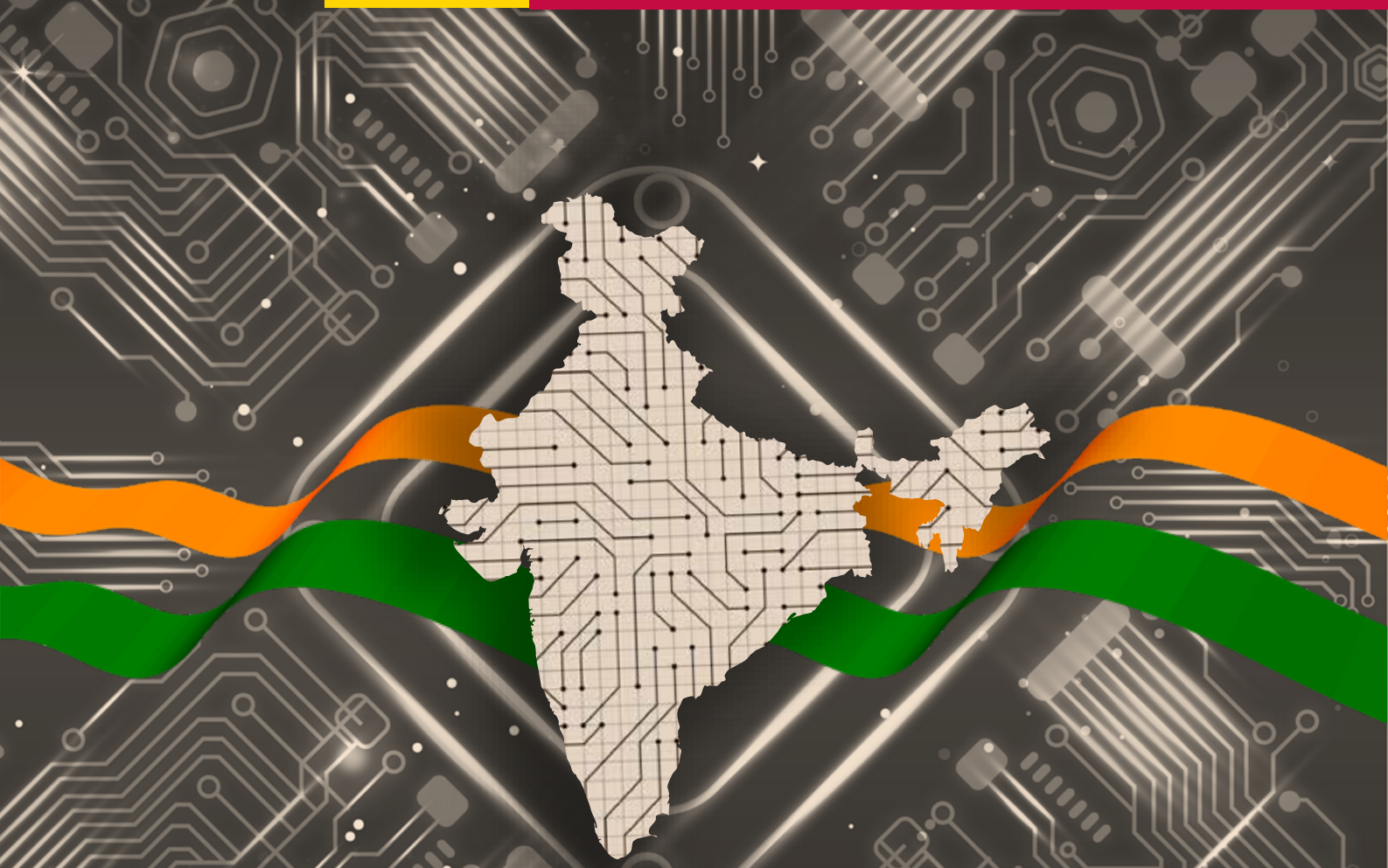
DEVELOPING INDIA'S LEADERSHIP IN PRINTED CIRCUIT BOARD ASSEMBLY



MAIT

2021

KNOWLEDGE PARTNER

Avanteum

DISCOVER FUTURE

ABOUT MAIT

Established in 1982, MAIT has a vision to develop, maintain and accelerate Electronic Hardware ecosystem that will transform India into a digital knowledge economy and a global manufacturing hub. MAIT's mission is to expand domestic market by catalyzing Digitization of India, establish India as a Global hub for ESDM and work with stakeholders to increase global ranking for Ease of Doing Business.

The principal objective of MAIT as an Association is to support Government and ICT industry in building a robust ecosystem for Electronic Hardware sector in India. The efforts of MAIT are towards **Creation, Development, Maintenance and Acceleration** of Electronic Hardware ecosystem. These efforts will lead towards digital readiness of the nation, which in turn will benefit the industry in its business goals. MAIT is working to create the digital readiness in the nation through device penetration, development of shared infrastructure, building the user capacity and content creation.

MAIT is headquartered in New Delhi with key affiliates across the globe. MAIT member spread covers Manufacturers, System Integrators, Solution & Service Providers E-Waste Recyclers, Testing labs, Software Developers, IT Park Developers, Consulting Organizations, Companies in areas of Cloud and IOT.

As a business support initiative, MAIT provides a wide range of programmes and services for member firms as well as the entire Electronic Hardware industry. These initiatives spread around conferences, events and workshops; legislative representation; domestic and international marketing support; technology initiatives; targeted publications; networking opportunities; and many other industry-directed services.

MAIT works in multiple areas for public advocacy, which include Cloud & Analytics, IPR, Skill Development, Component Hub, State IT/ESDM Policies, Import/ Export Policy, GST, Procurement Reforms, e-Governance, SMEs, e-Waste, Innovation & Start-up, Industry 4.0, IoT Devices, Smart Cities Solution and Standards.

One of the key objectives of MAIT is to encourage domestic manufacturing through local innovation and IP creation. It also focuses its efforts on ensuring compliance of standards and regulatory framework which is favorable for nation building. It does advocacy for policy which will lead to development of Electronic Hardware sector in the country.

EXECUTIVE SUMMARY

The ubiquitous character of the electronics makes it a favoured industry globally for investment and growth. The possibilities associated with materials, design, manufacturing and service besides its potential of multi-industry impact, attracts developed and emerging economies alike. India's NPE 2019 sets out the vision of creating a USD 400 billion industry that will give wings to India's goal of reaching USD 5 Trillion GDP size by 2025. Government schemes of PLI, SPECS and EMC 2.0 have emerged as strong enabling instrument for attracting investments into the industry.

Creation of a globally competitive industry hinges on developing a potent ecosystem that facilitate a design-led manufacturing industry. PCBA is a critical component in the value chain contributing between 40% and 60% of the product BoM. The growth of electronics industry in Asia has been marked by the growth of PCBA manufacturing. China's emergence as an electronics powerhouse was defined by migration of global PCBA manufacturing led by EMS companies.

The global PCBA demand is expected grow to USD 330 billion by 2025-26, driven by smartphones and computing devices. China caters to almost half the global demand for PCBA, signifying a well-developed ecosystem operating at a global scale. The migration of electronics manufacturing towards Asia has been the hallmark of the industry evolution in the past 2 decades. Among the other countries that have witnessed rapid increase in their PCBA production have been Malaysia, Thailand and Vietnam.

The geopolitical scenario in 2020 has created unprecedented disruption of global supply chain and product manufacturers have adopted the strategy of China+1 to de-risk themselves from future uncertainties. Trade frictions with China have led countries to lower their exposure to China and scout for viable countries to source components and manufacturing. Lower cost of manufacturing and ease of doing business top the criteria for global investors in this move.

Key Challenges

Dependence on component imports; **37%** from China

Cost disability of **9.8%** with Vietnam and **19%** with China

Lack of scale for exports

Proxy Investments by China

Ineffective market access policies

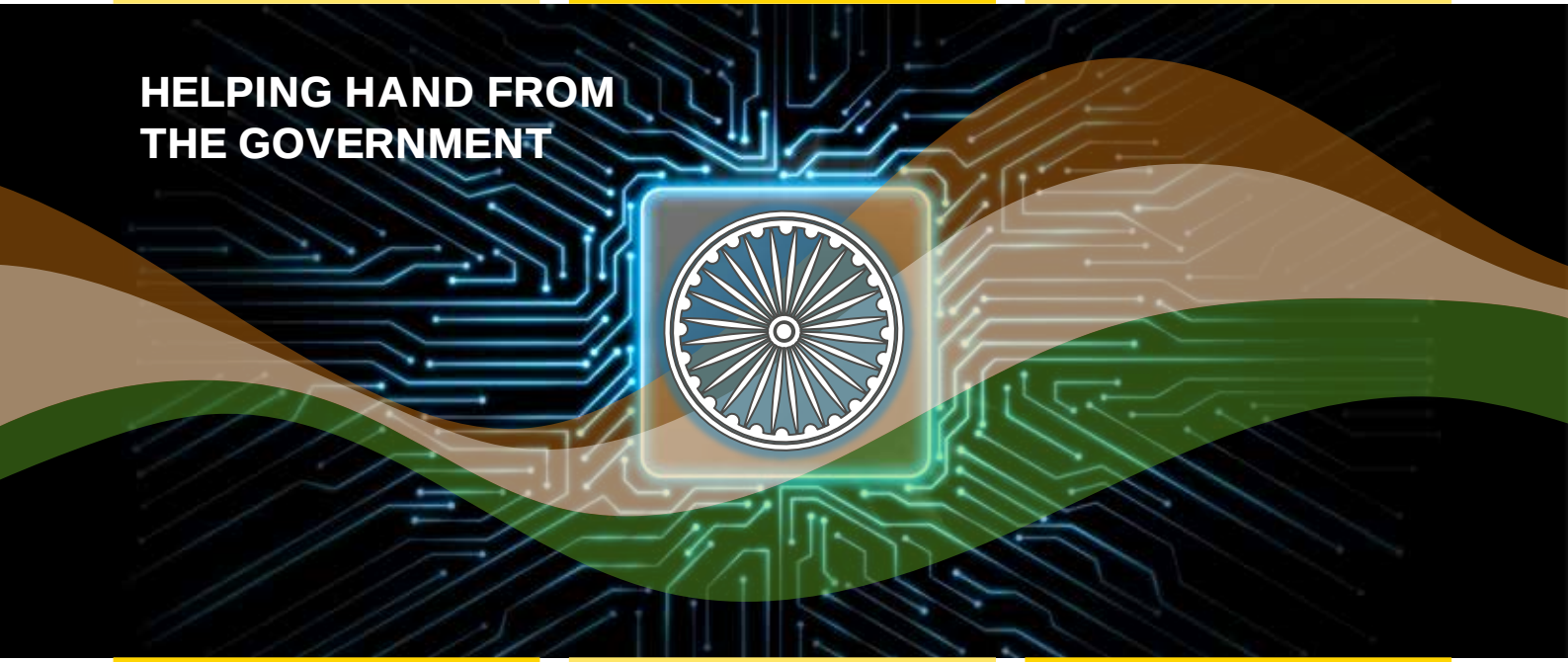
India has been eager to transform its high import driven electronics market into one that is self-reliant and globally competitive. The **"Atmanirbhar Bharat"** initiative pursue the objective of reducing India's import dependence and carve a niche for India's electronic products in the global markets. India's needs and global search for new destinations are perfectly aligned in India's favour.

Among the key areas for investment in India is PCBA that addresses the twin objective of import reduction and value addition. PCBA has the enviable distinction of catalyzing upstream components and design and downstream activities in systems manufacturing. It is expected that India's domestic PCBA market demand will touch USD 81.5 billion by 2025-26. The planned capacity investments by EMS companies are not only anticipated to address the domestic demand but position India as competitive player in the global market too. Between 2020-21 and 2025-26, India will generate cumulative export revenues of USD 101 billion.

Reduce import dependence and de-couple from China

Make available government controlled industrial infrastructure

Enable seamless imports for PCBA manufacturing



Create export competitiveness

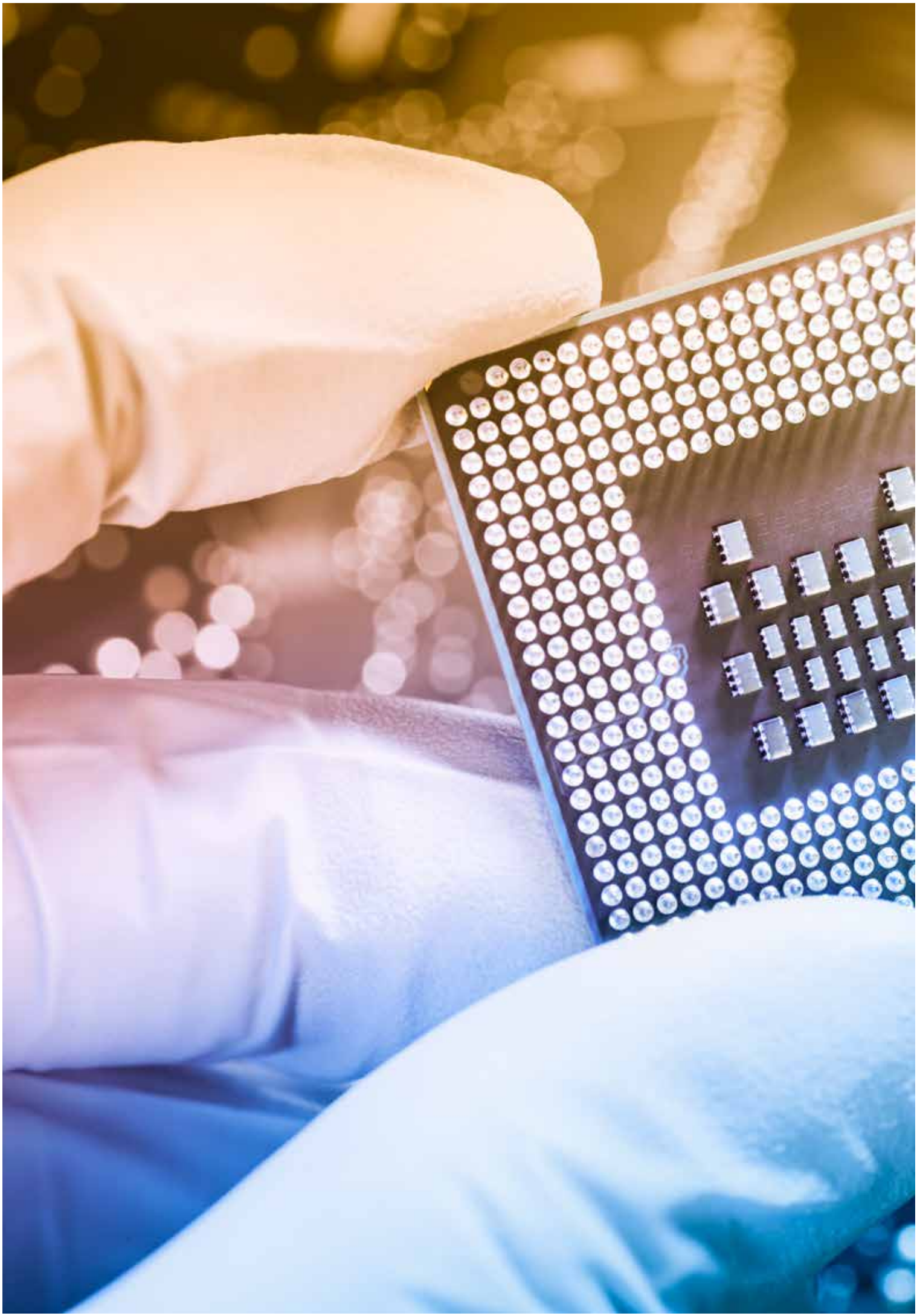
Incentivise new and existing PCBA investments

Facilitate EoDB

To achieve the domestic and export potential India's PCBA manufacturing would require cumulative capital investment of USD 25 to 30 billion by 2024-25. This investment will lead to generation of 1million to 1.2 million direct and indirect jobs.

High employment ratio of women in PCBA manufacturing is a collateral advantage in improving female participation.

As India set sights on the strategic goal of becoming a global electronics leader, PCBA manufacturing will turbocharge this endeavour.



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CHAPTER 1

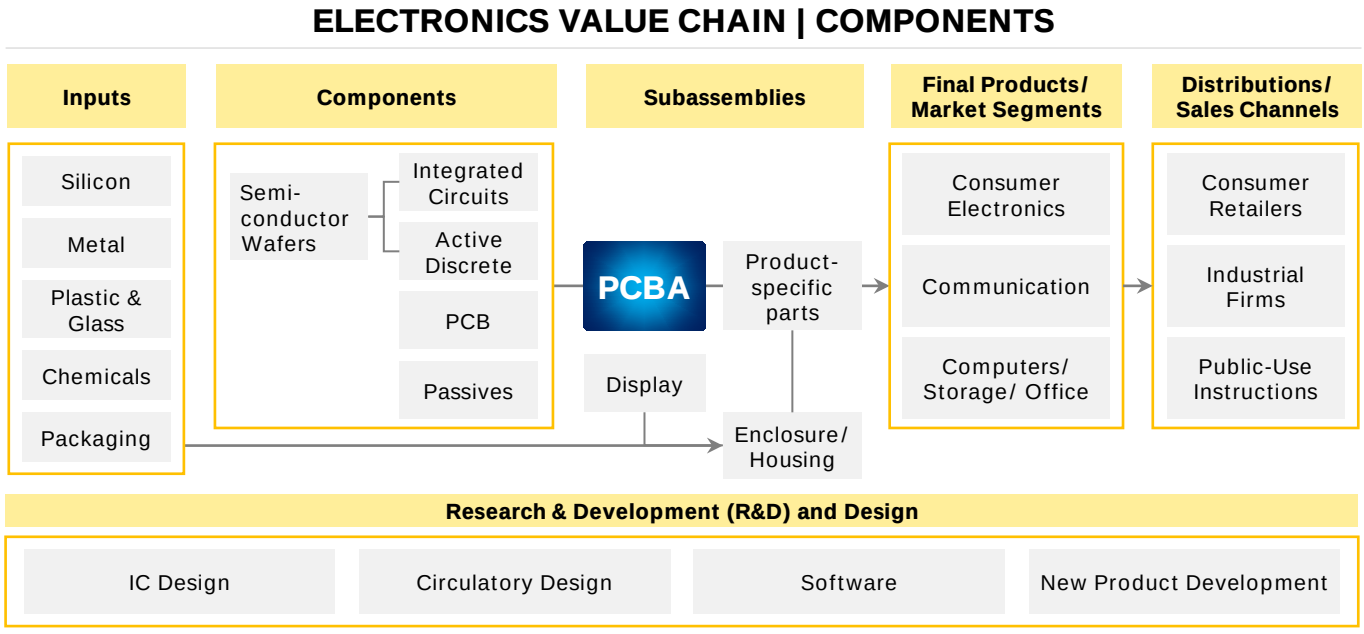
CRITICAL POSITION OF PCBA IN THE ELECTRONICS VALUE CHAIN

Global economic development has resulted in increased spending by individual consumers, Government and businesses. Electronics has been the key beneficiary of increase in expenditure as consumers in emerging economies seek better quality of life that is defined by greater convenience and comfort. Increasing scale of electronics production has aided a downward trend in prices, making it affordable for a larger community of users than before.

The global electronics industry is among the largest industry sectors that generated revenues of **USD 2.9 trillion[1] in 2019.**

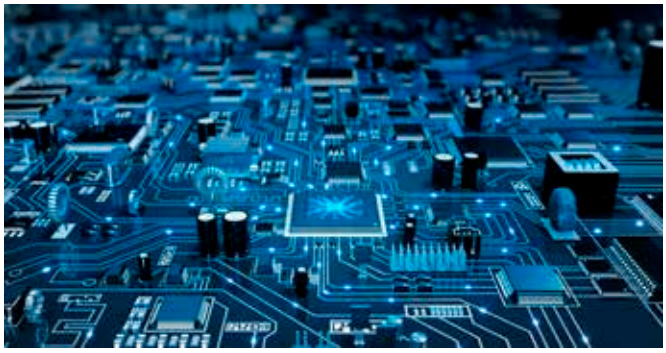
The quest for solutions to address challenges associated with mobility, health, energy, environment, productivity among others have been enabled by electronics. Development of technologies like AI/ML, Robotics, AR/VR, IoT, Edge computing, 5G have expanded the horizon for electronics and its diverse applications. The functionality achieved through electronic products is a resultant of complex design and engineering of components and system.
The electronic circuit is a pre-determined combination of components and connections on a board that becomes the brain of every electronic product.

Importance of PCBA in the Electronics Value Chain



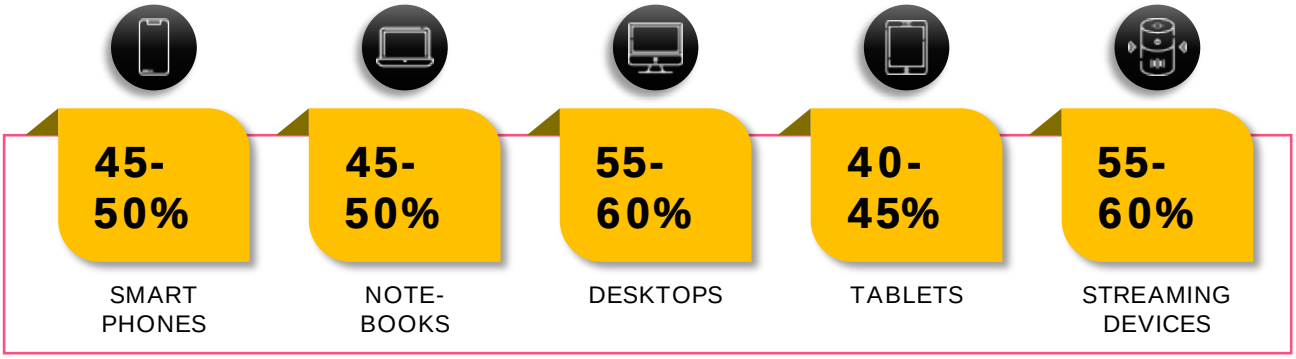
Source: Duke University Global Value Chains Center

A PCBA is a PCB with electronic components mounted on it along pre-determined lines linking connectors and components to each other for a specific functionality. PCBA is the board obtained after the blank PCB is soldered with various components like resistors, Integrated Circuits, capacitors, transformers and any other components depending on the application and desired characteristics of the board.



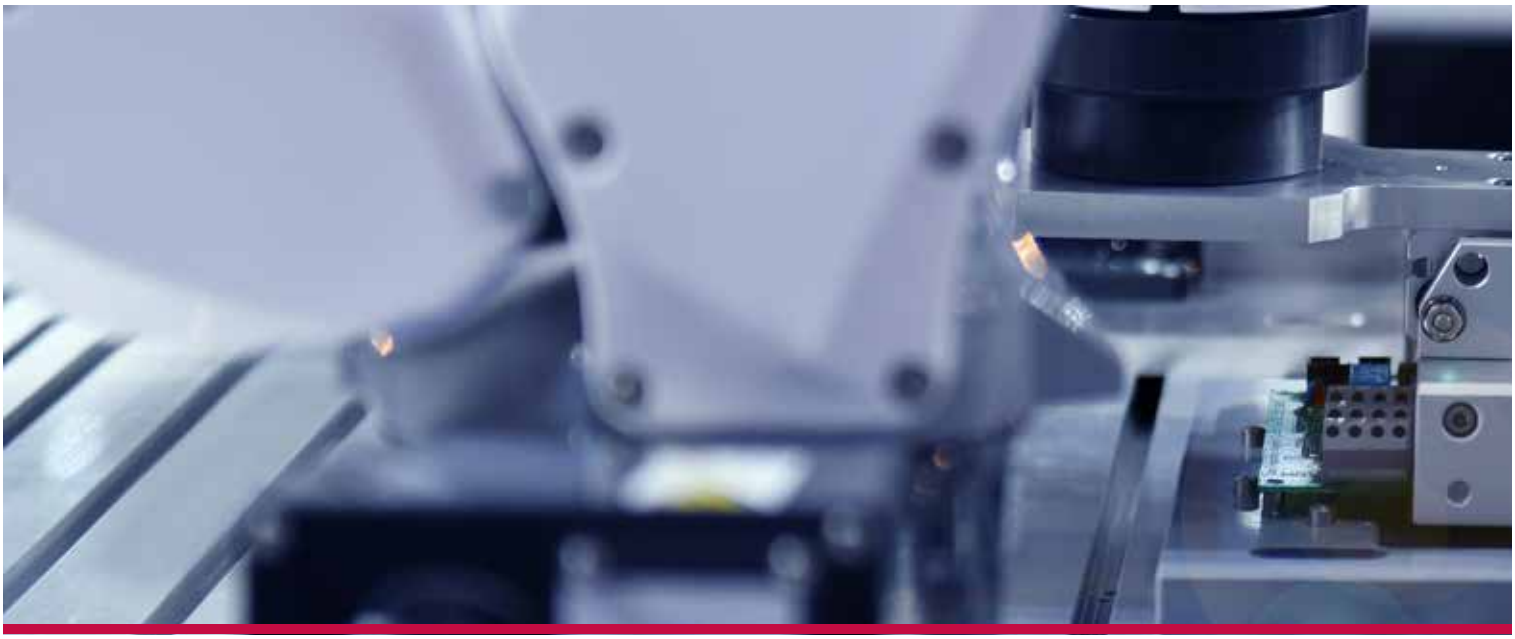
Since PCBA carries all critical components required for the electronic product, its value share in EBoM is the highest. Volume driven products like smart phones, computing devices have witnessed an increasing level of value contribution from the PCBA.

BILL OF MATERIALS



Presence of PCBA industry will likely herald local ecosystem development for greater local product manufacturing and exports. Evolutionary trends indicate that countries with appreciable presence of PCBA manufacturing have attracted investments into its key inputs namely PCB and components manufacturing. China's PCBA investment in middle of 1990s led to 5 times growth in components manufacturing by 2005. During the same period electronic products output grew by 20 times[2], thus highlighting the importance of an accelerated growth in PCBA industry. The PCBA is dependent on the type of electronic components, type of circuit board, and end use application of the board. The PCB used for assembly is segmented by layers, density of interconnections, flexibility, and IC substrate. Based on material types, PCB & PCBA market is segmented into FR-4, PTFE (Teflon) and metal.

Source: Electronics Industry Experts, Avanteum Analysis



The PCBA Manufacturing Process

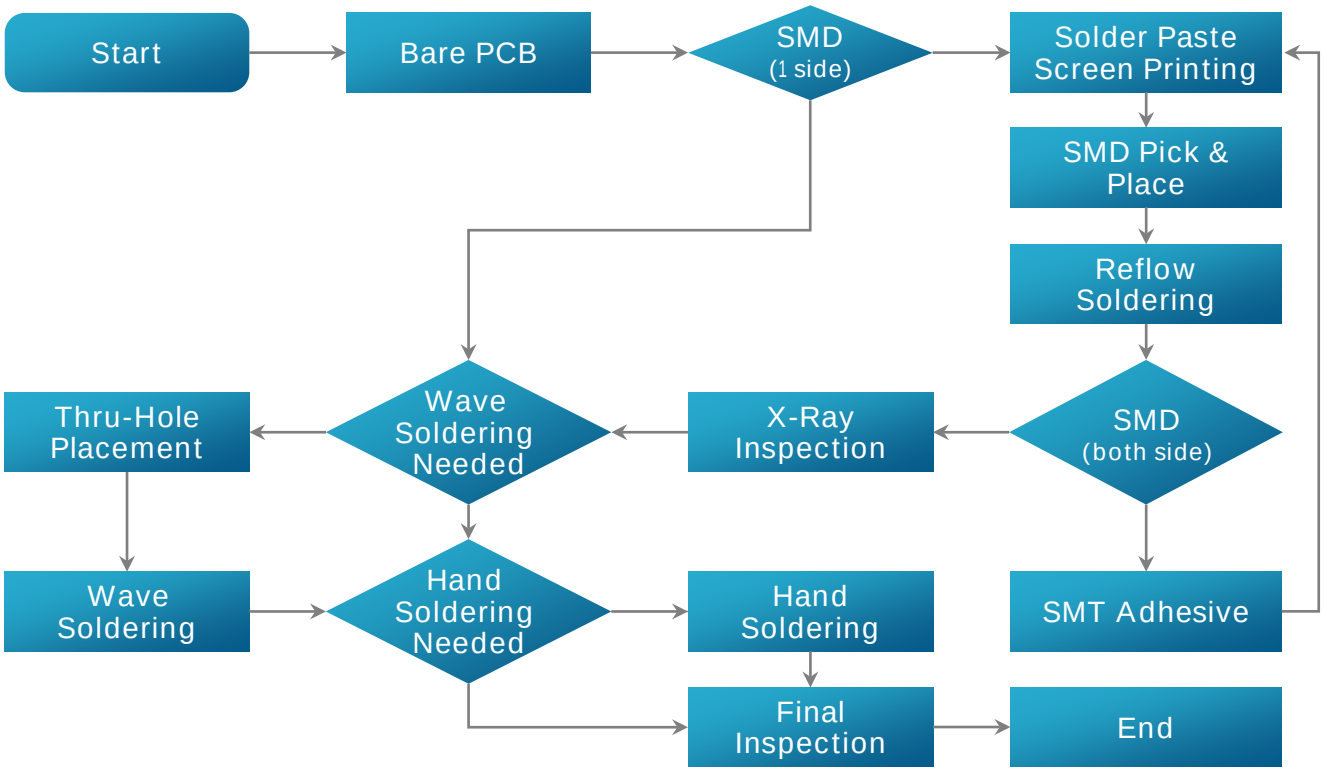
The manufacturing of PCBA is based on two different technologies for mounting the components on the PCB:

THE PCBA MANUFACTURING

	Surface Mount Technology	Thru-Hole Technology (THT)
Process Technology	v Mounting of SMD on PCB surface through automated pick & place equipment	v Mounting of components with leads on PCB board by connecting them through holes on the PCB. Extra lead part soldered on the other side of the board
Application	v Can be applied on small size components and integrated circuits (ICs) as small as 0.4mm X 0.2mm	v Applied on PCB assemblies containing large components such as capacitors and coils
Advantages	v Size of SMD increases density of the board v Suitable for high-speed signal transmission	v Greater reliability of soldering v Easy to test & prototype
Disadvantages	v Not suitable for high power applications v High investment requirement	v Require more space on the board surface and hence not suitable for miniaturization age v Expensive and time-consuming

Source: Electronicsandyou

PCBA MANUFACTURING | FLOWCHART



Globally THT is now less favoured due to relentless miniaturization drive and cost of manufacturing of PCBA. At the same time, cost and relatively larger form factor of many a component ensure THT continues to have a market of its own. Volume driven portable devices with their need for smaller components gain traction, SMT becomes the process of choice for the PCBA manufacturers. Modern PCBA manufacturing can adapt Mixed Technology which combine the advantages of both the above process technologies.

Source: Electronicsandyou

CHAPTER 2

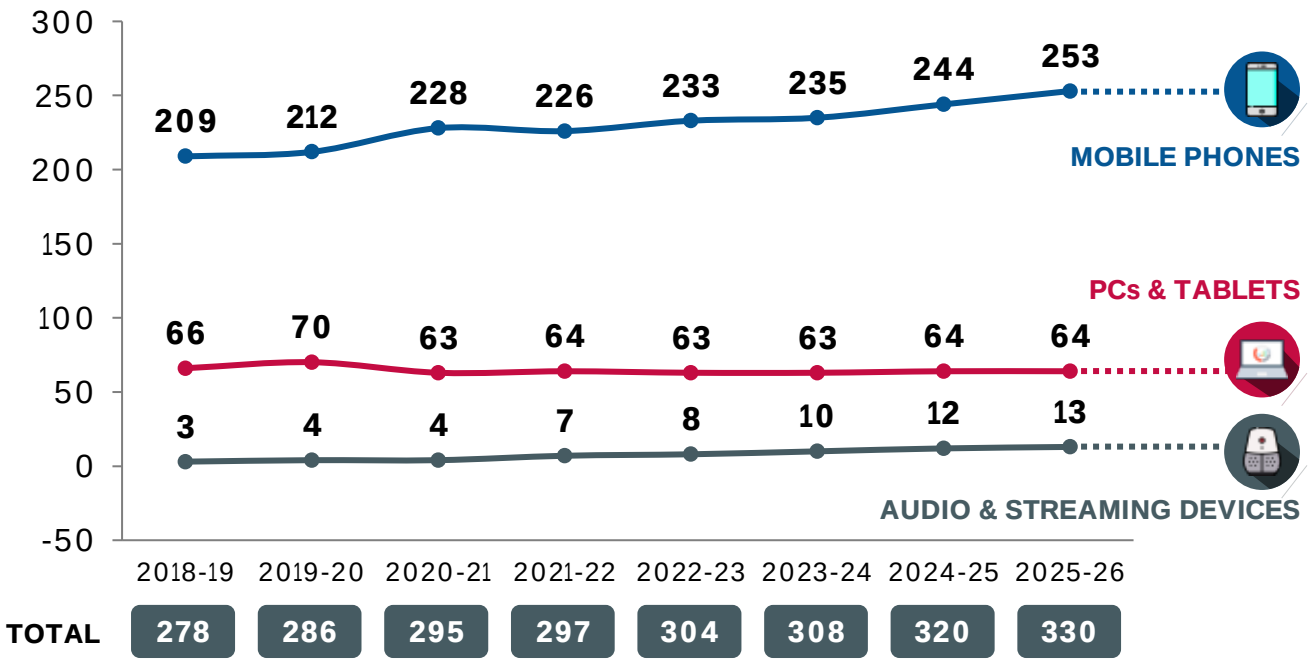
PCBA MANUFACTURING CONCENTRATED IN ASIA

Growth of Personal Devices Market is Key to PCBA Manufacturing

Global economic recovery in 2019 was muted with a 2.47%[3] growth over the previous year. Trade disputes between major economies and less than desirable investments acted as prime reasons for the deceleration. Electronics industry registered a modest growth to reach USD 2.9 trillion[3] size during this period. Consumer segments of mobiles, personal computing devices and entertainment had greater choices either through innovation in designs or new technologies to create a richer experience. The decline in cost of data services have also helped smart devices to permeate into under-addressed markets. The dominance of smartphones with integrated communications and entertainment features has impacted the growth of standalone AV and imaging products.

Smartphones shipments in 2019 were 1.52 billion[4] units with China, India and Vietnam as the largest producers. India with 330 million[5] units displaced Vietnam to take the second spot. During the same period, global shipments of desktops, tablets and notebooks were 391 million units[6]. As the key input in the making of electronic products, PCBA's production and demand mirrors the growth of electronic products.

GLOBAL PCBA MARKET SIZE AND GROWTH (IN USD MILLIONS)

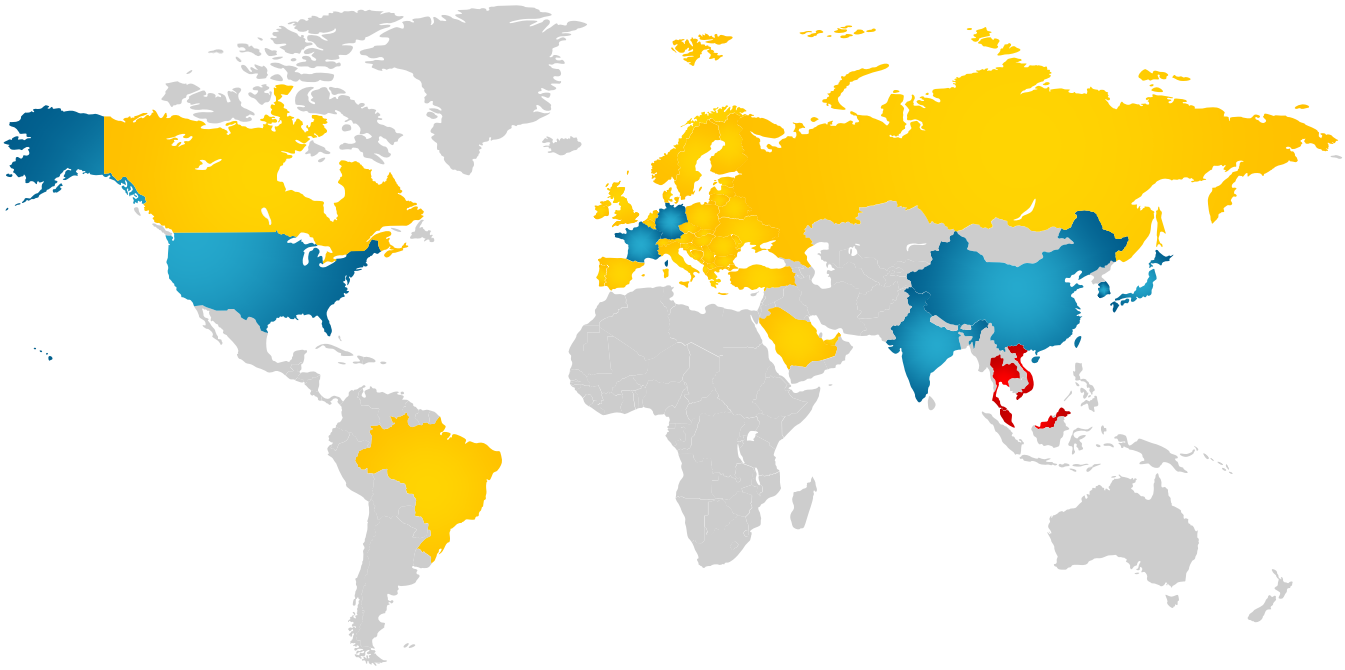


Source: ICEA

Will China Retain its PCBA Supply Dominance?

Majority of the global PCBA manufacturing is undertaken by EMS companies and their current concentration is in the Asian region. The region today accounts for more than 90% of the production. Over the past decade, PCBA manufacturing capacities has moved away from US and Europe. The existing fragmentation in PCBA manufacturing capacities has now consolidated with China enjoying a 48% share. The presence of numerous global EMS companies in China like Foxconn, Pegatron, Wistron, Flex and home-grown companies like BYD and USI have created enormous capacities to cater to export driven industry. The competitiveness in PCBA manufacturing is built around efficient supply chain and manufacturing cost that demands desirable scale commonly found in EMS operations. The well-developed components ecosystem of China ensures that the supply chain is both cost competitive and insulated from disruption.

FLOW OF ELECTRONIC MANUFACTURING TO CONSUMPTION



Countries Leading in Electronic Consumption

Countries Leading in Electronic Production

Countries Leading in Both Production & Consumption

The consolidation of PCBA manufacturing in Asian region is also driven partly by the rise in consumption and local manufacturing of electronics in Asia. Electronics manufacturing countries like India, Vietnam, Malaysia and Thailand offer attractive market for China's PCBA exports. While China has positioned itself as the competitive supplier for high volume PCBA, the IP prowess of Korea and Japan have helped them retain sizeable share of export markets. US and Europe's dependence on China has also increased corresponding to the decline of the industry in their respective regions.

The export shipments of mobile phones PCBA from China to India have witnessed a decline on account of the latter imposing an import duty of 20% to encourage localization. This measure is expected to lead to PCBA manufacturing intensifying in India and leading to export possibilities. Hence global supply is likely to see some supply realignment as India tries to grab a share from Europe and Asia. PCBAs dedicated to computing devices are expected to retain its existing trade route for few more years as China, Taiwan, US, Malaysia, Thailand among others will maintain their presence in products manufacturing. India's aspirations to reduce its import dependence coupled with large market for personal computing devices is likely to encourage part of existing PCBA manufacturing migrating to India.

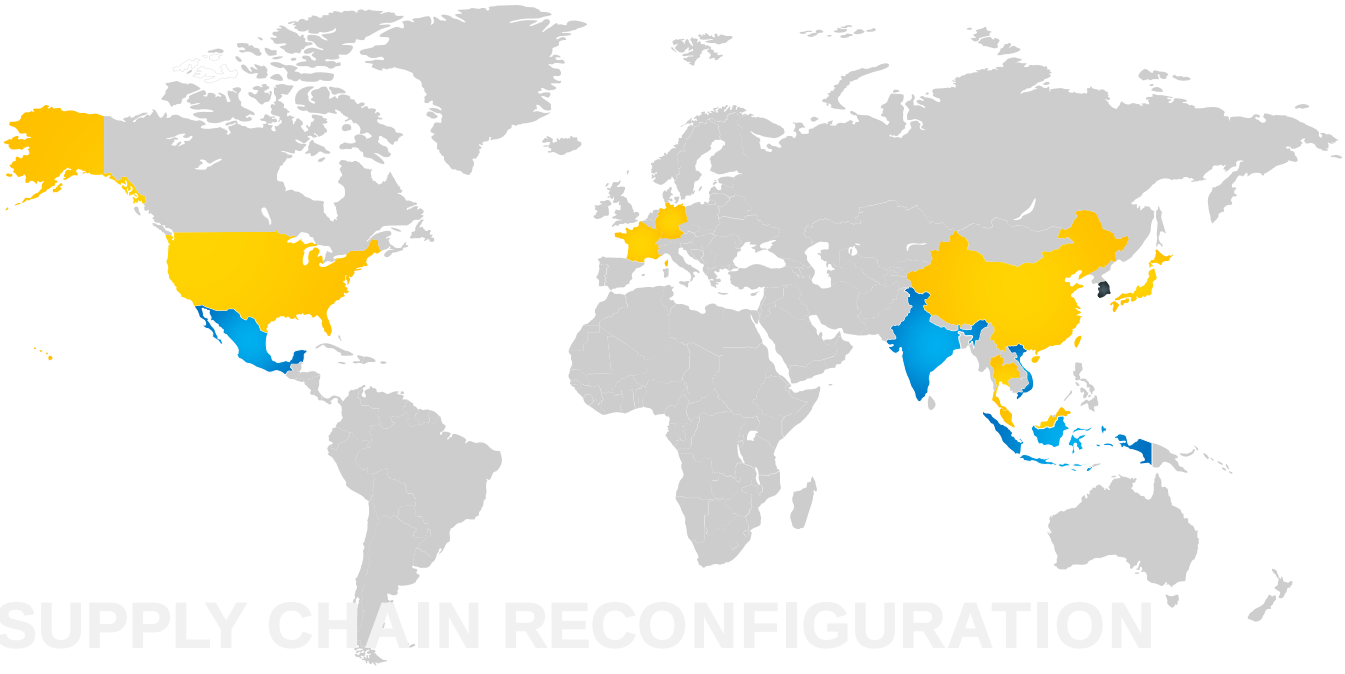
Supply Chain Reconfiguration

Among the industries that have been adversely impacted due to the Covid-19 pandemic, electronics ranks high. The truly global nature of the electronics supply chain and the concentration of key components suppliers in China resulted in widespread disruption. The shipment delays have caused significant production losses leading to sales impact. The trade ties between China and US have been under strain which has affected countries dependent on both for their economic growth. US has encouraged friendly countries to explore sources that can operate independent of China. The emerging situation has led to re-assessment of existing supply chain by global OEMs and EMS companies.

The heavy cost of dependence on a single country is now sought to be transformed into "Plus One" strategy where another supplier country or region can reduce the risk. Migration of manufacturing capacities in PCBA is being contemplated and countries offering best value as an alternative, stand to gain. The size of the market and production for mobile, PC manufacturing and other portable devices are major factors while scouting for new investment locations. Countries like Vietnam, Indonesia, Malaysia and India with their presence of EMS companies become targets for PCBA manufacturing. Availability of skills, proximity, logistics cost and supporting government policies provide impetus to such investment decisions.

50 US companies[7] have moved out of China between 2019 and mid of 2020, seeking manufacturing countries that can aid in lowering the risk. Japan's financial incentives to its companies to quit China also had the desired effect. Taiwan is inviting its companies to return and invest in their home country while India has encouraged its electronics industry to reduce the dependence on components import from China. India has also been recipient of 24 electronics investment projects[8] that pertain to investors seeking alternative destinations. Many companies which are invested heavily in China are adopting a gradual disengagement to ensure stability with long term change. The absence of an equivalent robust ecosystem acts as an impeding factor for interested companies. It is noteworthy that majority of such companies are averse to relocating to their parent country as higher cost of operations will prove to be counterproductive.

While the challenge of replicating China's success in PCBA is daunting, countries competing to attract the flight of capital, are attempting to carve out profitable positions for themselves. Key among them is to develop capabilities in components along with OEM partnership for access.



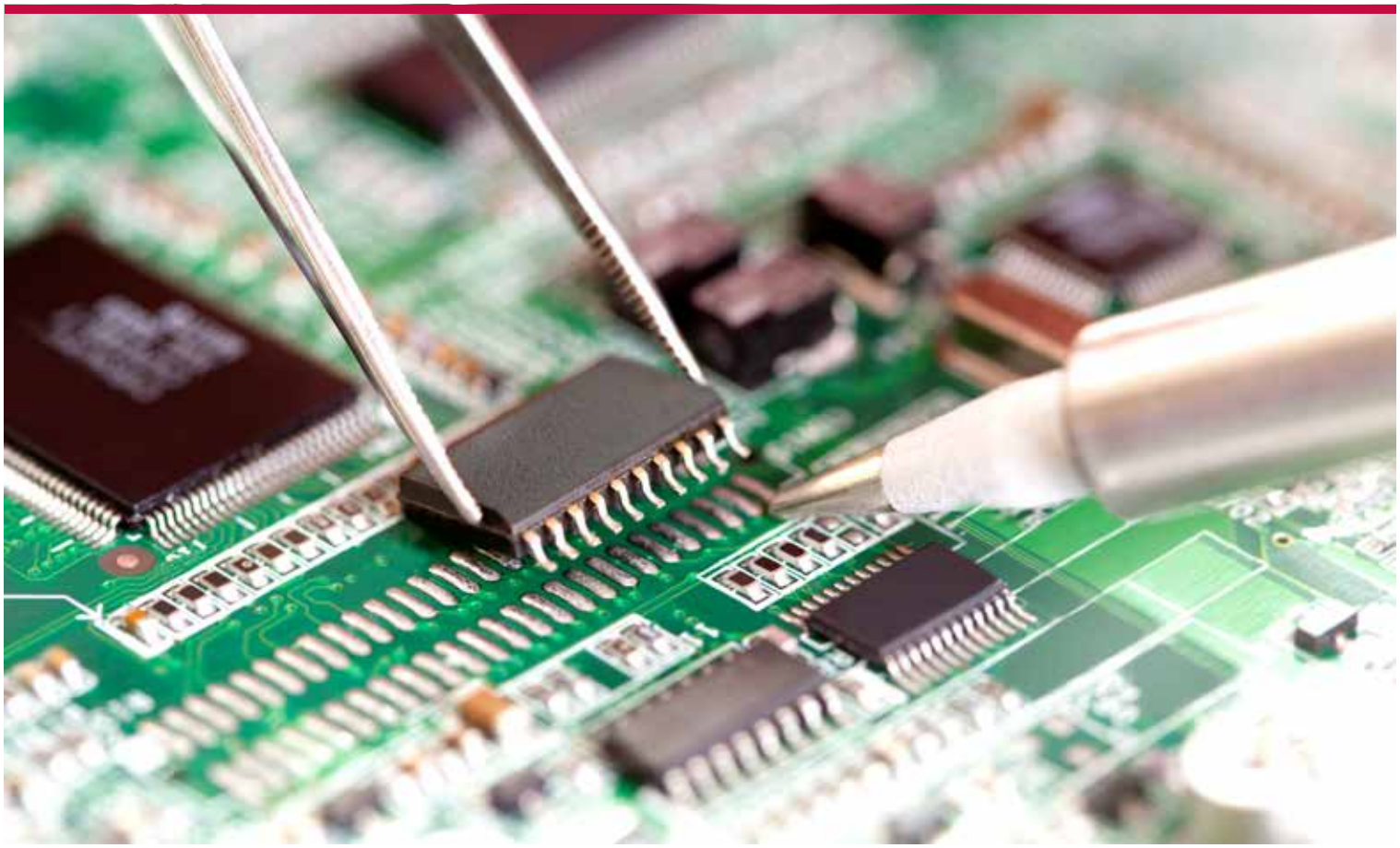
CHAPTER 3

PCBA MANUFACTURING HOLDS KEY TO INDIA'S GLOBAL AMBITIONS

Anticipated Transformation to Design Led Manufacturing

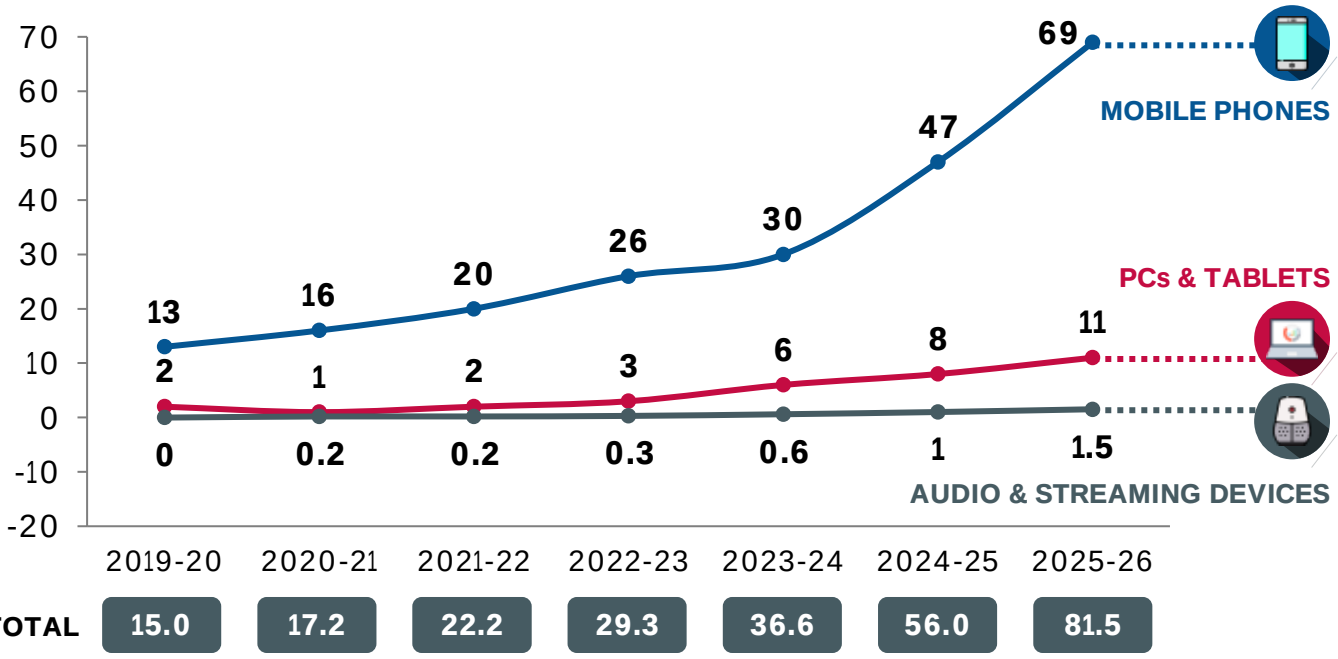
The growth story of the electronics industry in India is largely built on its consumption demand while the domestic manufacturing has not kept pace with demand. Growth of domestic manufacturing in the recent years has remained in the realm of assembly of imported components and modules.

NPE 2019 of Government of India envisions developing India as a global hub of electronics manufacturing and exports. The mission of this transformation prioritizes domestic value addition and reducing import dependence for core components by focusing on skills, technology, scale and leadership in global markets. Atmanirbhar Bharat initiative seeks to develop domestic capabilities for global competitiveness. This move has galvanized the industry and is turning into an excellent opportunity for India's electronics manufacturing to step up and be counted among the key contributors to the economic growth.



While high value-added manufacturing is the ideal aspiration, India can expedite its ecosystem development through an active intervention at the assembly stage. PCBA which contributes between 40% and 60% of the BoM of the targeted products is the critical activity for India in its efforts to reduce import dependence. Augmenting assembly activities to an appreciable level will likely draw investments into active, passive, and mechanical components. This move will help to develop its component base and realize the objective of a design-led manufacturing industry.

INDIA PCBA MARKET SIZE AND GROWTH (IN USD BILLIONS)



TOTAL	15.0	17.2	22.2	29.3	36.6	56.0	81.5

Mobile phones are expected to be the principal driving factor for PCBA demand as the industry caters to the domestic demand and firms up its export focus. EMS companies are in the forefront of PCBA output as the OEMs look to increasingly create local capacities.

The BCD of 20% created the stimulus for industry to shift PCBA manufacturing to India but export possibilities ensured focus on creating manufacturing scale. The foreign trade deficit on PCBA has been a matter of concern as the same reached a high of 99%[9] in 2017-18. This has eased to 79% in 2019-20 as the mobile industry moved ahead with import reduction and exports.

PCBA manufacturing's success is dependent on strong and time bound availability of the components. India has not invested adequately in PCBA over the years and hence the industry is handicapped by low to moderate capacities. The challenging position is a result of severe disadvantages impacting the Indian manufacturers compared to their counterparts in competing countries of China and Vietnam. It is imperative that the global PCBA market becomes the competing arena for the Indian manufacturers. The PCBA opportunities for the Indian industry emanate from:

Source: ICEA

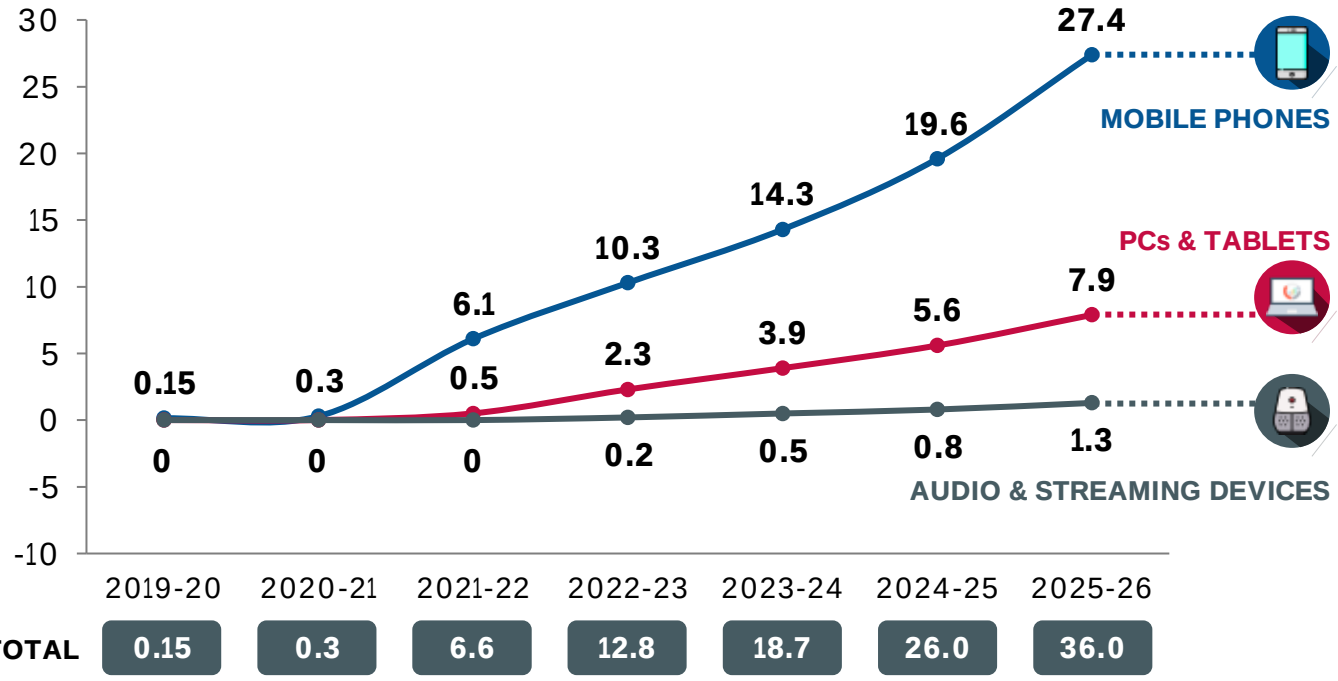
Import substitution within the electronic products manufactured for India market and exports

- In 2019, India produced USD 70 billion[10] worth of electronic products, with an average import content of 80%. China alone accounted for 55% of the PCBA imports into India, thus presenting tremendous scope for local manufacturing. The market guidance till 2025 reconfirms this opportunity for locally produced PCBA to eliminate the import dependence. The present and planned PCBA capacity in India, boosted by favourable schemes like PLI for mobile phones, is expected to fully address the demand.

Export of standalone PCBAs

- Global market for PCBA in the target segments is estimated to reach USD 330 billion[11] by 2025. The ramp up of PCBA capacity will enable India to capture a cumulative market of USD 101 billion in 5 years. This potential can only be achieved if the inherent challenges faced by the PCBA manufacturers are mitigated through a slew of government measures.

INDIA PCBA EXPORT POTENTIAL TILL 2025-26 (IN USD BILLIONS)



TOTAL	0.15	0.3	6.6	12.8	18.7	26.0	36.0

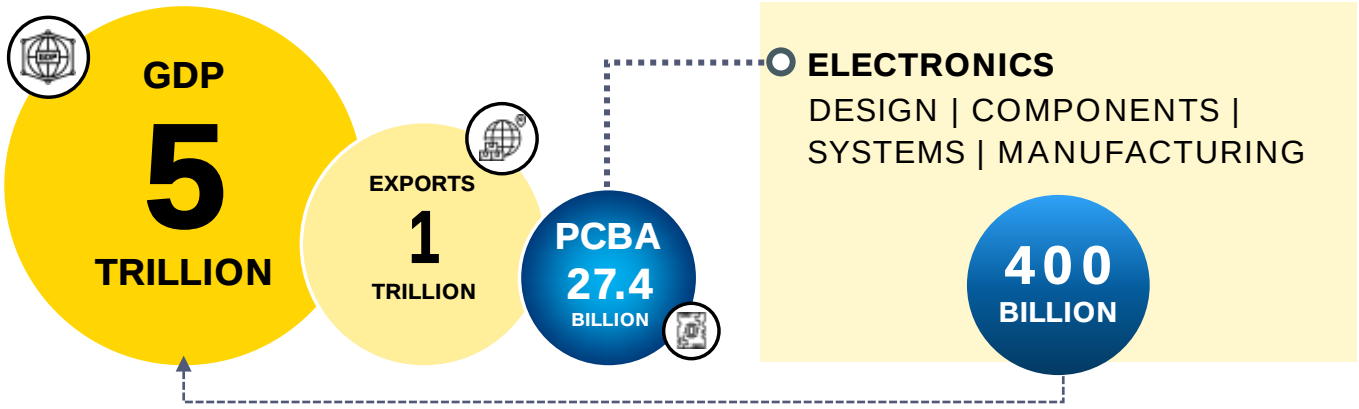
India as the second largest mobile phone manufacturer and its increasing investment in PCBA will enable it to address global markets. Manufacturers of computing devices are also keen on deepening their investment in PCBA for domestic demand and exports. An export driven PCBA industry is crucial for India since its ecosystem development goals are closely tied to it. A global scale PCBA industry centred in India will be a recipe for triggering a set of collateral benefits for India electronics industry.

Acceleration towards USD 1 trillion exports	Reducing burgeoning import bill and trade deficit	Allaying the security concerns
Exports will play a key part in India's pursuit of USD 5 trillion GDP size by 2025. Manufacturing is slated to contribute USD 1 trillion towards it and PCBA can lead the components industry in this endeavour.	India's import value for electronics in 2019 was USD 57 billion[12] and only USD 8.9 billion[12] worth of products were exported. This significant trade deficit can be narrowed through increased exports of PCBAs.	Security concerns arising out of imports of core components and China designed products can be curbed if PCBA are designed and manufactured in India.

Source: ICEA

China +1 candidature	Realizing design focus
PCBA manufacturing will establish India's credentials as a viable supply chain source and provide confidence to global investors keen on de-risking their operations dependent on China.	PCBA manufacturing is expected to draw greater number of companies to undertake system and component design activities in India, thus creating the platform for increased innovation. Design zone currently dominated by global captive centers will expand to include independent companies engaged in PCBA design catering to domestic and export needs.

INDIA - GROSS DOMESTIC PRODUCT, 2025 (USD)



The domestic market demand and export potential is expected to attract an investment of USD 25 to 30 billion[13] into PCBA manufacturing during the period 2021 to 2025. 10[14] companies have already received approval under the PLI scheme, and they are expected to add new capacities in PCBA. The presence of global companies in the approved list offers the prospects of creating a global manufacturing and supply center in India. Transformation of the industry is expected as greenfield projects and incremental capacities get added in anticipation of India emerging as a supply chain source for consumption countries. The employment potential in PCBA industry is also noteworthy, despite highly automated SMT lines used in manufacturing. Every USD 15 million[15] invested creates 200 (80% unskilled, 15% semi-skilled and 5% highly skilled) direct jobs while indirect jobs are 3 times of direct employment. The potential investment can lead to employment generation of 340,000 to 400,000 new jobs in the industry by 2025. During this period, the likely new indirect jobs associated with PCBA can touch 1.2 million. EMS industry is the cornerstone of India building a globally competitive PCBA industry. The top 6 global EMS players have presence in India, and they have OEM partnerships which ensure committed operations. Several home-grown EMS companies who possess design to manufacturing to service capabilities add strength to this vital segment for PCBA manufacturing. It is also notable that 14 players from the global top 20 with combined revenues of USD 44 billion[16] are yet to set up manufacturing in India. Keeping with the global trend, OEMs are expected to retain their dependence on EMS players for a variety of benefits.

CHAPTER 4

CHALLENGES IN INDIA'S QUEST FOR ESTABLISHING A GLOBALLY COMPETITIVE PCBA INDUSTRY

The Undercurrent

The current geopolitical situation has convinced investors to de-risk their manufacturing from the current sources of supply. China's dominant position in the global supply chain is creating apprehension among OEMs, who are exploring alternative credible sources. India is key among the preferred countries but certain structural and systemic challenges act as the hurdle in India realizing its true potential in electronics industry. India's PCBA manufacturing is anticipated to become the critical element in the planned transformation towards a design led, value added and export-oriented electronics industry. Government schemes like PLI, SPECS and EMC 2.0 have electrified the industry, but given the intense global competition, local industry remains handicapped by multiple challenges.

Dependence on Component Imports

Lack of focus on value addition of products being manufactured in India, led to stagnation and subsequently decline of existing component manufacturing. Domestic product manufacturers have to rely on imports for meeting the demand for active, passive and mechanical components. India's components import during 2019-20 was USD 15.6 billion[17] with 37% accounted for by China alone. Indian product manufacturers face the added challenge of lower volume in demand for individual components which leads to uneconomical procurement. PCBA manufacturers in India are unable to procure large volumes of PCB. A 6–8-layer PCB procurement suffer a price disadvantage of 20% compared to a volume driven PCBA manufacturer in China. Besides the vagaries of currency volatility, political friction and pandemic have disrupted imports in the recent years. PCBA manufacturers require seamless movement of components and any disturbance can prove damaging to smooth operations.

The China Factor

China's state support in creating dominating global scale for its industries with potential, is a well-crafted approach. As the world seeks alternative to China, the latter is indirectly propping up countries like Thailand and Vietnam to retain its supply chain dominance. India's efforts to encourage its domestic manufacturers is impacted by availability of cheaper imports. Moreover, critical component of semiconductor ICs imported in products from China, have their origin in other countries, depriving India a direct source to forge partnerships.

Cost Disability

Competition from China has relegated India's PCBA industry to an insignificant player in the global market. In the recent years, Vietnam's emergence as a supply source has further dented India's efforts to succeed at the global level. It is evident that governments of both China and Vietnam have patronized their electronics industry in a manner India has been unable to. An analysis of the 3 countries for mobile phone manufacturing highlights the disability suffered by manufacturers in India.

India's total disability compared to Vietnam is a maximum of 9.8% and with China, the gap increases to 19%.

	INDIA	VIETNAM	CHINA
MANUFACTURING ADVANTAGE			
Land & Building	0.40%	1.30%	2.20%
Fixed Assets - Machinery & Equipments (Centre, State, Duty Exemptions)	0.6-1.2%	0.70%	3.00%
Power	0.00%	1.00%	1.00%
Labour Subsidy	0.00%	0.50%	2.00%
Logistics	0.00%	0.50%	1.00%
R&D Subsidy	0.20%	0.4-1.0%	2.00%
Total	**1.2-1.8%**	**4.4-5.0%**	**11.20%**
FINANCIAL ADVANTAGE			
Corporate Income Tax#	0.73-0.95%	1.50-2.00%	2.00%
Interest subvention on working capital	0.00%	1.50-2.00%	3.00-3.50%
Industry Incentive Schemes	0.00%	0.50-1.00%	1.00-2.00%
Total	**0.73-0.95%**	**3.50-5.00%**	**6.00-7.50%**
EoDB ADVANTAGE	**0.00%**	**1.50-2.50%***	**2.00-3.00%**
TOTAL ADVANTAGE	**1.88-2.70%**	**9.40 -12.5%**	**19.20-21.70%**

* For new investments in India, CIT is 15%, World Bank EoDB Report 2020

Inadequate Exports

The PCBA exports, of target segments, from India during 2019-20 was a miniscule USD 0.15 billion. The capacity building was primarily aimed at addressing the domestic demand and incentives were inadequate to trigger mass volumes that could place India industry among the most competitive. The inconsistent incentive scheme of MEIS and its planned phase out by 31st of December 2020 has left the industry with no notable support. RoDTEP's introduction as a substitute for MEIS is yet to be notified. India's objective to address USD 101 billion of PCBA export market hinges on a robust export strategy.

Trade Pacts

India's international trade pacts with ASEAN, Japan and Korea has worked against building a strong ecosystem since importing components and sub-assemblies was economically favourable than manufacturing. ASEAN trade bloc has countries that has manufacturing and growth aspirations similar to India. Hence competitive actions were built on gaining cost benefits through low value addition. Moreover, China's trade relations with ASEAN countries result in violation of "Rules of Origin" using select countries as the base.

Market Access

Preferential Market Access provides for preferred treatment for locally value-added products in the government procurement. The roadmap stipulates progressive increase in local content whereby PCBA stands to benefit. This policy's implementation by central and state governments leave a lot to be desired. Emphasis on localization and assured access would encourage PCBA manufacturing.

CHAPTER 5

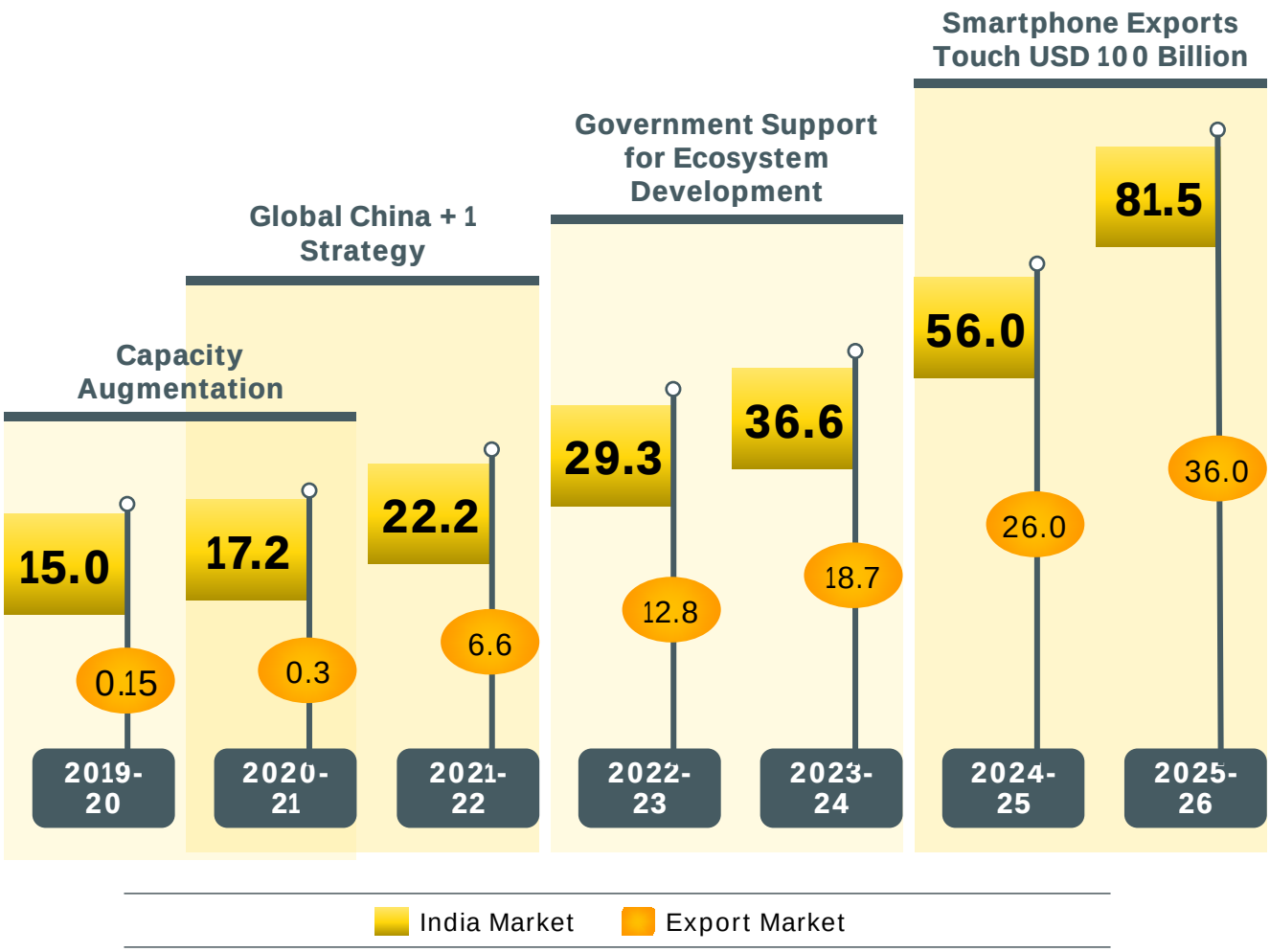
GOVERNMENT POLICIES TO ACT AS DRIVER AND ENABLER FOR PCBA

Electronics is considered by governments in leading economies to be a force multiplier industry. Among the components that imparts maximum impact is PCBA. PCBA industry is in its nascent stage in India but holds tremendous potential to be a globally recognized industry. In order to enable a vibrant ecosystem, the PCBA industry needs investment of USD 30 billion by 2025. PCBA being a technology intensive manufacturing process, is dependent on factors like infrastructure, seamless movement of components and skills.

The industry has been identified as a major export-oriented industry and its capability building has to be global equivalent.

The PCBA industry is primed to emerge as a global hub for manufacturing but it expects the government to enable it in unlocking its potential.

TOWARDS 400 BILLION ELECTRIONICS INDUSTRY (USD BILLION)



Unlocking Government Infrastructure

Establishment of PCBA manufacturing capacity at appreciable speed requires making available suitable land for factories. Land is a state subject and ability of states to provide ready land with plug and play facility will be crucial to India's success in attracting large investments in PCBA manufacturing. Given the challenge of land acquisition on both availability and cost, there is a need for a new approach to find a solution. This assumes urgency in light of the PCBA's potential for meeting both local demand and exports. Government should evaluate the option of opening up existing infrastructure of PSUs that are under-utilized. These are mostly located near urban centers and will be attractive to new investors interested in proximity to end user organizations. Location of urban centers will also help easy availability of required workforce.

Reduce Import Dependence and De-couple from China

37% of India's component imports in 2019-20 originated from China, signifying significant threat to create a robust domestic electronics ecosystem in India. Product imports from China also represent content of semiconductor ICs, originating from Japan, Korea, US, and Europe. PCBA manufacturing in India can shift IC imports to the above countries, till such time when domestic capabilities are established. Development of a potent PCBA industry as the precursor to value added manufacturing rests on India seizing this moment where global companies have adopted a China+1 strategy. India needs to position itself as the first choice for investments seeking new destination.

Imports for Seamless Manufacturing

Major electronics manufacturing countries are characterized by significant imports of components with the aim of maintaining trade surplus through higher exports. PCBA industry with its high volumes and throughput, follows best practices in sourcing and pricing. Manufacturing geographies for PCBA are expected to enable such practices with seamless inward movement of components. In the absence of local component supply base, India should facilitate smooth processes at ports and ensure unhindered and time bound components availability for PCBA manufacturing. A policy to prioritize processing of components bound for PCBA manufacturing will allay apprehension of PCBA manufacturers.

Manufacturing Ecosystem

Vietnam enjoys an advantage of 6% in the manufacturing ecosystem over India with infrastructure score much higher than measured for India. The fiscal and governance structure involving centre-state relations is often an impediment to quicker decision making. A proactive approach is required to address industry's requirements of availability and price of land, quick approvals, plug and play manufacturing and access to qualified talent pool.

The key transformation to differentiate India would be the shortening of timelines compared to a similar experience in competing geography. The pace of execution will be a key determinant in acquiring market share in global PCBA manufacturing.

Global Competitiveness

India's PCBA export potential is forecasted to be USD 101 billion, the opportunity in developing allied segments like design and manufacturing of laminates and PCB fulfils ecosystem development objectives too. The value addition in the short term will be minimal but the medium term will likely usher in investments in the laminates, prepegs and the crucial multi-layered/ high density PCBs. The planned export target for mobile phones will provide a fertile ground for greater value addition involving the inputs for PCBAs. Popular government schemes like PLI and SPECS are structured to aid investment and growth of these component segments. Extension of incentives to PCBA will help bring new investors and reduce the geographical uncertainties of supply chain too.

In order to establish PCBA manufacturing, India must overcome the cost disability compared to its closest competitor Vietnam. Government support to negate the cost disability should be viewed as enabling a critical segment of the industry for exports. Merely meeting the cost disability is not likely to provide an edge to India, going beyond will certainly require more investments. Ministry of Electronics and Information Technology (MeitY) should consider a disability incentive of 4% to 6% through an incremental production and turnover scheme such as PLI which was notified on 1st April 2020. It may be noted that prevailing MEIS scheme has already reduced the incentive to 2% which directly impacts the export output and also, the uncertainty of this 2% incentive has impaired any further investment in the manufacturing and export of PCBAs. The incentives may be phased out by 2025- 26 by when the PCBA industry's inherent strength would help propel an independent course.

Treat New and Existing Investments at Par

The PLI benefit should be applicable to both existing units engaged in manufacturing PCBAs and new units in PCBAs. While it is vital to incentivise new investments for PCBA capacities, it is equally important to recognize the value of existing PCBA units. The existing units with government support will be able to deliver faster than new entrants in PCBA manufacturing. Moreover, the PLI benefits for existing units can be devised based on achievement of incremental revenues.

Acronyms Explained

5G	5th Generation of Cellular Networks
AI/ ML	Artificial Intelligence/ Machine Learning
AR/ VR	Augmented Reality/ Virtual Reality
ASEAN	The Association of Southeast Asian Nations
BCD	Basic Customs Duty
EBoM	Electronics Bill of Materials
EMC	Electronic Manufacturing Clusters
EMS	Electronics Manufacturing Services
FR-4	Flame Retardant Material
FTA	Free Trade Agreement
GDP	Gross Domestic Product
IC	Integrated Circuits
IoT	Internet of Things
NPE	National Policy on Electronics
OEM	Original Equipment Manufacturer
PC	Personal Computers
PCB	Printed Circuit Board
PCBA	Printed Circuit Board Assembly
PLI	Productivity Linked Incentive
PTFE	Poly Tetra Flouro Ethylene
RCEP	Regional Comprehensive Economic Partnership
RoDTEP	Remission of Duties or Taxes on Export Products
SMD	Surface Mounted Devices
SPECS	Scheme for Promotion of Manufacturing of Electronic Components and Semiconductors
THT	Thru-Hole Technology
USD	United States Dollars

Bibliography

01 __ https://www.jeita.or.jp/english/topics/2019/1218

02 __ Https://www.researchgate.net/profile/Shaoqing_Huang/publication/325391938_The_Development_of_China's_Electronics_Industry_Causes_and_Constraints/links/5b0ac967a6fdcc8c253339eb/The-Development-of-Chinas-Electronics-Industry-Causes-and-Constraints

03 __ https://data.worldbank.org/indicator/NY.GDP.MKTP.KD.ZG

04 __ https://www.statista.com/statistics/263437/global-smartphone-sales-to-end-users-since-2007/

05 __ https://twitter.com/rsprasad/status/1267328360289464321

06 __ https://www.statista.com/statistics/272595/global-shipments-forecast-for-tablets-laptops-and-desktop-pcs/

07 __ https://www.washingtonpost.com/business/2019/07/18/more-than-major-companies-apple-nintendo-pull-production-china-because-trade-war/

08 __ https://www.businesstoday.in/current/corporate/another-blow-to-china-24-companies-to-shift-production-units-to-india/story/413201.html

09 __ MoCI website

10 __ MeitY Annual Report - 2019-20

11 __ ICEA

12 __ MeitY Annual Report - 2019-20

13 __ Estimates based on aggregate domestic and exports demand. Capital to output ratio of 1:5

14 __ MeitY

15 __ Elcina

16 __ ICEA

17 __ DGCI&S

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CHENNAI

Ph. No. **+91 98401 52397**

E-mail: vramakrishnan@avanteum.com

MUMBAI

Ph. No. **+91 98670 05330**

E-mail: vijay.kakade@avanteum.com

BANGLORE

Ph. No. **+91 99865 90331**

E-mail: vniju@avanteum.com

www.avanteum.com

Avanteum

DISCOVER FUTURE

PHD House, Ramakrishna Dalmia Wing,
4th Floor, 4/2, Siri Institutional Area,
August Kranti Marg,
New Delhi 110 016, India

Phone: +91-11-2685 5487 | +91-11-4287 8418

Fax: +91-11-2685 1321

Email: contact@mait.com

www.mait.com