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**Strategy to Attract IT & ITeS:
Learning from Kerala Experience**

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Strategy to Attract IT & ITeS: Learning from Kerala Experience

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Abstract

India has evolved as a major global hub of tech industries including tech-start-ups. For almost last three decades, tech-sector has been a major source of employment for the educated youth of the country. The tech-sector requires an enabling eco-system that include presence of universities and research institutions to survive and thrive. In India, tech-industries are largely concentrated in few large cities. The government's efforts to bring tech industries to smaller towns have largely fallen short, except in Kerala, where the Technopark Thiruvananthapuram model has not only succeeded but has also been replicated in other cities. The paper endeavours to identify key factors responsible for success of Technopark Thiruvananthapuram by applying the modified Spigel (2017) framework of entrepreneurial culture and suggests strategy to attract IT & ITeS sectors into other smaller towns of the country.

Key Words: Tech-sector, Tech-parks, Technopark Thiruvananthapuram Strategy, Start-ups

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1 Introduction

India is the leading destination for IT and ITeS services, accounting for about 58% of the global services sourcing market. Overall, the contribution of IT and ITeS to the GDP of the country is around 7.5% in 2022-23. The direct employment in the IT services and BPO/ITeS segment was estimated to reach 5.4 million in the year 2022-23, with an addition of 290,000 people in the last year alone. The revenue of India's tech industry is approximately \$245 billion in 2022-23 and is expected to reach the US\$ 350 billion mark by 2026, and contribute 10% towards the country's GDP. The tech sector exports stood at \$199 billion in the year 2023-24. Moreover, India has recently emerged as a global hub of Global Capability Centres (GCCs) with 1570+ GCCs in operation¹. Further, India hosts approximately 35000 tech firms and about 27000 tech start-ups². The computer software and hardware sector in India has cumulatively attracted \$102.9 billion between April 2000 and March 2024 as FDI. The sector ranked 2nd in FDI inflows as per the data released by the Department for Promotion of Industry and Internal Trade (IBEF 2024)³.

The tech sector broadly encompasses products and services that use engineering and other applied sciences. In the tech sector, computer hardware, software, information technology, robotics, and artificial intelligence (AI) are included. In India, tech-sector and IT sector are, in general, used interchangeably. The tech sector, by definition is R&D based and therefore constantly evolving. Being a highly skill-intensive activity, the entrepreneurs, management, and other workforce of the tech sector is largely

¹ Yojana-From-Outsourcing-To-Outpacing-Indias-Gccs-Lead-the-Next-Global-Revolution-01-02-2025.pdf

² Planning for a no normal future” Technology Sector in India, Strategic Review 2023, NASSCOM.

³ https://www.ibef.org/download/1728466425_IT_and_BPM_August_2024.pdf

engineers and technically skilled workers. Similarly, the nature of tech industries necessitates specific physical infrastructure and a complex support system, including the presence of universities and research institutes, to survive and thrive. The universities and research institutions not only work as the source of trained manpower, but also help tech-industries in R&D and many other support services. No wonder, the tech sector has emerged in the close vicinity of the universities and research institutions in almost all over the world.

Scope and structure of the paper

Despite India's emergence as a global leader in the IT and ITeS sector, the geographical concentration of tech industries in a handful of large metropolitan cities has led to significant regional disparities in employment opportunities and economic development. Government initiatives aimed at dispersing tech industries into smaller towns have largely underperformed, with the notable exception of Kerala's Technopark in Thiruvananthapuram. This paper seeks to address the core issue of why such decentralization has been difficult to achieve elsewhere, and what specific conditions enabled the Technopark model to succeed in a relatively smaller city. Using a modified version of Spigel's (2017) entrepreneurial ecosystem framework, the paper identifies key cultural, social, and material attributes—along with an added dimension of leadership—that contributed to this success. The analysis provides insights into how similar outcomes can be replicated in other Tier II and Tier III cities across India. The paper is organized as follows: the *section two* discusses the global and Indian evolution of the tech sector; in *section three* an assessment of India's strategies to promote Tech Sector Technology Business Incubation Centres and Technology Park/SEZs has been made. *Section four* details the case study of Technopark Thiruvananthapuram by applying modified Spigel's analytical framework. The final *section five* is devoted to policy

recommendations for replication of Technopark model followed by concluding remarks including key findings and implications.

Section 2: Evolution of tech-industries

2.1 Global perspective

Globally, the Route 128 corridor in Massachusetts, Boston is the first example of synergistic relationship between universities and tech-industries (Scott 1987). During the 2nd World War, the US government awarded a number of defence research projects to the Harvard University and Massachusetts Institute of Technology (MIT). The research outcomes of these projects were translated into defence related tech-industries by establishing the manufacturing units in the Route 128, an area near Harvard and MIT in Boston. The Route 128 evolved into a hub of high-tech industries, particularly in electronics, defence, and engineering in the 1960s and 1970s. The area continues to be a significant tech and biotech corridor, with Boston's influence expanding into nearby cities like Cambridge, Waltham, and Burlington (Saxenian 1994, Larsen 1984). The Route 128 has lost its pride of place though still, it is an important tech-business area.

The establishment of the *Stanford Research Park* (SRP) near the Stanford University was the first planned effort to commercially harness the knowledge and resources of the university in 1951. The Dean of Engineering of the Stanford University *Frederick Terman* established the SRP with the objective to leverage university knowledge for development of tech-businesses (Lecuyer 2007). In fact, the nature of tech-business is such that the entrepreneurs with strong background in technology and related activities only can survive and thrive. The SRP was a grand success and, evolved into what is presently known as the Silicon Valley, the Mecca of innovation (*Kenney & Burg (1999), Sturgeon (2000)*). Buoyed by the success of the SRP, the tech-parks in close vicinity of universities became highly popular (see Box-1) and at

present there are around 1200 tech-parks successfully functioning in different parts of the world. (*Saxenian, A. (1994), Reports World Technopolis Association (WTA)*).

Box 1:

Linkage between universities and high tech industries

- High-tech industries naturally spring up near the universities and research institutes (U&RIs) to leverage its research facilities and skilled manpower.
- Famous examples are:
 - Harvard and MIT - Route 128,
 - Stanford University - Silicon Valley.
 - University of Washington - Greater Seattle
 - North Carolina University- Triangle Park.
 - Cambridge University - Cambridge Science Park
 - CERN Lab - Geneva, Switzerland.
 - Eindhoven University of Technology - Eindhoven (Netherlands).
 - IISc, NAL, ISRO - Bangalore Tech Hub.
- Since 1960s, Governments of developed world has
 - Tried to harness the positive spill-over effects of knowledge & research of Universities and Research Institutions by setting up of dedicated tech-parks affiliated to them.
 - Presently, almost all the countries have been establishing tech-parks to nurture and support tech-industries near Universities and Research Institutions.
 - Presently, there are around 1000-1200 tech-parks in the world (IASP, WTA).

Source: Compiled by the author.

A tech-park is an enclave with requisite infrastructure to support technology-based industries, innovation, and research and development (R&D). These parks are basically campus with power supply, telecommunication facilities and in many cases ready to use office/workplace for technology businesses. Box-2 gives a glimpse of a tech-park.

Box 2:

Necessary pre-requisite for attracting tech industries

Global experiences tells that

- The tech-industry flourishes near Universities and Research Institutions.

Accordingly, the tech-parks focuses on:

- Physical infrastructure
 - 24X7 non-stop grid connectivity with 100% DG power back-up
 - Reliable digital connectivity for data communications.
 - Ready to use office: Plug & Play Modules/Warm Shells on flexible terms.
 - Open air auditorium, party lawns, business cubicles, club and guest house,
 - Shopping complex, food courts, banks, ATMs, restaurants and conference rooms etc.
- Collaboration with Universities and Research Institutions
 - The technology businesses need constant support of U&RIs facilities i.e.; labs, faculty expertise, research and development collaboration etc.

- The Universities and Research Institutions also facilitate in experimentation, testing and validation of new technology/concept etc.
- Linkages and interconnectedness amongst the different stakeholders
 - Entrepreneurs with business ideas,
 - Mentors to help nurture the ideas into business,
 - Bankers and venture capital funds,
 - Business consultants,
 - Professional service providers and
 - Legal experts etc.
- Single window clearance system for all necessary government approvals.
- In addition, to attract and retain talented workforce, in close vicinity of tech-parks, there should be quality schools for children education, healthcare, entertainment facilities etc.
- Good road, rail and air connectivity.
- Socially tolerant behaviour.

Source: Compiled by the author.

Overall, there are approximately 1000 to 1200 tech-parks around the world, though the exact number can vary depending on definitions and classifications (*LASP & WTA*). These parks aims to promote tech-start-ups and innovation. The USA has around 300 tech-parks. Most of these parks are associated with universities and research institutions. In Europe, the number of tech/science Park is more than 400. These parks are supported by initiatives like the European Network of Science Parks and Areas of Innovation (IASP Europe). The Cambridge Science Park in the UK, Sophia Antipolis in France, and Kista Science City in Sweden are major tech-hubs in Europe (*UNESCO Science Report 2015: Towards 2030.UNESCO*). Asia is rapidly expanding, with 300+

parks, particularly in China, India, Japan, and South Korea. Prominent examples of tech-parks in Asia are Zhongguancun Science Park (China), Cyberjaya (Malaysia), and HITEC City (India). Similarly, in Israel, UAE and Saudi Arabia, there are around 50-70 technology hubs. The Technion-Israel Institute of Technology (Israel) and Dubai Internet City (UAE) are examples of successful tech-parks. In Latin America, there are approximately 50-70 parks, with Brazil, Chile, and Mexico being prominent players. Leading tech-parks in Latin America include, Tecnopuc (Brazil) and Monterrey IT Cluster (Mexico). Further, Africa also houses more than 50 parks, with growing initiatives in South Africa, Kenya, and Nigeria. Some of the successful parks include Konza Technopolis (Kenya), Innovation Hub (South Africa).

Recent global trends indicate that the tech-parks are expanding rapidly in developing countries particularly in Asia, Africa, and Latin America. Further these parks are highly successful in attracting foreign investment, innovative tech-firms and other high-tech businesses. Moreover, of late, we see a growing trend of specialized tech-parks focusing on specific sectors i.e.; IT, Biotechnology, Fintech, or Artificial Intelligence.

2.2 Evolution of tech industries in India

Advances in Indian science and technology depended heavily on computers, particularly since the 1950s. The father of the Indian statistical system and planning, P C Mahalanobis, used data processing machines for number crunching (Mahalanobis 1958). Similarly, H. J. Bhabha deployed computers for managing the atomic reactors (Ramanna1991). Tata Institute of Fundamental Research, Indian Statistical Institute & Jadavpur University jointly developed initial computing systems in the country (www.tifr.res.in). Further, IIT Kanpur imported powerful computers (www.iitk.ac.in). Interestingly, the scientists working on these systems were the first generation of software engineers and

programmers in the 1960s. In the private sector, the Tata group established TCS in 1960s. The DCM Data Products and HCL also started their operations in the 1970s. Narendra Patni, the founder of Patni Computer Systems (PCS) was the first technopreneur who started processing imported data in India. The PCS was set up in Bangalore to take advantage of the satellite link for the exchange of data. Another tech giant, WIPRO, was incubated by the IISc Bangalore (<https://connect.iisc.ac.in/2019/12/the-birth-of-wipros-computer-systems-business>). Thus, in India, the presence of IISc and ISRO (satellite link for data transmission) played a key role in catapulting Bangalore into a tech hub of the country (Rao & Sundaram, 2018). NR Narayan Murthy, who was an employee at Patni, started Infosys along with his other colleagues. In addition, in the 1980s, the computerisation of the passenger reservation system by the Indian Railways, the computerisation of Banks, and the networking of government offices demonstrated the effectiveness of technology for common people.

The government of India, in its software policy of 1986, accorded the status of industry to software. Further, the Department of Electronics (DoE) launched the *Software Technology Park* (STP) scheme to provide tech-companies ‘with single window’ clearance and affordable and common high-speed data links for exports of services. The STP scheme proved a game changer, and Indian firms started serving the overseas clients more competitively.

In India, by the early 1990s, some US companies started to outsource work to India to leverage its skilled and talented workforce available at a low cost. With increased investment and R&D, India started to attract product development activities in IT sector. In 1994, the CM of Andhra Pradesh C. Naidu, decided to develop capital city Hyderabad into a knowledge hub on the pattern of Silicon Valley of the USA and Multimedia Super

Corridor of Malaysia (Sen & Frankel, 2005). The ISB was established in Hyderabad as global business school in 2001. The CCMB and ISB Hyderabad played critical role in transforming Hyderabad into a high-tech knowledge enclave for IT, ITES and biotech industries in a big way (Reddy & Sharma 2021, Singh & Desa 2020, Kumar & Verma 2022, Nair & Rao 2020. Patel & Choudhary 2019. Diganta Das 2015).

By the end of the 20th century, global computers were confronted with the Y2K problem. The solution of Y2K required cheap and relatively low skilled manpower in large numbers. India seized the opportunity and Indian tech sector boomed. By and by, providers of labour intensive solutions to global players, Indian tech-sector started stepping-up on the value chain. Presently the Indian tech sector is amongst the most advanced in the world.

In India, the government has adopted a two-pronged approach to encourage tech industries. One approach was to encourage the setting up of technology business incubators (TBIs) generally affiliated with a university or an industry. Another strategy was through the establishment of tech-parks/SEZs. A look at the tech-sector performance suggests that both strategies have been largely successful. However, a deep dive indicates several areas of concern that need corrective measures. Let us first take a reality check of both strategies.

Section 3: India's strategies to promote tech sector

3.1 Technology business incubators (TBIs) to promote tech-start-ups

In India, the tech sector has also been promoted by the establishment of technology business incubators (TBIs). The TBIs are either affiliated to the Universities and Research Institutions or industries. As per India Incubator Kaleidoscope 2024, presently, more than 1100 TBIs are functional in India. Out

of these TBIs, almost 45% are concentrated in the Southern states. Further, almost half (48%) of all the TBIs are located in Tier I cities. The absolute number of TBIs looks large, but per million population, there are only 0.8 TBIs in the country. In comparison, on average, developed countries have TBI density of 8-10 per million people. As of June 30, 2024, the Department for Promotion of Industry and Internal Trade (DPIIT) has recognized 140,803 entities as start-ups in India. This is an increase from 92,683 start-ups recognized in February 2023. Interestingly, the start-ups related to AI/ML, Data Analytics, Biotech, and Defence Tech are cropping up rapidly in the country. These start-ups are keen to join the TBIs as their requirement of tech support and networking are more intense. The TBIs incubated start-ups have more chances of success, including funding support from venture capital funds. However, only 8.2% of start-ups get nurtured by the TBIs in the country. Moreover, only 10.0% of the TBIs in the country support almost 98% of all start-ups that are incubated. In other words, out of 1100 TBIs, only around 100 are active, while the remaining 1000 TBIs are not successful in achieving their objective. Interestingly, it is found that the presence of TBIs do encourage more start-ups.

In substance, we can conclude that despite a huge number of TBIs, the overall density of TBIs needs to improve in the country. Further, northern and north-eastern parts of the country need to strengthen the presence of TBIs substantially. Moreover, a lot more TBIs are required in the tier II and III towns in the country. In this regard, it is important to appreciate that the TBIs and Tech-Parks fulfil the necessary conditions for the promotion of tech-industries by providing the requisite infrastructure. However, for the overall development of tech-sector, sufficient conditions include a supportive entrepreneurial culture, networking with other stakeholders, an anchor firm, availability of risk capital etc. In simple words, the absence of some of the critical factors other than physical infrastructure can fail a Tech-Park in a new city.

Similarly, the simple presence of the universities and research institutions is not sufficient. What is required is that these universities and research institutions should also have an active collaboration culture and enabling rules to work closely with the Tech-Parks on different issues of common interest.

3.2 Tech-Parks/SEZs as the vehicle of tech-sector growth

Presently, Bangalore, Hyderabad, Chennai, Pune, Kolkata, Delhi NCR, and Mumbai are the major IT Hubs in India. In the smaller towns, Thiruvananthapuram and Kochi in Kerala and Madurai in Tamil Nadu are also popular IT destinations. The Software Technology Parks of India (STPI) is the nodal agency of the Ministry of Electronics, Government of India to develop technology parks in the country. The STPI has set up 67 Tech-parks across the country to provide single window clearance and infrastructure facilities. STPI units can avail excise duty exemptions on procurement of indigenously manufactured goods. Notably, 57 STPI centres are in Tier-II/III cities. However, most of the STPIs in Tier II/III cities are not successful. The SEZs are primarily developed for promoting exports. As of November 2021, there were 425 approved SEZs across the country, and of these, 276 were from IT & ITeS.

In addition there are also a few tech-parks sponsored by other institutions including IKP Hyderabad (ICICI Bank+ Telangana Govt), Technopark Trivandrum (Kerala Govt), HITECH City Hyderabad (Government of Telangana & private partners like L&T), Electronic City, Bengaluru (Karnataka State Electronics Development Corporation Limited), TIDEL Park, Chennai (A joint venture of TIDCO and ELCOT: both Tamil Nadu Govt entities), Mahindra World City, Chennai and Jaipur (Mahindra Lifespace Developers Ltd.), Rajiv Gandhi Technology Park, Chandigarh (Chandigarh Administration), GIFT City, Gandhinagar (Govt. of Gujarat + IIL&FS), DLF Cybercity, Chennai (DLF Limited) and many more. A look at the non-STPI

sponsored tech-parks suggests that almost all these tech parks are located in already flourishing tech-hubs of the country and therefore are highly successful. It is interesting to note that there is hardly a study examining the performance of Tech-Parks in the country. However, in general, we can safely conclude that the Tech-Parks in a few selected Metro-towns, whether established by STPI or other entities, are largely successful, while a most of the tech-parks in non-metro towns have not been able to achieve the desired success.

After the COVID-19 pandemic, several companies began adopting hybrid and flexible work arrangements. The new working environment includes co-working spaces and managed offices. The quest for the minimization of establishment costs has encouraged the Indian tech companies to explore smaller cities. The smaller cities are found to be offering a local skilled workforce (which also helps manage the retention of employees), reasonable land costs, rents, and wages. The workers also prefer small towns for low commuting costs and time. However, in the absence of state government support, even the initial shift is confined to a very few selected cities such as Vijayawada, Lucknow, Bhubaneswar, Nagpur, Ahmedabad, and Guwahati.

Different state governments in India have attempted to attract IT and other tech-industries by adopting the tech-park or IT SEZ model with an aim to create enclaves with quality physical infrastructural development.

The tech-parks provide necessary physical infrastructure and other support services to the tech sector. In India, some of the tech-park successful in attracting tech-industries include Electronic City-Bangalore, HITEC City-Hyderabad, TIDEL Park-Chennai, Magarpatta IT-City-Pune and Technopark-Thiruvananthapuram. However, several tech-parks such as Ahmedabad IT Park- Nashik, IT Park- Naya Raipur, Tidel Park-Coimbatore, IT Park- Bhopal could not achieve success to the

desired extent in attracting tech-industries. The less successful Tech-Parks are generally from smaller towns. On the other hand, successful IT Parks are located in big metropolises. Only Technopark Thiruvananthapuram is an exception that has been a grand success by all accounts. Less than desired success has discouraged the state governments from aggressively pushing to attract IT and ITeS into smaller cities. Therefore, it becomes imperative to examine the factors that help the tech sector to flourish in certain cities while their absence results in the failure of tech industries to take root in other cities.

A look at the less successful/failed tech-parks/TBIs reveals that they were largely missing one or a combination of required elements. In many cases, supportive entrepreneurial culture, networking with other stakeholders, and availability of risk capital might be missing. In certain cases, the presence of a strong anchor company could create such a role model and work environment besides developing a network of professionals (*Startup India (2023)*, <https://www.startupindia.gov.in>), BIRAC. (2023). <https://birac.nic.in>). However, we found that in most of the cases the anchor companies were conspicuous by their absence.

Presently, the tech sector in India is majorly clustered in a few large cities. The evidence related to tech-industries development in Bangalore, Hyderabad, Delhi, Mumbai, Pune, Chennai and Kolkata clearly highlights the presence of a supportive eco-system including universities and research institutions, physical infrastructure, anchor units, venture capital, bankers etc. In substance, IT hubs in large cities of India naturally fulfil the requirements of an vibrant and supporting entrepreneurial eco-system, but we cannot be sure of presence of most of the requisite elements in tier II/III cities.

3.3 Why Tech-jobs in small towns?

In India, the tech sector has become one of the major creators of quality jobs to engineering students. A large part of the workforce engaged in the tech-sector comes from smaller towns, while major IT clusters are located in a few big cities. This necessitates the migration of tech-skilled persons from small towns to big cities in search of jobs. The migration from small to big cities creates cost of displacement (*leaving home involves additional costs of food, shelter, and transport, besides the disutility of being away from home place*). If the expected salaries are sufficiently high, displacement costs are easily compensated, and workers from small cities accept the jobs and migrate to big cities. However, in cases of *low-skill-low-salaried* jobs in the tech-sector, many workers find that the displacement costs outweigh their expected earnings. This creates a paradox where a large number of low-skilled persons are unemployed in small towns while a large number of low-salaried jobs remain unclaimed in large cities. In the process, the low-salary tech jobs can be priced out of India. High rent and high cost of living in large cities also discourage low-skilled-low-wage-tech-work in India. In this regard, India has already been facing stiff competition from Vietnam, Philippines, Sri Lanka, Bangladesh, and Indonesia in attracting low-skill tech jobs. Therefore, India must develop cost-competitive alternative tech-industry locations. In India, a large number of low skilled technically qualified workers are ready to work at low wages, provided the jobs are available in their home towns. The low-wage jobs at their hometown help such youth to avoid displacement costs, and even at low prevailing wages, they end up with more surplus after meeting their living expenses. Many sceptics might argue that workers should be encouraged to scale up their skills to man the jobs in large cities, as low-skill-low-wage solution is not a good option, and it also inhibits the creation of a dynamic labour market in the country. However, a careful look will reveal that the shifting of low-skill-low-wage-jobs to smaller towns, i.e., nearer to

the hometown of the potential workers is a better option as elaborated further. Most of the educated youths in small towns are invariably the first-generation educated persons. Empirical researches (Breen & Jonsson 2005, Chevalier & Lanot 2002, Heckman & Mosso 2014, OECD 2018) suggest that skill level of the first generation educated persons is relatively low and improves during on-job learning (Arrow 1962, Egan, Upton, & Lynham 2006, Kolb 1984, Gibbs 1988, Lucas 1988). The first generation of educated youth invariably comes from the agriculture and other traditional sectors. Therefore, their transition into modern economic activity in general and tech-sector in particular is not smooth as they need to forego their core competency i.e. skill of doing farming/traditional occupation etc. and acquire altogether different set of skills not only for the doing things efficiently in the tech-jobs but also adjusting to an unfamiliar social system and different values. It is really a complex and delicate process and needs careful and deft handling.

In simple words, a large number of low skilled youth (most of them being first generation educated), who are presently unemployed and regarded as employable, will not only get reasonably decent jobs but also help improve their skill level with the passage of time provided low skilled jobs are shifted into the small towns. Moreover, as Indian tech companies are climbing up the value chain, there is an urgent need for low value IT and ITeS jobs to shift to smaller towns. Fortunately, the Nasscom report 2023 (*see Box-3*) indicates that the low tech industry is migrating towards Tier 2 and 3 cities. However, a careful reading of the report suggests that the migration is rather tardy and happening naturally without much support of the state governments. On the other hand, most of the hinterland of the states have been suffering from the acute problem of unemployment amongst the educated youth (*Agarwal 2018, Ghose 2016, Ramasamy & Das 2017, Kumar & Sharma 2020, Ministry of L&E, GOI, 2019*). The quality of education in the interior of the states is relatively low, and

therefore youth from these areas are more suitable for low-skilled jobs. Since the salary of low skilled being low does not compensate them adequately they decide not to shift to big cities and consequently remain unemployed.

Box 3:

IT & ITES shifting towards smaller cities in India

(Emerging technology hubs of India, August 2023 by Deloitte and Nasscom)

Indian technology industry

- Clustered in a few large towns.
- But the trend is changing.

Because

- 60% of graduates come from smaller towns.
- Rental costs in small cities are almost half of large cities.
- The Work from Home (WFH) enabled 11–15% techies to be based in tier 2-3 cities.
- Physical and Social infrastructure improving in small cities substantially.

As a consequence

- > 7,000 start-ups are functional in small cities.
- 39% of tech start-ups established in 2022 are from emerging hubs.
- 13% funding in 2022 went to tech start-ups from tier 2 cities.
- Deep-tech, AI start-ups founded in emerging hubs have grown to 26 percent in 2021.
- New GCCs are rushing towards Tier 2-3 cities to leverage low-cost infrastructure, high quality untapped talent pool and risk diversification. (<https://ecanarys.com/Nasscom-Industry-Report.pdf>)

Source: Compiled by the author.

Therefore, if the state governments act proactively and succeed in attracting tech-sectors into their heartland by suitable policies and actions, India can not only address the problem of unemployment amongst its educated youth but also become the global hub of low-skilled job works related to tech-sector in the world. One of the side benefit of tech-sector in the hinterland of the states will be the improvement in quality of education as prospects of employment will galvanise the government, universities and also the youth to take education more seriously and sincerely.

Section 4: Case study of Technopark Thiruvananthapuram

However, the real challenging task is, how can a state government successfully attract tech-sector into the hinterland? For the purpose, we need to map the supporting entrepreneurial ecosystem and then try to develop that into the desired town to attract the tech-sector. In this context, Isenberg (2014) identifies the ecosystem responsible for entrepreneurial success that includes respect for entrepreneurs, trust in government policies, sound and inclusive financial system, mutual trust between entrepreneurs and labour, customer-centric product markets, and requisite institutional and infrastructure facilities. Similarly, in a pioneering work, Spigel (2017) elaborates 11 key elements grouped into three categories. The presence of these elements ensure success of innovative ventures in a region. There are eleven elements broadly divided into three categories. The first is **Cultural Attributes** which includes *Supportive Culture, Role Model Businesses and Path Dependency*. The second category is called the **Social Attributes** that encompasses *Networks, Talented Workforce and Risk Capital*. And the third category called **Material Attributes** includes *Business Friendly Policy, Universities and Research Institutions, Infrastructure, Local Markets and Anchor Firms*. Spigel (2017) asserts that based on presence/absence of these elements, the success/failure of a tech park can be ascertained. However, India is a developing country, particularly at state level, **role of**

leadership particularly during the early phase of development of the tech-park also acquires an added importance as a visionary and credible leaders can steer the Tech-park into right direction by negotiating right authority with state political and bureaucratic system and setting up of healthy traditions. Accordingly, in this paper, we have added role of leadership as the twelfth component.

A case study of the Technopark Thiruvananthapuram Model is attempted (see Box-4) by applying Spigel (2017) framework along-with an additional attribute, namely the role of leadership. The rationale for selecting the Technopark Thiruvananthapuram as case study is simple and straightforward. Technopark Thiruvananthapuram is the most successful planned and systematic effort in the country in attracting IT & ITeS industry into a relatively small town.

Box 4:

**A Brief Case Study of Technopark Thiruvananthapuram
Introduction**

- Established in 1990, Technopark is the one of the most successful case of planned efforts in a small town to attract tech industry.
- It is fully owned by government of Kerala.
- The *Technopark* is an autonomous entity registered under the *Travancore-Cochin Literary, Scientific and Charitable Societies Registration Act, 1955*.
- The Technopark is managed by:
Board of Governors: The apex decision making body headed by the Chief Minister of Kerala. Other members include administrative secretaries of Electronics & IT, Finance departments, MD of KSIDC.
Executive Council: is headed by Administrative Secretary of the Electronics & IT department. Other

members are from the department of finance, industry, KUSUM, KSIDC, and KSITI. The EC executes and implements the directives of the BOG.

- **The Technopark has the requisite authority to grant clearances of all legal and regulatory formality for its client firms under Single Window System.**
- Technopark also hosts a Technology Business Incubation Cell under Kerala Startup Mission and a SEZ.

The Technopark has been developed in different phases as detailed below:

Phase I (1990-1994): Inception and Initial Development

- 1990: Technopark formally established.
- 1994: Became operational with focus on attracting IT companies.
- Total Area: 198.43 acres, SEZ: 31.12 acres, Building: 5.61 million sq. ft.
- Development of basic infrastructure, including the first IT campus.
- Major companies: TCS the Anchor firm allotted 40 acres.
- Total companies: 16.

Phase II (1999-2007): Expansion and Growth

- Additional Area: 86 Acres, Additional SEZ: 86 acres, Additional Build up area: 3.72 million sq ft.
- 2003: Became a member of the International Association of Science Parks (IASP).
- Major companies: Infosys 50 acres, US technology (P) Ltd. 36 acres.

Phase III (2007-2013): Consolidation and Major Investments

Additional Area: 90.02 acres, Additional SEZ: 43.46 acres, Additional Build up area: 10.06 million sq ft.
Major Companies: Ariva Med Data Infotech P Ltd- 4.63 acres, Dragonstone Realty P Ltd. 11.39 acres.

Phase IV (2014-2018): Techno-city Integration

- Additional Area 389.74 acres, Additional SEZ: 43 acres, Build up area: 0.73 million sq ft.
- 2014: Techno-city, a 400-acre satellite campus, was introduced as an extension of Technopark.
- TCS 94 acres, Suntec 10 acres.

Phase V: Kollam (2019-Present): Innovation and Sustainability

- Additional Area: 4.44 acres, Additional SEZ: 4.44 acres, Additional Build up area: 0.10 million sq ft.
- 2019: Focus shifted toward sustainability and green infrastructure.
- 2020-2024: Expansion of Techno-city and further modernization of facilities in the main Technopark campus.

Total: Area: 768. 63 acres, SEZ: 208.02 acres, Total Build up area: 12.72 million sq ft (as on March 31, 2023).

Salient Features

- It is a CMMI Level 4, ISO 9001:2015, ISO 14001:2015 & OHSAS 18001:2007 certified Technology Park.
- Employing: 72,000 - Direct and 2, 00,000 – Indirect.
- Presently (2024), it Houses 486 companies functioning in various domains (*like AI&ML, Software development, Information Security, Cloud Computing, Big Data Management, Enterprise Resource Planning, Embedded systems etc.*).
- The *Technopark* houses firms ranging from
 - Tech MNCs
 - Large Indian tech-firm,
 - Small and medium firms
 - Start-ups.
- The list of prominent companies working at *Technopark* includes Infosys, Mckinsey & Co., Ernst & Young, Tata

Elxsi, Oracle, UST Global, IBS, TCS, Allianz Cornhill, BYJUS, TOONZ Animation etc.

Grand Vision and Unique Business Proposition

- World class physical infrastructure.
- Flexible terms and conditions for entrepreneurs.
- Caters to the whole value chain:
 - Commercial research;
 - Early stage start-ups;
 - Late stage start-ups;
 - Small scale technology ventures;
 - Full-scale high-tech ventures;
 - MNCs etc.
- Connectivity with U&I for mentoring as well as research support and validation.
- Networking with other stakeholders.
- Also created training mechanism to encourage local entrepreneurship in Kerala.
- Other methods i.e.; business ideas competition and technology demonstrator competition etc.

Evaluation of Technopark Thiruvananthapuram strategy

We have attempted to assess the success of Technopark on the basis of Spigel's entrepreneurial eco-system framework involving eleven attributes broadly divided in three categories.

I. Cultural attributes

1. Supportive culture:

Technopark's culture is centred on creating a collaborative and supportive eco-system for entrepreneurs. The world-class infrastructure, multi-options funding, mentorship, and knowledge-sharing platforms are offered on a highly flexible terms and conditions to take care of dynamic nature of tech-commercialization business.

2. Role model businesses

The IBS Software founded in 1997 was the first successful startup that leveraged the ecosystem of the Technopark and rapidly scaled up its operations, securing global players as its clients. The success story of IBS's and many other such firms encouraged other entrepreneurs to establish operations at Technopark, making it a thriving IT hub.

3. Path dependency

The successful startups at Technopark i.e.; IBS Software, SunTec Business Solutions, UST, Toonz Animation India, Flytxt and Q-Burst etc. paved the way for other to follow the path trodden by these firms to grow as globally competitive players. Recently, AI-driven startups like Inntot Technologies and Tranzmeo have encouraged other global AI firms to choose Kerala.

II. Social attributes

4. Networks with other stakeholders

Technopark Trivandrum has established a robust networking ecosystem with various stakeholders, including venture capitalists (VCs), consultants, chartered accountants (CAs), legal experts, marketing experts, and financial professionals.

The Kerala Start-up Mission (KSUM) that operates within Technopark organizes investor meetings, pitch sessions, and demo days to connect startups with VCs. The event '**Seeding Kerala**' brings together investors including global VCFs and entrepreneurs.

The Technopark regularly conducts conferences, workshops and training sessions to help businesses develop new network and understand emerging trends in IT, taxation, international markets, and funding options.

Further, the Technopark also hosts and participates in events like Kerala IT Expo and international fairs, where businesses can showcase their capabilities and connect with key stakeholders.

5. Talented Workforce

Kerala is the most educated state in the country. Its capital Thiruvananthapuram is one of the prominent centre of higher

and technical education in Kerala. At present Thiruvananthapuram hosts a number of universities including Indian Institute of Science Education and Research, Indian Institute of Space Science and Technology, Kerala Technological University, University of Kerala and Kerala University of Digital Sciences, Innovation and Technology (Digital University Kerala). In addition, there are a number of reputed colleges and engineering colleges imparting technical education to a large number of students. This large pool of educated and talented youth provides constant supply of technical workers as well as entrepreneurs to the Technopark. In fact, the presence of Technopark and its close collaboration with academic institutions has proved to be a game changer in promoting quality of education, relevance of research and tech-entrepreneurship not only in Thiruvananthapuram but in the whole region.

6. Risk capital

Technopark Trivandrum has played an active role in facilitating risk capital for startups and entrepreneurs through multiple channels. The Kerala Startup Mission offers seed funding up to Rs. 25 lakh to eligible startups located in Technopark. The Technopark Technology Business Incubator (T-TBI) helps early-stage companies secure funding by connecting them with angel investors including Indian Angel Network (IAN), government funding programs, and venture capitalists. The Technopark startups are eligible for various grants, including those provided by KSUM, DST (Department of Science and Technology), and NIDHI-PRAYAS schemes for prototype development. Startups are also encouraged to explore alternative funding models, such as debt-based funding, CSR-linked investments, and export-driven financial incentives. The Park organizes events to connect startups with global investors and accelerators, hackathons, and demo days to showcase startup innovations to investors. These forums allow startups to pitch ideas directly to angel investors, venture capitalists, and funding agencies.

III. Material Attributes

7. Business friendly policy:

Technopark offers ready-to-occupy office spaces with world-class infrastructure, including plug-and-play facilities for startups and established companies. Moreover, firms are allowed flexible leasing options for co-working spaces and shared offices, accommodating startups and SMEs with limited resources. This help reduce gestation period and capital expenditure for businesses. The startups also have flexible options for scaling up or down based on business needs. A Special Economic Zone (SEZ) has been set up with the Technopark that provides different tax benefits and incentives. One of the most business policy provided by the Technopark is the single-window clearance mechanism to complete all statutory and regulatory approvals seamlessly. It provides mentorship, seed funding, and networking opportunities for early-stage startups and focuses on innovation-driven ventures, particularly in IT, AI, and robotics. The firms located with the Technopark benefit from its international trade relationships and get global visibility.

8. Universities and research institutions

The Technopark was established on the land of Kerala university. Close physical proximity between Technopark and Kerala University helped forge close collaboration for research, training and other academic activities. The Technopark has also close collaborations with Indian Institute of Science Education and Research, Indian Institute of Space Science and Technology, Kerala Technological University, University of Kerala and Kerala University of Digital Sciences, Innovation and Technology (Digital University Kerala). The Vikram Sarabhai Space centre and other research institutes are also having close relations with Technopark for different purposes.

9. Infrastructure

The Technopark offers ready-to-occupy and build-to-suit office spaces for companies of all sizes on highly flexible terms and

conditions including co-working spaces, shared offices, and dedicated office spaces. The space availability ranges from a small modules for startups to large-scale campuses for MNCs. Technopark also offers high speed and reliable internet connectivity through high-speed fibre-optic networks with multiple service providers ensuring 24x7 connectivity. Further, on-site data centres with disaster recovery capabilities are also available on campus. The Technopark is easily accessible by road/railways/air.

The Technopark has also arranged a number of common facilities including conference halls, meeting rooms, and auditoriums. There are also multiple food courts, cafeterias, and restaurants serving a variety of cuisines. The Park also provide guest house, hostels and resident apartment facility on campus visiting employees and guests. In addition, facilities for indoor and outdoor sports, recreational activities and healthcare are also available on campus. The Technopark has also made available in house facilities such as Technology Incubation Center, Startup Zone, SEZ and Global IT Village.

10 Local markets

The Technopark firms collaborate with local enterprises for joint ventures, consulting, and technology adoption. Local banks, government agencies, and retail companies serve as early adopters of technology solutions. The companies at Technopark often pilot new products and services in the local market, gaining valuable feedback and insights. For example, fintech and e-governance solutions developed for Kerala-based clients often serve as prototypes for national and global markets. Helps refine products and services, making them more market-ready. Kerala's state government and public sector undertakings (PSUs) are significant consumers of IT services like e-governance platforms, digitization, and automation. Public sector projects provide stable, long-term contracts for IT companies. Establishes Technopark as a hub for government-backed technological advancements.

11. Anchor firms:

The Tata Consultancy Services (TCS) was the first firm that started operations on 40 acres of land provided to the company on concessional terms and condition. The presence of TCS created an ecosystem that worked as a role model for other smaller firms to look up to. After some time, Infosys also started its operations at the Technopark. This paved the path for other firms.

IV. Leadership Attributes

12. Role of leadership

Sh. G. Vijaya Raghavan, was the young and dynamic founding CEO of the Technopark Trivandrum. He played a pivotal role in conceptualizing, establishing, and shaping India's first IT Park into a globally recognized success. His leadership and vision were instrumental in overcoming bureaucratic hurdles, attracting investments, and building a strong foundation for Kerala's IT industry.

Major takeaways

- The tech sector thrives on institutionalized coordination and cooperation among stakeholders such as:
 - Government
 - Universities
 - Businesses
 - Industry leaders
 - Bankers
 - Venture capitalists (VCFs)
- **Physical infrastructure** is crucial, but equally vital are:
 - **A single window clearance system**
 - **A business-friendly administrative approach**
- **Small towns** are not a constraint for tech growth if:
 - **A supportive government**

- **A favourable ecosystem**
- **A talented workforce** are present
- **A strategic decision** to invite **TCS** early on:
 - Granted 40 acres of prime land on favourable terms
 - Included a condition to ensure a **minimum level of tech-employment**
 - This decision catalysed the creation of a **tech-friendly ecosystem**
- The **leadership and management** of Technopark played a key role by:
 - Maintaining a **flexible, business-friendly approach**
 - Building **networks with stakeholders**, including VCFs
 - Organizing **events to encourage technopreneurs**
- **Technopark's success has been replicated** in Kochi and Kozhikode, demonstrating:
 - It's a **well-thought-out strategy**
 - It has a **high probability of success** when implemented in true spirit

The replication of Technopark success in Kochi and Kozhikode clearly demonstrate that Technopark strategy is a well thought out plan of action and has high probability of success if implemented in true spirit.

Extension and replication of Technopark model

Encouraged by the success of the Technopark, the government of Kerala has replicated the experiment and developed Infopark Kochi and Cyberpark Kozhikode.

Infopark Kochi

Formed in 2004,

On 323 acres.

Build up area 9.2 million sq ft.

430 companies.
Employment to 51000 professionals.

Cyberpark Kozhikode

Formed in 2009.
On 42.5-acre
Built up area 2.88 lakhs sq. ft.
63 companies
Employment to 1000 professionals.

Source: Compiled by the author.

Section 5: Policy recommendation

Based on Technopark Thiruvananthapuram Model, the state governments are suggested following steps to invite tech-sector into their hinterland.

- Select one or two most prominent towns having cluster of university/IIT/IIMs and other educational and research institutions. Higher the number of educational/research institutions, the better are the chances of success. For example, Indore and Bhopal (MP), Jodhpur (Rajasthan), Varanasi and Lucknow (UP), Patna (Bihar), Hisar and Kurukshetra (Haryana), Guwahati (Assam), Bhubaneswar (Orissa), Mangalore and Mysore (Karnataka) and a large number of other towns.
- Develop Tech-parks on at least 200-500 acres of land. Larger Park size offers economies of scale and scope thereby giving more synergy to its different components i.e.; TBI, Commercial R&D, mature tech-operations, BPOs, and SEZ etc.
- Close collaboration with educational and research institutions.

- The Tech-park must have world-class infrastructure for IT/ITES/Biotech companies. In case of a biotech-focused Tech-park, the U&RIs should also have sufficient expertise and facilities in relevant areas.
- Single Window Clearance of all legal and administrative issues by the park management. For the purpose, the Tech-park management must be sufficiently empowered. It is always advisable to have the Chief Minister as the head of Board of Governor and Administrative Secretary as the head of EC/ Board of Management.
- The Tech-park should have business friendly and flexible approach towards businesses. The infrastructure and services of the tech-parks be made available to the entrepreneurs in a highly flexible and business-friendly manner.
- The management philosophy of the tech-park should be to minimize the capital cost of the businesses by offering and pricing its different services in a flexible and business-friendly manner.
- An anchor unit must be invited on concessional terms and conditions to create a vibrant business environment.
- The tech-park should also develop close linkages with venture capital funds, angel investors, legal and financial experts, universities etc.
- The tech-park should take care to develop linkages with the quality social infrastructure i.e.; quality schools, recreation facilities and vibrant social life.
- Arrangements of quality support services including star hotels, restaurants, conference facilities and other such facilities that may be of interest to the residents of the park.

- If possible, tech-park campus should also offer a residential complex within campus to provide superior work-life balance.
- Development of physical connectivity with the nearby urban areas by building roads and developing airports for global connectivity.
- The state government can also offer an incentive/subsidy package to the tech-parks and their clients' tech-companies on the pattern of *BPO promotion Schemes by MEITY, GOI* (see Box-5) now discontinued.

Box 5:

BPO promotion Schemes by MEITY, GOI

North East BPO Promotion Scheme (NEBPS) and India BPO Promotion Scheme (IBPS)

Ministry of Electronics & IT, Government of India notified the “India BPO Promotion Scheme (IBPS)” and “North East BPO Promotion Scheme (NEBPS)” under Digital India Programme. The schemes provide financial support in the form of Viability Gap Funding (VGF) to eligible companies, with the following objectives:

1. Creation of employment opportunities for the youth, by promoting the IT/ITeS Industry particularly by setting up the BPO/ITeS operations in smaller cities.
2. Promotion of investment in IT/ITeS Sector in order to expand the base of ITeS Industry and secure balanced regional growth.

STPI is the Nodal Agency for implementation of the BPO Promotion Schemes. Total budgetary outlay of these schemes is Rs. 543 Crore. The IBPS and NEBPS seek successful establishment of 48,300 seats in respect of BPO/ITeS operation across the country (except NE) and 5,000 seats in respect of BPO/ITeS operation in North Eastern Region respectively. The duration of IBPS was till 31.03.2019 and duration of NEBPS was till 31.03.2020 to invite new bids.

Salient features of the schemes include:

- Financial support of up to 50% of expenditure [Capital Expenditure (CAPEX) and/or Operational Expenditure (OPEX)] incurred on permissible items, with upper ceiling of Rs. 1 lakh per BPO/ITeS seat.
- Special incentives (Additional within upper cap of Rs 1 Lakh/Seat)
 1. 5% incentive for employing 50% Women
 2. 7.5% incentive for employing 75% Women (only in NEBPS)
 3. 2% incentive for employing 4% differently abled persons
 4. Up to 10% incentive for generating employment beyond target
 5. 5% incentive for local entrepreneurs
 6. 5% incentive for setting up BPO at location other than State capital (only for IBPS)
 7. Training incentive for regular employees

Source: <https://www.meity.gov.in/>

Conclusion

Therefore, we can conclude that for attracting IT and ITeS industries into smaller towns of the country, focus should shift from just providing infrastructure to building a comprehensive entrepreneurial ecosystem. The case study of Technopark Thiruvananthapuram demonstrates that success hinges on institutional support, university linkages, business-friendly policies, and strategic involvement of anchor firms.

While India's IT sector has thrived in major metropolitan areas, there is an urgent need to expand tech-based employment opportunities to Tier II and III cities. This shift is crucial for reducing migration pressure on big cities, minimizing displacement costs for workers, and creating a more inclusive and regionally balanced economic landscape. Moreover, developing IT hubs in smaller towns will help retain skilled talent locally, enhance the quality of education, and foster innovation-driven economic growth.

Therefore, it is suggested that state governments should proactively identify potential tech hubs, establish large-scale tech parks, and ensure close collaboration between educational institutions and industry. Offering incentives to early investors, particularly anchor firms, and implementing a single-window clearance system can further enhance the attractiveness of these locations. Additionally, fostering a supportive entrepreneurial culture, ensuring access to venture capital, and improving social infrastructure will be essential for sustaining long-term growth.

The success of Kerala's Technopark, and its replication in Kochi and Kozhikode, demonstrates that well-planned interventions can transform smaller towns into thriving IT hubs. If similar models are adopted across different states, India can not only strengthen its position as a global IT leader but also generate employment for millions of educated youth in underserved regions.

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