FROST & SULLIVAN

ASSESSMENT OF ELECTRONICS MANUFACTURING SERVICES (EMS) INDUSTRY IN INDIA

SUBMITTED TO

SYRMA SGS TECHNOLOGY LTD.

JULY 2022

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ABBREVIATIONS

Title	Abbreviations
APAC	Asia-Pacific
ATMP	Assembly, Testing, Marking and Packaging
ATMP	Assembly, Testing, Marking, and Packaging
BAI	Business Assessment Index
CAGR	Compound Annual Growth
CE&A	Consumer Electronics and Appliances
CPI	Consumer Price Index
CY	Calendar Year (January to December)
ECU	Engine Control Unit
EDP	Electronic Data Processing
EMC 2.0	Modified Electronics Manufacturing Clusters Scheme
EMS	Electronic Manufacturing Services
EVs	Electronics Vehicles
FY	Financial Year (April to March)
GCC	Gulf Cooperation Council
GDP	Gross Domestic Product
GVA	Gross Value Added
IMF	International Monetary Fund
IoT	Internet of Things
IIP	Index of Industrial Production
IT & BA	Information technology & Building Automation
ITM	Industry Transformation Map
KSA	Kingdom of Saudi Arabia
LATAM	Latin America
MEIS	Merchandise Exports from India Scheme
MEIS	Merchandise Exports from India Scheme
MeiTY	Ministry of Electronics and Information Technology
MoSPI	Ministry of Statistics and Programme Implementation

MSMEs	Micro, Small, and Medium Enterprises
NDAA	National Defence Authorization Act
NPE	National Policy on Electronics
NPE	National Policy on Electronics
ODM	Original Design Manufacturing
OEMs	Original Equipment Manufacturer
PCB	Printed Circuit Board
PCBA	Printed Circuit Board Assembly
PFCE	Private Final Consumption Expenditure
PLI	Production Linked Incentive
PMA	Project Management Agency
RFID	Radio-Frequency Identification
SEA	South East Asia
SME	Small and Medium Enterprise
SMT	Surface-Mount technology
SPECS	Scheme for Promotion of Manufacturing of Electronic Components and Semiconductors
STB	Set Top Boxes
THT	Through Hole Technology

DEFINITIONS

Title	Definition
Total Electronics Market	It includes domestic electronics production and imports of electronic finished goods
Original Equipment Manufacturer (OEM)	Also called as Brand Manufacturers. Beyond manufacturing, they offer a whole gamut of services from logistics, repair, servicing, etc.
Electronic Manufacturing Services (EMS)	Companies that provide services such as design, manufacture, test, distribute and servicing in electronics sector for the OEMs
Original Design Manufacturer (ODM)	Companies that offer product design as a service as well as manufacturing for other brands
Contract Manufacturing (CM)	Companies that contract manufacture products for OEMs. They do not provide design services
Engineering Bill of Materials (EBOM)	It is a type of bill of materials (BOM) reflecting the product as designed by engineering. It contains the list of items, parts, components and sub-assemblies in the product designed by engineering

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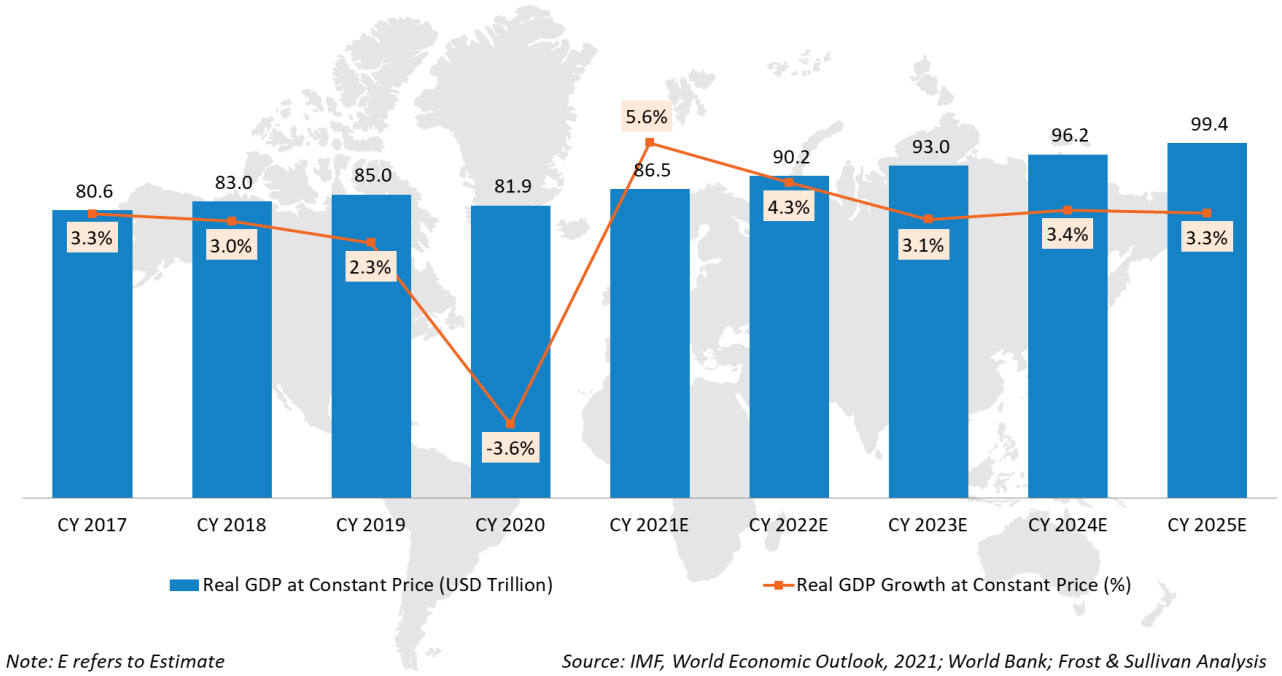
CHAPTER 1 - GLOBAL MACROECONOMIC OVERVIEW

Global Real GDP and Growth Outlook

The Global economy (real GDP), which is now in the path of steady recovery, has undergone significant stress in the last few years due to extended trade conflicts, slowdown in investments across the world and then a novel virus. Global economy was showing signs of slowdown since CY2018 and then entered into a recession in CY2020 owing to the unprecedented crisis caused by COVID-19 pandemic. The pandemic started from China around December CY2019 and then had spread across the continents with alarming speed, infecting millions and bringing economic activity to near standstill in Q2 and Q3 of CY2020 as many countries had to impose strict restrictions to curb the spread of the virus. World now has vaccines to fight this disease and companies have developed innovative business models including adoption of digital measures to continue with their businesses. Pent up demand, caused by economic stagnation and improvement in the supply situation are now fuelling the recovery of global economy which is poised to stage its most robust post-recession recovery in 80 years in CY2021. The global GDP is expected to grow at a CAGR of 3.9% by CY2025.

Chart 1.1: Real GDP and Real GDP Growth (Annual %age Change), Global, Value in USD Trillion, Growth in %, CY2017-CY2025E



Note: E refers to Estimate

Source: IMF, World Economic Outlook, 2021; World Bank; Frost & Sullivan Analysis

The pandemic, in its peak, had created several issues for the manufacturing industries such as supply chain disruptions, labour issues, sluggish demand and fall in exports. In order to survive, companies across the globe had to adopt drastic measures such as employment and wage cuts. This had a circular effect on the global economy. Job losses coupled with salary reductions and delayed payments resulted into significant decline in consumer spending which in turn affected the economy and further job losses. Travel, hospitality, banking, construction and manufacturing were among the worst-affected industries.

Impact of the Pandemic was severe among the weaker economies in CY2020. Most of the African countries faced severe economic downturn especially the countries with large energy exports such as Algeria, Angola and Nigeria. Fluctuations in the oil prices, cold war among major Oil & Gas producers coupled with the impact of the global economic slowdown had affected the Middle Eastern economies adversely. The Latin American region, which has been grappling with many socio-economic issues such as poverty, inequality, debt crisis, low economic growth etc., the pandemic had further worsened the situation. Latin America has also been one of the worst hit regions due to the COVID-19 pandemic.

However, the situation is lot better and brighter in CY2021 and the global economy is on the path of a strong recovery. Global economy is likely to grow by 5.6% in CY2021, largely on the inherent strength of the major economies such as the United States, China, Japan, Germany, United Kingdom and India. While global economic bodies have made upward revisions in their growth projections for most of the economies, many weaker and developing economies will continue to grapple with COVID-19 for the next few years.

Chart 1.2: Country/ Region wise Real GDP comparison, Global, Value in USD Trillion, CY2017-CY2025E

Country/ Region	CY2017	CY2018	CY2019	CY2020	CY2021E	CY2022E	CY2023E	CY2024E	CY2025E
Global	80.6	83.0	85.0	81.9	86.5	90.2	93.0	96.2	99.4
United States	17.4	18.0	18.3	17.7	18.9	19.7	20.2	20.5	20.8
Europe	23.7	24.2	24.6	23.2	24.2	25.2	25.8	26.3	26.8
China	10.2	10.9	11.5	11.8	12.8	13.5	14.2	14.9	15.7
South East Asia	2.8	3.0	3.1	3.0	3.1	3.3	3.5	3.6	3.8
India	2.7	2.8	2.9	2.7	3.0	3.2	3.4	3.6	3.8

** All values in USD Trillion*

Note: E refers to Estimate

Source: IMF, World Economic Outlook, 2021; World Bank; Frost & Sullivan Analysis

Chart 1.3: Country / Region wise Real GDP Growth (Annual Percentage Change), Global, Growth in %, CY2017-CY2025E

Country/ Region	CY2017	CY2018	CY2019	CY2020	CY2021E	CY2022E	CY2023E	CY2024E	CY2025E
Global	3.3%	3.0%	2.3%	-3.6%	5.6%	4.3%	3.1%	3.4%	3.3%
United States	2.3%	3.0%	2.2%	-3.5%	6.8%	4.2%	2.3%	1.5%	1.6%
Europe	2.8%	2.2%	1.6%	-5.7%	4.2%	4.4%	2.4%	1.9%	1.7%
China	7.0%	6.7%	6.0%	2.3%	8.5%	5.4%	5.3%	5.3%	5.1%
South East Asia	5.3%	5.1%	4.3%	-4.2%	4.5%	5.8%	5.4%	5.2%	5.2%
India	6.8%	6.6%	4.0%	-7.3%	8.3%	7.5%	6.5%	6.7%	6.6%

** Value growth %*

Note: E refers to Estimate

Source: IMF, World Economic Outlook, 2021; World Bank; Frost & Sullivan Analysis

Impact of COVID-19 pandemic in different Economies in 2020

The outbreak of COVID-19 pandemic has thrown the entire world into an unforeseen crisis in terms of both public health and economy. Protecting people's lives and supporting public health have become the highest priorities for countries across the world. The global economy, which was already slowing down, plunged into a deep depression in CY2020 causing severe impact on spending and employment.

With increasing spread of the virus, most of the economies had to enforce desperate measures such as lockdowns, travel restrictions, social distancing etc. Various containment measures including closure of offices and factories, slowdown of public services etc. were taken which resulted in significant drop in investments during CY2020.

United States of America - USA became the epicentre of the pandemic with highest number of reported casualties in the world with a devastating impact on the country's economy. As per U.S. Bureau of Labour Statistics, unemployment rate almost tripled between Q4 CY2019 to Q2 CY2020, from 3.6% to 13%. Over thirty million Americans had filed for unemployment benefits due to job losses during this period. However, unemployment rate fell to 6.7% by Q4 CY2020 due to slew of economic measure taken by the Government. The U.S. economy has been strengthened by massive fiscal support and widespread vaccination and the economy is expected to grow by 6.4% in CY2021, the fastest pace since 1984. While small businesses are expected to have a longer road to recovery, the services sector, construction, retail trade, management companies & enterprises, real estate, technical services and healthcare are driving economic recovery in the country.

Europe - The situation was no different in Europe. Post China, Italy was the second country to experience massive casualties in the initial months of the pandemic outbreak. While the pandemic triggered sharp declines in job opportunities and millions of job cuts, the region was also at the forefront in easing down economic lockdowns and opening up economic activities.

Compared to the global economy, the euro area suffered a bigger hit in 2020 and likely to experience comparatively slower recovery in CY2021. The real GDP is likely to reach pre-crisis levels only by mid-2022. Manufacturing industries were impacted by short-term supply shortages, but most of them recovered relatively quickly during Q3 CY2020. Sectors which thrive on human contact and interactions, such as the cultural and creative industries and the aerospace industry, have experienced substantial hits by the crisis, and likely to have longer recovery path. Pharmaceuticals and Digital sectors were the least impacted sectors.

South East Asia - Even though health, economic and political impact of COVID-19 has been significant across South East Asian nations, the virus has not spread as rapidly in this region as compared to other parts of the world. Although the region could not match fiscal incentives of many of the western world countries, fiscal policy in Southeast Asia has still been more generous and this has played a crucial role in limiting the economic and social fallout from the pandemic.

Asian Development Bank, in one of its latest reports, mentioned that Southeast Asian economies will recover at "a much slower pace" than previously thought due to recurring waves of Covid-19. ADB downgraded economic growth projections for all Southeast Asian economies — except Singapore and the Philippines. Major Southeast Asian economies including Indonesia, Thailand, Malaysia and Vietnam reported a sharp rise in daily COVID-19 infections and deaths in the recent months. The spike in cases and deaths was attributed to the highly infectious delta variant. Southeast Asia plays a major role in the global manufacturing supply chain. Lockdowns and social-distancing measures in the region, primarily in Taiwan, have prolonged a global shortage of semiconductors, and constrained the supplies of goods such as coffee and clothing.

China - Covid-19 outbreak started with China and then rapidly spread into other parts of the world. Before the pandemic, China was already grappling with slower growth and rising unemployment along with trade conflicts with economic giants like USA. Impact of the Pandemic was severe on the country's economy in Q1 CY2020. The Govt. had to adopt strict containment measures and as China is the biggest exporter to many countries in the world, there were supply chain disruptions in the first few months of 2020 which impacted the manufacturing sector globally. However, the country could restore its operations within next few months and was one of the leading suppliers of medical consumables and equipment globally in CY2020. China's economy, which did not contract in CY2020, is expected to grow at 8.5% in CY2021 and moderate as the country's focus shifts to reducing financial stability risks.

India - India, one of the potential superpowers in the world and one of the emerging manufacturing destinations, could not decouple itself from this global disaster. Indian manufacturers had to face supply side bottlenecks as there was no supply from China in Q1 2020. India is the second most populous country and population density of the cities are one of the highest in the world. Due to this, India Govt. had to impose strict country-wide lockdown much faster than most of its western counterparts. Indian manufacturing sector could not withstand this double blow – first from the supply side and then from the demand side and its economy contracted the most (-23.9 %) globally in Q2 2020.

However, the country has shown strong resilience since then. The Govt. had called for 'Atmanirbhar Bharat' or 'Self-Reliant' India and the industries have responded to that call. India has not only become self-reliant on medical supplies, it is now one of the largest producers of Covid-19 vaccines globally. The demand scenario has improved and Indian economy has grown by record 20.1 % in Q2 2021 compared with the corresponding period last year.

Manufacturing has emerged one of focus area for the Govt. with policies such as 'Make in India' and 'Atmanirbhar Bharat' and series of schemes such as Phased Manufacturing Plan (PMP), Production Linked Incentive (PLI) etc. India has emerged as the second most sought after manufacturing destination across the world indicating the growing interest shown by manufacturers in India as a preferred manufacturing hub over other countries, including the U.S and those in the Asia-Pacific region, showed Cushman & Wakefield's 2021 Global Manufacturing Risk Index.

Other countries - The economic impact of the COVID-19 pandemic has been different across different countries. Iran had the highest number of corona cases in Middle East, followed by Iraq and UAE. Countries

such as Saudi Arabia and UAE were conservative in allowing tourists, which has badly affected the region's tourism revenue. Tourism is one of the biggest revenue generators of the region especially for GCC countries like the UAE. GCC governments have taken swift measures to reduce the impact of the virus in the region. Africa is one of the most affected regions globally due to COVID-19 pandemic. It is one of the most susceptible regions in terms of controlling the pandemic due to lack of proper health care services and basic infrastructural amenities.

For many countries, economic recovery is being driven by the private sector. The Small & Medium Enterprises are expected to play a key role in economic and employment recovery in these countries. Digitalization is also playing a key role in economic rebound across Africa as healthcare apps, payment platforms, e-commerce portals and micro-insurance systems are witnessing positive traction across end users.

Chart 1.4: Value Added Manufacturing of select countries in Asia-Pacific (at Current USD), Global, Value in USD Trillion, CY2015-CY2020

Year	China	India	Indonesia	Thailand	Malaysia	Philippines	Vietnam	Singapore
CY2015	3.20	0.33	0.18	0.11	0.07	0.06	0.03	0.06
CY2016	3.15	0.35	0.19	0.11	0.07	0.06	0.03	0.06
CY2017	3.46	0.40	0.20	0.12	0.07	0.06	0.03	0.06
CY2018	3.87	0.40	0.21	0.14	0.08	0.07	0.04	0.08
CY2019	3.82	0.38	0.22	0.14	0.08	0.07	0.04	0.07
CY2020	3.85	0.34	0.21	0.13	0.08	0.06	0.05	0.07

** All values in USD Trillion*

Source: World Bank; Frost & Sullivan Analysis

Chart 1.5: Value Added Manufacturing of select countries in Asia-Pacific (% of GDP), Global, Contribution by %, CY2015-CY2020

Year	China	India	Indonesia	Thailand	Malaysia	Philippines	Vietnam	Singapore
CY2015	29.0%	15.6%	21.0%	27.4%	22.3%	19.9%	13.7%	18.1%
CY2016	28.1%	15.2%	20.5%	27.1%	21.8%	19.6%	14.3%	17.6%
CY2017	28.1%	15.0%	20.2%	27.0%	21.8%	19.5%	15.3%	18.6%
CY2018	27.8%	14.9%	19.9%	26.7%	21.5%	19.1%	16.0%	20.9%
CY2019	26.8%	13.3%	19.7%	25.6%	21.4%	18.5%	16.5%	19.5%
CY2020	26.2%	13.0%	19.9%	25.2%	22.3%	17.7%	16.7%	20.5%

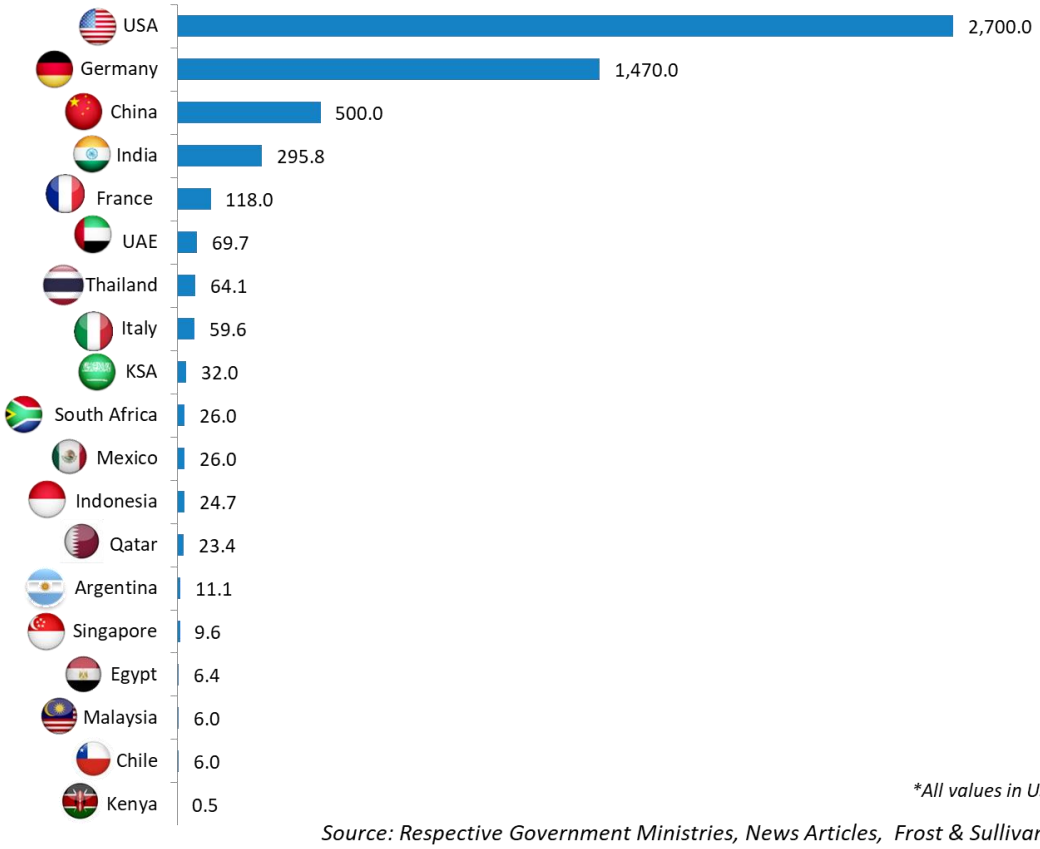
** Contribution by %*

Source: World Bank; Frost & Sullivan Analysis

Stimulus Packages announced by different Economies

The United States, one of the worst affected countries, has distributed a total of USD 2.7 trillion in three phases in order to revive the economy and bringing back normalcy to the country. These stimulus packages have been aimed towards aiding the process of reopening schools, empowering small businesses while also providing tax holidays and enabling cash inflow to American citizens.

Chart 1.6: Stimulus Packages Announced by Countries, USD Billion, Global, CY2020



**All values in USD Billion*

Source: Respective Government Ministries, News Articles, Frost & Sullivan Analysis

The EU has outlined massive investments to support people and businesses across Europe as the region has battled a deep economic recession due to the COVID-19 outbreak. The European Commission has distributed USD 857 billion stimulus funds in the form of grants and loans to countries and sectors most impacted by the coronavirus pandemic. In addition to this, each member country has announced huge sums as stimulus. For instance, Germany has designed a package of over USD 1.47 trillion to battle the economic crisis. The French government has worked on USD 117.98 billion Stimulus package for the local economy while the Italian government has allocated USD 59.6 billion as an economic stimulus for its ailing economy.

China has disbursed a stimulus worth USD 500 billion, 4.5 % of country's GDP to save the economy. Banks had suspended interest collection and principal payments on loans till March 2021. Unemployed population were allowed to claim unemployment benefits.

Within LATAM, Mexico has announced a USD 26 billion stimulus package, 3.5 % of country's GDP which is widely discussed as one of the smallest in comparison to some of the other economic stimulus packages that have been offered by other global economies in the developing regions. Similarly, Argentina and Chile has allocated USD 11.1 billion and USD 6 billion respectively as stimulus packages to rescue the sinking economy. Being one of the worst affected regions due to the pandemic, stimulus packages have played some role in the revival of economies in the LATAM region however; there are concerns that the current stimulus package would not be sufficient to bring the economies on track.

Within South Asia, Singapore and Malaysia have announced additional stimulus to the tune USD 6 billion in an attempt to revamp their economies. Singapore's third stimulus, which is worth USD 3.6 billion, adds up to a total of about 12% of the city state's GDP. Indonesia has already announced a first round of measures worth USD 24.65 billion and there are plans to add more. Similarly, Thailand has also introduced a second stimulus package worth USD 51.29 billion on top of a first one worth USD 12.8 billion.

Gulf Cooperation Council (GCC) governments have taken numerous initiatives in order to support the residents and companies financially. United Arab Emirates has doubled the size of its stimulus package from USD 34 billion initially to USD 69.7 billion. Similarly, KSA and Qatar have implemented stimulus package of USD 31.99 billion USD 23.35 billion respectively. The objectives of these stimulus packages have been to reinforce liquidity and support business continuity of companies and to reduce the impact of corona-virus on the economy.

African countries and Governments have also offered stimulus packages to support their citizens and businesses. Kenya has offered USD 503 million that includes credit guarantees, loans to small businesses and helping propping up tourist facilities. South Africa, one of the leading economies in the region has announced USD 26 billion or roughly 10 % of its GDP to jump start businesses and assist the weaker sections of the population. A large portion of this stimulus package has helped the informal sector to protect jobs through various credit guarantee schemes. Egypt has announced USD 6.4 billion stimulus package and offered credit repayment extensions for the SMEs. The country's Central Bank has also announced a rate cut to the extent of 3%. In addition, the package also included reduction in natural gas and electricity prices for the industry, funds allocation to healthcare services, tax exemptions and monthly cash subsidies for the affected workers.

The Indian Government, On May 12 2020, has announced a stimulus worth USD 295.8 billion (INR 20.97 Trillion), about 10 % of India's GDP to support and revive the Indian economy and make India self-reliant. India bailout package is the fourth largest among major economies in the World. A high level break-up of the bailout package has been mentioned below:

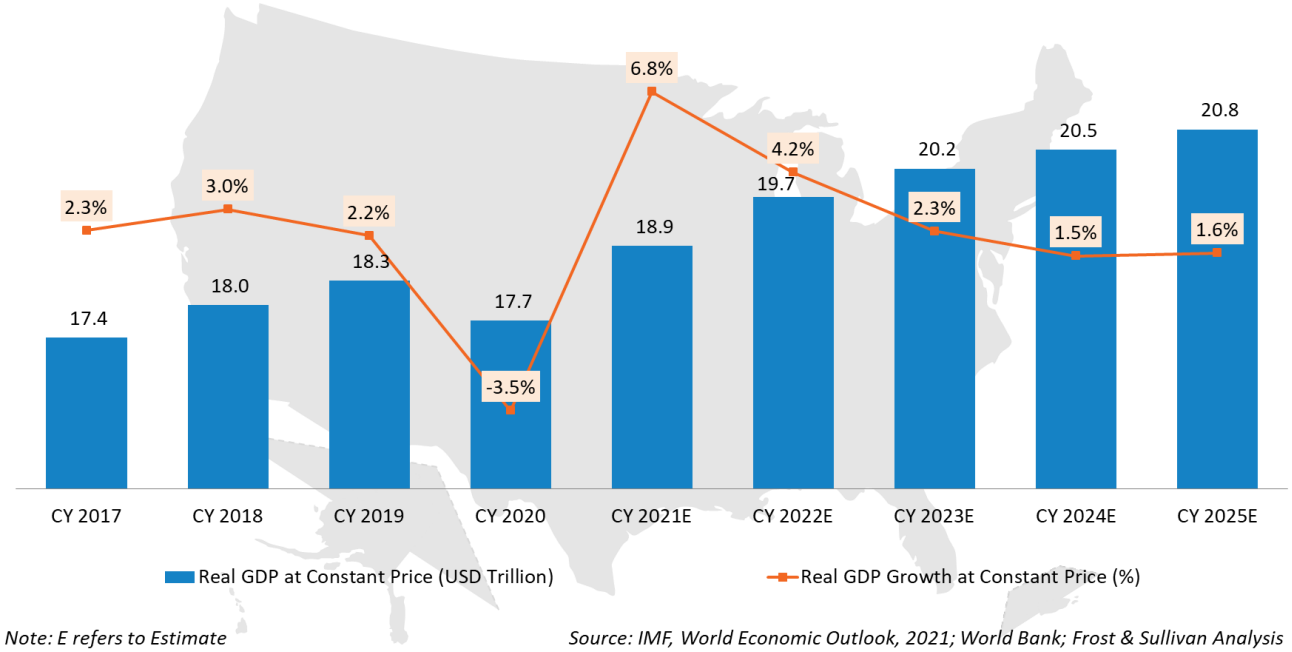
Chart 1.7: Components of Stimulus package announced by Government of India, CY2020

Item	Value (USD Billion)	Key Components
First Tranche	83.9	• Collateral free loans and equity infusion for MSMEs, Liquidity relief measures for NBFCs, HFCs, Power distribution companies etc.
Second Tranche	43.7	• 'One nation one ration card' schemes for migrant workers, credit facility for street vendors, Kisan credit cards etc.
Third Tranche	21.2	• Fund for development of Agriculture and Animal Husbandry infrastructure, funding of schemes such as PMMSY, formalization of micro food enterprises etc.
Fourth & Fifth Tranches	6.8	• Reforms for sectors including coal, minerals, defence production, air space management, airports, MRO, distribution companies in UTs, space sector, and atomic energy
Earlier measures including PMGKP	27.2	• Comprehensive relief package for the poor so that they can buy essentials for their livelihood
RBI measures (Actual)	113.1	• Various measures by the Reserve Bank of India to inject liquidity
Total	295.8	

Real GDP for Key Regions and Growth Outlook

A) United States of America (USA)

Chart 1.8: Real GDP and Real GDP Growth (Annual %age Change), USA, Value in USD Trillion, Growth in %, CY2017-CY2025E



Note: E refers to Estimate

Source: IMF, World Economic Outlook, 2021; World Bank; Frost & Sullivan Analysis

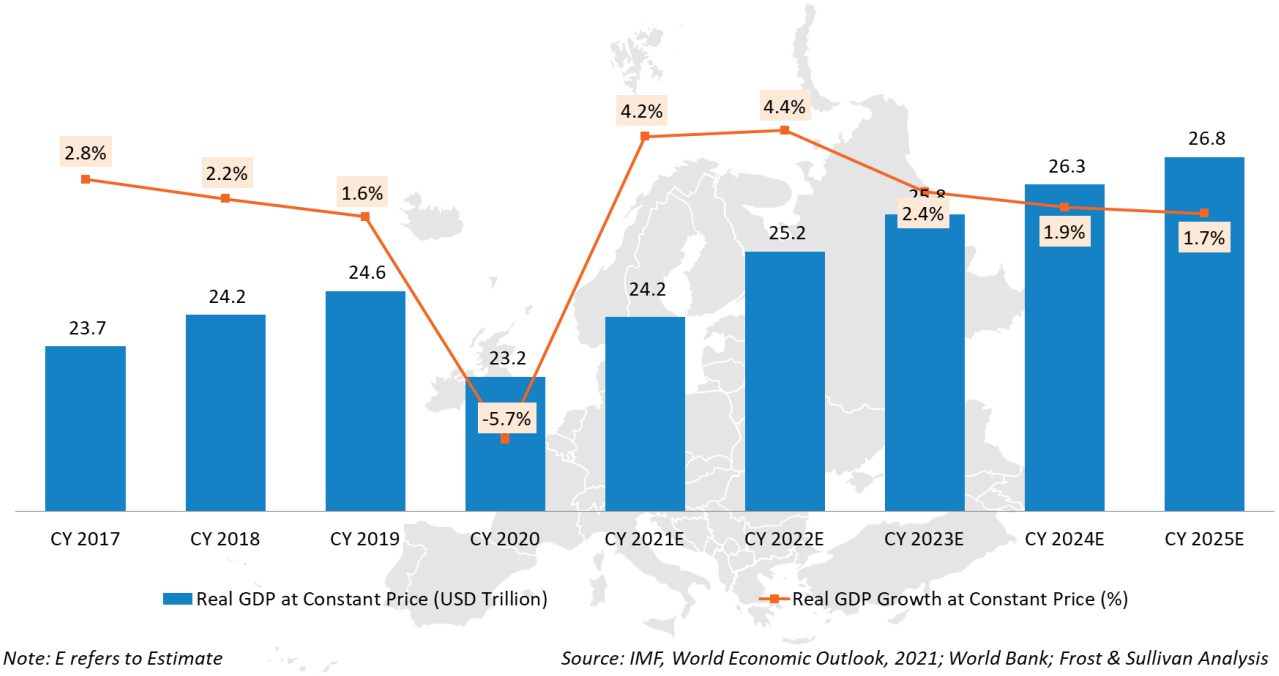
USA economy was progressing well with more than 2.0 % growth between 2017 and 2019 before it experienced the biggest decline in 2020 when the economy contracted by over 3.5%. This was worse than the 2.5 % decline witnessed during the economic recession of 2009. A positive recovery of 6.8% in 2021 is

anticipated to be followed by subdued growth and saturation in economic activity where the market is expected to grow between 4.2% in 2022 and 1.6% in 2025.

The US policy makers have taken proactive decisions to protect lives and businesses. The stimulus announced by the government has given the nation some additional relief. Few of the economic indicators like employment are showing significant improvement in 2021. Household expenditure has now been rising gradually since April 2021. Retail sales and housing sales has also gathered pace and also exceeded pre-crisis levels.

B) Europe

Chart 1.9: Real GDP and Real GDP Growth (Annual %age Change), Europe, Value in USD Trillion, Growth in %, CY2017-CY2025E



Note: E refers to Estimate

Source: IMF, World Economic Outlook, 2021; World Bank; Frost & Sullivan Analysis

The European Union (EU) economy has shrunk by 5.7 % in 2020 with a recovery anticipated at 4.2% in 2021. Spain, UK, Italy, Greece and France are the worst affected economies, experiencing a GDP decline of 10.8 %, 9.1 %, 8.9 %, 8.2 % and 8.1 % respectively. After the pandemic, EU and the United Kingdom have adopted various trade control measures to ensure the availability of essential items, medicines and medical equipment. In addition to this, EU member countries introduced export bans, notification requirements for exports, power to seize goods etc. The entire EU nations are experiencing a low production crisis. European companies have started redesigning production to revive from the current situation. Companies across Europe are embracing innovative business models to survive the crisis and continue doing business.

While the recurrence of COVID-19 looms large, economic experts have predicted that economic recovery of EU region will happen at a slower pace and the region will reach to pre-crisis level only in 2022 as many economies depend heavily on tourism. Most of the economies are now operating normally and a positive sentiment prevailing buoyed by a landmark agreement forged by the European Union to raise a 750 billion

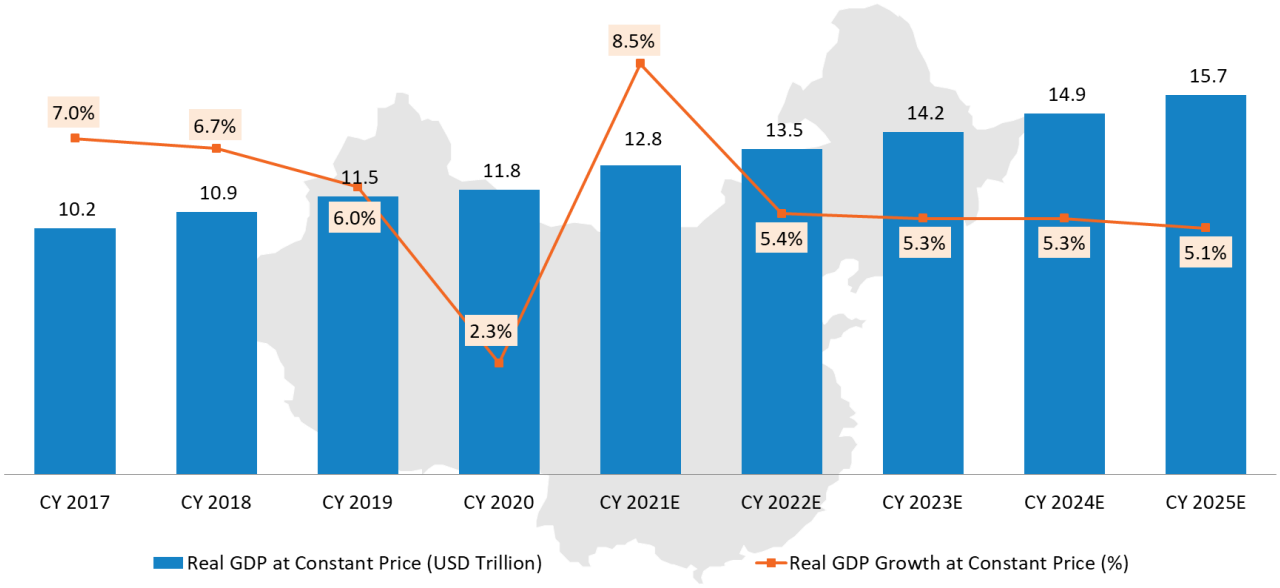
euro (USD 883 billion) relief fund through the sale of bonds backed collectively by all members. Countries are now looking towards more sustainable growth with resilience and cohesion.

C) China

China is the only large economy to register a positive GDP growth in a year when the global economy contracted by 3.3 %. China's economy had a positive growth of 2.3% during 2020. The country has shown its resilience during the pandemic year and expected to register 8.5% GDP growth in 2021. China's economy has recovered well with the government focusing on supporting Small and Medium Enterprise (SME's) and allowing delay of loan repayments. Though China's industrial economy showed positive signs, retail and investment industry remained weak and challenging.

As the recovery gains traction, the composition of aggregate demand is likely to shift toward private domestic consumption. Real consumption growth is expected to eventually return to pre COVID-19 levels, aided by continued labour market recovery, growing household incomes, and increased consumer confidence. Despite recent increases in imported raw material prices and an increase in local demand, consumer price inflation is projected to stay below target. Given the on-going uncertainty, the authorities are expected to remain flexible and modify the level and nature of macroeconomic policy assistance.

Chart 1.10: Real GDP and Real GDP Growth (Annual %age Change), China, Value in USD Trillion, Growth in %, CY2017-CY2025E



Note: E refers to Estimate

Source: IMF, World Economic Outlook, 2021; World Bank; Frost & Sullivan Analysis

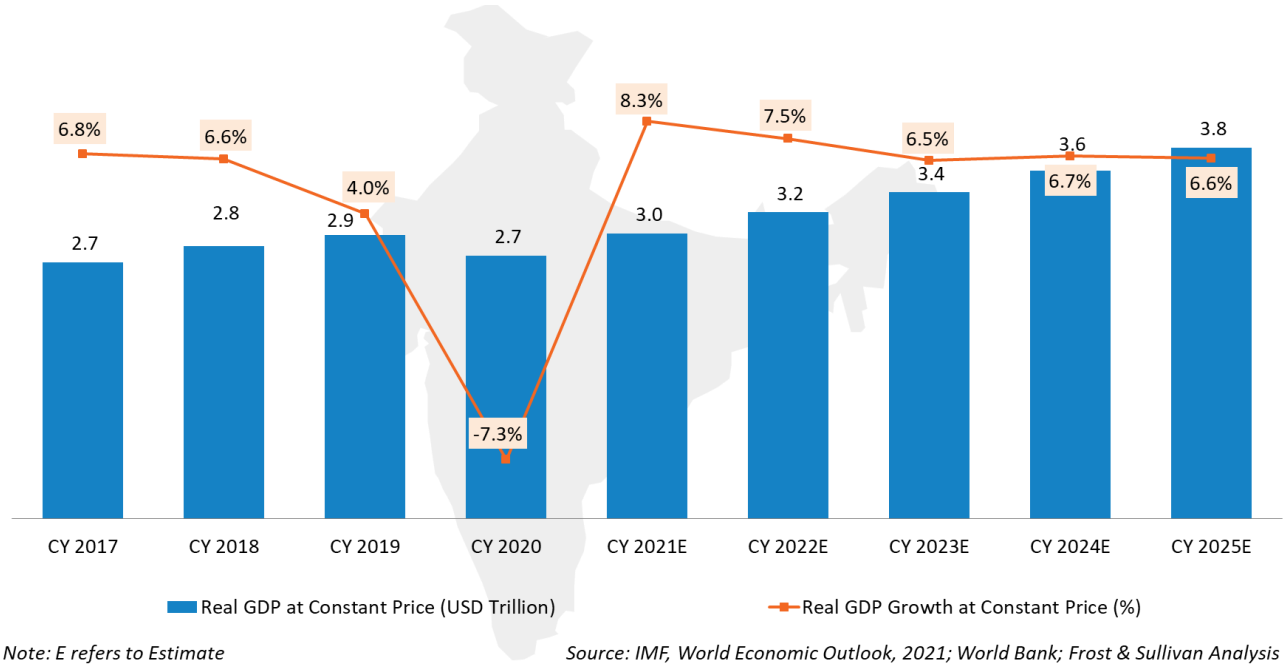
D) India

The Indian economy continued to grow between 2017 and 2019. However, there was a moderation in the growth rate during these years. As the Government was taking various measures to counter this slowdown, Covid-19 created havoc in 2020 which resulted in 7.3% contraction of the country's economy. This was worst ever economic performance by India, worst year in terms of economic contraction in the country's

history and much worse than the overall contraction in the world. Unemployment rate was more than 20% in April and May 2020 and individual income dropped by more than 40% during this period. Private consumption, the mainstay of aggregate demand, was severely affected by the pandemic. As per NSO estimate, Private Final Consumption Expenditure (PFCE) contracted by 9.0 per cent in 2020-21, reflecting impact of the stringent nation-wide lockdown and social distancing norms, heightened uncertainty as a result of transitory and permanent job losses, closures of small, micro and unincorporated businesses and wage resets.

However, the country has showed tremendous resilience in these difficult times and macroeconomic indicators started improving gradually since Q3 2020. The medium term growth outlook is very positive and country is likely to record a growth of 8.3% in 2021 and 7.5% in 2022, on account of strong macroeconomic fundamentals including moderate inflation, implementation of key structural reforms and improved fiscal and monetary policies. Among all large economies, India is likely to demonstrate a rapid and sustainable growth post COVID-19, driven by strong manufacturing-led industrial expansion and consumption demands from the private sector.

Chart 1.11: Real GDP and Real GDP Growth (Annual %age Change), India, Value in USD Trillion, Growth in %, CY2017-CY2025E



Note: E refers to Estimate

Source: IMF, World Economic Outlook, 2021; World Bank; Frost & Sullivan Analysis

One of the key reasons for the anticipated growth of Indian economy is the country's focus on the manufacturing sector. Indian manufacturing sector's contribution has increased from 16% to over 18% in the past 10 years buoyed by initiatives like the "Make In India" and sector specific initiatives to various manufacturing companies that aim to make India a global manufacturing destination. Similarly, the Government of India has also introduced Production Linked Incentives (PLI) scheme for large-scale electronics manufacturing. The scheme proposes production-linked incentive to boost domestic manufacturing and attract large investments in - Large Scale Electronics Manufacturing (mobile phones and

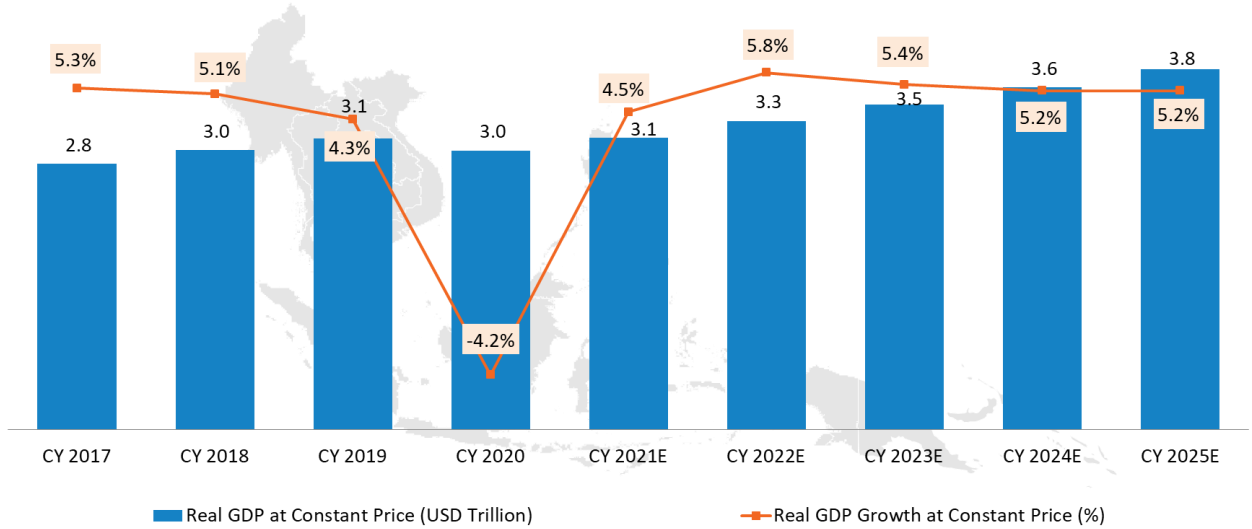
specified electronic components), IT Hardware (Laptops, Tablets PCs and Servers) and White Goods (Air Conditioners and LED Lighting) including Assembly, Testing, Marking and Packaging (ATMP) units.

The pandemic has also created unique growth opportunity for India. Supply chain disruption during the pandemic has forced many countries and organization to re-think on their sourcing strategy and reducing dependency on one country for the entire supplies. These large companies are now looking for alternate low-cost manufacturing locations in South East Asia and South Asia and India is emerged as one of the sought after investment destinations for many of these organization. As there would be re-alignment of global supply chain in the coming years, India is likely to benefit immensely from these strategic decisions and likely to become a manufacturing powerhouse in the coming years. Favourable business environment, liberal FDI norms, constantly improving 'Ease of Doing Business' rankings, enormous consumer base and rapidly improving digital infrastructure are some of the key factors that will drive investment in India in the coming years.

E) South East Asia (SEA)

For the first time in 20 years, due to the economic downturn, the poverty rate in South Eastern Asia is expected to increase. Trade and other sectors are experiencing a sharp decline in the region and likely to recover at a much slower rate due to recurring waves and imposition of multiple lockdowns.

Chart 1.12: Real GDP and Real GDP Growth (Annual %age Change), South East Asia, Value in USD Trillion, Growth in %, CY2017-CY2025E



**List of South East Asian countries: Brunei, Burma (Myanmar), Cambodia, Timor-Leste, Indonesia, Laos, Malaysia, the Philippines, Singapore, Thailand and Vietnam.*

Note: E refers to Estimate

Source: IMF, World Economic Outlook, 2021; World Bank; Frost & Sullivan Analysis

Following the Covid-19 pandemic, South East Asia went through socioeconomic crises, with GDP falling by 4.2 % in 2020. Declining tourism and businesses have caused sharp downturn in the overall economy of the region. Low material movements and lockdowns are affecting countries dependent on trade and tourism especially Singapore, Vietnam, Cambodia, Malaysia and Thailand. Also, reduced remittance has negatively

impacting the economic growth of countries such as Philippines and Taiwan. According to the recent International Monetary Fund projections, GDP per capita in the region will stand at 4.5, 5.8 and 5.4 % in 2021, 2022 and 2023. Although the outlook is shadowed by uncertainty, three major elements have shaped Southeast Asia's experience with the crisis thus far and will be critical in the following years (a) Controlling the virus through vaccine drives (b) Role of international trade (c) Responsiveness of the macroeconomic policy.

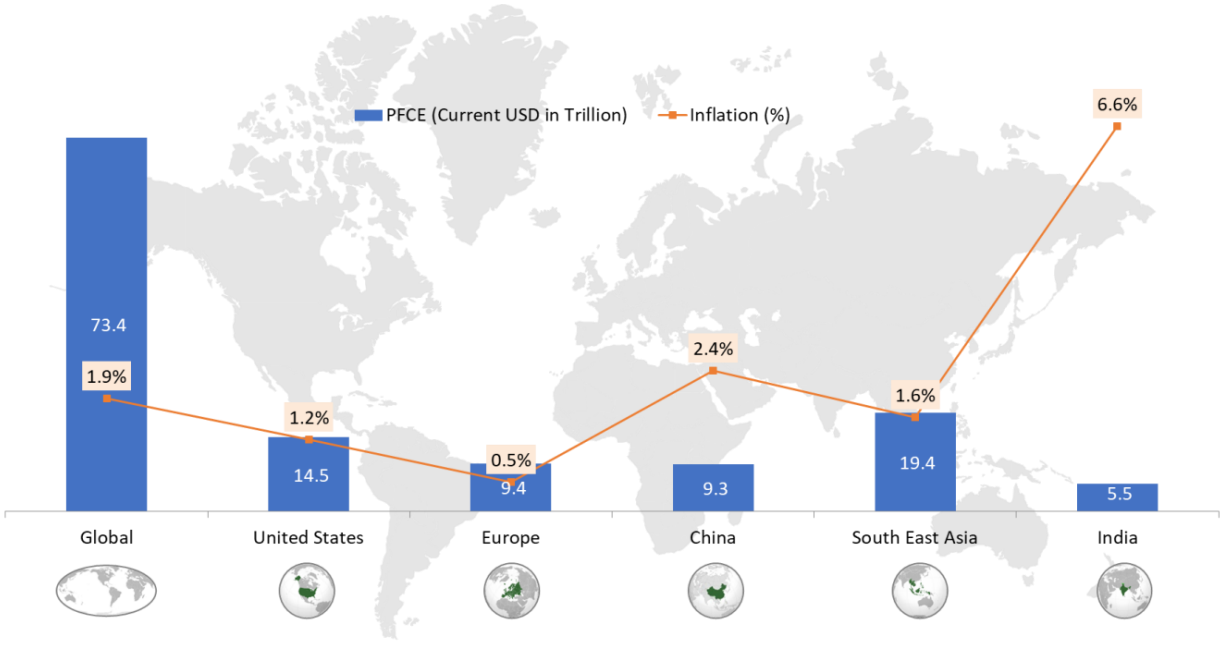
With the US China trade war and the economies are now gradually recovering from the impact of COVID-19, the focus of global growth is shifting towards South East Asia. With a rapid growth in urbanization and industrialization, high proportion of young population, digitization, and growing access to education and employment, South East Asia is set to emerge as one of the manufacturing hotspots in the coming years.

Private Final Consumption Expenditure and Average Disposable Income Levels

A. Private Final Consumption Expenditure

Private Final Consumption Expenditure (PFCE) which reflects the demand in an economy includes all goods and services that are acquired by a household for private consumption. Major category of items covered under PFCE include food, clothing & footwear, gross rent, fuel, power, furniture, furnishings, appliances & services, medical care & health services, transport and communication, recreation, education & cultural services and miscellaneous goods & services. With rise in per capita income and positive economic sentiment, customers are able to spend more on goods and services.

Chart 1.13: Private Final Consumption Expenditure and Inflation of key countries, current USD, in %, Global CY2020



Source: World Bank; Frost & Sullivan Analysis

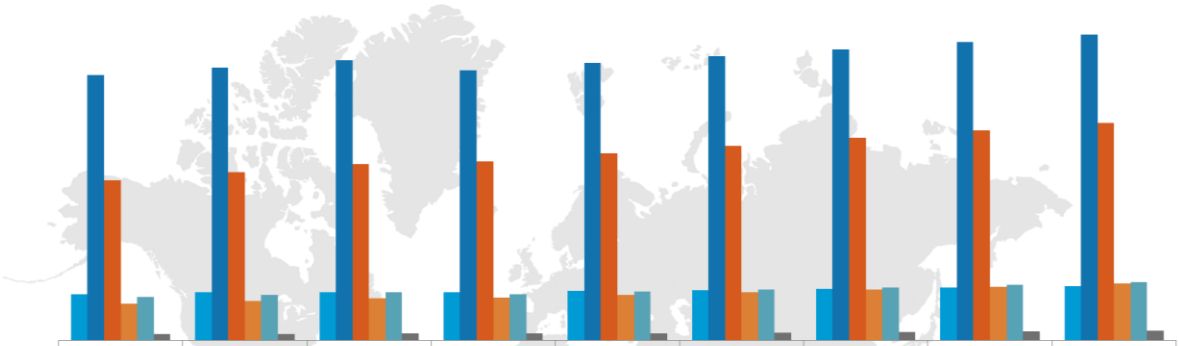
Despite unprecedented global shutdowns, the economy has recovered considerably faster and stronger than predicted. Following a brief rebound, experts expected waves of bankruptcies and eventual collapse, while in reality it was better than expected. Compared to global average of 1.9%, countries such as Europe and USA the inflation was at par and hence the spending was comparatively better than other regions. The United States of America is one of the biggest consumer markets in the world. Spending accounts for over 80% of country's contribution to the GDP.

Swelling urbanisation, rising economy and increasing affluence has led to rise of consumerism in South East Asia. Though the current situation looks dull, online purchase of physical goods has been gaining momentum. Unlocking of the economy to allow manufacturing, creation of new employment opportunities and improvement in per capita income levels especially across the Indian sub-continent will be critical in increasing the contribution of final consumption towards GDP.

In 2020, consumer spending accounted for 58% of GDP growth. China's economy had been experiencing a slow growth in nearly 30 years even before the COVID-19 pandemic started. Mass layoffs and recession were being witnessed across various sectors which negatively impacted consumption expenditure. However, Chinese consumers were more optimistic compared to other regions across the world since China was among the first to curb the COVID-19 virus while also regaining control of its economy and manufacturing capabilities

B. Average Disposable Income Levels

Chart 1.14: Average Disposable Income Levels, USD, Global CY2017 to CY2025E



	CY2017	CY2018	CY2019	CY2020	CY2021E	CY2022E	CY2023E	CY2024E	CY2025E
Global	9,025	9,427	9,484	9,381	9,629	9,870	10,107	10,349	10,598
United States	52,113	53,570	55,026	53,082	54,451	55,820	57,189	58,619	60,026
Europe	31,494	33,074	34,655	35,175	36,709	38,244	39,778	41,182	42,635
China	7,150	7,697	8,245	8,394	8,916	9,439	9,961	10,513	11,095
South East Asia	8,449	8,928	9,408	9,081	9,521	9,962	10,402	10,907	11,436
India	1,198	1,252	1,287	1,287	1,388	1,492	1,607	1,715	1,830

Source: World Bank, IMF, MOSPI, RBI

With the American consumer accounting for more than two-thirds of the economy, the personal consumption witnessed a sharp decline to 7.0% in 2020 amid widespread shutdowns triggered by the pandemic. Disposable personal income of the country also fell by 3.5 %. The situation is likely to rebound in

proportion to the recovery rate. Employment rates in the US have shown an upswing since May 2020 with 2.5 million jobs being added in the month, followed by 4.8 million jobs in June and 1.8 million jobs in July.

Similarly, India's disposable income slumped to 0.8 times in 2019 and remained flat in 2020 as compared to 2.3 times average growth in the previous few fiscals majorly due to financial distress among households. Indian households are saving money and invested it in financial instruments in recent three to four months due to Covid-19 pandemic. The careful spending and reduced income are leading to lowering consumption. Indian households' personal disposable income growth is already been impacted owing to weaker job creation trend and the automation overhang before the pandemic itself. The household saving rate in the European Union experienced highest year-over-year increase in the first quarter of 2020 and the households experienced their gross disposable income increase by 2.4 % year-on-year in the first quarter 2020. This trend is likely to continue and is estimated to increase by on an average in the second quarter of 2020.

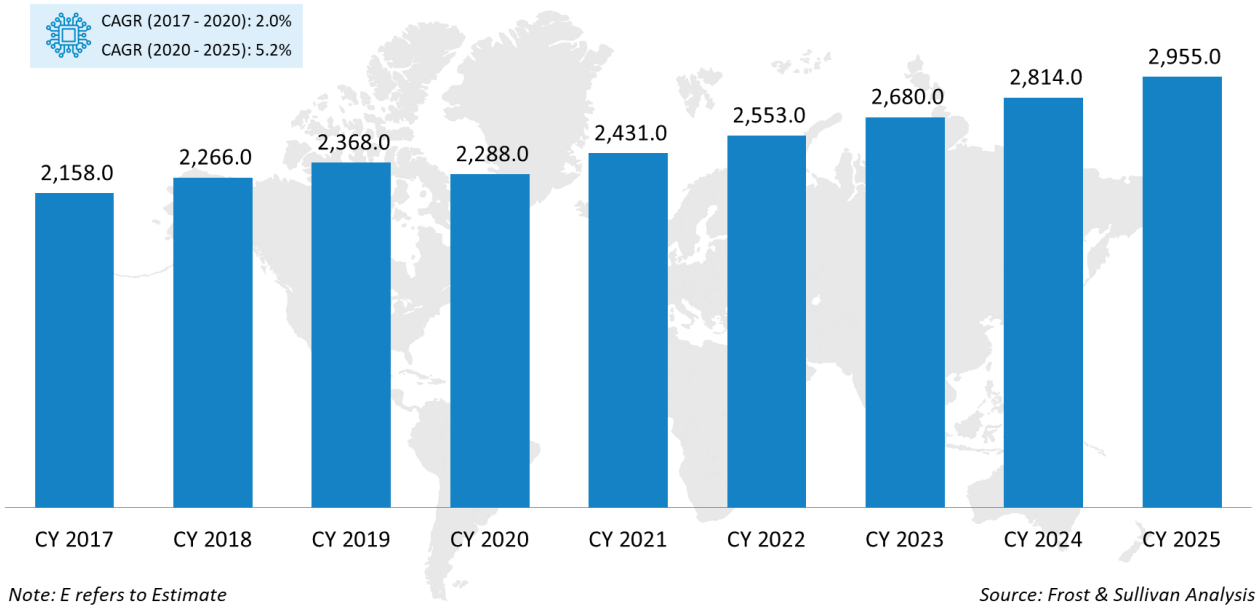
CHAPTER 2 - GLOBAL ELECTRONICS INDUSTRY OVERVIEW

Global Electronics Industry

The global electronics industry has evolved tremendously over the last 60 years. Global demand for electronics industry is created by emerging and multiple disruptive technologies. The overall electronics market is inclusive of electronics products, electronics design, electronics components and electronics manufacturing services. Traditionally a strong growth market however, the market contracted by 3.4 % in in CY2020, owing mostly to decline in private expenditure triggered by the COVID-19 pandemic.

The global Electronics industry has been valued at USD 2,288 billion in CY2020. As per Frost & Sullivan analysis, the industry is expected to grow at a CAGR of 5.2 % to reach USD 2,955 billion by CY2025. Some of the critical factors driving this growth are increasing disposable income, improved acceptability of audio and video broadcasting, higher internet penetration, inclination of the youth towards next gen technologies, emergence of e-commerce etc.

Chart 2.1: Overall Electronics Industry, Global, Value in USD Billion, Growth in %, CY2017-CY2025E



Note: E refers to Estimate

Source: Frost & Sullivan Analysis

Introduction to Electronics Manufacturing Services (EMS) Industry

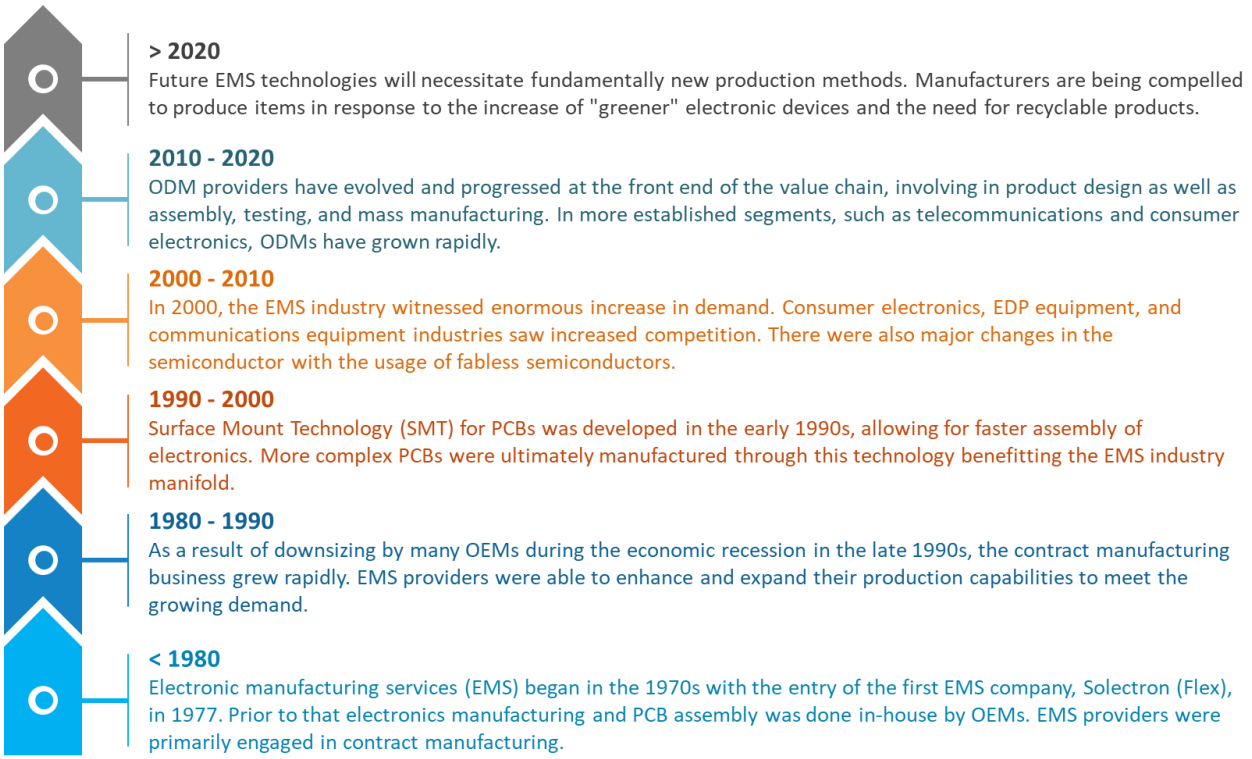
The global electronics manufacturing services market traditionally comprised of companies that manufacture electronic products, predominantly assembling components on Printed Circuit Boards (PCBs) and box builds for OEMs. Today OEMs are seeing more value from EMS companies, leading to involvement beyond just manufacturing services to product design and developments, testing, aftersales services, such as repair, remanufacturing, marketing, and product lifecycle management.

Evolution of EMS Industry

The EMS market was established more than five decades ago to execute manufacturing designs from government, defence, and research institutions. As the years progressed, the EMS market grew to support the demand that exceeded manufacturing capacity of the OEMs. By mid 1990s, the advantages of EMS concept became extremely evident and OEMs started outsourcing PCB Assembly in large scale. By the end of 1990s and in early 2000s, several OEMs sold their assembly plants to the EMS players, aggressively striving for the market share. A wave of partnerships followed as the more cash-rich EMS companies started buying the existing plants and the smaller EMS companies to consolidate their position in the global market.

The introduction of digital computers and their successive progress and the integration into the mainstream since the 90's has played a colossal role in popularizing the electronics usage. Modern day electronic devices have long exceeded the capacities of their antecedents, becoming gradually more cost-effective, available, and diverse over past few decades. As the complexities linked with the component miniaturization and the electronic assembly continue to surge, so will the penetration of electronics manufacturing services (EMS) market in the years going ahead. EMS comprises a sequence of procedures for design, assembly, manufacturing, & testing of electronic components for the OEMs.

Chart 2.2 Evolution of EMS Industry, 1980 to 2020



Source: Frost & Sullivan Analysis

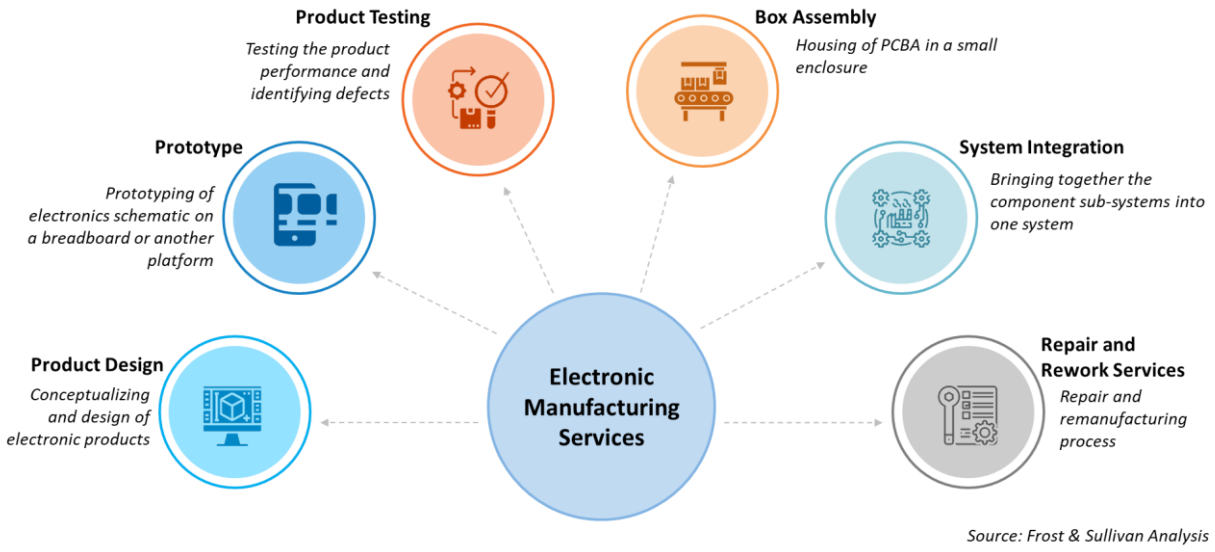
As the technology advances, the size of the components and the circuits usually becomes smaller. With the demand for the novel features and products growing up in recent years, manufacturers are turning towards more state-of-the-art and sophisticated technical solutions to streamline their manufacturing processes. Electronics manufacturing is observing substantial traction in the adoption of the advanced robots, due to

their capability to perform tasks at enhanced precision levels. Artificial intelligence is another transformative technology in the EMS segment, primarily changing the way the machines function and interconnect. Partnerships, mergers, agreements, and other types of strategic initiatives are becoming more and more prevalent among the OEMs, EMS providers, ODMs, and stakeholders as they work to familiarize to the speedy transitions in the manufacturing space.

Range of Services offered by EMS Companies Globally

EMS companies are equipped to provide a gamut of services which includes design, assembly, manufacturing and testing of electronic components for the original equipment manufacturers. These companies can be contracted at different points in the manufacturing process. While large EMS companies have the capability to offer entire range of services starting from design, sourcing of components, assembly and testing (also known as ODM), smaller EMS companies offer primarily assembly and testing services.

Chart 2.3 Range of Services offered by Electronic Manufacturing Service companies, Global, 2020



Source: Frost & Sullivan Analysis

Electronic manufacturing contains different levels of automation, depending on the capability of the company and the project they can deliver. Corporations that yield large runs of products typically employ heavily automated manufacturing. Service providers who specialise in the small production or prototypes runs normally assemble Printed Circuit Boards manually to save time and cost involved in setting up the automated assembly equipment. Electronics manufacturing services differ by service provider, and any particular partner may provide any combination of the following: PCB assembly, cable assembly, electro mechanical assembly, contract design, testing, prototyping and aftermarket services.

Design services: Design services incorporate numerous associated actions that occur after determining the customer's specifications or product requirements and before manufacturing or at the beginning of an assembly. The EMS Company initially provide the product concept describing the core objectives of the project and the initial specifications and the company is expected to do research by interviewing the product users, consulting the experts, and exploring the existing correlated products. After these two steps

take place, the product is then being developed, envisioned, and tested, and a sample is being sent to the customer for approval purpose.

Prototyping: EMS providers build prototypes, which are the early samples prepared to test the product's concept, after the design phase. Prototyping make sure that the product will serve its proposed purpose after it is manufactured as a part of a bigger production run. Prototypes are frequently built with low-cost materials than those used in the manufacturing process. Prototyping may happen many times at several points in the design and the planning stages of a project.

Testing services: Testing is an essential element of the production process since it protects against defects and errors. EMS companies should have strong test solutions in place so that they can consistently create high-quality products. EMS companies might provide one or further types of product testing after finishing a prototype or product run. Some of the key types of testing solutions include:

- **Agency compliance testing -** guarantees that the product meets the safety and the quality guideline of a certain agency's standards
- **Analytical laboratory testing -** helps in terms of quality control, research and development and failure investigation
- **Automated optical inspection -** uses a computer to analyse a Printed Circuit Board to find defects, including the broken traces, etching problems, excess solder or incorrect hole registration
- **Electrical safety testing -** is required for every product that uses electricity and helps to maintain the assembly's integrity
- **Environmental testing -** simulates a product's planned environment. It could vary the environment's temperature, humidity, & vibration to test the product's resistance
- **Functional testing -** simulates the assembly's usual function to test its complete operational features
- **In-circuit testing -** involves probing distinct components within the circuit to test their operation
- **X-ray testing -** uses non-destructive imaging technique to provide a detailed analysis of the assembly

Manufacturing capabilities: Electronics manufacturing includes quite a few diverse types of electronic products and service providers should be capable of delivering the specified product as per design.

- **Printed circuit boards (PCBs):** are the flat boards that hold the electronic components. EMS providers populate the PCBs with components for the purpose of creating printed circuit assemblies, and may have the competency to work with some different types of boards. Printed Circuit Boards are expected to be very rigid and manufactured as a hard and inflexible board.

  EMS companies might also specialize in one of two different types of PCB technology: (i) Through hole technology (THT) encompasses mounting the components by inserting their leads through the holes drilled in board. The leads after that are soldered into place on the reverse side of board. THT components are usually hand-soldered or wave soldered to a Printed Circuit Board in the production line. (ii) In Surface mount technology (SMT) the components are soldered to the top of the Printed Circuit Board. They are typically smaller and cheaper than the THT components. From

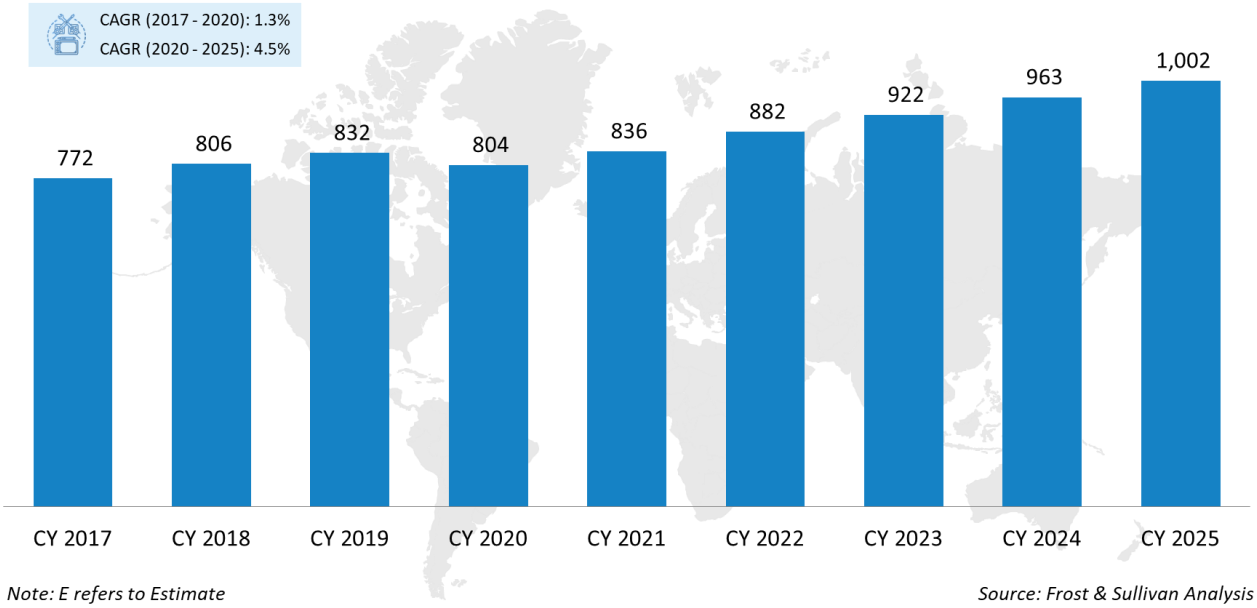
the manufacturing standpoint, existing pick-&-place equipment can mount the SMT components very quickly and precisely.

- **Microelectronics:** deals with the production of small semiconductor components that contains flip chip and chip on board devices. Flip chips are integrated circuits that connect to the external circuitry using the solder bumps deposited on the chip. They are frequently used in the mobile phones and other types of small electronics. Chip-on-board devices include bonding bare dies to Printed Circuit Boards.
- **Optoelectronics:** devices include sourcing, identifying, or controlling the light. EMS companies can bring together optical switches, fibre optic transmitter & receiver, and the laser modules.
- **Radio frequency or wireless devices:** are regularly used in the telecommunications and the data transfer applications. EMS providers can assemble RFID and other types of telecommunication and wireless technologies.

Aftersales Service: Aftersales currently generates 7.1 % of the total EMS market revenue. The demand for repair and remanufacture is not high, as a majority of the electronics products, for instance mobile phones, tablets, computers, and laptops, do not create a demand for repair or remanufacturing activities. The end-user mind-set is fixed on replacement rather than repair, and hence, the overall demand for this service is low. Only high-value electronics with warranty will the create necessity for repair and remanufacturing, for instance telecom or certain products in the aerospace and industrial sectors.

Global Electronics Manufacturing Services (EMS) Industry and Outlook

Chart 2.4 Electronics Manufacturing Services (EMS) Industry, Global, Value in USD Billion, CY2017-CY2025E



Note: E refers to Estimate

Source: Frost & Sullivan Analysis

The global EMS market was estimated at USD 804 Billion in 2020, and is expected to reach USD 1,002 Billion in 2025 at a growth rate of 4.5 %. The global EMS market witnessed a period of steady growth till 2018, riding on the wave of increased outsourcing activities from OEMs and increasing electronics content.

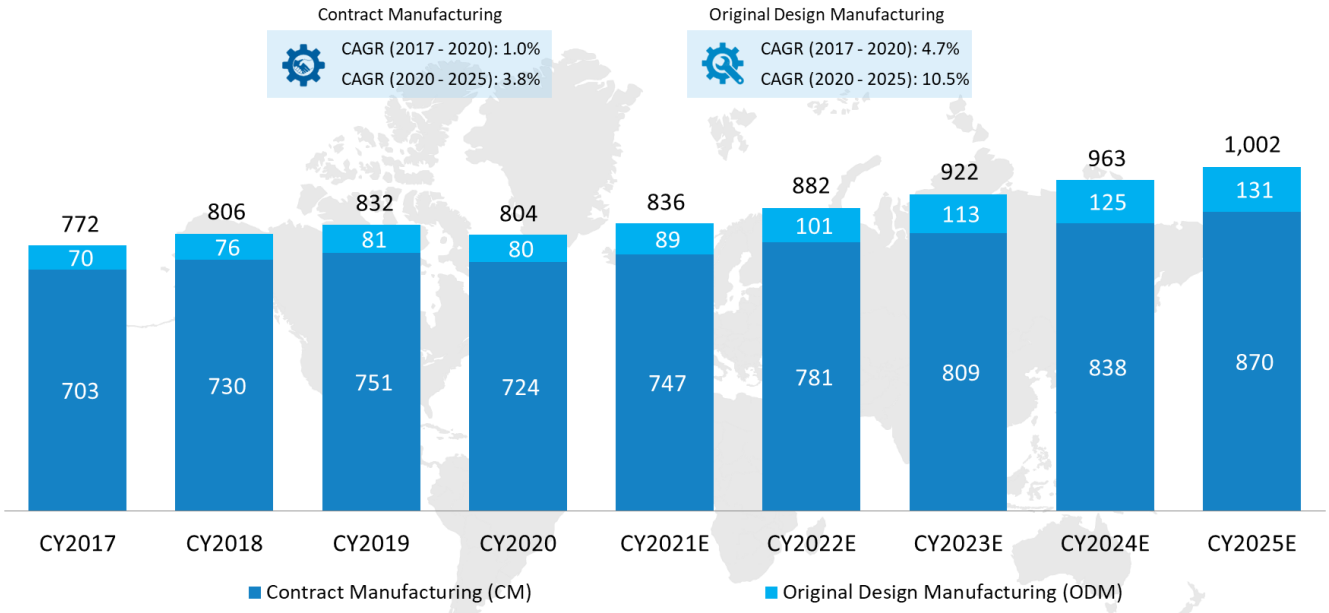
However, in 2019, the opportunities started stagnating due to multitude of factors. Firstly, decline of global automotive sales and saturation of consumer electronic sales. Secondly, supply chain restriction due to heightened trade tensions between US and China.

While the industry was still coming in terms with these shocks, a bigger blow was waiting for the industry in the form of Covid-19 pandemic. The pandemic-induced lockdown produced an even more complicated environment for the industry affecting demand, supply, and manufacturing activities. Despite growing demand in the Q4, EMS industry recorded a 3.4 % decline in 2020. Impact on the industry was expected to be higher, however certain factors worked in favour of the industry. These are – a. the pent-up demand created by the need for life-sustaining medical devices; b. the work-from-home economy, which created demand for smartphones, tablets, and laptops; and c. the push for climate change, which created demand for Digitalization or Digital softwares/products/solutions that can track, monitor, measure and verify sustainability initiatives.

Moving ahead, the EMS industry is anticipated to grow rapidly over the following years, surpassing pre-COVID-19 revenue level by 2021 or 2022. According to Frost & Sullivan analysis, the EMS market will face challenges with supply chain in 2021, which will have a medium restraining effect. The issue is expected to be resolved by the end of 2021 through various measures including part localization. Additionally, as the electronics content increases, the demand for electronic components will increase in future which will drive the EMS market. EMS providers are increasing their focus on the design aspects which would also add into their revenue stream going ahead. According to market participants, technological expertise would add to the competitive advantage of EMS providers and will increase their revenue opportunities.

Global EMS Market Break-up by Contract Manufacturing (CM) and Original Design Manufacturing (ODM)

Chart 2.5 EMS Market break-up by CM and ODM, Global, Value in USD Billion, CY2017-CY2025E



Note: E refers to Estimate

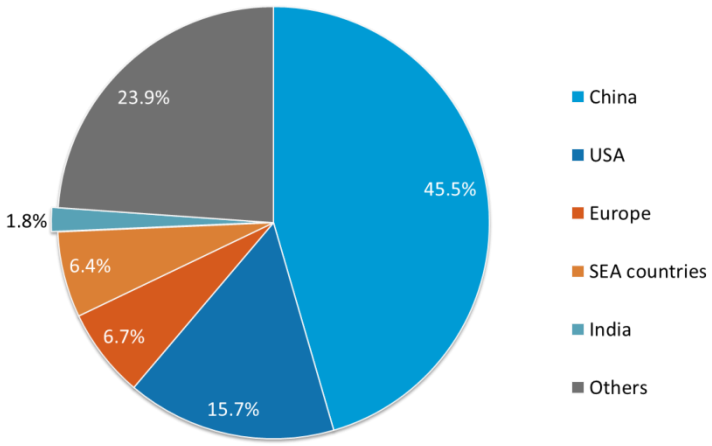
Source: Frost & Sullivan Analysis

The global EMS market is defining the force in production of the electronics products and now accounts a very large portion of the electronics market. While outsourcing increased rapidly in 2019, it remains the most anticipated manufacturing model for the assembly of advanced electronics products accessible to OEM companies. The EMS market was valued at USD 804 billion in 2020, is split by Contract manufacturing which enjoys the majority share in the year 2020 valued at USD 724 billion in 2020 and expected to grow to a value of USD 870 billion in 2025; ODM has a market share of around 10%, is worth USD 80 billion, and is expected to grow to 13%, worth USD 131 billion, by 2025.

Global EMS Market Break-up by Select Countries

APAC is undoubtedly the largest revenue contributor and high growth region due to operational cost benefits, availability of a large number of highly skilled personnel, infrastructure, logistical advantages, and proximity to the largest end-user base across all end-user verticals. On-going digitalization, IoT, and urbanization are some Mega Trends that will drive the region's growth prospects. China leads the global EMS business with almost 46% share. Its dominance in the global market is attributed to a blend of cost effectiveness and technological leadership in electronics manufacturing. It is a high growth region due to operational cost benefits, availability of a large number of highly skilled personnel, infrastructure, logistical advantages, and proximity to the largest end-user base across all end-user verticals.

Chart 2.6 EMS Market break-up by select countries, Global, Value in USD Billion, in %, CY2020



Source: Frost & Sullivan Analysis

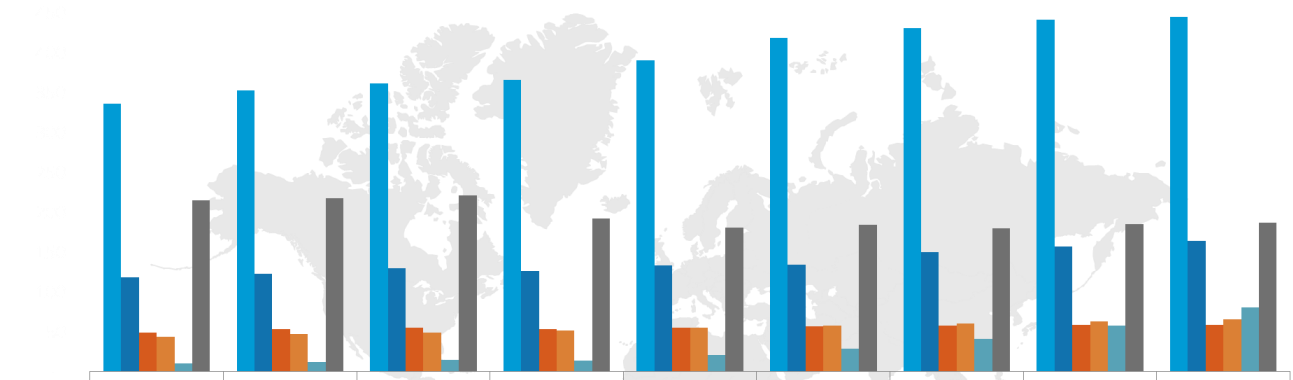
North America is a leader in adopting next-generation technologies and devices. For instance, USA is one of the first countries to start commercialization of 5G. On the devices front, the demand for IoT based devices is expected to accelerate at CAGR of 15.0 % till 2025. In the next five years, demand for EMS will be driven by a rise in electronic device demand, a well-established EMS infrastructure, and evolving government policies that encourage local production. Linking the region's quantum of R&D activities to the total available market, EMS providers can expect good growth opportunities from product development if EMS providers can solve scalability and time-to-develop challenges.

Advanced technologies provide huge market potential for European EMS providers. Manufacturers in the region are expected to aggressively adopt Smart Factory capabilities to compete on price and secure more

contracts. Also, the EMS providers in the region are looking to diversify the portfolio of end-user verticals to create sustainable growth opportunities. Currently, some EMS firms in the region that rely heavily on the automotive or aerospace and defence (A&D) verticals were significantly impacted in 2020 due to economic slowdown. From a growth perspective, the presence of leading network equipment OEMs, emerging medical device start-ups, regulations forcing auto OEMs to shift to EVs, reshoring, and upgrading of manufacturing facilities will improve growth prospects for EMS companies in the region.

In India, there is a strong government push to broaden the operations and revenue from the electronics industry. In 2019, India launched several schemes, including EMC 2.0, under National Policy on Electronics (NPE) to improve the infrastructure of electronics manufacturing and provides incentives to produce more goods that drive EMS in India. PLI scheme offers various incentives to promote the EMS industry and pushes companies to rethink their local supply chain and aim for export-led growth. An EMS corridor is being set up in southern state of Tamil Nadu at Chennai. EMC Smart City investment in Greater Noida is proposed at an investment of USD 162.7 million. Companies such as Jabil, Dixon, Flextronics, SFO, Elin, Rangsons, Kaynes, and Centum have invested in production capacities backed by Make in India policy initiatives.

Chart 2.7 EMS Market break-up by select countries, Global, Value in USD Billion, CY2017-CY2025E



	CY2017	CY2018	CY2019	CY2020	CY2021E	CY2022E	CY2023E	CY2024E	CY2025E
China	336	353	362	366	390	419	431	441	445
USA	118	123	130	126	134	134	150	157	164
Europe	49	53	55	54	55	57	58	59	59
SEA	44	48	50	52	55	58	61	63	66
India	10	12	15	14	21	29	41	58	81
Others	215	218	221	192	181	184	180	185	187

** Others include: Rest of Asia, Latin America (LATAM), Middle East & Africa (MEA)*

Note: E refers to Estimate

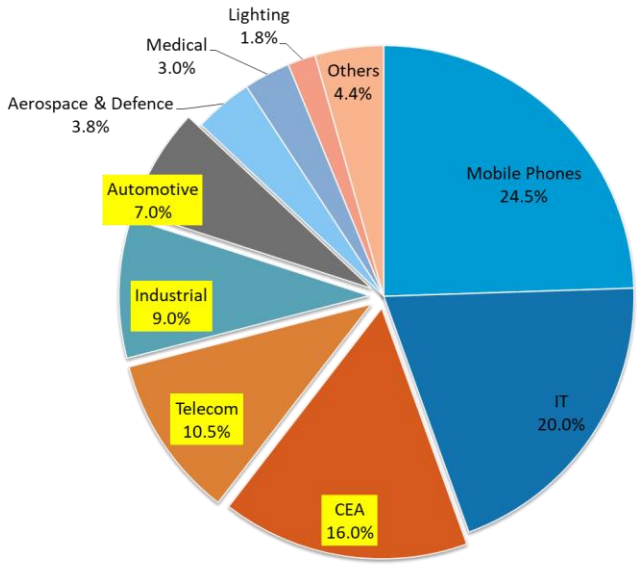
Source: Frost & Sullivan Analysis

Post Covid-19 pandemic, many global electronics manufacturers are contemplating on China + 1 strategy and looking for alternate manufacturing locations for exports business. This is creating tremendous investment potential for countries like Vietnam, India, and Philippines etc. North American EMS providers are in the process of reducing the revenue opportunity from China. For instance SMTC, an American EMS provider, closed its production facility in China in 2019 and relocated its assets to its North American plants. Similarly, Jabil, a large North American EMS provider, has started experiencing a decline in revenue from China, but drastic increase in the revenue from other SE Asian countries, indicating a strategic shift to reduce the impact of US-China trade tariffs, while aiming to improve the cost margin. Plexus, one of the leading EMS providers, also recently announced commissioning of a new plant in Thailand. In Frost & Sullivan's interaction with industry experts in SE Asian countries, the participant acknowledged the

increased interest among large EMS providers to relocate from China. There are country-level investor programs initiated by governments, such as the Philippines, Vietnam, and Thailand, to capitalize on the situation and evolve into the next EMS manufacturing hubs of the region. Asian countries like China, India, and Japan will further strengthen their shares in the global electronics market over the coming years. Requirement for low cost manufacturing within closer proximity of the end market will be the driving factor.

Global EMS Market Break-up by End-user Applications

Chart 2.8 EMS Market break-up by Industry Applications, Global, Value in USD Billion, CY2020



 # Segments highlighted in yellow are the key business segments for Syrma

** Others include: Energy, Power, etc*

Source: Frost & Sullivan Analysis

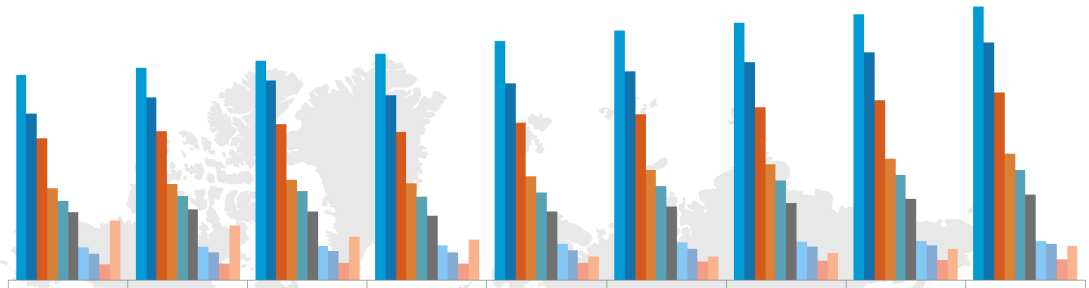
Computers and information technology (IT) and consumer electronics and appliances (CE&A) account for roughly 36% of the market in terms of value in 2020. The work-from-home trend boosted sales of computers, IT, and other hardware products during this time period. Consumer electronics and appliances, which have the second largest market share, have had a consistent performance in the last few years, which has been aided by growth in advanced economies and developing countries. Though the segment was impacted due to the COVID-19 pandemic, EMS manufacturers have also profited from rising consumer spending and technological improvements. Rising demand for smart solutions is expected to fuel future growth. Furthermore, OEM and EMS manufacturers are progressively supplying both premium and mid-range appliances in order to meet the growing demand for both product categories and increase revenue.

The Telecom vertical includes servers, routers, base-station transceivers and transmitters, and other telecom devices. 5G technology commercialization is one of the major factors contributing to the growth of the EMS market from this vertical. EMS companies provide end-to-end services, including design, prototyping, testing, and supply chain management.

Automotive is one of the key growth opportunity verticals for EMS providers in the next 5 years, due to the technology transformation currently underway with autonomous car development and electric car commercialization activities. Moreover, the rapidly growing electronics content will accelerate the growth

of EMS revenue from this vertical. Medical device electronic manufacturing services are a key revenue opportunity in the other segment. Though the Covid-19 pandemic has created a surge in demand for EMS in this vertical, it is important to carefully assess the demand level for the mid and long terms.

Chart 2.9 EMS Market break-up by Industry Applications, Global, Value in USD Billion, CY2017-CY2025E



	CY2017	CY2018	CY2019	CY2020	CY2021E	CY2022E	CY2023E	CY2024E	CY2025E
Moile Phones	179	184	191	197	208	217	224	231	238
IT	145	159	174	161	171	181	190	198	206
CEA	124	129	135	129	137	144	150	157	163
Telecom	80	84	87	84	90	96	101	105	110
Industrial	69	73	78	72	76	82	87	91	96
Automotive	59	62	60	56	60	64	67	71	74
Aerospace & Defence	28	29	30	30	32	33	33	34	34
Medical	23	24	25	24	26	28	29	31	32
Lighting	14	14	15	14	15	16	17	18	18
Others	52	48	38	36	21	21	24	27	30

** Others include: Energy, Power, etc.*
Note: E refers to Estimate

Source: Frost & Sullivan Analysis

Drivers and Challenges for the growth of Global EMS industry

Key Drivers for the growth of Global EMS industry

- **Technological advancements and acceptance of smart home devices**
- **Greater Emphasis on Vehicle Electrification**
- **Technological upgrade of facilities**
- **Product development activities**
- **COVID-19 induced pent-up demand**

Technological advancements: The development of new manufacturing technologies and the emerging end-use sectors, such as the Internet of Things, are expected to boost demand for the EMS industry. Major manufacturers are strengthening their R&D investment in order to differentiate their products and attract new end-use applications. The rising popularity of smart home devices in developed nations such as the United States and European countries raises very high expectations for EMS companies. In the United States, companies provide electronic manufacturing services that include developing optoelectronics, radio frequency and wireless devices, and microelectronics devices for the rapidly growing smart home sector.

Key market participants are focusing on increasing production volumes by combining cloud computing, artificial intelligence, big data analysis, and 3D printing to produce connected devices for smart homes.

Greater emphasis on Vehicle electrification: The Electric Vehicle market will be the most lucrative in the automotive industry over the next decade. With an ever-increasing electronic content in each car, energy-related modules and sub-assemblies, as well as charging infrastructure, which requires an overall ecosystem; it is a paving out major potential for EMS firms to enter this fast developing industry and serve the leading EV manufacturers. Across the world, incentives are provided by the respective government to encourage people to purchase electric vehicles. For instance grants are highly popular in the United Kingdom, China, the United States, Germany, and even Norway, among other places, in order to reduce air pollution and promote a more sustainable way of life. As the number and complexity of PCBAs in electric vehicles are significantly higher than in typical ICE vehicles, this growth represents a huge potential for EMS businesses to offer electronic manufacturing and mass production services to automakers.

Technological upgrade of facilities: EMS companies are investing in the technological up gradation of their facilities by adopting digitization and industry 4.0 concepts. This will improve productivity and capacity, thus acquiring the capability to get more contracts. A majority of the market participants are progressing in this direction; hence, this factor will evolve into a significant driver in the mid to long-term.

Product development activities: The dependence created by electronics in product development activities across all verticals will turn out to be a significant driver for EMS, especially in consumer electronics and automotive segments, where new devices and systems are being developed. As the electronic content increases, the volume of manufacturing will increase, driving the market.

COVID-19 induced pent-up demand for medical devices: has currently increased the requirement for EMS services. This will subdue in the mid to long-term once inventory is created. Also, major medical device manufacturers are very keen to design & manufacture smaller and smarter medical devices that integrate new technologies like IoT and other electronics-embedded features. Furthermore, the growing demand for the wearable and the smart medical devices is pushing the need for smaller, flexible, and light-weight products in the healthcare business.

Challenges / market restraints hindering the growth of Global EMS industry

- **Presence of market participants is high**
- **Shrinking operating margin**
- **Complex structure and delay in supply chain**
- **Shortened product lifecycles and uncertain demand**
- **Regulations and Violations of IP**

Presence of market participants is high: The existence of a high number of market participants in all areas results in competitive pricing, which reduces market revenue potential. Despite the fact that the

market is seeing a number of mergers and acquisitions, Frost & Sullivan does not foresee a substantial beneficial impact.

Shrinking operating margin: A majority of the market participants face challenges with respect to the operating margin. In the EMS industry, profit margins are relatively low. As component prices are on an average, key focus lies on the labour costs. A low operating margin is viewed as an impediment to growth, considering the impact it can create on expansion plans. Currently, this is viewed as a significant restraining factor for the market. However, in the long term, as overall demand increases, market participants will be able to expand through technological investments. Thus, the impact will lower in the mid to long terms.

Complex structure and delay in supply chain: Manufacturing businesses must adhere to global standards since they rely on a wide range of suppliers, both local and international. The operational constraints are compliance with rigorous government and industry regulations, as well as the concern of traceability. It is fairly uncommon for a product's components to traverse across several continents before reaching the market. Supply chain delays causing shortage of components are likely to impact the revenue in the short term. Overall, the impact of transformation is very low in the mid and long terms.

Shortened product lifecycles and uncertain demand: Customer preferences and interests continue to evolve at a breakneck pace. An active new product launch procedure is required for EMS companies. To launch the items on schedule while fulfilling quality and volume objectives, a collaborative effort across difference sections is required. Production is always based on the customer demand, which can be both unstable and cyclic. The industrial sector should be able to handle the rise in demand if it reaches exceptional heights. If demand falls, companies must have a strategy in place for the idle raw materials or machinery.

Regulations and Violations of IP: Local stringent laws and trade pricing are having an influence on the EMS sector, driving OEMs to build in-house manufacturing capabilities. In addition, an increasing number of cases on infringement of intellectual property rights are posing a serious threat to EMS companies.

Government incentives and Programs to support Electronics Industry by Select Countries

Across nations, there is a strong government push to broaden the operations and revenue from the electronics industry.

India: The government of India has been proactively building a base for electronics manufacturing in India and it has launched numerous incentive schemes, which have allowed manufacturing growth, reduced dependence on the imports, and promoted the exports. The GOI has launched numerous policies over the last few years to increase the innovation, protect the intellectual property, and develop the best-in-class electronics manufacturing set-up to build a favourable environment and invite the investment in the electronics hardware manufacturing. India’s production of electronics has more than doubled in the past five years in between the time period 2015 to 2020 depending on such favourable incentive schemes. Some of the key schemes/ policies include: Product Linked Incentive (PLI) Scheme, Scheme for Promotion of Manufacturing of Electronic Components and Semiconductors (SPECS), Modified Electronics Manufacturing Clusters Scheme (EMC 2.0), Merchandise Exports from India Scheme (MEIS).

Chart 2.10 Key government incentives, policy / schemes and programs by select countries, Global, 2020

Key government incentives, policy / schemes and programs by select countries, Global, 2020	
India	PLI Scheme, SPECS, EMC 2.0, MEIS
China	China Standards 2035;Made in China 2025
United States	National Defense Authorization Act of 2021 (NDAA)
Europe	Industry 4.0 Policies; Digital Single Market Strategy; Industrial Policy Strategy
Vietnam	National industrial Development policy through 2030
Thailand	Thailand 4.0 strategy
Indonesia	National Industrial Policy
Singapore	Electronics Industry Transformation Map (ITM)

China: The Chinese economy is locally driven and has grown rapidly in recent years as a result of rapid expansion of its consumer market, deep localization of supply chains, and a strong emphasis on local innovation. As a result, China's revelation to the rest of the world in terms of people, technology, and capital has decreased. As a result of COVID-19, a number of foreign government leaders have called for reshoring of supply chains. Hence, a number of initiatives and policies recently launched by the Chinese government highlight the importance of attracting international companies to conduct business and invest in the country. In April, 2020, the Ministry of Commerce issued the 'Circular on Further Expanding Reform & Opening up to Stabilize International Investment,' which includes 24 various steps to encourage foreign investment into China.

At the 2020 National People's Congress, the Chinese Communist Party announced that along with doubling down on its China Standards 2035 and Made in China 2025 initiatives, it is also going to spend roughly USD 1.4 trillion on the digital infrastructure public spending initiative. The new structure includes seven crucial areas: Industrial internet, 5G networks, inter-city transportation & railway system, Artificial Intelligence, data centres, ultra-high voltage power transmission, and new-energy vehicle charging station. Originally pushed as a way-out for China to attain the domain independence and speed up its industrial up gradation, the new infrastructure plan has transformed into a very long-term nationwide economic strategy.

United States of America: The United States Congress enacted the yearly policy law as part of the National Defence Authorization Act of 2021 (NDAA) in January 2021, and it has made a strategic move toward Onshore Electronics Manufacturing. The national defence bill encourages the establishment and expansion of cutting-edge foundries. The provisions authorise financial incentives for the construction or modernization of semiconductor fabrication, assembly, testing, advanced packaging, or advanced research and development facilities.

In addition to financial incentives, the NDAA authorises microelectronics-related R&D, the development of a "provably secure" microelectronics supply chain, the establishment of a National Semiconductor Research

Technology Centre to assist in the transition of new technology into industrial facilities, and the formation of committees to develop strategies for increasing cutting-edge capacity. It also gives the go-ahead for quantum computing and artificial intelligence programs.

Europe: Industry 4.0 Policies in the European Union is a significant trend in the region, and the European Commission sees the introduction of Industry 4.0 as an opportunity to boost productivity and re-shore industrial operations. Recognizing the obstacles that the European Union has in fully leveraging Industry 4.0, the European Commission has advocated for bold industrial policy initiatives. The two most relevant policy strategies are the Digital Single Market Strategy for Europe (2015) and a renewed EU Industrial Policy Strategy (2017).

Vietnam: Vietnam's electronics industry is one of the fastest-growing and the most vital industries in Vietnam. Largely dominated by the multinational companies, electronics industry has considerably boosted country's trade volume and contributed to the Vietnam's GDP in the preceding decade. With evolving opportunities because of trade liberalization, labour quality enhancement, corporate tax discount and the government restructurings, Vietnam has become one of the most favourable alternatives for the foreign investors who are considering relocating their electronics industry investment in Asia Pacific.

Thailand: In the perspective of the 4th Industrial Revolution, the Royal Thai Administration has launched "Thailand 4.0" strategy in the year 2016, classifying the Electrical & Electronics industry as the strategic sector within its industrial advancement and human capital growth plans. This capacity growth plan is expected to boost the industry going ahead for Thailand.

Indonesia: The Indonesian government has selected electronics as one of the six manufacturing priorities with the Presidential Decree on the National Industrial Policy, which offers a road map of industrial development and long-standing development goals. It has set a long-term industrial development vision for Indonesia to be a strong industrialized nation by 2025. The Ministry of Industry has taken a two-pronged approach to set the Policy into effect. The first is a top-down strategy, with the central government planning to establish 35 key industrial clusters, which will be followed by municipal and regional participation. The second is a bottom-up approach that involves identifying local industries that will become core competences in each region, followed by the establishment of province, regency, or municipal excellence industries.

Singapore: The country has a robust electronics industry that accounts for a quarter of the country's manufacturing GDP. With the Electronics Industry Transformation Map (ITM), the Singapore government has outlined plans to improve the electronics industry, with the goal of increasing the electronics sector to SGD 22.2 billion. The plan aims to transform the current installed base of companies through productivity, automation, and upgrading the manufacturing product mix.

The Geopolitical Situation and its Impact

Geo political situation, Global, 2020

- US China Trade War
- Rising labour cost in China
- Threat on EMS industry in China
- Covid-19 driven disruption in supply chain
- Impact of Global Chip Shortage on EMS industry

US-China Trade War: Since early 2017, the Trump government began making threats of tariffs on the Chinese imports. In the month of March 2018, the US Government endorsed its first of three rounds of tariffs which ultimately covered a varied range of Chinese exports comprising many manufactured by the country's 4,500+ EMS companies. The imports were transferred to other countries due to the trade war between these 2 major economies. Asian countries especially India, Vietnam and Indonesia, are likely to benefit more than the rest of the world due to lower wages and their geographical proximity to China. Vietnam has benefitted the most, with 7.9 % of its 2019 GDP coming from import substitutions by the United States and China. Electronics manufacturers are preparing to shift more production to SEA.

Rising labour cost in China: The aspiration level of Chinese workers has increased and they are focusing on high-tech jobs, leaving gaps in the low end of manufacturing value chain. This has led to scarcity of the labour and a higher cost due to lack of availability of the manpower. The average cost of manufacturing labour per day is USD 6.2 in India and USD 28.2 in China, which make manufacturers to move out of China.

Threat on EMS industry in China: Over the past few years, China has realized its stake of challenges, and what some individuals recognize as the potential threats to China's current position as the world's biggest EMS host country. Trade tensions, allegations of currency manipulation, and a resurrection of economic patriotism in the US, UK and some other western nations have all formed a new level of emphasis and scrutiny on the China's EMS business. On top of these challenging concerns, none of which have been fully resolved, the Covid-19 pandemic has caused major supply disruptions around the world. All of the above issues have been exacerbated by allegations and blame games, resulting in a perfect storm for China's EMS industry. OEMs' need to diversify their supply chain to reduce risk has fuelled the expansion of the EMS industry in countries like Vietnam and Mexico. At present, China is the world's largest EMS destination, and this is likely to change in the coming decade.

Covid-19 driven disruption in supply chain: The COVID-19 pandemic has disrupted the manufacturing supply chain and curtailed the commodity demand across the world. Although manufacturing of electronic products are boosted through various government initiatives and policies, most countries are heavily dependent on China for supply of raw materials, components and accessories. Such high dependency on imports with some critical components being produced in China is expected to have significant impact in the future if there is reoccurrence of any similar outbreak. Hence, OEMs across the world are also planning to source components from countries other than China following the 'China + 1' strategy.

Impact of Global Chip Shortage on EMS industry: The global chip supply shortage has intensified in 2021 after the COVID-19 pandemic, as major companies across industries have failed to meet the rising demand for electronic goods and components. Supply chain disruption due to pandemic, rising demand for electronic products as more people work from home, and a lack of investment in chip production capacity have all contributed to the global chip shortage. As a result, the prices of household appliances and electronics have increased. The supply of finished electronic products and components necessary for local manufacturing has been delayed due to prolonged congestion at Chinese ports and a lack of containers. Analysts predict the chip shortage may not end until 2022, since supply delays caused by current COVID limitations are expected to last at least a year.

Next in the EMS Industry Post COVID-19

In the next 4 to 5 years, major Asian economies such as India, Vietnam, and Thailand, as well as a significant number of low-cost Asian nations such as Laos, Myanmar, Cambodia, and Bangladesh, will witness increased investment in their budding tech manufacturing businesses. Much of this investment is estimated to be based on the total size of current labour force, along with growth rates of the labour force and the increasing local consumer marketplaces. EMS & ODM companies from Foxconn to Flex truly understand that these big investments in the new manufacturing centres most often take 15 years or even more before they actually become a competitive force at a meaningful scale.

Entry to China's EMS industrial unit is expected to become a bit less exposed to the international visitors, as restrictions are put on the total number of visitors, and the access controls including the health checks and the travel questionnaires for the visitors become much more widely adopted. As the world emerges from the current pandemic, it is going to become more and more important for the OEMs and the Brand Owners to have some sort of in-country sustenance for their offshore production and supply chain undertakings across entire Asia.

A substantial wave of consolidation is most likely to happen among the China's smaller EMS firms, which number is well over 4,000. For few of these businesses, who most often persist on the business of just a handful of important customers, the loss of even one single western client could leave no other options other than consolidation. This very long outstanding process will certainly serve to reinforce the complete EMS industry in China as the weakest players get shaken out of business. A new kind of mid-sized, China only EMS providers are expected find their wings and grow outside of China to contest with the larger multi-national EMS providers from the US and Taiwan.

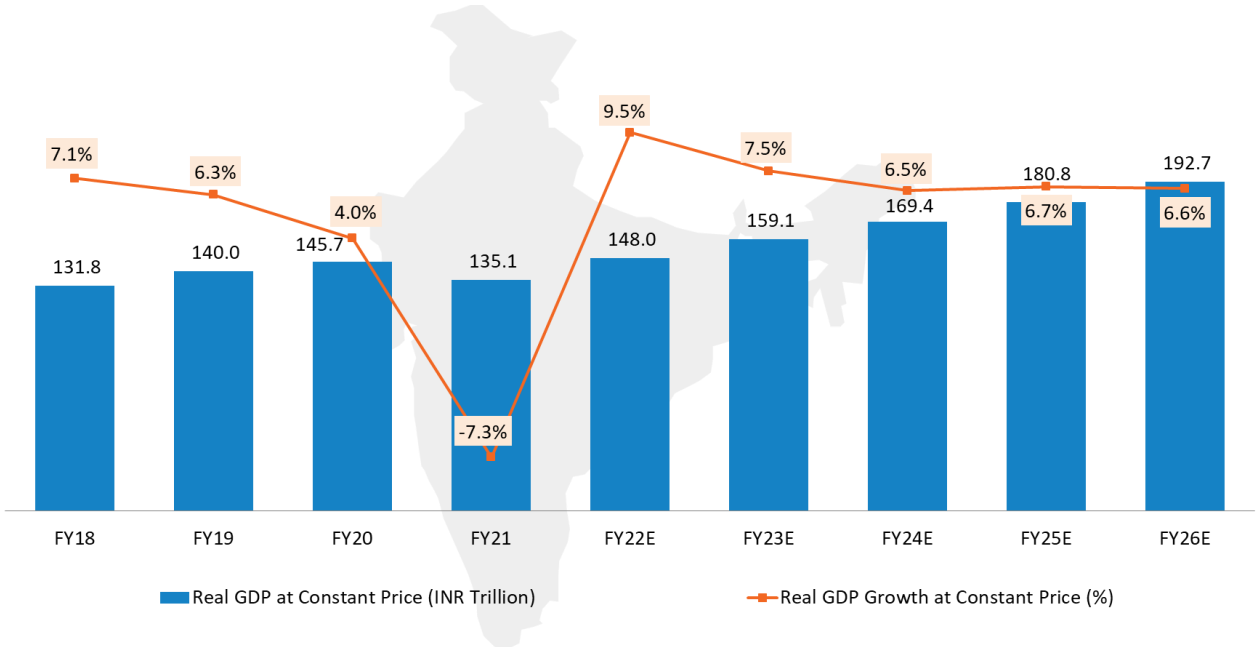
CHAPTER 3 - INDIAN ELECTRONICS INDUSTRY OVERVIEW

India Macroeconomic Outlook

A. India Real GDP

India's Real GDP grew steadily till FY17, following the economic downturn of FY13. The growth was robust and fundamentals were strong. However, the growth started slowing down since FY18 and touched a record low of 4.0% in FY20. While multiple reasons are attributed to this decline, eminent economic experts have cited Demonetisation and GST implementation are the key reasons for this moderation in growth. Along with this, the economy was already struggling with massive bad loans in the banking system during this tenure. While the fundamentals were already week, the economy received a huge jolt from Covid-19 pandemic in the beginning of FY21. The government's efforts to curb the spread of the Covid-19 pandemic have had an impact on the economic activity. To address the crisis created by the pandemic, the government had proposed a slew of policy initiatives, from providing daily food supplies to delaying various compliance and tax reporting deadlines.

Chart 3.1: Annual Real GDP and Real GDP growth (Annual Percentage Change), Value in INR Trillion, Growth in %, , India, FY18-FY26E



Note: E refers to Estimate *Source: MoSPI (Annual Estimates of GDP at constant price, 2011-12 series), IMF; Frost & Sullivan Analysis*

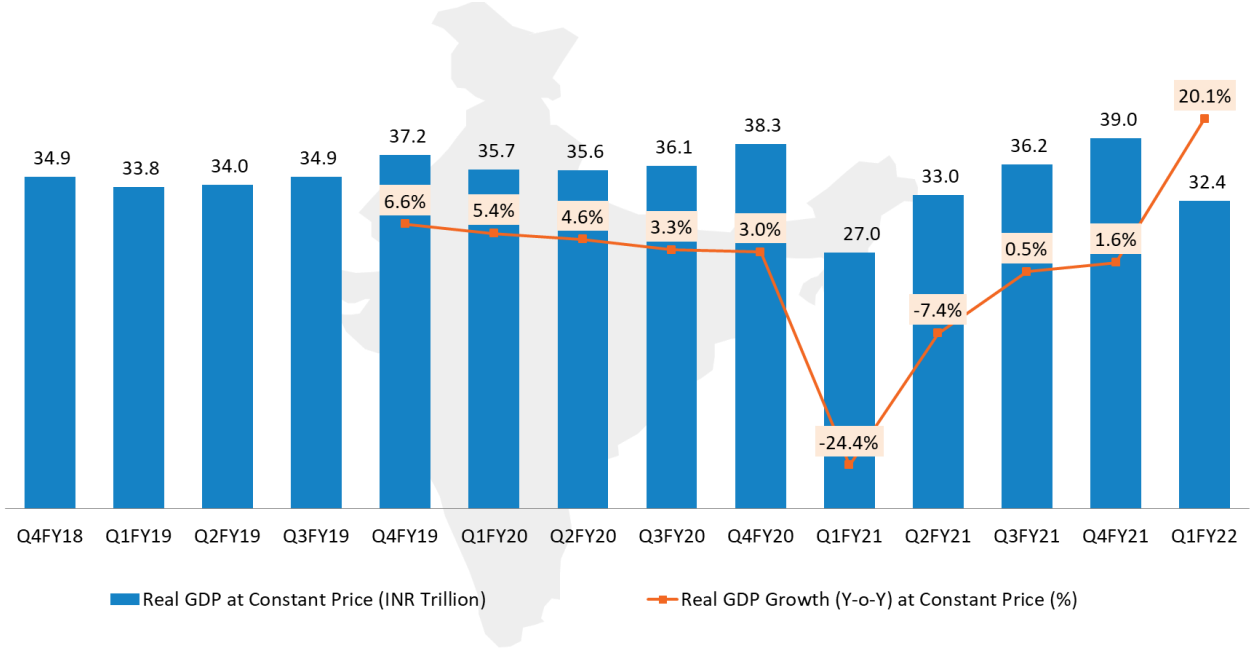
During the first wave (March 2020 onwards), the Indian government had to enforce a four-phase countrywide lockdown till May 2020 in order to curb the spread of this deadly virus. Since then, the recovery has been slow, which has caused many job losses and a decline in economic activity that has harmed the spending power of the majority of middle class people. However, India's recovery was robust in the succeeding months, since the country's economic trajectory had been on the rise. Many industries, including technology, pharmaceuticals, and healthcare, have experienced unprecedented growth. However,

segments such as travel and tourism, as well as wellness and hospitality, have declined to record lows, and the situation has improved subsequently.

Similar to FY21, FY22 also started on a sour note as the second wave of the deadly pandemic swept across the country. The duration of the second wave was shorter but the impact was much severe and the country had to experience huge loss of human lives during the month of April and May earlier this year. However, the economy showed extreme resilience and recorded 20.1 % growth in April – June quarter of this financial year. The economy has been witnessing positive sentiments across the sectors and the stock market indices are touching new heights every day. India's electricity demand has reached to pre-pandemic level due to heightened activities in the manufacturing sector.

FY22 outlook is strong and the Indian economy is expected to register 9.5 % growth in this financial year. Govt. has taken slew of measures to bring the economy back into track. There is strong focus on growth of the domestic manufacturing sector through various policy initiatives such as Atmanirbhar Bharat, PLI schemes etc. These initiatives will help the economy to register stable growth of approximately 6.5 % in the medium term.

Chart 3.2: Quarterly Real GDP and Real GDP growth (Quarterly Percentage Change), Value in INR Trillion, Growth in %, India, Q4FY18-Q1FY22

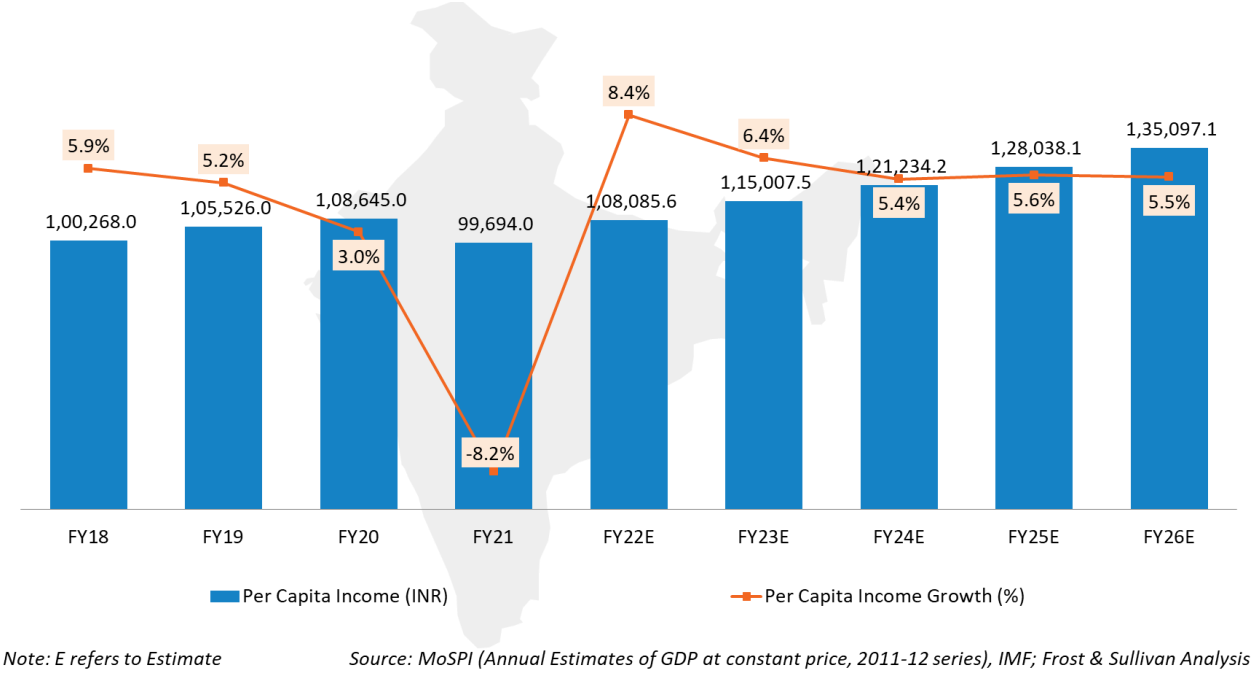


Source: MoSPI (Annual Estimates of GDP at constant price, 2011-12 series), IMF; Frost & Sullivan Analysis

B. Per Capita Income

The per capita income is a broad indicator of prosperity of an economy. India's per capita income, calculated in correlation to Real GDP, was INR 99,694 during FY21 compared to INR 108,645 in FY20, an approximate 8.2 % decrease. However, it is expected that the per capita income will increase by around 8.4 % during FY22 to touch INR 108,085. The effect is likely to be short term and as COVID-19 pandemic effects subside, the growth will continue at its pre-COVID 19 anticipated pace.

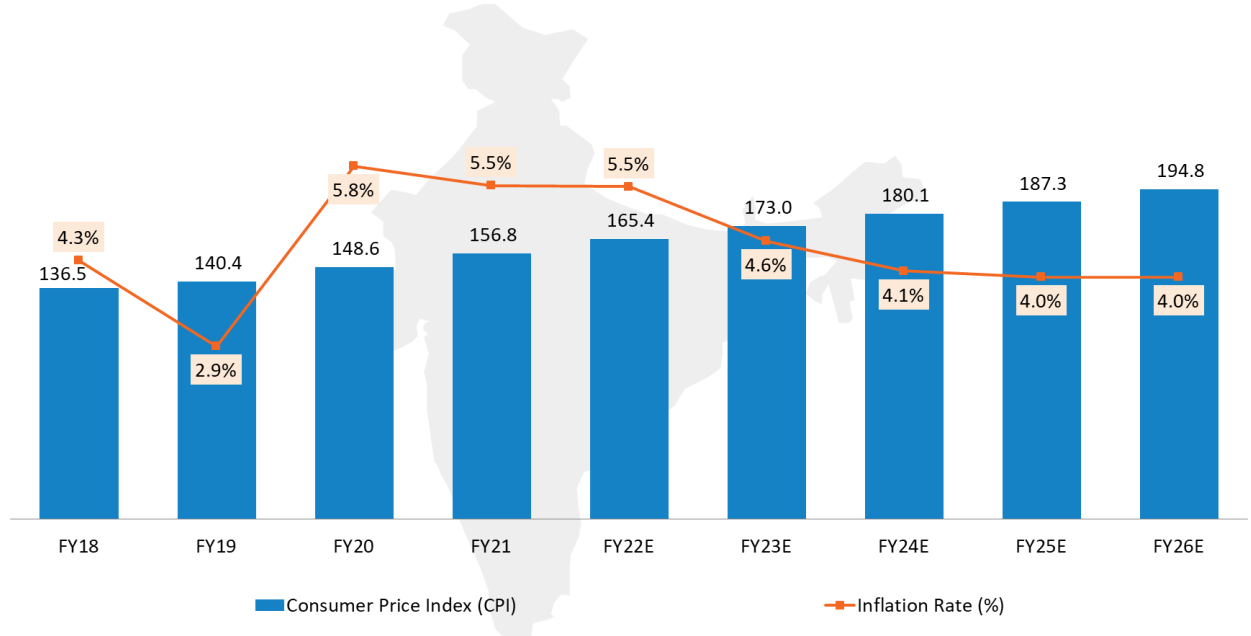
Chart 3.3: Per Capita Income and Growth (Annual Percentage Change), Value in INR, Growth in %, India, FY18-FY26E



Note: E refers to Estimate *Source: MoSPI (Annual Estimates of GDP at constant price, 2011-12 series), IMF; Frost & Sullivan Analysis*

C. Consumer Price Index (CPI) and Inflation

Chart 3.4: Consumer Price Index (CPI) and Annual Inflation Rate, Index in Number, Rate in %, India, FY18-FY26E



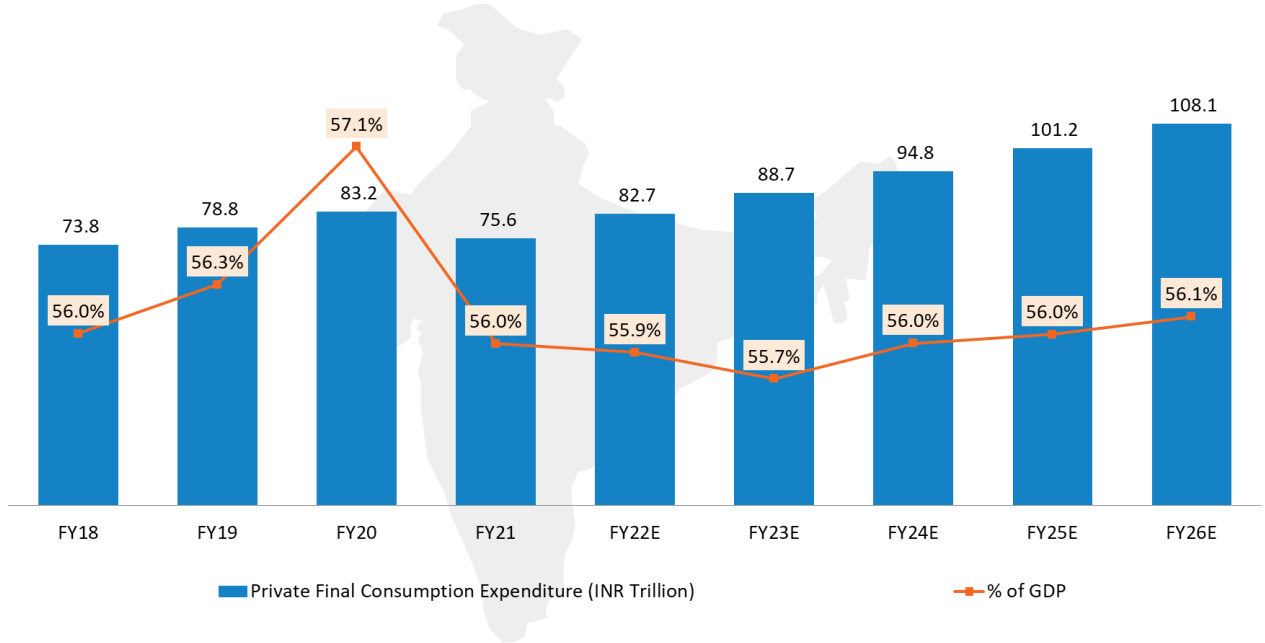
Note: E refers to Estimate *Source: MoSPI (Annual Estimates of GDP at constant price, 2011-12 series), IMF; Frost & Sullivan Analysis*

Inflation has been trending lower since FY19, which was a positive sign for the consumption economy since customers can then afford to purchase more products, providing the necessary fuel to the manufacturing sector. However, inflation rate has almost doubled in FY20 and likely to maintain at that level since FY22. Rising inflation has been emerged as a key macroeconomic concern in the recent months with prices of almost every commodity has touched new heights. Going forward, the trajectory of inflation will be governed by multiple factors such as global commodity prices, crude prices etc. As always, The RBI has to strike a balance between managing growth and inflation in the face of weak consumer demand. Once the market is completely open, consumer spending may move back to services, reducing demand for products and therefore relieving some inflationary pressure on the goods side. The inflation rate is likely to ease out in the near future and get stabled around 4 % CAGR in the medium term.

D. Private Final Consumption Expenditure

India's Private Final Consumption Expenditure (PFCE) has declined by 9.1% in FY21. Consumption expenditure growth has been slowing through the last decade. The blow of Covid-19 pandemic has put it back on the time machine. FY21 PFCE was not only 9.1% lower than FY20; it was also 4.1 % lower than FY19. This shrinking of consumption expenditure had a direct impact on the intermediate industries that feed India's consumption engine. As the threat and uncertainty around Covid-19 has significantly declined in the last few months, consumer confidence is coming back and PFCE is expected to catch-up pre-COVID levels within this financial year. Post that, the PFCE is expected to stable at approximately 56 % in the medium term.

Chart 3.5: Private Final Consumption Expenditure and Contribution to Real GDP, Value in INR Trillion, % of GDP, India, FY18-FY26E



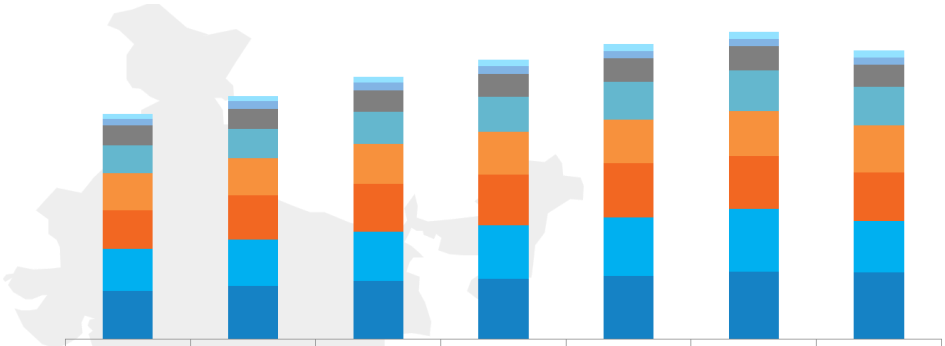
Note: E refers to Estimate

Source: MoSPI (Annual Estimates of GDP at constant price, 2011-12 series), IMF; Frost & Sullivan Analysis

E. Gross Value Added (GVA) at basic price by Economic Activity

In the first three quarters of FY21, GVA estimates were substantially lower than the previous years. However, Indian GVA increased better than the advance forecast in the fourth quarter. Consistent opening of the economy and updated receipts of GST data for the third and fourth quarters, have equally contributed to this increase. Manufacturing sector growth rebounded strongly and surged to 6.9 % in the fourth quarter of FY21, compared to a decline of 4.2 % a year ago, according to the latest estimates.

Chart 3.6: Gross Value Added (GVA) at Basic Price by Economic Activity, Value in INR Trillion, FY15-FY21



	FY15	FY16	FY17	FY18	FY19	FY20	FY21
Electricity, Gas, Water supply & Other utility	2.1	2.2	2.5	2.7	2.9	3.0	3.1
Mining & Quarying	2.9	3.3	3.5	3.7	3.3	3.2	2.9
Construction	8.4	8.7	9.2	9.6	10.3	10.4	9.5
Public administration, Defence & Other services	12.0	12.8	13.9	15.3	16.2	17.6	16.8
Agriculture, Forestry & Fishing	16.1	16.2	17.2	18.3	18.9	19.7	20.4
Manufacturing	16.9	19.0	20.6	21.9	23.3	22.7	21.1
Trade, Hotels, Transport & Communication services	18.0	19.9	21.5	23.1	25.4	27.0	22.1
Financial, Real estate & Professional services	20.8	23.0	24.9	26.1	27.2	29.2	28.7

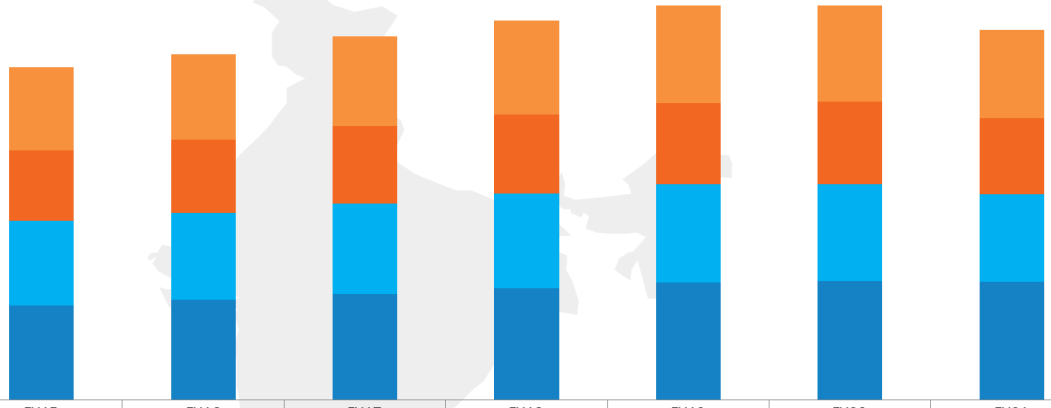
Source: MoSPI (Annual Estimates of GDP at constant price, 2011-12 series); RBI (Reserve Bank of India); Frost & Sullivan Analysis

F. Index of Industrial Production

Due to the pandemic, the investment activity was sluggish from March to May 2020. Project completions were delayed, and industrial activities remained muted during this period. Industrial output growth, returned to positive territory after a two-month period, owing mostly to the low-base impact and strong performances by the manufacturing, mining, and power sectors. The RBI has predicted that business confidence will improve in FY22. In Q4 FY21, the Business Assessment Index (BAI) increased to 113.1 from 108.6 in the previous quarter.

The manufacturing sector constitutes around 77 % of the IIP. Manufacturing businesses reported that output, order books, and employment have improved in the Q4 FY21. Availability of finance from banks, internal accruals and foreign sources has also improved during the quarter. There has been increase in the industrial activity since June 2021, which should ideally continue to gain momentum through FY22. The key indicators sustained their pace with further relaxation of lockdowns. Furthermore, there are signs of increase in consumer activity on the ground, which is expected to gather pace with the impending festive season.

Chart 3.7: Index of Industrial Production based on Sector, Index in Nos., India, FY15-FY21

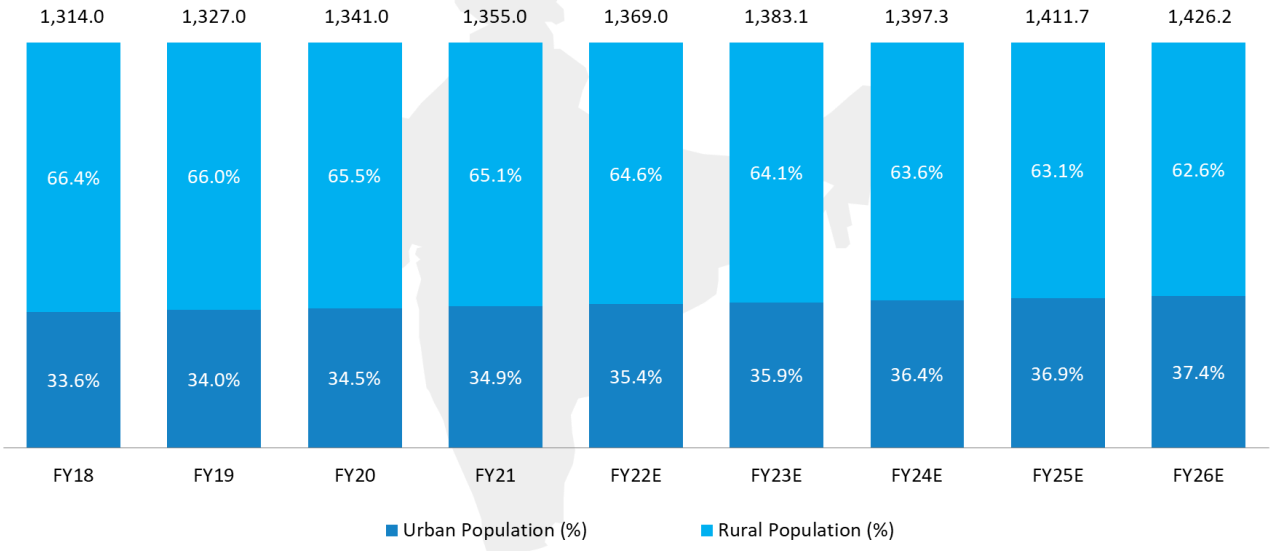


	FY15	FY16	FY17	FY18	FY19	FY20	FY21
General	111.0	114.7	120.0	125.3	130.1	129.0	118.1
Mining	93.3	97.3	102.5	104.9	107.9	109.6	101.0
Manufacturing	112.7	115.9	121.0	126.6	131.5	129.6	117.2
Electricity	126.6	133.8	141.6	149.2	156.9	158.4	157.6

Source: MoSPI (Annual Estimates of GDP at constant price, 2011-12 series); RBI (Reserve Bank of India); Frost & Sullivan Analysis

G. Population

Chart 3.8: Urban Vs Rural Population in India, number in million, in %, India, FY18-FY26E



Note: E refers to Estimate

Source: MoSPI (Annual Estimates of GDP at constant price, 2011-12 series; World Bank; Frost & Sullivan Analysis

India is the second most populous country in the world and the UN estimates that India will exceed China's population by the year FY2024. Currently, the estimated population of India in FY21 is 1,355 million, which is equivalent to ~17% of the total world population. The country has a relatively young demographic profile,

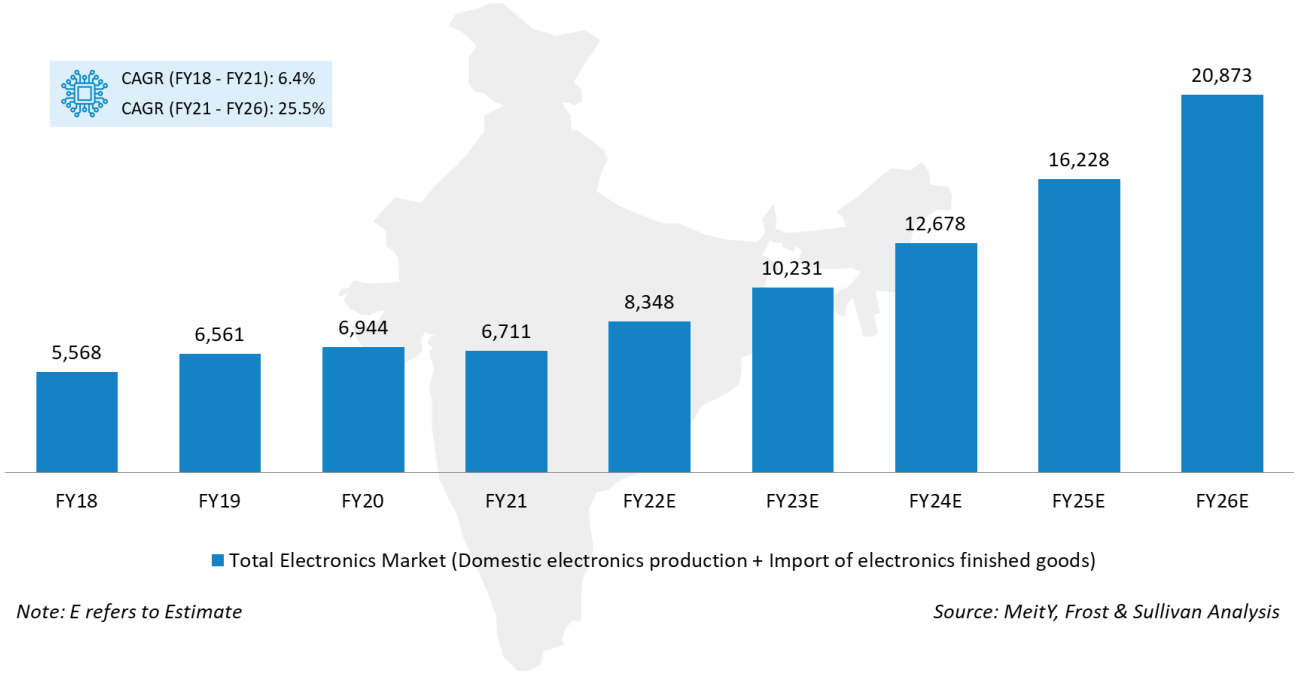
with a median age of 27.3 years. Approximately 67% of the population belongs to the middle age group, which includes those aged 15–64 years, has the largest share of the total population. The younger proportion of the population supports the increase in consumer demand and overall economic growth.

India's population is expected to grow at an average of 1.0% between FY21 and FY25. India's Gen Y constitutes a third of the country's population and will join the working-age group, forming 42% of the total working-age population by FY25. Given the economic prosperity and younger demographics of the population in most of these states, demand has also undergone a positive change in the past decade.

India is in the midst of a massive wave of urbanization. There has been a drastic increase in urban towns and cities in the country over the past few years. Since the last decade, around 10 million people have moved to towns and cities each year in search of better economic opportunities. India's seven largest metropolitan areas—Mumbai, Delhi, Bengaluru, Kolkata, Chennai, Hyderabad, and Ahmedabad—dominate the country's economic landscape. In the case of major cities like Delhi, Mumbai, Hyderabad, and Kolkata, population growth has been fastest in their peripheries with the development of emerging metropolitan clusters. India's urban population percentage was around 34.9 % in FY21 as compared to 33.6 % in FY15. By FY26, it is expected to be around 37.4 %. Economic growth, a better standard of living, and increasing opportunities in the cities have led to urbanization, which has further increased the burden on these cities in terms of the requirement for infrastructure and housing. Employment opportunities and the opportunity for income generation across newly urbanised towns create a positive outlook for consumption of electronic products.

Indian Electronics Industry - Historical Trends and Outlook

Chart 3.9: Total Electronics Market, Value in INR Billion, India, FY18-FY26E



Note: E refers to Estimate

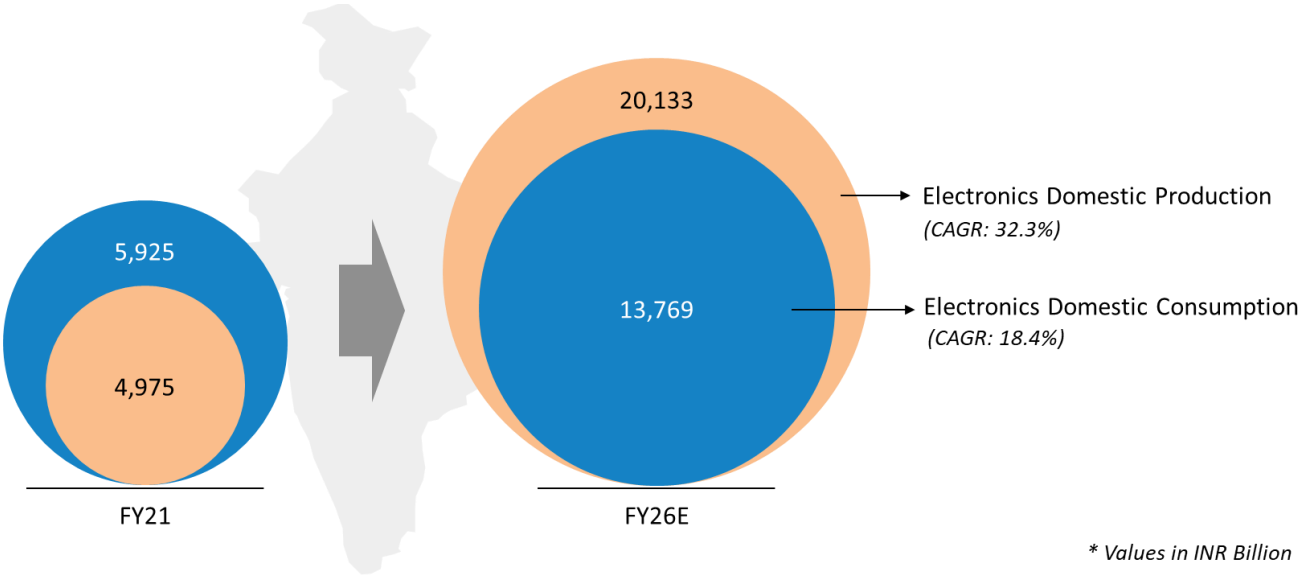
Source: MeitY, Frost & Sullivan Analysis

Electronics is one of the fastest growing industries in the country. The total electronics market (which includes domestic electronics production and import of electronics finished goods) in India is valued at INR 6,711 Billion (USD 91 Billion) in FY21, which is expected to grow at a CAGR of 25.5% to reach INR 20,873 Billion (USD 282 Billion) in FY26. The domestic production of electronics is around 74% of the total electronics market in FY21, which is expected to reach around 96% by FY26, with the help of various government initiatives and development of electronic ecosystem in India. Also, the global landscape of electronic design and manufacturing is changing significantly, and revised cost structures have shifted the attention of multinational companies to India.

At present, the Indian government is attempting to enhance manufacturing capabilities across multiple electronics sectors and to establish the missing links in order to make the Indian electronics sector globally competitive. India is positioned not only as a low-cost alternative, but also as a destination for high-quality design work. Many multinational corporations have established or expanded captive centres in India. The electronics production market is widely defined as Consumer electronics, Industrial electronics, Computer hardware, Mobile Phones, Strategic electronics, Electronic components, and LED goods, according to MeiTY (Ministry of Electronics and Information Technology). Among the large bouquet of EMS players in India, Syrma SGS is one of the fastest growing Indian-headquartered ESDM companies.

Indian Electronics Industry - Electronics Consumption vs. Domestic Manufacturing

Chart 3.10: Overview of Electronics Industry - Domestic Consumption Vs Production, Value in INR Billion, India, FY21 and FY26E



** Values in INR Billion*

Note: E refers to Estimate

Source: MeitY, Frost & Sullivan Analysis

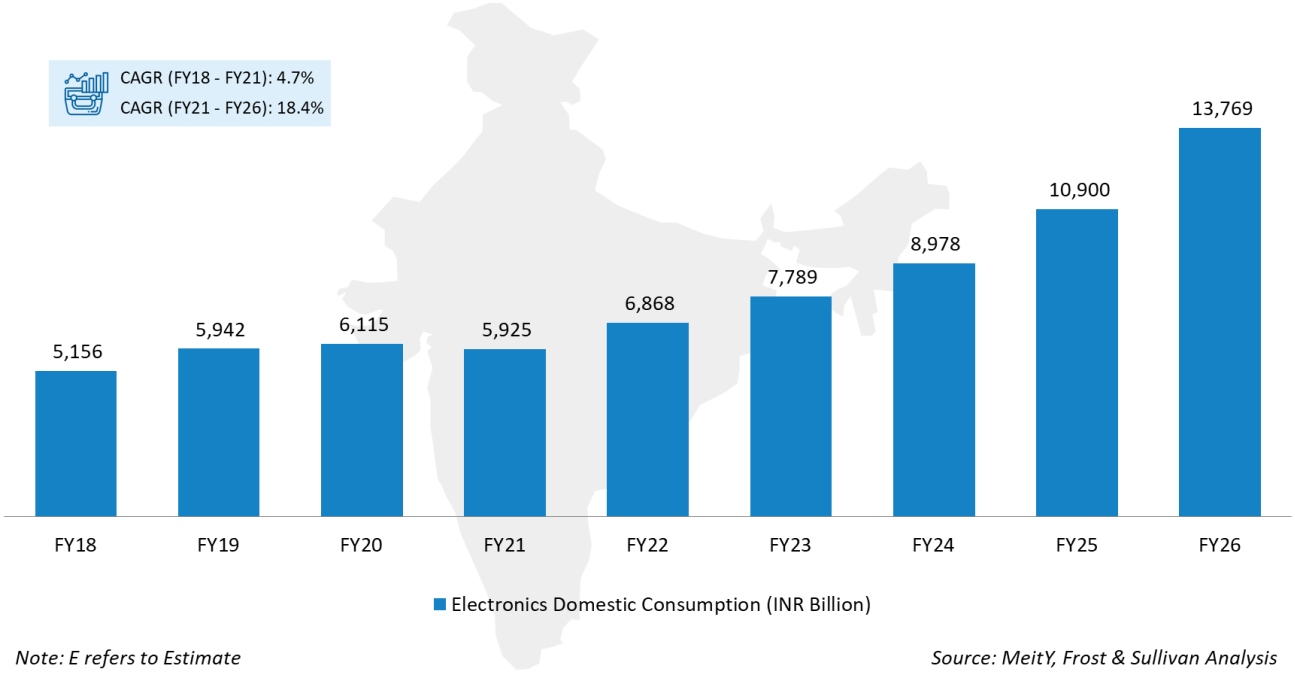
The government's stated objective of enhancing manufacturing capability within India has been backed by creation of a favourable environment. Whether it is the customs duty for certain products or removal of duties on components or encouraging local component manufacturing, there has been appreciable movement to drive domestic manufacturing. The government has also taken several steps towards increasing the ease of doing business, which has resulted in increased manufacturing setups by multiple

foreign manufacturers in the country. According to the World Bank's Doing Business Report, India has improved its position in ease of doing business from 142 ranks in 2015 to 63 rank in 2020. This environment has certainly encouraged the OEM/ EMS/ ODM segment as electronics brands continue to push for collaboration and partnership.

In recent years, India's demand for electronic products has increased substantially, primarily due to India's development in the EMS segment. At present, India is the second largest mobile phone manufacturer in the world. The Indian start-up ecosystem is still evolving, and the potential that Indian start-ups have shown is a huge opportunity for the country. Syrma SGS has deep connects with the start-up ecosystem that can help partner with the next generation companies very early. The reliance on imports to meet rising demand for electronic products is projected to increase unless timely measures are taken to improve local electronic production.

A. Indian Electronics Consumption

Chart 3.11: Electronics Domestic Consumption Market, Value in INR Billion, India, FY18-FY26E



Note: E refers to Estimate

Source: MeitY, Frost & Sullivan Analysis

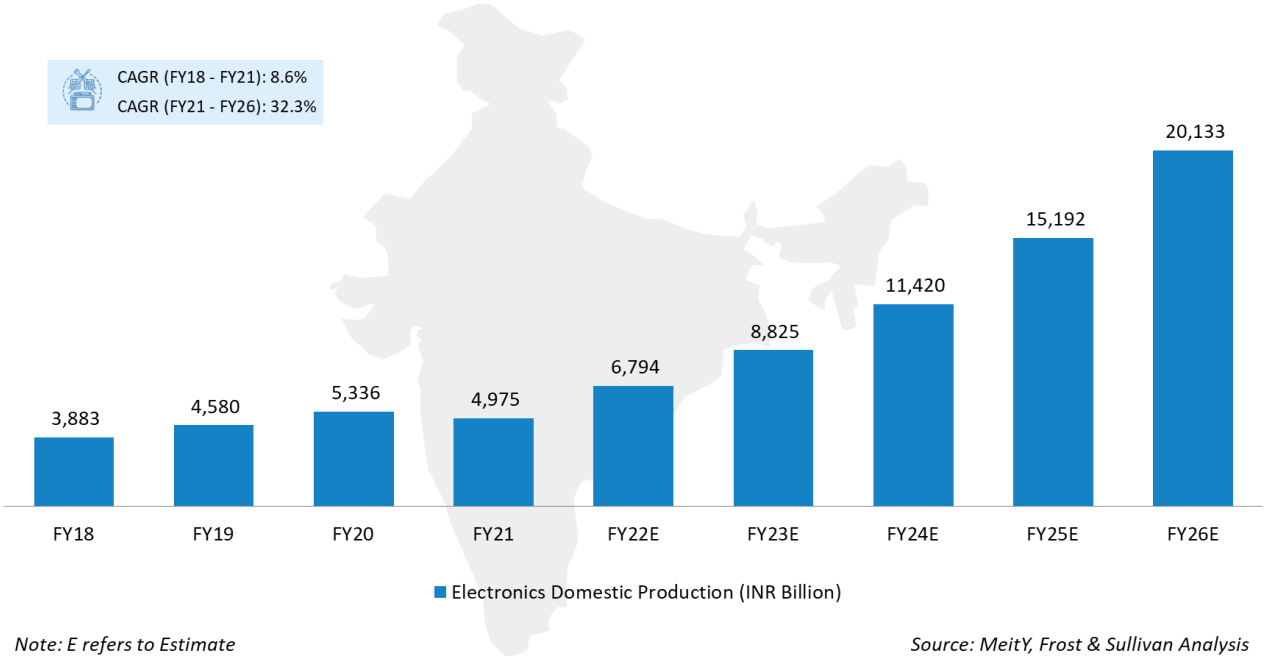
Electronics consumption market in India is estimated at INR 5,925 Billion (USD 80 Billion) in FY21, and is expected to grow at the rate of 18.4% to reach INR 13,769 Billion (USD 186 Billion) by FY26. India's vast consumer base is one of the largest in the Asia-Pacific region, and the country's electronics industry is one of the fastest growing in the world.

- **Consumer electronics** - is one of the largest segments that have a broad category of electronic products that includes televisions, cameras, audio players, and a range of other household items. Growing awareness, greater access, changing lifestyles, higher discretionary incomes, and a reduction in per-unit prices are the key drivers.

- **Telecom** - Need for deep penetration of broadband networks and availability of mobile telephony propel telecom sector. The government's push for the availability of broadband in remote areas of the country is a key demand driver for the telecom segment. Also, the increasing focus on the 5G sector is driving this segment. 3G/4G will remain strong over the coming years and 5G will start making impact pretty soon.
- **Lighting** - LED lighting technology has taken the Indian market by storm with government, commercial and residential segments witnessing phenomenal growth. Automated and interconnected, smart lighting solutions will see usage in lighting applications and LED lighting products are expected to act as enablers in this regard.
- **IT& BA** - Government of India's programs like Digital India and increased internet penetration will fuel growth in short-to-long term. Government's push toward cashless transactions, financial Inclusion programs and growth of banking drive local electronics hardware manufacturing. Use of smart cards in transportation, public distribution systems and corporate environment is seeing large growth, which is expected to continue in future.
- **Medical and Defence** - segments are seeing large uptake in usage of electronics.
- **Mobile phones** - In this segment, with introduction of new smartphone models along with better availability, declining prices and increased customer spending across Tier1/2/3 cities are causing increased mobile penetration in India.

B. Indian Electronics Domestic Production

Chart 3.12: Electronics Domestic Production Market, Value in INR Billion, India, FY18-FY26E



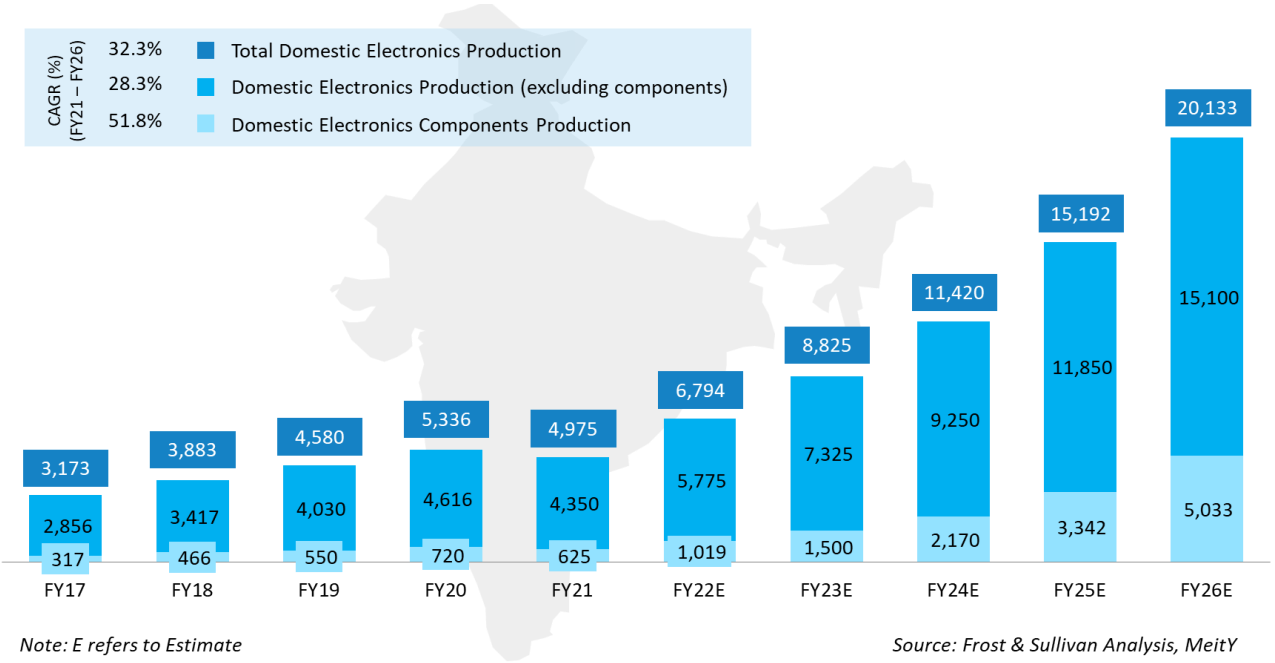
Note: E refers to Estimate

Source: MeitY, Frost & Sullivan Analysis

Electronics production in India is estimated at INR 4,975 Billion (USD 67 Billion) in FY21, and is expected to grow at a CAGR of 32.3% to reach INR 20,133 Billion (USD 272 Billion) by FY26. India has the potential to be one of the most attractive manufacturing destinations and support the objective of 'Make in India for the

World'. Government and Industry needs to collaborate and drive initiatives to help India move among top 5 countries in electronics production and among top 3 in electronics consumption.

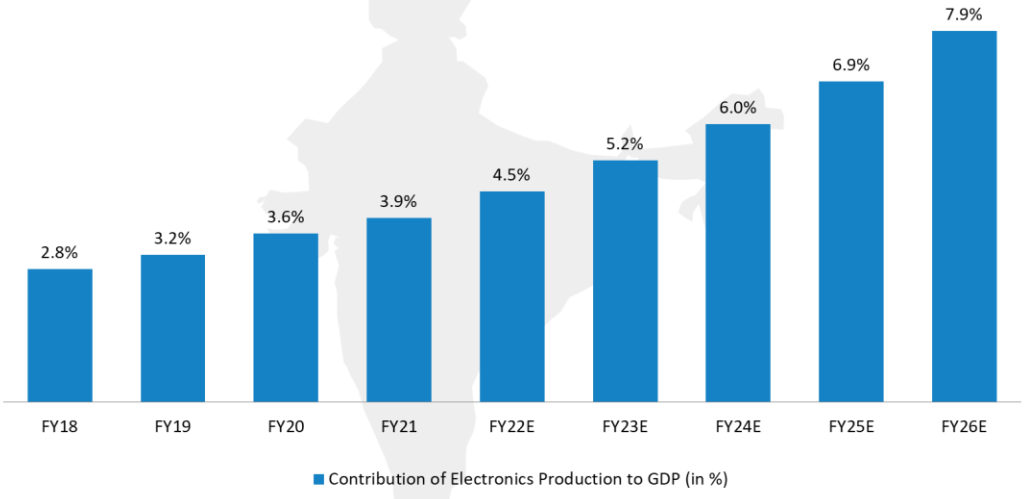
Chart 3.13: Total Domestic Electronics Production vs. Component Production, Value in INR Billion, India, FY18-FY26E



Note: E refers to Estimate

Source: Frost & Sullivan Analysis, MeitY

Chart 3.14: Contribution of Electronics Production to Indian GDP, in %, India, FY18-FY26E



Note: E refers to Estimate

Source: MoSPI (Annual Estimates of nominal GDP, at current prices); Frost & Sullivan Analysis

Many policy level initiatives are desired to be implemented in a fast-track mode. The effect of policies should be measured and evaluated against the desired objectives to re-check and refine at regular intervals. The success of the PLI scheme for the electronics segment in encouraging large-scale manufacture of

electronics products is being viewed with great confidence. Similarly, the National Policy on Electronics (NPE) aims to make India a global hub of the electronic system design and manufacturing and has fixed some aspiring targets: manufacture of 1.0 billion mobile phones by the year 2025, valued at USD 190 billion including 600 million mobile phones (approximately USD 110 billion) for export purpose. The electronics industry is the foundation of the all other manufacturing sector. Diverse sectors have dissimilar incentive schemes.

Excellent opportunities for increasing the electronics manufacturing is estimated to come from Home Appliance, Telecommunication, Industrial, Automotive, Healthcare, Defence & Aerospace, Renewable Energy, Digital Infrastructure, etc. India will have to find a way out of incorporating into the global value chains to increase the production and the exports. The biggest challenge before India is to make a fast transition to the manufacturing of the high technology electronics. Electronic products do need continuous design modifications, as end-users expect creativity and continuous innovation. Consequently, the design and development of electronics products is often outsourced to ODMs. In such situations, the earlier an OEM engages a contractor for product design and development services, the product being designed moves into high-volume, production stages.

In FY21, the electronics production in India contributed to 3.9 % of the nominal GDP (at current prices), which is expected to increase to around 7.9 % by FY26. The Government's objective is to provide domestic manufacturers with a better facility to make them competitive with imports into the industry by simplifying the tariff system, simplifying the procedures, giving incentives and improving the infrastructure. Considerable high value added manufacturing takes place in the industrial segment and most products command high brand equity globally, offering an excellent opportunity for EMS companies to export. Other than Mobile Phones, CEA and Industrial, Telecom is another constant contributor to EMS volumes. Increasing logistics and raw material costs, and hence an increase in production costs, are affecting OEMs, which leads them to approach EMS/ODM, which offers a complete end-to-end solution including product design and reverse logistics, owing to higher margins and increased visibility. EMS/ODM also jointly offers to work with OEMs in terms of product localization and design.

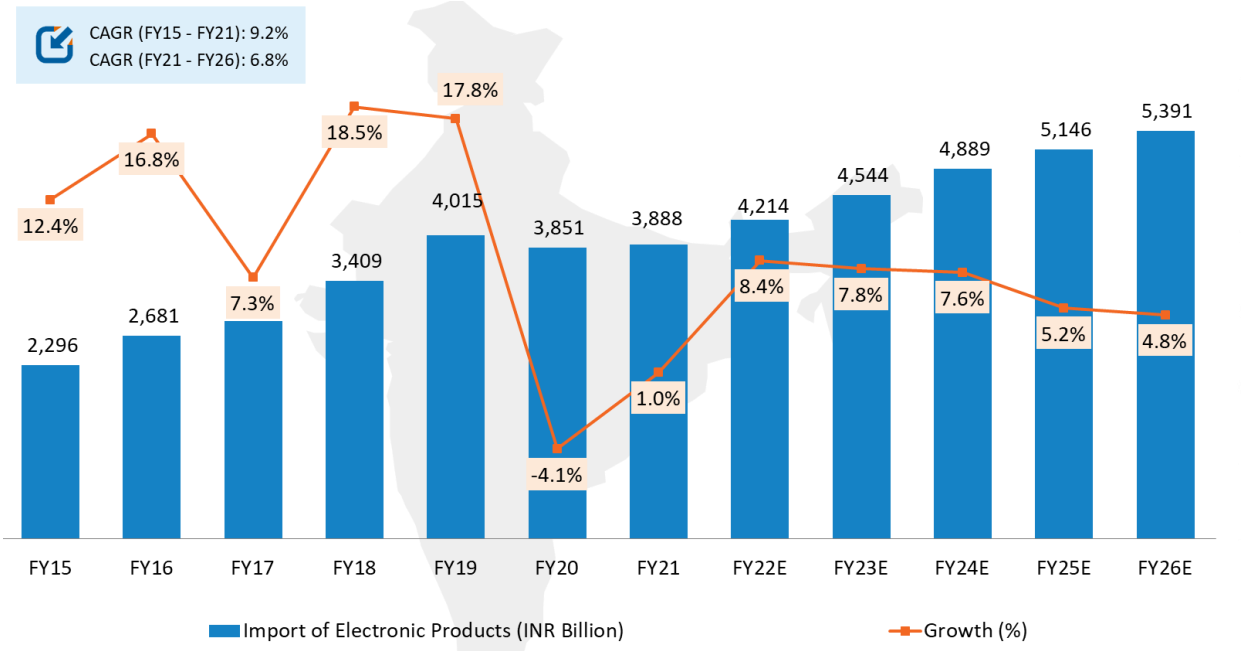
Import of Electronic Products in India

The total import value of the electronics products in FY15 was INR 2,296 Billion and in FY20 the value was INR 3,851 Billion. The import value saw a negative growth of 4.1 % in FY20 from FY19 which was valued at INR 4,015 Billion. In FY20, China and Hong Kong accounted for ~ 60 % of India's total electronic imports. The majority of semiconductor demand is now fulfilled by imports from the United States, Japan, and Taiwan. The government is developing electronics manufacturing clusters (EMCs) around the country to provide world-class infrastructure and facilities in order to minimise reliance on imports.

The government relies extensively on Chinese suppliers in the electronics sector, especially consumer electronics, industrial electronics, computer and IT hardware, mobile phones, strategic electronics, light emitting diodes etc.; the top 3 leading products in the import category are laptops & desktops, FPD Television and storage device. In Laptops and Notebooks segment, almost all the components in building notebooks are completely imported or as semi knocked down units, from China and Thailand. In GPON and CCTV segments, the components are still imported from China and Taiwan. Similarly, lifestyle products such as Electric Shavers, Hair Dryers, etc. are also majorly imported from China, Germany, Belgium, Thailand,

Indonesia, etc. as their component ecosystem is lacking. Despite the government's efforts to build India's electronics ecosystem, domestic manufacturers' reliance on China for components persists, which is expected to improve slowly as the localization of production for these products is increased with the opening of new manufacturing facilities.

Chart 3.15: Import of Electronic Products, INR Billion, India, FY15-FY26E



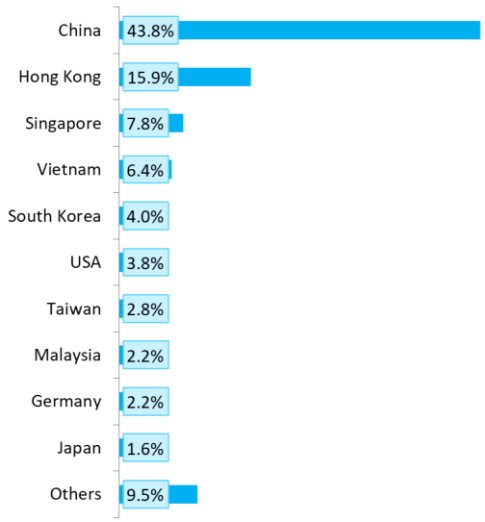
Note: E refers to Estimate

Source: MeiTY; Directorate General of Commercial Intelligence and Statistics (DGCI&S)

Chart 3.16: List of Top 10 Imported Electronic Products by Value, India, FY20

Source: Export-Import Data Bank, Frost & Sullivan Analysis

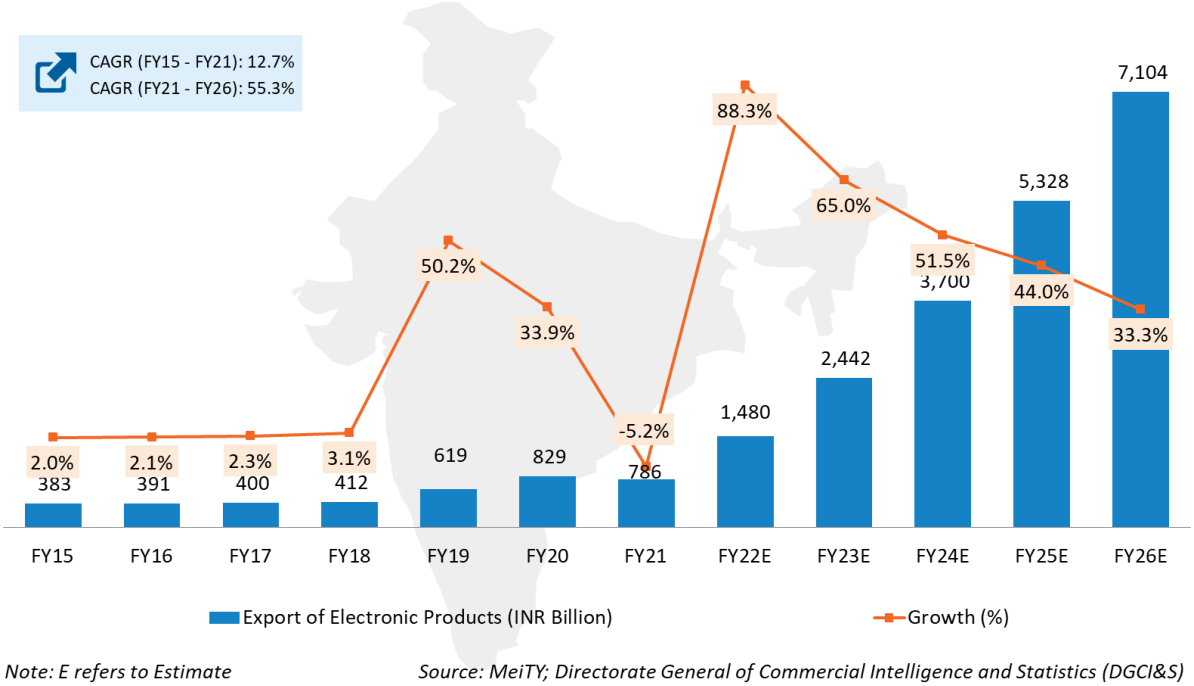
Chart 3.17: Import of Electronic Products by Key Countries, Value in %, FY20



Source: Ministry of Commerce & Industry, Govt. of India

Export of Electronic Products in India

Chart 3.18: Export of Electronic Products, INR Billion, India, FY15-FY26E



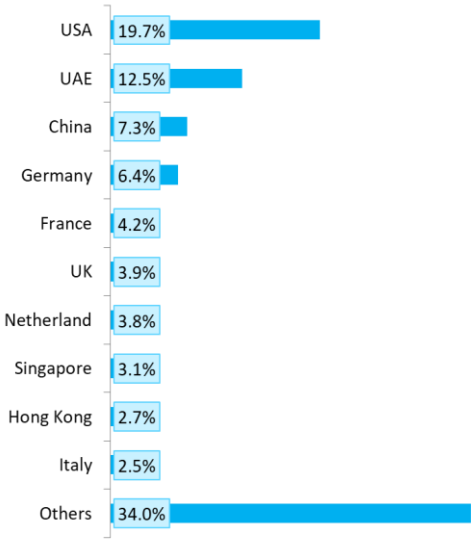
Note: E refers to Estimate

Source: MeiTY; Directorate General of Commercial Intelligence and Statistics (DGCI&S)

Chart 3.19: List of Top 10 Exported Electronic Products by Value, India, FY20

Source: Export-Import Data Bank, Frost & Sullivan Analysis

Chart 3.20: Export of Electronic Products by Key Countries, Value in %, FY20



Source: Ministry of Commerce & Industry, Govt. of India

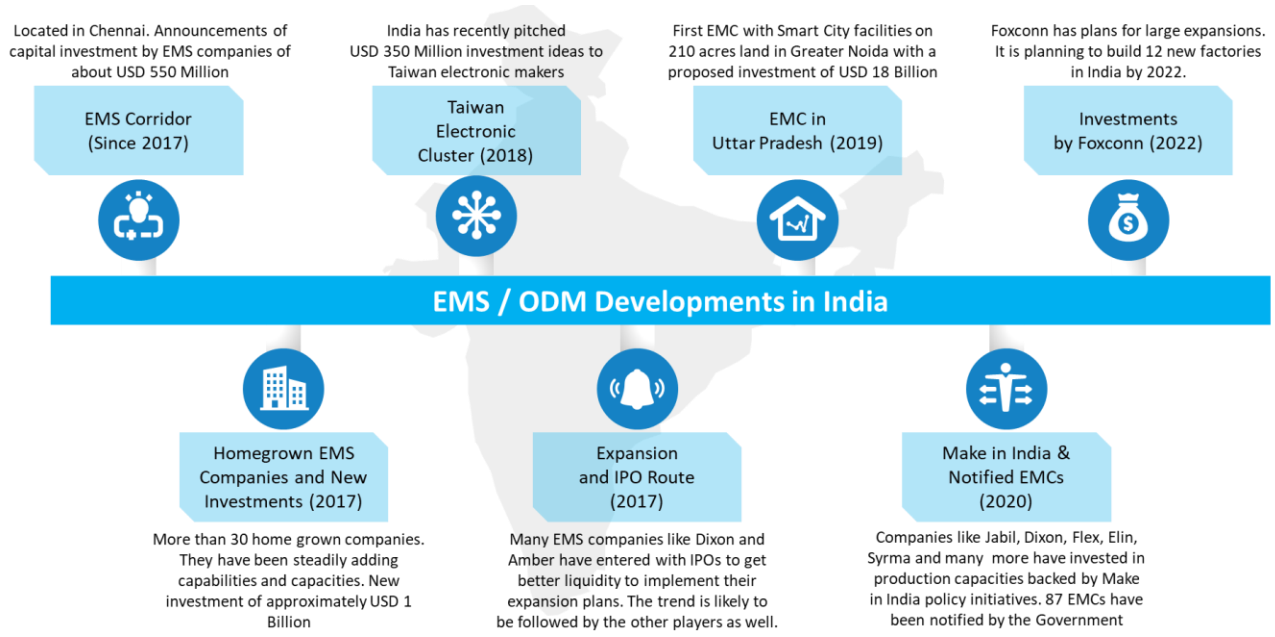
The total export value of the electronics products in FY15 was INR 383 Billion and in FY20 the value was INR 829 Billion. The value of exports increased by 34.0% in FY20 compared to FY19, which was valued at INR 619 billion.

The top 3 leading products in the export category are mobile phones, engine control units, and industrial machinery. India holds superior design competence and the availability of a talented workforce at lower wages compared to China, which fortifies its position as the futuristic, domestic-cum-export-oriented manufacturing destination for the globe. Cost-effectiveness, a talented and affordable workforce, a burgeoning domestic electronics market, and export opportunities will drive the market for EMS/ODM in India. Globally, India ranks second in mobile phone manufacturing, which involves design of the handset, assembly of components, and manufacturing of the device. India has a strong base with the automotive industry, including component suppliers, in the engine control unit. India has emerged as the global hub for auto component sourcing. As more players are setting up bases in India, auto component manufacturers need to up-skill their technology know-how to remain in the lead.

Increase in design and manufacturing capabilities have led to export opportunities for some products and is a key driver for other segments as well. Global players use local companies for contact manufacturing as local companies have their in-house plants, R&D and testing facilities. In Energy Meters/ Smart Meters segment, India has a strong base of manufacturing/ assembly; however many components like LCD, Relay, Communication Module, PCB, Passive Components and Microcontrollers are imported. Components like Mechanical Components, Terminals, Brass Terminals and Screws are locally sourced. Syrma SGS, with its presence in the electronics sector, operates in one of the fastest growing sector in the market with enormous growth potential globally.

Overview of EMS (Electronic Manufacturing Services) Industry in India

Chart 3.21: EMS / ODM Developments in India



Source: Frost & Sullivan

The Indian electronic market, which is large, complex and highly competitive, requires OEMs to focus on marketing and after-marketing services, thus leaving manufacturing to electronic manufacturing service providers. The extensive financial costs involved in setting-up manufacturing, capacity additions/expansions, R&D, manpower, etc. influence OEMs to leverage on EMS/ODM services. An EMS player with economies of scale is better positioned to accommodate frequent technology changes as it allows for better price negotiations with raw material suppliers. Aftermarket services provided by EMS companies also give OEMs a viable component in deepening their presence.

There are more than 30 players in the organized market. Major players are Flextronics, Foxconn, Jabil, Dixon, SFO, Syrma, Elin, NTL and Cyient. Mobile Phones, Consumer Electronics and Industrial electronics contribute to 3/4th of the total EMS market in India. In highly commoditized markets such as Semi-Automatic Washing Machines, Direct Cool Refrigerator, Window Air Conditioners, CFLs, UPS and Energy meters, where the scope for design is not high, OEMs prefer to engage in ODM partnership with their EMS partners. Many EMS providers are slowly evolving to offer complete design services apart from contract manufacturing. This acts as a win-win situation for both EMS players as well as OEMs; EMS players obtain higher margins through this model and OEMs benefit by outsourcing manufacturing and design activities enabling them to focus on other expansion activities. Embracing ODM model of partnership with EMS partners coupled with venturing into new product segments is propelling OEMs to pursue EMS engagement. High volumes will influence EMS/ODM to bring in the component ecosystem locally and enhance domestic capabilities of component sourcing thus making the electronics ecosystem stronger.

Ambitious expansion plans and capacity augmentation of indigenous EMS players to capitalize favourable policy initiatives ensure that the EMS sector in India shall witness heightened growth in coming days. Also, India has done well in Electronics design and has established itself as design hub of the world. The next phase of growth in the design sector is characterised by growth of indigenous design companies creating their own IPs as against the erstwhile growth of outsourced captive design services companies. This, together with impressive expected growth in EMS market, presents an opportunity for Design-led manufacturing.

Some of the notable expansions announced:

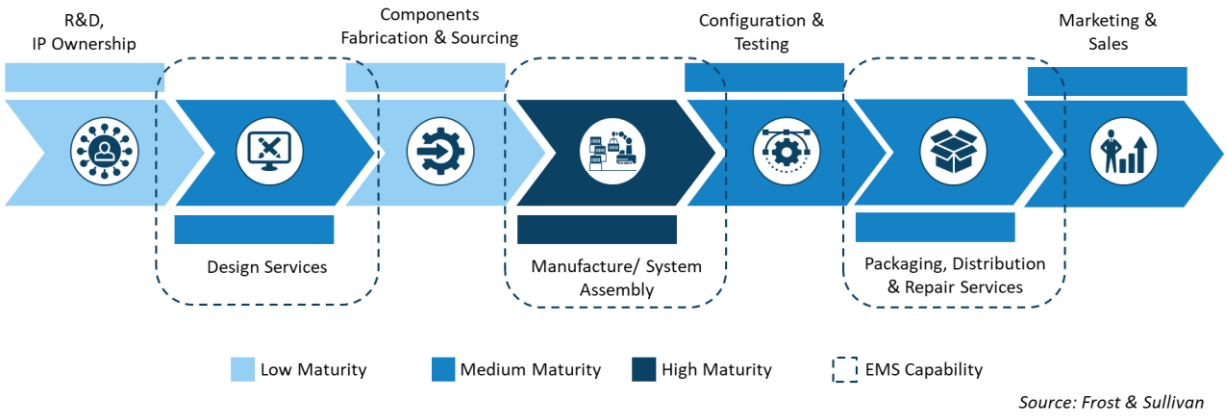
- Jabil in 2021 announced they are going to invest INR 20 Billion in Pune and they are going to venture into smartphone, home appliances, mobile spare parts and food packaging.
- Electronic manufacturing services player Dixon Technologies announced in 2021, to invest around INR 6 Billion to build the new capacity in India in the mobile devices, laptops & tablets, telecom equipment, & LED components segment to cater to the domestic and the global market.
- Foxconn has announced in 2020, to invest around USD 1 Billion for expansion of its factory on Chennai as part of the Make in India initiative

EMS Value Chain Analysis

Manufacturers in India lack mature R & D set-ups due to large Capex investments and long gestation periods. Europe and the US continue to dominate R & D and IP ownership of related work. This has also been a factor that has restrained OEMs & EMS from investing. Most MNCs hold their IP in their headquarter locations (mostly located in the USA and Europe). However, India has a competitive edge in design services,

since most such work is outsourced to cost-effective destinations (China, South Korea, Thailand). In terms of manufacturing and system assembly, India has an established set-up. Many EMS providers are slowly evolving to offer complete design services apart from contract manufacturing. EMS players obtain higher margins through this model, and OEMs benefit by outsourcing manufacturing and design activities.

Chart 3.22: Value Chain of EMS / ODM Industry in India, FY21



Source: Frost & Sullivan

EMS providers in India have moderate maturity levels in packaging, distribution, repair, sales and marketing functions to meet geographical standards and cater to local requirements. After-sales services which include repair and maintenance are fairly important for the Indian buyer as the use-and-throw perception is still not acceptable in the Indian electronics ecosystem. EMS companies having an extra ability to provide the reverse logistics will get additional business from the OEMs at the same time they would also be playing a very significant role in the e-waste management which is a huge concern globally. Many players like Dixon, Flextronics, etc. are offering after-market services like repair, refurbishment, logistics, vendor management etc. Syrma SGS is involved with customers from design stage thereby ensuring integration in the entire value chain. It has strong credentials in concept co-creation with many customers followed by product realization and lifecycle support. The company is also driving innovations in the SCM.

Emerging Trends in Electronics Manufacturing in India

Key Trends for EMS industry

- **Emerging Technologies**
- **System Automation and Analytics**
- **Localization of Supply Chain**
- **Component Miniaturisation**

Emerging Technologies: Rapid technology advancement and newer products having upgraded technology have led to shorter life cycles for electronic products. Also, continuously changing customer attitudes and

various consumer-to-consumer websites has made it relatively easier for customers to replace their current electronic devices with newer products.

Augmented demand for high-speed data has also contributed to the increasing demand for high-end smartphones. This growing preference for advanced technology products has driven rapid innovation in the consumer electronics business. Emerging technologies, for example, IoT, AI, and the introduction of robotics and analytics in the industrial and strategic electronics segment, have all led towards the overall development of numerous electronic products, which has given a lift to local demand. Utilization of IoT/sensors, 5G, artificial intelligence, and machine learning are providing stimulus for the creation of advanced multi-utility electronic products.

System Automation and Analytics: Indian design companies work on end-to-end product development, right from concept design to development to prototype testing. Advanced product development focusing on miniaturisation, IoT, automation, AI, and defence applications is likely to be one of the biggest trends in market growth in electronics design. IoT-based advanced analytics and industrial automation provide manufacturers with better efficiency and productivity gains.

Electronic Design Automation is a category of software tools which drives the design of Integrated Circuits and PCBs. Until recently, EDA software tools were used to cater mainly to the semiconductor business, but the digital transformation has actually made these tools tremendously relevant across numerous industries. The fast rise of AI, ML, deployment of 5G communication, edge and cloud computing have all created the need for invention in hardware, as an outcome of which electronic design automation software tools are in very high demand.

Localization of Supply Chain: High domestic volumes and consumption, higher outsourcing volumes will influence EMS/ODM to bring in the component ecosystem locally and enhance local capabilities of component sourcing, thus making the ecosystem stronger and closer. Tier-2 players are increasingly focusing on product localization, innovative product design, and R & D. However, the extensive financial costs involved in setting-up manufacturing, capacity additions/expansions, R&D, manpower, etc. influence them to leverage EMS/ODM services.

A vigorous and localised supply chain offers numerous advantages, like reduced reliance on imports and the ability to cater to larger volumes in relatively shorter time periods, leading to lower costs and additional flexibility.

Component Miniaturization: Manufacturing equipment is very essential for guaranteeing the quality of any electronic device or electronic component. During the course of the complete production cycle, an electronic device is being handled by a variety of manufacturing equipment. The ever-increasing complexity of electronic assemblies, as well as component miniaturization, has increased demand for advanced and dependable manufacturing equipment.

The choice of PCB is dictated by three major factors from the product perspective, which is complexity of operation, form factor, and level of miniaturization. As the PCBs and the electronic components contract in size, manufacturers face the challenge of precisely placing the small components on the miniaturised boards. Technological advancements, which are a need to meet the high performance expectations in the field of electronics, combined with today's high-speed production, comprehensive process automation, and

rigorous quality control standards, are all driving up the demand for manufacturing equipment. The dawn of the conjunction has led manufacturers to assimilate numerous devices and produce small-scale devices for mechanical, electronic, and optical products.

Growth Drivers and Challenges for EMS industry

Key Growth Drivers and Challenges for EMS industry

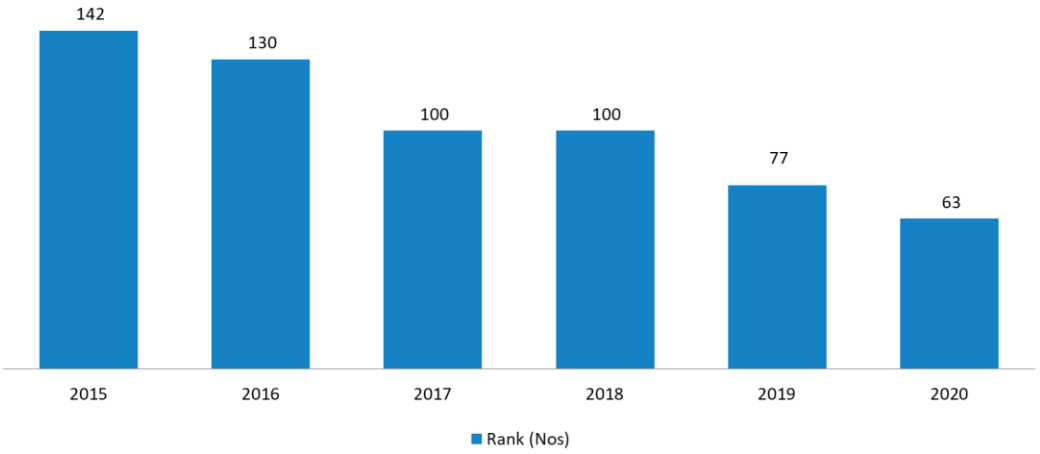
- **Import Substitution**
- **Enhancing Local Value Add**
- **Supply Chain Realignment**
- **China+1 Strategy**
- **Export Focus on USD 5 Trillion GDP**
- **Component Manufacturing / Lead Time**
- **Investment by Local and Global Players**

Import Substitution: As per MeiTY, electronic imports accounted for INR 3.9 Trillion (USD 56 Billion) in FY1, which is 21% of the total electronics market in India. The top products contributing to the highest electronics imports are the Engine Control Unit, FPD TV, Refrigerator, Set Top Box, Machine Tools, CCTV Camera, Notebooks, Servers, Storage Devices, Home Automation Modules, Mobile Phones, Media Gateways, Enterprise Routers, Defence, Medical Devices and Smart Cards & Readers. Imports are expected to reach USD 68 Billion by FY25, accounting for 12.6 % of total electronics market demand.

Enhancing local value add: India's business environment can be improved by simplifying procedures involved in setting up and conducting business. To position India as an attractive business destination, the government must reduce the burden of additional taxes on start-ups and strengthen the IP protection framework. India is evolving as an innovation-driven R & D destination for global companies. The government, academia, industry players and industry associations need to make concerted and coordinated efforts to help the industry reach its potential. India is registering increasing EV investment in the country. Companies such as Tesla and Ola are investing in setting up manufacturing plants in the country. Likewise, EMS companies in the country, including the likes of Wistron, are ramping up investments, which indicate a robust EV market for EMS in the next 5 years.

Sub-assembly modules and the finished goods assemblies are things that are happening currently in India and are very lucrative opportunities given in the Indian ecosystem. Current Indian wages stand at roughly 20 % of the Chinese average wages, and India offers a 500 million plus workforce in the age bracket of 15 to 39 years, which is 15 % larger than that of China. Even though component manufacturing is currently being dominated by China, Japan, and South Korea, India has showcased strong potential in this part and is on the path to developing a strong component manufacturing base. The opportunities in India ominously offset the hurdles. It is also clear from the World Bank report's improvement in rank of ease of doing business in India, which has risen from 142nd in 2015 to 63rd in 2020.

Chart 3.23: Ease of doing Business in India, Rank in Nos., FY15 to FY20



Source: World Bank's Doing Business Report, Frost & Sullivan

Supply Chain Realignment: Local availability of components and chip fabrication are primary activities that determine the strength of a country's electronics manufacturing ecosystem. India has a very limited component supplier base; a majority of the high-value and critical components are imported. Components that are predominantly imported include ICs, PCBs, and other active components. As supply-chain resilience and localization are becoming more significant, India has had to take the necessary steps to improve the domestic value chain capability for long-term benefits.

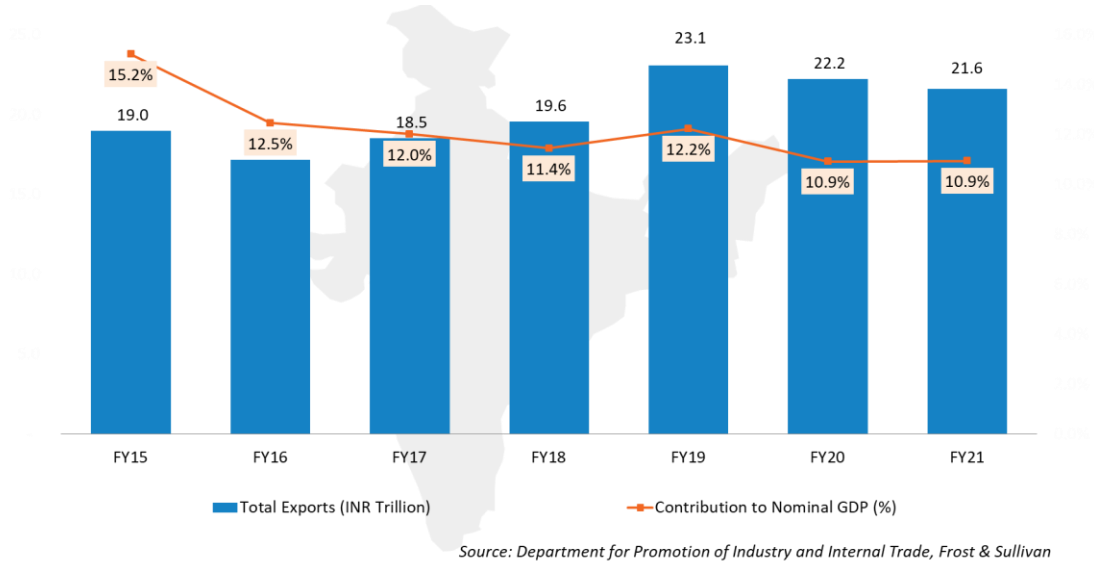
The introduction of the PLI scheme to promote component sourcing; FDI policies relaxing companies' ability to set up bases in India, allowing them to drive product development, research and development (R & D), and other knowledge-intensive activities in collaboration with Indian companies; and the establishment of dedicated freight corridors that help in the advancement of transportation technology and increase in productivity are some of the key initiatives taken by the government of India. Freight corridors are high-speed, high-capacity railway lines designed solely for freight traffic, requiring the seamless integration of improved infrastructure. The Bhaupur-Khurja segment of the Eastern Dedicated Freight Corridor (EDFC) in Uttar Pradesh was recently inaugurated by the government.

China + 1 Strategy: As the Chinese electronics contract manufacturing cost structure continues to be on the rise, so has the OEM customer's interest been amplified in moving the electronics production to other countries having similar prices, quality, and receptiveness. There is a new urgency now to examine practical alternatives to manufacturing in China given the tariff conflicts and the COVID 19 pandemic. Though, transferring production decisions is not very straightforward. Sub-tier vendor incorporation of metal fab, plastics, and other mechanical components all in China improves the product cost, efficiency, and time-to-market. The gigantic size of the China market itself for the end-products should also be considered. These factors and other factors have OEM clients thinking more in terms of adding one more nation for additional production rather than replacing China entirely. Syrma SGS is a strong contender for China+1.

China now accounts for 13 % of global exports and 18 % of global market capitalization, and is one of the world's two corporate giants in terms of economic supremacy. However, as a result of the China+1 strategy and the US-China trade dispute, China is gradually losing its global partners. According to a recent global

survey, 20-30 % of industrial firms will leave China in the next few years. Around USD 4 trillion in manufacturing took place in China in 2020, and it is the world's largest exporter and the US is its top importer, posing a huge challenge for the World Trade Organization to regulate trade under its current rules and regulations.

Chart 3.24: Total Exports in India and Contribution to GDP, INR Trillion, %, India, FY15-FY20



Source: Department for Promotion of Industry and Internal Trade, Frost & Sullivan

Export focus on USD 5 Trillion GDP: With a larger focus on CAPEX and R&D, Budget 2021 has given a strong push to the domestic marketplace, which is very significant to India's economic growth. Presented encouragingly at the tail-end of the COVID 19 pandemic and at the inauguration of the vaccination drive, Budget 2021-22 lived up to the hope of being an exercise to push growth. In the following two-three years, high real GDP growth rates are going to be rare in the majority of the economies as they gradually recover from the impact of the COVID 19 pandemic.

India has the potential to be one of the most attractive manufacturing destinations and support the objective of 'Make in India for the World'. The government and industry need to collaborate and drive initiatives to help India move among the top 5 countries in ESDM production and the top 3 in ESDM consumption. Many policy-level initiatives are hoped to be implemented quickly. The effect of policies should be measured and evaluated against the desired objectives to re-check and refine at regular intervals.

Component Manufacturing/ Lead time: Companies in the industry should take initiative to jointly locally source a minimum quantity of key components that are currently imported (fully or partially). Criteria on minimum quality standards and sourcing price should be set up for such an engagement. This will help component manufacturers plan and develop scale advantage.

India has limited capacity in local manufacturing of PCB with significant gaps with flexible, HDI and multilayer PCBs. Indian manufacturers find strength in rigid multilayer range and are limited by their scale. OEMs, at present, are importing already designed and manufactured PCBA from third party suppliers. However, the need is to invest resources in in-house PCBA design and assembly. Investing in Printed Circuit Board Assembly design and (Surface Mount Technology) SMT-level PCBA assembly are important steps

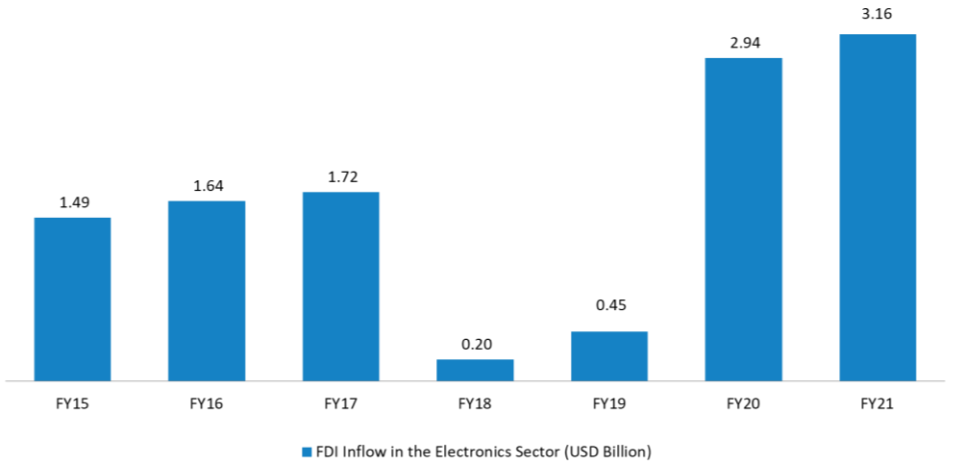
towards full-scale manufacturing. Some EMS companies are building capabilities for PCBA and are actively scouting for PCB suppliers to reduce cost and lead time. There are numerous benefits for adopting the in-house design and assembly. Firstly, it will guarantee more control over the entire product design, selection of crucial components, better buying power, building Intellectual Property portfolio and ensuring several in-house quality checks and testing In comparison to importing a readymade PCBA from a third party ODM from the overseas. PCBA design and assembly will further help in development of component ecosystem.

Investments in PCBA by EMS companies as well as OEMs with the objective of high value adding manufacturing is expected to drive the demand for PCB in the country. Reduction in lead times from 4 weeks to 1 week by discrete local sourcing of PCB is a significant driver for PCBAs to source their bread boards locally than import. PCBA design and assembly with local sourcing of some passive components alone will drive the total local value addition and will make a strong case to attract foundry players to manufacture the high-cost silicon based PCBA sub-components locally. This could alone grow the total value addition for Make in India program substantially.

Investments by Local and Global players: The higher growth rate in India vis-à-vis the Global market is because of multiple factors: consistent local demand for Electronics products, Government's focus on domestic manufacturing, programs like Make in India and Digital India, which have led to increasing manufacturing investment in the country.

The Make in India initiative, tax and duty support and Government support through policies, most notably, MSIPS, have been instrumental in encouraging new investment from EMS companies. Electronic manufacturing services player Dixon Technologies is spending over INR 6 Billion to build the new capacity in India in the mobile devices, laptops & tablets, telecom equipment, & LED components segment to cater to the domestic and the global market in the coming year. Dixon is currently positioning itself as India's largest home-grown 'universal champion' for the electronics manufacturing, one of the important goals of the government's PLI scheme which Dixon is currently leveraging for its overall growth.

Chart 3.25: FDI Inflow in the Electronics Sector, Value in USD Billion, FY15-FY21



Source: Department for Promotion of Industry and Internal Trade, Frost & Sullivan

European telecom dealers Ericsson and Nokia have conveyed their intention to increase existing manufacturing operations in India to support their worldwide supply chain. Local telecom component manufacturers VVDN Technologies, HFCL, Dixon, Coral Telecom and the Sterlite Technologies have also expressed interest in the PLI scheme of Government. India is expected to run a widespread outreach program with the support of "Invest India team" for the Production Linked Incentive scheme. Nokia and Ericsson is also going to target the BSNL big ticket 4G contract expansion after GOI dropped few clause which was earlier prohibiting them from bid participation.

Impact of COVID-19 Pandemic in India

India has been one of the countries with the highest number of COVID-19 infections in the world. Economic lockdown affected manufacturing and production related activities that resulted in economic and job losses. An overall shutdown has created challenging scenario for small and medium scale enterprises that form the backbone of the Indian economy that have had to effect major layoffs (typically in the unorganized and semi-skilled category) and in many cases shut down businesses to curtail economic losses. India faces a huge decline in government revenues and growth of the income for at least two quarters as the coronavirus hits economic activity of the country as a whole. A fall in investor sentiment impacts privatization plans, government and industry. The manufacturing sector has been at the forefront in the country's economic recovery. The automobile and two wheeler manufacturing segment witnessed record sales in the third quarter of the financial year with consumer sentiment buoyed by rebounding economic activity and the festive season.

Chart 3.26: Atmanirbhar Bharat 3.0 - Stimulus package (after first Covid-19 wave), India, November 2020

Sectors	Stimulus Package (INR Billion)
Boost for Atmanirbhar Manufacturing - Production Linked Incentive Scheme	1,459.8
Industrial Infrastructure, Industrial Incentives and Domestic Defence Equipment	102.0
Boost for Project Exports - Support for EXIM Bank	30.0
Boost for Infrastructure - equity infusion in NIIF	60.0
Atmanirbhar Bharat Rozgar Yojana	60.0
Support for Agriculture - Fertiliser Subsidy	650.0
Boost for Rural Employment	100.0
R&D Grant for Covid Suraksha - Indian vaccine development	9.0
Housing for All - PMAY-U	180.0
Total	2,650.8

Source: Ministry of Finance, Govt. of India

Policy initiatives driving Domestic Production in India

The Government in India is encouraging domestic manufacturing through supporting policies and initiatives that are likely to lead to overall development in the ecosystem and will open up gates of opportunities for companies, vendors, and distributors in the market. Incentives for local manufacturing, demand side support through Government procurement, import barriers via duties and favourable steps like GST that reduced complexity of operations, are pull factors for MNCs to invest in India. The Government has given higher priority to promote mobile phones segment within the electronics manufacturing, by providing focus on development of mobile phones, components, sub-assemblies and the entire ecosystem. Right from providing land at a subsidized rate to offering them variable investment subsidy and VAT exemption, the government is also providing mega industry status to these companies. India's domestic demand has been increasing, thus encouraging the likes of Apple, Xiaomi, Oppo, Vivo, Lava, OnePlus, RealMe and Samsung to expand local manufacturing and also export from the world's second largest smartphone market. Some of the key initiatives/ schemes/ programs introduced by the government in boosting the mobile phone market in India include:

Make in India: In 2014, the government of India announced this initiative to make India a global manufacturing hub, by facilitating both domestic as well as International companies to set-up manufacturing bases in India. As per the scheme, government released special funds to boost the local manufacturing of mobile phones and electronic components. It has also introduced multiple new initiatives, including promoting foreign direct investment, implementing intellectual property rights and developing the manufacturing sector. Also, in the latest budget of 2020, government has further announced new measures to strengthen the local manufacturing and its ecosystem.

Make in India program, a part of the 'Atmanirbhar Bharat Abhiyan' (Self-reliant India), will give the additional boost to country's business operations through 'Make in India' and through encouraging substitution of import of low Technology goods from other country and creating demand for local production. The financial package is aimed at reviving and revamping country's economy. The major objective of Self-Reliant India Mission is to eliminate import dependency and emphasising on discouraging the import of goods, which can be manufactured domestically

Atmanirbhar Bharat Abhiyan is planned to get carried out in two phases:

- Phase 1: The emphasis will be on segments like medical, textiles, electronics, plastics and toys
- Phase 2: For products like gems and jewellery, pharma and steel, etc.

Production Linked Incentive (PLI) Scheme: The scheme was initially announced in the year 2019 by the Government of India considering the incremental investment and sales of manufactured goods specifically to mobile phones and components market in India. It is expected to promote exports in the next few years. As per the scheme, a total production of INR 11,500 Billion is expected including INR 7,000 Billion exports in the next five years. Production Linked Incentive Scheme (PLI) for large scale electronics manufacturing was notified in April 2020. Another PLI scheme for IT Hardware was later notified in March 2021. As per the scheme incentives of 3 % to 5 % is provided on incremental sales (over base year) of goods manufactured in

India. Eligibility is subjected to thresholds of incremental investment and incremental sale of manufactured goods. The Scheme is open for applications for a period of 4 months initially which may be extended. Support under the Scheme shall be provided for a period of five (5) years subsequent to the base year. The Scheme will be implemented through a Nodal Agency which shall act as a Project Management Agency (PMA) and be responsible for providing implementation support.

Chart 3.27: PLI scheme in 13 key sectors for enhancing India's manufacturing capabilities and enhancing exports, Atmanirbhar Bharat, FY21 and FY22

Sectors	Implementing Ministry/Department	Approved financial outlay over a five year period (INR billion)
Mobile manufacturing and specified electronic components	Ministry of Electronics and Information Technology	409.5
Critical key starting materials/ drugs intermediaries, APIs	Department of Pharmaceuticals	69.4
Manufacturing of medical devices	Department of Pharmaceuticals	34.2
Advance Chemistry Cell ACC Battery	NITI Aayog and Department of Heavy Industries	181.0
Electronic/Technology Products	Ministry of Electronics and Information Technology	50.0
Automobiles & Auto Components#	Department of Heavy Industries	259.4
Pharmaceuticals drugs	Department of Pharmaceuticals	150.0
Telecom & Networking Products	Department of Telecom	122.0
Textile Products	Ministry of Textiles	106.8
Food Products	Ministry of Food Processing Industries	109.0
High Efficiency Solar PV Modules	Ministry of New and Renewable Energy	45.0
White Goods (ACs & LED)	Department for Promotion of Industry and Internal Trade	62.4
Speciality Steel	Ministry of Steel	63.2
Total		**1,661.9**

 # Financial outlay for Automobiles & auto components was revised on September 2021 from INR 570.4 billion to INR 259.4 billion

Source: MeitY (Ministry of Electronics and Information Technology), Invest India

As per the 2021-22 budget, under the PLI scheme the government has allotted INR 409 Billion for Mobile Manufacturing and Specified Electronic Components, which is much higher than any other scheme. It has different thresholds of investments required for domestic vs. international companies. Fully integrated domestic players are going to be the biggest beneficiary of this scheme. This scheme will definitely help India Inc. to be an integral part of the global supply chain. Initially introduced in mobile phone production, this policy is being expanded to other sectors as well. The mobile phone sector is expected to generate over 0.2 million direct jobs and nearly 0.6 million indirect employment opportunities in the next five years with the help of PLI scheme.

The Production Linked Incentive Scheme (PLI) for Large Scale Electronics Manufacturing proposes a financial incentive to boost domestic manufacturing and attract large investments in the electronics value chain including mobile phones, electronic components and ATMP units. Production Linked Incentives of up to INR 409.51 Billion will be awarded over a period of 5 years.

Chart 3.28: Production Linked Incentive Scheme (PLI): Scheme 1 (Round 1) - for Large Scale Electronics Manufacturing, India, April 2020

Target Segments Eligible under PLIC Scheme

- Mobile Phones
- Specified Electronic Components
  - SMT components
  - Discrete semiconductor devices including transistors, diodes, thyristors, etc.
  - Passive components including resistors, capacitors, etc. for electronic applications
  - Printed Circuit Boards (PCB), PCB laminates, prepregs, photopolymer films, PCB printing inks
  - Sensors, transducers, actuators, crystals for electronic applications
  - System in Package (SIP)
  - Micro / Nano-electronic components such as Micro Electromechanical Systems (MEMS) and Nano Electromechanical Systems (NEMS)
  - Assembly, Testing, Marking and Packaging (ATMP) units

Segment	Proposed Incentive Rate (%)	Incremental Investment Over Base Year (INR Billion)	Incremental Sales of Manufactured Goods Over Base Year
Mobile Phones (Invoice Value of INR 15,000 and above)	Year 1: 6% Year 2: 6% Year 3: 5% Year 4: 5% Year 5: 4%	INR 10 Billion over 4 years Cumulative minimum: Year 1: INR 2.5 Billion Year 2: INR 5.0 Billion Year 3: INR 7.5 Billion Year 4: INR 10.0 Billion	Year 1: INR 40.0 Billion Year 2: INR 80.0 Billion Year 3: INR 150.0 Billion Year 4: INR 200.0 Billion Year 5: INR 250.0 Billion
Mobile Phones (Domestic Companies)		INR 2 Billion over 4 years Cumulative minimum: Year 1: INR 0.5 Billion Year 2: INR 1.0 Billion Year 3: INR 1.5 Billion Year 4: INR 2.0 Billion	Year 1: INR 5.0 Billion Year 2: INR 10.0 Billion Year 3: INR 20.0 Billion Year 4: INR 35.0 Billion Year 5: INR 50.0 Billion
Specified Electronic Components		INR 1 Billion over 4 years Cumulative minimum: Year 1: INR 0.25 Billion Year 2: INR 0.50 Billion Year 3: INR 0.75 Billion Year 4: INR 1.0 Billion	Year 1: INR 1.0 Billion Year 2: INR 2.0 Billion Year 3: INR 3.0 Billion Year 4: INR 4.5 Billion Year 5: INR 6.0 Billion

**Year 1 (FY2020-21); Year 2 (FY2021-22); Year 3 (FY2022-23); Year 4 (FY2023-24); Year 5 (2024-25)*

Source: MeitY (Ministry of Electronics and Information Technology)

Chart 3.29: Production Linked Incentive Scheme (PLI): Scheme 1 (Round 2) - for Large Scale Electronics Manufacturing, India, March 2021

Segment	Incentive Rate (on Incremental Sale of Manufactured Goods) (%)	Incremental Investment Over Base Year (INR Billion)	Incremental Sales of Manufactured Goods Over Base Year
Specified Electronic Components	Year 1: 5% Year 2: 4% Year 3: 4% Year 4: 3%	INR 0.25 Billion over 4 years Cumulative minimum: Year 1: INR 0.05 Billion Year 2: INR 0.11 Billion Year 3: INR 0.18 Billion Year 4: INR 0.25 Billion	Year 1: INR 0.15 Billion Year 2: INR 0.35 Billion Year 3: INR 0.60 Billion Year 4: INR 1.00 Billion

**Year 1 (FY2021-22); Year 2 (FY2022-23); Year 3 (FY2023-24); Year 4 (FY2024-25)*

Source: MeitY (Ministry of Electronics and Information Technology)

The Production Linked Incentive Scheme for IT Hardware proposes a financial incentive to boost domestic manufacturing and attract large investments in the value chain. The scheme seeks to incentivise companies to utilise the existing installed capacity to fulfil the increasing domestic demand. Product Linked Incentives of upto INR 73 Billion will be awarded over a period of 4 years.

Chart 3.30: Production Linked Incentive Scheme (PLI) for IT Hardware, India, March 2021

Target Segments Eligible under PLIC Scheme

- Laptops
- Tablets
- All-in-one PCs
- Servers

Segment	Proposed Incentive Rate (%)	Incremental Investment Over Base Year (INR Billion)	Incremental Sales of Manufactured Goods Over Base Year
IT Hardware Companies (I) Laptops (Invoice value of INR 30,000 and above) (II) Tablets (Invoice value of INR 15,000 and above) (III) All-in-one PCs (IV) Servers	Year 1: 4% Year 2: 3% Year 3: 2% Year 4: 2% / 1%	INR 5 Billion over 4 years Cumulative minimum: Year 1: INR 0.5 Billion Year 2: INR 1.0 Billion Year 3: INR 3.0 Billion Year 4: INR 5.0 Billion	Year 1: INR 10.0 Billion Year 2: INR 25.0 Billion Year 3: INR 50.0 Billion Year 4: INR 100.0 Billion
Domestic Companies (I) Laptops (II) Tablets (III) All-in-one PCs (IV) Servers		INR 0.20 Billion over 4 years Cumulative minimum: Year 1: INR 0.04 Billion Year 2: INR 0.08 Billion Year 3: INR 0.14 Billion Year 4: INR 0.20 Billion	Year 1: INR 0.5 Billion Year 2: INR 1.0 Billion Year 3: INR 2.0 Billion Year 4: INR 3.0 Billion

**Year 1 (FY2021-22); Year 2 (FY2022-23); Year 3 (FY2023-24); Year 4 (FY2024-25)*

Source: MeitY (Ministry of Electronics and Information Technology)

Scheme for Promotion of Manufacturing of Electronic Components and Semiconductors (SPECS): The aim is to strengthen the manufacturing ecosystem of electronic components and semiconductors. Target manufacturing of electronic components and semiconductors through the scheme will help meet domestic demand, increase value addition and promote employment opportunities in this sector. Incentives of up to INR 32.85 Billion will be awarded under the Scheme over a period of 8 years.

Merchandise Exports from India Scheme (MEIS): The scheme falls under foreign trade policy of India, replacing five other similar incentive schemes in the past. As per this scheme the government of India provides benefits up to 4 % depending on the country of exports and the products. Rewards under the scheme are payable as percentage of realized free-on-board value and, MEIS duty credit scrip can be transferred to the company for working capital needs or used for payment of various duties such as basic customs duty.

Modified Electronics Manufacturing Clusters Scheme (EMC 2.0): The scheme aims to strengthen the electronics industry's infrastructure and value chain in India. There are financial incentives to provide high-quality infrastructure and shared facilities for electronics producers. Incentives of up to INR 37.62 Billion will be distributed over 8 years.

Comparative Analysis of industry in India and China

Overall Electronics Manufacturing Level comparison

Economic development in India is gaining support as a result of the continuing expansion of private consumption and investments some industries following the liberalisation of foreign ownership. The projected government expenditure expansion would further enhance growth by focusing on social infrastructure, making the best use of technology, digital India, make in India, job creation in Micro, Small, and Medium Enterprises (MSMEs), and heavy investment in infrastructure.

Chart 3.31: Economic comparison on favourable manufacturing parameters, India and China, 2020

PARAMETERS	INDIA	CHINA
Population (Million)	1,355.0	1,402.0
Annual GDP (USD Billion)	2.7	11.8
GDP Growth (%)	-7.3	2.3
Inflation (%)	6.6	2.4
Manufacturing Value Added (% of GDP)	13.0	26.2
Export (USD Billion)	474.1	4,723.0
Imports (USD Billion)	482.5	2,357.0
Manufacturing Risk Index (Rank)	3	1
FDI Investments (USD Billion)	81.7	149.0

Source: Frost & Sullivan

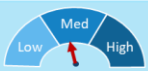
Chart 3.32: Labour market comparison, India and China, 2020

PARAMETERS	INDIA	CHINA
Total Labour Force (Million)	471.7	771.0
Total Labour Force, Female (% of Total population)	20.3	43.6
Labour force participation rate (% of total population in ages 15-64)	52.1	75.9
Employment in Industry (% of Total Employment)	25.1	27.4
Wage and salaried workers (% of Total Employment)	24.2	55.3
Average Daily Wages - Manufacturing (USD)	6.2	28.2

Source: Frost & Sullivan

China is now the world's second-largest economy, with a growth rate of approximately 6% projected for 2020. The growth rate is impressive when compared to the size of the economy. The primary difficulties for its expansion are excess capacity issues, labour costs, and financial market weaknesses.

Chart 3.33: Manufacturing eco-system comparison, India and China, 2020

PARAMETERS	INDIA	CHINA
Favorable Government Policies and Programs		
Developed Component eco system		
Labour availability		
Maturity of Infrastructure		
Ease of Export		

Source: Frost & Sullivan

A long history and dominance in electronics production make China the perfect manufacturing site. China's electronic sector has grown three times faster than the country's GDP. China's electronics production, including notebooks, mobile phones, and flat panel displays, is heavily exported. The global economic crisis and years of fast development have weakened China's industrial competitiveness. The Indian electronics sector is evolving, and it is now recognised as a governmental priority. The National Electronics Policy (NPE) has emphasised local value addition and created a favourable environment. With its unrestricted focus on manufacturing, the government is increasingly attracting global and domestic companies. India now has high ambitions to dominate the region's electronics production.

Chart 3.34: Electronics manufacturing level comparison, India and China, 2020

PARAMETERS	INDIA	CHINA
Raw Material/ Component Sourcing costs (%)	64.0	55.0
Labor Costs (Cost X Productivity) (%)	17.0	26.0
Logistics and Transportation costs (%)	6.0	5.0
Utility costs (%)	14.6	14.8

Source: Frost & Sullivan

Indian electronics manufacturers are heavily dependent on imports for raw materials sourcing. The phased manufacturing programme of the Government of India involves a mix of local assembly import levies and incentives. Since plastic components are driven by international prices, there is no noticeable disadvantage for Indian producers. As a large number of electronic manufacturing units are anticipated to undertake greater value addition; the component cost is likely to go down over the next 3 to 4 years.

Advantage India: A favourable destination for Electronic Manufacturing

India has long been seen as an attractive destination with low-cost skilled labour and a challenging business environment. In recent years, India has risen significantly in the global rankings to become a favoured investment destination. Previously hampered by poor demand and value addition, India's electronics sector was not regarded as a top destination by decision makers. With the recognition of electronics as a key segment for policy focus, this situation has changed. The National Policy on Electronics (NPE) emphasised local value addition and created an enabling environment. Shift in government in 2014, and its unwavering focus on manufacturing through Make-in-India policies, attracted the interest of both global and domestic companies.

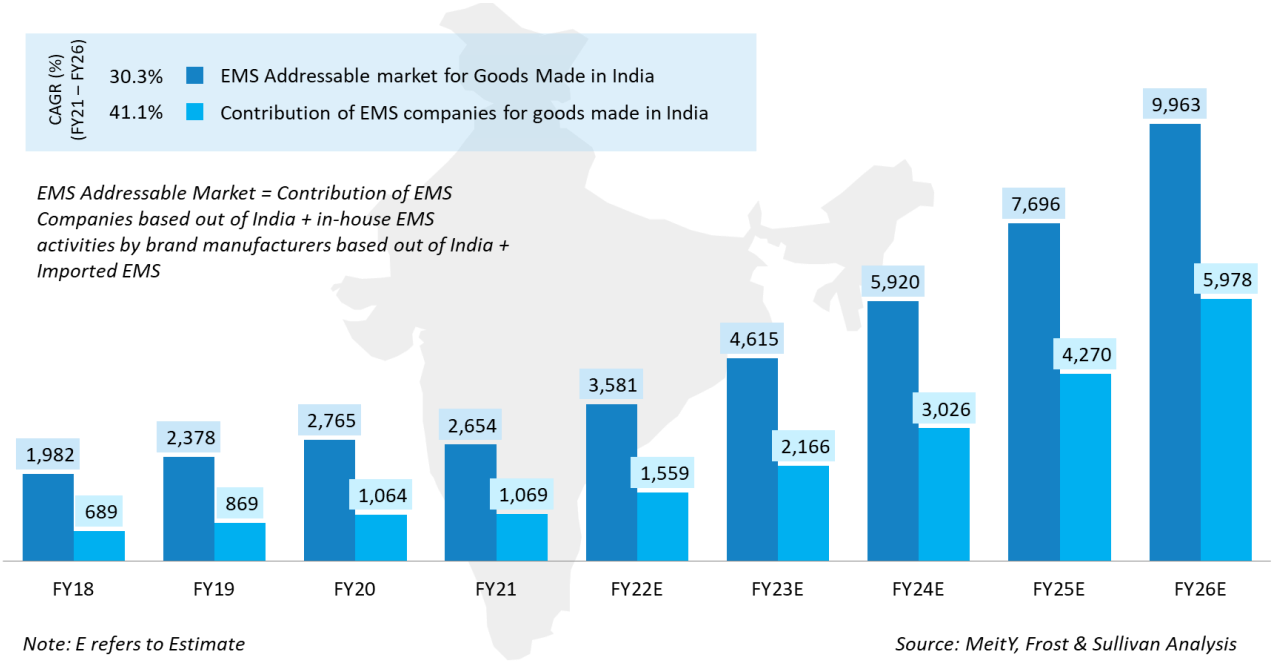
India has been able to take advantage of its demographic dividend while also introducing much-needed flexibility in its manufacturing policies. The conscious efforts to attract global investors have resulted in a growth in FDI as well as investor confidence. The following driving factors contribute to India's increasing preference for electronics manufacturing:

- Stable political government that assures global investors on consistency in policies
- Rising cost of labour in China while India is still at a lower end of this cost
- Creation of National Manufacturing Zones (NMZ), Electronics Manufacturing Clusters (EMC), close coordination between centre and states for investment promotion
- High domestic demand for products and services; local needs
- Investment by EMS companies
- Duties and tariffs to discourage imports and encourage domestic value addition
- Digitalization that accentuates demand for select products

EMS Industry Size and Growth Forecast

The total addressable EMS market in India was valued at INR 2,654 billion (USD 36 Billion) in FY21, and is expected to grow to INR 9,963 Billion (USD 135 Billion) in FY26 with a CAGR of 30.3%. However, the contribution of Indian EMS companies is around 40%, which is valued at INR 1,069 Billion (USD 14 Billion) in FY21, which is expected to grow at 41.1% CAGR to reach INR 5,978 Billion (USD 81 Billion) by FY26. India is positioned as a destination for high-quality design work, not merely as a low-cost alternative. Many multinational companies have established and expanded captive centres in the country. Although it aided the economy by creating domestic infrastructure and jobs, the intellectual property rights were held by the global headquarters. Most OEMs prefer engaging EMS partners for contract manufacturing, but the ODM model is slowly gaining traction in India, where OEMs collaborate with ODMs on product development. Many EMS players are gradually expanding to provide complete design services in addition to contract manufacturing. This acts as a win-win situation for both the EMS players as well as the OEMs; EMS players obtain higher margins through this model, and OEMs benefit by outsourcing manufacturing and design activities, enabling them to focus on other expansion activities. Embracing the ODM model of partnership with EMS partners, coupled with venturing into new product segments, is propelling OEMs to pursue EMS engagement. High volumes will influence EMS/ODM to bring in the component ecosystem locally and enhance domestic capabilities for component sourcing, thus making the electronics ecosystem stronger.

Chart 3.35: EMS addressable market vs. Contribution of EMS companies for goods made in India, Value in INR Billion, FY21 and FY26E



Note: E refers to Estimate

Source: MeitY, Frost & Sullivan Analysis

A strong consumer economy with increasing demand for consumer and industrial electronics has driven the Indian EMS sector into the forefront. Domestic electronics production in India has received a lot of attention from both industry and the government, owing to the necessity for import substitution. Favourable policy initiatives in recent years, as well as changes in the global manufacturing environment, have drawn attention to India as a preferred destination for electronics manufacturing investments. Syrma SGS are leaders in high mix low volume product management and it is present in most industrial verticals. The company is growing through consolidation and partnership models. Also, it is recognized in the industry for responsiveness and being a reliable partner based on the NPS Score.

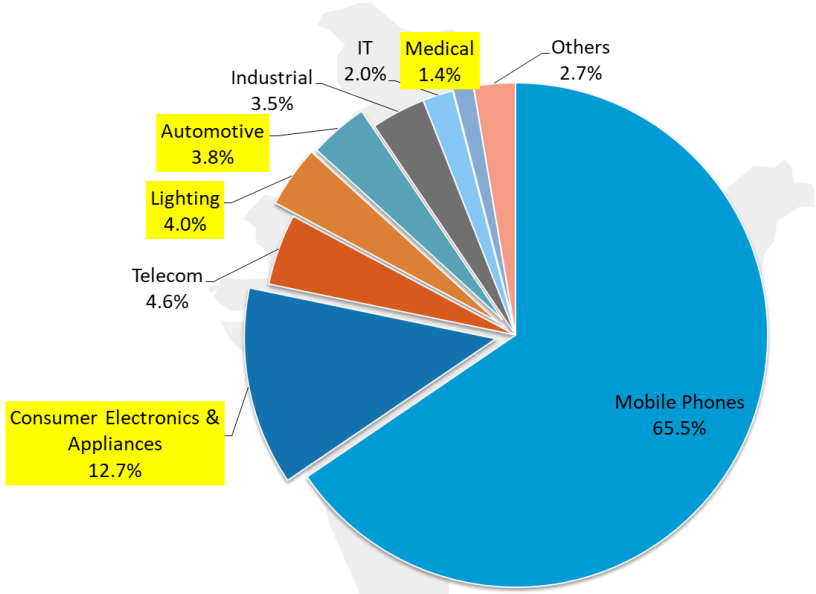
The Indian EMS industry has benefited from a greater focus on manufacturing and an overall growth in the u sage of electronics in many aspects of life. Domestic demand for mobile phones, PCs, consumer electronics, medical products, strategic and automotive electronics and offers a huge growth potential. Because of the 5G rollout, there is an increase in demand for telecom infrastructure projects, as well as a necessity to build them locally. Furthermore, growing labour costs in other parts of the world have led major OEMs to favour India, which is a practice of large OEMs to outsource manufacturing rather than to create their own infrastructure. EMS market in India enjoys unique benefits of an explosive domestic demand and the migration of manufacturing from other manufacturing havens driven by multiplicity of factors. These reasons have resulted in the Indian EMS market growing at a higher rate than average global market and are expected to intensify in the next decade.

Syrma SGS is operating in some of the fastest growing sectors in the current market, including consumer electronics and appliances, telecommunications, automotive and industrial. These sectors have tremendous development potential globally. The company is also having a plan to diversify its focus into other key

industry verticals such as aerospace and defence which is currently contributing to less than 2 % of the overall market.

EMS Market Break-up by Industry Applications

Chart 3.36: EMS Market break-up by Industry Applications, India, in %, FY20



 # Segments highlighted in yellow are the key business segments for Syrma

** Others include: Aerospace & Defence, Energy, etc.*

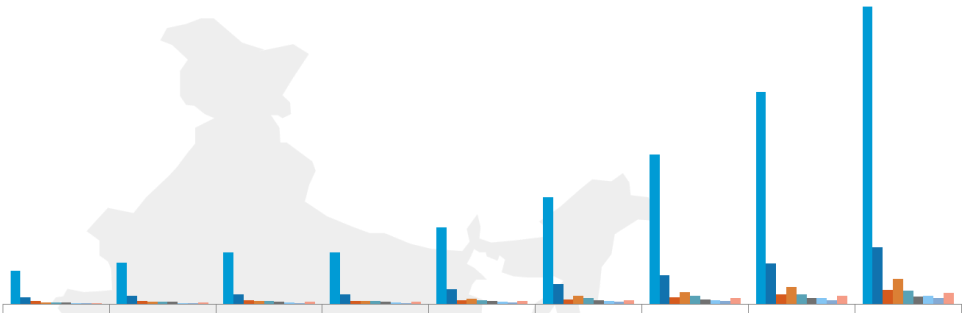
Source: Frost & Sullivan Analysis

Consumer Electronics & Appliances - In India, CEA has the largest market share after mobile phones. Sales are driven by rising income levels and technological innovation, since users tend to adapt to new technologies through early replacement. Untapped markets have been brought to the attention of consumer electronics companies due to digital technology and enabling connectivity infrastructure. FPD TVs, Refrigerators and Set Top Boxes (STB) account for a significant portion of the market size. With rise in demand of components, it is very likely that EMS and Tier-1 players would take steps to build a component base within the country.

Telecom - Rise in mobile-phone penetration and decline in data costs is leading to increase in internet users in India, creating opportunities for new businesses in the Telecom sector. The top 4 products in the Telecommunications segment include Base Transceiver Station (BTS), Gigabit Passive Optical Networks (GPON), Media Gateways and Modems that occupy 92% of the market in terms of volume. Government launched Digital India initiative in FY15 aiming to provide digital infrastructure as a core utility to every citizen, and it seeks to enable people to access the internet by providing digital literacy.

Lighting - The LED business is booming, and the government has designated LED as one of its strategic priorities. Smart lighting solutions would contribute to building management systems via wireless networking, as the Internet of Things (IoT) gains traction. The government's drive for LED lighting and measures to replace conventional CFL and GLS lights with LEDs is continuing. Till date, the Indian government has installed around 12 million LED lights as part of the Street Lighting National Programme.

Chart 3.37: EMS Market break-up by Industry Applications, India, Value in INR Billion, FY18-FY26E



	FY18	FY19	FY20	FY21	FY22E	FY23E	FY24E	FY25E	FY26E
Mobile Phones	449	560	697	704	1,035	1,449	2,028	2,874	4,035
Consumer Electronics & Appliances	89	111	135	136	199	277	387	549	774
Telecom	40	44	49	42	54	65	94	134	189
Lighting	22	32	42	47	74	111	162	237	344
Automotive	26	33	40	40	58	79	112	138	183
Industrial	28	33	37	33	45	56	68	85	105
IT	13	17	21	21	31	42	57	79	109
Medical	10	13	14	14	20	29	41	58	82
Others	12	27	28	32	44	57	78	117	156

** Others include: Aerospace & defence, Energy, etc.*

Note: E refers to Estimate

Source: Frost & Sullivan Analysis

Automotive - In the Automotive Electronics industry, the top 5 products, namely, Engine Control Unit (ECU), EV/HV, HVAC, Infotainment and Lighting account for around 95% of the demand by value. Government Initiatives like the Automotive Mission Plan which targets production of 940 Million vehicles by FY26 bodes well for the market. Statutory requirements on emissions and safety are expected to generate significant demand for many products, which will boost local manufacturing.

Industrial - The transition to smart manufacturing technology will result in intelligent machinery based on the requirement of electronic systems. The vast majority of electronics applications are concerned with the management and operation of heavy machinery. Energy metres / smart meters, machine tools (CNC), and industrial machinery are key products occupying a huge market share in this segment. The need for process optimization, energy efficiency, M2M, asset management, machine and process safety are the key drivers for increased use of automation and instrumentation solutions. PCBA forms the core of an electronic product, contributing to nearly 40 % of the total EMS market. RFID is another key component which is gaining prominence in the Indian market and has a contribution of around 2 % in the EMS market.

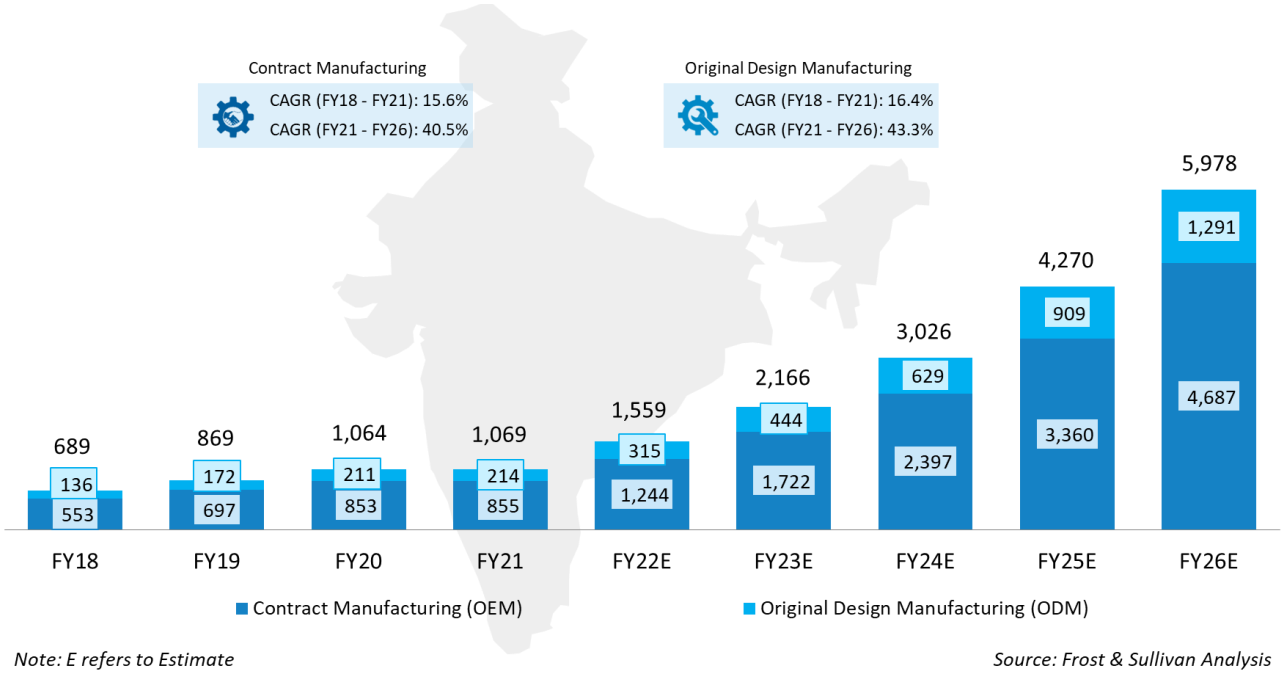
IT & BA - Government's digitization programs like Digital India, Digital Economy & Digital Payment will continue to drive this segment. Additionally, rising security concerns (primarily deployment of video surveillance systems), demand from upcoming infrastructures projects as well as growing awareness amongst consumers is driving the Building Automation market in India. The top 5 products in the IT and Building automation segment include CCTV cameras, Notebooks, Servers, Storage Devices and Tablets. These top 5 products occupy 90 % of the market in terms of volume.

Medical - With medical devices becoming relatively smaller, more complex and "smarter" devices are expected in the market, thanks to the IoT. EMS companies have a fast growing role in the growth of these

advanced medical products. In reality, many of the technology developments in the medical device industry are electronics-related. Medical device manufacturers are keen to take advantage of the fast-growing, data-driven consumer business by building the real-time multi-functionality into their products. Miniaturization, mobility, connectivity, data collection, and wearables usually require EMS.

EMS market Break-up by ODM vs. Contract Manufacturing

Chart 3.38: EMS Market break-up by ODM and CM, Value in INR Billion, India, FY18-FY26E



Note: E refers to Estimate

Source: Frost & Sullivan Analysis

In the total EMS market, contract manufacturing (CM) accounts for approximately 80 %, while ODM accounts for the remaining 20 %. As reference designs and specifications are provided primarily by the OEMs to EMS providers, there is not much scope for product differentiation. EMS companies are steadily shifting towards ODM models, giving full turnkey solutions for items from design, product development to reverse logistics. Also, due to increased competition, EMS companies are striving to diversify their product offerings. EMS providers have the expertise to procure and manufacture at faster turnaround times. Moreover, they are able to leverage their global footprint and easy access to local markets to deliver their customer products ahead of competitors.

Range of services offered by EMS companies: ODM vs. Contract Manufacturing

EMS companies can offer end-to-end services right from Design, Assembly, Production, Testing and After sales. However, only very few companies in India provide end-to-solutions, as most OEMs are primarily involved in assembly and testing phase. The evolution of the Indian electronics market has, surprisingly, resulted in a gradual but drastic shift in the supplier base. The availability of technology and regional presence has contributed to their growing acceptability. While Tier-I players focus on their product design

and development due to their financial strength, Tier-II players are comfortable with brand positioning rather than in-house product skills.

In the ODM industry, innovation is critical to success. While cost reduction remains the major driver of EMS outsourcing, other factors such as improved design skills have contributed to ODM capabilities. OEMs have realised the benefits of EMS providers serving as joint design manufacturers. Partnering right from the design stage results in significant cost reduction, as the initial stage sets the price of the end product. Increased competition has emphasised the importance of time to market. OEMs are moving away from an era where they trailed behind demand to a scenario where they have to create demand in order to remain more profitable. The impact of this driver is expected to remain high for the short and medium terms and is expected to become very high during the long term.

High opportunity segments for EMS companies

Industrial, Consumer electronics and appliances, Automotive, Lighting and Mobile phones are the high opportunity segment for EMS companies in India. The mobile phone has become the dominating sector in the EMS industry. Additionally, as India is a global leader in the automotive sector, with various OEMs active in the market, Engine Control Units (ECU) have a stronger focus. The growing concern among end-users about vehicle performance and fuel consumption are the primary drivers of ECU growth. The government has classified LED lighting as one of the products with a strategic focus. In the coming years, the biggest applications are expected to be residential, street lighting, and commercial lighting. Syrma SGS is delivering excellence with larger focus on new age communication (specifically M2M) – like, IOT based products. Also, Syrma SGS has a well-diversified portfolio with over half of the revenue from exports.

Benefits of ODM over Contract Manufacturing

Chart 3.39: Advantages of ODM over CM

Original Design Manufacturing	Contract Manufacturing
✓ ODM retains IP rights to their design, giving them better negotiating power.	✓ Contract manufacturing helps in quicker production time
✓ ODMs may produce client products themselves or through subcontract; also into final assembly of products.	✓ OEMS save on their capital costs by involving CMs
✓ ODMs will manage the technical resources required for the successful completion of the production process.	✓ Better economies of scale when the business grows, when contract manufacturers produce for multiple customers.
✓ It is difficult for OEMs to switch suppliers since ODM players hold the rights for the design.	✗ OEMs gain complete ownership of all IP rights, including product specifications. CMs do not have negotiating power.
✗ Product development costs will be high	✗ All contractual manufacturing items are produced in-house, but not into final assembly.
✗ Minimum order quantity requirements are quite high.	✗ Lack expertise in producing their own set of products, development starts from the scratch.
	✗ OEMs can easily move to other providers, as they own rights for the design.

The increase in demand for electronic products has not been met by a corresponding increase in investment by OEMs in their production facilities. This is due to the fact that they have the choice of EMS businesses,

giving them a compelling incentive to create them locally. This has given support to ODM companies who create designs that end up in the portfolios of Tier-II players. It is a compelling value offer because of its low cost, rapid manufacturing turnaround, and aftermarket product support. The ODM companies, with their versatile capabilities in system designs, plastic moulding, PCBA, software engineering, and more importantly, manufacturing, encourage OEMs to increase the width of their partnership. Instead of investing in R&D, Tier-II players collaborate with ODMs to select and develop specific models based on existing models. The secondary benefit for ODMs from such collaborations is the improvement of capabilities to handle fresh clients.

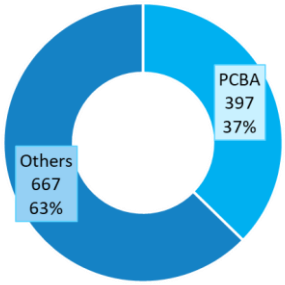
There is a growing perception that there is a rising outsourcing trend for some product segments where regional and private brands have gained dominant market position, and the ODM model allows companies to service this market as well. As the products moves towards maturity phase, more products are likely to become standard and fall within the purview of ODMs. As a result, in the long term, ODM firms will become an essential component in the success plans of OEMs of both tiers. Syrma SGS is one of the leading EMS companies with a focus on technology based solutions and ODM business.

EMS Market Break-up by Select Product Segment

A. PCBA (Printed Circuit Board Assembly)

The PCBA is the core of an electronic device, which includes Flash Memory, Application Processor, Graphics Processor, other semiconductor-based active and passive sub-components. All these assembly parts are not locally sourced considering a lack of semiconductor foundry and PCB sub-components supplier ecosystem in India. All electronic devices derive their intelligence and functionality from the PCBA. PCBAs are used in several sectors such as consumer electronics, mobile phones, automotive, and medical. It supports most electronic products and continues to expand into new sectors and applications.

Chart 3.40: Break-up of PCBA in the EMS Market, India, by Value in %, FY20



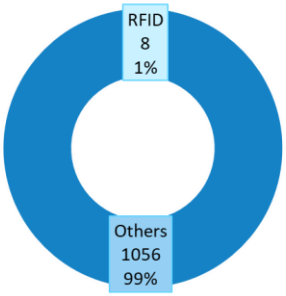
The National Policy on Electronics 2019 predicts positioning India as the global hub for the ESDM by concentrating on the size and the scale, endorsing the exports and enhancing the domestic value addition by creating a facilitating environment for the industry to compete on global level, which is an important policy objective. Building PCBA manufacturing capabilities is going to be the key to India's desire to become the leading electronics manufacturing hub for the universe. Investing in Printed Circuit Board Assembly is not only critical for maintaining the domestic manufacturing impetus but also India's emphasis on reducing its dependency and trade deficit on China. There is now a very strong realization among the multinational companies that supply chains must be de-risked and these establishments are now looking at diversifying to the other countries.

Some of the key drivers of PCBAs include growth in value addition and increasing demand for electronic products globally, requirement for high-speed assembly and miniaturization. It is very important for India to encourage the contract manufacturers and increase their manufacturing operations in India. This is

expected to speed up the export of PCBA, position India as the source of the global supply and further strengthen India's hold on the electronic manufacturing. Syrma is one of the leading PCBA manufacturers in India, supplying to various OEMs and assemblers in the market.

B. RFID (Radio-Frequency Identification) Tags

Chart 3.41: Break-up of RFID Tags in the EMS Market, India, by Value in INR Billion, FY20



RFID is a technology that uses radio wave communication to identify items and personnel individually or as a group. On the basis of their frequency of operation, these radio waves are classified as low frequency (LF), high frequency (HF), and ultra-high frequency (UHF). A tag is a silicon chip embedded with an antenna to enable communication through assigned radio frequencies. The significance of the benefits in using RFID in various applications across verticals is expected to have a major bearing on the level of adoption of the technology. Benefits attracting customers include better inventory management, improved operational efficiency, reduced labour, enhanced supply chain visibility, information accuracy, greater sales, and improved customer service.

India is a promising market for RFID adoption. Several ministries involving the MoD, the Ministry of Roadways and Highways, and the Ministry of Railways have issued mandates towards the use of RFID. Owing to the high pressure created by the need to research and create new markets and applications, suppliers in the Indian ecosystem come under tremendous pressure to make profits and sustain margins. This is compounded by the high threat from substitutes because of the price-sensitive nature of the Indian market. Demand for RFID is expected to increase in India along with organised retail, automotive, health care, and public transit. In addition, growing utilisation in government projects like Unique identification programme (Aaadhar) and metro rail is expected to fuel the market in India.

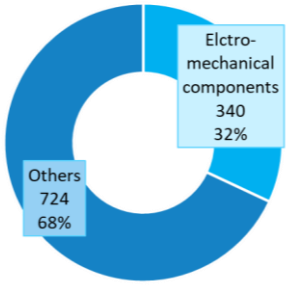
India is expected to witness considerable RFID deployments in coming days. Supply chain and asset tracking are among the top end-user applications in India. With passive RFID predominantly preferred in the asset tracking applications, the Indian market offers considerable opportunities for growth. Syrma's RFID tags, readers, and custom software enable the development of cutting-edge RFID applications for access control monitoring, animal identification, healthcare tracking, inventory management, product authentication, and vehicle sharing programmes, among others.

Some of the leading RFID player in India includes, Syrma SGS, InfoTech Software and System Limited, Zebra Technologies Corporation, Gemini Communication Limited, Alien Technology Corporation, NEC Corporation, Bartronics India Private Limited, PVL Tag Factory (India) Private Limited and Mantra Softech India Private Limited. Syrma SGS is one of the key global players in the custom RFID tags.

C. Electro mechanical components

Electro-mechanical components are those that utilise an electrical signal to create a mechanical change. The electronic components market can be largely categorised as follows:

Chart 3.42: Break-up of Electro-mechanical components in the EMS Market, India, by Value in %, FY20



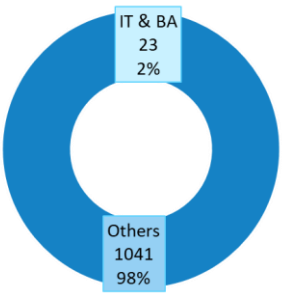
- Passive components - capacitors, resistors, wound components and crystals
- Active components - diodes, transistors, ICs and LEDs
- Electromechanical components - PCBs, switches, relays, cables and connectors
- Associated components - optical discs, magnets, RF tuners, heat-sinks, magnetrons, etc.

The electromechanical components dominate the EMS market, contributing to 43 % of the total EMS market. China, Taiwan, Japan, South Korea, and a few European countries are the key import destinations for India. The amount of value added in electronic components is quite restricted because the majority of the raw materials are imported. Imports of specialised components such as chip components, ICs, LEDs, PCBs, and so on have a greater percentage share of imports. India has strong production capability for components that do not require complex manufacturing.

Consumer durables and the telecommunication which includes mobile phone account for the major demand for the electronic components in India. This is being followed by the information technology and office automation and the automotive industries. Other major application industries like industrial and medical electronics, strategic electronics and the lighting industry contribute to the balance of the market. Industries like lighting and the strategic electronics are anticipated to witness the substantial growth in the near future. Rising local demand, adoption of high-end technology devices, technological advancements such as 4G/LTE network rollouts and the Internet of Things (IoT), along with government policies and incentives will drive the growth for electro mechanical components in India. Syrma's magnetic components and assemblies are used in a broad range of sectors, from household products to cutting-edge applications in heavy industry and beyond. Syrma is supplying to some of the key segments such as Industrial products, defence and aerospace, home appliances, and telecommunications.

Some of the leading electro-mechanical component player in India include, Vishay Components India Pvt Ltd, Epcos India Pvt Ltd, Deki Electronics Ltd, Globe Capacitors Ltd, Keltron Component Complex Ltd, Victor Component Systems Pvt Ltd. Syrma SGS is one of the key player in magnetics. The company has in-house magnetics facility with constant focus on backward integration.

Chart 3.43: Break-up of IT & BA in the EMS Market, India, by Value in INR Billion, FY20



D. IT & BA

Government's digitization programs like Digital India will continue to drive this segment. Additionally, rising security concerns (primarily deployment of video surveillance systems), demand from upcoming infrastructures projects as well as growing awareness amongst consumers is driving the Building Automation market in India.

The top 5 products in the IT and Building automation segment include CCTV cameras, Notebooks, Servers, Storage Devices and

Tablets. These top 5 products occupy 90% of the market in terms of volume.

Syrma SGS having one of the key focus area in this segment; the company is involved with customers from design stage thereby ensuring integration in the entire value chain. It has strong credentials in concept co-creation with many customers followed by product realization and lifecycle support.

E. Other Product Segments

Dynamic Random Access Memory (DRAM) is a subtype of RAM utilised for data or command processing by the computer processor. Servers use DRAM modules to enhance memory capacity while networking applications use DRAM modules to increase bandwidth and signal integrity. Organizations use contemporary equipment such as PCs, servers, and workstations, which is driving the DRAM market.

Solid State Drives (SSDs) are used in computers to employ flash memory, which is much faster than a mechanical hard drive. Rising need for high-performance and large-capacity storage devices, rising IT investment, and expanding number of data centres will drive the SSD market in India.

USB flash drive - stores data on flash memory with a USB interface. It's usually rewritable and smaller than an optical disc. A high demand for electronic data storage devices, a need for backup storage, and the ability to store data without power are key drivers. Dual drives are a growing trend in the industry.

Syrma is having key presence in other product segments such as DRAM modules, solid state drives, USB drives and other memory products. These specific product segments contribute to less than 10 % of the overall sales of Syrma SGS, which has a growth of around 10 % CAGR.

Syrma SGS has a strong track record of technical innovation, which includes collaboration with the engineering teams of its marquee customers, and the company has evolved over the years to provide integrated services and solutions to OEMs, from the initial product concept stage to volume production via concept co-creation and product realisation.

Competition Scenario

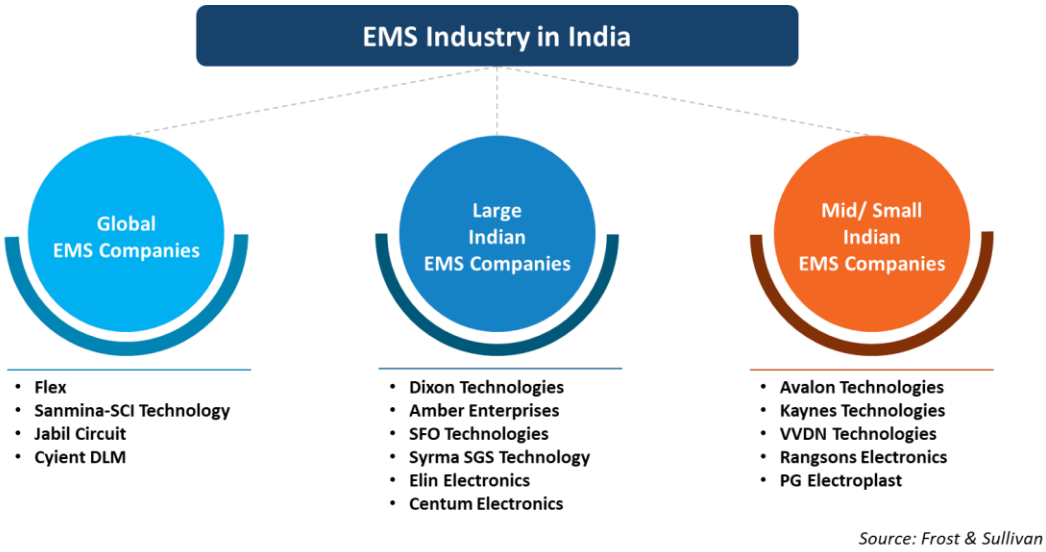
Industry Structure

There are more than 30 organized companies in the EMS industry but the commercial semiconductor fabrication operation is almost non-existent. Indian EMS market comprises of different tiers of companies including the global EMS companies with operations in India, large Indian EMS companies and mid/small Indian EMS companies. The competition concentration is moderate as the top 3 companies account for 28.5 % of the market. EMS companies in India have matured from being mere contract manufacturers to end-to-end support partners today. Companies are observed to follow either of the two unique business models – High volume/low mix or Low volume/high mix and seldom do companies adopt a mixed approach. Major players are Flextronics, Jabil, Dixon, SFO, Resolute, Syrma SGS, Elin, NTL, Cyient and Foxconn.

Continuous efforts by industry stakeholders and policy makers to create a favourable ecosystem have substantially enhanced the prospects of Indian electronics manufacturers and distributors matching international standards. Competition intensity in the market is high, as the market is crowded with MNCs,

domestic players and other unorganized players offering a range of services. EMS companies are slowly moving toward the ODM model offering complete end to end services including design, product development and also Reverse Logistics for certain products. Companies are also trying to expand into other product lines apart from the ones they are operating owing to increasing competition.

Chart 3.44: Industry Structure of EMS market in India



Source: Frost & Sullivan

Some of the key mergers and acquisitions in the EMS industry include:

- In 2020, Syrma Technology, a prominent ESDM provider in India, and SGS Tekniks inked a merger agreement, resulting in the formation of Syrma SGS Technologies Pvt Ltd.
- In 2019, Dixon Technologies (India) Ltd purchased its joint venture company, Padget Electronics Pvt Ltd, to boost the expansion of its business.
- In 2015, Cyient, a global EMS provider, acquired Indian ESDM player Rangsons Electronics. It has boosted Cyient's high-tech, design, and systems expansion.

1) Syrma SGS Technology Ltd

Company Overview

- Syrma SGS Technology, founded in 1978 by industry pioneers (Tandon family), is located in San Jose (California), and Chennai (India), developing quality technology products. It is one of India's leading exporters of electronics, providing a high-value integrated design and production solution for internationally recognized OEMs.
- Syrma SGS is one of the leading ESDM company with a focus on technology based solutions and ODM business. Unlike the traditional OEM or ODM business model, which only focuses on certain stages of the production process, the company's business model starts from product concept design and focuses on every segment of the overall industry value chain.
- Syrmas' business approach leads to continuous advancements in product technology, structure, and functional design to meet customer requirements and lead the industry in development.
- The company believes that their business model gives a competitive advantage at the front-end of the industry value chain which makes a value-creator and it enables them to become a driving force for developing new products and break-through technologies.

EMS Products Manufactured

- PCBA (Printed Circuit Boards)
- ZAC (Zone of Autonomous Creation)
- RFID (Radio-Frequency Identification)
- Magnetics (Mechanical Parts)
- Others (motherboards, DRAM modules, SSD and USB drives, copper wire coiling, induction devices, chokes, transformers)

Key Business Segments

- Industrial
- Consumer Electronics
- Automotive
- Computer
- Medical
- Railways

Key Services Offered

- Product Design
- Prototyping
- Product Assembly
- Quality & Testing
- Supply & Logistics
- After market

Manufacturing Facilities

- The company currently operates through 11 manufacturing facilities spread across four states in Chennai, Bargur, Bengaluru, Baddi, Bawal, Gurugram and Manesar

Key Strengths

- Manufacturing facilities in Tamil Nadu are placed in SEZs, allowing them to take advantage of specific tax and other incentives in relation to the products manufactured at these facilities.
- All of the manufacturing facilities are certified, including ISO 14001 and ISO 9001. Syrma is recognized as leader in people development as in the company is one of the great places to work.

Also, it has key focus on women empowerment, where more than 80% of employee base is women workforce.

- The company was the first in India to manufacture RFID products in India and continues to lead the industry. Also, the company is recognised as a leader in memory modules with deep expertise.
- Syrma has a long standing relationships with customers, an opportunity for increased wallet share and not a single customer more than 5 %

ESG Activities

The list of Environment and Social Objectives the Company is adhering to includes: (a) Access to water (b) Access to Energy (c) Equality & Empowerment (d) Human Rights Protection (e) Income and Productivity (f) Pollution prevention and waste management (g) Water resource management.

Environmental & Social

- Legal requirements and compliance checklist on Emissions, leakage, waste management, safety checks, employee safety etc.
- Agreement with Best hospital on SGS's Bio medical waste disposal.
- Periodical Testing of plant and machinery on emissions (Environment testing labs)
- Safety health and environment program: Regular spends to ensure further safety and environment control
- Annual EHS Objective planning and monitoring on emissions, pollution (air, water, noise), plantation, leakages & wastage checks, and proper disposals in check.

Legal Authorization

- E-Waste Authorization
- Fire Compliance and NOC
- Hazardous Waste Authorization
- Returns under EHS

Employee's health and Safety

- LOTO program: Identifying hazard and ensure safety to before proceeding on work
- Annual Hazard Identification & Risk Assessment (HIRA)
- Launched Covid 19 protocol manual to follow across plants
- Emergency Preparedness And Response Plan
- Safety Organization Chart in place for better planning and response.

Governance

- Employee Grievances redressal policy
- Equal Employment Opportunity Policy
- Human Rights Policy
- Sexual Harassment & Resolution Committee
- Anti-Corruption Policy

2) Bharat FIH (formerly Rising Star Mobile India)

Company Overview

- Bharat FIH, the subsidiary of the FIH Mobile Ltd, a Foxconn Technology Group Company, is currently India's leader in manufacturing and services of handset and the wireless communications. The company have been a part of the Indian growth story since 2015, leading an unmatched manufacturing revolution. Bharat FIH is one of the largest EMS providers in the country serving the local and the international brands.
- Formerly known as the Rising stars Mobile India, the company entered and established their presence in India in the year 2015 at Sri City, Andhra Pradesh. By 2017, the company had expanded their capacity to Sungavarchatram and Sriperumbudur near Chennai, with added capabilities.

EMS Products Manufactured

- Mechanical components (metal & plastic) of mobile phones
- PCBA
- Assembly of both Smart Phones and the Feature Phones categories

Key Business Segments

- Mobile phones (Communication devices)
- Telecom
- Television

Key Services Offered

- Design & Engineering
- New Product Development
- PCB Assembly
- Complex machining
- SMT
- Final assembly

Manufacturing Facilities

- The company has 3 manufacturing campuses and 12 factories in overall
- 50+ mobile assembly lines
- Company's manufacturing operations are spread over three campuses in at Sri City, Andhra Pradesh, at Sriperumbudur and Sungavarchatram with on-going R&D center at IIT Research Centre, Chennai.

Key Strengths

- To enhance the value chain, Bharat FIH is continually ramping up their production architecture from L1 to L10 capabilities. These operations are being supported by developing an environment of world class local suppliers to support the value chain.
- The company also offer direct-order fulfilment & configure-to-order services for delivery of the final products.

3) Dixon Technologies India Ltd

Company Overview

- Dixon Technologies, located in Noida, is an Indian Electronics Manufacturing Services Company that was founded in 1993 and has been leading this space in India. Initially, the company began production of colour televisions.
- Dixon has now expanded its activities to numerous electronic sub-segments. The company offers design-focused solutions in consumer durables, home appliances, lights, mobile phones, and security systems, as well as repairing and refurbishing services for a wide range of products.
- Since its initial public offering in 2017, the company has been listed on the BSE and NSE.

EMS Products Manufactured

- LED TVs
- Washing Machines
- LED bulbs, LED Drivers
- Feature Phone and Smart Phone
- CCT and DVR
- Micro PCR Analyser and Thermometer
- Set-Top-Box

Key Business Segments

- Consumer Electronics
- Home Appliances
- Lighting Solution
- Mobile Phones
- Security surveillance system
- Medical Electronics
- Reverse Logistics

Key Services Offered

- Product Design
- Prototyping
- System Integration
- Quality & Testing
- Supply & Logistics
- After market

Manufacturing Facilities

- The company operates in ten production facilities in Noida, Dehradun, and Tirupati / Chittoor District

Key Strengths

- Core Competence: Provides design focused products and solutions, along with repairing and refurbishment services of a wide range of products
- Diversified Product portfolio covering multiple electronic segments
- Largest television, washing machine and bulb assembly plants in India.
- Integrated Business model has helped derive greater operating efficiencies

4) Amber Enterprises India Ltd

Company Overview

- Amber Enterprises was established in 1990 and was converted to a public limited company in 2017.
- The company is a prominent solution provider for Air conditioner OEM/ODM Industry in India. It has a dominant presence in RACs complete unit and deals in major RAC components.
- The company provides greater energy efficiency as well as experience in indoor, outdoor, split, and window air conditioners. It also sells both AC and non-AC components.
- Amber is well-positioned to extract the core deliverables in terms of quality, pricing, and delivery due to its backward integration.

EMS Products Manufactured

- Room Air Conditioners (Window ACs, Indoor & Outdoor units of split ACs, Inverter Split ACs)
- Room Air Conditioner Components (Heat exchanger, Electric motor, Copper tubing, Sheet metal components)
- Non-AC Components (Plastic extrusion, Vacuum forming, Sheet metal component)
- Mobile Air Conditioners (Railway, Metro, Bus, Defence & Telecommunications)

Key Business Segments

- Consumer Electronics
- Home Appliances
- Industrial
- Automotive

Key Services Offered

- Conceptualize & Design
- Product Development
- Prototyping
- Product Assembly
- Testing
- Supply Chain

Manufacturing Facilities

- The company has ten manufacturing facilities across seven locations in India – Rajpura, Jhajjar, Faridabad, Pune, Kala amb, Dehradun and Noida

Key Strengths

- Amber Enterprise is a market leader in the Indian OEM/ODM industry for room air conditioners. It has a diverse product range and a long approval cycle.
- Because of the company's high degree of backward integration and excellent R&D skills, it has a large share of ODM.
- Their growth strategy continues to focus on product expansion, customer expansion, and overall profit within the customer.
- Amber Enterprises is constructing two new Greenfield factories in Pune and South India.

5) SFO Technologies Pvt Ltd

Company Overview

- SFO Technologies, a subsidiary of the NeST Group of Companies, was founded in 1990 and is headquartered in Kochi, Kerala.
- It has evolved from a single manufacturing facility to a diversified corporation with a global footprint and multi-domain competence in EMS, ODM, SI, and ADM.
- SFO Technologies has a global presence with front end operations in all continents and the products and services are targeted at technology fields across diverse domains.
- SFO can provide turnkey solutions, product development and maintenance, R&D support, and customised services across a wide range of domains and technologies.

EMS Products Manufactured

- Digital electronics, power supplies & RF
- Optronics & Magnetics
- Cables & Harness
- Tool Making & Sheet metal fabrication
- Plastic injection & Moulding

Key Business Segments

- Healthcare/ Medical Diagnostics
- Automobile/ Transportation
- Communications
- Aerospace & Defence
- Energy
- Industrial

Key Services Offered

- Hardware Design Services
- Hardware Testing
- Software Services
- Manufacturing Services
- Testing & Certification
- After market support

Manufacturing Facilities

- SFO Technologies has manufacturing units, robust software development centers and R&D cells spread over Kochi, Trivandrum and Bangalore

Key Strengths

- The company offers unique ODM plus solutions in a variety of areas and specialises in IoT, Analytics, GIS, and Mobility. SFO Technologies' Quality Is a Key Differentiator
- SFO has prioritised organisational quality or quality entrenched in its goods and services.
- The Group currently comprises development centres, manufacturing, and front-end offices in 32 different countries, including the United States, Canada, Europe, the Middle East, South East Asia, Japan, Australia, and India.

6) Elin Electronics Ltd

Company Overview

- Elin Electronics Ltd, founded in 1969 in Delhi/NCR, is the flagship company of the Elin Group.
- Initially, the company produced switches, relays, and cables for Philips. Later, as a backward integration, the company started producing motors and audio heads.
- In the late 1990s, the company expanded into the manufacturing of small appliances and diversified into different motor categories.
- Elin now provides a variety of goods and services to its OEM clients and serves as a one-stop solution provider.

EMS Products Manufactured

- Motor (Universal , Induction, Other range of motors)
- Fans (Ceiling, Fresh Air)
- Components (Sheet metal, plastic)
- Small appliances (Mixer Grinders, Juicer Mixer Grinders, Flash Lights, Dry & Steam Irons, Pop-up Toasters, Bar Blenders, Hair Dryers, Trimmers & Hair Straightener)
- LED Lighting

Key Business Segments

- Lighting
- Small Appliances
- Personal Care
- Motors

Key Services Offered

- Development & Engineering
- Motors & Tools Manufacturing
- Injection Moulding
- PCB Assembly
- Die Casting

Manufacturing Facilities

- Elin has three manufacturing plants, located in Ghaziabad, Baddi and Goa

Key Strengths

- In India, Elin is a prominent manufacturer of electric motors. It is also India's leading manufacturer of fractional horsepower motors.
- Research and development, as well as end-to-end design and development, are among the company's core competencies.
- The firm has a high degree of backward integration, which results in higher profits.

7) Kaynes Technology India Pvt Ltd

Company Overview

- Kaynes Technology, headquartered in Mysore, is a prominent domestic player in the Electronics System & Design Manufacturing Services, having a strong worldwide presence
- Kaynes Technology is an ISO 9001/14001/18001 BVCI Certified Company, making it one the key EMS player in the Professional Electronics market with an integrated Management System.
- The company has a cutting-edge Design and Development Center in Bangalore that provides Embedded Design and Engineering services to customers from Concept to Manufacturing.

EMS Products Manufactured

- PCBAs
- Box Build
- Military Wire/Cable Harness
- SMD & THD boards with latest packaging of QFPs, Fine Chip ICs and Wire/Chip Bonding

Key Business Segments

- Defence & Aerospace
- Railways & other Transportation
- Healthcare
- Automotive
- IT & Telecom
- Power & Energy & Industrial Automation & Controls

Key Services Offered

- ODM
- OEM Manufacturing
- Systems Integration
- Product Service Support

Manufacturing Facilities

- Kaynes has manufacturing plants in five distinct sites, including Bangalore, Chennai, Manesar, Parwanoo, and Selaqui, in addition to its main factory and supplementary manufacturing facility in Mysore.

Key Strengths

- Kayne's capabilities in Design, Manufacturing, Infrastructure, Systems, Skill Sets, and TQM techniques allow it to provide High Tech, High Mix, Low and Medium Volume Production, as well as Value Engineering and Product Data Management throughout the product's life cycle.
- Kaynes provides conceptual design, production, and testing of high reliability PCBAs, Box Build, Products, and Systems Integration Services in addition to products required by various industry segments.
- It features a cutting-edge production and testing facility as well as a contemporary infrastructure, including a unique line for green manufacturing.

8) Avalon Technologies Pvt Ltd

Company Overview

- Avalon Technologies, a division of Sienna Group, has been a preferred vendor for large global MNCs operating in a wide range of industries.
- Avalon, founded in 1995 in Fremont, California, is a vertically integrated manufacturing company that offers service to a wide range of industry segments.
- In the year 2000, the company established its EMS manufacturing facility in Chennai, India.

EMS Products Manufactured

- Sheet Metal Fabrication & Machining
- Manufacturing of Solar Modules, Hybrid Power Systems and Inverters
- Network Routers, Switches, Communication Systems, BTS Antenna Systems and ATM Machines
- Digital Radiography Systems, Ultrasound Equipment, Patient Monitoring Devices
- Electronic Control Units and Telematics Solutions

Key Business Segments

- Transportation
- Aerospace
- Power & Energy
- Communication
- Healthcare
- Automotive
- Industrial

Key Services Offered

- PCBA Design & Assembly
- Wire Harnesses, Magnetics
- Electro-Mechanical Integration (EMI)
- Sheet Metal Fabrication
- Machining
- Injection Moulded Plastics
- Complete system integration
- Product testing

Manufacturing Facilities

- The Company has manufacturing facilities in Chennai & Bengaluru (India) and Atlanta & Fremont (USA)

Key Strengths

- Avalon Technologies meets industry-specific quality criteria by adhering to ISO 9001:2008, ISO 9100C (Aerospace & Defence), ISO/TS 16949:2009 (Automotive), and ISO 13485 (Medical).
- Avalon Technologies provides a complete turnkey solution that is "all under one roof" and ideally located in LCR (low-cost region).
- Avalon has distinct benefits in terms of manufacturing capabilities, such as supply chain integrity, existing infrastructure, and incoming and outgoing logistics managed by skilled employees.

9) VVDN Technologies Pvt Ltd

Company Overview

- VVDN's India headquarters' is located in the Global Innovation Park in Manesar, Gurugram, India, while its North America HQ is in San Jose, CA, USA.
- It is a global leader in product engineering and manufacturing with clients in a range of technical domains.
- The company supports its global customers across several regions including US, Canada, Europe, India, Vietnam, Korea, and Japan.

EMS Products Manufactured

- PCB Assembly
- 5G NR Products
- Cloud network management system
- Industrial IoT, E-mobility, Hearable & Wearables
- Smart Medical
- Power & Utilities

Key Business Segments

- Communications (5G, Networking & Wi-Fi, VISION, IoT, Clouds & apps)

Key Services Offered

- Embedded Product Design and Manufacturing
- Hardware Design, Software Design, Mechanical Design, QA & Testing, Prototyping and Manufacturing

Manufacturing Facilities

- VVDN has five manufacturing centers located in Gurugram and ten design centers

Key Strengths

- VVDN has over a decade of expertise in Product Engineering & Manufacturing electronic solutions, and it provides end-to-end design, development, and manufacturing support.
- It offers a unique value proposition to its clients by being a one-stop destination for comprehensive hardware, software, mechanical, testing, prototyping, certification, and manufacturing services.
- In the Communication segment, the company intends to make a significant investment in electronics manufacturing services, including CKD Manufacturing in India.
- VVDN has recently announced the establishment of a Global Innovation Park in Manesar, Gurugram, India. This announcement is part of the company's goal to improve its engineering service offerings while also boosting production capacity through infrastructure expansion.

10) Sanmina-SCI Technology India Pvt Ltd

Company Overview

- Sanmina was founded in 1980 and is located in San Jose, California (USA); the company entered the Indian market in early 2000 with its head office in Chennai.
- Sanmina manufactures some of the world's most sophisticated and inventive optical, electrical, and mechanical devices.
- Sanmina, a technological leader, offers end-to-end design, manufacturing, and logistics solutions, as well as exceptional quality and support to OEMs.

EMS Products Manufactured

- PCB Circuit Boards & Assembly
- SMT capability
- Medical devices
- RF products & enclosures
- LED Lighting
- Cables

Key Business Segments

- Communications networks
- Computing and storage
- Healthcare
- Defense and Aerospace
- Industrial
- Automotive
- Clean technology sectors

Key Services Offered

- Design & Engineering
- Prototyping
- Test Services
- New Product Development
- Systems Manufacturing
- Global Services and Logistics
- PCB Assembly
- SMT

Manufacturing Facilities

- The company has global operations in 21 countries.
- In India, Sanmina has a complete end-to-end design service and a high-tech manufacturing facility located in Chennai

Key Strengths

- Key certifications held by the Sanmina's Chennai manufacturing facility include TL 9000, EN/AS9100, ISO 13485, and IATF 16949.
- Sanmina became India's first tier EMS Company to get FDA certified in 2018.
- Sanmina has been granted Domestic Tariff Area (DTA) status at its manufacturing facility, allowing the company to support the Make in India initiative, a government-led initiative to encourage the domestic production.
- With SEZ and DTA status, Sanmina is able to manufacture and distribute products for both local and export markets with zero customs duty.

Comparative Analysis of Leading EMS companies in India

Chart 3.44: Comparison of EMS companies presence in key application segments, India, FY21

Name of the EMS Company	Consumer Electronics	Home Appliances	Mobile Phones	Automotive	Industrial	IT	Telecom	Lighting	Medical	Others #
Syrma SGS Technology Ltd		✓		✓	✓		✓		✓	✓
Bharat FIH Ltd			✓	✓		✓	✓			✓
Dixon Technologies India Ltd *	✓	✓	✓					✓	✓	✓
Amber Enterprises India Ltd *	✓									✓
SFO Technologies Pvt Ltd				✓	✓				✓	✓
Elin Electronics Ltd		✓						✓		✓
Avalon Technologies Pvt Ltd				✓	✓		✓		✓	✓
Kaynes Technology India Ltd				✓		✓	✓		✓	✓
VVDN Technologies Pvt Ltd				✓	✓	✓	✓			✓
Sanmina-SCI Technology India Pvt Ltd				✓	✓		✓		✓	✓

** Listed companies (Dixon Technologies India Ltd, Amber Enterprises India Ltd)*
 # Others - include Aerospace & Defence, Energy, etc.
Source: Company websites; Frost & Sullivan Analysis

Chart 3.45: Revenue Comparison of key EMS companies, India, Value in INR Million, FY17-FY22

Name of the ESDM Company	FY17	FY18	FY19	FY20	FY21	FY22
Syrma SGS Technology Ltd #	1,492.1	2,226.0	7,947.4	8,656.5	8,874.0	12,666.5
Bharat FIH Ltd	1,14,879.9	2,37,620.2	3,43,453.9	2,66,355.6	1,58,548.6	1,81,492.0
Dixon Technologies India Ltd *	24,987.2	28,533.9	29,844.5	44,001.2	64,481.7	1,06,970.8
Amber Enterprises India Ltd *	17,358.1	21,715.1	27,519.9	39,627.9	30,305.2	42,064.0
SFO Technologies Pvt Ltd	12,366.1	12,746.7	16,696.5	17,889.7	16,593.4	NA
Elin Electronics Ltd	4,381.2	4,943.2	8,285.5	7,855.8	8,623.8	NA
Avalon Technologies Pvt Ltd	3,048.1	2,952.3	3,669.6	3,702.8	4,519.1	NA
Kaynes Technology India Ltd	2,874.7	3,794.3	3,642.3	3,682.4	4,206.3	NA
VVDN Technologies Pvt Ltd	764.9	1,515.1	2,632.2	3,090.9	6,659.9	NA
Sanmina-SCI Technology India Pvt Ltd	778.2	873.9	854.2	861.5	908.5	NA

NA – Required data not available in Annual Report
Source: Annual Reports of Companies published in RoC, MCA; Frost & Sullivan Analysis
** Listed companies*
 # Financial information of SYRMA SGS Technology have been obtained from Proforma Condensed Combined Financial Information for Fiscal 2019 to Fiscal 2022; while, Fiscal 2017 and Fiscal 2018 are Standalone financials

Revenue = Revenue from operations

Comparative Analysis of Leading EMS companies in India - EBITDA & PAT

Chart 3.46: EBITDA Comparison of key EMS companies, India, Ratio in %, FY17-FY22

Name of the ESDM Company	FY17	FY18	FY19	FY20	FY21	FY22
Syrma SGS Technology Ltd #	2.2%	4.2%	11.4%	15.1%	11.3%	9.9%
Bharat FIH Ltd	1.1%	0.6%	-0.2%	2.6%	2.4%	2.7%
Dixon Technologies India Ltd *	3.7%	3.9%	4.5%	5.1%	4.4%	3.5%
Amber Enterprises India Ltd *	7.5%	8.5%	7.7%	7.8%	7.3%	6.5%
SFO Technologies Pvt Ltd	7.8%	5.8%	6.8%	8.3%	9.4%	NA
Elin Electronics Ltd	8.1%	7.6%	6.9%	7.1%	7.7%	NA
Avalon Technologies Pvt Ltd	11.9%	10.8%	9.4%	9.6%	9.2%	NA
Kaynes Technology India Ltd	7.1%	10.0%	9.6%	11.2%	9.7%	NA
VVDN Technologies Pvt Ltd	10.6%	9.0%	11.6%	-6.4%	11.8%	NA
Sanmina-SCI Technology India Pvt Ltd	25.2%	31.2%	25.5%	26.3%	31.8%	NA

NA – Required data not available in Annual Report *Source: Annual Reports of Companies published in RoC, MCA; Frost & Sullivan Analysis*

** Listed companies*

 # Financial information of SYRMA SGS Technology have been obtained from Proforma Condensed Combined Financial Information for Fiscal 2019 to Fiscal 2022; while, Fiscal 2017 and Fiscal 2018 are Standalone financials

EBITDA = Profit before exceptional items and tax + Finance cost + Depreciation & Amortisation - Other income

Chart 3.47: PAT Comparison of key EMS companies, India, Ratio in %, FY17-FY22

Name of the ESDM Company	FY17	FY18	FY19	FY20	FY21	FY22
Syrma SGS Technology Ltd #	1.2%	3.4%	6.6%	10.6%	7.4%	6.0%
Bharat FIH Ltd	1.6%	0.3%	-0.6%	1.5%	1.0%	1.1%
Dixon Technologies India Ltd *	1.9%	2.1%	2.1%	2.7%	2.5%	1.8%
Amber Enterprises India Ltd *	1.3%	2.9%	3.4%	4.1%	2.7%	2.6%
SFO Technologies Pvt Ltd	3.3%	1.6%	1.7%	4.2%	2.3%	NA
Elin Electronics Ltd	3.2%	3.1%	3.5%	3.5%	4.0%	NA
Avalon Technologies Pvt Ltd	3.2%	1.8%	1.3%	1.7%	3.4%	NA
Kaynes Technology India Ltd	5.2%	4.2%	2.7%	2.5%	2.3%	NA
VVDN Technologies Pvt Ltd	8.0%	3.9%	5.9%	-5.4%	6.5%	NA
Sanmina-SCI Technology India Pvt Ltd	15.7%	21.3%	20.4%	20.8%	22.2%	NA

NA – Required data not available in Annual Report *Source: Annual Reports of Companies published in RoC, MCA; Frost & Sullivan Analysis*

** Listed companies*

 # Financial information of SYRMA SGS Technology have been obtained from Proforma Condensed Combined Financial Information for Fiscal 2019 to Fiscal 2022; while, Fiscal 2017 and Fiscal 2018 are Standalone financials

Comparative Analysis of Leading EMS companies in India – Export Sales & RoCE

Chart 3.48: Export Sales Comparison of key EMS companies, India, Ratio in %, FY17-FY22

Name of the ESDM Company	FY17	FY18	FY19	FY20	FY21	FY22
Syrma SGS Technology Ltd #	60.9%	48.9%	55.9%	57.6%	53.3%	36.9%
Bharat FIH Ltd	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Dixon Technologies India Ltd *	2.4%	2.6%	0.9%	0.1%	0.1%	0.1%
Amber Enterprises India Ltd *	0.3%	0.2%	0.7%	0.9%	0.7%	0.5%
SFO Technologies Pvt Ltd	57.6%	59.9%	59.6%	55.2%	59.5%	NA
Elin Electronics Ltd	0.4%	0.5%	0.2%	1.0%	0.8%	NA
Avalon Technologies Pvt Ltd	65.2%	55.5%	44.6%	68.8%	67.4%	NA
Kaynes Technology India Ltd	24.3%	36.0%	15.8%	20.5%	25.6%	NA
VVDN Technologies Pvt Ltd	11.7%	30.7%	33.5%	54.3%	35.1%	NA
Sanmina-SCI Technology India Pvt Ltd	82.7%	77.7%	86.2%	16.9%	16.0%	NA

NA – Required data not available in Annual Report *Source: Annual Reports of Companies published in RoC, MCA; Frost & Sullivan Analysis*

** Listed companies*

 # Financial information of SYRMA SGS Technology have been obtained from Proforma Condensed Combined Financial Information for Fiscal 2019 to Fiscal 2022; while, Fiscal 2017 and Fiscal 2018 are Standalone financials

Comparative Analysis of Leading EMS companies in India – Financial Ratios

Chart 3.49: CAGR of Operations and Profitability Ratios, India, CAGR in % (FY19 to FY21)

Name of the EMS Company	Revenue from Operations	Operating EBITDA	RoE	RoCE	RoA	Operating expense	PAT
Syrma SGS Technology Ltd #	5.7%	5.2%	-10.2%	-3.1%	1.1%	5.7%	11.4%
Bharat FIH Ltd	-32.1%	-	-	-	-	-32.9%	-
Dixon Technologies India Ltd *	47.0%	45.8%	13.7%	9.4%	15.0%	47.0%	58.8%
Amber Enterprises India Ltd *	4.9%	1.7%	-26.8%	-21.3%	-23.7%	5.2%	-6.3%
SFO Technologies Pvt Ltd	-0.3%	17.2%	4.0%	14.5%	10.7%	-2.0%	13.4%
Elin Electronics Ltd	2.0%	8.0%	-6.0%	-9.2%	-3.1%	1.6%	9.5%
Avalon Technologies Pvt Ltd	11.0%	9.7%	61.6%	-4.8%	49.9%	11.1%	79.2%
Kaynes Technology India Ltd	7.5%	8.0%	-18.2%	-5.1%	-6.9%	7.4%	0.0%
VVDN Technologies Pvt Ltd	59.1%	60.5%	42.9%	-17.5%	-17.3%	58.9%	66.5%
Sanmina-SCI Technology India Pvt Ltd	3.1%	15.1%	-4.0%	3.5%	-3.9%	-1.3%	7.4%

NA – Required data not available in Annual Report *Source: Annual Reports of Companies published in RoC, MCA; Frost & Sullivan Analysis*

** Listed companies*

 # Financial information of SYRMA SGS Technology have been obtained from Proforma Condensed Combined Financial Information for Fiscal 2019 to Fiscal 2022

Chart 3.50: Profitability Ratios (RoE, RoCE, RoA, EPS, NAV), India, FY19 to FY22

	RoE (%)				RoCE (%)				RoA (%)			
Name of the EMS Company	**FY19**	**FY20**	**FY21**	**FY22**	**FY19**	**FY20**	**FY21**	**FY22**	**FY19**	**FY20**	**FY21**	**FY22**
Syrma SGS Technology Ltd #	16.2%	22.1%	13.1%	13.6%	19.6%	27.9%	18.4%	19.1%	7.1%	11.1%	7.2%	6.6%
Bharat FIH Ltd	-14.1%	14.6%	5.7%	6.4%	-5.6%	18.8%	7.8%	9.1%	-2.5%	4.5%	1.9%	2.0%
Dixon Technologies India Ltd *	16.8%	22.3%	21.7%	19.1%	22.9%	30.5%	27.4%	21.8%	4.2%	7.1%	5.6%	4.4%
Amber Enterprises India Ltd *	9.5%	14.0%	5.1%	6.3%	12.8%	15.2%	8.0%	8.6%	4.0%	5.7%	2.3%	2.3%
SFO Technologies Pvt Ltd	5.7%	13.4%	6.2%	NA	10.2%	13.9%	13.4%	NA	2.0%	5.1%	2.4%	NA
Elin Electronics Ltd	16.4%	13.3%	14.5%	NA	17.5%	15.2%	14.4%	NA	7.3%	7.1%	6.9%	NA
Avalon Technologies Pvt Ltd	2.7%	3.2%	7.1%	NA	9.5%	8.1%	8.6%	NA	1.3%	1.3%	2.8%	NA
Kaynes Technology India Ltd	10.5%	9.1%	7.0%	NA	11.7%	12.3%	10.5%	NA	2.7%	2.5%	2.3%	NA
VVDN Technologies Pvt Ltd	18.1%	-23.0%	36.9%	NA	23.9%	-11.4%	16.2%	NA	10.4%	-4.1%	7.1%	NA
Sanmina-SCI Technology India Pvt Ltd	11.3%	10.4%	10.4%	NA	11.7%	10.7%	12.6%	NA	10.3%	9.5%	9.5%	NA

NA – Required data not available in Annual Report

Source: Annual Reports of Companies published in RoC, MCA; Frost & Sullivan Analysis

** Listed companies*

 # Financial information of SYRMA SGS Technology have been obtained from Proforma Condensed Combined Financial Information for Fiscal 2019 to Fiscal 2022

Note:

RoE calculation formula considered for Syrma SGS (based on Proforma Condensed Combined Financial Information of Syrma SGS Technology Limited)

RoE (Return on Equity) = Profit after Tax / Average Equity

** Average equity represents the average of opening and closing equity.*

RoE calculation formula considered for the other companies which are competitiors of Syrma SGS

RoE (Return on Equity) = (Profit attributable to owners of the company) / (Total equity excluding non-controlling interest and capital reserve)

** Profit attributable to owners of the company = Profit after tax - Profit attributable to non-controlling interest*

** Total equity excluding non-controlling interest and capital reserve = Total equity - non-controlling interest - capital reserve*

RoCE calculation formula considered for Syrma SGS (based on Proforma Condensed Combined Financial Information of Syrma SGS Technology Limited)

RoCE = EBIT / Average capital employed

** EBIT = Profit before Tax & EI + Finance cost*

** Capital employed has been computed as (Total assets excluding investments in subsidiaries / Associates and intangible assets) - (Current liabilities excluding short term borrowings and lease liabilities) - (Long term provisions and Other Non-current financial Liability).*

** Average Capital employed represent Opening and Closing Capital Employed.*

RoCE calculation formula considered for the other companies which are competitiors of Syrma SGS

RoCE (Return on Capital Employed) = EBIT / Total capital employed

** EBIT (Earnings before interest & tax) = Profit before exceptional items and tax + Finance cost*

** Total capital employed = (Non-current borrowings + Current borrowings + Current portion of long term debt + Total equity)*

RoA (Return on Assets) = Profit after tax / Total assets

	EPS (INR)				NAV (INR)			
Name of the EMS Company	FY19	FY20	FY21	FY22	FY19	FY20	FY21	FY22
Syrma SGS Technology Ltd #	3.8	6.4	4.6	5.2	26.8	33.3	39.4	41.7
Bharat FIH Ltd	-1.6	2.1	0.7	0.8	11.1	14.3	11.9	12.7
Dixon Technologies India Ltd *	55.1	20.5	26.9	32.0	329.1	92.3	124.0	167.7
Amber Enterprises India Ltd *	29.8	50.4	25.0	33.4	319.6	369.9	501.9	542.3
SFO Technologies Pvt Ltd	318.4	829.1	408.9	NA	5,568.0	6,204.6	6,612.0	NA
Elin Electronics Ltd	42.7	40.4	51.2	NA	292.4	334.6	385.3	NA
Avalon Technologies Pvt Ltd	327.7	402.4	894.4	NA	12,055.2	12,521.4	12,658.7	NA
Kaynes Technology India Ltd	14.3	13.8	14.3	NA	137.4	151.8	205.2	NA
VVDN Technologies Pvt Ltd	16.1	-16.9	44.0	NA	88.9	73.7	119.4	NA
Sanmina-SCI Technology India Pvt Ltd	2.0	2.1	2.3	NA	18.0	20.1	22.5	NA

NA – Required data not available in Annual Report
** Listed companies*
 # Financial information of SYRMA SGS Technology have been obtained from Proforma Condensed Combined Financial Information for Fiscal 2019 to Fiscal 2022
Source: Annual Reports of Companies published in RoC, MCA; Frost & Sullivan Analysis

Note:

EPS (Earnings per Share) = Profit attributable to owners of the company / Weighted average number of equity shares outstanding

** Profit attributable to owners of the company = Profit after tax - Profit attributable to non-controlling interest*

NAV calculation formula considered for Syrma SGS (based on Proforma Condensed Combined Financial Information of Syrma SGS Technology Limited)

NAV = Total equity / Total outstanding number of Equity Shares as on the respective year end (With dilutive component)

NAV calculation formula considered for the other companies which are competitiors of Syrma SGS

NAV (Net Asset Value) = Total equity / Weighted average number of equity shares outstanding

Chart 3.51: Liquidity Ratios (Current ratio, Quick ratio, Average collection period, Average payment period, Days cash on hand, Cash ratio, Net working capital, Debt equity ratio), India, FY19 to FY22

	Current Ratio / Liquidity Ratio				Quick Ratio				Average collection period			
Name of the EMS Company	FY19	FY20	FY21	FY22	FY19	FY20	FY21	FY22	FY19	FY20	FY21	FY22
Syrma SGS Technology Ltd #	1.3	1.5	1.8	1.3	0.9	1.0	1.2	0.8	78.1	79.8	80.8	69.5
Bharat FIH Ltd	1.1	1.3	1.3	1.3	0.7	0.9	0.9	1.0	43.1	50.4	84.9	87.6
Dixon Technologies India Ltd *	1.2	1.2	1.2	1.2	0.7	0.7	0.8	0.7	50.0	42.8	45.4	41.7
Amber Enterprises India Ltd *	1.3	1.2	1.3	1.1	0.8	0.7	0.9	0.8	77.3	75.6	115.8	103.4
SFO Technologies Pvt Ltd	1.2	1.2	1.3	NA	0.7	0.6	0.8	NA	80.3	71.8	77.6	NA
Elin Electronics Ltd	1.6	1.9	1.6	NA	1.1	1.2	1.1	NA	48.5	53.0	57.9	NA
Avalon Technologies Pvt Ltd	1.7	1.5	1.3	NA	1.3	0.9	0.8	NA	192.1	186.5	156.0	NA
Kaynes Technology India Ltd	1.3	1.2	1.3	NA	0.8	0.6	0.6	NA	129.7	107.4	93.5	NA
VVDN Technologies Pvt Ltd	2.0	3.1	1.8	NA	1.7	2.7	1.2	NA	61.2	73.0	53.0	NA
Sanmina-SCI Technology India Pvt Ltd	8.6	11.1	11.3	NA	8.6	11.1	11.3	NA	277.7	370.2	368.4	NA

NA – Required data not available in Annual Report
** Listed companies*
 # Financial information of SYRMA SGS Technology have been obtained from Proforma Condensed Combined Financial Information for Fiscal 2019 to Fiscal 2022
Source: Annual Reports of Companies published in RoC, MCA; Frost & Sullivan Analysis

Note:
Current ratio = Total current assets / Total current liabilities

Quick ratio = (Total current assets - Inventories) / Total current liabilities

Average collection period = 365 / Receivables turnover ratio
** Receivables turnover ratio = Revenue from operations / average trade recievables*

	Average payment period				Days Cash on Hand, All Sources				Cash Ratio			
Name of the EMS Company	**FY19**	**FY20**	**FY21**	**FY22**	**FY19**	**FY20**	**FY21**	**FY22**	**FY19**	**FY20**	**FY21**	**FY22**
Syrma SGS Technology Ltd #	80.4	90.9	87.2	67.2	26.7	52.8	50.6	23.4	0.9	1.0	1.2	0.8
Bharat FIH Ltd	74.6	85.1	135.8	120.6	6.6	16.1	20.6	8.7	0.7	0.9	0.9	1.0
Dixon Technologies India Ltd *	88.2	78.3	84.0	74.2	5.7	8.8	9.7	11.2	0.7	0.7	0.8	0.7
Amber Enterprises India Ltd *	118.2	112.3	174.8	156.3	6.4	12.0	44.5	63.4	0.8	0.7	0.9	0.8
SFO Technologies Pvt Ltd	133.0	139.2	146.2	NA	8.9	11.8	16.4	NA	0.7	0.6	0.8	NA
Elin Electronics Ltd	47.0	53.9	51.1	NA	7.8	17.7	8.7	NA	1.1	1.2	1.1	NA
Avalon Technologies Pvt Ltd	69.5	87.6	117.5	NA	14.5	36.3	22.6	NA	1.3	0.9	0.8	NA
Kaynes Technology India Ltd	141.0	127.6	121.2	NA	35.9	13.7	13.7	NA	0.8	0.6	0.6	NA
VVDN Technologies Pvt Ltd	45.0	80.4	68.9	NA	32.0	183.4	42.2	NA	1.7	2.7	1.2	NA
Sanmina-SCI Technology India Pvt Ltd	-	-	-	NA	27.2	27.4	215.4	NA	8.6	11.1	11.3	NA

NA – Required data not available in Annual Report
Source: Annual Reports of Companies published in RoC, MCA; Frost & Sullivan Analysis
** Listed companies*
 # Financial information of SYRMA SGS Technology have been obtained from Proforma Condensed Combined Financial Information for Fiscal 2019 to Fiscal 2022

Note:
Average payment period = 365 / (Credit purchases / average trade payables)
** Credit purchases = Cost of materials consumed (includes purchases of raw-material, stock-in-trade and all others)*

Days Cash on Hand, All Sources = (Current Investment + Bank and cash equivalents + Cash and cash equivalents) / (Operating expense / 365)
** Operating expense = Total expense - Finance cost - Depreciation & Amortisation*

Cash ratio = Quick ratio

	Net Working Capital (INR million)				Debt to Equity Ratio			
Name of the EMS Company	**FY19**	**FY20**	**FY21**	**FY22**	**FY19**	**FY20**	**FY21**	**FY22**
Syrma SGS Technology Ltd #	1,033.0	1,537.4	2,334.2	1,783.5	0.42	0.25	0.17	0.33
Bharat FIH Ltd	5,606.3	17,215.7	19,949.1	22,874.0	-	-	-	-
Dixon Technologies India Ltd *	1,403.2	2,121.9	3,203.3	4,111.1	0.03	0.03	0.13	0.35
Amber Enterprises India Ltd *	3,347.0	2,860.8	5,195.6	3,401.3	0.16	0.17	0.14	0.22
SFO Technologies Pvt Ltd	1,624.6	1,982.9	2,326.7	NA	0.18	0.06	0.11	NA
Elin Electronics Ltd	906.1	1,026.3	1,255.4	NA	0.27	0.24	0.23	NA
Avalon Technologies Pvt Ltd	1,467.3	1,310.1	930.3	NA	0.00	0.07	0.11	NA
Kaynes Technology India Ltd	699.2	450.2	713.6	NA	0.42	0.32	0.26	NA
VVDN Technologies Pvt Ltd	554.0	2,164.9	1,624.7	NA	0.01	2.57	2.16	NA
Sanmina-SCI Technology India Pvt Ltd	753.5	925.3	1,163.4	NA	-	-	-	NA

NA – Required data not available in Annual Report
Source: Annual Reports of Companies published in RoC, MCA; Frost & Sullivan Analysis
** Listed companies*
 # Financial information of SYRMA SGS Technology have been obtained from Proforma Condensed Combined Financial Information for Fiscal 2019 to Fiscal 2022

Note:
Net Working Capital = Total current assets - Total current liabilities

Debt to Equity ratio calculation formula considered for Syrma SGS (based on Proforma Condensed Combined Financial Information of Syrma SGS Technology Limited)
Debt to Equity ratio = Total Debt/ Total Equity
** Total Debt = Long Term Debt + Short Term Debt*
** Total Equity = Equity Sharecapital + Reserve & Surplus*

Debt to Equity ratio calculation formula considered for the other companies which are competitiors of Syrma SGS
Debt to Equity ratio = (Non-current borrowings + Current portion of long term debt + Redeemable preference shares) / Average equity
** Average equity = (Total equity of current year + Total equity of previous year) / 2*

Chart 3.52: Gearing Ratios (Capital gearing ratio, Debt services coverage ratio, Interest coverage ratio), India, FY19 to FY22

	Capital Gearing Ratio				Debt service coverage ratio				Interest Coverage Ratio			
Name of the EMS Company	**FY19**	**FY20**	**FY21**	**FY22**	**FY19**	**FY20**	**FY21**	**FY22**	**FY19**	**FY20**	**FY21**	**FY22**
Syrma SGS Technology Ltd #	0.26	0.01	-0.06	0.20	7.72	14.18	8.95	1.66	129.73	487.00	103.51	28.46
Bharat FIH Ltd	0.28	-0.43	-0.31	-0.14	-	-	-	-	-	-	-	-
Dixon Technologies India Ltd *	0.26	-0.02	-0.01	0.06	5.41	12.66	5.04	6.67	4.83	6.61	12.89	15.76
Amber Enterprises India Ltd *	0.20	0.21	-0.01	-0.13	78.87	128.56	42.41	53.02	27.53	38.09	63.18	78.72
SFO Technologies Pvt Ltd	0.75	0.42	0.39	NA	-	-	-	NA	-	-	-	NA
Elin Electronics Ltd	0.38	0.20	0.44	NA	-	-	-	NA	-	-	-	NA
Avalon Technologies Pvt Ltd	0.65	0.69	0.42	NA	0.27	0.28	0.33	NA	-	-	-	NA
Kaynes Technology India Ltd	1.38	1.47	0.99	NA	2.67	1.81	1.73	NA	1.68	1.62	1.40	NA
VVDN Technologies Pvt Ltd	-0.10	0.82	1.30	NA	-	-	-	NA	28.58	-33.29	26.08	NA
Sanmina-SCI Technology India Pvt Ltd	-0.03	-0.03	-0.19	NA	-	-	-	NA	-	-	-	NA

NA – Required data not available in Annual Report
Source: Annual Reports of Companies published in RoC, MCA; Frost & Sullivan Analysis
** Listed companies*
 # Financial information of SYRMA SGS Technology have been obtained from Proforma Condensed Combined Financial Information for Fiscal 2019 to Fiscal 2022

Note:
Capital Gearing Ratio calculation formula considered for Syrma SGS (based on Proforma Condensed Combined Financial Information of Syrma SGS Technology Limited)
Capital Gearing Ratio = Net Debt / Equity
** Net Debt is defined as long-term borrowings (including redeemable preference shares) and short-term borrowings less Cash and Cash Equivalents*
** Equity includes all capital and reserves of the Company that are managed as capital.*

Capital Gearing Ratio calculation formula considered for the other companies which are competitiors of Syrma SGS
Capital Gearing Ratio = (Gross debt - Total Cash and Cash Equivalents) / Total equity
** Gross debt = Non-current borrowings + Current borrowings + Current portion of long term debt + Redeemable Preference Shares*
** Total cash and cash equivalents = Current Investment + Cash and cash equivalent + Cash and bank balance + Other non current investments + Bank Deposit*

Debt Service Coverage Ratio calculation formula considered for Syrma SGS (based on Proforma Condensed Combined Financial Information of Syrma SGS Technology Limited)

Debt Service Coverage Ratio = Earning available for Debt Services /Total Interest and principal repayments

** Earning available for Debt Services = Profit after tax & EI + Finance cost + Depreciation & Amortisation + Non cash operating expenses and finance cost (Post-tax)*

** Total Interest and principal repayments = Expected interest outflow on long term borrowings, lease and principal repayments represent the expected outflows during next one year from the year end.*

Debt Service Coverage Ratio calculation formula considered for the other companies which are competitiors of Syrma SGS

Debt Service Coverage Ratio = Operating EBITDA / Total principal and interest due remaining

** Operating EBITDA = Profit before exceptional items and tax + Finance cost + Depreciation & Amortisation - Other income*

** Total principal and interest due remaining = Total expected interest outgo + Current portion of long term debt*

Interest Coverage Ratio calculation formula considered for Syrma SGS (based on Proforma Condensed Combined Financial Information of Syrma SGS Technology Limited)

Interest Coverage Ratio = Earning available for Interest Services /Total Interest repayments

** Earning available for Interest Services = Profit after tax & EI + Finance cost + Depreciation & Amortisation + Non cash operating expenses and finance cost (Post-tax)*

**Expected interest outflow on long term borrowings represent the expected outflows during next one year from the year end.*

Interest Coverage Ratio calculation formula considered for the other companies which are competitiors of Syrma SGS

Interest Coverage Ratio = EBIT / Total Expected interest outgo

** EBIT = Profit before exceptional items and tax + Finance cost*

Chart 3.53 : Turnover Ratios, India, FY19 to FY22

	Total Assets Turnover Ratio				Fixed Assets Turnover Ratio				Capital Turnover Ratio			
Name of the EMS Company	FY19	FY20	FY21	FY22	FY19	FY20	FY21	FY22	FY19	FY20	FY21	FY22
Syrma SGS Technology Ltd #	1.1	1.1	1.0	1.1	4.3	4.3	4.5	4.7	7.8	5.7	3.9	7.2
Bharat FIH Ltd	3.9	3.1	1.8	1.9	43.9	33.9	20.8	28.7	21.9	10.0	5.6	6.0
Dixon Technologies India Ltd *	2.0	2.6	2.3	2.5	11.7	13.7	13.5	13.7	7.9	8.1	8.7	10.7
Amber Enterprises India Ltd *	1.2	1.4	0.9	0.9	4.2	5.3	3.8	3.6	2.8	3.5	1.9	2.4
SFO Technologies Pvt Ltd	1.2	1.2	1.1	NA	7.6	8.5	7.1	NA	3.3	3.2	2.8	NA
Elin Electronics Ltd	2.1	2.0	1.7	NA	6.3	5.1	5.4	NA	4.2	3.5	3.3	NA
Avalon Technologies Pvt Ltd	1.0	0.8	0.8	NA	13.1	5.3	6.4	NA	2.1	1.9	2.1	NA
Kaynes Technology India Ltd	1.0	1.0	1.0	NA	7.7	6.7	7.3	NA	4.0	3.6	3.1	NA
VVDN Technologies Pvt Ltd	1.8	0.8	1.1	NA	8.2	6.0	3.7	NA	3.1	4.5	5.8	NA
Sanmina-SCI Technology India Pvt Ltd	0.5	0.5	0.4	NA	37.0	4.0	4.6	NA	0.6	0.5	0.5	NA

NA – Required data not available in Annual Report

Source: Annual Reports of Companies published in RoC, MCA; Frost & Sullivan Analysis

** Listed companies*

 # Financial information of SYRMA SGS Technology have been obtained from Proforma Condensed Combined Financial Information for Fiscal 2019 to Fiscal 2022

Note:

Total Assets Turnover Ratio = Total income / Total assets

** Total income = Revenue from Operations + Other income*

Fixed Assets Turnover Ratio = Total income / (Property, plant & equipment + Capital work in progress)

** Total income = Revenue from Operations + Other income*

Capital Turnover Ratio calculation formula considered for Syrma SGS (based on Proforma Condensed Combined Financial Information of Syrma SGS Technology Limited)

Capital Turnover Ratio = Total income / Net Working Capital

** Net Working capital = Current Assests – Current Liabilities*

Capital Turnover Ratio calculation formula considered for the other companies which are competitiors of Syrma SGS

Capital Turnover Ratio = Total income / Total equity

** Total income = Revenue from Operations + Other income*

	Current Asset Turnover Ratio				Inventory Turnover Ratio			
Name of the EMS Company	**FY19**	**FY20**	**FY21**	**FY22**	**FY19**	**FY20**	**FY21**	**FY22**
Syrma SGS Technology Ltd #	2.0	1.9	1.7	1.8	4.2	3.9	3.8	3.8
Bharat FIH Ltd	4.4	3.5	2.0	2.0	10.4	9.4	6.3	6.9
Dixon Technologies India Ltd *	2.8	3.5	2.9	3.4	7.1	8.5	9.3	10.3
Amber Enterprises India Ltd *	1.9	2.3	1.4	1.4	4.9	5.4	3.7	4.5
SFO Technologies Pvt Ltd	1.7	1.8	1.6	NA	2.7	2.3	2.1	NA
Elin Electronics Ltd	3.4	3.6	2.7	NA	8.5	6.8	6.0	NA
Avalon Technologies Pvt Ltd	1.1	0.9	1.2	NA	2.6	1.8	2.2	NA
Kaynes Technology India Ltd	1.2	1.3	1.3	NA	2.1	1.8	1.7	NA
VVDN Technologies Pvt Ltd	2.4	1.0	1.8	NA	7.1	3.5	3.6	NA
Sanmina-SCI Technology India Pvt Ltd	1.1	0.9	0.7	NA	-	-	-	NA

NA – Required data not available in Annual Report

** Listed companies*

 # Financial information of SYRMA SGS Technology have been obtained from Proforma Condensed Combined Financial Information for Fiscal 2019 to Fiscal 2022

Source: Annual Reports of Companies published in RoC, MCA; Frost & Sullivan Analysis

Note:

Current Asset Turnover Ratio = Total income / Total current assets

** Total income = Revenue from Operations + Other income*

Inventory Turnover Ratio calculation formula considered for Syrma SGS (based on Proforma Condensed Combined Financial Information of Syrma SGS Technology Limited)

Inventory Turnover Ratio = Cost of materials consumed / Average Inventories

**Cost of material consumed comprises of cost of raw materials consumed, consumption of spares, purchases of stock-in-trade and changes in Inventories.*

**Average Inventory represents the average of opening and closing inventory.*

Inventory Turnover Ratio calculation formula considered for the other companies which are competitiors of Syrma SGS

Inventory Turnover Ratio = Cost of goods sold / Average Inventories

** Cost of goods sold = Inventories at the beginning of the year + Cost of materials consumed - Inventories at the end of the year*

	Receivables Turnover ratio				Payables Turnover ratio			
Name of the EMS Company	**FY19**	**FY20**	**FY21**	**FY22**	**FY19**	**FY20**	**FY21**	**FY22**
Syrma SGS Technology Ltd #	4.7	4.6	4.5	5.3	4.6	4.0	4.2	5.4
Bharat FIH Ltd	8.5	7.2	4.3	4.2	5.9	4.7	3.0	3.0
Dixon Technologies India Ltd *	7.3	8.5	8.0	8.7	4.0	4.7	3.8	4.6
Amber Enterprises India Ltd *	4.7	4.8	3.2	3.5	2.9	3.6	2.3	2.5
SFO Technologies Pvt Ltd	4.5	5.1	4.7	NA	3.8	4.2	4.5	NA
Elin Electronics Ltd	7.5	6.9	6.3	NA	9.0	11.5	8.3	NA
Avalon Technologies Pvt Ltd	1.9	2.0	2.3	NA	6.8	4.4	3.9	NA
Kaynes Technology India Ltd	2.8	3.4	3.9	NA	4.1	4.0	4.4	NA
VVDN Technologies Pvt Ltd	6.0	5.0	6.9	NA	18.7	8.9	6.8	NA
Sanmina-SCI Technology India Pvt Ltd	1.3	1.0	1.0	NA	15.6	18.0	16.7	NA

NA – Required data not available in Annual Report

Source: Annual Reports of Companies published in RoC, MCA; Frost & Sullivan Analysis

** Listed companies*

 # Financial information of SYRMA SGS Technology have been obtained from Proforma Condensed Combined Financial Information for Fiscal 2019 to Fiscal 2022

Note:

Receivables Turnover Ratio calculation formula considered for Syrma SGS (based on Proforma Condensed Combined Financial Information of Syrma SGS Technology Limited)

Receivables Turnover ratio = Credit Sales / Average Trade Receivables

**Credit sales includes sale of products, services and scrap sales on such sales*

** Trade receivables is included gross of ECL and net of customer advances. Average Trade receivables represents the average of opening and closing Trade Receivables.*

Receivables Turnover Ratio calculation formula considered for the other companies which are competitiors of Syrma SGS

Receivables Turnover ratio = Revenue from Operations / Average Trade Receivables

** Average Trade Receivables = (Trade payables of current year + trade payables of previous year) / 2*

Payables Turnover Ratio calculation formula considered for Syrma SGS (based on Proforma Condensed Combined Financial Information of Syrma SGS Technology Limited)

Payables Turnover ratio = Credit Purchases / Average Trade Payables

**Credit purchases includes purchases of raw-material, stock-in-trade and all other expenses except cash and non-cash transaction like rates and taxes, bank charges, CSR, loss on sale of asset and Mark-to-Market loss.*

** Average Trade Payables = (Trade payables of current year + trade payables of previous year) / 2*

Payables Turnover Ratio calculation formula considered for the other companies which are competitiors of Syrma SGS

Payables Turnover ratio = Total Income / Average Trade Payables

** Average Trade Payables = (Trade payables of current year + trade payables of previous year) / 2*

CHAPTER 4 - FUTURE OPPORTUNITIES IN EMS MARKET IN INDIA

Electric Mobility Market (Chargers both Carry and static, Controllers and Battery Management Systems)

Industry Overview

Automotive industry is rapidly evolving in terms of technology as well as tackling environmental issues. Electric vehicles have been introduced as a clean energy initiative, as they have low or zero emissions and have come a long way to become an integral part of OEM's business strategies. Automakers are creating separate EV business units to be prepared for the expected EV boom in the future. However, the surge in EV demand will create a huge need for charging infrastructure and safety regulations and standards.

India is expected to aggressively push itself toward electrification, especially in the automotive and transportation sector. Stringent emission regulations, liberal incentives and subsidies for consumers and manufacturers, high level of localization, concrete safety standards, and established technology roadmaps are few key steps that must need to be given a lot more focus by the government to ensure the success of electric vehicles in the coming years.

OEMs can partner with charging infrastructure operators, aggregators, and manufacturers to set up networks of normal and fast chargers across the country. The cost of setting up a charging infrastructure varies depending on the level and type of the infrastructure that is required - slow, medium, or fast charging. Motors, controllers, harness, and converters are critical for localization on modes that will provide suppliers and OEMs with the desired scale in India.

Key Drivers

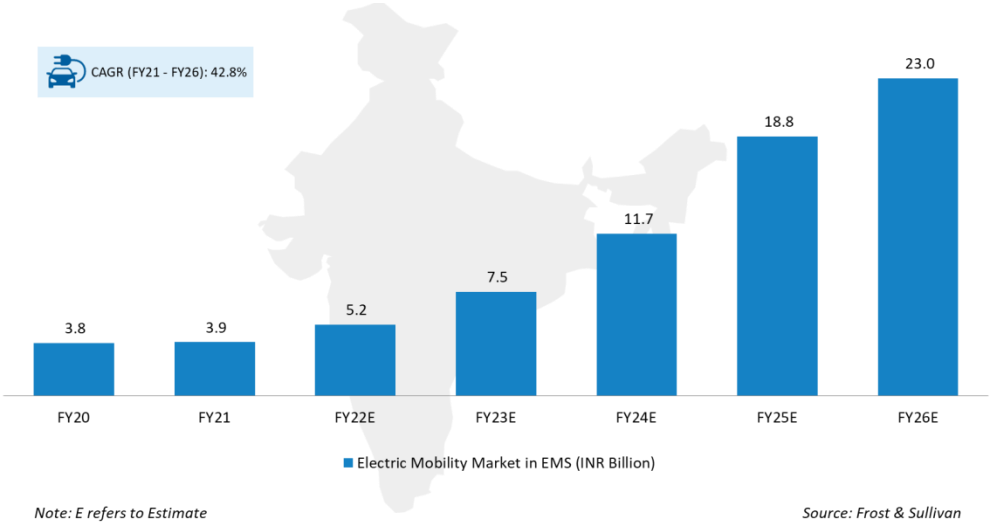
- **Incentives and Subsidies:** As part of the Make in India initiative, the government is providing incentive schemes and subsidies (FAME I and II) for domestic companies, and they can utilize this opportunity to partner with foreign companies and set up manufacturing facilities to drive local market growth and decrease the final cost of the vehicle.
- **Reducing carbon emission:** Increase in fuel cost will be a key factor to drive higher adoption of electric vehicles, starting from e2Ws in India. The electric vehicle with its zero-emission assurance is the future of the transportation. For a country having a population of 1.3 billion, ease of transportation is a requisite. Indian transport contributes to about 10 % of country's carbon emissions. India is prepared to branch out into a new sustainable mode of transportation through the means of an electric vehicle.
- **Emission norms:** Stringent emission norms to improve the air quality and reduce carbon emissions are mainly forcing OEMs to launch more electric vehicles. The government has committed to cut down on the air pollution concentration. Government is embracing expensive technologies for the purpose of achieving the target which is been committed under the COP 21 Paris agreement. The higher cost of compliance for BS VI emission norms will dent the demand for IC engines in the Indian market and provide scope for electrification, primarily in the 2W and 3W segments.

Market Trends

- The **installation of EV public charging stations** may reduce concern among users about achieving comparable performance to IC engine vehicles. Hence, charging infrastructure needs to be established on the high-transit routes with an in-depth survey of the availability of all the required essentials within its vicinity.
- Across India, **high-level rapid charging stations** are being installed. Regarding the security of charging stations, government should consider installing charging stations beneath hotspots. As flyovers are erected at the intersections of national and state roads, these stations should reduce right of way concerns. Hence, extensive customer access reduces total start-up costs.
- Innovations like **light EV charge points, streetlight charger and other low-cost Electric Vehicle Supply Equipment solutions** are providing inexpensive solutions for the charging infrastructure in India.

Market Size

Chart 4.1: Electric Mobility (Chargers both Carry and static, Controllers and Battery Management Systems) Market Estimates in EMS, Value in INR Billion, India, FY20-FY26E



Note: E refers to Estimate

Source: Frost & Sullivan

The EV segment is in a growth phase and India is equally competing with the global leaders. The electric mobility market, specifically for products such as carry and static chargers, controllers, and battery management systems (BMS), has very good potential. The EV market was worth INR 3.9 Billion in FY21, and it is expected to grow at a 42.8% CAGR to INR 23.0 Billion in FY26.

Chargers, controllers, and BMS are going to play a very crucial role in the overall EV ecosystem in India and will grow rapidly in the forecast period. As of 2020, there were 293 community charging stations in India, of which 22 were fast-charging points. The Department of Heavy Industry has plans to incentivize 1,000 charging stations with 6,000+ chargers under 3 incentive categories. Incentives will be distributed in three instalments: 20% as an advance at the time of approval, 40% after charging station commissioning, and 40% after 6 months of successful commercial operation.

Competition

Some of the key OEMs / Auto makers in EV market include Maruti Suzuki India Limited (MSIL) and Mahindra & Mahindra (M&M), which hold approximately 67 % of India's total EV market share. Mahindra & Mahindra focuses on battery electric vehicles, while Maruti Suzuki India Limited focuses on plug-in hybrid electric vehicles and hybrid electric vehicles. OEMs such as Hyundai and Tata Motors are expected to join the bandwagon as volumes increase. Due to their high penetration of hybrid vehicles, MSIL and M&M will have the maximum market share in terms of eMotors. M&M will not limit itself to being a vehicle manufacturer but will also supply EV components (including eMotors) to other manufacturers.

India is on a continuous growth path in the EMS market in the EV / Electric mobility segment. All leading companies are looking for India as an option. There are also Indian companies who are into this segment. Tesla has planned to start a manufacturing unit in India. Sanmina, Solectron, Flextronics, Syrma SGS and Frontline are some of the most prominent players in the EMS market in the E mobility category.

Future Opportunities

Growth in charging infrastructure is a must for the growth of electric passenger cars in India. Localization of EV components will lead to a decrease in the cost of vehicles, improving the demand from drivers in the country. At present, e-Rickshaws have little or no penetration in Maharashtra and all southern states. However, these states could be potential markets for e-Rickshaws in the future due to increasing metro rail connectivity and the need for pollution-free last-mile connectivity services. Most of the growth is in the e2W segment, eRickshaws, and electric auto rickshaws. e4Ws are picking up pace and are expected to occupy a significant share by 2025.

Automotive (Lighting Control, Infotainment, Engine Control Unit)

Industry Overview

Commercial vehicles, passenger vehicles, three-wheelers, and two-wheelers are all part of the automotive manufacturing industry in India. The Indian automobile sector is expected to recover in FY22 following the COVID-19 pandemic. Two-wheelers and passenger vehicles dominate India's domestic auto market. Small and mid-size cars account for the majority of sales of passenger vehicles.

Due to its low penetration, India's automobile electronics market offers huge growth potential. Regulatory norms, comfort, and personalization are the three key trends in the Indian automotive sector, which is expected to have a significant impact on electronic industry in India. The manufacturers' constant focus on new technologies and product development has made automotive electronics an essential part of their transition from conventional mechanical systems to electronic systems. Electronics for vehicles such as body electronics, safety, and entertainment and driver assistance are all contributing to the fast expansion of the automotive electronics industry.

Bluetooth, Wi-Fi connectivity, interactive speech recognition services, live media streaming, and smart technologies for mobile integration are all possible with advanced infotainment systems, which is widely preferred by tech-savvy customers.

Key Drivers

- **Norms and regulations:** Growth in Automotive segment is driven majorly by the BS VI and safety norms.
- **Income levels:** One of the major factors driving the rise of automotive electronics is rising income levels and increasing customer preference for digital in-vehicle experiences.
- **Automotive technologies:** Automotive electronics development is linked to automotive technologies in the creation of solutions that improve safety, fuel efficiency, consumer comfort, infotainment, and related applications.
- **Government Standards:** Requirements for automotive electronics components are being driven by government standards and the move to electric vehicles (EVs). This creates enormous market potential for manufacturers in India.
- **Cloud based infotainment:** In response to increasing consumer demand for more advanced safety, comfort, and aesthetic features, the automotive industry has made many significant advances in technology. One of these developments is the use of cloud-based infotainment. Cloud adoption enables in-car infotainment systems to play content on-demand from cloud-based sources.

Market Trends

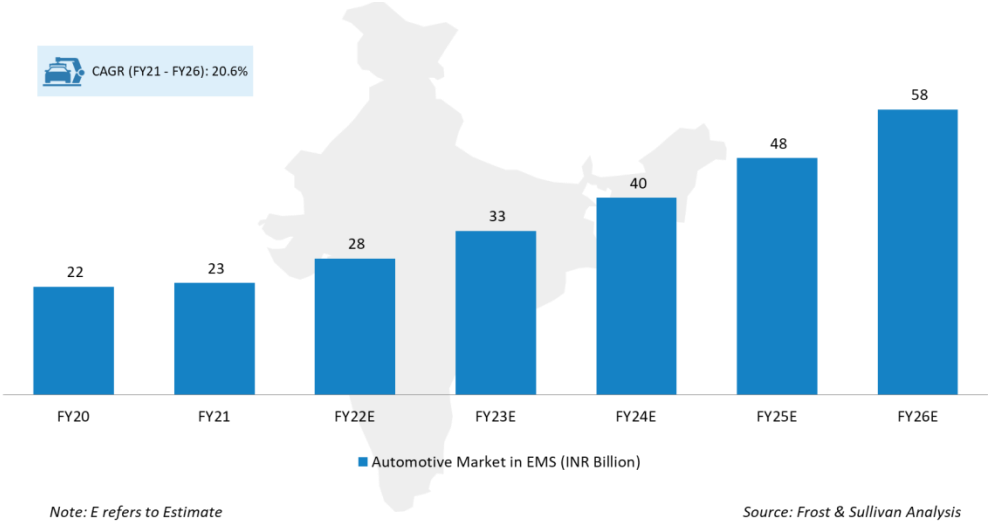
- **Electrification** will penetrate cars and last-mile connectivity modes like 2W by 2030. Frost & Sullivan expects more electrification in the fleet segment due to a combination of lower ownership costs and regulatory intervention.
- **Stringent regulations** like Corporate Average Fuel Efficiency II (CAFE II) and Bharat Stage-VI (BS-VI) are also among the key drivers for rising electronic content in a car.
- **Establishing a Circular Value Chain**: A new vision for the production and consumption of electronic products is necessary in terms of recycling and scrappage policies

Market Size

The Automotive electronics market specific to products such as Engine Control Unit (ECU) Infotainment, and Lighting Control has a very good potential. The Automotive electronics market is estimated to be at INR 23 Billion in FY21 and is expected to grow at 20.6% CAGR to reach INR 58 Billion in FY26.

Engine Control Unit has a major contribution in the overall Automotive Electronics. The growing concern among end-users about vehicle performance and fuel consumption are the primary drivers of Engine Control Unit. Furthermore, due to regulatory compliance, even entry-level vehicles are equipped with ECUs. In Engine Control Unit, India has a strong base with automotive industries, including the component suppliers. As end-users prefer comfort and additional features, Infotainment is receiving more popularity and acceptance. With the help of compatibility with Mobile phones and other devices, the Infotainment is expected to grow exponentially in the near future.

Chart 4.2: Automotive (Lighting Control, Infotainment, Engine Control Unit) Market Estimates in EMS, Value in INR Billion, India, FY20-FY26E



Note: E refers to Estimate

Source: Frost & Sullivan Analysis

Competition

There is presence of many electronics supplier for Indian automotive industry in India. With presence of key players such as Bosch and Continental manufacturing Engine Control Unit in India, the market is expected to show a rapid progress in the future.

Jabil, Sanmina, Kaynes, Syrma SGS are some of the key players providing EMS services to the Automotive sector in India.

Future Opportunities

This automotive electronics market will be driven in the future by rising public awareness of enhanced safety and communication services, as well as manufacturers' increased embedded connection service offerings. Rising income levels and increased customer preference for in-vehicle digital experiences will cause automotive electronics sales to treble throughout this time. Due to the use of telematics and other innovative technologies such and on-board diagnostics, the electronics market in the commercial vehicle segment is expected to reach INR 15.2 Billion by FY26.

Telecom (GPON, IP PBX, Media Gateway, Modem, Router)

Industry Overview

India is currently the world's second largest telecommunications market. Over the next five years, increased mobile phone penetration and reduced data prices will add 500 million additional internet users in India. The advancement of direct and indirect competition in the telecommunications market has had an influence on conventional operators' revenue growth rates and profit margins. While penetration of telecommunications services is high, infrastructure on information technology (IT) and value-added services

(VAS) is in the growth stage. Moving away from the traditional sources of revenues to cloud offerings is critical for long-term growth.

When considering the key sub-products of the Indian telecom sector, GPON is a critical product and it is of a moderate cost and it is easy-to-maintain equipment. AES (advanced encryption standard) is used to prevent eavesdropping on downstream communication to subscribers, and it includes robust management and security features. The lifting of the lockdowns in different parts of India led to numerous enterprise projects which had been shelved in previous quarters finally materialising. The enterprise routing business grew significantly in the first quarter of 2021 compared to last year.

Key Drivers

- **Removal of duty exemption on imported products:** In line with the 'Make in India' initiative, exemption from the basic customs duty, special additional duty and countervailing duty has been removed on chargers, battery, adapters, wired headsets and the speakers for the mobile phones. This is intended to benefit domestic manufacturers by increasing the cost of imports. Import tariffs on inputs that contribute to the manufacture of such parts and components have also been removed to encourage local production.
- **Capex Optimization:** Spend on Capex in the telecom industry is very high. Nearly 40 % to 60 % of the Capex is being utilized for setting up and managing the telecom infrastructure. As revenue per tower and ARPU is declining over a period of time, sharing of the telecom tower and other types of infrastructure is imminent. By sharing the infrastructure, operators can actually optimize their capex, and focus more on providing new and advanced services to their subscribers.
- **4G and 5G Infrastructure in India:** While Airtel, Vodafone and Jio have concluded the roll out of its 4G services on pan-India basis, service providers are gearing up for 5G roll out in India, which will boost the customer utilization of high-end data products. 5G is required to create new economic value in India and globally. The business opportunity for 5G in India is huge and it will encourage investors to participate, manufacture, sell and export to the global market.

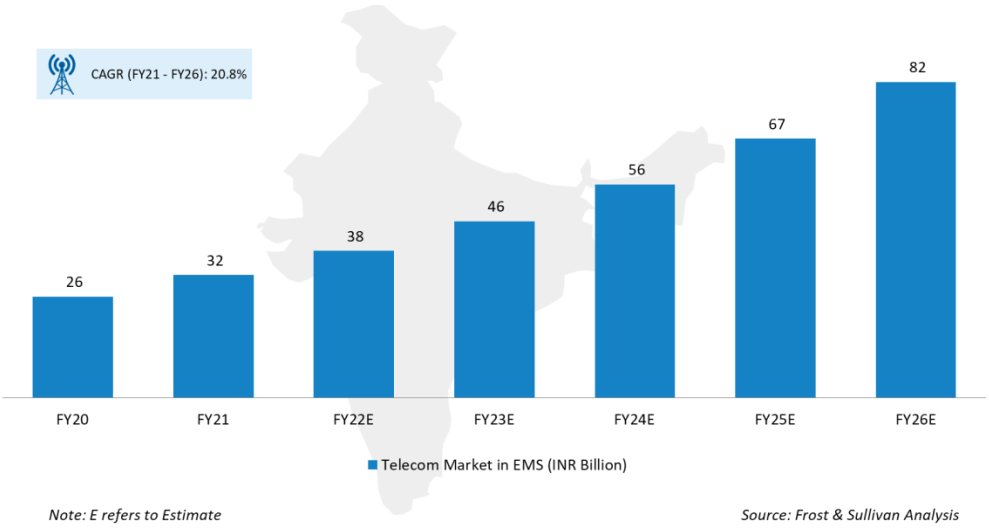
Market Trends

- India's current market penetration in optical fiber connectivity is not more than 30 per cent of the mobile towers and 7 % of households. Significant fiberisation and infrastructural improvements are required to bring in 5G and high-speed connection, and this will be a key focus area in 2021 and beyond.
- Industrial Internet of Things (IIoT), smart homes, connected mobility and autonomous appliances and gadgets are all deeply reliant on the hyper connectivity. This trend is expected to continue to rule in 2021 and beyond. Smart cities would also need a robust digital neural network for the purpose of functioning seamlessly.
- Tower industry and the telecom operators do need to come forward to consciously take a step towards pulling down their total energy consumption and trying to figure out a better way to develop the total eco system without hurting the environment any further. Alternative energy sources to power operations are pursued and the intervention has already taken place at the ministerial level.

- 2021 and beyond, can be seen as an era of hyper connectivity (anything, anywhere and at any time). This is going to create huge security challenges and henceforth, security is going to become tremendously important. There will be imminent threats and henceforth, complete device, application and the network infrastructure eco-system requires developing the security mitigation strategies.

Market Size

Chart 4.3: Telecom (GPON, IP PBX, Media Gateway, Modem, Router) Market Estimates in EMS, Value in INR Billion, India, FY20-FY26E



Note: E refers to Estimate

Source: Frost & Sullivan Analysis

A lot of growth potential exists for telecom electronics products like GPON, IP PBX and Media Gateway as well as Router and Modems. The market was valued at INR 32 Billion in FY21 and is expected to grow at a 20.8% CAGR to reach INR 82.0 Billion in FY26. Routers, GPONs, and modems are going to remain key revenue contributors within the telecom business in the forecast period.

India plans to roll out state-of-the-art 5G telecom services by 2022. The new technology provides the advantages of massive connectivity and low power consumption and boasts of download speeds and capacity that can enable autonomous vehicles, drones, remotely assisted surgeries, and traffic control. 5G connectivity will be used in emerging technologies and technology-enabled markets such as IoT, smart cities, and smart agriculture. 5G, due to its greater speed, would also enable next-generation IoT and machine-to-machine (M2M) applications such as autonomous vehicles and virtual or augmented reality.

Competition

The on-going consolidation and spectrum acquisition could add to the debts of the telcos, further stretching their already-stretched balance sheets. The entry of Reliance Jio has further intensified the competition, making it difficult for the incumbents to increase tariffs. As consolidation picks up, the number of telecom operators would eventually come down fast, which will adversely impact the tower companies. Fewer

operators and increasing spectrum sharing/trading deals will result in fewer tenants hitting their margins hard, resulting in higher rentals.

Key players in Telecom companies and EMS players include Syrotech, Netlink, Alcatel – Lucent, Syrma SGS, Tejas Networks, Speech & Software Technologies, and Alphion India.

Future Opportunities

The Indian telecom market, home to more than 900 million mobile subscribers, has witnessed a relentless growth during the past decade. This growth has been largely driven by voice, but the next wave of growth will be data-centric. Focus on customer experience, network quality, and the growing demand for wireless data services, 4G, and broadband wireless access networks, along with roll-out to newer circles and rural expansion, will result in increased opportunities.

As coverage and capacity become increasingly important, telecom infrastructure service providers have increased opportunities to help the Telco's. From the roll-out of new networks to network benchmarking and optimization, the services are becoming critical.

BLDC for Fans

Industry Overview

BLDC fan refers to usage of BLDC motor in the ceiling fan compared to the induction motor in the normal ceiling fan. With the use of the BLDC motor in the ceiling fan 60% electricity can be saved in the ceiling fan. Stator, rotor and shaft are the other key components of BLDC fan.

BLDC fan life expectancy is more than that of a normal ceiling fan because there is no heat being generated in the BLDC Motor hence its rises the lifespan of ceiling fan bearing, also there are very few chances for winding failure because of the use of the high thickness copper wire in winding.

The use of the new BLDC motor technology in fans can save its user up to INR1000-1500 per year per fan. Pioneered by 'Atomberg Technologies' and 'Versa Drives', BLDC fans have lesser wear and tear, reduced electromagnetic interference, noiseless operation, improved efficiency, increased reliability, and a longer lifespan.

Key Drivers

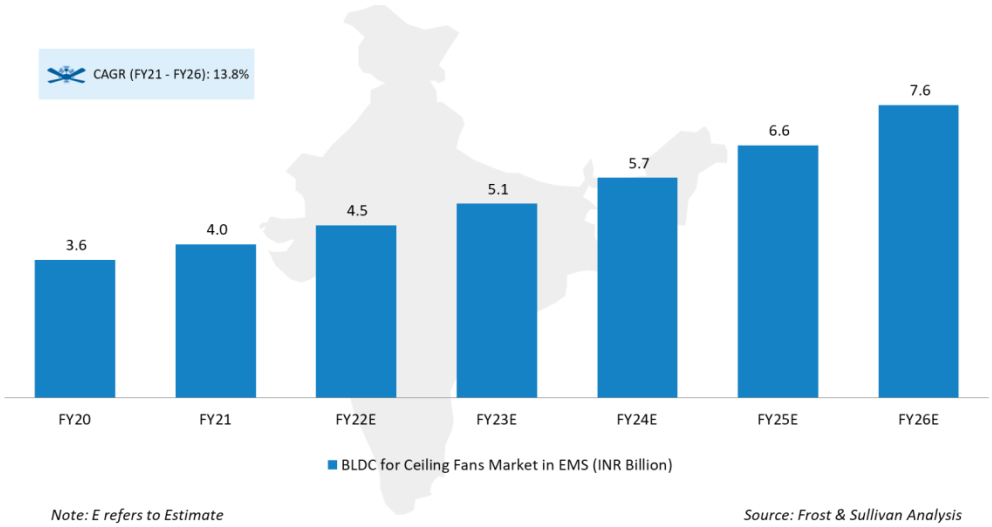
- Under the Saubhagya scheme, the Indian government has energized almost 23.0 Million households. In FY18, a total of 1.4 Million houses were sanctioned under Pradhan Mantri Awas Yojana (PMAY) program. On the other hand, the Indian real estate market also saw good growth in last couple of years. The demand for flats increased 7.0% during 2018 to nearly 0.215 Million units. This in turn is expected to drive the fans market.
- Affordable housing and GST reduction on houses from 12.0% to 8.0%, backed by several government reforms, will drive the demand for electric fans, with low growth in the short term and high growth in the long term.

Market Trends

- Significant increase in discretionary income have led to shortened product replacement cycles and evolving lifestyles where consumer durables are being replaced faster than usual. With a desire to upgrade lifestyle and increasing consumer preferences towards enhanced and appealing interiors, the upper-middle class section is replacing fans at a faster rate. About 5 years ago, the replacement cycle was around 8-9 years. Due to premiumisation of ceiling and TPW fans, the urban replacement cycle has shortened to 5-6 years.
- Driven by an aspiration to upgrade lifestyle and décor, the premium segment in fans is fast growing, and is expected to grow substantially by 15.0-20.0% in the next 3-5 years, with innovations in product aesthetics. The impact of this particular market trend on demand is expected to be medium throughout the forecast period.

Market Size

Chart 4.4: BLDC for Fans (Chargers both Carry and static, Controllers and Battery Management Systems) Market Estimates in EMS, Value in INR Billion, India, FY20-FY26E



Note: E refers to Estimate

Source: Frost & Sullivan Analysis

The BLDC fans has got a very good growth potential going ahead because of its features like longer life span and electricity saving. The market was valued at INR 4.0 Billion in FY21 and is expected to grow at 13.8% CAGR to reach INR 7.6 Billion in FY26. Precise speed control, cooler operation and less acoustics are the key factors that will increase the adaptability of BLDC fans going ahead.

Competition

The market is highly concentrated with top 5 to 6 players having majority market share and the rest is been divided among small and mid-sized player. The key players in the market are Orient, Versa Drive, Jupiter, Atomberg, Crompton, and Havells among others. Aggressive and Elin are the key EMS players in BLDC fans segment.

Future Opportunities

Given the increase in rural electrification, expansion of distribution network to tier 3 cities, towns and rural areas is a big growth opportunity going ahead.

Consumer Appliances

Industry Overview

A growing Indian economy, rising purchasing power of consumers and better access to quality products at affordable prices has revolutionized the appliances and consumer electronics (ACE) industry in India. The rapid pace of urbanisation, a large emerging middle class and easy digital access have further aided the growth of ACE products.

- Household penetration of room ACs in India is slightly higher than 5%, implying that there is considerable scope for growth. Future demand for RACs in urban areas will be driven by cost competitiveness, better features and energy efficiency.
- Penetration of refrigerators in India is currently around 33%, hence there is sufficient head room for growth. The Indian refrigerators market is categorized into two product types i.e. Direct Cool and Frost Free. Direct Cool refrigerators dominate the market with almost 75% share however the popularity of Frost Free refrigerators is growing.
- The penetration of television in India is around 65% which makes it the highest penetrated category among those covered in this study. Major types of TVs marketed are LCD, LED and OLED. Availability of high definition content, high speed broadband and declining price points is driving consumers to buy bigger screen sizes and Smart TVs.
- Penetration of washing machines in India is currently 12% implying high scope for growth. Semi-automatic (SA) Washing Machines is the more popular category in India occupying 60% in terms of volume when compared to Fully-automatic (FA) machines.
- The most dominant type of water purifier in India is ultraviolet (UV) water purifier, having more than 30 % of the market and this is being followed by RO water purifier. Current penetration of water purifiers is around 10% in India.
- The penetration of microwave oven is around 5 % currently in Indian market. The solo oven segment is expected to maintain very fast growth in next 5 years.

Key Drivers

- Demand for the consumer electronics in India has been growing depending on the rising income of consumers; this particular trend is all set to continue even as the other factors like the rising rural incomes, a growing middle class, increasing urbanization and changing lifestyles aid the demand growth in the sector. Substantial increase in the discretionary income and the easy financing arrangements have led towards reduced product replacement cycles and developing life styles where consumer electronics are perceived as the utility items rather than the luxury possessions.
- E-commerce platform is fast capturing the commodity requirement of customers and is becoming popular among a large section of customers. Internet transactions in consumer electronics and

home appliances have grown tremendously over the past couple of years. The expansion of internet access, the growing usage of smartphones, and the increased number of internet retailers have aided in growth.

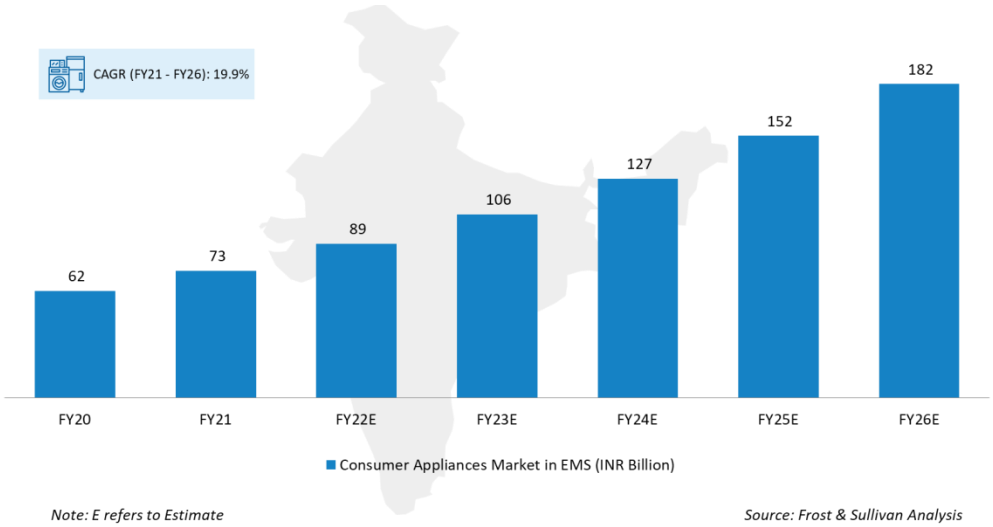
- Advancement in the technology and the higher competition are driving the price reductions across numerous consumer appliances product segments like television, refrigerators, washing machine and RACs. With the “Make in India” initiative, numerous domestic and the foreign manufactures are investing in India to set up their production plants which is going to produce more affordable products.

Market Trends

- Modern technology has paved the gateway for the multi-functional devices like the smart watch and the smartphone. Computers are much faster, more portable, and higher-powered than it was ever before. With all of these uprisings, technology has also made our lives easier, better, faster and more fun.
- The Indian consumer electronics sector has attracted numerous significant investments in the form of mergers and acquisitions by key global competitive companies, as well as other FDI inflows. Some of the key essential factors for the consumer market include the government of India's policies and regulatory frameworks, such as the easing of license restrictions and the permission of 51 % FDI in multi-brand retail and 100 % FDI in single-brand retail.
- The advent of IoT and artificial intelligence (AI) in the consumer appliances segment opens a wide array of possibilities, given the massive size of the market in India.
- Introduction of wide serving automation and robotics in production lines, inspection cycles, maintenance and logistics is becoming a new trend.

Market Size

Chart 4.5: Consumer Appliances (PCB and Box-build for Washing Machines, RACs, Water Purifier, Owens, Refrigerators, Television) Market Estimates in EMS, Value in INR Billion, India, FY20-FY26E



Note: E refers to Estimate

Source: Frost & Sullivan Analysis

The appliances electronics market specific to products such as RAC, water purifier, washing machine and microwave ovens has a very strong growth potential going ahead due to large untapped market in India across the regions. The market was valued at INR 73 Billion in FY21 and is expected to grow at 19.9% CAGR to reach INR 182.0 Billion in FY26.

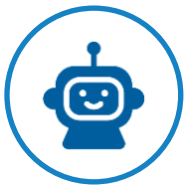
Competition

Indian air conditioners market is highly fragmented with varied set of players – global, indigenous and importers – selling a wide range of products in the market. Voltas and LG are front runners and have a long standing presence in India. The Refrigerator category is less fragmented; LG, Samsung and Whirlpool are the leading refrigerator brands. The television market has several brands but LG, Samsung and Sony command nearly two-thirds share of the market. Other prominent players in the market are Xiaomi, Panasonic, Videocon, Haier, Micromax, Intex and Lloyd. Indian Washing Machines market is a highly competitive market with different brands leading in each of the Washing Machine types. LG, Samsung, IFB and Whirlpool holds a combined market share of more than 70% while other prominent players are Godrej, Panasonic, Videocon, Haier, Lloyd, Hitachi, and Intex . Key players in the consumer electronics and appliances EMS category are Dixon, Jabil, and Flextronics to name a few.

Future Opportunities

Low penetration levels of most Consumer Electronics and Appliances categories leaves large headroom for the industry to grow. This opportunity is further pronounced in large semi-urban and rural markets of India. The sharp focus by government in improving infrastructure, especially electrification and roads, has resulted in reducing the gap between rural and urban.

Today consumers are value conscious and do detailed research before buying a product. Therefore, companies are forced to provide features that differentiate them from others. Designing and making products that meet the aspirations of today’s consumers is what is the order of the day.



Electronic Toys

Industry Overview

India has one of the world's largest young populations, which has resulted in significant growth in the country's toy sector. The market has established itself in both traditional and modern toys. Currently, there is a wide range of toys available in the market. However, recent trends have resulted in a shift away from traditional toys and moving towards creative and high-tech electronic toys. Toys are manufactured locally by small, medium, and large manufacturers, as well as by prominent international brands. Each toy category includes both budget-friendly and high-end products.

Toy manufacturers are primarily located in the Maharashtra, Karnataka, National Capital Region and Tamil Nadu, as well as clustered in central India. The sector is fragmented, with 4,000 toy manufacturers classified as small and medium-sized players and 90 % of the market is unorganised. The rise in disposable income,

children's adoption of digital technology, and advancements in electronic toy manufacturing technology are the major factors driving the electronic toy's market in India. Domestic toy demand is expected to grow by 10-15 %, compared to the global average of 5 %.

Key Drivers

- **Large customer base:** The increasing demand from the toy sector is owing to the young population (below 15 years) in India, which accounts for nearly 26 % of the entire population. It is anticipated to provide opportunities for the toy sector to expand.
- **Rising disposable income:** The country's robust economic growth and rising disposable incomes are also driving up domestic demand for toys in India. India has seen significant GDP growth rates in recent years. As a result, the region's middle-class population has grown rapidly.
- **Driven by online sales channels:** Since the emergence of smartphones, online sales channels have seen a significant increase in India. Customers have alternatives to choose from multiple online platforms reviewing the price, quality and features of the products.

Market Trends

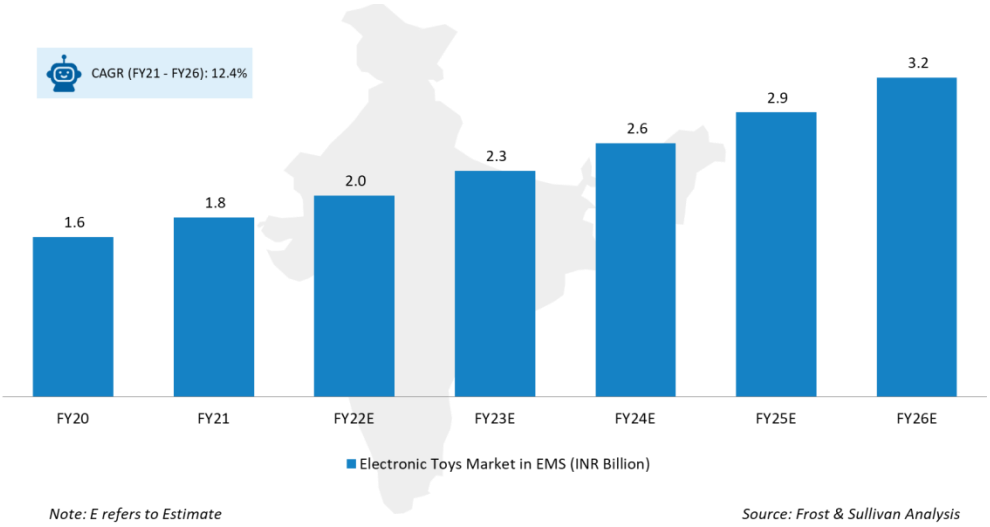
- **Introduction of BIS certification:** To boost the toys sector, the Government of India gained the support of state governments, by introducing the BIS safety certification. Since January 1, 2021, BIS certification is mandatory, and anything that does not satisfy the requirements are not approved.
- **Allocation of Toy Cities and Parks by State Governments:** A number of state governments have allotted dedicated spaces for toy cities and parks. 115 firms have already relocated to the Yamuna Expressway near Delhi; Koppal in Karnataka is set to become a toy centre; and Gujarat is building a plug-and-lay industrial development for toy manufacturers.
- **Adoption of Connected Toys:** Smart tech toys have a high market adoption. These toys, make learning more fun for children while also assisting parents in keeping track of their locations.

Market Size

India's contribution to the global toy business is currently less than 1 %, which is approximately INR 60 billion. Although manufacturers have pushed themselves to produce new and innovative toys with the help of modern technology and manufacturing, electronic toys contribute far less in comparison. The EMS contribution to the electronic toys market is estimated to be INR 1.8 billion in FY21, which is expected to grow at a 12.4 % CAGR to reach INR 3.2 billion in FY26, indicating that this market has enormous potential.

The rising demand for app-enabled and remote-controlled electronic toys is projected to boost the market growth. At the same time, increasing investment in research and development for developing advanced hi-tech electronic toys is boosting EMS. The Indian toy market benefits from a skilled workforce, a broad selection of toys, a focus on innovation and creativity, and an emphasis on learning and education. Based on these significant developments, the central government is introducing various initiatives to promote the industry.

Chart 4.6: Electronic Toys Market Estimates in EMS, Value in INR Billion, India, FY20-FY26E



Note: E refers to Estimate

Source: Frost & Sullivan Analysis

Competition

The Indian toy market is fragmented. There are around 5-6 major players, while the rest of the toys manufacturers, over 3000 players ranging from medium and small enterprises, are much unorganized. Some of the key players in electronic toy manufacturing include Toys hi toys, Actia India and few more domestic players.

Future Opportunities

The Indian toy business has a promising future. The government is developing a PMP for toys in order to establish a strong local manufacturing ecosystem. The programme will make local toy assembly less expensive than imports. The Department for Promotion of Industry and Internal Trade (DPIIT) is approaching large scale manufacturers (both domestic as well as global players) about investing in the toy industry in India. Various initiatives by state governments, such as developing a toy manufacturing cluster in Karnataka, toy manufacturing parks in Andhra Pradesh, West Bengal and Uttar Pradesh, are also expected to boost the industry.

The government's drive for local production and the fact that prominent global toy companies are considering India as a manufacturing destination have boosted the sector's outlook. Major initiatives aimed at boosting toy production in India include proposed tax increases and stricter certification for imported toys and allotment of industrial plots for manufacturers. Although it will take time for the sector to reap the benefits, on a long run it will help the economy, trade toes with global partners and foreign exchange.

Smart Metering

Industry Overview

After China and the United States, India is the world's third largest power producer. Through advanced metering systems and custom-made technologies, India's utility sector is beginning on a new path. Smart metering has been in use in India for more than two years, although it is still in its infancy. In the industrial, commercial, and residential sectors, smart metres are deployed. This is used to measure the energy customer's use. Initially, there was a problem with consumer acceptability, but when the union government took the initiative with individual states, things began to improve. Both consumers and the utility sector stand to benefit from smart metering technology by allowing providers to increase operational efficiency, reduce energy theft and avoid revenue losses while providing consumers more stable electricity service and the ability to control their usage expenses.

The Smart Meter National Program (SMNP) is being implemented across the country to deploy smart metres. Energy Efficiency Services Limited (EESL), a joint venture of PSUs under the Ministry of Power, is implementing the plan. The aim of the plan is to replace 250 million traditional metres with smart variants. However, there are no proper standards in place, and various technical specifications are followed by different distribution firms, affecting the quality and pricing of energy metres. Currently focused on urban regions, rural regions would be included in the second part of the five-year distribution scheme programme. The programme is estimated to need 100 million smart metres in the first phase and another 150 million devices in the second phase. India has a significant energy metre manufacturing capabilities, with certain companies exporting extensively to the global market

Key Drivers

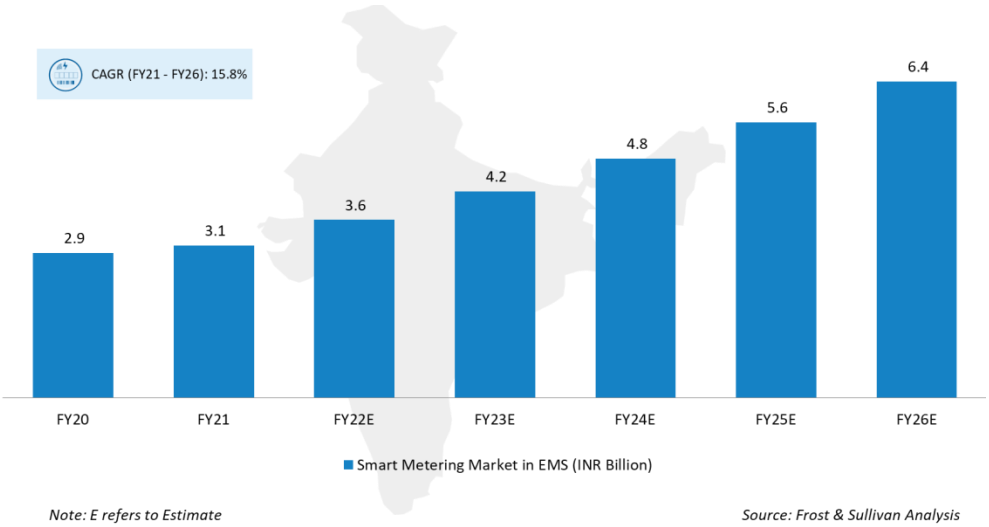
- **Government initiatives:** The smart metre industry is expected to be strengthened by government programmes such as the Deen Dayal Upadhaya Gram Jyoti Yojna and the Integrated Power Development Scheme. The Ministry of Power has launched the Ujwal DISCOM Assurance Yojna, which is expected to boost the power sector's growth.
- **Development in Infrastructure and Construction industry:** In the next five years, projects such as the development of 100 smart cities and 500 cities under AMRUT (Atal Mission for Rejuvenation and Urban Transformation) are anticipated to draw investments of INR 2,000 Billion, which bodes well for the industry.
- **Growth of key industrial sectors:** The Make in India initiative is designed to strengthen India's manufacturing sector, boosting essential industries including power, metals and minerals, and chemicals. As electricity metres are a crucial element for monitoring energy usage, the market for smart metres in India is expected to increase.
- **Advanced features for better usage:** Bidirectional communication smart metres, integrated load limiting switch, firmware updating over the internet, net metering, prepayment, post payment and time of day tariff features, in addition to electrical energy parameter monitoring, are some of the key features available in smart meters, apart from measurement of electrical energy parameters

Market Trends

- Smart metres are often promoted as the next big thing to solve the problems of the power industry, although their primary purpose is to benefit DISCOMs as well as consumers. Aggregate Technical and Commercial (AT&C) losses can be tracked considerably more easily for DISCOMs now that smart metres have been fully integrated into the distribution system and at the end users. Improved revenue collection and easier demand-side management are both results.
- DISCOMs and customers can also benefit from prepaid smart metres. Prepaid smart metres require customers to fill up their metres before using them, or otherwise their electricity will be disconnected. DISCOMs will now be able to receive money right away as a result of this.

Market Size

Chart 4.7: Smart Metering Market Estimates in EMS, Value in INR Billion, India, FY20-FY26E



Note: E refers to Estimate

Source: Frost & Sullivan Analysis

The Smart meter market in India is estimated at INR 3.1 Billion in FY21 and is expected to grow at a CARG of 15.8% to reach INR 6.4 Million in FY26. In Energy Meters/ Smart Meters segment, India has a strong base of manufacturing/ assembly; however many components like LCD, Relay, Communication Module, PCB, Passive Components and Microcontrollers are imported. Components like Mechanical Components, Terminals, Brass Terminals and Screws are locally sourced.

Smart metre installations are projected to rise and exceed traditional metres. Despite financing problems and low-cost requirements in addition to satisfying Indian regulations, the market is expected to offer a potentially significant investment opportunity for most manufacturers. Due to the enormous customer base of over 250 million households, the potential for replacing electronic metres with smart ones having dual functionality (prepaid and post-paid) is significant, but electronic metre sales continue to dominate the market today.

Competition

HPL is the largest player followed by Genus power and L&T. Other major companies include Itron India Pvt Ltd, Schneider Electric India Pvt Ltd, Secure Meters Ltd, Superior Products Industries and Towa Engineering Works among others.

Future Opportunities

Smart energy metres will continue to be deployed mostly due to government regulations. Electric companies will focus on installing metres in areas with significant non-technical losses if requirements are not issued universally. As Chinese metre makers begin actively pursuing the foreign market in 2020 once China's deployment is done, price competition will continue to escalate.

In order to attract investment from utilities who lack the financial means to undertake a CAPEX-led rollout, the smart metering-as-a-service model will acquire more momentum. To prepare for the smart grid's future, we're building cutting-edge facilities for customers and DISCOMs alike. Managing demand-side resources and the grid's response to changing conditions are key components of the smart grid. In order for the grid to be self-sufficient, it must be equipped with a powerful digital backend.

Other Key Segments (Focus on the Segments where Syrma has opportunity)

A. Lighting

Lighting: Market size and future outlook

After a century of dominance by incandescent bulbs, halogen and CFL lights, LED lights have become the norm in the Indian lighting industry. LED lighting was introduced to the Indian market in 1993, since then it has taken the market by storm with government and commercial segments witnessing phenomenal growth. Energy-efficiency initiatives are gaining momentum in India currently. As local demand rises, LED lighting manufacturers are strengthening their capabilities across several activity streams. Energy Efficiency Services Limited (EESL) efforts such as UJALA and SLNP provide vendors with pricing leverage with component suppliers, allowing them to drastically reduce product costs. Street lighting segment will be the biggest application for the next few years. Pure-play LED lighting companies are a dominant force in Indian market.

EMS is essential for LED lighting industry since many manufacturers outsource their LED lighting manufacturing to EMS companies. In the forecast period, the EMS market has a significant growth potential. Contribution from EMS market in the total manufacturing was around INR 47 Billion in FY21 and is expected to reach INR 344 Billion in FY26, at a CAGR of around 49.2% %.

Lighting: Competition Overview

Major LED lighting EMS player present in the Indian market are Dixon, Elin and RK Lighting which combined hold a market share of around 91%. The other key players present in the EMS space are Century LED, Compact Lamps and Goel Lighting to name a few.

With a combined market share of 57%, prominent brands such as Signify (Philips), Havells, Wipro, Syska LED, and Bajaj dominate the majority of the market. Surya Roshni, Orient Electric, Eveready, Halonix, and MIC are some of the other major competitors in the industry

B. Medical Electronics

Medical Electronics: Market size and future outlook

The Indian Medical Devices market is experiencing dynamic changes with the emergence of advanced technologies, evolving clinical and administrative needs, and the introduction of new policies and regulations, which is forcing industry participants to innovate to maintain their competitive edge.

The EMS market for the Medical devices business was around INR 14 Billion in FY21 and is expected to reach INR 82 Billion in FY26, at a CAGR of around 42.8%.

Medical Electronics: Competition Overview

Large multinationals and small and medium businesses (SMEs) exist in India's medical device industry, which is expanding at an unprecedented rate. Around 65% of Indian manufacturers are domestic operators in the consumables sector, catering mostly to domestic consumption with little exports. With vast service networks, large multinational corporations lead the high-tech end of the Medical Devices industry. Increased demand for healthcare and medical products as a result of rising medical tourism is anticipated to boost local production at a rate of 21% over the next 5 years.

C. IT and Hardware

IT: Market size and future outlook

Government’s digitization programs like Digital India will continue to drive this segment. Key products in the IT segment include Notebooks, Servers, Storage Devices and Tablets. These top products occupy majority of the market in terms of volume.

AI printed circuit board designs & engineering processes bring further flexibility and create a new generation of products, like the connected objects, smart home devices, IoT devices. Printed Circuit Boards (PCB) for the connected devices which have been reinvented in order to add the AI aspects.

The EMS market for the IT business was around INR 21 Billion in FY21 and is expected to reach INR 109 Billion in FY26, at a CAGR of around 39.1%.

IT: Competition Overview

EMS is essential for IT industry since there are limited number of companies who are focusing on storage and memory devices although numbers are slightly higher for those companies who are more focused

towards procuring tablets, notebooks and servers. Key players operating In the storage systems market in India are Dell, Net App, Lenovo, IBM, Hitachi, HP among others.

D. Overall Consumer Electronics and Appliances (CEA)

CEA: Market size and future outlook

Low penetration levels of most consumer electronics and appliance categories leaves large headroom for the industry to grow. This opportunity is further pronounced in large semi-urban and rural markets of India. The sharp focus by government in improving infrastructure, especially electrification and roads, has resulted in reducing the gap between rural and urban. Today consumers are value conscious and do detailed research before buying a product. Therefore, companies are forced to provide features that differentiate them from others. Designing and making products that meet the aspirations of today's consumers is what is the order of the day. After-sales service is a crucial component as it helps in building brand value and customer loyalty, which triggers repeat purchase and helps in word-of-mouth publicity.

EMS is essential for consumer electronics and appliances industry since many manufacturers outsource their CEA manufacturing to EMS companies. In the forecast period, the EMS market has a significant growth potential in this industry. The EMS market in this industry was around INR 135 Billion in FY21 and is expected to reach INR 774 Billion in FY26, at a CAGR of around 41.6%.

CEA: Competition Overview

Prominent brands present in this industry include Hitachi, Panasonic, Godrej, Samsung, Haier, Whirlpool, Philips, Bajaj, Preethi, Havells and Faber. There is also large number of small and mid-size companies present in this category.

E. Aerospace & Defense (A&D)

A&D: Market size and future outlook

India is the 7th largest Aerospace and Defence market globally. India needs to reduce its dependence on the imports and also modernize its Aerospace & Defence capital equipment base.

The indigenous manufacturing base, historically built around the Defence Public Sector Undertakings and the Ordnance Factories is only now growing with the private sector players focusing on setting up meaningfully sized and proficient facilities. As the Aerospace & Defence industry advances, the crucial impact is in terms of the greater capability in the platforms a substantial portion of this comes from the electronics. Hence electronics in the Indian Aerospace & Defense industrial plan is the crucial centre-piece that needs to be addressed.

A&D: Competition Overview

Some of the leading players in A&D electronics space are Amphenol Interconnect India Pvt Ltd., Hical Technologies, System Controls Technology Solutions, Tata Advanced Systems among others. Kaynes Technology and Sanmina are the two leading EMS players in A&D space.

F. Smart Toothbrush

Smart Toothbrush: Product overview

A smart toothbrush has a motor that notifies the user's brush position, speed, feedback, and how to enhance oral hygiene. Most smart toothbrushes have a sonic motor with sensors attached to the head that vibrates to clean teeth.

Smart toothbrushes are not like electric toothbrushes. Both an electric and smart toothbrush has replaceable heads, but not the same motor. A typical toothbrush will have roughly 300 strokes per minute. An electric toothbrush vibrates between 2,500 and 7,500 times per minute, while smart toothbrushes vibrate over 30,000 times per minute. To clean better, smart toothbrushes vibrate up to ten times faster than electric toothbrushes.

Smart Toothbrush: Competition Overview

Prominent brands present in this industry include Oral-B, Xiaomi, Realme, and Colgate to name a few. The market is still at a nascent stage in India and has significant growth potential in the future.

G. Controller module for solar panel

Controller module for solar panel: Product overview

The solar charge controller module, also known as the controller module for solar panels, serves as a regulator. Its primary functions are to deliver power from the PV tray to the system loads and then to the battery, to monitor the battery, to protect the system from both overcharging and undercharging, and to regulate the voltage and current flowing from the solar panels to the battery.

As a result of India's commitment to reduce carbon emissions, the push toward renewables, India's solar capacity has nearly increased tenfold from about 3 GW in FY14 to nearly 29 GW today. Solar manufacturing capacity in India has lagged behind solar generation capacity, while imports have steadily increased with increased capacity over the years.

China has been the primary source of solar imports into India, followed by other Southeast Asian countries such as Malaysia and Vietnam. To protect the local solar manufacturing industry, which had been flooded with low-cost imports, the government imposed a 25% safeguard duty on imports from China and Malaysia in July 2018, but not on imports from other countries.

Controller module for solar panel: Competition Overview

Key players in India working in this industry includes Loom Solar Pvt Ltd, Genus Innovation Ltd to name a few