

India's Electronics Manufacturing Sector

Getting the Diagnosis Right

SMITHA FRANCIS

The Indian electronics industry's high dependence on imports can be directly linked to trade and investment policy liberalisation, in the absence of vertical industrial policy measures to improve productivity and capabilities. With the failure of passive industrial policies oriented towards attracting foreign direct investment, growth in domestic electronics manufacturing will have to come from a comprehensive policy approach encompassing trade, FDI, technology, taxation, infrastructure development, environmental protection, and education and skill development. Apart from significantly increasing the public fund outlay for research and development, such an industrial policy intervention must subsidise the cost of commercialising new innovations and expand the market for domestic electronics products by interlinking the demands of upstream industries with downstream manufacturers through incentives.

The Indian government has announced several policy measures aimed at promoting domestic electronics manufacturing as part of its "Make in India" initiative (2014). A casualty of incoherent policy regimes for nearly three decades, the electronics industry appears to be receiving some focused attention. The efforts began after the National Policy on Electronics (NPE), drafted by the Department of Electronics and Information Technology (Deity) in 2012, highlighted the abysmally low level of value addition in domestically produced electronic products, which ranged just between 5% and 10% in most cases at the time (NPE 2012). Instead, electronics manufacturers appear to prefer importing components and parts, making import dependence a major weakness of this sector (Kallummal 2012; Ernst 2014; Saraswati 2013; Deity 2012; Saripalle 2015; Francis 2016).

At present, the electronics industry is one of the largest contributors to India's merchandise imports, second only to petroleum and petroleum products. After nearly two decades of trade liberalisation and favourable foreign direct investment (FDI) policies—which were expected to improve the competitiveness and productivity of domestic manufacturing—the gap between the country's electronics demand and its domestic production capabilities has only been widening (Francis 2016). While the largest contributor to the industry's growth has been the communication segment, the highest share of value addition is from the consumer electronics sector (Saripalle 2015). As a result, in 2014, more than 50% of the total electronics imports to the country comprised telecommunication products, which illustrates how massive this missed opportunity is for domestic electronics manufacturing (Francis 2016). This article tries to understand how and why this import dependence came about, and why it still persists, despite India's liberal policy regime. NITI Aayog's "Make in India" strategy for electronic products has also been assessed against this backdrop.

The Policy Trajectory

In the decades that followed independence, the desire for a self-reliant India through indigenous technology development saw the setting up of public sector electronics firms and the pursuit of a restrictive policy framework for the electronics industry. However, in the mid-1980s, the electronics manufacturing market was opened up to a limited extent by liberalising component imports and relaxing capacity constraints for the information technology (IT) hardware sector while opening up of the telecommunication sector to private participation; these

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developments led to significant growth in these segments in the second half. However, the nature of the incentives provided to the IT software exports industry, driven by a myopic policy approach, led to a disconnect between the subsequent boom in India's software export growth and the domestic IT hardware and telecommunication growth trajectories.¹ In the absence of vertical industrial policies, local IT hardware and components producers did not benefit from the growth in the Indian software exports industry. They could not realise the economies of scale necessary to make businesses in this sector viable, nor could they face the competitive pressure to build up technological capabilities in parallel with the advancements in the information and communication technology (ICT) sector.

This disconnect became entrenched after the initiation of market-led, export-oriented economic reforms in the early 1990s (Francis 2016). But, even as the economy was being opened up, India had nil or ineffective policy measures in place to invigorate the productivity of domestic manufacturers of computers, telecommunication equipment, consumer electronics, or parts and components. Successive governments have made inadequate efforts to develop competitive indigenous production and promote continuous technological capability build-up, before and during tariff liberalisation. However, this required proper technology forecasting and research and innovation in emerging technologies. It also required the implementation of policies that would spur necessary changes in higher education and skill-development programmes.

Meanwhile, India had also been continuously liberalising its FDI policies since 1991. These policies gradually rolled back regulations related to the formation of joint ventures, technology collaborations, etc, which had originally been put in place to promote technology transfer, spillovers, and the creation of domestic backward linkages. In the meantime, several special economic zones (SEZs) were established across the country in the 2000s, which were meant to enable greater foreign investments and enhance export growth, with the government providing the required infrastructural facilities.

Incoherent Policy Approaches

This presents a sharp contrast to the development trajectories of the electronics sector in countries such as Singapore, South Korea, Taiwan, and China, where governments aimed to upgrade production and skill development within the framework of a vertical industrial development strategy.² This involved creating performance-linked incentives to induce growth in productivity, while pursuing the overlapping trade strategies of import substitution and export promotion. They were also ingenious in their implementation of policies to promote backward linkages and technology spillovers between foreign-owned enterprises and domestic supplier firms (Lall 1996; Wade 1990; Amsden 1989, 2001; UNCTAD 2014, 2016).

A belief in market-led industrialisation that gives credence to isolated passive industrial policies leads to incoherent policy approaches. India joined the World Trade Organization's (WTO) Information Technology Agreement (ITA-1) in 1996,

with the conviction that lowering duties on a range of ICT products under the ITA-1 would boost the competitiveness of India's software exports, apart from increasing their market access (Francis 2016). The ITA-1 was designed to establish the tariff-free trade of 165 products across the following product lines: computers, telecom equipment, semiconductors, semiconductor manufacturing and testing equipment, software, and scientific instruments. India offered the highest average tariff reduction on the largest number of tariff lines among developing countries (Ernst 2014).

As shown in Majumdar (2010), tariff liberalisation and efforts to increase foreign investments from the early 1990s, and other reform measures such as relaxing industrial licensing and reducing excise duties, did not result in greater competition and improved productivity in the electronic hardware industry. Compared to the 1993–98 period, all four electronics sub-sectors—computer hardware, consumer electronics, telecommunication, and components—witnessed significant net decline in total factor productivity growth (TFPG) between 1999 and 2004. This downward trend continued after trade liberalisation was intensified from 1997 onwards under the ITA-1. In the mid-2000s, the impact of ITA-1 was exacerbated by the equally non-strategic tariff liberalisation carried out by India under its free-trade agreements (FTAs) with the Association of Southeast Asian Nations (ASEAN) and Japan and South Korea, countries that were already deeply integrated into global value chains (GVCs) in the electronics sector.

Under the 2010 India–ASEAN FTA, India committed to make 170 electronics tariff lines, which were not covered under the ITA-1, duty-free by 2013. In the case of India's Comprehensive Economic Partnership Agreement (CEPA) with South Korea, which also came into force in 2010, eight non-ITA-1 product lines were made duty-free immediately, with another 60 tariff lines scheduled to become duty-free from January 2014. A further 277 lines became tariff-free from January 2016. It is important to note that while consumer electronics and professional apparatuses such as video cameras, photocopiers, medical equipment, etc, were not included under ITA-1, several of them were liberalised under the FTAs. Under India's trade agreement with Japan, which came into force in 2011, India is set to bring down the tariffs on 132 non-ITA-1 product lines in 10 equal reductions by 2020. The reductions obtained under these FTAs for imports from ASEAN, South Korea, and Japan are as high as 12.5% and 10%, in the case of several non-ITA-1 electronic products (Francis 2016). It is clear that despite the government realising by the early 2000s³ that output and employment in the domestic electronics industry had been adversely affected by the import surge under ITA-1, successive governments have continued with deep and non-strategic trade liberalisation. There was little attempt to link it with a more comprehensive strategy for the long-term development of the industry.

It is pertinent to note that the spree of FTAs with East and South-East Asian countries were aimed at attracting FDI that would facilitate India's integration into a GVC. The November 2016 report by the Department of Industrial Policy and

Promotion (DIPP) and Ministry of Electronics and Information Technology (MeitY) claims that the “electronics system design and manufacturing sector” was among the top-five FDI attracting sectors. However, a comprehensive analysis of “real FDI” inflows by Rao and Dhar (2016) showed that such inflows into the electronics manufacturing sectors, namely (i) office, accounting and computing machinery; (ii) radio, television and communication equipment; and (iii) medical, precision and optical instruments, watches, etc, were quite small. The NITI Aayog’s report on the electronics industry also states that from April 2000 to June 2015, India received only 0.66% of the total FDI inflow of \$258 billion (NITI Aayog 2016: 6). Clearly, neither the ITA-1 nor the FTAs with the ASEAN countries and East Asian economies have helped in attracting FDI into the electronics industry.

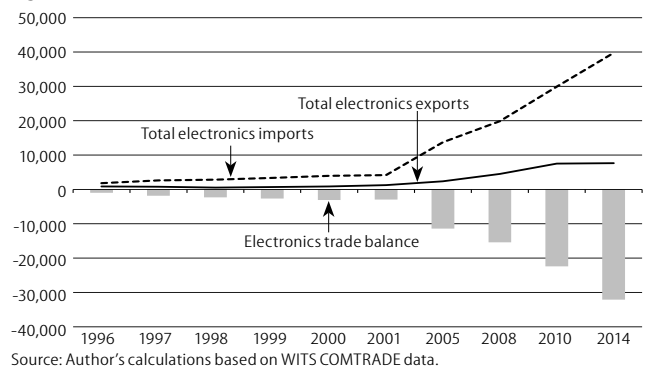
Such low levels of inward FDI into India’s electronics industry are, in fact, related to the liberal FDI policy regime that has been in place since 1991 (Francis 2016). These policies have provided limited incentive for large foreign original equipment manufacturers (OEMs) and electronics manufacturing service providers to invest in local production. Instead, they typically choose to only set up final assembly plants in India (Ernst 2014; Saripalle 2015). A trade policy that promotes duty-free imports will clearly reduce the appeal of domestic production, particularly in a scenario where there is inadequate policy support for enhancing productivity at the firm and industry levels. This also means that trade liberalisation through FTAs did not grant Indian firms access to the right opportunities to integrate with GVCs. For instance, while the domestic production of televisions was being carried out through the import of intermediate parts such as picture-tubes (despite relatively high tariffs), no attempt was made during the period of protection to support localisation of such major parts through innovative vertical industrial policy measures as has been done in selected industries by China or Brazil (Francis 2016).⁴ Similarly, the lack of a coherent strategy for developing strong and varied technological capabilities has meant that while India currently has a well-developed integrated circuit (IC) design sector located within multinational corporations (MNCs), Indian chip design engineers lack the capabilities required for semiconductor fabrication and component manufacturing, as well as in system design and systems manufacturing further up the chain (Ernst 2014).

Thus, tariff liberalisation policies and the liberal FDI policy regime, enveloped within a passive industrial policy framework, have resulted in India’s increased electronics import dependence.

Growing Electronics Import Dependence

Liberalisation policy reports have not had a favourable impact on India’s electronics export performance. Analysis of trade data from Comtrade (World Integrated Trade Solution) shows that India’s electronics exports constituted 3.2% of India’s total manufactured exports in 1996. Though the sector reported accelerating growth from 2001 to 2010, growth declined after 2010 and the share of electronics in manufactured exports declined to 2.7% in 2014, that is, lower than its share in 1996. However, the share of electronics imports in total manufactured

Figure 1: Trends in India’s Overall Electronics Trade, 1996–2014



imports, which was at about 5% in 1996, increased continuously. Even though the growth in electronics imports became weak after 2011, the share of electronics in manufactured imports increased again from 2012 and stood at 9.3% in 2014. Consequently, there has been a rapid increase in the electronics industry’s trade deficit (Figure 1).

Out of the top 20 products imported, the majority were ITA-1 products whose import increased significantly following the rapid trade liberalisation under ITA-1. These included telecommunication apparatuses and parts, computers, laptops, monolithic ICs, semiconductor devices and LEDs, and static converters. Exceptions whose import shares dropped were computer parts and accessories, computer storage units, and unrecorded media for sound recording. In the absence of a strategic industrial policy that could link the domestic demand for hardware arising from the success of the Indian software industry, Indian computer hardware producers lost out to imports. This was reflected in the decline in the share of computer parts and accessories within exports too. Once India began importing greater volumes of finished computers, laptops, etc, duty-free, it adversely had an impact on most segments of the domestic computer industry, and the need for parts and accessories reduced. However, as expected, import demand for computer input/output units remained steady. In addition, imports of cell phone parts also increased to support the import-dependent assembly of cell phones by MNCs such as Nokia. Telecom equipment imports increased as well, in tandem with the expansion of the domestic telecom market in the 2000s. In the case of non-ITA-1 products, such as transformer parts and scientific instruments, import demand remained significant.

With a share of about 48%, Chinese imports accounted for almost half of India’s electronics imports in 2014. It is ironic that while China did not sign the ITA-1 until 2004 or an FTA with India as of March 2018, Chinese firms which matured under the strategic guidance of the state were able to gain massive market shares in India; on the other side, India’s market share in China remains insignificant.⁵

Getting the Diagnosis Right

In the case of Indian electronics manufacturing, market failures have been compounded by policy failures. A trade policy that promotes duty-free imports clearly dilutes incentives for local production, particularly in the absence of policies and

factors that incentivise higher productivity. Moreover, the lack of a comprehensive industrial strategy to guide tariff liberalisation led to many final products becoming duty-free. However, several intermediate components had to be imported by paying tariffs, leading to an inverted duty structure. Despite having the advantage of a large domestic market, this became an adverse factor that ended up incentivising local assembly of goods, in the absence of a sufficiently developed domestic parts and components supply base. Moreover, successive governments' FDI-friendly policies meant that there were also few policies linking foreign invested firms and the domestic supply base (unlike, for instance, the indigenisation policy in the automobile industry). Such a policy could have led to spillage effects, increased competition, and technological upgradation among domestic firms. Consequently, trade and FDI liberalisation have translated India's growing demand for electronics products into high import dependence.

The development trajectory of the Indian electronics industry shows that in the absence of a comprehensive industrial policy to stimulate productivity in the domestic market, a policy of trade liberalisation will dilute and negate incentives for local production, for both Indian and foreign manufacturers. This clearly points to a need to re-evaluate the assumptions underlying India's current trade, FDI, and other industrial policies, including those entrusted with the objective of promoting GVC engagement. It has been observed that domestic firms/workers need extensive knowledge capital and technological capabilities to be included in GVCs, let alone for achieving technological catch-up through GVCs (Francis 2017). This clearly shows that adopting pro-FDI policies to facilitate technological/industrial catch-up—without simultaneously improving indigenous technological capabilities—is unlikely to be met with success.

Current Policy Thinking

There is a long overdue need to build on the United Progressive Alliance government's National Electronics Policy (NEP), which took a refreshingly coherent view towards restructuring India's electronics manufacturing sector. However, instead of building on this success, the NITI Aayog (2016) brought out a new study, which, while bringing together various policy initiatives, offers a labyrinthine logic for its recommendations that do not show any learning from previous policy mistakes.

While acknowledging that the local OEM/ODM (original design manufacturing) and components manufacturing sectors are still in their infancy in India, the NITI Aayog report suggests that Indian electronics firms can become globally competitive and capture the markets of our FTA partners by quickly developing an electronics industry on a large scale. Doing this will apparently allow India to convert FTAs into an opportunity.

Instead of emphasising the lack of domestic technological capabilities and the absence of an innovative manufacturing ecosystem, the report lists the following factors as having been detrimental to the global competitiveness of domestic firms: uncertainties in the tax regime and labour market rigidities, onerous customs regulations, poor connectivity of production locations to ports, and delays at ports. According to the report,

these same factors also shut out these firms from GVCs (NITI Aayog 2016: 19–20). While some of these do need to be addressed, the focus on passive industrial policies is notable. Meanwhile, it also laments that the electronics manufacturing industry has received only a tiny part of the total FDI into India. So, to quickly develop the domestic electronics industry on a large scale, it has proposed a 10-year tax holiday for any firm that invests \$1 billion or more, and which creates more than 20,000 jobs. According to NITI Aayog, such firms must also promise to support small- and medium-sized firms as ancillaries (NITI Aayog 2016: 24). It also believes that even if a product has only a small value addition, if it is globally competitive, it can be produced on a mass scale, generating a large number of jobs and significant "total value." Further, the report suggests that India ("following China") should set up coastal economic zones.

Apparently, all these policy recommendations are based on an analysis of China's electronics industry. In a section devoted to understanding the Chinese experience, the following four lessons have been listed: (i) rapid growth will not be achievable by focusing on the domestic market; (ii) the Chinese experience highlights the importance of large-scale manufacturing; (iii) in today's world, large firms are predominantly MNCs; (iv) China gave primacy to the creation of SEZs and economic and technical development zones (ETDZs) along the vast coastline on its eastern and southern coasts; and so, the geographical location of firms is important as well.

There is no mention whatsoever of the comprehensive industrial policy framework that fostered the growth of the Chinese electronics industry (Zhongxiu Zhao et al 2007; Ernst 2016). While India was doing away with import regulations, licensing requirements, and performance requirements related to foreign investments, China had adopted the Technology Transfer in Exchange for Domestic Market (TTEDM) access strategy in the late 1980s.⁶ China encouraged technological innovation through government funding, with an Electronics Industry Development Fund set up in 1986, while establishing technical standards and regulating market access/import growth (Zhongxiu Zhao et al 2007). In addition, modifying some of its policies after joining the WTO in 2001, China has been continually adapting its policies in accordance with technological evolutions, and has also started focusing on green technologies, apart from other emerging technologies. But, nowhere does the NITI Aayog report factor in the need to formulate economic policies in accordance with changing environmental priorities amidst India's international commitments with regards to climate change, which require investment, production, and consumption patterns to be directed in more ecologically sustainable directions.

India's faith in the capacity and willingness of large electronics firms to support the growth of exports or domestic supplier networks is not new. Between 2000 and the mid-2000s, when the central and state SEZ policies were being put in place, the FDI policy already allowed MNCs to set up large firms in India. The entry of Nokia, and its seven supplier companies, in 2005, was seen as the harbinger of electronics hardware manufacturing in Tamil Nadu (Dutta 2016). It was

the largest mobile phone assembly plant globally at that time, and much was made of the growth it was expected to contribute to the electronics manufacturing ecosystem. However, the industrial ecosystem that emerged from the SEZ policy was completely dependent on imports (Saripalle 2015: 102). None of the seven Nokia vendors or even Nokia itself manufactured components in India; instead, they were imported duty-free to the factories (Dutta 2016). Evidence from other companies such as Samsung and NCR Corporation show that imports accounted for as much as 95% of their total foreign exchange expenditure (Francis 2016).

Other studies like those by Verma (2015), Saripalle (2015), and Rajakumar (2014), etc, have established the import dependence of foreign-owned firms, thus providing evidence of the absence of any backward linkage creation. Saripalle (2015), in fact, found that the import dependence of the electronics firms surveyed in Tamil Nadu increased with their size, which buttresses the point that the NITI Aayog's faith that large foreign firms will create domestic supplier networks is misplaced. Moreover, as observed by Dutta (2016), the 2014 report by the Comptroller and Auditor General of India (CAG), based on data on trade, investments, exports, employment, and infrastructure from 117 SEZs, noted that SEZs have not shown any "significant impact" on any of the factors that were the key objectives for setting them up (Dutta 2016).

The closure of the Nokia factory in November 2014, once touted as one of the greatest success stories of SEZ in the country, came about following charges of tax evasion. Nokia's supplier companies (Foxconn, Lite-On Mobile, Build Your Dream) also closed their factories subsequently. Nokia (Microsoft) has moved most of its operations to Hanoi from China and India, as the Vietnamese government was offering subsidised resources and cheap labour (Dutta 2015). This experience with Nokia also negates the NITI Aayog's misplaced belief in the benefits of encouraging large volumes of low value-added manufacturing through foreign investments instead of exploring the means to develop the ecosystem for higher value-added production. Nokia's story clearly shows that even if India attracts foreign firms to produce a large number of low value-added electronics locally through investment incentives and infrastructural support, in the absence of conscious building up of indigenous technologies and capabilities, the expected benefits out of such large foreign investments will turn out to be temporary.

Towards a Coherent National Strategy

By continuing a barren debate about whether to adopt import substitution or export promotion—one that has been settled at least two decades ago—India is losing precious years in redundant wrangling over a strategy for electronics manufacturing. Even a cursory glance at the histories of countries with technological leaders in specific sectors reveals that the best approach is to have import substitution and export promotion strategies for different products within a sector simultaneously with time-bound incentives. In each case, the government has played an undisputable and pre-eminent role by spending on research and development (R&D), as well as in commercialising innovation.

One of the huge mistakes that India made was considering the trade policy, investment policies, and other industrial policies in silos. Progress in domestic electronics manufacturing towards achieving the government's target of "zero net imports by 2020" will not come about by making nationalist rhetoric; it will be achieved by having a strategic industrial development plan that achieves coherence and coordination among trade, FDI, technology, taxation, infrastructure development, environmental protection, education, and skill development policies. We need to applaud the fact that the Indian government did not sign the Information Technology Agreement-2 (ITA-2) which was concluded at the WTO in 2015. However, the pressure of the Regional Comprehensive Economic Partnership (RCEP) negotiations are imminent, with the deadline to finalise the deal now pushed to November 2018. Apart from resisting non-strategic tariff liberalisation, India should take the lead in establishing a new template for FTAs that preserves the country's right to adopt investment-related measures as per national laws and regulations (Francis 2017).

A recent example of a lack of foresight and policy coordination is the inability to visualise the integral synergies between the policies concerning Digital India, and the industries that supply the equipment required to advance digitalisation. For instance, the government has announced zero duty on components for fingerprint readers/scanners, iris scanners, miniaturised PoS (point of sale) card readers and parts, and components of all these machines in a push to create a "less cash economy." However, a strategic approach would have involved a gradual move towards digital payments, along with incentives for the domestic manufacture of the related equipment (and their parts), the demand for which will go up.⁷ Granting zero duty on importing components for the domestic assembly of such machines without any time limit on the duty-exemption period and without support policies to promote domestic component production will only help increase imports of electronics parts and components.

The same applies for the current approach with regard to correcting the inverted duty structure by bringing down the tariffs on components, while increasing those that are applicable to the final products. Such duty reductions need to be announced as time-bound policies, while local production of such parts and components should be simultaneously incentivised. It is crucial to understand that in the absence of factors that make local sourcing profitable for the end-user firm, trade liberalisation nullifies incentives for local sourcing, including by MNCs. The former can take the form of specific policies/incentives that make it more profitable for end-user firms to buy from domestic suppliers (assuming their availability), or through levying technical standards for specific parts and components, whose production is incentivised through funds for R&D and technology upgradation (Francis 2015).

Apart from significantly increased public fund allocation for R&D, the main thrust of industrial policy intervention has to be in subsidising the cost of commercialising new innovations, and expanding the domestic market for domestic electronics products by interlinking the demand of upstream industries to

downstream manufacturers through incentives. The setting up of the Electronic Development Fund envisaged by the NPE (2012) and put into operation as part of the Digital India initiative (2015)—although coming two decades behind China—is one of the important strategies which one hopes would enable the creation of an ecosystem of innovation, and R&D. Technology Incubation and Development of Entrepreneurs, initially launched in 2008 to support technology incubation centres in institutes

of higher learning, and the Multiplier Grants Scheme,⁸ launched in 2013 to support collaborative R&D between industries and academic and R&D institutions, which have both been extended until March 2017, also need to be continued and given additional impetus. But, a significant part of the policy thrust has to also involve increasing skills and capabilities within India's engineering education system, which has been found time and again to be severely lagging behind technology changes.

NOTES

- Under the Computer Software Policy of 1986, import of computer systems on a duty-free basis was allowed for 100% software export companies, without reference to indigenous angle clearance. This is a clear reflection of the lack of coherence in the industrial policies of the time. Similar policies were continued under the Software Technology Parks of India (STPI) scheme launched in 1990 (Francis 2016).
- "Passive" industrial policies mainly aim to reduce the costs of doing business through broad policy measures for improving infrastructure, energy supply, business regulations, etc, while implementing trade and financial liberalisation to allow greater play of market forces. These contrast "active" or vertical industrial policies that seek to influence the trajectory of industrial development and structural change through active policy interventions that guide investments towards new activities and sectors with higher productivity, better paid jobs, and greater technological potential (UNCTAD 2014).
- The 2001 report of the Planning Commission's Working Group on Information Technology for the Formulation of the Tenth Five Year Plan had recognised the state of the IT sector to be more dismal than that of other Indian manufacturing sub-sectors (Kallummal 2012).
- UNCTAD (2014, 2016) provides a discussion.
- India's average shares in China's total imports in the electrical and non-electrical machinery sectors during 2012–13 were 0.1% and 0.4%, respectively (Francis 2015).
- The Chinese government encouraged advanced technology transfers from transnational corporations (TNC) by offering them access to the Chinese domestic market in exchange (Zhongxiu Zhao et al 2007).
- It should be noted that the public sector defence electronics major Bharat Electronics Limited (BEL) had in June 2016 announced its foray into manufacturing micro ATMs and citizen verification devices (CVD).
- Under the scheme, if industry supports R&D for development of products that can be commercialised at an institution, then the government will also provide financial support up to twice the amount provided by industry for development of products and packages.

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