's growth and industrial production. In fact, trade experts would argue that PMP and PLI cannot co-exist. PMP promotes import substitution and PLI promotes exports. The former requires higher duties, which negates exports by making domestic product uncompetitive globally.

### Temporary elimination of Local Content Requirement (LCR)

The imposition of LCRs is a non-tariff barrier that affects the competitiveness of a country's supply chain. It may appear to provide short-term benefits in terms of maximising local production.<sup>11</sup> But in the long-run, the negative impacts of LCRs can be significant and extensive as we have shown earlier. It is noteworthy that Vietnam reduced its LCR restrictions from 30 per cent to 0 per cent in 2008 to meet its WTO obligation and encourage Samsung to invest in the country, which subsequently resulted in its electronic exports rising from just under \$3 billion in 2008 to \$123 billion in 2021. Vietnam's success story clearly negates the widely held views among Indian policymakers that if local value addition is not increased, local firms cannot grow or survive.

It may appear that, in the short-term, LCR policies are helping India to produce more. Take the PLI scheme, which hopes to increase  $DVA_{ratio}$  by encouraging local contents to increase to 35-40 per cent for mobile phones and 25-30 per cent for laptops, tablets, and PCs. Following this policy, the production of mobile phones has increased from \$3.1 billion in 2014-15 to \$30 billion in 2020-21<sup>12</sup>, and the exports of smart phones increased from \$0.23 billion in 2014-15 to \$3.8 billion in 2021-22 (Feb 2022), which are significant achievements.

But as has been widely reported, in the absence of a well-developed ecosystem of intermediate suppliers, most mobile phone companies would have difficulty in increasing local sourcing<sup>13</sup>. And when they do, the quality may not meet export standards. With such onerous LCRs, India-based manufacturers are unlikely to achieve the global scale within the timespan that Vietnam-based manufactures did.

If India wishes to achieve the same level of exports as China and Vietnam have done in the past, it must relook and temporarily suspend or eliminate its LCR policies. This includes removing LCR from public procurements as well as in flagship programmes like PLI and PMP.

### Developing a competitive domestic ecosystem of the electronics ancillaries and the intermediate producers

Developing and strengthening the domestic ecosystem in the electronics sector is crucial to India's ability to become a global hub for manufacturing and exports of electronic products. Here, Vietnam's recent experience provides a useful guide for Indian policymakers. We discuss below three specific ideas that could be customised to the Indian context (also see Box 6).

- **Sourcing Fairs.** In 2014, the Vietnamese government in collaboration with Samsung held a "Sourcing Fair"; around 200 domestic suppliers who attended the event expressed interest in supplying 91 parts for Samsung mobile phones and 53 parts for its various tablet models available locally (including batteries, earphones, USB storage devices, and data transmission cables). Through this fair, Vietnamese firms were able to identify specific components that could potentially be outsourced.<sup>14</sup> They were also provided

<sup>11</sup> Deringer et al. (2018)

<sup>12</sup> Iyer (2022); ICEA (2022)

<sup>13</sup> Gupta (2022)

<sup>14</sup> Thu (2017)

guidance to meet Samsung's quality standards and requirements. In 2017, Samsung again conducted a Sourcing Fair in Vietnam, which led to a further increase in the localisation rate of Samsung's products. MeitY could consider organising such sourcing fairs for local firms in collaboration with foreign companies such as Apple, Samsung, Xiaomi, Vivo, Lenovo, and HP for different electronic product segments, especially laptops, tablets, hearables, and wearables.

- **Technology Upgradation Programme.**

Samsung placed internal experts from South Korea in Vietnamese firms as part of the Technical Consultation Program (2015) to assist them in improving their manufacturing processes. They initially conducted technical evaluations of the firms, followed by interviews and hands-on partnerships with key members involved in production to meet Samsung's product and process standards. As a result, Samsung enrolled 26 local companies in its consultation programme. This programme was initiated in collaboration with the Vietnamese government. While such programmes exist in India too, there is a need to systemically pursue them, often in partnership with the State governments, and to back these programmes with necessary fiscal and financial support.

In order to increase domestic value addition, the local supply chain needs to be strengthened. For this purpose, policy must allow supply chains from countries which

are hubs of electronics manufacturing to shift to India, both directly and by way of joint ventures where appropriate. Over time, this will also help reduce imports and simultaneously build the technical capability and worker skills amongst Indian companies at a much faster pace than they would on their own. Any restrictions on shifting supply chains and by consequence skills/technological knowhow is bound to delay the pace and quantum of domestic value addition in the electronics sector.

- **Supporting Industry Development Programme.**

Vietnam has introduced a ten-year Supporting Industry Development Programme (SIDP) 2016-25 to assist 1,000 Vietnamese firms, linking them with local as well as international firms in the supply chain with the aim of converting at least 130 of those firms to become direct suppliers to MNCs. The programme mentions the need to target FDI in supplying industries to create more backward supply linkages for local firms.<sup>15</sup> The objective of SIDP is, by 2025, local firms must meet 65 per cent of the demand of both local and foreign firms manufacturing within Vietnam. Such programmes to link local SMEs with big players and MNCs is a missing piece in India's current policy stance. Instead of requiring firms to raise DVA<sub>ratio</sub> through LCR targets, the Indian government should consider programmes like SIDP that would achieve the same goal but through an investor-friendly approach.

### Box 6: Vietnam's success in scale corresponds to entry of export-oriented MNEs, particularly Samsung, and their linkages with domestic firms, followed by Vietnamese development programmes

Vietnam's electronics exports increased to almost \$110 billion in 2020 from just \$3 billion in 2008. The Vietnamese government's agenda largely relied on increasing foreign value added (FVA) or the usage of imported content and the utilisation of incoming FDI flows, originating mostly from China, Japan, Singapore, Taiwan, Korea, and Hong Kong.

<sup>15</sup> Tong, Kokko, and Seric (2019)



In 2008, Vietnam **eliminated the local content requirement** (from 30 per cent) on FDI<sup>16</sup> as part of its agreement to join the WTO, which was followed by Samsung's announcement that it would invest in Vietnam in mobile phone manufacturing.

Here is a timeline of the sequence of reforms involving the electronics sector, especially with regard to Samsung's operations in the country.

2009	Samsung Electronics Vietnam (SEV) started operations in Vietnam with an investment of \$670 million in electronic devices <sup>17</sup>
2012	Samsung invested in a research and development (R&D) facility in Vietnam
2014	Samsung had 67 suppliers providing intermediate inputs: <ul style="list-style-type: none"> <li>• 63 local affiliates of foreign firms established in Vietnam as part of a co-location strategy: Korea (53), Japan (7), Malaysia (1), Singapore (1), UK (1)</li> <li>• Only four tier-I local Vietnamese suppliers of paper packaging products (low VA)</li> </ul>
2017	Samsung intermediate inputs' suppliers increased to 215: <ul style="list-style-type: none"> <li>• 25 tier-I suppliers (directly supplying to Samsung): 20 foreign affiliates, 5 domestic firms (with one additional firm compared to 2014)</li> <li>• 190 tier-II suppliers: domestic firms supplying to Samsung's foreign-owned tier-I suppliers in Vietnam</li> </ul> <p>(In order to increase domestic sourcing, initial inputs were supplied by the foreign affiliates, and it took five to seven years to build domestic presence)</p>
2019	Samsung tier-I suppliers of Vietnamese firms increased to 42
2020	Samsung made a target of opening 50 Vietnamese tier-I suppliers (8 more in addition to the number in 2019) <sup>18</sup>

**In nutshell, it took about 10 years for Samsung to increase the involvement of domestic Vietnamese firms in supplying intermediate inputs in Vietnam** – technology spill-over and assistance programmes helped. The presence of Samsung created an ecosystem of supporting businesses, which attracted several other companies to come to Vietnam:

- Intel invested in testing and assembly of semi-conductors and entered into the production of chip sets in 2010
- Foxconn entered into the assembly of internet protocol phones, routers, and modems in 2014
- LG established production lines for smart phones, TVs and appliance plants in 2015
- Since 2018, local smartphone company VinSmart has also emerged as a potential competitor in the production of low-cost smart phones, using similar technology and skilled labour as Samsung<sup>19</sup>

<sup>16</sup> Pham, Nguyen, and Johnson (2020)

<sup>17</sup> Tong, Kokko, and Seric (2019)

<sup>18</sup> VietNam News (2020)

<sup>19</sup> Hosokawa and Tomiyama (2018)

**Interestingly, Vietnam followed a different approach to create jobs and scale in the electronics sector, which was not through tariff increases but mostly through training programmes and better investment climate in domestic economy. Specifically,**

- Samsung announced a collaboration with the Vietnamese government in holding the Samsung Sourcing Fair in 2014 to involve potential Vietnamese firms in its supply chains via production of intermediate inputs; Vietnamese firms were invited to present their product offerings, sourcing policy, and potential specific components for outsourcing purpose
- Samsung introduced a three-month technical consultation programme in 2015 for existing and potential Vietnamese suppliers, and this covered initial technical assessments of the firms, followed by interviews and hands-on collaboration with key personnel on production floors to improve the firms' manufacturing processes; Samsung provided guidance on the application process and requirements for becoming a Samsung supplier
- The Vietnamese government announced the Supporting Industry Development Programme (2016-2025) to involve domestic supplier firms in serving domestic production and exports, to participate in GVCs, and connect supporting industry enterprises to become product suppliers for domestic and foreign customers
- Samsung & the Ministry of Industry and Trade in 2019 completed a training course for 207 Vietnamese consultants

## Incentivise the future labour force to acquire skills that the sector needs

The PLI scheme for smartphones aims to create a total of 8 lakh jobs in the electronics sector by 2025-26 (i.e., 2 lakh direct jobs and 6 lakh indirect jobs).<sup>20</sup> Achieving it would require a concerted effort on several fronts:

- **Increase in female labour force in the electronics sector.** Low female labour force participation rate in India is a national concern. Worldwide, the electronics sector employs a large percentage of female workers for its assembly line work.<sup>21</sup> This would require flexibility in the work and shifts — a differentiated approach that is consistent with the requirements of the electronics sector. To
- **Providing training and skills at scale.** More training centres and greater investments into ITIs/Polytechnics are required to impart better skills to the workers, in collaboration with the industry and the state governments. For functional and economic upgrading in GVCs, along with high capacities and infrastructural growth, there is a need for

encourage more female workers to join this sector, the industry and the government need to come up with a strategy urgently, involving job security, availability of housing, women-friendly work environment and possible incentive programmes. For example, large 'campus housing' or creating dormitories for large scale manufacturing units is a relevant option to explore by the Indian electronics sector.

<sup>20</sup> PIB, Government of India (2020b)

<sup>21</sup> Rocha and Winkler (2019)

<sup>22</sup> Hasan (2022)

higher skilled manpower at every stage of the value chain. This is because supply chains keep reallocating jobs and resources, creating demand for specialised labour skill sets at different stages. For instance, the electronics sector requires high designing and R&D skills for fab development. Greater 'digital skilling' is required for the workers in this sector. A

skill mission focused on the specific need of the electronics sector needs to be developed.

- **Greater emphasis on on-the-job training.** Evidence from the US shows that anywhere from 20 to 60 per cent of skills are developed in firms while on-the-job. This is one of the reasons the returns to experience



can be so high. There is a need to distinguish between foundational cognitive and non-cognitive skills, which can most efficiently be provided by government; sector specific skills and task specific skills and firm specific skills can be imparted by the private sector. Preliminary work in this area shows that

many of the latter skills can be easily acquired with 1.5-2 months in the Indian setting.<sup>22</sup> On-the-job training programs haven't received as much attention in India, especially when the government has ambitious target to significantly increase industrial production and employment.



---

<sup>22</sup> Hasan (2022)

**6**

**WAY**  
**FORWARD**

---





India's ambition to become a trillion-dollar export economy by 2025-26 needs to be matched with a more aggressive trade policy stance. It is encouraging that India is changing from being a reluctant globaliser to one that is impatient to see the benefits of globalisation. It wants to ride the manufacturing bus it had failed to catch in the past thirty years. This is most evident in the electronics manufacturing sector that has become the torchbearer of India's effort to become a global manufacturing hub. To make up for the lost time, the government has announced series of policy measures to address the multitude of problems buffeting the industry. While these efforts have yielded positive benefits, they need to be much more strategic, internally consistent and empirically validated if India has to reach the trillion-dollar milestone.

Our analysis suggests that the current path involving simultaneous increase in exports and greater use of domestic content is unlikely to put India in the same trajectory as China and Vietnam. An alternative approach would involve a sequential path: immediate goal should be to export at scale to the global market (*globalise*), and the subsequent objective could be to increase the share of local contents (*localise*). Such an approach has not only strong empirical validity but is also consistent with the nature of GVC-dominated global electronics trade.

There are significant policy implications if India is to adopt the “*first globalise, then localise*” approach. It calls for rolling back policies that are slowing down the electronics sector to achieve global scale quickly. This would mean being agnostic about localisation requirements and perhaps proactively removing them from trade and industrial policies and procurement rules. It would also mean phasing out localization policies from programs like PLI and PMP and not increasing custom duties further. By reversing policies that explicitly encourages import substitution, this path would quickly build India's reputation as a low-cost producer of high-quality electronic products. The short-term goal of maximizing revenue through high custom duties needs to be replaced with long-term strategic thinking of growing the sector. Once the global scale has been achieved, the policy emphasis could shift to encouraging greater use of local contents. While the latter will happen in few years from now, the preparation for it needs to begin immediately. Therefore, in parallel with policies to encourage scale, there is an urgent need to create a competitive domestic ecosystem of ancillary suppliers through technology upgradation programmes, holding sourcing fairs and introducing supporting industry development programmes, as has been done by other successful electronic exporting countries.



# APPENDIX 1:

## GOI'S POLICY INITIATIVES TO BOOST SCALE AS WELL AS RATIO

In 2012, the Indian government recognized the importance of the electronics sector because of its potential for high value addition and exports. As a result, the National Policy on Electronics (NPE) was launched, and India's electronics ecosystem has changed significantly since then. As targets of NPE-12 seemed to be far-fetched, it was revamped in 2019 to reach a turnover of \$400 billion by 2025. However, in 2021-22, government set the target of achieving electronics manufacturing of \$300 billion by 2025-26.

Overall, measures post 2012 have been to make India self-reliant by raising DVA share and reducing import dependence as well as to let R&D grow in this sector.

- For encouraging 'Make in India' policy, GoI modified the **public procurement norms** in 2020 with reference to Desktops, Laptops, Tablets, Servers, and Cellular Mobile Phones: Class-1 local suppliers to get preference in all government purchases for 50 per cent or more localisation rate, followed by Class-2 local suppliers with 20-50 per cent local content in production process.<sup>23</sup>
- As per Union Budget 2018-19, **basic custom duty (BCD) in India was increased on mobile phones** from 15 per cent to 20 per cent, and for some of their parts/accessories to 15 per cent.<sup>24</sup> During 2020, tariffs were also revised on other inputs to promote value addition.

Description of the product	Change in Custom Duty <sup>25</sup>
Inputs, parts/sub-parts for manufacture of specified parts of mobile phones, viz.: (1) Printed Circuit Board Assembly (PCBA) (2) Camera module (3) Connectors	0% to 2.5%
PCBA and Moulded Plastic for manufacture of charger or adapter	10% to 20%
Inputs and parts [other than PCBA & moulded plastic] of mobile chargers	0% to 10%
Inputs, Parts and Sub-parts [other than PCBA and Liion Cell] for manufacture of Lithium-ion battery and battery pack	0% to 2.5%

<sup>23</sup> PIB, Government of India (2021a)

<sup>24</sup> Ministry of Finance, Government of India (2019)

<sup>25</sup> Ministry of Finance, Government of India (2021)

However, such new tariffs proved contradictory to the development of a conducive ecosystem capable of supporting large-scale production of mobile phone handsets and components.

- Implementation of the **Phased Manufacturing Program (PMP)** for cellular mobile handsets & sub-assemblies/parts/sub-parts started out in 4 phases to progressively increase DVA by rise in BCD<sup>26</sup> (see the table below).

In case of mobile handset, manufacturing has steadily moved from Semi Knocked Down (SKD) to Completely Knocked Down (CKD)<sup>27</sup> level, but later phases of PMP became difficult to follow for the import substitution.<sup>28</sup>

- In April 2020, the **Production Linked Incentive Scheme (PLI), Scheme for Promotion of Manufacturing of Electronic Components and Semiconductors (SPECS), and Modified Electronics Manufacturing Clusters Scheme (EMC 2.0)** were notified in order to further the vision of NPE 2019. These schemes aim to build \$1 trillion digital economy, achieve \$5 trillion GDP, boost mobile phone and components' production

to about INR 10,00,000 crores by 2025, and generate almost 5 lakh direct as well as 15 lakh indirect employment.<sup>29</sup>

- To promote high-value local manufacturing, **SPECS** provides a financial incentive of 25 per cent on capital expenditure. The scheme had received applications from 22 firms (with total investment of INR 13,500 crores) for active, passive, and electromechanical components, displays, and mobile phone mechanics in 2020. Also, financial assistance of 50 per cent of the project cost provided under **EMC 2.0** has fetched 227 units to create manufacturing clusters during 2020.<sup>30</sup>
- While the focus was more on increasing value addition, **PLI scheme for Large Scale Mobile and Component Manufacturing (2020)** has been launched to generate approximately INR 10.5 lakh crore total production by 2025. Out of which, exports have been estimated to account for more than 60 per cent (INR 6.5 lakh crores).<sup>31</sup> Hence, targeting of GoI moved towards increasing the scale in exports. Further, PLI initiatives also aimed to bring additional INR 11,000 crores in investment. In the next five years since 2020, PLI is proposed to create around

Phases	Year	Sub-Assembly/Parts	BCD Applicable as per Union Budget 2020-21
Phase 1	2016-17	Chargers, Adapters, Battery pack, Wired headset	15-20%
Phase 2	2017-18	Mechanics, Die-cut parts, Keypad, USB cable, Microphone and Receiver	15%
Phase 3	2018-19	PCBA, Camera modules, Connectors	10-20%
Phase 4	2019-20	Manufacture of touch panel/cover glass assembly, Display system, Vibrator motor	10%

<sup>26</sup> MeitY, Government of India (2020a)

<sup>27</sup> MeitY, Government of India (2020b)

<sup>28</sup> ICEA (2021)

<sup>29</sup> PIB, Government of India (2020a)

<sup>30</sup> Gupta, Kumar, and Saini (2021)

<sup>31</sup> PIB, Government of India (2021b)

2 lakh direct job opportunities. Note that, by the March 2021 quarter<sup>32</sup>, investment of INR 2,336 crores, production of INR 54,357 crores (exports of INR 16,800 crores), and additional employment of 12,350 have been gained. As pandemic affected success of PLI scheme during 2020, GoI agreed in June 2021 to give option of considering year 2020-21 as the zero year for PLI preparation.

To make India ESDM hub, **PLI was also approved for IT hardware in March 2021**, particularly for Laptops, Desktops/PCs, Servers, and Tablets. Until April 2021, 19

applications were accepted for this scheme. The approved IT hardware companies under this scheme have been estimated to produce more than INR 1.61 lakh crores, with the anticipated target for exports as INR 0.6 lakh crores by 2025. Domestic enterprises that have been approved have proposed a production of INR 76,007 crores. Also, a total of INR 2,517 crores is to be invested in IT hardware production for creating 36,000 additional employment in next 4 years.<sup>33</sup> Overall, PLI scheme expects to increase DVA shares, as mentioned in Table 1.



<sup>32</sup> PIB, Government of India (2021c)

<sup>33</sup> PIB, Government of India (2021d)

## APPENDIX 2:

# OBJECTIVES, CONCEPTS, DATA SOURCES AND METHODOLOGY

The report aims to ascertain how to increase Total Domestic Value Addition (or DVA), with the emphasis on the electronics manufacturing sector. It seeks to:

- (i) Explore the role of Domestic Value Addition (DVA) as a policy goal and its outcome in promoting India as a global manufacturing hub.
- (ii) Identify the factors and policies that have helped countries such as Vietnam and China to either raise their DVA or expand their scale and/or exports overtime, with emphasis on macro, trade and industrial policies and the time required to achieve such an outcome.
- (iii) Ascertain what sort of trade and industrial policies should India pursue, if it wishes to increase its total DVA, to transform from a modest to a major exporter of electronics manufacturing products and how those policies should evolve over time?

The report uses latest input-output tables from OECD-WTO Trade in Value Added (TiVA) database, as launched on 17<sup>th</sup> November 2021, for the time period 1995-2018 to obtain the trends and patterns of aggregate and sectoral domestic value additions (of electronics). For GDP, FDI, wages, employment, custom tariffs, exports data, etc., different indicators have been used from the databases by OECD, World Bank, CEIC, ADB, UNCTAD, WITS software, Government of India's Export-Import Data Bank, Annual Survey of Industries, databases by Government of Vietnam and China, etc.

**OECD-WTO TiVA database** provides data on value added, DVA content in gross exports, production, GDP variables, etc. for the period 1995-2018 for the particular category of electronics sector, i.e., **D26<sup>34</sup>: Computer, Electronic and Optical Equipment**, which corresponds to India's classification code NIC 26. The data are sourced from the National I-O tables.

<sup>34</sup>“This division includes the manufacture of computers, computer peripherals, communications equipment, and similar electronic products, as well as the manufacture of components for such products. Production processes of this division are characterized by the design and use of integrated circuits and the application of highly specialised miniaturization technologies. The division also contains the manufacture of consumer electronics, measuring, testing and navigating equipment, irradiation, electromedical and electrotherapeutic equipment, optical instruments and equipment, and the manufacture of magnetic and optical media.” (European Commission, n.d., Retrieved from <https://inspire.ec.europa.eu/codelist/EconomicActivityNACEValue/C.26>) The category D27 of electrical equipment has been excluded (“this division includes the manufacture of products that generate, distribute and use electrical power. Also included is the manufacture of electrical lighting, signalling equipment and electric household appliances.”) from electronics.



<b>Value Added</b>	“Value added in the TiVA indicator system includes taxes less subsidies on intermediate products to maintain the condition of equity with final expenditures at basic prices (Total output at basic prices less intermediate consumption expenditures at basic prices). Value added by industry $i$ in country $c$ : $VALU_{c,i} = W_{c,i}$ . Value added at basic prices reflects the value that is added by industry $i$ in country $c$ when producing goods and services.”
<b>DVA content of gross exports</b>	“EXGR_DVA <sub>c,i,p</sub> Domestic Value Added content of exports, by industry $i$ in country/region $c$ to partner country/region $p$ , represents the exported value added that has been generated anywhere in the domestic economy (i.e. not just by the exporting industry).”

**Definition and calculation of GoI** for domestic value addition or value added are as follows:

- Under public procurement scheme<sup>35</sup>,** DVA is defined as the “Local Content” which is ‘the amount of value added in India’. It is the total value of the items produced (excluding net domestic indirect taxes) minus the value of imported content in the item (including all custom duties) as a proportion of the total value – in percentage terms.
- PLI scheme defines Domestic Value Addition<sup>36</sup> as:** Net Sales Turnover minus value of non-originating material and services used in manufacturing divided by Net Sales Turnover. Note that “Net Sales Turnover shall

mean the Gross Sale Turnover net of credit notes (raised for any purpose), discounts (including but not limited to cash, volume, turnover, target or for any other purpose) and taxes applicable.” (Data collected by GoI through firms’ primary survey and from government open portal – data.gov.in)

**The difference lies in methodology: TiVA uses trade/exports-based approach to calculate DVA share, while GoI uses turnover/output/production-based approach for the same (with least focus on indirect value added).**

**The report uses DVA<sub>ratio</sub> as equal to DVA divided by Total Demand.**



35 DPIIT, Ministry of Commerce & Industry (2020)

36 MeitY, Government of India (2020c)

## Note on Using TiVA Database<sup>37</sup>

Ever since the launch of the first TiVA database in May 2013, several studies have been undertaken to gauge value-added trade in different regions such as the OECD, European Union, and Asian as well as the majority of emerging economies, including India, China, Vietnam, Indonesia, and others. Some of the studies employing TiVA are Ahmad (2013), Banga (2014a, 2014b), Gupta (2016), Francis and Kallummal (2020), Veermani and Dhir (2017), Banerjee and Zeman (2020), Hua (2021), Kersen (2017), etc.

The reasons for its high usage have been availability of specific data for evaluating GVCs linkages and its ability of addressing double-counting issues prevalent in official trade statistics. TiVA has been specifically developed for providing the origin and the destination of value-added in the trade of commodities and services in value chains. The ‘domestic value added embodied in gross exports’ indicator is widely used for the above-mentioned studies: includes not just exporters’ direct value-added, but also their indirect value-added.

Although TiVA is by far the most reliable databases across countries, Francis and Kallummal (2020) stated that, particularly in the context of

developing economies, importing for increasing domestic sales or consumption must be also considered in GVCs conceptualization, which has been focused mostly on ‘importing for exports’ such as in OECD-WTO TiVA database.

Few studies also raised doubts about TiVA’s restrictiveness as the sample of non-OECD countries is very low.

Further, different countries use distinct National Input-Output tables, so TiVA database tends to display gross trade numbers different from data available in the National Statistical Offices. For instance, in TiVA, Vietnam’s electronics sector exports are shown as US\$24 billion, while international sources estimated the number at US\$92 billion in 2018. This is probably due to under-reporting by countries.

Harmonization of ICIO tables for TiVA thus takes time. Another caveat emerging is delay in updating the database, i.e., the latest database launched in 2021 provides indicators only up to 2018. For instance, India’s electronics sector has had significant policy changes concerning DVA since 2019-20; however, DVA statistics are dated as of 2018.



<sup>37</sup> Gupta (2015); Lee et al. (2020); Francis and Kallummal (2020); OECD (2019); UNIDO (2018)

# APPENDIX 3:

## REGRESSION

### RESULTS

The Ordinary Least Square (OLS) regression analysis is based on 51 countries for which data are available. Table 2 shows the regression results.

The dependent variable is  $DVA_{ratio}$  and the five independent variables in the basic regression

equation are exports to GDP ratio (proxy for SCALE), share of industrial employment in total employment, share of electronics production as a share of GDP, a dummy variable with a value of 1 for natural resource exporters, and the GDP of the country.

**Regression results show that it is not easy to change DVA through policies and could be associated with high opportunity costs**

Dependent variable is the $DVA_{ratio}$ in the electronics sector	Basic regression (I)	(I) + Trade liberalisation	(I) + Domestic reforms
SCALE: Electronics exports (% of GDP)	<b>-4.020***</b> -2.97	<b>-3.618***</b> -2.58	<b>-3.641***</b> -2.71
Employment in industry (% of total employment)	<b>11.429***</b> 2.35	<b>11.878***</b> 2.38	<b>10.995***</b> 2.32
Production of electronics (% of GDP)	<b>2.416***</b> 2.29	<b>2.310***</b> 2.04	<b>2.191***</b> 2.11
Natural Resource Dummy	<b>0.692</b> 0.17	<b>3.407</b> 0.87	<b>3.274**</b> 0.78
GDP (US\$ bn)	<b>0.001***</b> 2.40	0.0003 0.46	<b>0.0009*</b> 1.99
ITA-1 Dummy		<b>7.409**</b> 1.93	
Logistics Performance Index			5.532 1.28
Ease of Doing Business Index			0.219 0.73
R square	0.44	0.43	0.499
Number of observations	51	51	51

Note: \*\*\*, \*\*, \* imply the coefficients are statistically significant at 1, 5 and 10 per cent level.

## APPENDIX 4:

# CHINA'S SUCCESS LIES IN ACHIEVING SCALE BEFORE ATTEMPTING TO INCREASE DOMESTIC VALUE ADDITION AND IN WIDE-RANGING DOMESTIC REFORMS

China is regarded as the factory of the world and the epicentre of many manufacturing GVCs. It has taken China nearly forty years to achieve this status; the pace accelerated after it became a WTO member in 2001. China entered the manufacturing bandwagon downstream – by importing inputs from neighbouring countries and exporting assembled final goods to the developed countries. With the intensification of globalization, the country started to engage in the manufacturing of high-tech components, improving its productivity and export earnings.

Having achieved massive scale, China since 2015 has moved to increase the domestic content of core components and materials to 70 per cent by 2025 from the low level for high-tech goods, where foreign content accounts for more than 50 per cent on average.<sup>38</sup> It has been strategic in the choice of products to be included under the 'Made in China 2025' policy, which has allowed 10 years to achieve the targets. Here is a timeline of some of the key reforms in the electronics sector in China:

1980s	China launched 4 SEZs in Guangdong and Fujian provinces to attract foreign capital and boost exports; MNCs from Japan and NIEs started relocating their production units to China
1992	15 free trade zones (FTZs), 32 state-level economic and technological development zones (TDZs), 53 HITDZs established in large and medium-sized cities in China

<sup>38</sup> ISDP (2018)

1994	Electronics declared as one of China’s “pillar” industries in the “National Industrial Policy Outline for the 1990s” <sup>39</sup>
1999	“Strategy of Promoting Trade by Relying on High-tech” was launched for boosting electronics exports <sup>40</sup>
2001	China’s accession to WTO; permitted 100 per cent foreign ownership (via automatic route) for manufacturing activities; Apple entered China with a Shanghai-based trading company and made a deal with Foxconn to be one of the manufacturers of iPods
2004	9 (Beijing, Tianjin, Shanghai, Qingdao, Suzhou, Hangzhou, Shenzhen, Fujian coastal area and the Pearl River Delta) National Electronic and Telecommunication Industry Bases (NETIB) were instituted; China surpassed the USA and the EU and became the leading exporter of electronic products in the world market
2007	54 central-government approved HITDZs – ICT and telecom as leading industry
2010	‘Buy Chinese’ policy was adopted to give preference to domestic technology companies; <sup>41</sup> aimed to promote ‘indigenous innovation’ for shifting foreign technology creators towards local Chinese firms
2014	6 SEZs, 14 open coastal cities, 4 pilot free trade areas and 5 financial reform pilot areas
2015	<b>Made in China 2025</b> introduced to make China dominant in global high-tech manufacturing and heighten its export promotion  <b>National IT Development Strategy</b> to secure core ICT technologies, such as semiconductors, enterprise software  <b>Technology Transfer from MNEs</b>
2021	<b>Dual Circulation strategy (2021-2025)</b> <sup>42</sup> to protect the domestic market’s demand by raising domestic consumption (“internal circulation”) while remaining open to international trade and investment (“external circulation”)

39 Jigang (2020)

40 Zhao et al. (2007)

41 The Associated Press (2010)

42 Herrero (2021)



## REFERENCES

- Ahmad, N. (2013). Measuring trade in value added, and beyond. Retrieved from [http://www.upjohn.org/MEG/papers/Ahmad\\_Trade\\_in\\_VA.pdf](http://www.upjohn.org/MEG/papers/Ahmad_Trade_in_VA.pdf)
- Amiti, M., and Konings, J. (2007). "Trade liberalization, intermediate inputs, and productivity: Evidence from Indonesia." *The American Economic Review*, 97(5), 1611-1638.
- Banerjee, B., and Zeman, J. (2020). "Determinants of Global Value Chain Participation: Cross-Country Analysis" (Working Paper No. 1/2020). National Bank of Slovakia, Eurosystem.
- Banga, R. (2014a). "Linking into global value chains is not sufficient: Do you export domestic value-added contents?" *Journal of Economic Integration*, 29(2), 267-297.
- Banga, R. (2014b). "Trade facilitation and 'hollowing-out' of Indian manufacturing." *Economic and Political Weekly*, 49(40), 57-63.
- Bas, M. (2012). "Input-trade liberalization and firm export decisions: Evidence from Argentina." *Journal of Development Economics*, 97, 481-493.
- Das, A., Kallummam, M., and Banerjee, S. (2020). "Performance of Computer, Electronics and Optical Products in Post-ITA Phase: Some Insights from the OECD TiVA Database." *G20 Digest*, 2(2), 3-11.
- Dash, A., and Chanda, R. (2017). "Indian Firms in Electronics Global Value Chains: Sectoral Analysis." Centre for WTO Studies, Indian Institute of Foreign Trade, New Delhi.
- Deringer, H., Erixon, F., Lamprecht, P., and Marel, E. (2018). "The Economic Impact of Local Content Requirements: A Case Study of Heavy Vehicles" (Working Paper No. I/2018). European Centre for International Political Economy.
- Dollar, D., Khan, B., and Pei, J. (2019). "Should high domestic value added in exports be an objective of policy?" World Trade Organization.
- DPIIT, Ministry of Commerce & Industry. (2020). "Public procurement (Preference to Make in India) Order-2017-Revision." Ministry of Commerce & Industry, Government of India.
- Feng, L., Li, Z., and Swenson, D. L. (2016). "The connection between imported intermediate inputs and exports: Evidence from Chinese firms." *Journal of International Economics*, 101(Supplement C), 86-101.
- Francis, S., and Kallummam, M. (2020). "India's Participation in Electronics Industry Value Chains: A New Analytical Framework and A Case Study Analysis." Institute for Studies in Industrial Development, New Delhi.
- Goldberg, P. K., Khandelwal, A. K., Pavcnik, N., and Topalova, P. (2010). "Imported intermediate inputs and domestic product growth: Evidence from India." *The Quarterly Journal of Economics*, 125(4), 1727-1767.
- Gupta, N. (2015). "Estimating Linkages of Indian Manufacturing Industries into Global Value Chains using International Input-Output Table." *Review of Development and Change*, XX(2), 177-202.
- Gupta, N. (2016). "Domestic Value-Added Growth is Vital: Are Indian Industries Gaining by Linking into Value Chains?" *South Asia Economic Journal*, 17(2), 271-294.

- Gupta, N., Kumar, P., and Saini, R. (2021). "India's Electronics Industry: Potential for Domestic Manufacturing & Exports." Indian Council for Research on International Economic Relations.
- Gupta, S. D. (2022). "Testing times for PLI schemes: Covid-related delays put firms in pressure." *Business Standards*, April 2, 2022.
- Hasan, R. (2022). "Economic diversification, industrial policy, and cities: Some reflections." Ongoing work.
- Herrero, A. G. (2021). "What is behind China's Dual Circulation Strategy?" *Global Economy and Trade. China Leadership Monitor*.
- Hosokawa, K., and Tomiyama, A. (2018). "Samsung suppliers in Vietnam branch out to new frontiers." *Nikkie Asia*.
- Hua, P. (2021). "How did China rise its manufacturing domestic value added in exports through GVC moving up?" Retrieved from HAL open science: <https://hal.archives-ouvertes.fr/hal-03373508/document>
- ICEA. (2021). "Making India a Global Hub for Handset Manufacturing." *India Cellular and Electronics Association*.
- ICEA. (2022). "\$300 Bn Electronics Manufacturing & Exports By 2026: Roadmap and strategies." *India Cellular and Electronics Association*.
- Iyer, C. G. (2022). "Mobile Phone Manufacturing in India: A Study of Few Characteristics." *Economic and Political Weekly*, 57(8), 46-53.
- ISDP. (2018). "Made in China 2025." *Institute for Security & Development Policy*.
- Jigang, W. (2020). "China's Industrial Policy: Evolution and Experience." *United Nation Conference on Trade & Conference, BRI Project/RP11*.
- Kasahara, H., and Rodrigue, J. (2008). "Does the use of imported intermediates increase productivity? Plant-level evidence." *Journal of Development Economics*, 87(1), 106-118.
- Kersen, I. (2017). "Trade in Value-Added (TiVA) in EU new member states (EU-NMS)." *Croatian Economic Survey*.
- Lee, M., Zagdanski, J., Spencer, J., and Hay, G. (2020). "Research on Trade in Value-Added." *Cambridge Econometrics, Department for International Trade, Cambridge, UK*.
- MeitY, Government of India. (2020a). "Presentation on Production Linked Incentive (PLI) Scheme for Large Scale Electronics Manufacturing." *Ministry of Electronics & Information Technology, Government of India*.
- MeitY, Government of India. (2020b). "Phased Manufacturing Programme for cellular mobile phones and sub-assemblies/ parts Notification." *Ministry of Electronics & Information Technology, Government of India*.
- MeitY, Government of India. (2020c). "Annual Report, 2020-21." *Ministry of Electronics & Information Technology, Government of India*.
- MeitY, Government of India. (2021a). "Production Linked Incentive (PLI) Scheme for Large Scale Electronics Manufacturing." *Ministry of Electronics & Information Technology, Government of India*.
- MeitY, Government of India. (2021b). "Guidelines for the Operation of Production Linked Incentive Scheme (PLI) for Large Scale Electronics

- Manufacturing.” Ministry of Electronics & Information Technology, Government of India.
- MeitY, Government of India. (2021c). “Guidelines for the Operation of Production Linked Incentive Scheme (PLI) for IT Hardware.” Ministry of Electronics & Information Technology, Government of India.
- Ministry of Commerce & Industry, Government of India. (n.d.). “Information Technology Agreement.” Department of Commerce, Ministry of Commerce & Industry, Government of India.
- Ministry of Finance, Government of India. (2019). “Union Budget, 2018-19 Paragraph 160.” Ministry of Finance, Government of India.
- Ministry of Finance, Government of India. (2021). “Union Budget, 2020-21.” Ministry of Finance, Government of India.
- OECD. (2019). “Guide to OECD’s Trade in Value-Added (TiVA) Indicators, 2018 edition.” OECD, Directorate for Science, Technology and Innovation.
- Pham, H. S. T., Nguyen, A. N., and Johnson, A. (2020). “Economic policies and technological development of Vietnam’s electronics industry.” *Journal of the Asia Pacific Economy*.
- PIB, Government of India. (2020a). “The government has always believed in transformative programs be it Digital India, Make in India and Startup India.” Press Information Bureau, Government of India.
- PIB, Government of India. (2020b). “PLI Scheme to herald a new era in mobile phone and electronic components manufacturing.” Press Information Bureau, Government of India.
- PIB, Government of India. (2021a). “Vocal for Local, Ministry of Commerce & Industry.” Press Information Bureau, Government of India.
- PIB, Government of India. (2021b). “Production Linked Incentive Scheme for Large Scale Mobile & Component Manufacturing-Factsheet.” Press Information Bureau, Government of India.
- PIB, Government of India. (2021c). “Production Linked Incentive Scheme for IT Hardware Manufacturing.” Press Information Bureau, Government of India.
- PIB, Government of India. (2022a). “Engineering goods exports registers a stupendous growth of 54% and jumps to USD 81.8 Billion during April-December 2021.” Press Information Bureau, Government of India.
- PIB, Government of India. (2022b). “India’s Foreign Trade: January 2022.” Press Information Bureau, Government of India.
- PIB, Government of India. (2022c). “India’s Foreign Trade: February 2022.” Press Information Bureau, Government of India.
- PIB, Government of India. (2022d). “India’s Foreign Trade: March 2022.” Press Information Bureau, Government of India.
- Rocha, N., and Winkler, D. (2019). “Trade and Female Labour Participation: Stylized Facts Using a Global Dataset.” Policy Research (Working Paper No. 9098). World Bank, Washington, DC.
- Rodrik, D. (2015). “Premature Deindustrialisation.” John F. Kennedy School of Government Harvard University, Cambridge.
- Singal, N. (2022). “MEITY working with industry to achieve \$300 bn electronics production vision: Vaishnav.” *Business Standard*, June 24 2022.

- The Associated Press. (2010). “Buy China’ policy alarms trade partners.” CNBC News.
- Thu, P. (2017). “Samsung Sourcing Fair 2017: more opportunities for local firms.” Vietnam Investment Review, July 26 2017.
- Tong, Y., Kokko, A., and Seric, A. (2019). “Linking FDI and local firms for global value chain upgrading: Policy lessons from Samsung mobile phone production in Viet Nam.” Department of policy, research and statistics, UNIDO.
- Topalova, P., and Khandelwal, A. (2011). “Trade liberalization and firm productivity: The case of India.” *Review of Economics and Statistics*, 93(3), 995-1009.
- UNIDO. (2018). “Global Value Chains and Industrial Development: Lessons from China, South-East and South Asia.” United Nations Industrial Development Organization, Vienna.
- VietNam News. (2020). “Samsung VietNam continues its support to local suppliers.”
- Zhao, Z., Huang, X., Ye, D., and Gentle, P. (2007). “China’s Industrial Policy in Relation to Electronics Manufacturing.” *China & World Economy*, 15(3), 33-51.











**Indian Council for Research on  
International Economic Relations**