

Webinar Transcript

All-in on Chips: The High Stakes race to build the Indo-Japan Semiconductor Corridor

26th December 2025, 16:00 IST (19:30 JST) Friday

About the Organizer

Mizuho India Japan Study Centre (MIJSC) is a Centre of Excellence at the Indian Institute of Management Bangalore, established in 2017, dedicated to promoting deeper economic, cultural, and strategic ties between India and Japan. Chaired by a career diplomat Amb. Jaideep Sarkar and led operationally by an Industry Veteran Mr. Saideep Rathnam, MIJSC's mission is to foster mutual understanding and build expertise in areas such as manufacturing, corporate governance, start-ups, innovation, and cultural exchange. Through collaborative research projects, executive education programs, student and faculty exchanges, and regular webinars and seminars, the Centre serves as a dynamic hub for knowledge-sharing and capacity building in India–Japan relations.

About the Initiative

The Webinars and Seminars Initiative is a dynamic platform that brings together global experts, practitioners and policy-makers to share insights on pressing challenges and opportunities. Its core themes include Science, Technology & Sustainability; People, Art & Culture; Innovation, Entrepreneurship & Society; and Leadership, Management & Business Culture. A special focus of this series is to deepen India–Japan ties, fostering bilateral dialogue through joint sessions, case-study exchanges and collaborative research. By leveraging each country's strengths—India's vibrant startup ecosystem and Japan's cutting-edge technologies—the initiative aims to catalyze new partnerships, policy alignment and capacity building across both nations

About the Moderator

Saideep Rathnam is the Chief Operating Officer of Mizuho India Japan Study Centre, bringing a wealth of 47 years of industry and academic experience to the Centre. An alum of IIM Bangalore, from Hindustan Aeronautics Ltd. to British Aerospace, UK he has spent over 2 decades in the aeronautics industry and over 18 years in the automotive sector in various capacities including president of manufacturing excellence at Anand Automotive Ltd. He is also a Certified Chartered Management Accountant [CMA], UK. He wears many hats and has chaired Anand University, helping companies in the fields of management of change and innovation. Recently, he drove the Visionary Leaders for Manufacturing (VLFM) program as a Senior Advisory Committee Member of CII.

About the Speaker

Prof. Eri Ikeda is an Assistant Professor in the Department of Management Studies at IIT Delhi, specialising in the intersection of macroeconomics, industrial development, and the emerging semiconductor ecosystem.

She holds both a Master's and a Ph.D. in Development Studies from the International Institute of Social Studies, Erasmus University Rotterdam. Originally from Japan, she has studied and worked in Japan, the United States, Belgium, and the Netherlands, bringing a rich international perspective to her work on global value chains and industrial policy.

Her book *Global Business Cycles and Developing Countries* (Routledge, 2019) examines how global shocks shape emerging economies.

As a 2023 Japan Foundation JFIPP Research Fellow, she analyses India's semiconductor ambitions within the Quad, focusing on economic security, infrastructure gaps, and the geopolitics of chip supply chains

Mr. Pranay Kotasthane is Deputy Director at the Takshashila Institution in Bengaluru, where he chairs the High Tech Geopolitics Programme focused on how emerging technologies, especially semiconductors, reshape global power and security.

He researches semiconductor supply chains, export controls, and technological chokepoints, analysing how they influence great-power competition and national security strategies.

He is co-author of *When the Chips Are Down: A Deep Dive into a Global Crisis*, a pioneering study of the geopolitics of semiconductors, and has also co-authored *Missing in Action* and *We, the Citizens* and co-edited *India's Marathon*.

Through his newsletter, podcasts, and the Technopolitik platform, he translates complex high-tech geopolitics into accessible, policy-oriented insights for Indian and global audiences.

Saideep Rathnam (Moderator) Context setting

Under the India–Japan Economic Security Cooperation (2025) the two governments have explicitly prioritized semiconductors, critical minerals, ICT, and supply-chain resilience as key areas of collaboration.

In July 2023, the cooperation was operationalized with a formal India–Japan Semiconductor Supply Chain Partnership — bringing together government agencies, industry, and academia to explore supply-chain diversification, talent sharing, R&D collaboration, and secure technology flows.

At the same time, India is ramping up its domestic push: under its national semiconductor mission and incentives (e.g. design-linked incentives, packaging / OSAT

facilities, promotion of domestic manufacturing) the Indian chip ecosystem is expanding — but remains nascent in many respects

Globally, semiconductor supply chains remain fragile and concentrated; the recent shortage and geopolitical disruptions underscored the risk of over-dependence on a few geographies.

For Japan, efforts to rebuild advanced domestic manufacturing (e.g. through firms like Rapidus) run in parallel — but to be globally relevant, need secure supply-chain linkages, stable raw-material flows, and diversified manufacturing partners

Thus the India–Japan semiconductor cooperation is emerging at the intersection of shared strategic need (supply-chain resilience), complementary capabilities (Japan’s advanced manufacturing + India’s market, labour, and growing policy support), and geopolitical pressure (global supply-chain shifts, trade tensions, critical-minerals crunch).

Prof. Ere Ikeda

At the beginning of my talk, I would like to present a broader picture. While many of the key points have already been introduced, I will highlight some aspects of how India is re-entering the semiconductor domain, the current global context, and how India–Japan cooperation is evolving.

Let me begin with a brief disclaimer. I am not an engineer; I am a social scientist. I am still learning about the semiconductor sector, so some technical aspects may not be fully covered. However, I hope to provide a useful perspective from the standpoint of industrial development and macroeconomic policy.

To begin with, India’s renewed focus on semiconductors can be understood through two key pillars: industrial development and economic security. These two dimensions are reinforcing each other, particularly in the aftermath of the COVID-19 crisis. Even before that, from around 2018 onwards, the technological and economic competition between the United States and China had already signaled that technology would once again become central to global power dynamics.

Historically, we have seen similar patterns. For example, Japan’s rise in the 1980s as a leading economic power was closely tied to its leadership in semiconductors. Today, a similar dynamic can be observed in China, and potentially in India in the future. As countries rise economically, technological capability becomes a key domain of competition.

From an economic security perspective, the current global environment is actually favorable for India’s ambitions. External pressures, including geopolitical tensions and supply chain disruptions, are aligning with India’s internal drive for industrial

development. Since 2014, under the “Make in India” initiative, there has been a sustained push to position India as a global manufacturing hub.

What is different this time is the level of commitment. India is no longer experimenting; it is making a serious, long-term commitment to building semiconductor capabilities. Concepts such as self-reliance and strategic autonomy have become central to policy discourse.

However, it is important to recognize that semiconductors cannot be developed in isolation. Collaboration is essential. This is not a standalone industry; it requires horizontal integration across countries and ecosystems. This aligns with the broader idea of economic security, where countries work with like-minded partners to reduce vulnerabilities.

At the same time, there are significant challenges. For example, trade data shows that India’s imports of integrated circuits are still heavily dependent on China and Hong Kong. In some years, these account for more than 50–70% of total imports in this category. This highlights the extent of dependence and the urgency of diversification.

Turning to India–Japan relations, I examined trade data to understand the role of Japan. It is quite interesting to note that semiconductor-related products already rank highly in Japan’s exports to India. For instance, integrated circuits and related devices are among the top categories. Japan has strong capabilities in semiconductor equipment and materials, and these are precisely the areas where India is seeking support.

There is also growing interest among Japanese companies in entering the Indian market. While Japanese firms traditionally take a cautious and long-term approach, there has been a noticeable increase in engagement since 2014. Companies are attracted by India’s scale, cost advantages, and policy support.

Although the ecosystem is still at an early stage, the pace of engagement is encouraging. Government commitment on both sides is strong, and semiconductors are clearly recognized as a strategic priority.

With that, I will conclude my opening remarks and look forward to the discussion.

Pranay Kotasthane

Thank you, Professor Ikeda, and thank you, Professor Saideep.

What I will try to do is build on what Professor Ikeda has already outlined and focus more specifically on the opportunities for collaboration between India and Japan.

Let me begin by emphasizing that the semiconductor industry is fundamentally driven by firms, not governments. Collaboration will only happen when firms identify complementary strengths. Government-to-government agreements can create enabling

conditions, but ultimately, firms must find economic and strategic value in working together.

In this context, two important dimensions determine collaboration: complementarity and feasibility. Complementarity refers to whether firms from different countries bring strengths that can work together. Feasibility includes geopolitical, bureaucratic, and political factors that enable or constrain collaboration.

Now, let me briefly outline where India stands today in the semiconductor ecosystem.

India is already a significant player in semiconductors, but primarily in the design segment. All of the top 25 fabless semiconductor companies have design centers in India. In fact, the concentration of such design centers in Bangalore is unmatched globally.

However, this contribution is often underrepresented in global value addition data because such data is typically attributed to company headquarters rather than to global capability centers.

At the same time, India does not yet have large-scale commercial fabrication capabilities. While there are some facilities serving strategic and defense needs, there is no significant commercial manufacturing at scale.

Similarly, in the testing and packaging segment, India's presence remains limited, although this is now beginning to change.

There are also auxiliary segments, such as specialized gases and materials, where Japan has a dominant presence. India has some adjacent capabilities in these areas, but they are still developing.

Now, what is different about India's current semiconductor push compared to previous attempts?

There are four key differences.

First, there is significant upfront capital support from the government. The government is willing to co-invest alongside firms, reducing uncertainty for investors.

Second, there is strong coordination between central and state governments. Incentives are being provided at multiple levels, significantly lowering project costs.

Third, there is a focus on building capabilities across the entire value chain—from design to manufacturing to packaging.

Fourth, there is a clear recognition of the geopolitical importance of semiconductors. I often describe semiconductors as "meta-critical" because they are important not just geopolitically, but also geoeconomically and technologically.

Given this context, several challenges and opportunities emerge for India–Japan collaboration.

One challenge is the potential overcapacity in mature node manufacturing globally. As more fabs come online, sustaining them will require anchor customers. This is an area where collaboration can play a role.

Another challenge is the concentration of manufacturing in Taiwan. Any disruption there would have global consequences. This underscores the need to build alternative capabilities.

There is also a significant global talent shortage in semiconductor manufacturing. This is perhaps the biggest bottleneck today.

Finally, export controls and technology restrictions are likely to continue, making it important to develop alternative and open-source solutions.

At the same time, there are strong opportunities.

Advanced packaging is emerging as a key area of innovation. Semiconductor manufacturing equipment is another area where Japan's strengths align with India's needs.

There are also opportunities in niche segments such as compound semiconductors, as well as in design collaboration and talent development.

With that, I will conclude my remarks and look forward to the discussion.

Saideep Rathnam (Discussion Begins)

Thank you both for those insightful perspectives. Together, you have laid a strong foundation for understanding where meaningful collaboration can emerge.

Let me begin the discussion with the topic of critical minerals. Both India and Japan are heavily dependent on China for materials such as gallium, germanium, and rare earth elements. With recent export restrictions, this has become both a strategic and technological bottleneck.

From your perspectives, what is India doing to secure access to these critical minerals, and how strong is its capability in refining and processing?

Saideep Rathnam (Moderator – Continued)

Let me begin by inviting Pranay to respond first, and then we will move to Professor Ikeda.

Pranay Kotasthane

Thank you. I would approach the question by first distinguishing between two categories of critical minerals: rare earth elements and non-rare earth elements.

Rare earth elements are not as critical for the semiconductor industry itself, although they are extremely important for other industries, particularly those involving motors. Since motors are also used in semiconductor manufacturing equipment, they do have an indirect relevance. However, for semiconductors specifically, the more critical materials are non-rare earth elements such as gallium and germanium. These are essential inputs for compound semiconductors, such as gallium nitride chips.

Let me first address rare earths. One of the strategies being explored globally, including in India, is to reduce dependence on rare earths altogether. For example, in the electric vehicle sector, particularly in two-wheelers, there is a shift away from neodymium-based magnets toward alternative motor technologies. While these alternatives may involve some efficiency trade-offs, significant engineering efforts are underway to improve their performance.

Another important strategy is recycling. India has a growing stock of electronic waste—laptops, hard drives, and electric vehicles—which can serve as a source of rare earth materials through urban mining. This is an area where Japan has considerable expertise, and there is strong potential for collaboration.

It is important to note that mining itself is a long-term solution. According to the International Energy Agency, it takes approximately 16 years on average to develop a new mine from discovery to production. Therefore, in the short to medium term, the focus must be on refining, recycling, and improving processing technologies.

Now, turning to non-rare earth elements such as gallium and germanium, these are typically extracted as byproducts of other mining processes, such as bauxite and alumina production. India does have some of these resources, but the challenge lies in economically viable extraction and processing.

This is where technology becomes critical. Developing efficient methods to extract these materials from byproducts is an area where international collaboration can play a significant role. India's National Critical Minerals Mission is aimed at addressing these challenges, including improving extraction capabilities and securing supply chains.

Saideep Rathnam

Thank you. Professor Ikeda, would you like to add your perspective, particularly on the international dimension and the role of partnerships such as those with Australia and African countries?

Prof. Ere Ikeda

Thank you very much. I believe most of the key points have already been covered, so I will add only a few observations.

From an international perspective, frameworks such as the Quad can play a useful role. While bilateral relationships are important, multilateral cooperation can provide additional resilience, especially given that many countries share similar concerns regarding dependence on China.

At the same time, it is important to recognize that these collaborations are still evolving, and concrete outcomes have been limited so far. Expanding cooperation through platforms such as the Indo-Pacific Economic Framework could also be beneficial.

Japan, for its part, is exploring alternative sources of critical minerals, including deep-sea resources. However, these efforts face significant challenges, including long development timelines and environmental considerations.

One area where Japan has a clear advantage is in refining technologies. Japanese companies have developed sophisticated capabilities in processing and refining materials, and some of these firms are already operating in India or considering entry into the Indian market.

In this sense, collaboration in refining and processing could provide a more immediate pathway for strengthening supply chains, compared to upstream mining activities, which require much longer time horizons.

Pranay Kotasthane (Additional Input)

If I may add one more point, there is also the Mineral Security Partnership, which includes around 15 countries such as India, Japan, and the United States. This initiative is focused on catalyzing investments across the critical minerals value chain.

Currently, there are multiple projects underway:

- Around 19 in upstream mining
- Around 15 in midstream processing
- A few in recycling and recovery

Another important strategy is stockpiling. Since many of these materials are required in relatively small quantities, maintaining strategic reserves can help mitigate short-term disruptions.

Finally, long-term solutions will depend on research and innovation, particularly in developing substitutes and alternative materials. For example, companies like Tesla are already working on rare-earth-free motor technologies. Similar innovations will be critical in reducing dependency over time.

Saideep Rathnam

Thank you. Let me now move to another topic that both of you touched upon—the role of the Quad.

Given the evolving geopolitical environment, and considering that both China and the United States are actively using economic tools in strategic ways, how do you see the Quad evolving? Will it remain a meaningful platform, or will collaboration increasingly shift toward bilateral arrangements?

Pranay Kotasthane

I see the Quad primarily as an enabling framework rather than a platform for direct implementation.

Its main value lies in facilitating bilateral and trilateral cooperation. For example, India–Japan, India–Australia, and Japan–Australia collaborations are all taking place within the broader understanding created by the Quad.

However, given current geopolitical realities, especially shifts in US policy, it is unlikely that large-scale semiconductor initiatives will be executed directly under the Quad framework. Instead, most practical collaboration will continue to happen at bilateral or smaller multilateral levels.

Prof. Ere Ikeda

I broadly agree with that assessment.

The Quad continues to be relevant as a strategic framework, particularly in the context of security and economic security. However, when it comes to semiconductors, the competitive nature of the industry makes large-scale joint initiatives more difficult.

At the same time, the United States remains an essential player. Despite tensions, economic interdependence—especially between the US and China—remains significant. Therefore, completely excluding any major player is neither feasible nor desirable.

The Quad, in that sense, serves as a platform that shapes the broader environment, even if most concrete actions occur through other channels.

Saideep Rathnam

Thank you. Let me now turn to an issue that is absolutely critical for the semiconductor ecosystem—talent and capability development.

India produces a very large number of engineers every year, but only a very small percentage are ready for semiconductor manufacturing roles. On the other hand, Japan is facing an aging workforce and a shrinking talent pool.

So, let me begin with India. What is India doing to address the semiconductor talent gap, and what more needs to be done?

Pranay Kotasthane

That is a very important question.

At the core of semiconductor manufacturing is process knowledge—the ability to consistently produce chips with high yields. This expertise resides in the skills and experience of engineers and technicians.

India has a strong foundation in engineering talent, but much of it is oriented toward software and design. The challenge is to build capabilities in manufacturing, process engineering, and equipment handling.

Several initiatives are underway. For example, there is a target to train around 85,000 engineers in chip design. Industry players, including global companies, are actively participating in training programs.

In the manufacturing segment, partnerships with companies such as Applied Materials and Lam Research are helping to build the required skill base. Additionally, there is an effort to attract Indian-origin talent working abroad, many of whom have experience in fabrication and packaging.

However, more needs to be done, particularly in building practical, hands-on capabilities. This is where collaboration with countries like Japan can play a significant role.

Saideep Rathnam

Thank you. Professor Ikeda, what is Japan's approach to addressing its talent challenges?

Prof. Ere Ikeda

Japan is indeed facing significant workforce challenges due to demographic trends.

One of the strategies being considered is to attract more foreign talent, particularly from India. There is increasing interest in bringing highly skilled Indian engineers into the Japanese workforce.

At the same time, Japan is also focusing on strengthening vocational and technical education. For example, technical colleges that combine high school education with specialized training are being emphasized.

There is also growing engagement with Indian institutions and students, as Japan seeks to better understand the Indian talent ecosystem and explore opportunities for collaboration.

Saideep Rathnam

Thank you. Let me now move to a broader policy question.

Countries such as the United States and China have committed very large financial resources to semiconductor development. India's investment is relatively smaller.

In this context, what lessons can India learn from other countries, and what role can international partners like Japan play?

Pranay Kotasthane

It is important not to focus only on the headline numbers. The scale of investment must be evaluated in relation to the specific goals.

India's approach is to start with a focused strategy—building one fabrication facility and several supporting capabilities—rather than attempting to replicate the entire ecosystem at once.

The level of support being provided is actually quite significant when viewed at the project level. In some cases, up to 70% of project costs are being supported by the government.

The key objective at this stage is to establish credibility. Once successful projects are operational, they will attract further investment.

Another important aspect is demand assurance. New facilities will require anchor customers, especially in the initial stages when costs are higher. This is where collaboration with like-minded countries can help, through mechanisms such as trusted supply chain agreements.

Prof. Ere Ikeda

If I may add, government support is indeed critical in this industry.

One lesson from Japan's experience is that relying solely on the private sector may not be sufficient. Strong and sustained government backing is necessary, not only in terms of subsidies but also through long-term financing and policy support.

In addition, there is a need to gradually move up the value chain—from lower-value activities to higher-value ones. India's current approach, which includes both OSAT and more advanced capabilities, reflects this progression.

Saideep Rathnam (Closing Remarks)

Thank you both for your insightful and comprehensive perspectives.

This discussion has provided a deep understanding of the opportunities and challenges in India–Japan semiconductor collaboration, as well as the broader global context.

Due to time constraints, we were not able to address all audience questions. However, with your permission, we would like to share your contact details with participants who may wish to follow up.

We invite all attendees to stay connected with MIJSC and to follow our work through LinkedIn and other platforms. Your engagement helps us continue fostering meaningful collaboration between India and Japan.

Once again, thank you to our speakers for joining us, and we look forward to continued engagement in the future.

Thank you, and goodbye.