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Entrepreneurial Ecosystems as an Enabler of Technological Sovereignty: The Case of the Indian Short Form Video Market

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Entrepreneurial Ecosystems as an Enabler of Technological Sovereignty: The Case of the Indian Short Form Video Market

Abstract

This paper examines whether the geopolitical objective of technological sovereignty is attainable and enabled by entrepreneurial ecosystems, as both concepts aim to improve economic competitiveness. A qualitative single-case study of the Indian short-form video (SFV) market, which provides some of the most innovative business-to-consumer (B2C) digital applications, was conducted based on 20 stakeholder interviews and triangulated archival data. Numerous SFV start-ups were created in the city of Bangalore after a geopolitical incident that prompted the Indian government to ban comparable Chinese SFV apps, including TikTok. The research empirically demonstrates that the Bangalore entrepreneurial ecosystem facilitated technological sovereignty in three steps based on an input-process-output (IPO) model to enable the creation of these “sovereign” Indian SFV apps. Core of the theoretical enablement process is the adaptability of an entrepreneurial ecosystem to socio-political disruptions induced by geopolitical and geoeconomic objectives. This allows for ecosystem self-sustainment and triggers technological sovereignty as ecosystem response.

Keywords: Ecosystem, Sovereignty, India, Geopolitics, Innovation

1 Introduction

Many nations have experienced rapid economic growth, fuelled in large parts by the presence of robust entrepreneurial ecosystems (cf. Xie et al., 2021). Such ecosystems contribute to the innovative strength, competitiveness, and ultimately soft and hard powers as a result of accelerated economic growth. However, as nations gain power, they may begin to compete with one another, resulting in geopolitical tensions and a call for strategic sovereignty, especially in the realm of technology. Prior research has examined the phenomenon of entrepreneurial ecosystems, while technological sovereignty remains a nascent concept.

Entrepreneurial ecosystems are defined as “combinations of social, political, economic, and cultural elements within a region that support the development and growth of innovative start-ups and encourage nascent entrepreneurs and other actors to take the risks of starting, funding, and otherwise assisting high-risk ventures” (Spigel, 2017, p. 50). Either literature on entrepreneurial ecosystems and technological sovereignty claims that the respective concepts promote international and economic competitiveness. The concept of technological sovereignty should reduce vulnerability to foreign countries’ influences, which describes “the ability of a state to provide the technologies it deems critical for its welfare, competitiveness, and ability to act and to be able to develop these or source them from other economic areas without one-sided structural dependency” (Edler et al., 2020, p. 2).

Lütjen et al. (2019) have identified the government as an important stakeholder of ecosystems based on the examination of service ecosystems. It was thus of interest to extend their work and to investigate as proposed research question in this study whether technological sovereignty is achievable and enabled by entrepreneurial ecosystems if proposed as geopolitical objective by national governments. Benefits of technological sovereignty include according to Edler et al. (2020):

- To prevent the risk of interference in internal affairs of a nation by external powers.

- To ensure that the data of citizens are not transferred to another country.
- Independence from external (and potentially adversarial) powers for technology.

A particular case of interest in this paper is India's ban of Chinese apps in 2020 after a military incident between both countries caused by geopolitical tensions. This sparked widespread boycotts and backlash against Chinese products in India. At the time, *TikTok*TM, a Chinese-owned Short Form Video (SFV) app developed by *ByteDance*, was one of the most popular business-to-consumer (B2C) apps in India. After it was banned, homegrown apps have attempted to fill the gap created by this sudden event, constituting a significant ecosystem transformation (cf. Oghazi et al., 2022). Nowadays, there have six prominent homegrown SFV app providers emerged that fill the void, and four of them are classified as unicorns (companies with a market valuation of \$1 billion or more). All of these firms are based in or have a significant presence in Bangalore, which has become one of the world's most prominent entrepreneurial ecosystems. Previous research such as by Bala Subrahmanya (2017b) and Bhagavatula et al. (2019) has also examined the Indian entrepreneurial ecosystem, and specifically the city of Bangalore, citing that this geographical area of the Indian economy is *under-researched* and calling for further research on the topic.

This paper commences with a literature review to establish the theoretical foundations of entrepreneurial ecosystems and technological sovereignty. For the subsequent exploratory study, an inductive and interpretative methodology was chosen, and a qualitative, single-case study methodology was deemed to be the most appropriate research design. Primary data was collected in interviews with twenty participants within the Indian SFV ecosystem. This data was triangulated and supported by secondary data such as academic journals, government reports, newspaper articles, and market reports from consulting firms. Based on an input-process-output (IPO) model (Van de Ven and Huber, 1990; Gouran, 2009), entrepreneurial ecosystems and technological sovereignty were formally linked the first time.

2 Literature Review

The research reviews relevant literature describing the concepts entrepreneurial ecosystems and technological sovereignty to gain a deeper understanding of their theoretical foundations. The review applies a methodology set out by Snyder (2019). In total, 40 papers were analysed in-depth. It could be inferred that the concept of entrepreneurial ecosystems has indeed become a mature research phenomenon, whilst technological sovereignty remains a nascent concept.

2.1 Development of the Entrepreneurial Ecosystem Concept

The underlying theory leading to the concept of entrepreneurial ecosystems evolved in the 1980s, with for instance Vesper (1980) creating a model to understand dynamics of new firm creation. This idea was further developed by Gartner (1985), who aggregated previous works on entrepreneurship and found the personality of the entrepreneur, properties of the firm and implementation of a business idea to be the primary tenets for the success of new firm creation.

In the 1990s, research was conducted on the importance of the industrial environment for a nation's competitiveness, primarily by Porter (1990), Dean and Meyer (1996), and Audretsch (1991, 1995). Later, Joshi and Satyanarayana (2014) proposed influences such as innovation intensity, business concentration ratios, minimum efficient scale, profit rate, venture capital (VC) involvement and industry growth to be key for the survival of a start-up.

Research also analysed the impact of government policies on start-up creation. For example, Millán et al. (2012) concluded government actions should ensure not to distort the occupational choice of the workforce by encouraging entry into self-employment. The related concept of regional innovation systems was championed by Cooke et al. (1997) and Cooke (2001). Describing a formal framework that allows for innovation and development within a policy-driven institutional system in a geographically defined area, this laid the foundation for the concept of entrepreneurial ecosystems.

However, the term *ecosystem* in an entrepreneurial context was first derived in the 1990s from biological ecosystems observed within the natural world (Moore, 1993). The idea of a regional start-up ecosystem was formed early on in the works of Reynolds et al. (1994). They identify factors such as agglomeration of urbanisation, domain specialisation (cluster forming) and product service localisation as positive externalities for ecosystem build-up based on knowledge spillover.

A framework for entrepreneurial ecosystems was drafted by Isenberg (2010, 2011, 2014), and further developed by other authors such as Mason and Brown (2014), Stam (2015), Spigel (2016, 2017), Spigel and Harrison (2018), and Malecki (2018). Organisations such as the World Economic Forum, Organisation for Economic Co-operation and Development (OECD) and World Bank also began to use the concept as *modus operandi* in publications (Foster et al., 2013; Mulas et al., 2017).

The idea of entrepreneurial recycling (Mason, 2008; Mason and Harrison, 2007) is also related to entrepreneurial ecosystems, describing successful entrepreneurs that reinvest their expertise into the ecosystem. For instance, they start another company, provide mentorship to new start-ups, or become investors themselves (Jha, 2018, p. 180). A timeline of the literature development is shown in Figure 1.



Figure 1 A timeline of entrepreneurial ecosystems research single [2-column fitting image]

2.2 Success Factors of Entrepreneurial Ecosystems

Isenberg (2011) understands high-quality entrepreneurial ecosystems to be shaped by six main factors. These factors determine the success of an entrepreneurial ecosystem based on the market accessibility, availability of financial funds, a favourable institutional environment, skilled labour, and a conducive culture.

Numerous scholars have performed additional research based on Isenberg's findings. However, there has been an ongoing debate over the constituent elements of entrepreneurial ecosystems (Spigel and Harrison, 2018). There is only consensus among the various definitions that entrepreneurs operate as "pivotal agents of change" in local communities (Feldman, 2014, p. 16). Thus, it is suggested the concept should be regarded as a spatially, relationally, and socially embedded phenomenon (Brown and Mawson, 2019, p. 349).

Several scholars have also claimed that there is ambiguity and interpretive flexibility of the term due to the various uses of the concept in diverse disciplines (Brown and Mason, 2017; Spigel and Harrison, 2018; Bala Subrahmanya, 2020). The concept has thus been labelled a "conceptual umbrella" to comprise a variety of theoretical perspectives (Spigel, 2017, p. 49).

Aside from the six main factors that drive entrepreneurial ecosystems according to Isenberg (2011), studies have found further distinguishing features that drive entrepreneurial ecosystems' success. As a foundation, the existence of large and already well-established businesses will create a critical mass of talent in various domains, i.e. managers and technical staff (Mason and Brown, 2014; Mulas, Qian, and Henry, 2017). It was discovered that many talents from well-established firms exit to create their own companies within the regional ecosystem (Bala Subrahmanya, 2017a). Entrepreneurial recycling also draws a local attention to the ecosystem which motivates more people to take up entrepreneurial activities.

Another key driver of a thriving entrepreneurial ecosystem was found to be the availability of information. A dense network of formal and informal ties typically facilitates a

free flow of information between ecosystem actors, with intermediaries (dealmakers) who provide information access (Mason and Brown, 2014, p. 11).

Infrastructure and education have also been cited by scholars as essential drivers of an entrepreneurial ecosystem (Germain et al., 2022; Konarev and Konstantinova, 2019).

2.3 Conceptualisation of Technological Sovereignty

Technological sovereignty is a nascent idea in the field of international relations research; however, the core concept of sovereignty is hundreds of years old, with 16th and 17th century philosophers Bodin and Hobbes defining it as a way to conceptualise supreme authority over a political entity (Lloyd, 1991). This idea back then was primarily used in the context of territorial disputes. It was not until more recently that the term sovereignty was applied to describe the autonomy of nations and their ability to act without interference from another nation based on technological sufficiency (Krasner, 2001; Couture and Toupin, 2019).

Over time, the sovereignty concept was adopted specifically for the realm of technology. It indicates that countries should preserve the ability to act strategically and autonomously in an era of intensifying global technology-based competition (Mazzucato et al., 2015, p. 137). Couture and Toupin (2019) emphasised that sovereignty could be used within the technology domain to facilitate control, autonomy, and independence of a polity's technological capabilities. The term has widely been considered to signal a primary goal of developing homegrown industries and localised innovation (Crespi et al., 2021).

The concept of technological sovereignty only emerged recently as a frame for innovation, with two subsequent papers by Edler et al. (2020, 2021). Edler et al. (2020) identify three core objectives that describe reasons why a nation would choose technological sovereignty as strategic priority: to ensure the continuity of public service, to preserve a competitiveness of the national economy based on its technological capabilities, and to

maintain the sovereign integrity of a polity. The key expected benefit of technological sovereignty is the medium and long-term success of a national economy and its technological competitiveness (Edler et al., 2020, p. 10). This would lead to both innovation sovereignty and economic sovereignty. Both types of sovereignty are achieved as a by-product when aiming towards technological sovereignty.

Edler et al. (2020, p. 18) also asserted that the key to achieving technology sovereignty is a “critical mass of knowledge carriers”, ensuring that a nation has the knowledge to sustain itself without dependence. This points to the importance of the learning and knowledge society, two themes that can often be found in the innovation literature.

Further determinants of technological sovereignty are a polity’s competencies and resources, as well as its dependence and access to competencies and resources of other nations; only then contributes technological sovereignty legitimately to prosperity (Edler et al., 2021). To achieve technological sovereignty, a nation must ensure it builds up own competencies while lowering dependence on nations deemed adversarial, which often implies a dissimilar set of culture and values, for instance in the case of democratic versus autocratic systems.

2.4 Theoretical Framework

It was found that while literature on entrepreneurial ecosystems and technological sovereignty both mention international competitiveness as an overall objective, few research further elaborated and detailed an interplay if these concepts. For instance, Ács et al. (2018), Bate (2021), and Soto-Rodriguez (2014) demonstrate that entrepreneurial ecosystems contribute to innovation, global prosperity, and international competitiveness. Resilience was also identified as an important dynamic capability in an entrepreneurial ecosystem (Khurana et al., 2022). Most research on entrepreneurial ecosystems does however not consider geopolitical factors and tends to focus on localised regions, without emphasising the global impact flourishing

entrepreneurial ecosystems might have for the whole national economy.

Existing literature on technological sovereignty is nascent, and there has barely research been conducted to understanding its drivers apart from a high-level governmental perspective. Additionally, the existing literature is highly concentrated on Europe (cf. Crespi et al., 2021), with few existing works of literature investigating the topic from a non-European perspective. In rare theoretical contributions, Edler et al. (2020, 2021) conceptualized *Technology Sovereignty* as an enabler of innovation sovereignty and economic sovereignty, which provided higher national competitiveness and ultimately prosperity.

This research proposes a link between the two concepts entrepreneurial ecosystems and technological sovereignty as visualised in Figure 2. Entrepreneurial ecosystems are thereby proposed to act as an enabler for technological sovereignty by providing adaptability and agility of an innovative environment. This would trigger a feedback mechanism, as economic and innovation sovereignty would likewise support the ecosystem to grow and to prosper.

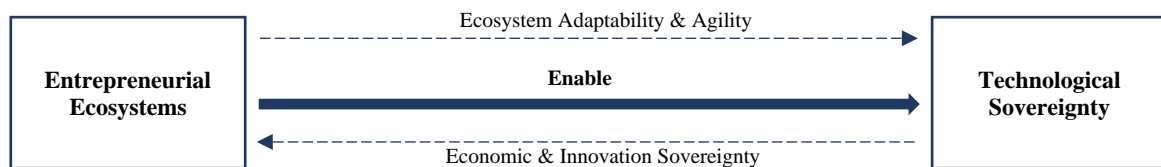


Figure 2 Theoretical framework of the research [2-column fitting image]

3 Methodology

An interpretative research philosophy reflects the subjective character of the exploratory and qualitative research methodology. The inductive approach supports this exploratory nature of the study, which relies on a cross-sectional single case study method based on semi-structured interviews. According to Eisenhardt (1989), the collection of such primary data allows for a holistic development and understanding of complex phenomena. Case study research is a widely used method within the entrepreneurial ecosystem field (Bala Subrahmanya, 2017b, 2020; Guerrero et al., 2021; Kapturkiewicz, 2021).

3.1 Case Study

A single case study approach was chosen over a multiple case approach. This has some benefits when building high quality theory according to Eisenhardt (1989) and Dyer and Wilkins (1991). It allows for deeper understanding and exploration of the subject in a constrained timeframe. Furthermore, the theory building relies on grounded theory, as it allows existing theories to be questioned whilst new theories are explored (Glaser and Strauss, 1967; Strauss and Corbin, 1990).

The Indian SFV market was chosen as a suitable case study based on an expected link between technological sovereignty and entrepreneurial ecosystems, which provided the motivation for conducting this research. After the ban of *TikTok*TM was imposed following geopolitical tensions, alternative native SFV applications emerged in India out of the Bangalore entrepreneurial ecosystem in the Karnataka state.

3.2 Data Collection and Analysis

A qualitative strategy based on semi-structured interviews constituted the primary data collection method. Purposive and subsequent snowball sampling were used to identify and

approach the target interviewees for relevant information. The initial purposive sampling was mainly facilitated by searches in the professional network *LinkedIn*TM. The sample size reflects data gathering up until a decoupling point, when data saturation was assumed after reaching informational redundancy (Fusch and Ness, 2015).

Participants were senior managers, product managers, or members of the C-suite at their respective companies. This was owing to their industry expertise, a familiarity with the business environment, an awareness of policy implications, and strategic decision-making experience. Executives in four out of the top six companies listed in Table 1 were interviewed. Five individuals that worked for government institutions – all classifiable as traditional public sector stakeholders of the companies – were interviewed, as well. They worked on topics concerning the Indian entrepreneurial ecosystem and the provision of foreign investment advice. Table 2 summarizes details of the interviewees.

Insert Table 1

The interview questions were drafted in a semi-structured and open-ended manner and were trialled in a pilot study with colleagues to ensure questions' quality and suitability. The interviews lasted between 30 to 60 minutes, a duration that is deemed appropriate in line with other relevant literature (cf. Jamshed, 2014).

After largely generic questions about the SFV market evolution in India as a whole, the impact of the Indo-Sino geopolitical clash and subsequent *TikTok*TM ban on their company was reviewed. In addition, the overall state of the entrepreneurial ecosystem in India and the determinants for location choice of their company were discussed. Questions about the company strategy, the outlook in the geopolitical context and induced strategy changes, i.e. related to company funding, concluded the interview. Any follow-up questions were based on the prior answers of the interviewees.

All interviews were recorded and transcribed with informed consent for further analysis. In a second step, information from secondary data sources such as academic journals, industry reports from consultancy firms, news articles and government publications was triangulated with the interviews (Carter et al., 2014). This should help to validate the reliability of data gathered through primary sources.

There were some limitations in this research project during the data collection phase, including the low contact to acceptance ratio of interviewees and an assumed bias of the interviewees. This may be attributed to the character of discussed topics, such as nationalism, politics, and geopolitics.

The case study's data analysis was conducted following Eisenhardt (1989) and Yin (1981, 1984). Grounded theory building was applied where data was split into first and second-order themes for further analysis (Glaser and Strauss, 1967; Strauss and Corbin, 1990). This thematic analysis was conducted with the software *NVIVO 12™* following the methodological advice by Braun and Clarke (2006). The steps are summarized in Table 3.

Insert Table 2

4 Findings

The findings provided in this section identify the factors that were crucial to develop and transform the entrepreneurial ecosystem in Bangalore. These insights were used as an input within an input-process-output (IPO) model to identify the link between entrepreneurial ecosystems and technological sovereignty in the discussion part of this paper.

Generally, it could be observed that India's national and regional entrepreneurial ecosystems have increased in quantity and quality over the past two decades and transformed the way business is conducted. The Bangalore entrepreneurial ecosystem was found to be capable of accelerating new businesses creation, innovation, and growth for increased

competitiveness on a global scale. Moreover, the ecosystem enables existing businesses to adapt to new situations and innovate, which is ultimately supportive when aiming for technological sovereignty as political objective.

An interviewee, for instance, reflected that “the resources available in Bangalore allowed for us to adapt and quickly get our own homegrown product to market quickly” (#1). Another respondent stated that the concept to create a homegrown app within his company was “an overnight decision when TikTok was banned” and attributes this to the locational advantage of “being in a place where the talent, and funding is there, was critical in achieving success” (#14). He also emphasised that this was owed to the fact that Bangalore companies have “the means and capability to have our own homegrown technologies and don’t need to rely on countries not in good terms with us” (#14).

Interviewees reiterated that many cities and states in India have purposefully created entrepreneurial ecosystems to replicate the success of Bangalore and consequently became competitors in attracting talents and start-ups. This is supported by the central government of India assisting in planning hubs such as Gurgaon in the Delhi National Capital Region (NCR). The number of start-ups currently based in India has increased tremendously ever since (Bhagavatula et al., 2019). Furthermore, various state governments directly invest in their states’ entrepreneurial ecosystems by creating infrastructure, by providing government grants, and by enabling access to experts. So far, 15 states in the country have developed initiatives to create entrepreneurial ecosystems out of a total of 28 states in the country (Cranenburgh, 2017).

4.1 Hard Infrastructure

The development of hard infrastructure has been found to be a critical factor in the evolution of the Bangalore entrepreneurial ecosystem, which was mentioned by both interviewees and the academic literature (Audretsch and Belitski, 2017; Konarev and Konstantinova, 2019). The

most critical determinants within this domain were typically cited to be public transport availability, digital infrastructure, office spaces, and housing.

4.1.1 Roads & Public Transport

The availability of roads and public transport were crucial in developing the accessibility of the entrepreneurial ecosystem. High quality road and public transport infrastructure would enable individuals to follow their occupation when commuting in large, highly populated cities like Bangalore, as it reduces travel time. It also strengthens supply chains. Reduced travel time was often cited as an important factor enabling easier access for employees to reach peripheral workplaces. The urban rail transit networks in India nowadays comprise 700 km of metro lines and allowed a larger proportion of the population accessibility to take-up work that would not have been financially viable for them previously (Nandy, 2022).

4.1.2 Internet Accessibility: Digital India

Another critical area that aided ecosystem growth can be attributed to the widespread rollout of mobile internet in India in 2016. This was largely the work of the private company *Reliance*, which invested heavily into their *Jio*TM network. Numerous interviewees stated that this made the market accessible for SFV firms and laid the foundation for the Indian social media market. *Jio*TM initially offered its mobile data network for free to all users between 2016 and 2017 and then created affordable data packages, thus increasing the internet penetration of tier 2/3 cities and rural regions. Social media usage has increased rapidly after 2016 and doubled by 2020. As of 2022, 58.31% of the population uses social media (Basuroy, 2022).

Furthermore, the access to tier 2/3 cities and rural regions greatly benefited Indian SFV firms, as it allowed them to enter the market with little competition. Western social media competitors such as Alphabet (YouTube Shorts) and Meta (Instagram Reels) only had a strong

user base in tier 1 cities after the ban of *TikTok*TM.

Interviewees also mentioned that the accessibility of high-speed internet facilitated the development of the SFV apps. This homegrown industry was developed during the COVID pandemic and impacted by the imposed restrictions, as many employees worked from their family homes. Most of the programming work for the applications was conducted online in home office and would not have been completed without the widespread availability of internet infrastructure. As one interviewee stated, “this industry would not have been possible without easily accessible internet, from both the end user and value creation perspective” (#5).

4.1.3 Technology Parks

Technology parks were highlighted as a critical infrastructure that has driven ecosystem growth. They are centrally planned environments that localise technology companies within a city. Technology Parks consist of office spaces, residential areas, and retail developments. The overall goal is to enhance operations of technology companies within the area whilst also providing benefits like the advancement of technology, investment attraction, job creation, new company growth, and overall regional development (Konarev and Konstantinova, 2019).

The first technology park in Bangalore was the *International Tech Park Bangalore*. This park was created in 1992, shortly after India began its economic liberalisation. It was a joint venture with the Singaporean government to create high-quality infrastructure that should replicate Singapore’s economic success (Parasuram et al., 2007). Since then, there have numerous tech parks been built in India. Although other tier 1 Indian cities such as Hyderabad, Pune, and Gurgaon have likewise created IT parks to support their entrepreneurial ecosystem, Bangalore was not overtaken as the number one destination for technology companies in India. Whilst these other cities have improved their standing, none of them is on a global level as relevant as Bangalore, which has become a leading technology cluster with global reach.

Critical factors that determine the success of tech parks include an entrepreneurial culture, anchor companies, research centres and proximity to universities (Parasuram et al., 2007, p. 29). All of this is available in Bangalore.

4.2 Soft Location Factors

There are several soft location factors that are critical for driving the success of the Bangalore entrepreneurial ecosystem. The most important of these soft location factors were identified as a favourable climate, personal safety, the local culture, and technical talent.

4.2.1 Climate

An unexpected ecosystem factor that allowed Bangalore to become the desired location of choice for Indian start-ups is its favourable climate. Several interviewees stated that there is a consistent and pleasant climate all year round in Bangalore in addition to low pollution levels. Compared to temperature extremes and high pollution levels faced by other major Indian cities with thriving entrepreneurial ecosystems such as Gurgaon, this constitutes a locational advantage (Roy, 2021).

The average pollution in Bangalore is 40% of the levels measured in Gurgaon (Wei, 2019). Moreover, the climate variation in Bangalore can be classified as moderate, whereas in the Gurgaon (Delhi NCR) region, there is a composite climate facing temperature extremes between -0.4°C and 49°C prevalent. Interviewees concluded that the city's liveability is a significant positive ecosystem factor.

4.2.2 Safety

Safety was cited as another major factor by various interviewees to influence the perception of the entrepreneurial ecosystem. It is commonly known that safety remains problematic in many

areas within India, particularly the aspect of Women's safety.

In the 2021 Women, Peace and Security Index, India only ranks 148 out of 170 nations (Klugman, 2021). Interviewees, however, stated that Bangalore was an excellent city for work due to its low crime rates and high safety for women. This allows female entrepreneurs – a fast-growing group currently steering 15% of all Indian unicorns (Sarkar, 2022) – and employees a subjective and objective peace of mind when working in the city. This was also important for employees and entrepreneurs with families, an aspect of particular relevance as the median age of an Indian entrepreneur is 31 years. It is customary for Indian citizens to form a family by reaching this age. Bangalore is also well connected by public transport, and most residential buildings have CCTV for security purposes.

Overall, Bangalore is ranked the fourth safest city in India, whereas Gurgaon, in comparison, is rated the least safe city in India (Sunny and Sikdar, 2017; Pawar, 2020).

4.2.3 Culture

India is a diverse country with 22 official languages and numerous religious groups shaping its culture. There exist many regional differences within the country, which has also translated to businesses strategically choosing their headquarter location. For example, the South of India is far more socially progressive than the north (Vardhan, 2021). This led to a diverse and varied workforce in cities such as Bangalore. Employees feel welcome there regardless their origin, and more than 50% of the city's inhabitants are classified as immigrants. Furthermore, interviewees cited that Gurgaon in comparison had implemented legislation targeted against immigrants by restricting 75% of private sector jobs to residents of the state. This was perceived negatively by the tech workforce.

Moreover, the corporate culture varies between regions in India. An interviewee who had worked in both Gurgaon and Bangalore emphasised that there is a far more friendly work

environment in Bangalore, with managers typically being understanding and adopting a “laissez faire”-management approach (#9). Gurgaon, on the opposite, is known for strict work policies. A progressive work environment is thus a pull-factor for technical talent. An interviewee also mentioned a “start-up buzz culture” within Bangalore and explained that “if you ever go to a coffee shop, you will almost definitely hear someone talking about their start-up or talking about joining one. It has become part of the Bangalore culture” (#6). The culture within the city was thus described to have an “atmosphere of creation” within the ecosystem.

The diverse population from all parts of India resident in Bangalore also provides support in creating targeted products for the various regions of India. This is a factor that the international SFV players with presence in India (Instagram Reels and YouTube Shorts) cannot leverage, as they only focus on tier 1 cities where the urban culture is similar to other major cities in the world. However, the unique selling point of the homegrown apps is the support and targeting of tier 2/3 cities and rural regions with specialised vernacular language content. This is an approach that *TikTok*TM was developing when expanding its Indian presence until the ban in 2020. Interviewees stated that the capability of setting up a business in a region with high diversity by adapting the business model to this diversity is crucial in India.

It was also mentioned that until a few decades ago, there was a strong cultural stigma against entrepreneurship, especially amongst white-collar workers. Back then, a “successful” individual was expected to seek a position in the civil service and government. However, over the decades, this has changed with economic liberalisation, and the definition of “success” then became synonymous with joining a sizeable MNC. Since recently, this has been extended to include entrepreneurial activities. A secondary analysis shows that this development is closely linked with the economic growth of a country, and that taking high-risk opportunities is more acceptable as a country gets prosperous (Klasing, 2014).

The interviewees described Bangalore as a city with a progressive culture suited to

young, highly educated individuals. One interviewee mentioned that the general corporate culture in Bangalore is more encouraging in terms of a liberal error culture, whereas Gurgaon is more conservative and gives employees less space for error and creativity. This general attitude motivates young graduates to rather take up work in Bangalore.

4.2.4 Technical Talent

Although other cities are growing rapidly and likewise provide ecosystems for new start-up creation, they lag behind Bangalore in popularity amongst young talents. Numerous interviewees mentioned that the city has access to the best technical talent within the country, which was considered to be a most crucial factor for SFV start-up creation. It was also noted that Bangalore at the same time has a large critical mass of employees working at MNCs. The technical knowledge they gained in these occupations would enable them to join – or found their own – technology start-ups, thus increasing new business' likelihood of survival.

An interviewee emphasised the importance of an entrepreneurial culture amongst the young talents in Bangalore: “Now people are thinking that you are young in your 20’s and 30’s, so explore and try these risky opportunities. If they don’t work out, then you can seek stability in a larger company later on” (#11). A reason why Bangalore is an ideal location for technical talent is the moderate real estate cost level, which is lower than in other cities like Mumbai, Gurgaon, and New Delhi. Bangalore can still expand its city boundaries in all directions because of rural surroundings, which contributes to non-excessive real estate costs. Coworking spaces further reduce overhead cost for firms, and Bangalore alone has 16 *WeWork* offices, followed by Mumbai with 12 and Delhi NCR (including Gurgaon) with 7. Figure 3 provides an overview about the number of start-ups in different cities across India.

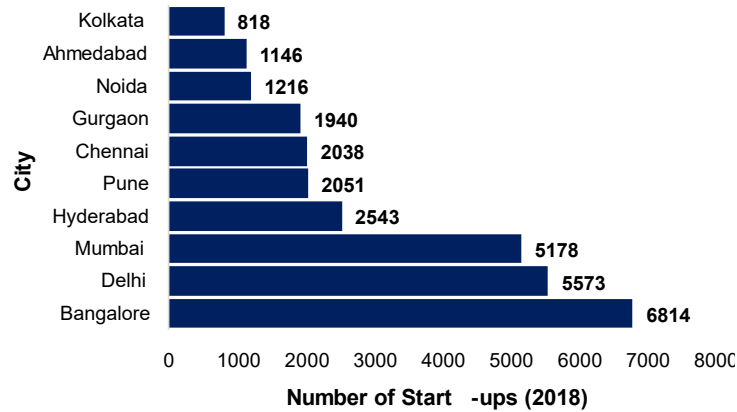


Figure 3 Number of startups by city (Bhagavatula et al., 2019) [single column fitting image]

Furthermore, it is important to note that *ByteDance* (*TikTok*TM's parent company) had a significant presence in Bangalore prior to the ban. Many of the employees from *ByteDance* decided to stay in Bangalore and to just move on to the homegrown SFV firms. It allowed these homegrown companies to understand best practises in SFV based on the existing prior knowledge and experiences within *ByteDance*, which they could leverage to develop a SFV product on both technical and managerial levels. Interviewees pointed out the concentration of technical talent within Bangalore has enabled SFV firms to innovate and compete on a global stage. Two of the SFV companies have now expanded internationally, and another has entered the Web3 and blockchain space. It was admitted that “none of this would be possible without the exceptional talent available here” (#1), which became largely accessible due to the ban.

4.3 National Policy Initiatives

National policy initiatives set out by the government were found to increase investments into Indian SFV firms and encouraged regional entrepreneurship. Most of the policy programs are top-down initiatives with limited impulses out of industry.

4.3.1 Startup India

Policymakers in India have taken an interest in further supporting the development

entrepreneurial ecosystems. The *Startup India* programme should establish an entrepreneurial culture within the country. As a central government initiative, it aims to simplify existing laws and to flank new business creation in India, by providing funding and business incentives, as well as fostering industry-academia partnerships and incubation with policy support (Bhandary and Banerjee, 2022). *Startup India* has attracted an inflow of foreign direct investment (FDI) into the country going directly into new start-ups. For example, the Japanese conglomerate *SoftBank* has invested \$3 billion into Indian start-ups in 2021 with an option of another \$10 Billion of investments in 2022 (Sharma, 2021). In the SFV space, *Roposo*'s™ parent company *InMobi* group was also backed with an investment of 40% equity by *SoftBank* (Rakheja, 2021).

Interviewees also noted that the *Startup India* programme provides seed funding, resources for creating a start-up, and schemes to connect start-ups with mentors, incubators, accelerators, and the government.

Furthermore, *Startup India* has created a ranking framework for entrepreneurial ecosystem performance to drive competition and to increase the performance amongst entrepreneurial ecosystems in the country (Goyal, 2022). Only three states achieved the top performer category, including Karnataka as the state home to Bangalore. *Startup India* stated that the Karnataka state government won this award due to its “R&D policy to attract sector-focused incentives”, creating “regulatory sandboxes for start-ups to avail exemptions from state and municipal laws”, and by “developing modern policies to support innovation in disruptive sectors” (Goyal, 2022).

The central government also recognized the state of Karnataka as “institutional champion”, an “innovative leader”, a “capacity building pioneer”, and a “funding leader” (Goyal, 2021). This is further backed by an interviewee stating that “Bangalore has easy access to funding sources which is essential for a start-up to succeed” (#9). According to the World Bank, the business environment in India has improved significantly (Felsenthal et al., 2020).

4.3.2 Startup Karnataka

In addition to the central government programme, there are initiatives at the state level to nurture entrepreneurial ecosystems. *Startup Karnataka* provides resources such as triple helix initiatives for public, private, and educational sector collaboration (Bock and Johnson, 2015). Furthermore, the campaign creates incubation infrastructure via public-private partnerships. Private sector technology companies operating in Bangalore have generally become India's wealthiest and most talent-heavy firms. The state provides backing for start-ups with public funding, tax incentives, and concessions.

The *Startup Karnataka* programme was built on a vision to create 20,000 technology start-ups within the state by 2020, with a state funding of \$330 million (Bomma, 2015). This target was successfully achieved, and whilst other state governments have launched similar schemes, the Karnataka government's access to the globally competitive private sector has given it a "head-start" and a continuing lead over other states in India.

4.3.3 Invest India

Invest India is a government-funded organisation which claims to act as the "advisor, guide and facilitator" for foreign investors aiming to enter the Indian market. The organisation comprises 200 business professionals who assist foreign firms and try to actively attract foreign investment. Interviewees employed by *Invest India* mentioned they have direct links to the *Startup India* programme and are organised by a structure representing industry, region, and target country. For example, some employees specialise in the technology industry in the Karnataka state and focus on investments from the United Kingdom.

The organisation's aim is to make India the most "liberal" investment destination globally; it also provides entry strategies, research, investment, and aftercare for every "major nation" in the world (Invest India, 2021). The major exception constitutes investment offers

that touch on matters of national security, with one interviewee stating that “we are okay with all investments as long as they do not pertain any national security issues” (#6). Since the 2020 geopolitical incident, there has indeed been enhanced scrutiny on Chinese investments.

4.3.4 Investment in Education

Investment into education in India has consistently been underfunded, with an overall budget for education amounting to 3.5% of GDP until 2022, which is lower than the world’s average of 4.2% (Sharma, 2022). This is also below the level of educational funding in any of the other global top five start-up ecosystem nations. The government has acknowledged this issue and introduced an increase of education funding to 6% of GDP as political target (Pradhan, 2022).

As India is a developing market, the level of education has an impact on both the app developer and end-user sides of the SFV market. From an app developer perspective, the increase in secondary and tertiary educated citizens can further contribute to the talent pool of qualified employees working in the technology sector. The end-users comprise a higher share of the population that is educated, which improves literacy rates and accelerates social media use. This can grow the accessible market for SFV firms. A larger talent pool also allows Indian SFV companies to rely on workers from within the country to utilize their technical capabilities, thus reducing the need to turn other nations for talents and ultimately increases sovereignty.

In order to attract students to join start-ups, rather than to take the traditional route of employment in a large MNC, several incubator funds have been created. An interviewee mentioned that there has been a sharp rise in university-based incubators in recent years that enable students to create their own start-ups. It was also pointed out that a lot of the company’s talent comes from campus recruitment, indicating a cultural shift that signals an interest of graduate students to joining a start-up (#1). Another interviewee highlighted that “while you are in your 20s to 30s, you are now encouraged to experiment and try new things – whether

this is joining or founding a start-up” (#14). The number of Indian universities entering the *Times Higher Education* rankings has consistently increased during the past decade (Basu, 2022). The Indian Institute of Management (IIM), for instance, has a presence in Bangalore. Students from elite institutions like the IIM, the Indian Institute of Technology (IIT), and the National Institute of Technology (NIT) receive 50% of public funding (Sarma, 2018).

Graduates nowadays believe that they have a fallback should their business fail, which an interviewee attributed to the overall strong economic situation in India: “I know if this start-up fails, I can join another, and if not, I will just go to an MNC – there is no shortage of jobs in this sector at the moment, someone is always hiring” (#11). Interviewees stated that Bangalore is nowadays a leading destination for alumni from top tier Indian universities.

4.4 International Business Relations

The Indian government’s relationship with other countries defines the rules and regulations on international business access to the Indian market. Since the economic liberalisation of the 1990s, India has maintained good relationships with most nations globally, including the three major powers United States, European Union, and Russia. However, it tends to have tensions with its neighbouring countries, including China and Pakistan.

4.4.1 Private Sector Funding

Despite significant support from the government, most of the Indian entrepreneurial activities remain privately funded due to the country’s liberalised free market economy approach. The government nevertheless co-invests into the entrepreneurial ecosystems’ infrastructure, which incentivizes engagement of venture capital (VC) and private equity (PE) firms seeking to capitalise from new start-up creation and scale-up. VC is the most important category of private sector funding in India. The Indian VC deal volume has reached \$38.5 billion in 2021, which

was a 380% increase from 2020 and more significantly than the growth of available VC funding in any of the other four nations ranked in the top five start-up ecosystems (Sheth et al., 2022b). Leading VC firm *Elevate Capital* even stated that “we believe that the Indian tech market has finally hit PMF – a perfect storm of talent, capital, infrastructure, depth in demand, and other enablers is brewing. The next decade is going to be growth” (Sheth et al., 2022b, p. 1). Figure 4 provides an overview about the total available start-up funding by city.

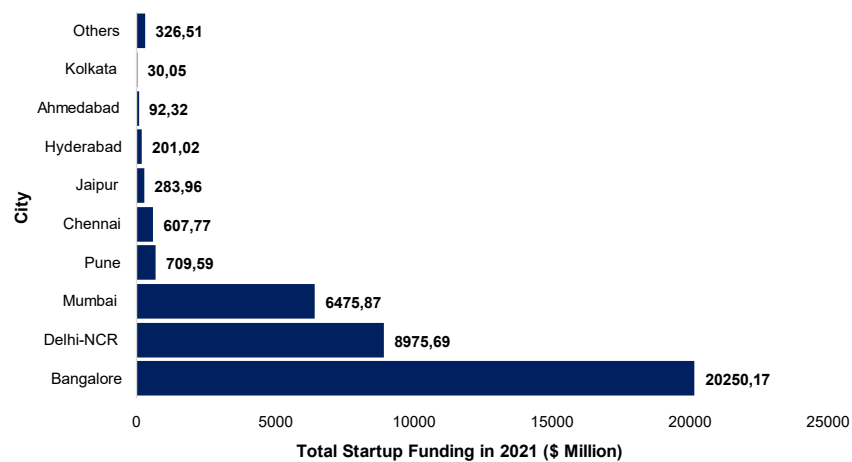


Figure 4 Total available start-up funding by city (Keelery, 2022) [single column fitting image]

Numerous interviewees mentioned that Bangalore is the preferred hub location for most Indian VC and PE funds due to its thriving entrepreneurial ecosystem, creating a self-reinforcing cycle of encouraging new start-ups to base themselves in Bangalore. In consequence, Bangalore is one of the fastest growing VC investment destinations globally and nowadays ranked 6th, followed by Mumbai that is ranked 21st (Srinivasan, 2021).

Other funding sources in the private sector include PE and angel investors. The overall contribution of VC and PE involvement in the Indian economy is displayed in Figure 5.

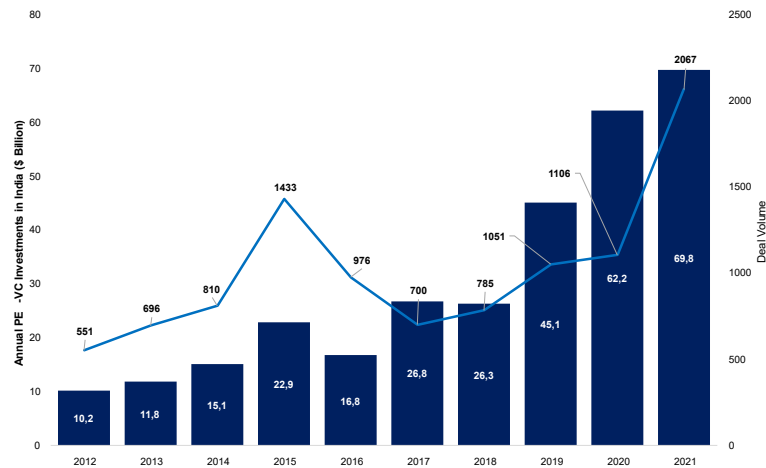


Figure 5 Development of PE and VC in India (Sheth et al., 2022a,b) [single column fitting image]

The SFV market was seen as promising area for VCs, with a 400% increase of VC funding in homegrown Indian apps since the ban of *TikTok*TM in 2020 (Sheth et al., 2021). All interviewed SFV companies have accepted VC funding from both local Indian and international firms. However, PE has not had significant relevance for the SFV market so far (Sheth et al., 2022a).

4.4.2 Foreign Direct Investment

There have been calls from all sides of the Indian political spectrum to limit foreign funding inflows, especially from countries that are deemed less friendly from India’s perspective. The leader of the parliamentary opposition, Rahul Gandhi, famously stated “the government must not allow foreign interests to take control of any Indian corporate” (Nambath, 2020).

The Ministry of Commerce has also created new rules so that any country that “shares a land border with India” requires government approval before investing in Indian companies (Mital and Shinde, 2022). This primarily affects Chinese business investments in India, as most other nations bordering India do not have companies with adequate monetary resources that

would allow them to make significant foreign investments. Chinese corporations have invested in two-thirds of Indian unicorns (Bhandari, Fernandes, and Agarwal, 2020).

There was a significant number of takeovers and investments due to the economic impact of the COVID pandemic, which exposed Indian firms to a vulnerable position. An interviewee stated that “during the pandemic, when the economic situation is tough, the funding source is irrelevant. It is a matter of life or death” (#8). This suggests that despite regulations and hindrances to receiving foreign funding from competitor nations, it was accepted if resources were scarce.

The amount of FDI into India has reached record highs of \$83.57 billion in 2021 (cf. Figure 6), and all of the top SFV firms in India have received a share of it.

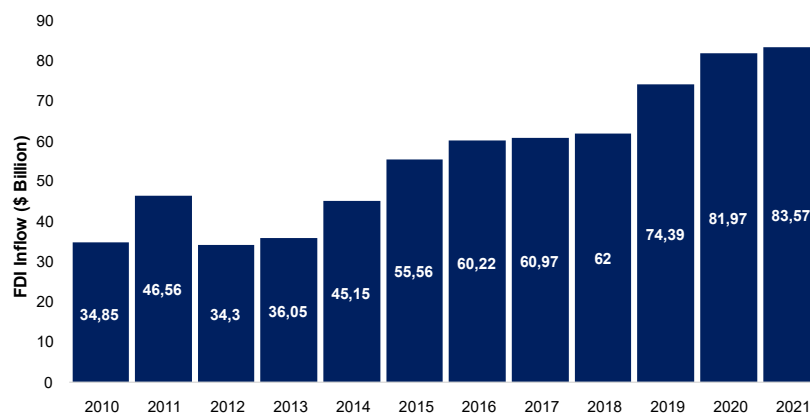


Figure 6 Foreign direct investment inflow into India over time (Ghosh, 2022) [single column fitting image]

4.4.3 Trade Barriers

Since the retaliatory ban, the central government has occasionally prevented outside funding to flow into India, and China remains a country to which relations have been tense. Most interviewees identified an increasing reluctance of SFV companies to accept funding originating from China if other options were available. An interviewee stated that funding was like “a free-flowing river from China to India like the Brahmaputra and what the government of India has done, has created a lot of dams which has limited the amount of funds that are

flowing to India” (#11). However, there also seems to be an increased hesitancy on the Chinese side to invest in India due to the risks of intervention by the government of India. Company B, for instance, was able to sell a share owned by *ByteDance* to two Canadian Pension Funds.

There are nevertheless avenues that allow companies facing geopolitical trade barriers to continue financing Indian companies. For example, *ShareChat* received funding from “special purpose vehicles” created by Chinese companies to route investments through other countries. This mitigates the risk of facing “negative press” and acts as a legal loophole to funnel funds into India.

Interviewees also stated that geopolitical relations with other countries would impact the operational presence of foreign firms in India more gravely than the pure financial investments in Indian firms, due to data sovereignty concerns. Since the ban of 59 Chinese apps in 2020, the Indian government has increased this number of banned applications to more than 220 apps citing sovereignty and national security as reasons (Jain, 2020). This has primarily been attributed to preventing the data of Indian citizens from being transferred to other territories. All interviewees agreed that technological sovereignty targets rather “data than financials” in the Indian context.

A notable example is the South Korean mobile game *PUBG*TM developed by *Krafton*; this app was banned in India due to the company’s significant investment from *Tencent*. In order to gain permission for re-entering the market, *Krafton* created an India-specific game called *Battlegrounds Mobile India*TM, which is registered in India and routed through domestic data centres (Campbell, 2021).

Interviewees felt that geopolitical tensions between India and China have lessened since their peak in 2020. Figure 7 shows an increase in Indian start-up funding levels originating from China in 2021 as the political tensions calmed. There have been rumours of *ByteDance* re-entering the Indian market with an Indian version of *TikTok*TM, similarly to *PUBG*TM. The

interviewed SFV firms, however, feared this development and believed that this would be a “huge threat to the current Indian homegrown ecosystem which is still in its infancy” (#3).

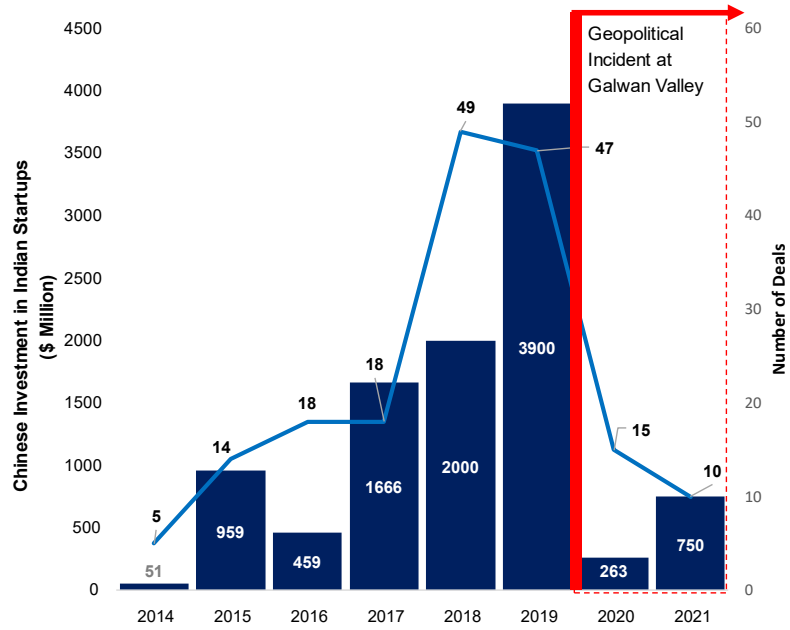


Figure 7 Chinese investment in Indian start-ups over time (Bhattacharya, 2021; Ghosh, 2022)
[single column fitting image]

5 Discussion

The overall objective of this study was to answer the research question of whether technological sovereignty can be achieved and enabled by a high-quality entrepreneurial ecosystem. An input-process-output (IPO) model was chosen to comprehend the interaction between the two concepts (Pavitt, 2014; Ven and Huber, 1990). The framework operates under the premise that the input factors cause variations in the output. Mechanisms that convert inputs into outputs are referred to as processes. This framework, as displayed in Figure 8, is a methodical, interdisciplinary concept that is frequently used to examine how input factors influence and impact the investigated output (Gouran, 2009; Langley et al., 2013).

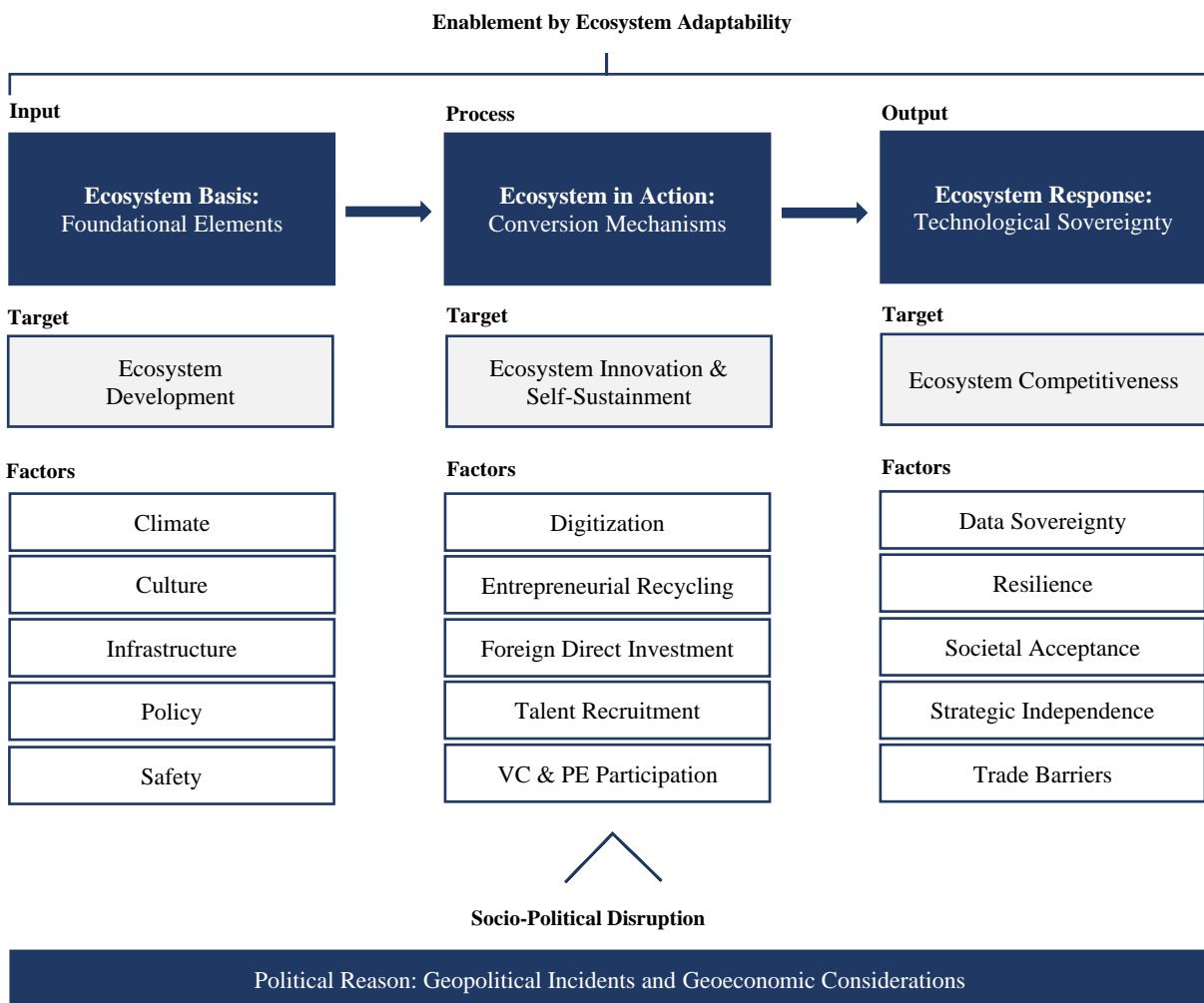


Figure 8 Input-process-output (IPO) model [2-column fitting image]

The IPO model describes the mechanism of how entrepreneurial ecosystems enable technological sovereignty. *Enablement* was defined as an ecosystem adaptability that allows existing companies to contribute to the achievement of strategic sovereignty in the technology realm. Consequently, new companies could be created rapidly, growing and competing with foreign rivals. The model's inputs provided explanations for what drives the development of a thriving entrepreneurial ecosystem, touching on concepts from prior literature as well as uncovering new factors not previously reported based on primary data. The process section then elaborates on factors that allow an entrepreneurial ecosystem to innovate and to sustain itself for a successful new business venture creation. A rapid adaptation of existing businesses serves a political objective of greater technological sovereignty if they respond quickly and efficiently to geopolitical incidents. Finally, the output examines the ecosystem response and factors of technological sovereignty.

5.1 Input: Foundational Elements of Ecosystem Development

In this study, the input variables are classified empirically based on the development of the entrepreneurial ecosystem in Bangalore. The identified factors comprise five main elements: infrastructure, policy, culture, climate, and safety.

In terms of infrastructure, key components include a functioning road network, high-quality public transportation (such as the metro and bus), internet access, as well as technology parks. It was discovered that these infrastructure factors create a productive environment both upstream and downstream of a SFV company. The effective road and public transportation network, for instance, lets technical talent travel greater distances to their workplace. Moreover, technology parks create accessible living and office spaces within proximity of each other. This is consistent with the findings of academic literature, as Germain et al. (2022) and Konarev and Konstantinova (2019, p. 167) find that tech parks can aid in “organizing the

development and coordination of stakeholders in an entrepreneurial ecosystem”. Tech parks stimulate the local economy by creating new business opportunities in the local economy, such as malls, restaurants, and schools. This caters to family needs and lifestyles of white-collar employees and is an attractive pull-factor for start-ups. The availability of coworking spaces enables entrepreneurs to conduct business on a budget. Internet access is a general requirement for the presence of technology firms.

From a policy standpoint, it was determined that a targeted government policy to initiate entrepreneurial ecosystems, such as by the creation of support institutions, was effective in driving the ecosystem. Bala Subrahmanya (2017a, p. 49), had likewise emphasised the significance of institutional support in a high-quality entrepreneurial ecosystem before. Policy initiatives such as *Invest India*, *Startup India*, *Startup Karnataka*, and an updated education policy also contributed to ecosystem success. *Invest India* has successfully attracted FDI from a variety of countries, resulting in increased access to capital for Indian businesses. In addition, the *Startup India* and *Startup Karnataka* programmes have utilised successful entrepreneurial ecosystem models from around the world and transferred them to Bangalore, creating a thriving ecosystem that is among the fastest growing in the world.

Regional and organisational culture constitute further soft factors. Interviewees preferred a culture that was more progressive and less hierarchical than traditional management practises (i.e., strict top-down leadership). Bangalore tends to have more of a liberal culture than comparable cities such as Gurgaon. The “buzz” within the Bangalore ecosystem also inspires other city residents to start their own businesses or to join a start-up, resulting in a chain reaction. This is consistent with Isenberg (2011), who highlights the relevance of a conducive culture within the ecosystem. It was discovered that graduates consider working for start-ups nowadays as a viable career path, and that their families accept this decision; this has not been the case for too long and is important to emphasise given the relevance of family

acceptance in Indian culture. An increased acceptance might be attributed to the fast-growing middle-income class that encourages their children to take on risks in their early life.

Throughout the interviews, personal safety within an ecosystem was repeatedly mentioned as important factor. This was not found in any of the reviewed literature before. A reason may be the focus of most of the literature on the hard infrastructure factors and policy requirements to create an ecosystem, which tends to neglect soft locational factors. The safety of women in India is of particular significance, as the number of women in Indian entrepreneurship reaches record heights.

Finally, the climatic conditions within India vary significantly, and turned out to be comparably favourable in the Bangalore region. This very much attracts the workforce to prefer the region over other hubs such as Gurgaon. Prior research has entirely omitted this factor for entrepreneurial ecosystem development.

5.2 Process: Conversion Mechanisms for Innovation and Self-Sustainment

The development and growth of a successful entrepreneurial ecosystem is iterative, as the ecosystem continues to develop and become self-sufficient after the implementation of the foundational elements identified in the *input* section. This capability for adaptability equips businesses with necessary elements for enabling technological sovereignty based on ecosystem adjustments. Five *process* factors fuel the evolution: VC and PE participation, digitization, entrepreneurial recycling, talent recruitment, and FDI.

PE and VC involvement is an important factor after the formation of a basic entrepreneurial ecosystem was successful. This is due to the rising awareness that the ecosystem has become a start-up hub and can already provide a track-record in this regard. The participation of VC and PE investors in an entrepreneurial ecosystem can in consequence further stimulate ecosystem evolution and generates a substantial amount of capital for start-

ups, greater than what could be provided by angel investors and government grants in its foundational stages as earliest form of ecosystem support. VC and PE investment in start-ups then provides them with guidance and partnerships to better conduct business, including leverage and the skills to perform at a world-class level. This enhances an ecosystem's international competitiveness and enables its self-sufficiency as prerequisite for the attainment of technological sovereignty. VC and PE involvement in India has indeed reached record levels, and the scaling time required to become a unicorn has decreased. Practice has recognized the importance of VC and PE funding for the evolution of entrepreneurial ecosystems (Sheth et al., 2022a,b).

On the downstream end of a tech firm, the expansion of digitization due to improved internet infrastructure creates new market opportunities. In the SFV market, the impact of widespread affordability and access to the internet as a result of *Jio's*TM release opened up the Indian market, thereby providing these companies with higher growth potential. This is consistent with Isenberg (2011), who identifies accessible markets as a key factor in the expansion of entrepreneurial ecosystems. Without an increased internet accessibility in rural India, demand for SFV would be lower. Moreover, less innovative SFV firms had an incentive to become competitors in the SFV market on the supply-side with higher digitization levels.

According to Jha (2018, p. 180), entrepreneurial recycling is another by-product of a thriving entrepreneurial ecosystem. This occurs when successful entrepreneurs within the ecosystem become angel investors, serial entrepreneurs, institution builders, or even engage in entrepreneurial philanthropy. Such a development increases the quality and quantity of new businesses within the ecosystem and ultimately a region's overall wealth, like in Bangalore. Before deciding to create a start-up, the majority of all Indian SFV company founders also had experience working for a large corporation, an observation that is consistent with findings provided by Bala Subrahmanya (2017a). This allowed entrepreneurs to utilise prior industry

experience to create their own businesses. These former employees can work effectively and efficiently in an environment with favourable start-up ecosystem support, such as by incubators, SFV funding, affordable workspaces, and technical talent.

Furthermore, a mature education system can increase the educated workforce. Jha (2018, pp. 181-186) have already mentioned the importance of available talent for ecosystem success, which was reiterated in this research. Funding for leading universities has further improved their global rankings in India. This supports all entrepreneurial ecosystems in India by providing cutting-edge technologies and by increasing the quantity of available technical talent, thereby contributing to a strengthened university-industry link. Existing companies in an ecosystem can benefit from policies and infrastructure to increase their talent pool, supply chain efficiency, and market accessibility. Bala Subrahmanya (2017a, p. 49) has also suggested that availability of talent is key to a successful entrepreneurial ecosystem in Bangalore.

FDI from large corporations into start-ups often occurs within established entrepreneurial ecosystems. Prior research by Isenberg (2011) and Bala Subrahmanya (2017a) emphasises that the availability of capital is a fundamental element to transform an emerging ecosystem into a mature and healthy entrepreneurial ecosystem. The largest technology companies in the world, including Google and Meta – which both have their Indian base in Bangalore – have invested in Indian SFV companies. Large amounts of capital and access to some of the world’s most advanced technologies provides domestic companies with a “head-start” in order to ensure that the home country is globally competitive. Bala Subrahmanya (2017b, p. 17) has also found the presence of large companies in India had a positive effect on the Bangalore ecosystem. However, FDI was deemed problematic if it originated from nations that have geopolitical tensions with India. It was discovered that there is pressure to drop funding in Indian companies by investors originating from adversarial nations. These investors require additional governmental permissions to invest in Indian companies since the 2020 ban.

5.3 Output: Technological Sovereignty as Ecosystem Response

This study corroborates the assumption that technological sovereignty might be enabled and achievable based on a robust entrepreneurial ecosystem. In the present case, the government executed an important role as stakeholder of the entrepreneurial ecosystem by banning foreign applications from the Indian SFV market. Extending the findings of Lütjen et al. (2019), the government thus not only acts as stakeholder to introduce mere policy and legislative initiatives, but ecosystem actors also need to consider its geopolitical ambitions and constraints for their own strategy. Government interventions based on socio-political disruptions motivated by geopolitical reasons may shape and transform the ecosystem considerably, as it occurred in the present case (cf. Oghazi et al., 2022). Five variables can be inferred from the findings that facilitate or impede ecosystem competitiveness, and ultimately support the attainment of technological sovereignty in varying degrees: data sovereignty, resilience, societal acceptance, strategic independence, and trade barriers.

Initially, it was expected that trade barriers such as restricting competition and halting foreign funding from adversarial nations were a means for a government to achieve technological sovereignty. Restriction of foreign competition indeed enabled local firms to identify a gap in the market and to enter the SFV market with limited foreign competition, therefore increasing control, autonomy, and independence of the polity as demanded by Couture and Toupin (2019) when aiming towards technological sovereignty. The ban in 2020 therefore allowed these SFV firms to advance their technologies with eased time pressure. However, halting foreign investments had limited significance in the case of the Indian SFV market. Whilst the government has enacted new laws requiring firms from competitor nations to seek explicit permission before investing in Indian companies, the practice has been of ambivalent success. Only in some cases, the government has granted this permission, but companies could also exploit legal loopholes to accept funds via “special purpose vehicles”

from foreign investors. Due to a pessimistic global economic outlook, some start-ups chose this approach despite the risks of perceived dependence, which runs contrary to the idea of economic sovereignty as element of technological sovereignty (Edler et al., 2020).

Achieving data sovereignty, however, was a crucial motivation in the pursuit of technological sovereignty in India. The ban of foreign apps that route data to servers located in foreign countries highlights the government's concern in this area, as witnessed by many official statements and perceived as a matter of relevance for national security. The Ministry of Electronics and Information Technology introduced related legislation to ensure the sovereignty of citizens' data and prevent it from being transferred out of the country (cf. PIB Delhi, 2020). Operational considerations therefore played a considerably more important role than financial factors in the present case. Edler et al. (2020) had emphasised the importance of data sovereignty as an element of technological sovereignty before.

Strategic independence can be inferred as a foundational objective when aiming towards technological sovereignty. India has historically been protectionist and independent from other nations until the 1990s (Shastri, 1997; Bala Subrahmanya, 2017b). Since then, there has been significant foreign entry of MNCs into the Indian market, which absorbed many young talents. The ban of Chinese apps and the subsequent growth of homegrown alternatives in the SFV space allowed for the existing talent pool to work for homegrown companies, inspiring individuals to start their own start-ups and further contributing to the development of the local economy. This confirmed the availability of a "critical mass of knowledge carriers" in the present case (Edler et al., 2020, p. 18). India clearly acted strategically and could secure its say in the technology-based competition to generate a comparative advantage as suggested by Mazzucato et al. (2015, p. 137). Less reliance on foreign actors for employment thereby created a 'trickle down' growth effect for the domestic economy. At the same time, it also reduced the dependence on a foreign power's technology (cf. Edler et al. 2020).

Furthermore, the ecosystem's reaction to the ban has shown a great degree of resilience towards government-induced instability. The unpredictability of government relations with adversarial nations has prompted some SFV firms and other Indian start-ups to strategize against potential new legislation by trying to avoid funding from China. This further accelerated India's building-up of its own competences and capabilities as suggested by Edler et al. (2021). The government has likewise tried to support the development of the ecosystem's independence from an external power with policy measures, which added to the resilience of the ecosystem towards changing foreign relations. This adds a new geopolitical perspective to research on ecosystem resilience as a dynamic capability (Khurana et al., 2022). Policy actively supports homegrown technologies with central-government campaigns such as *Startup India* (Bhandary and Banerjee, 2022), as well as state-funded campaigns such as *Startup Karnataka* (Bomma, 2015). These schemes thus increased the country's resilience from a geopolitical standpoint whilst contributing to the local economy by increasing the pure number of start-ups.

Lastly, the societal pressure exerted by end users should not be underestimated as an enabling factor of technological sovereignty. The Indian SFV market was initially created based on the widespread availability of mobile internet in tier 2/3 cities and rural regions, contributing to 70% of India's population (Kumar, 2020). The Indian population in these areas tends to be nationalistic and has historically participated in boycotts of foreign products, therefore potentially politically rewarding the government for a strategy of technological sufficiency (Krasner, 2001). This has caused companies to be wary of potentially harmful foreign investments to avoid negative press and user boycotts. Interviews also revealed these audiences respond better to apps that are tailored to vernacular language creating a personalised user experience. Contributing to the success of Indian entrepreneurs, these "sovereign" apps supported the attainment of technological sovereignty in the Indian SFV market based on a homegrown industry due to innovation sovereignty (Edler et al., 2020; Crespi et al., 2021).

6 Conclusion

This paper investigated technological sovereignty in a case study outside of a European context and in relation to entrepreneurial ecosystems, which has been neglected in the academic literature so far.

The IPO model enabled a structured review of the essential characteristics of entrepreneurial ecosystems that can contribute to technological sovereignty. The availability of technical talent, a high-quality infrastructure, internet access, and the local culture were essential to the development of an effective and adaptable entrepreneurial ecosystem as prerequisite for technological sovereignty. These factors correspond to previous works, such as by Isenberg (2011). However, personal safety and favourable climatic conditions also supported the development of a thriving entrepreneurial ecosystem, which was not reported before. These factors were found to be crucial for attracting technical talent to Bangalore.

Additional factors enable an entrepreneurial ecosystem to flourish, self-sustain, and expand, like entrepreneurial recycling, VC and PE investments, and individual entrepreneurial efforts. After the ban of *TikTok*TM in India, existing companies in the Bangalore entrepreneurial ecosystem learned to quickly adapt, and the city's resources allowed new companies to be created, to grow, and to compete in the SFV market. It was also discovered that under this exogeneous requirement due to a socio-political disruption a large self-sustaining accessible market was established.

The escalating geopolitical tensions clearly laid the basis for the call to technological sovereignty by the Indian government, which has cited data sovereignty as a significant factor in its decision to ban more than 200 foreign software applications. Moreover, government pressure and nationalistic tendencies within India have accelerated the development of local, "sovereign" applications. The capability to develop such homegrown apps based on machine learning can be an additional driver for technological sovereignty but might depend on the

availability of talent for the technology. This has largely become available in Bangalore after *TikTok*TM was banned and ceased their operation in India.

Company funding and FDI, however, was not found to be a significant factor for technological sovereignty. Despite increased legislation to prevent foreign funding from adversarial nations like China, there remain loopholes that allow funding to continue flowing into the country via “special purpose vehicles”. Combined with a general lack of funding due to economic downturns, entrepreneurs still have a way to accept funding – albite reluctantly – from China.

Overall, it is concluded that an entrepreneurial ecosystem can facilitate international competitiveness to ultimately also enable technological sovereignty, by fostering the creation of innovative homegrown businesses. Very few research has approached the phenomenon of technological sovereignty empirically before.

While every effort was made to ensure the rigour and quality of this study, some limitations have to be acknowledged. Although the number of interviewees was limited to 20 respondents after reaching theoretical saturation, the sample size could have been increased by including other ecosystem actors like PE and VC specialists. The study’s robustness was also limited due to the single-case study methodology. In addition, as this case was extremely unique, its generalisability may be limited.

Future works could use multiple case studies and a mixed- or multi-method approach. For instance, the regional innovation system of the Chinese Bay Area could be investigated, including its relevance for the evolution of Chinese applications following a ban on western technologies since the 2000s. Other examples include the United States’ restrictions on Chinese apps and the European Union’s policies on AI and data, with initiatives like Gaia-X that are also motivated by the political objective of technological sovereignty. Other areas of significant social impact such as technology in healthcare could likewise be investigated.

References

- Ács, ZJ, L Szerb, E Lafuente and A Lloyd (2018). The entrepreneurial ecosystem and global prosperity. In *Global Entrepreneurship and Development Index 2018*, ZJ Ács, L Szerb, E Lafuente and A Lloyd (eds.), pp. 11–19. Cham: Springer.
- Anbarasan, E (2021). China-India clashes: No change a year after Ladakh stand-off. *BBC News*, News Item, June 1. Available at: <https://www.bbc.co.uk/news/world-asia-57234024> (Accessed 19-05-2022).
- Audretsch, DB (1991). New-firm survival and the technological regime. *The Review of Economics and Statistics*, 73(3), 441–450.
- Audretsch, DB (1995). Innovation, growth and survival. *International Journal of Industrial Organization*, 13(4), 441–457.
- Audretsch, DB and M Belitski (2017). Entrepreneurial ecosystems in cities: Establishing the framework conditions. *Journal of Technology Transfer*, 42, 1030–1051.
- Bala Subrahmanya, MH (2017a). Comparing the entrepreneurial ecosystems for technology startups in Bangalore and Hyderabad, India. *Technology Innovation Management Review*, 7(7), 47–62.
- Bala Subrahmanya, MH (2017b). How did Bangalore emerge as a global hub of tech start-ups in India? Entrepreneurial ecosystem, evolution, structure and role. *Journal of Developmental Entrepreneurship*, 22(1), 1–22.
- Bala Subrahmanya, MH (2020). Entrepreneurial ecosystem for tech start-ups in Bangalore: An exploration of structure and gap. *Journal of Small Business and Enterprise Development*, 27(7), 1167–1185.
- Basu, S (2022). Indian universities: 71 Indian universities make it to the Times Higher Education Asia University Rankings 2022. *The Economic Times*, News Item, June 1. Available at: <https://economictimes.indiatimes.com/industry/services/education/71->

indian-universities-make-it-to-the-times-higher-education-asia-university-rankings-2022/articleshow/91941901.cms (Accessed 15-05-2022).

Basuroy, T (2022). Social network user penetration in India from 2015 to 2020, with estimates until 2025. *Digital Market Outlook*, Market Report, March 15. Available at: <https://www.statista.com/statistics/240960/share-of-indian-population-using-social-networks/> (Accessed 07-06-2022).

Bate, AF (2021). A comparative analysis on the entrepreneurial ecosystem of BRICS club countries: Practical emphasis on South Africa”. *SN Business & Economics*, 1, 1–20.

Bhagavatula, S, R Mudambi and JP Murmann (2017). Management and organization review special issue ‘The innovation and entrepreneurship ecosystem in India’. *Management and Organization Review*, 13(1), 209–212.

Bhagavatula, S, R Mudambi and JP Murmann (2019). Innovation and entrepreneurship in India: An overview. *Management and Organization Review*, 15(3), 467–493.

Bhandari, A, B Fernandes and A Agarwal (2020). *Chinese Investments in India*. Gateway House Report No. 3, Indian Council on Global Relations.

Bhandary, D and A Banerjee (2022). Everything you need to know about startup India. *Startup Talky*, News Item, January 25. Available at: <https://startuptalky.com/startup-india-scheme/> (Accessed 14-06-2022).

Bhattacharya, J (2020). Technological sovereignty and how India lacks it. *StratNews Global*, News Item, June 8. Available at: <https://stratnewsglobal.com/trade-tech/technological-sovereignty-and-how-india-lacks-it/> (Accessed 04-07-2022).

Bhattacharya, A (2021). China has invested a lot less in Indian startups than you thought it did. *QZ.com*, News Item, November 19. Available at: <https://scroll.in/article/1010783/china-has-invested-a-lot-less-in-indian-startups-than-you-thought-it-did> (Accessed 29-06-2022).

- Bock, A and D Johnson (2015). Entrepreneurial ecosystems: Fixing the triple helix. *European Business Review*, Blog, November 20. Available at: <https://www.europeanbusinessreview.com/entrepreneurial-ecosystems-fixing-the-triple-helix/> (Accessed 11-05-2022).
- Bomma, B (2015). *Karnataka startup policy 2015-2020*. Department of Information Technology, Biotechnology and Science & Technology, Government of Karnataka, India.
- Braun, V and V Clarke (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2), 77–101.
- Brown, R and C Mason (2017). Looking inside the spiky bits: A critical review and conceptualisation of entrepreneurial ecosystems. *Small Business Economics*, 49(1), 11–30.
- Brown, R and S Mawson (2019). Entrepreneurial ecosystems and public policy in action: A critique of the latest industrial policy blockbuster. *Cambridge Journal of Regions, Economy and Society*, 12(3), 347–368.
- Campbell, I (2021). PUBG mobile returns to India after ban with green blood and a new name. *The Verge*, News Item, June 17. Available at: <https://www.theverge.com/2021/6/17/22539055/pubg-battlegrounds-mobile-india-returns-ban> (Accessed 11-07-2022).
- Carter, N, D Bryant-Lukosius, A DiCenso, J Blythe and AJ Neville (2014). The use of triangulation in qualitative research. *Oncology Nursing Forum*, 41(5), 545–547.
- Chaney, L, K Thundiyil, S Andersen, S Chidambaram and YP Abbi (2007). Fuel savings and emission reductions from next-generation mobile air conditioning technology in India. *Conference Paper at the National Renewable Energy Laboratory*, Golden, 2016.
- Chishti, S (2001). India and the WTO. *Economic and Political Weekly*, 36(14), 1246–1248.

- Cooke, P (2001). Regional innovation systems, clusters, and the knowledge economy. *Industrial and Corporate Change*, 10(4), 945–974.
- Cooke, P, MG Uranga, and G Etxebarria (1997). Regional innovation systems: Institutional and organisational dimensions. *Research Policy*, 26(4-5), 475–491.
- Couture, S and S Toupin (2019). What does the notion of “sovereignty” mean when referring to the digital?. *New Media & Society*, 21(10), 2305–2322.
- Cranenburgh, C (2017). More states join Startup India campaign, here are the startup policies of 15 states across India. *Mybigplunge*, News Item, June 13. Available at: <https://mybigplunge.com/startups/startup-india/startup-india-campaign-policies-of-15-states-across-india/> (Accessed 16-10-2022).
- Crespi, F, S Caravella, M Menghini and C Salvatori (2021). European technological sovereignty: An emerging framework for policy strategy. *Intereconomics*, 56(6), 348–354.
- David, E (2022). Global startup ecosystem 2022: Ranking 1,000 cities and 100 countries. *Crunchbase*, News Item, June 16. Available at: <https://about.crunchbase.com/blog/trends-global-startup-ecosystem-2022/> (Accessed 13-07-2022).
- Dayalani, V (2021). Indian startups turning unicorns 2X faster than a decade ago. *Inc42*, News Item, April 10. Available at: <https://inc42.com/datalab/indian-startups-turning-unicorns-2x-faster-than-a-decade-ago/%7D> (Accessed 10-06-2022).
- Dean, TJ and GD Meyer (1996). Industry environments and new venture formations in U.S. manufacturing: A conceptual and empirical analysis of demand determinants. *Journal of Business Venturing*, 11(2), 107–132.
- Dyer, WG and AL Wilkins (1991). Better stories, not better constructs, to generate better theory: A rejoinder to Eisenhardt. *Academy of Management Review*, 16(3), 613–619.

- Edler, J, K Blind, R Frietsch, S Kimpeler, H Kroll et al. (2020). *Technology Sovereignty: From Demand to Concept*. Fraunhofer Institute for Systems and Innovation Research (ISI), Germany.
- Elder, J, K Blind, H Kroll and T Schubert (2021). *Technology Sovereignty as an Emerging Frame for Innovation Policy: Defining Rationales, Ends and Means*. Fraunhofer ISI Discussion Papers – Innovation Systems and Policy Analysis No. 70, Germany.
- Eisenhardt, KM (1989). Building theories from case study research. *Academy of Management Review*, 14(4), 532–550.
- Falkenheim, J (2018). *2018 Science and Engineering Indicators*. National Science Foundation, USA.
- Feldman, MP (2014). The character of innovative places: Entrepreneurial strategy, economic development, and prosperity. *Small Business Economics*, 43(1), 9–20.
- Felsenthal, M, S Mozumder and N Roy (2020). Doing business 2020: Reforms boost India’s business climate rankings; Among top ten improvers for third straight year. *World Bank*, Press Release, October 24. Available at: <https://www.worldbank.org/en/news/press-release/2019/10/24/doing-business-india-top-10-improver-business-climate-ranking> (Accessed 10-07-2022).
- Foster, G, C Shimizu, S Ciesinski, A Davila, SZ Hassan et al. (2013). *Entrepreneurial Ecosystems around the Globe and Company Growth Dynamics*. World Economic Forum, Switzerland.
- Fusch, PI and LR Ness (2015). Are we there yet? Data saturation in qualitative research. *The Qualitative Report*, 20(9), 1408–1416.
- Gartner, WB (1985). A conceptual framework for describing the phenomenon of new venture creation. *Academy of Management Review*, 10(4), 696–706.

- Germain, E, M Klofsten, H Löfsten and S Mian (2022). Science parks as key players in entrepreneurial ecosystems. *R&D Management*, in press.
- Ghosh, D (2022). *Technology Sector in India 2022: Resilience to Resurgence*. NASSCOM Insights, India.
- Ghosh, U (2022). FDI inflow hits all-time high of \$83.57 bn in 2021-22. *Rediff Business*, News Item, May 20. Available at: <https://www.rediff.com/business/report/fdi-inflow-hits-all-time-high-of-8357-bn-in-2021-22/20220520.htm> (Accessed 01-06-2022).
- Glaser, BG and AL Strauss (1967). *The Discovery of Grounded Theory: Strategies for Qualitative Research*. New Brunswick: Aldine de Gruyter.
- Gouran, DS (2009). Group communication: Perspectives and priorities for future research. *Quarterly Journal of Speech*, 59(1), 22–29.
- Goyal, P (2021). Karnataka – Startup India details. *Startup India*, News Item, June 8. Available at: <https://www.startupindia.gov.in/srf/state1.html?state=Karnataka> (Accessed 16-10-2022).
- Goyal, P (2022). *States' Startup Ranking 2021 on Support to Startup Ecosystems*. Department for Promotion of Industry and Internal Trade (DPIIT), Ministry of Commerce and Industry, India.
- Guerrero, M, F Liñánand and FR Cáceres-Carrasco (2021). The influence of ecosystems on the entrepreneurship process: A comparison across developed and developing economies. *Small Business Economics*, 57(4), 1733–1759.
- Invest India (2021). About us. *Investindia.gov.in*, Website, July 7. Available at: <https://www.investindia.gov.in/about-us> (Accessed 09-06-2022).
- Isenberg, DJ (2010). How to start an entrepreneurial revolution. *Harvard Business Review*, 88(6), 40–50.

- Isenberg, DJ (2011). *The Entrepreneurship Ecosystem Strategy as a New Paradigm for Economic Policy: Principles for Cultivating Entrepreneurship*. Babson Entrepreneurship Ecosystem Project, USA.
- Isenberg, DJ (2014). What an entrepreneurship ecosystem actually is. *Harvard Business Review Digital Articles*, News Item, May 12. Available at: <https://hbr.org/2014/05/what-an-entrepreneurial-ecosystem-actually-is> (Accessed 18-05-2022).
- Jain, R (2020). Indian government has banned 220 Chinese apps so far – including PUBG Mobile, AliExpress, TikTok, ShareIt, and more. *Business Insider India*, News Item, November 24. Available at: <https://www.businessinsider.in/tech/apps/news/indian-government-has-banned-220-chinese-apps-so-far-including-pubg-mobile-aliexpress-tiktok-shareit-and-more/articleshow/79390031.cms> (Accessed 01-07-2022).
- Jamshed, S (2014). Qualitative research method – Interviewing and observation. *Journal of Basic and Clinical Pharmacy*, 5(4), 87–88.
- Jha, SK (2018). Entrepreneurial ecosystem in India: Taking stock and looking ahead. *IIMB Management Review*, 30(2), 179–188.
- Joshi, K and K Satyanarayana (2014). What ecosystem factors impact the growth of high-tech start-ups in India?. *Asian Journal of Innovation and Policy*, 3(2), 216–244.
- Kapturkiewicz, A (2021). Varieties of entrepreneurial ecosystems: A comparative study of Tokyo and Bangalore. *Research Policy*, in press.
- Kashyap, H (2022). India’s unicorn boom: Where does India stand in the global arena?. *Inc42*, News Item, May 18. Available at: <https://inc42.com/features/indias-unicorn-boom-where-india-stand-global-arena/> (Accessed 01-07-2022).
- Keelery, S (2022). Leading cities for startup funding in India 2021. *Statista*, Market Report, July 21. Available at: <https://www.statista.com/statistics/1238483/leading-cities-for-startup-funding-india/> (Accessed 27-06-2022).

- Klasing, MJ (2014). Cultural change, risk-taking behavior and implications for economic development. *Journal of Development Economics*, 110, 158–169.
- Klugman, J (2021). *Women, Peace, and Security Index 2021/22: Tracking Sustainable Peace through Inclusion, Justice, and Security for Women*. Georgetown Institute for Women, Peace and Security, USA.
- Konarev, A and S Konstantinova (2019). Technological parks in regional entrepreneurship ecosystems. *Trakia Journal of Sciences*, 17(1), 165–170.
- Krasner, SD (2001). Sovereignty. *Foreign Policy*, 122, 20–29.
- Kumar, V (2020). Tier 3 cities & rural India – Growth drivers for Indian businesses?. *Nasscom Insights*, News Item, November 7. Available at: <https://community.nasscom.in/communities/current-issues/tier-3-cities-rural-india-growth-drivers-for-indian-businesses.html> (Accessed 23-10-2022)
- PIB Delhi (2020). Government blocks 118 mobile apps which are prejudicial to sovereignty and integrity of India, defence of India, security of state and public order. *Ministry of Electronics & IT*, Press Release, September 2. Available at: <https://pib.gov.in/PressReleasePage.aspx?PRID=1650669> (Accessed 14-06-2022).
- Langley, A, C Smallman, H Tsoukas and AH Van de Ven (2013). Process studies of change in organization and management: Unveiling temporality, activity, and flow. *Academy of Management Journal*, 56(1), 1–13.
- Lloyd, H (1991). Sovereignty: Bodin, Hobbes, Rousseau. *Revue Internationale de Philosophie*, 45(4), 353–379.
- Lütjen, H, Schultz, C, Tietze, F and F Urmetzer (2019). Managing ecosystems for service innovation: A dynamic capability view. *Journal of Business Research*, 104, 506–519.
- Madhavan, N (2021). What exactly is Atmanirbhar Bharat?. *The Hindu Business Line*, News Item, April 15. Available at: <https://www.thehindubusinessline.com/opinion/what->

- exactly-is-atmanirbhar-bharat/article34328520.ece (Accessed 04-07-2022).
- Majumdar, R (2021). Bengaluru ranks 23rd in global startup ecosystem list. *Inc42*, News Item, September 23. Available at: <https://inc42.com/buzz/bengaluru-ranks-23rd-in-global-startup-ecosystem-list-delhi-on-36th/> (Accessed 10-07-2022).
- Malecki, EJ (2018). Entrepreneurship and entrepreneurial ecosystems. *Geography Compass*, 12(3), 1–21.
- Mason, C (2008). Entrepreneurial dynamics and the origin and growth of high-tech clusters. In *Handbook of Research on Innovation and Clusters: Cases and Policies*, C Karlsson (ed.), pp. 33–53. Edward Elgar Publishing: Glos, UK.
- Mason, C and R Brown (2014). *Entrepreneurial Ecosystems and Growth-Oriented Entrepreneurship*. Background paper prepared for the workshop organised by the OECD LEED Programme and the Dutch Ministry of Economic Affairs, The Hague.
- Mason, C and R Harrison (2007). After the exit: Acquisitions, entrepreneurial recycling and regional economic development. *Regional Studies*, 40(1), pp. 55–73.
- Mathias, L, T Chakrabarty, A Kirloskar, K Brothers, T Bagrodia et al. (2021). *Technological Sovereignty and India*. Dr Syama Prasad Mookerjee Research Foundation, India.
- Mazzucato, M, M Cimoli, G Dosi, JE Stiglitz, MA Landesmann et al. (2015). Which industrial policy does Europe need? *Intereconomics*, 50(3), 120–155.
- Millán, JM, E Congregado and C Román (2012). Determinants of self-employment survival in Europe. *Small Business Economics*, 38(2), 231–258.
- Mital, A and M Shinde (2022). Investment from land border sharing countries. *Ministry of Commerce & Industry*, Press Release, March 23. Available at: <https://pib.gov.in/PressReleasePage.aspx?PRID=1808806> (Accessed 16-10-2022).
- Moore, J (1993). Predators and prey: A new ecology of competition. *Harvard Business Review*, 71(3), 75–86.

- Mulas, V, K Qian and S Henry (2017). *Tech Start-up Ecosystem in Beirut: Findings and Recommendations*. The World Bank, USA.
- Nambath, S (2020). Protect firms from takeover, says Rahul Gandhi. *The Hindu*, News Item, June 19. Available at: <https://www.thehindu.com/business/Economy/govt-must-not-allow-foreign-interests-to-take-control-of-indian-corporates-during-covid-19-crisis-rahul/article31323784.ece> (Accessed 04-06-2022).
- Nandi, J (2018). Data from your doorstep to help map pollution. *The Times of India*, News Item, February 26. Available at: <https://timesofindia.indiatimes.com/city/delhi/data-from-your-doorstep-to-help-map-pollution/articleshow/63071816.cms> (Accessed 11-04-2022).
- Nandy, R (2022). Growing momentum for public transport in India. *International Railway Journal*, News Item, March 9. Available at: <https://www.railjournal.com/opinion/growing-momentum-for-public-transport-in-india/> (Accessed 05-06-2022).
- Oghazi, P, Parida, V, Wincent, J and R Mostaghel (2022). Ecosystems transformation through disruptive innovation: A definition, framework and outline for future research. *Journal of Business Research*, 147, 16–26.
- Parasuram, R, P Khare and J Koshta (2007). *Study of Leading IT Parks in India*. Atal Bihari Vajpayee Institute of Good Governance and Policy Analysis, India.
- Pavitt, C (2014). An interactive input-process-output model of social influence in decision-making groups. *Small Group Research*, 45(6), 704–730.
- Pawar, SRP (2020). *Crime in India 2020*. National Crime Records Bureau, India.
- Porter, ME (1990). The competitive advantage of nations. *Harvard Business Review*, 68(2), 73–93
- Pradhan, D (2022). Working to hike investment in education to 6% of GDP. *The Times of India*, News Item, March 24. Available at: <https://timesofindia.indiatimes.com/>

- business/india-business/working-to-hike-investment-in-education-to-6-of-gdp-govt/articleshow/90407926.cms (Accessed 29-06-2022).
- Racine, JL (2008). Post-post-colonial India: From regional power to global player. *Politique Étrangère*, 5, 65–78.
- Rakheja, H (2021). SoftBank transfers 40% InMobi shareholding to vision fund 2. *Inc42*, News Item, May 13. Available at: <https://inc42.com/buzz/softbank-transfers-40-inmobi-shareholding-to-vision-fund-2/> (Accessed 16-10-2022).
- Reynolds, P, DJ Storey and P Westhead (1994). Cross-national comparisons of the variation in new firm formation rates. *Regional Studies*, 28(4), 443–456.
- Suparna Roy, G (2021). Gurugram among 30 most polluted cities in world despite improvements. *Hindustan Times*, News Item, March 16. Available at: <https://www.hindustantimes.com/cities/gurugram-news/gurugram-among-30-most-polluted-cities-in-world-despite-improvements-101615916222640.html> (Accessed 02-07-2022).
- Salman, SH (2022). VerSe Innovation goes global, expands operations to the Middle East. *Financial Express*, News Item, June 21. Available at: <https://www.financialexpress.com/industry/verse-innovation-goes-global-expands-operations-to-the-middle-east/2567141/> (Accessed 06-06-2022).
- Saraogi, V (2019). How the tech city of Bangalore became the Silicon Valley of. *Elite Business*, News Item, April 17. Available at: <http://elitebusinessmagazine.co.uk/global/item/how-the-tech-city-of-bangalore-became-the-silicon-valley-of-india> (Accessed 22-10-2022).
- Sarkar, J (2021). India becomes third largest startup ecosystem in the world. *The Times of India*, News Item, September 3. Available at: <https://timesofindia.indiatimes.com/business/india-business/india-becomes-third-largest-startup-ecosystem-in-the-world/articleshow/85871428.cms> (Accessed 11-05-2022).

- Sarkar, G (2022). Only 15% Indian unicorns have women founders. *Inc42*, News Item, May 11. Available at: <https://inc42.com/buzz/only-15-indian-unicorns-have-women-founders-bridging-gender-divide-still-a-work-in-progress/> (Accessed 22-10-2022)
- Sarkar, J (2022a). ShareChat closes \$520 million round at \$5 billion valuation. *The Times of India*, News Item, June 16. Available at: <https://timesofindia.indiatimes.com/business/startups/companies/sharechat-closes-520-million-round-at-5-billion-valuation/articleshow/92259394.cms?from=mdr> (Accessed 14-07-2022).
- Sarkar, J (2022b). VerSe raises \$805 million at \$5 billion valuation. *The Times of India*, News Item, April 6. Available at: <https://timesofindia.indiatimes.com/business/india-business/verse-raises-805-million-at-5-billion-valuation/articleshow/90674791.cms> (Accessed 14-07-2022).
- Sarma, K (2018). IITs, IIMs, NITs have just 3% of total students but get 50% of government funds. *The Print*, News Item, July 30. Available at: <https://theprint.in/india/governance/iits-iims-nits-have-just-3-of-total-students-but-get-50-of-government-funds/89976/> (Accessed 21-09-2022).
- Sharma, S (2021). SoftBank may invest \$10 billion in Indian startups in 2022. *The Economic Times*, News Item, November 11. Available at <https://economictimes.indiatimes.com/tech/startups/softbank-may-invest-10-billion-in-indian-startups-in-2022/articleshow/87651891.cms?from=mdr> (Accessed: 16-10-2022).
- Sharma, S (2022). Will budget 2022 heal India's sagging education system?. *India Today*, News Item, January 30. Available at: <https://www.indiatoday.in/diu/story/budget-india-education-system-covid-school-closures-1906438-2022-01-30> (Accessed: 30-06-2022).
- Shastri, V (1997). The politics of economic liberalization in India. *Contemporary South Asia*, 6(1), 27–56.

- Sheth, A, S Unnikrishnan, S Krishnan and M Bhasin (2021). *Online Videos in India – The Long and Short of It*. Bain & Company, India.
- Sheth, A, S Krishnan and N Bansal (2022a). *India Private Equity Report 2022*. Bain & Company, India.
- Sheth, A, S Krishnan, A Upmanyu and S Deo (2022b). *India Venture Capital Report 2022*. Bain & Company, India.
- Singh, M (2021). ByteDance is cutting jobs in India amid prolonged TikTok ban. *Tech Crunch*, News Item, January 27. Available at: <https://techcrunch.com/2021/01/26/bytedance-to-cut-jobs-in-india-amid-tiktok-ban/> (Accessed 04-07-2022).
- Sitharaman, N (2022). Key highlights of the economic survey 2021-22. *Indian Ministry of Finance*, Press Release, January 31. Available at: <https://pib.gov.in/PressReleasePage.aspx?PRID=1793829> (Accessed 07-07-2022).
- Snyder, H (2019). Literature review as a research methodology: An overview and guidelines. *Journal of Business Research*, 104, 333–339.
- Soto-Rodriguez, E (2014). Entrepreneurial ecosystems as a pathway towards competitiveness: The case of Puerto Rico. *Competition Forum*, 12, 31–40.
- Spigel, B (2016). Developing and governing entrepreneurial ecosystems: The structure of entrepreneurial support programs in Edinburgh, Scotland. *International Journal of Innovation and Regional Development*, 7(2), 141–160.
- Spigel, B (2017). The relational organization of entrepreneurial ecosystems. *Entrepreneurship Theory and Practice*, 41(1), 49–72.
- Spigel, B and R Harrison (2018). Toward a process theory of entrepreneurial ecosystems. *Strategic Entrepreneurship Journal*, 12(1), 151–168.
- Srinivasan, R (2021). Bengaluru world’s fastest-growing tech hub, London second. *The Hindu Business Line*, News Item, January 14. Available at:

- <https://www.thehindubusinessline.com/economy/bengaluru-worlds-fastest-growing-tech-hub-london-second-report/article33573646.ece> (Accessed 05-07-2022).
- Stam, E (2015). Entrepreneurial ecosystems and regional policy: A sympathetic critique. *European Planning Studies*, 23(9), 1759–1769.
- Strauss, A and JM Corbin (1990). *Basics of Qualitative Research: Grounded Theory Procedures and Techniques*. London: SAGE Publications.
- Sunny, S and S Sikdar (2017). Delhi most unsafe city, tops crime chart among 19 major Indian cities. *Hindustan Times*, News Item, November 30. Available at: <https://www.hindustantimes.com/delhi-news/delhi-tops-crime-chart-among-19-major-indian-cities-national-crime-records-bureau/story-e4iawBXJLsJ8ZrO5SF0zrL.html> (Accessed 30-06-2022).
- Vardhan, P (2021). People in South India are far more liberal in matters of religion and nationalism. *The Hindu*, News Item, July 11. Available at: <https://www.thehindu.com/data/data-people-in-south-india-are-far-more-liberal-in-matters-of-religion-and-nationalism-survey/article61443831.ece> (Accessed 18-07-2022).
- Van de Ven, A and G Huber (1990). Longitudinal field research methods for studying processes of organizational change. *Organization Science*, 1(3), 213–219.
- Vesper, KH (1980). New venture planning. *Journal of Business Strategy*, 1(2), 73–75.
- Wei, N (2019). Did Bangalore’s air quality get better in 2018?. *Smart Air*, Blog, May 20. Available at: <https://smartairfilters.com/en/blog/did-bangalores-air-quality-get-better-2018/%7D> (Accessed 01-07-2022).
- Xie, Z, Wang, X, Xie, L and K Duan (2021). Entrepreneurial ecosystem and the quality and quantity of regional entrepreneurship: A configurational approach. *Journal of Business Research*, 128, 499–509.
- Yin, RK (1981). The case study as a serious research strategy. *Knowledge*, 3(1), 97–114.

Yin, RK (1984). *Case Study Research: Design and Methods*. (2 ed.). Beverly Hills, CA:
Sage Publications.

Yousaf, S (2016). How Bengaluru became India's startup capital. *CNTraveller*, News Item,
March 7. Available at: <https://www.cntraveller.in/story/how-bengaluru-became-indias-startup-capital/> (Accessed 11-06-2022).

Tables

Table 1 Details of interviewees

Interviewee #	Position	Organisation	Description	Interview Duration
1	C-Suite	Company A	Top 6	25 mins
2	Senior Manager	Company A	Indian SFV Firm	35 mins
3	Senior Manager	Company A		35 mins
4	Senior Strategy Manager	Company B		30 mins
5	Assistant Manager	Company B	Top 3	30 mins
6	Senior Product Manager	Company B	Indian SFV Firm	40 mins
7	Product Manager	Company B		50 mins
8	Program Manager	Company C		30 mins
9	Senior Manager*	Company C		55 mins
10	Product Manager	Company C	Top 6	55 mins
11	Senior Community Manager*	Company C	Indian SFV Firm	30 mins
12	Senior Product Manager	Company C		30 mins
13	Strategy Manager*	Company C		35 mins
14	Strategy Manager*	Company D	Top 3 Indian SFV Firm	50 mins
15	Senior Strategy Manager	Company E	Top 3 Indian SFV Firm	35 mins
16	Confidential	Governmental Agency		40 mins
17	Confidential	Governmental Agency	Public Sector Stakeholders	35 mins
18	Confidential	Governmental Agency		50 mins
19	Confidential	Governmental Agency		40 mins
20	Confidential	Governmental Agency		55 mins

*Interviewees with this marker were previous employees of *ByteDance*

[2-column fitting table]

Table 2 Steps of the qualitative thematic analysis (Braun and Clarke, 2006, p. 36)

Step	Description
1	Transcription of data and check for errors
2	Code generation
3	Removal of duplicate codes
4	Codes grouped to sub-categories (nodes)
5	Codes grouped into themes
6	Data analysis and interpretation
7	Clear outline of overall theme
8	Clear outline of the method

[single column fitting table]