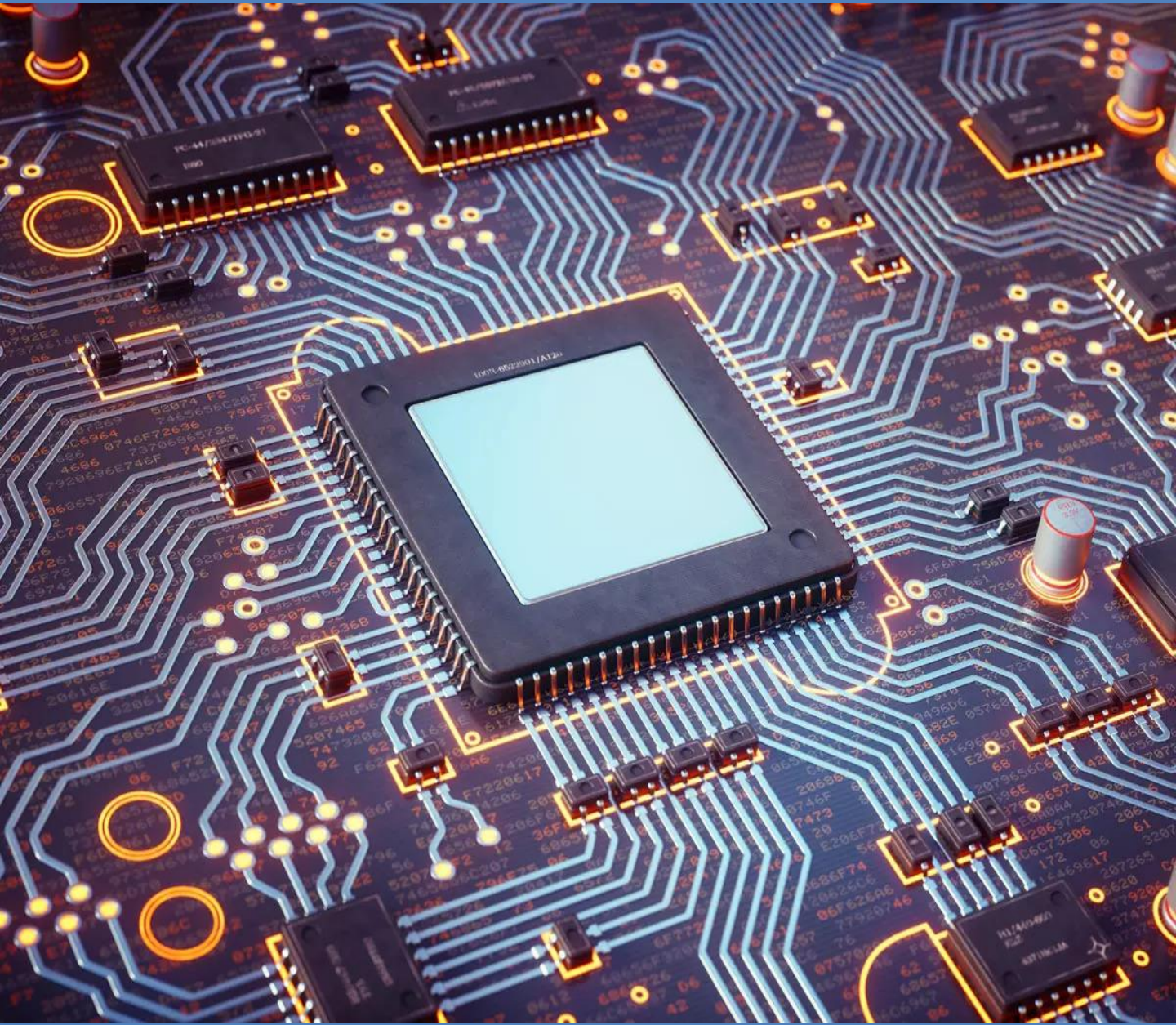


# THE SEMICONDUCTOR CRISIS : WHEN THE CHIPS ARE DOWN

April 2022



## A GBS Knowledge Perspective

This paper is based on secondary research carried out by GBS using multiple data points across sources from the Print, Internet and Social Media handles. The attempt is to educate the reader in an appropriate/ alternative way, about the topic which holds a great amount of economic importance in the present scenario. GBS, in no way, claims propriety over the source data. This paper is a mere reproduction of relevant facts derived from Source Data . In no way, it attempts to drive GBS's individual viewpoint in any way.

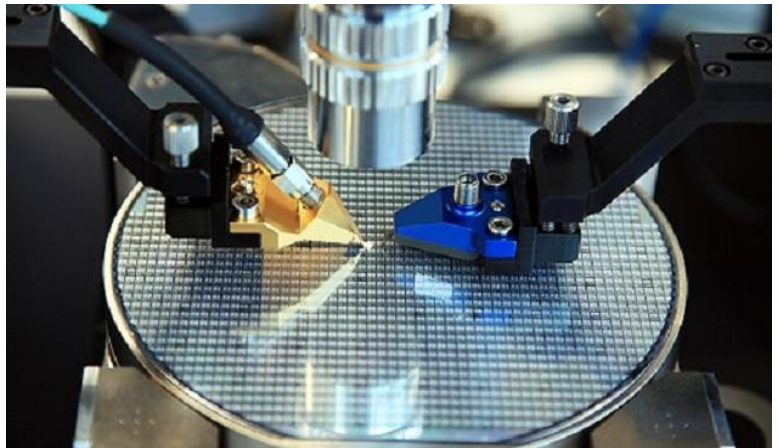


Compiled by Guidant Business Solutions



## Introduction

The semiconductor industry is the aggregate of companies engaged in the design and fabrication of semiconductors and semiconductor devices, it offers high growth potential areas as the industries which source semiconductors as inputs are themselves witnessing high demand. The end-use industries such as mobile devices,



telecommunication equipment, information technology, office automation (IT & OA), industrial machinery, automobiles and several other industries have applications for computing in some form or other and thereby necessarily have growing demand for semiconductors. Now with the concept of Internet of Things (IoT) picking up momentum, the next generation of interconnected devices would further increase the demand for intelligent computing, thereby creating sustainable demand for semiconductors.

As of 2016, the government allows 100% FDI in the Electronics system manufacturing and design (ESDM) sector through an automatic route to attract investments including from Original Equipment Manufacturers (OEMs) and Integrated Device Manufacturers (IDMs), and those relocating to India from other countries, in addition to EMC, MIPS and other incentives and schemes provided to the electronics sector. The India Electronics & Semiconductor Association (IESA) has announced a SPEED UP and SCALE-UP of its talent development initiative to be implemented through the Centre of Excellence with Electronics Sector Skills Council of India (ESSCI) .

**Now with the concept of Internet of Things (IoT) picking up momentum, the next generation of interconnected devices would further increase the demand for intelligent computing, thereby creating sustainable demand for semiconductors.**

The Department of Electronics and Information Technology (DeitY) has established an Electronics Development Fund (EDF) managed by Canara Bank (CANBANK Venture Capital Funds or CVCFL) to provide risk capital and to attract venture funds, angel funds and seed funds for incubating R&D and fostering the innovative environment in the sector. The establishment of “Fund of Funds for Start-ups” (FFS) approved by

the union cabinet as part of the EDF for contribution to various alternative investment funds or daughter funds, registered with Securities and Exchange Board of India which would extend funding support to start-ups, in line with the Start-up India Action Plan unveiled by Government in January 2016, will be beneficial to the start-ups in the ESDM space, according to IESA.



**Ravi Shankar Srivastava**  
**Managing Partner –**  
**Client Acquisition &**  
**Entrepreneurial**  
**Development**

Semiconductor is an integral part of various automobile, computer, mobile, defense, AI, and all electronic application. A huge shortage of chips is being observed globally. India heavily imports semiconductors for all applications. Taiwan being world largest semiconductor maker had shortage and India sensed an opportunity to manufacture the chips in India. Government has initiated the process with lot of support and funding as well as PLI scheme. Making semiconductor is very complex process which needs lot of decision, automation and AI application. Vedanta with Foxconn, Qualcomm and Reliance Jio with 5G application has moved to domestic manufacturing. Many countries have given lot of financial aid to accelerate the production of semiconductor. India is all geared up to meet the huge demand in the times to come.



**Jaykumar Acharya**  
**Managing Partner –**  
**Leadership &**  
**Process Expert**

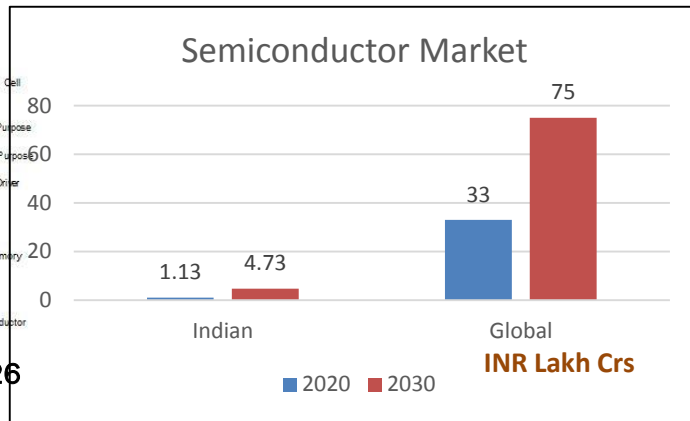
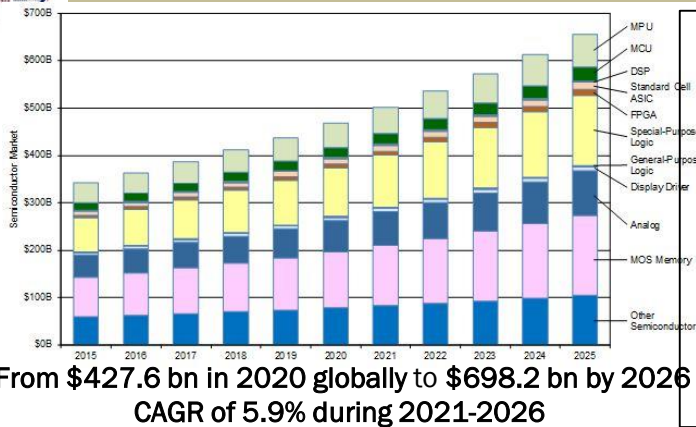
As the world transitions to embrace green energy, and as fossils get ready to gradually phase out, the sun is just about rising in the alternative energy space globally. However, some very advanced countries have been racing far ahead of their time in terms of the pace of implementing future technologies, India slowly gets ready by strategically positioning itself to capitalize on the humongous scope of using unconventional energy to power industry. One of the major economic drivers of the future is the entire circle of Electronics and Microelectronics with varied applications in most industries. And thus, India is set to focus on the Semiconductor market, given it's acute consumerism and the revolution that is projected to storm the Indian Economy in the near future. This article focusses on the magnitude of the problem as we see it today and aims to bring out the solution to this crisis.



**Shardul Srivastava**  
**Managing Partner –**  
**Client Relations &**  
**Start-Up Cell**

The Global Chip shortage crisis which started after the Pandemic have caused massive distress among the companies manufacturing Electronic goods and components for various sectors. Though the cost of the chip is fairly inexpensive but it plays a key part of the finished product which today is causes losses of billions of dollars worldwide. In simple terms it forms building blocks of modern computation. Sudden surge in the demand for electronics is the major reason for the crisis. The Indian Government is taking measures to ramp up the infrastructure for domestic production of the chips. Going ahead favorable tax incentives, long term vision, state of the art facility and systematic planning by government will make India self-dependent in this technology.

## Market Growth, Size &amp; Future



High internet penetration and proliferation of smart devices are contributing to the semiconductor market growth. The electronics system design manufacturing market is the fastest growing industry in India. **India imports 100 % of chips from Taiwan, Singapore, Hong Kong, Thailand and Vietnam**, so do other countries in the world. Post-pandemic, the demand went up rapidly with focus on digitalization. **As per Deloitte study, PC sales rose by more than 50% on year in early 2021 while cloud computing data center chip purchases went up by 30%.**

The presence of the number of design bases in India and the rise in the number of skilled professionals and engineers are expected to foster the growth of the semiconductors market. The rise in the disposable income of consumers is increasing their expenditure capacity to afford electronic devices, which in turn is influencing the market growth.

Favorable **government policies such as Make in India, Production Linked Incentive Scheme (PLI), Scheme for Promotion of Manufacturing of Electronic Components and Semiconductors (SPECS), Modified Electronics Manufacturing Clusters Scheme (EMC)**, amongst others aims to boost the domestic manufacturing and provide incentives to the manufacturing companies. This is expected to fuel the semiconductor market growth. The huge demand for semiconductors from end-user industries comprising of industrial machinery, automobiles, telecommunication equipment, office automation, consumer electronics, information technology, among others for computing purposes is expected to accelerate the growth of the semiconductor market in the next five years .

### Semiconductor Market- Challenges

**Changing Functionality of Chipsets** - The semiconductor market is being held back by the constantly changing functionality of semiconductor chips and the unique demands of end-users from various industries.

- **Semiconductor Market Landscape** - The market of Electrical conductivity has been consolidated by the major players – Qualcomm, Samsung Electronics, Toshiba Corporation, Micron Technology, Intel Corporation, Texas Instruments, Kyocera Corporation, Taiwan Semiconductor Manufacturing, NXP Semiconductors, Fujitsu Semiconductor Ltd.

- **Acquisitions/Technology Launches** - In 2020 Qualcomm introduced QCS410 AND QCS610 system on chips, this is designed for premium camera technology. In 2019 Samsung announced it production of its 12GB and 24GB LPDDR4X uMCP chip & new 5655 Series electronic Board-to-Board connectors from Kyocera Corporation are optimized for high-speed data transfer, with a 0.5mm pitch and a stacking height of under 4mm.

Source : <https://www.prnewswire.com/news-releases/india-semiconductor-market-report-2021-presence-of-the-number-of-design-bases-in-india-and-rise-in-the-number-of-skilled-professionals-and-engineers-foster-market-growth---forecast-to-2027-301409644.html>



Semiconductors are essential elements in electronic devices in a number of sectors including healthcare and medical devices, communication, consumer electronics, computing, 5G, defense, automobile, clean energy, and key emerging technologies like artificial intelligence and quantum computing. Below are application of semiconductor industry of few of these sector:

**Health Care** - The focus of semiconductor companies on the healthcare industry has significantly increased. Technological advancements, an increased use of connected devices, and the digitization of a vast array of previously manually operated processes and operations in the healthcare industry are the key factors indirectly fostering this trend. To process the vast volumes of digital data developed by connected devices. As a result, these changes in the overall structure of the healthcare industry are playing a critical role in changing the outlook of semiconductor companies towards the healthcare industry.



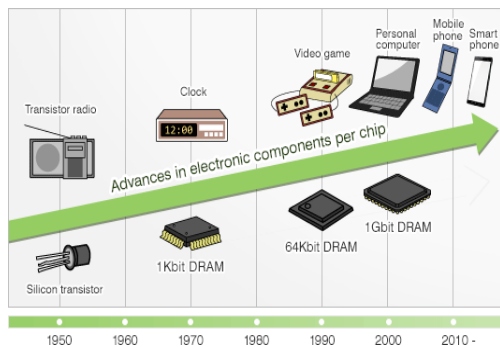
The use of semiconductors in the development of portable, self-care, and small therapeutic and diagnostic devices, demand for which is rising at a swift pace owing to the rising prevalence of chronic diseases, is also a key factor driving the market.

**Artificial Intelligence** - Artificial intelligence/machine learning (AI/ML) has the potential to generate huge business value for semiconductor companies at every step of their operations, from research and chip design to production through sales. But our recent survey of semiconductor-device makers shows that only about 30 percent of respondents stated that they are already generating value through AI/ML. Notably, these companies have made significant investments in AI/ML talent, as well as the data infrastructure, technology, and other enablers.



The other respondents—about 70 percent—are still in the pilot phase with AI/ML and their progress has stalled. AI/ML will dramatically accelerate in the semiconductor industry over the next few years.

**Consumer Electronics** - Smartphone and wearable devices have already been touched on, yet semiconductors are also utilized in VR, laptops, computers, televisions and more. Demand for faster and better consumer electronics means that there is a lot of opportunity for talented people who thrive in a fast-paced environment, particularly those with experience in research and development

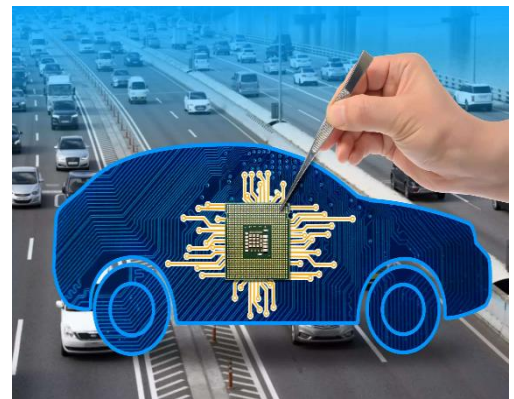


**Defense** - Semiconductor product portfolio has a heritage for supporting the most demanding requirements in defense microelectronics, with our strategic focus on integrated circuit (IC) security, reliability, availability, integrity and supply chain security. Our broad product portfolio spans RF front end modules and discrete, Flash-based FPGAs, highly secure, accurate and flexible time and frequency platform for synchronizing mission-critical electronics systems and instrumentation applications, secure memory modules, broad security IP portfolio and more.



We've leveraged our expertise and product portfolio to build applications based solution platforms to reduce integration risk, improve productivity and time to mission.

**Automobile** - Designing of automotive ECUs is actively done in many of the R&D offices by the semiconductor companies in India. However, the majority of these smart solutions are manufactured overseas and then imported by automotive customers back in India. If all the activities from design to manufacturing of semiconductor products for the auto industry is done in house in India, then the benefits in terms of employment and business are huge. Alternate fuel will demand more smart semiconductor solutions and many of these are already in use.



With the increasing use of electronics in automobiles along with exploding automobile industry, India needs to re-think the policies such that they not only cater to the automotive industry but also enable semiconductor manufacturing.

**5G** - A relatively new product, speed, ultra-low latency and reliability means that the revenue potential of 5G is enormous, and demand for Smartphone's that come equipped with 5G will surge. Not only will this increase opportunities for semiconductor companies to create and supply these chips, but it also means there are further research and development opportunities to continue adapting the product for even better performance both in and outside of Smartphone's.



These include developments in infotainment, fixed wireless access, always-connected tablets and PC and more. It's safe to say 5G and semiconductors are critical now and will remain so in the very near future.

## India, US semiconductor industry bodies sign MoUs to bring chip firms into country

The India Electronics and Semiconductor Association (IESA) has signed a memorandum of understanding (MoU) with the Semiconductor Industry Association (SIA), which represents the chip industry in the US to identify potential areas of collaboration between the two countries. SIA's member companies include large American chip designers and manufacturers, such as Intel, AMD, NVIDIA, Texas Instruments, Qualcomm, Global Foundries, and Broadcom. In an interview with Mint, Rajeev Khushu, chairman of IESA, said that the MoU will help in strengthening the country's semiconductor ecosystem. If IESA's strength, it is to connect with the local government, the state governments and we also cater to customers who use semiconductors here. On the other hand, the SIA has global reach. Our companies include startups and fables companies, and they will look to leverage SIA's global reach to move outside India and sell their products and services, **20% of the global workforce in semiconductor design comes from India, which is the country's "biggest strength"**.

The state governments are planning the idea is to get more foreign direct investment (FDI) into the country. The two industry bodies also released two reports, titled the India Semiconductor Industry Report and the **Semiconductor Manufacturing Supply Chain report**, which provide insights into the manufacturing supply chain in the country. John Neuffer, president and chief executive officer of SIA, said that the MoU will help the SIA "establish and build relationships" with key stakeholders in the country and gain better market understanding. Global Chip suppliers have been stressed over the past two years, due to the growing demand for chips in electronics, automotive, IT, and healthcare sectors and the pandemic-led disruption in the supply of material and production. The ongoing war in Ukraine is expected to constrain the supply even further as both Russia and Ukraine are leading suppliers of neon gas and palladium that are used for semiconductor manufacturing in several countries.

Several chip companies have announced the setting up of new foundries to overcome the chip shortage. For instance, in January **Intel said it will invest up to \$100 billion** to set up the world's largest chip-making facility in Ohio, US. An initial investment worth \$20 billion has already been made in the **1,000-acre site in the US state**. **In India, the union government announced a ₹76,000 crore incentive scheme, in December 2021**, to encourage semiconductor design and manufacturing in the country. Some Indian companies including **Vedanta Group also announced entry into semiconductor manufacturing with phased investment plans of \$15 billion**.



Source : <https://www.livemint.com/industry/manufacturing/india-us-semiconductor-industry-bodies-sign-mous-to-bring-chip-firms-into-country-11649771777693.html>



World leaders and executives at multinational corporations are worried about the **global scarcity** of semiconductors, which has hit manufacturing and sales in numerous countries and no early solution is in sight. The initial months of the pandemic, a number of companies across sectors have highlighted their concerns about the problem. **The unforeseen situation is not expected to improve anytime soon, and supply constraints could potentially continue into 2023.**

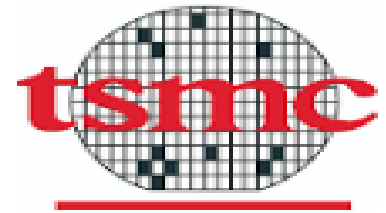
Semiconductor, or tiny chip objects perform a host of functions such as powering displays and transferring data. So, a supply crunch has a consequent impact on sales of cars, fridges, laptops, TVs and other electronic devices. Manufacturing a chip typically **takes more than three months** and involves giant factories, dust-free rooms, multi-million-dollar machines, molten tin and lasers. **Taiwan Semiconductor Manufacturing Corporation is the world's largest contract chipmaker, whose customers include Qualcomm, Nvidia and Apple.** It holds 56 percent of the foundry business of manufacturing chips. The surge in sales for electronic devices during the pandemic created a huge demand for semiconductors. **But COVID-19 is not the only factor behind the shortage.**

**The tense relationship between the United States and China is also a factor,** since many US companies do business with Chinese companies. For instance, Huawei, which supplied to American chip makers, has been blacklisted by the US government.

**Enter India. The government, in December 2021, rolled out an incentive scheme worth Rs 76,000 crore (roughly \$10 billion) to attract international semiconductor and display manufacturers in a bid to establish the country as a global chip manufacturing hub.**

In a significant development for the performance-linked incentive (PLI) scheme, **Anil Agarwal – led Vedanta and Hon Hai Technology Group (also known as Foxconn) have formed a joint venture (JV) to manufacture semiconductors in India.** The Vedanta Group had in January shared its intent to invest \$15 billion for making displays and semiconductor chips in India over the coming five years. Technology Group is a multi-billion Taiwanese electronics contract manufacturer famed for making Apple's iPhones and other popular products. In December, the company said it had raised stake in its India subsidiary by spending \$350 million, terming the new investment as part of its long-term development in India.

**The worst of the semiconductor crisis, which has crippled production for automotive companies around the globe and forced customers to wait months for a new car, may not be over yet** according to automotive components major Bosch. While Bosch produces some semiconductors itself in Europe, it buys from outside most of the chips used for the automotive industry, Hartung said. The global semiconductor supply chain was short of capacity and that was impacting not only the automotive industry but also household appliances and consumer electronics. **Soumitra Bhattacharya, the president of the Bosch Group in India, told ET that the chip shortage will not worsen when compared to the present demand in the market.** However, if the demand for new vehicles increases further, the shortage may worsen.



Source : <https://www.moneycontrol.com/news/business/in-depth-the-semiconductor-shortage-what-caused-the-supply-crunch-and-how-long-will-it-last-7501241.html>



**Rajeev Chandrasekhar** - India is eager to welcome all semiconductor giants to the country to explore new investment opportunities. The country has tried many times in the past to get semiconductor fabrication plant [fabs], but almost always flopped because the semiconductor sector thought we were not serious enough. But the PM's vision, backed by this package, reaffirms the serious strategy to build a global standard semiconductor ecosystem. Our goal is to build high-volume silicon fabs, fabs for compound semiconductors, fabs for display used for mobile devices & etc. Investments in semiconductor testing and packaging, and expanding semiconductor design and innovation, which includes electronic design automation companies and start-ups.



**Minister of State for  
Electronics and  
Information Technology**

**Ashwini Vaishnaw** - The government is confident of seeing one of the big global players in semiconductor industry coming in the next round. He asserted that many other players too are "seriously evaluating" India's semiconductor programme, and that the ministry is in discussions with several companies. The semiconductor scheme is "good" and doesn't require any further tweaks, adding that the focus is now on execution for the applications received, and on building the talent pipeline. Evaluation of the projects has to be done in a very transparent manner.



**Minister of Railways of India**

**Akarsh Hebbar** - Semiconductor is a long-term business. We are looking at about USD 10 billion on display. Right now we are looking at USD 7 billion in semiconductors that may also go up by another USD 3 billion to further extend it. First 10 year we have engaged to invest up to USD 15 billion. We will evaluate further investment at a later stage. The company expects to start commercial supply of display units by 2024 and electronic chips in the 28 nanometre category by 2025. Our aim is to do display by the end of 2024 and semiconductors by the end of 2025. The government is providing support of 45-50 per cent of the project cost and response from some of the state governments has also been very good, based on which the Vedanta and Foxconn will work on equity and debt structure of their semiconductor joint venture.



**Managing Director at  
AvanStrate**

**Soumitra Bhattacharya** - The shortage of semiconductors or chips is a global reality and the impact of this is for the world as much as for India. The shortages of chips will impact the car market and it could remain tight till 2022. The company also saw a dip in its capex plans for FY22 for the first time in several years. The company will be investing Rs 200 crore as capex for FY22. In the past the company's capex would be in the range of Rs 350-500 crore. While capex for Bosch India which is the group entity should be in the range of Rs 400-600 crore for Bosch Ltd it will be in the range of Rs 160-200 crore.



**President of the Bosch India**



# About Guidant Business Solutions

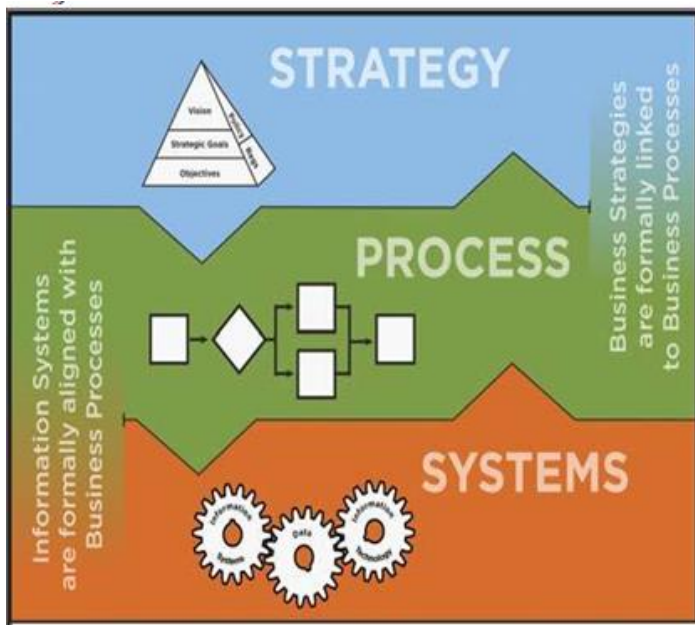
**Guidant Business Solutions LLP** is a team of **BUSINESS consultants** who are experts in the Mapping, Planning, Developing and Delivering the right solutions that ensure **guaranteed success**.

We specialize in the following Business Processes and Sub-processes -

Key Business Processes	Sub-Processes
1. Client Acquisition	Strategic Objective, Buss Need, Buss Dev, Marketing, Sales
2. Client Servicing	How will you ensure servicing the client?
3. Quality Mgmt	How will you ensure Quality of delivery to the client?
4. Operations	How are the various sub-processes integrated to ensure delivery?
5. Service Delivery (Int)	Details to which internal customer processes are developed
6. Outsourcing	The Make/buy Algorhythn
7. Service Provider Mgmt	Managing Vendors, Suppliers, External Partners
8. Financial	Financial and Accounting Sub Processes
9. People	People Management Sub-processes
10. Logistics (I/O)	Inner/ Outward movement of tangible/ intangible items



## Our Service Offerings.....



**Business Process Assessment** - Assess Business Process Outlay  
 - Ensuring 360 deg approach  
 - Across business perspectives

**Strategic Business Planning** - Defining the Business Strategy  
 - Strategic Planning Workshop  
 - Formulation of Action Plans

**Business Turnaround Services** - Check Sub-optimization/  
 - Check Under-performance  
 - Get business out of stress

**Value Stream Mapping** - Understand the value chain  
 - Mapping key processes  
 - Ensures clarity in processes

**Business Mentoring & Training** - Mentoring CEOs/CxOs  
 - Intense dialogue with Leaders  
 - Mentoring Plan (6- 2 months).

**Business Plan Execution** - Aligning plan with strategy  
 - Laying out implementation  
 - Monitor implementation

Reach us on –  
[info@guidantbusiness.com](mailto:info@guidantbusiness.com)

Call us on –  
**+91 99304 62649/ 98925 65088**



**THANK YOU**