

Exploring regional innovation system pathways for startups in India

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1. Introduction

The concept of regional science is an important part of the literature on innovation system as it explains how regional economic processes operate to produce agglomeration, urbanization, and industrialization. Economists have recently rediscovered the importance of this field and labeled it “new economic geography.” Traditionally, regional science and industrial innovation studies have focused on new rationalization strategies within enterprises. Sternberg and Muller (2005) highlighted that entrepreneurial activity is largely a regional event. They argued that local conditions are more significant if an individual decides to be an entrepreneur or an enterprise survives and grows. Industrial clusters and regional economic growth are correlated. Consistent with the literature on innovation systems, enterprises are neither atomistic nor do they interact with others based only on business considerations. Any business activity is embedded in a broader socio-institutional context; therefore, the economic dimensions or relationships cannot be separated from the socio-institutional ones. In this context, Regional Innovation System (RIS) explains the phenomenon well where business activity is embedded in a socio-institutional context where the relationship between that context, namely, the regional environment, and entrepreneurial activities is analyzed. According to Feldman and Martin (2005), enterprises’ success and regional economic growth are mutually dependent. Knowledge-based new enterprises positively influence RIS in various ways (Koschatzky, 2001). Malecki and Spigel (2013)

claimed that entrepreneurs have more to learn from their local environment and other actors within it (Zahra et al., 2006). In case of startups, entrepreneurs’ interregional connections enrich their socio-institutional capacity and increase their survival rate. A regional startup ecosystem is an effective method for endorsing regional innovation and developing the business environment, along with securing the growth of domestic product and employment in a country (Krajcik and Formanek, 2015). These associations between institutions linking knowledge-producing hubs, such as universities and public research labs within a region, and innovative enterprises leads to knowledge spill over among various organizations, thus increasing a region’s overall innovativeness (Cooke et al., 1997).

In this context, India is considered the next Asian wonder owing to its rising entrepreneurial success (Huang, 2008). The government’s grip on the economy is limiting, and there are indicators that India is transitioning toward a market-oriented economy. India has also established a clear-cut policy and goal of becoming a premier business-friendly economy (World Bank, 2008). Startups and small businesses have played a critical role in India’s economy, with the world’s third-largest startup population (ET, 2016b). India is likely to have more than 45 million small- and medium-sized enterprises (SMEs), accounting for more than 40% of the country’s gross domestic product (GDP) (ET, 2016b). The State’s domination over the economy is gradually declining and there are indications that the country is

moving toward a market-oriented system. “Startup India” is the government’s flagship initiative that intends to build a strong ecosystem for nurturing innovation and startups to drive sustainable economic growth and generate large-scale employment opportunities. It empowers startups to grow through innovation and design. The government has initiated several steps to create an environment of ease of doing business; ready availability of essential services such as office space, location, supplies, and telecom connectivity; and mentors to provide strategic advice and knowledge sharing. Additionally, National Institution for Transforming India (NITI) Aayog has initiated the Self-Employment and Talent usage (SETU) program to support startups, particularly in technology-driven areas through a Techno-Financial,

Incubation, and Facilitation Programme. To facilitate credit availability for startups, the government had announced the Micro Units Development & Refinancing Agency (MUDRA) scheme operated by Small Industries Development Bank of India (SIDBI). Against this backdrop, India is offering its new Science Technology and Innovation Policy—the draft of which is already in the public domain. Considering the importance of an RIS framework to boost innovations in startups against this thrust on creating a vibrant ecosystem for startups in India and the release of the new Science, Technology and Innovation (STI) policy, this study explores the RIS pathways for startups in India.

2. Startups: Growth Engines for the Economy

New company registrations have increased from 15,000 in the 1980s to nearly 100,000 in the 2010s, due to favorable demographics and an open, commercial culture, among other factors. At an average age of 28 years, India’s entrepreneurs are among the world’s most promising young talent. As the number of startups continues to increase, their benefits are extending beyond traditional sites to regional economies. Entrepreneurial ventures are upending long-established company models and generating entirely new markets. Startup enterprises

are threatening to disrupt existing businesses and traditional distribution channels across various industries. As a result, they are likely to serve as catalysts for innovation and collaboration across India’s corporate ecosystems (IBM, 2016). Startups are regarded as India’s hope for employment generation, wealth creation, and spurring innovation. TIE and Zinnov (2019) reported that Indian startups have immense potential for job creation. Specifically, travel and hospitality industry is likely to create 52.3 million jobs by 2028, and the food and foodtech industry will generate 9 million jobs by 2024. Figure 1 reflects the growth in the number of jobs reported as India witnesses the growth of startups.

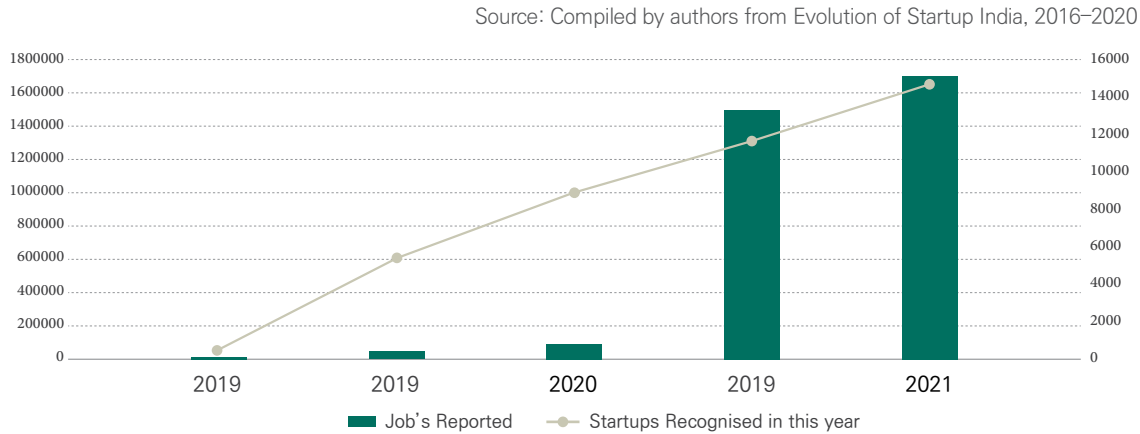


Figure 1. Growth of Startups vis-à-vis jobs created

India has more than 1500 traditional skill-based groups, covering a wide range of abilities from textile design, handicrafts, technology, paper manufacturing, coal, leather, and brass items to timber industries and everything between (Karma Bhutia, 2016) that can nurture prospective startups, which, in turn, can generate jobs, particularly in rural India. Moreover, with Industry 4.0, and technologies such as artificial intelligence, 3-D printing, and the Internet of things are no longer considered “next great things,” the digital technology revolution will significantly affect on every discipline, industry, and economy in every country. In this line, the growing number of startups in India can elevate the country from its status as a

3. Startup Ecosystem in India

Isenberg (2011) classified an ecosystem into six domains: policy, finance, culture, support, human capital, and markets. Aspects of the ecosystem's systemic conditions include networks of entrepreneurs, leadership, financial resources; human capital; knowledge; and support services. These factors, and their interactions, play a significant role in determining the success of an ecosystem. However, a diversified and talented pool of employees (referred

4. Institutional structure and governance for startups in India

Various government policy initiatives have enabled the growth of startups in India. Along with a strong policy shift toward innovation and entrepreneurship visible in different policy articulations, such as Make in India and Atamnirbhar Bharat (Self-Reliant India), specific policies has been developed for startups. “Startup India” is the government’s flagship initiative that intends to build a strong ecosystem for nurturing innovation and startups. The policy is directed toward sustainable economic growth and large-scale employment opportunities. It empowers startups to grow through innovation and design. The government has initiated several steps to create an environment of ease of doing business and provide entrepreneurial support. The core of the initiative was to build an ecosystem in which startups can innovate and excel.

hiring destination for low-cost IT services to that of a global leader in skilled work. The Indian startup ecosystem hosts nearly 167,540 startups, which can drive digital revolution in India and leverage the enormous opportunities to advance the economy. India is on the right route, as stated by the recent reports that the Indian venture capital business had invested \$10 billion in 2019, which is 55% greater than the total investment in 2018. Startups can play a significant role in transforming India from world’s information technology, services, and business process outsourcing hub to a key R&D center for international corporations.

to as “talent” in certain cases, as in Lee et al., 2004) is possibly the most critical component of a successful entrepreneurial ecosystem. Entrepreneurship is determined by the factors that affect entrepreneurial performance (Ahmad and Hoffmann, 2008). Studies have shown that the various determinants of startups and entrepreneurship development can be divided into three categories: (1) regulatory framework, (2) values, culture, and skills, (3) access to finance, market, R&D, and technology (Kshetri, 2014).

The larger program reflects on comprehensive learning program, setting up research parks, incubators, and startup centers across the country. A network approach that involves different stakeholders, academia, and industry, industry bodies with government framing policies and joint partnerships underscore the new policies (Table 1).

Startup India mission also includes learning programs, ease of patent filing, easy compliance norms, Relaxed Procurement Norms, incubator support, innovation focused programs, funding support, and tax exemptions. Various other initiatives that enable and complement the Startup Mission include “Make in India,” “Skill India,” and “Digital India” programs. Department of Promotion of Industry and Internal Trade (DPIIT) is an important government body that has created an enabling support system for startups. They have simplified norms for startups so that they

Source: Compiled from the websites of respective departments

Scheme	Funding Organization	Linked Institutions	Amount/Incentive (key highlight)
Startup India Action Plan	NITI Aayog	Flagship program of Indian government encompassing several institutions of different verticals all over the country	Fund of funds – INR 2500 Cr (approx. US \$337.2 million) per year; Tax Exemption on capital gains for capital gains invested in Fund of Funds; Tax exemption to startups for 3 years; It also encompasses and funds other programs such as NIDHI.
Atal Innovation Mission (AIM)	NITI Aayog	All Schools, universities, Higher Education Institutions, Research Institutions all over India	Grant-in-aid of INR 2 million (approx. US \$30,000) to each school (one-time establishment cost of INR 1 million (approx. US \$15,000) and operational expenses of INR 1 million (approx. US \$15,000)
Biotechnology Ignition Grant (BIG)	Biotechnology Industry Research Assistance Council (BIRAC), New Delhi	IKP Knowledge Park, Hyderabad: Centre for Cellular and Molecular Platforms (C-CAMP), Bangalore: Foundation for Innovation and Technology Transfer, New Delhi: KIIT Technology Business Incubator, Bhubaneswar: Venture Centre (Entrepreneurship Development Centre), Pune	INR 5 million (approx. US \$75,000) for each project
Biotechnology Industry Partnership Programme (BIPP) National IPR Policy 2016	Biotechnology Industry Research Assistance Council (BIRAC), New Delhi	Partnership with industry in various fields and sectors and facilities; Evaluation Committee comprising members from various ministries and government departments	The development of technologies in the context of national priorities. Supports startups, SMEs and other biotech companies on cost-sharing basis; provides a fund of US \$270,000 (approx.) to US \$1.3 million (approx.).
National IPR Policy 2016	Department for Promotion of Industry and Internal Trade (DPIIT)		SIPP Scheme – 80% IP-filing rebate for startups
Social Innovation program for Products: Affordable & Relevant to Societal Health (SPARSH)	Biotechnology Industry Research Assistance Council (BIRAC), New Delhi		For academia, capping of INR 5 million (approx. US \$75,000) per project For Companies/LLP, capping of INR 10 million (approx. US \$150,000) per project

Table 1. Major Publicly Funded Schemes for facilitation of startups

can avail fiscal and infrastructure facility. A startup registered with DPIIT enjoys a simplified compliance structure, 80% reduction in the cost of filing patents, tax exemptions, and the option of closing business within 90 days of application and many other benefits. A significant growth in the registration of startups with as many as 10,000 registered in the past 6 months shows the success of this policy initiative.

Following Start-up India, NITI Aayog, a public policy think tank, initiated the Self-Employment and Talent Utilization (SETU) scheme to support various aspects of startups, particularly in technology-driven areas through Techno-Financial, Incubation, and Facilitation Programme, with an investment INR 10,000 million (approx. 134.75 million USD) for setting up of incubation centers and improving skill development. This scheme aims at increasing the number of startups by incubation and extending other services for reducing the rate of unemployment in the country. To ease the credit availability to the startups, the government had announced the MUDRA scheme operated by SIDBI, which is a financial institution for developing and financing micro, small, and medium enterprise sectors. Tables 2 and 3 show the various forms of incentives framed for startups to leverage and flourish in India.

Regarding the regulatory framework, to be eligible for registering as a Startup, the criterion of INR 0.25 billion turnover was stipulated at the inception of the program, which has now been increased to INR

1	Section 54GB has undergone change for capital gains exemption to Startups	Feb 2016
2	Taxation of convertible notes – Period for which a bond, debentures, deposit certificate held before conversion to be considered for determining period of holding	Mar 2016
3	The introduction of section 54EE to encourage Startups	May 2016
4	Tax exemption on investments above Fair Market Value (FMV)	June 2016
5	Startups to be provided exemption on income tax for 3 years out of 7 years	Feb 2017
6	Minimum Alternate Tax carries forward period increased to 15 years	Feb 2017
7	25% corporate tax slab for companies with an annual turnover of less than INR 250 crores	Feb 2018
8	Exemption from levy of income tax (angel tax) on share premium received by eligible Startups under section 56 of the Act	Apr 2018

Table 2. Regulations about Taxation to incentivize startups in India

1 billion. Startups in India have been incentivized with 80% rebate in patent filing fees and 50% rebate in trademark filing fees. Additionally, startups are considered for expedited examination of patent applications to reduce the time taken for granting patents.

An innovation promotion platform, Atal Innovation Mission (AIM), involving academics, entrepreneurs, and researchers was initiated. It is a flagship initiative to promote a culture of innovation and entrepreneurship. AIM fosters innovation in different sectors of the economy, provides a platform and collaboration opportunities for different stakeholders, and creates awareness and an umbrella structure to oversee the innovation ecosystem. AIM has established “Mentor India,” one of the largest mentoring networks in India, from the professional and industry community to mentor startups. Significant technical support is provided under various programs of AIM.

Source: Compiled by Authors from various sources

Regulations about Banking and Commercial Borrowings		
1	The opening of foreign currency account – Indian Startup, having an overseas subsidiary allowed to open foreign currency accounts with a bank outside India	June 2016
2	External Commercial Borrowing regulations relaxed for Startups	October 2016
Regulations about Investments		
3	Investment by foreign Venture Capital Investors (FVCI) – SEBI registered FVCI can invest in equity or equity-linked instruments or debt instrument of Indian ‘Startup’ under an automatic route	October 2016
4	Angel funds allowed to invest up to 25% of their corpus in overseas Startups	November 2016
5	Upper limit for number of angel investors in an angel fund increased to 200	November 2016
6	Minimum investment made by angel fund in a Startup reduced to INR 25 lakhs	November 2016
7	Increase in maximum investment amount by an angel from five crore rupees to ten crore rupees	March 2018
8	Requirement of minimum corpus of an angel fund reduced from ten crore rupees to five crore rupees	March 2018
9	Lock in period for investments made by an Angel Fund reduced to 1 year	November 2016

Table 3. Snapshot of regulations to promote access to finance for startups in India

5. Human Resource

The Make in India campaign has gained much recognition, especially during the COVID-19 pandemic. Despite of India's vast market size and thriving startup scene, startups account for only 4% of globally recognized unicorns (startup businesses valued at USD 1 billion or more). Most (70%) venture capitalists believe that firms fail because they are unable to hire personnel having appropriate capabilities. Human resource with appropriate skill set is another component that determines the success of startups in a country. In this context, India also enjoys demographic dividend and will be at an advantageous position compared with China in terms of the working population of the age range 20-24 years. India is a young country, with 65% of its population falling under the age bracket of 25-35 years. Figure 2

shows that the maximum population lies in the age range of 20-24 and 24-44 (highlighted in red). This demographic dividend with the appropriate skill set will result in a better startup culture. Figure 3 further substantiates that most students have enrolled in bachelor's degree in Arts, followed by Technology, Science, Computer Application, Pharma, and MBBS courses, which indicates that most students are enrolled in professional undergraduate courses. Thus, with courses and curriculum, the need of the startups for personnel with the appropriate capabilities and skill set is satisfied.

Source: Census 2011

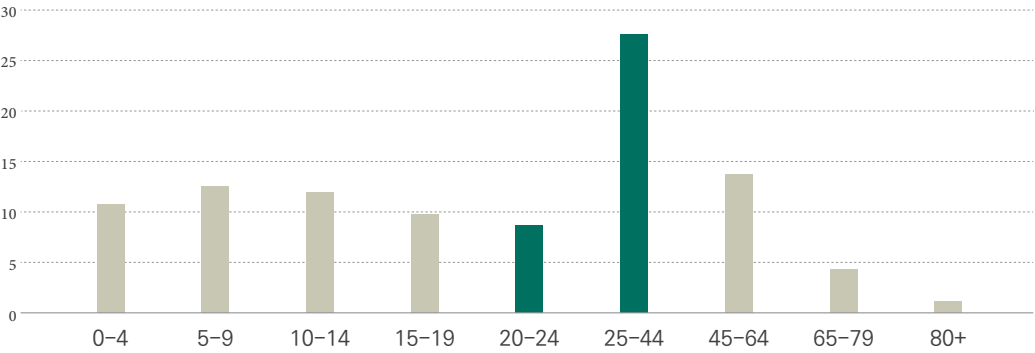


Figure 2. Population distribution across different age groups in percentage

source: Census 2011

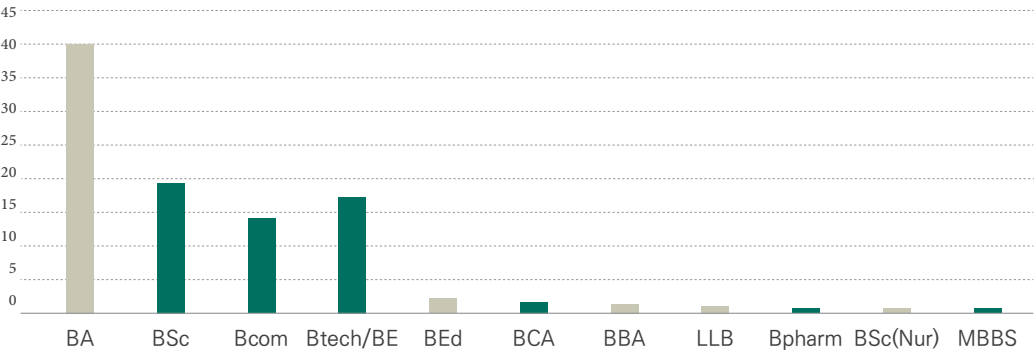


Figure 3. Enrollment in various professional undergraduate courses in percentage

6. Other Facilitators of the Startup Ecosystem: Incubators, Accelerators, Mentors, and Investors

Recognizing the catalytic role played by facilitators, such as incubators, accelerators, mentors, and investors, India has created a portal called Startup India under the Ministry of Commerce and Industry. This portal contains multiple resources for networking, training, and guidebooks for startups. A set of 19 action points has been outlined under the promotion for startup development in India. Table 4 summarizes the facilities available for startups in India across sectors, which reflect sectors like healthcare, edutech, and food gaining prominence.

Incubators and other new organizational frameworks have helps entrepreneurs in growing and bringing breakthrough products and services to market. In

2010, it was claimed that India had approximately 40 incubators; each of which mentored 4–20 businesses (Chaudhary, 2010). For example, Villgro (<http://www.villgro.org/>) reported mentoring 119 businesses as of mid-2016. It also invested US\$2.2 million as seed money and assisted them in raising more than US\$19 million in funding. Thus, more and more incubation facilities have been established in India to nurture the ideas/ventures of startups, particularly Technology Business Incubators (TBIs). TBIs are instruments that help the growth of new enterprises through innovative technological interventions. They also lay the path toward faster setup of new technologies, which are results of market research.

Sector	Start ups	Mentors	Investors	Accelerators	Corporates	Incubators
Healthcare (Healthcare IT, health &wealth, healthcare research, healthcare technology, medical devices, biomedical devices)	9401	136	39	62	6	251
Agriculture (Agritech, Agriculture chemicals, organic chemicals)	4814	116	33	47	3	306
Entertainment and Media (digital media, digital marketing, digital blogging, digital news, publishing, videos, movies, Social media)	2139	80	24	28	2	61
Ed-tech (E-Learning & Education technology, skill development, NLP)	9863	333	57	103	4	332
Food (Processing, technology, food and beverage)	6193	159	39	50		312
Clean tech (Clean technology, renewable energy, waste management, solar & wind energy)	6046	143	34	60	5	270
Construction (Engineering, Materials, supplies, and fixtures)	4401	34	6		16	39
IT (IT Consulting, IT Management, IT Services, Data science, KPO)	6752	194	41	80	4	206
Accounting & Sales	2663	281	52	74	2	167
Apparel & Accessories	2897	70	16	19	1	59
Machine Learning, Robotics Application and Technology	2693	132	50	89	3	255
Business (Business Intelligence, Business support services, business support supplies, business finance)	5223	296	57	90	5	210
Others	104625	639	91	161	25	864

Table 4. Sector-wise facilitators available for startups in India

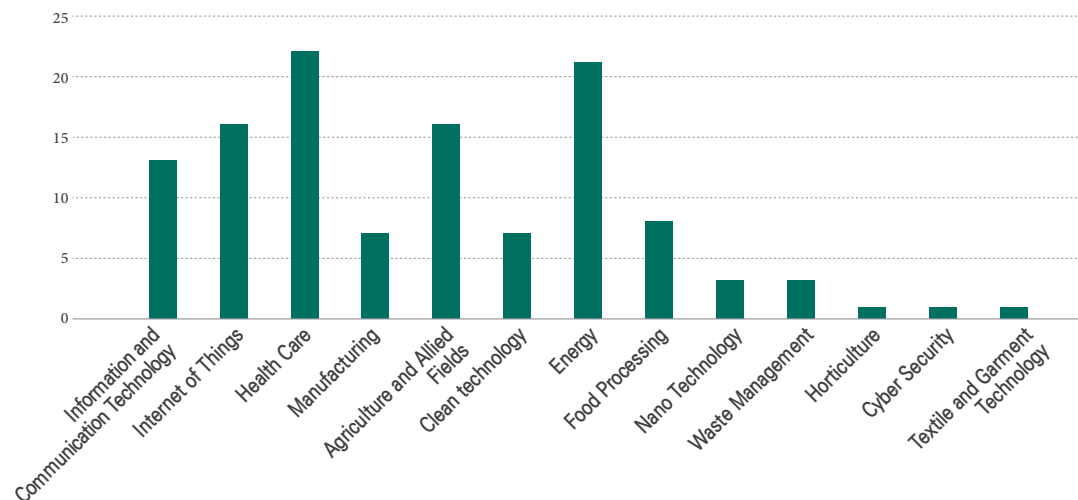


Figure 4. Sector-wise TBIs under Department of Science and Technology (DST) in India

Department of Science and Technology (DST) stated that TBIs are proposed in select thrust areas (Figure 4) for faster growth, such as information and communication technology, the Internet of Things (IoT), healthcare and digital health (medicines and drugs), manufacturing-related industries (agriculture and allied fields), clean technologies (including renewable energy), food processing, and nanotechnology. Thus, DST has established many TBIs; each of which focuses on distinct sectors such as startup companies, biotechnology, agriculture and allied industries, food processing, medicine and pharmaceuticals, and other related fields.

Corporates support startups in various ways as some could directly buy the startup products and offer

7. Access to finance

Over time, startups have attracted more number of international investors, thus increasing their confidence in India as a destination for foreign direct investment. From INR 3260 million in 2014 to more than INR. 2,7030 million in 2019, the investment amount raised by SEBI-registered venture capital funds has more than doubled, representing an increase of up to eight times in the previous 4 years. Although the proportion of investment money converted to promises was just 35% in 2014, the percentage has already grown to 61% in 2019, indicating that

support to the entire entrepreneurial ecosystem through angel networks or by providing co-working space or mentorship. Some act as angel investors that provide financial support. In fact, corporate-startup is a mutually beneficial partnership, where both benefit mutually. Startups collaborate with corporates to avail several benefits, such as free and independent working space, scalable customer base, and attractive retail chain, lesser risk in internationalization, market knowledge, and mentoring, while corporates are equally benefited as they acquire external innovation ideas, innovators with long-term trustworthy relationship, customer focus, and entrepreneurial culture.

investors are recognizing India's investment potential.

Following the launch of Start-up India, SETU scheme was initiated by NITI Aayog to support various aspects of startups particularly in technology-driven areas through Techno-Financial, Incubation and Facilitation Programme. An amount of INR 10,000 million (approx. 134.75 million USD) was invested at the onset for setting up of incubation centers and improve skill development to enable the startups in the country. This scheme aims at increasing the number of startups by incubation and extending other services for reducing the rate of unemployment in the country.

Source: Compiled by authors from Evolution of Startup India, 2016–2020

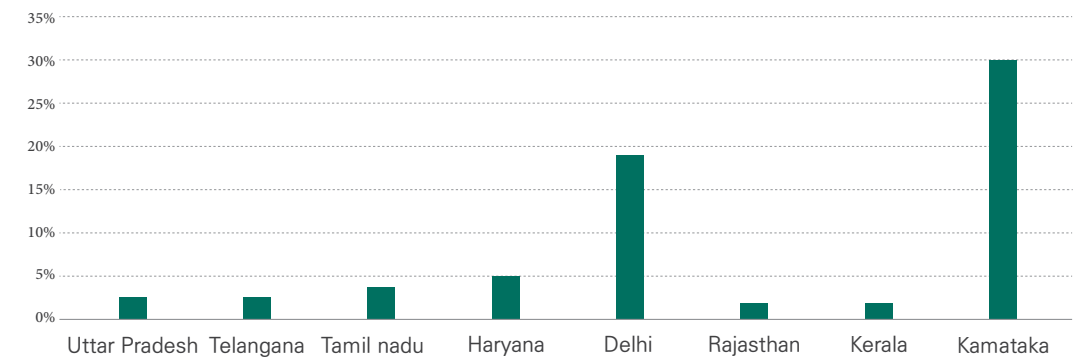


Figure 5. Startups funded under fund-of-fund scheme across states

To ease the credit availability to the startups the government had announced the MUDRA scheme-Micro Units Development & Refinancing Agency, operated by SIDBI (Small Industries Development Bank of India) is a financial institution for developing and financing micro, small and medium enterprise sector.

The Atal Incubation centre establishment is another program under which facilities to support startups into scalable and sustainable enterprises are the focus. A support of US \$ 1.35 million can provide for setting up of incubation centers. The AICs are set up at higher education institutions, R&D institutes, corporate sector, registered alternative investment funds, business accelerators, groups and via individuals who can provide 10,000 sq. ft. of space for setting up the facilities. The incubation centers cover areas of

manufacturing, transport, energy, health, education, agriculture, water and sanitation where they provide world class support facilities. This mission includes corporates and private individuals that shows an intent to increase the size of network of incubation centers.

Among the important government initiatives is the “Fund of Funds” created to help startups gain access to funding. Figure 5 illustrates that, among Indian states, most startups in Karnataka have availed funds under this scheme, followed by Delhi, Haryana, and Tamil Nadu.

8. Data and Methods

Our empirical analysis focuses on Indian startup firms established across various geographical regions, and it is based on data drawn from current startup activity and information about historical industry structure, human resources, raw materials, market, regulations, and information sources.

Human resource availability and higher education are our primary indicators of an area's knowledge base; alternatively, the amount of R&D institutes and higher education institutions in the region are our primary indications of a region's knowledge base.

To understand the presence of RISs for startups in India, primary data were collected through a structured questionnaire on the various innovation factors for entrepreneurship from startups in India operating in various sectors such as healthcare, renewable energy, education technology, agriculture technology, human resource management, advertising, and financial services sectors. Data were gathered on dimensions of innovation, institutions, rules and regulations, and regional characteristics that contribute to the development of entrepreneurs in the startup ecosystem of the country. Besides, interviews were conducted for approximately 1.5 hours with various stakeholders of the startup ecosystem to gain

Sl. No	Major Domains	Number of Experts
1	Startup Entrepreneurs	31
2	Financiers covering Seed Funders, Angel Investors Venture Capitalists and Private Equities	2
3	Government Official	3
4	Accelerator/Co-Working Space/Technology Business Incubator	1
5	Educational & Research Institute Professors	3
6	Mentors	2

Table 5. Experts interviewed under different stakeholders of the startup ecosystem in India

a general understanding of tech startups, their key characteristics, the components of the entrepreneurial ecosystem, the factors that determine the effectiveness of an ecosystem for startups, and factors that contribute to the emergence and growth of an RIS for startups in India. Table 1 lists the number of experts

interviewed during our research. We located these specialists through Internet search, print media, and professional contacts.

9. Significance of RIS for Startups

The argument that innovation is a geographical process and the skills are perpetuated through regional networks that share common knowledge bases (Maskell and Malmberg, 1999; Asheim and Isaksen, 1997) has been recognized because of the an emphasis on regions as the most appropriate geographical scale for an innovation-based learning economy; it is clear that unique and regional resources are critical for stimulating the enterprises' innovation capabilities and competitiveness. Regarding long-term competitive advantage in a global economy, Porter (1998) argued that it is frequently local, stemming from a concentration of highly specialized skills and knowledge, (formal) institutions, relevant businesses, and customers in a particular region that takes the lead. In support of this argument, earlier studies on the RIS have illustrated how the innovative activity of firms is based on localized resources, such as a highly specialized workforce, subcontractor and supplier systems, local learning processes and spillover effects, local traditions for cooperation and entrepreneurial attitude, supporting agencies, and government.

Thus, the literature on regional science focused on the role of proximity, which is defined as the benefits

derived from localization advantages and spatial concentration, and the territorially prevailing sets of rules, conventions, and norms that govern the process of knowledge creation and dissemination (Kirat and Lung, 1999). Empirical studies have provided the evidence that aspects of the learning process and knowledge transmission are extremely localized (Maskell and Malmberg, 1999). The concept of RISs had developed when government is concentrating on systematic support of localized learning processes to ensure the regional competitive advantage (Asheim and Gertler, 2004). To improve local enterprises' skills and performance, and their business environment, the RIS framework is focused on these two objectives. Thus, interactions between different innovative actors who have compelling reasons to collaborate should be encouraged, such as interactions between firms and universities or research institutes, or interactions between small startup firms and larger (customer) firms (Cooke, 2001).

Essential aspects influence the development and long-term viability of startup companies (O'Shea, Chugh, and Allen, 2008; Vohora et al., 2004; Vohora et al., 2004). These elements emerge throughout the company's learning process, during which the existing information is insufficient for the

company's development, necessitating knowledge acquisition. It can be employed both internally within the organization and externally through market transactions throughout the knowledge life cycle (Baskerville & Dulipovici, 2006; Coase, 1937, Naicker, 2013). Internal knowledge is related to professional knowledge, which is considered a company advantage because (1) it determines when to acquire external knowledge and when it can be generated internally through rearrangement of existing knowledge; (2) it establishes, when necessary, the relationships of knowledge through external partnerships; (3) it determines when internal knowledge can be commercialized; and (4) it determines when internal knowledge cannot be commercialized. In situations when to complement the learning process of a firm there is need for external knowledge, the existence of a regional ecosystem in the region where a startup is operating aids the learning process, thereby influencing the long-term success of the firm. Because a startup is typically based on a single, novel, high-technology product (Midler & Silberzahn, 2008), the level of risk and uncertainty is high during the early stages. Entrepreneurial innovation occurs when startup companies successfully launch new products and services into the commercial marketplace, thereby becoming key sources of technological and industrial growth in their respective industries (Baumol, 2002; Scherer, 1980). The importance of institutions in establishing production systems, and the extent to which innovation processes are institutionally incorporated into the setup of production systems is another aspect that is external to the firm but plays a major role to aid the innovation process. Numerous individuals and circumstances, both within and external to the organization, contribute to the process of innovation (Dosi 1988). The social aspect of innovation refers to the collective learning process that occurs between several departments within a company (e.g., R&D, production, marketing, and commercialization), and external collaborations with other firms, knowledge providers, financial institutions, and training providers (Cooke et al. 2000). Regional science addresses the role of proximity, that is, the benefits derived from localization and spatial concentration, and the territorially prevailing sets of rules, conventions, and norms through which the process of knowledge

creation and dissemination occurs. Regional science can be divided into two categories: (1) knowledge creation and dissemination and (2) regional science and policy (Kirat and Lung, 1999). As a result of a collaboration between firms and knowledge-creating and disseminating organizations such as universities, training organizations, R&D centers, technology transfer agencies and other similar entities over time, an RIS is characterized by an innovation-supportive culture that allows both firms and systems to evolve over time. Thus, we examined the relevance of RIS framework for the growth of startups in India. Figure 6 explains the spread of startups across different sectors in states of India. IT sector is the leader followed by healthcare, food, and agriculture. Coinciding with this sample also as in Figure 7, the respondent startups in the primary survey undertaken are also more from healthcare, IT, and agritech.

From the regional innovation system perspective, choosing an appropriate location for setting up a venture for a startup is all about positioning oneself in the best situation for success by making use of available local/regional resources. Startups do not simply choose the most fashionable and popular place for their business set up; rather, they chose the region based on the requirements of the firm and the availability of market and other input resources in the area. Successful entrepreneurs give serious consideration to the location in which they wish to build their enterprise. One of the most important elements to consider while selecting a business location is the demographics of the area, which is followed by affordability and community involvement in the local area. It is critical to be in close proximity to the intended customer group. Sales will be higher in a densely populated location where the target market can be found. A well-developed infrastructural setup is also equally essential for any type of successful business to operate. It is important to consider basic amenities, variables such as uninterrupted electricity and water supply, as well as the accessibility of the area in some cases. Often it appears that the ideal location to establish a business is to locate it in an urban region with a large number of clients. Most of the time, urban regions are preferred locations for young, up-and-coming entrepreneurs to set up a business. Besides its appealing characteristics, the urban region faces

intense competition from other firms that are already established in the marketplace. In India, the situation is that startup entrepreneurs are increasingly choosing rural locations for their operations and production because rural areas have a lower population density than urban areas, which makes them more attractive to investors. In a rural region, there is a greater likelihood of reduced overhead expenses and lower costs, which translates into higher profits for businesses. Funds can be directed to other costs to increase the quality of your products and services. Because overhead costs

are significantly reduced, banks will allow for the acquisition of direct loans because lower expenses mean that they will not need to rely on third parties for approval. This is the reason that in our primary study it reflects metro areas account for around only 38 percent of startup-manufacturing units, with the remaining 34 percent located in other cities. The majority of startups are concentrated in urban areas, with only 14 percent based on rural areas (Figure 8).

The study also highlights that startups mostly prefer locally skilled human resources as a benefit from the geographic region of the location of their firm. 47% startups agree that local skilled labor is the major benefit from the region followed 21% of them has voted for the availability of raw materials in the region as a major benefit.. Climate condition gets 16% weight favoring their firm, followed by public infrastructure facilities by 11% (Figure 9). That the firms have experienced availability of local skilled labor as a greatest advantage of regionality is future substantiated in Figure 9, where we find a large pool of educated young population in the cities where the sample firms are located across several disciplines. Over 80% of the startups have rated that they are dependent for human resource, knowledge resources and tacit knowledge from the region that further adds to the argument on how regional resources are important in bringing innovation and hence the significance of regional innovation system is undoubtedly effective in building the startup ecosystem in India. Although only 25% startup firms have rated high on being directly dependent upon the natural resources in the region for their production, as for the rest of the firms production process is not dependent on the natural resources. Even in this scenario too almost 60% of firms give importance to the regional natural resources (Figure 11). Accordingly, only 11% of the firms get their raw materials from the local market, whereas 15% get it from nearby cities (Figure 12). Only 16% firms depend on the local market for their raw material, due to the sector like ICT, Advertisement, Edu-tech for which raw material as knowledge base is across the nation. The reason for

startups ranking high on the availability of knowledge resources as in Figure 13 is explained well in Fig, which reflects the presence of R&D institutes and universities in the cities from where the startups are located from whom data were collected.

ties like Bangalore, Hyderabad, Mumbai, Delhi and its NCR region are hubs for such knowledge producing organizations from which the startups are directly or indirectly gaining momentum in their areas of operation. Figure 14 shows the source of technology for the startups in the sample and reflects that the majority of them are developing them in house. It is followed by 18% of the firms using open source technologies for their day-to-day operation perhaps. About 9% of the firms are resorting to import of technologies and very less of them have developed technologies in collaboration with universities/ R&D Institutes. This reflects that active collaboration with the knowledge producing organizations is missing in the region but at the same time the firms opine high on the availability of knowledge resources might be due to spillover effects.

Over 40% of the firms ranked the benefits derived from regional government as poor on provisioning of facilities for R&D, mentorship, input materials, market, and skilled human resources. Only 20% of the firms ranked such provisioning as high.

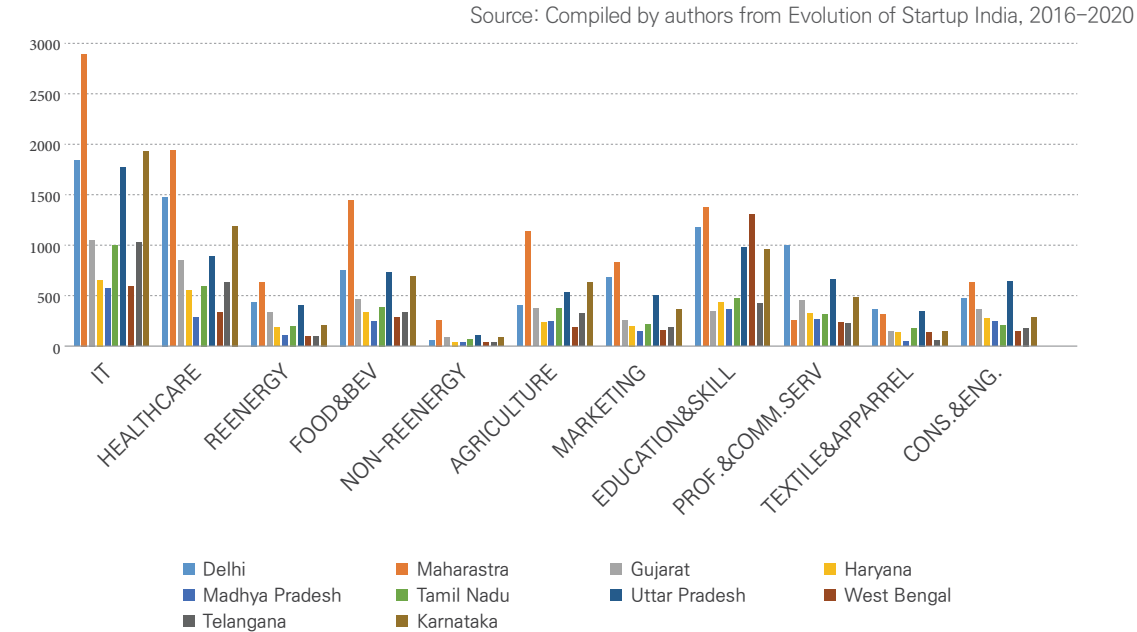


Figure 6. Sector-wise registered startups across states of India

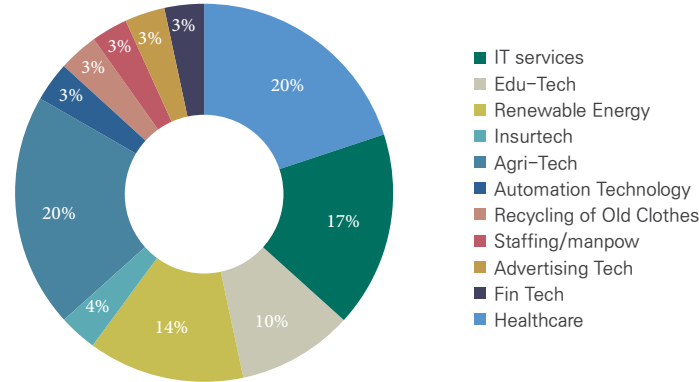


Figure 7. Sector-wise distribution of sample data According to our sample data, Agritech businesses account for about 20% of all startups.

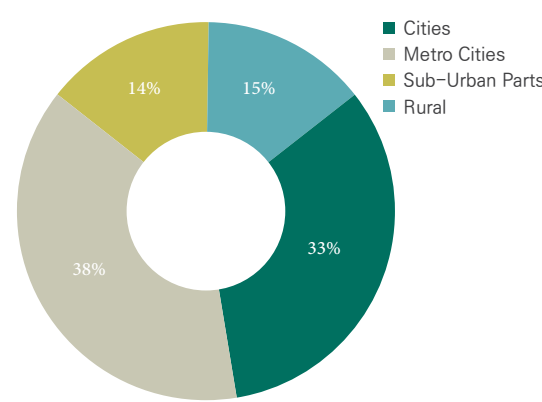


Figure 8. Location of Production Units of startups

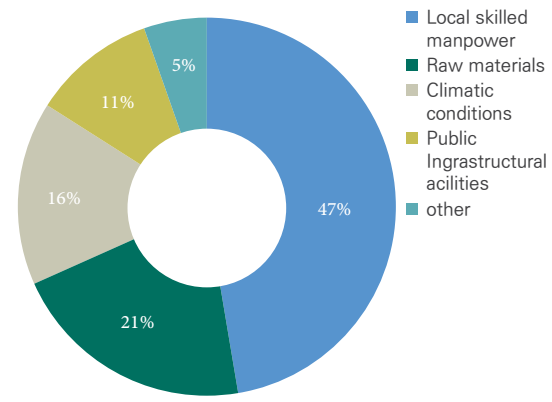


Figure 9. Factors providing regional benefit to the startups in India

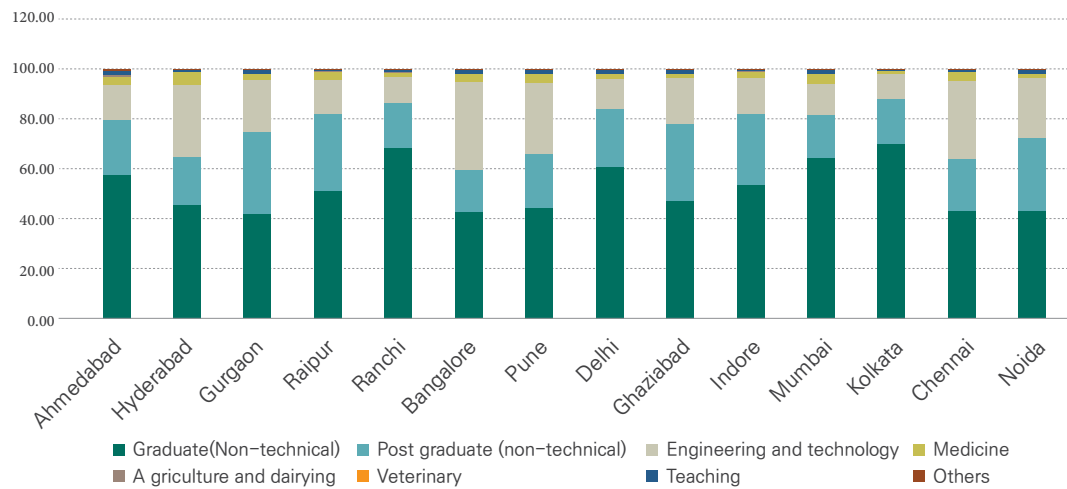


Figure 10. Education profile of young population in sample cities

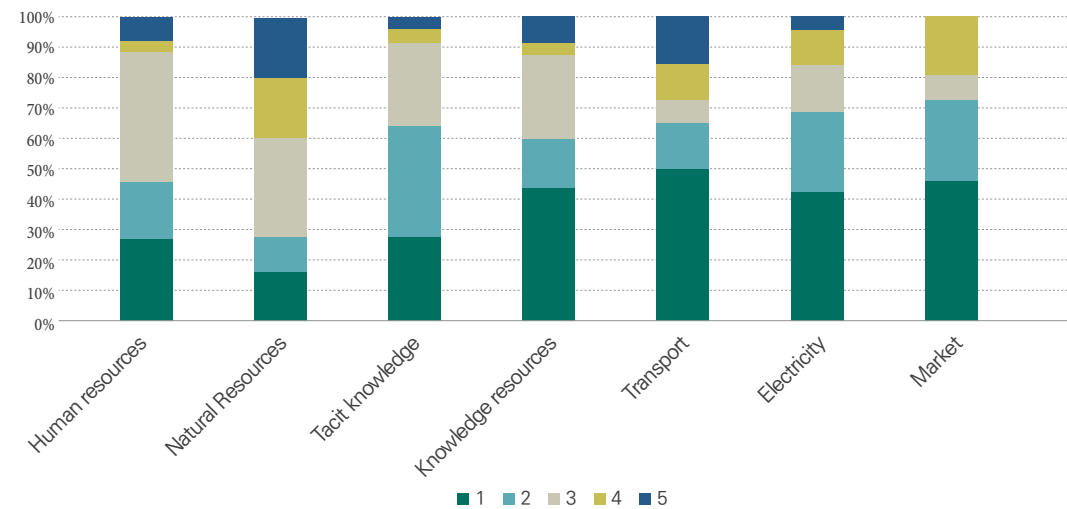


Figure 11. Opinion on the locational advantage of the startups in their respective regions

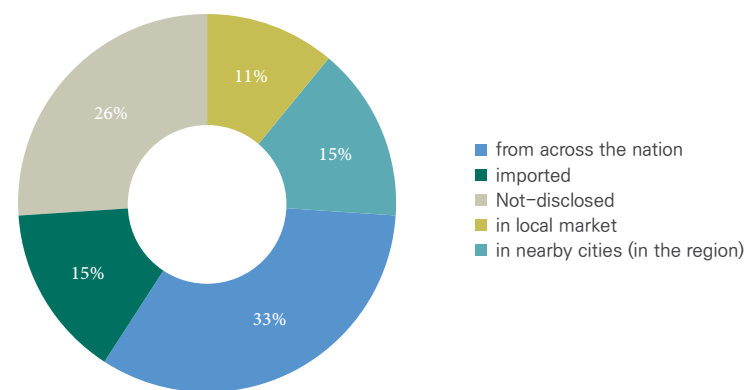


Figure 12. Access to raw materials for production for production

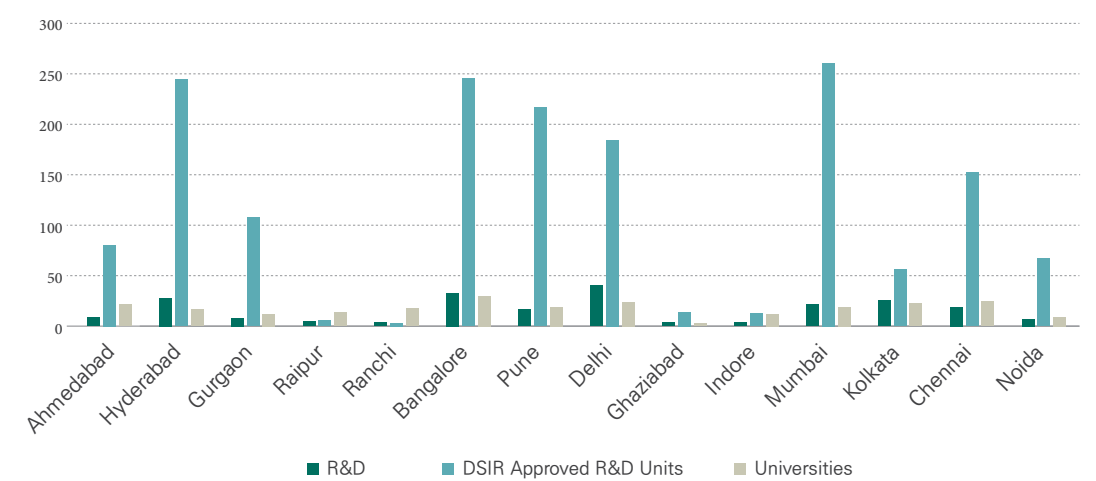


Figure 13. Number of R&D institutes and universities in the sample cities

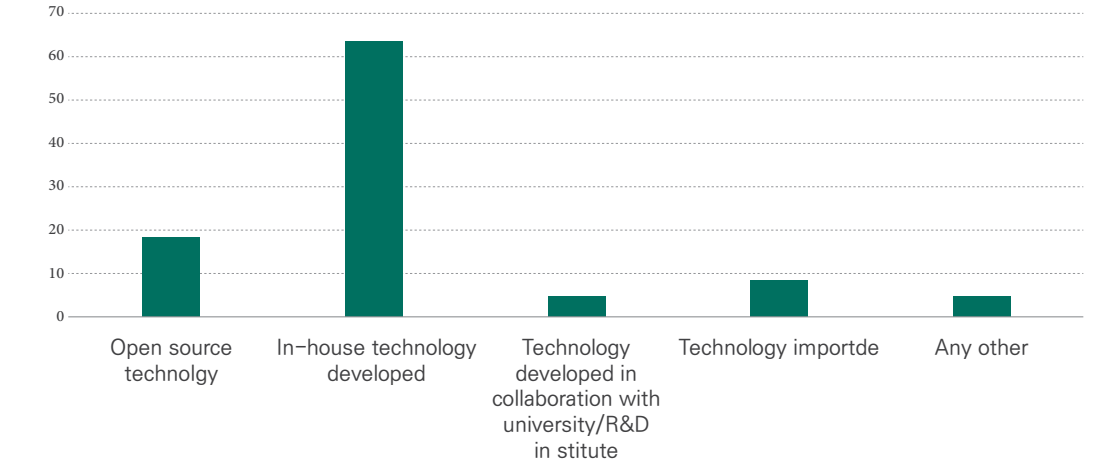


Figure 14. Source of technology for the startups in the sample

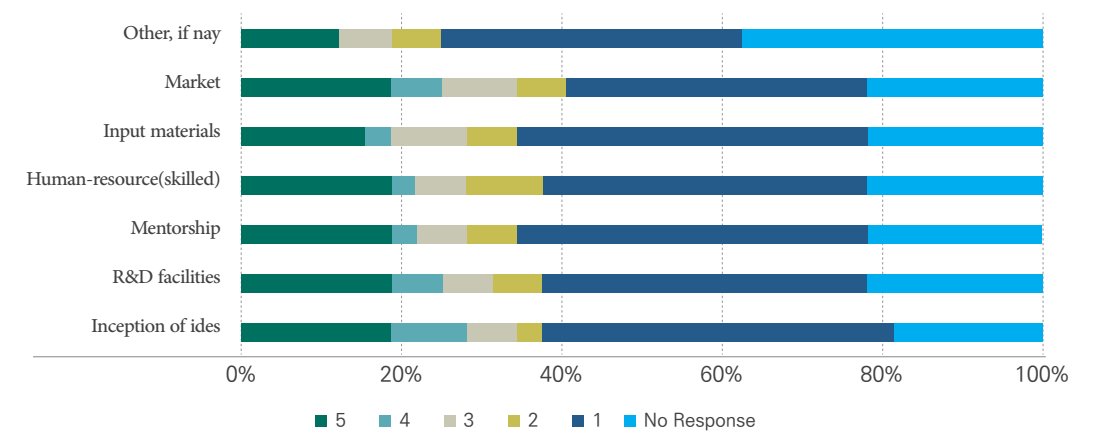


Figure 15. Perception of regional government response to provisioning of an enabling startup ecosystem

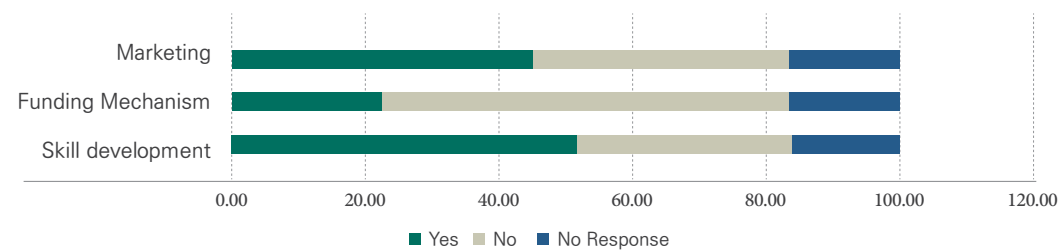


Figure 16. Opinion on regional government support necessary for the growth of the startups in the region

52% startups firm confirmed that skill development initiative by the regional government are important and conducive in their region for the growth of their business. Funding is the most desired component of startup ecosystems, it is in general provided by central government-governed policy, so therefore on little more

than 20% of the firms felt that regional government initiative/promotion is conducive for enabling startup ecosystem in their business domain. As startup policy varies from one state to another, opinion on regional government initiative/promotion being conducive for marketing is variable as reflected in Figure 16.

10. Discussion and Conclusion

The current study investigates a number of issues relating to the role of entrepreneurs in a RIS entrepreneurship policy framework, both theoretically and, to provide a better understanding of the subject. According to Asheim et al. (2016), a fundamental challenge is that different sorts of regions are faced with different forms of systemic difficulties. These develop because of fundamental structural disparities between different contexts (Asheim et al., 2011a), and they provide difficulties for policymakers when formulating region-specific innovation strategies. Bengaluru, India's Silicon Valley, is still the country's startup capital in 2020, thanks to a total funding amount of \$28 billion spread across 1,876 deals from 2014 to 2020, which makes it the country's startup capital. Bengaluru, India's Silicon Valley, is still the country's startup capital in 2020. It is regarded as India's "Startup Capital," with a population of over a million people. Additional top hubs include Delhi and Mumbai, as well as Pune and Hyderabad, which have witnessed annual growth rates of 45 percent and 37 percent, respectively, over the previous five years. Additionally, the fastest-growing hubs include Beijing and Shanghai.

Three major aspects of the region have been highlighted to better understand these concerns.

The first is the nature, availability, and challenges associated with human resource development in the respective locations. When it comes to human resources, the startup company has extremely specific skill requirements specific to their industry. One of the most dominant sectors in the world, information and technology (IT), necessitates the development of cutting-edge skill sets and understanding of current technical advancements in the area. Such technology sector firms are less reliant on regional human resources than other types of firms. Because the majority of TBIs are located within academic and research institutions around the region, entrepreneurs are heavily reliant on the students of these institutions. High-skilled human resources, on the other hand, are relocating to other regions in search of better employment opportunities. Because of the disparity between the growth of the region in terms of better infrastructure and greater job possibilities, qualified human resources are migrating to other locations to find work.

The success of a firm is heavily reliant on the talent and skills strength of its employees. The hiring of experienced professionals with track records of excellence within their area of expertise ensures that the mission and goals of the firm will be conducted efficiently and with competence. Almost 90% startups across the different sectors found the usefulness of local skill-set-based human resources for their firm,

where as 25% of the startup firm rated high on the quality and usefulness of the local skill set.

The second factor to consider is the character of the region's knowledge base. Historically, the relationship between knowledge base and entrepreneurship has been extremely substantial, and this indicates a strong persistence of both regional knowledge and entrepreneurial activity. Our findings also suggest that a historically developed regional knowledge base and a tradition of science-based entrepreneurship, as well as the interaction between the knowledge base and the level of general self-employment, are important factors in explaining entrepreneurial activity in innovative industries today. More than 60% startup firms found regional tacit knowledge is important for their development in the region. In the recent past, the government initiative for skill development like Skill India helps to nurture skill bases in the regions. Most of the startups relies on in-house technology development which also reflects the regional knowledge base and strength of R&D and academic institute like universities, science & engineering institutes in the region.

The tacit knowledge and the regional knowledge resource are most liked by the firms in the region. The regional factors and actors providing knowledge resources became important for developing startup ecosystems in the region. Other regional logistics facilities like transport, electricity is also getting higher attention by the startup firms. Most of the firms agree with the present and the importance of market for the development of the firm in the region. More than 70% rated more than moderate for the importance of market in their region. The firm also getting benefits from the initiatives from the regional government for developing marketing facilities in the region.

In conclusion, Fritsch and Storey (2014) demonstrated that there is a pattern in which some regions entrepreneurial stay entrepreneurial for a time regardless of policy intervention. Because of this, entrepreneurship policy has been absent from the development of some types of RIS, particularly those that are focused on high-tech entrepreneurship. Entrepreneurship policies, on the other hand, do make a difference in the way certain regions work in

some cases. They accomplish this through addressing a combination of entrepreneurship, enterprise, and innovation policies, which takes into account economic, social, and institutional aspects, among others (Asheim et al., 2011a). Entrepreneurial cultures and networks, human capital, and technology transfer are all important considerations. Whether entrepreneurs shape an RIS is determined by their objectives, which include those of both people (such as Schumpeterian entrepreneurs) and policy actors who are there to assist them.

There are, of course, certain limits to our study's findings. Regional clusters were identified based on the responses collected from the startup firms across a range of different industries. Because of the COVID-19 pandemic, travel was restricted and it was difficult to communicate with all stakeholders in enough number. In the current situation, only a few sectors, such as healthcare, information technology, and education technology, among others, are performing well. However, because the majority of IT-related firms operate in a virtual environment from various locations, they were satisfied with their participation in the survey.

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