

Venture capital in India: a critical view from an evolutionary and systemic perspective

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Abstract

The main objective of this essay is to explore the process of emergence and evolution of the Indian venture capital (VC) industry and its institutions from a systemic and critical point of view. We sustain that although the financial and institutional reforms implemented since the 90s have contributed to the development of the Indian venture capital (VC) industry, the role played by the Indian National Innovation System (NIS) and the Computer and Information Services Entrepreneurial Ecosystem (CISEE) have been critical. We will try to show that the Indian VC industry development should be understood in a broader context of: a) a booming economy, b) the stock of capabilities accumulated between the 50s and the 80s, c) the role played by the Indian Diaspora, d) the deregulation process initiated in the 80s and e) the US computer and information services offshoring opportunities.

1. Introduction

Despite not so highlighted as the figure of the entrepreneur, the financing of new firms and business projects was a main channel to explain the business cycle in 'the first' Schumpeter. In his Theory of Economic Development (1911), the banker, through credit, creates money and selects firms and projects fueling the process of creative destruction. The relevance of banks and credit in developing new industries in "latecomers" countries has been highlighted and discussed by Gerschenkron (1962). In our days, venture capital (VC) funds are one of the main financial innovations of the ICT techno-economic paradigm. In fact, the US VC industry is usually related to the Silicon Valley entrepreneurial ecosystem boom. However, to what extent this role of VC funds is or could be so relevant for emerging countries is an issue of big interest for innovation and development scholars and governments. From that perspective, India is an emerging country of particularly interest.

In April 2016, IMF Chief Cristine Lagarde stressed that, in a context of slowdown in global growth rates, "*India, by contrast, remains a bright spot with a strong growth and rising real income in the global economy*" (The Economic Times, 2016). India was the fastest growing economy in 2016 and she will surely repeat the same in 2017. No doubt, India's (and, mainly, China's) growth performance is one of the most outstanding features of the XXI century economic landscape. Besides, one of the most interesting features of this growth process is that it has been characterized as a services-led growth (Rakshit, 2009; World Bank, 2004). Despite the open debate about India's GDP growth determinants and sustainability, as stated by Nagaraj (2013), empirically speaking, India is strictly a case of growth acceleration. Between 1951 and 1980 India's GDP grew 3.6% per year, between 1981 and 2010, the growth accelerated to 6% per year. These features set a very dynamic context for the analysis of the Indian venture capital, which institutionally emerged during the late 70s and has grown in relevance during the 2000s.

Most of the literature on the Indian VC industry mainly stress that the post 90s reforms, implemented since the New Economic Policy (NEP), significantly contributed to the development of the VC industry. However, some other issues seem also be important. As could be inferred from Nayyar (2015) on his analysis of the 'birth, life and death' of development financial institutions, the Indian VC industry has developed in parallel to the diminishing in the role of development banks. It is also true that most of the structural aspects of the Indian National Innovation System (NIS), mainly configured in the post-Independence period, have been of main importance for the VC development. In fact, compared with Israel, a *Mecca* of the VC industry, India has some strategic similarities such as the long term State commitment with R&D research (both civil and military) and an important and constant supply of technicians and electronic engineers. In the Indian case the 'Diaspora' has been directly involved in the development of the Silicon Valley entrepreneurial ecosystem, an issue that is not of minor relevance as will be seen later.

The main objective of this essay is to critically explore the process of emergence and development of the Indian VC industry from an evolutionary and systemic perspective¹. We

¹ We will not include in our analysis the role played by angel investors and others sources of funding such as crowdfunding.

will try to highlight that although the financial and institutional reforms implemented in the 90s have contributed to the development of the Indian VC Industry, the Indian NIS and the Computer and Information Services Entrepreneurial Ecosystem (CISEE), have been critical factors for the development of a huge dealflow (demand side) for the VC industry (supply side). As we will try to show, the Indian VC industry development should be understood in a broad context of: a) a booming economy, b) the stock of capabilities accumulated between the 50s and the 80s, c) the role played by the Indian Diaspora, d) the deregulation process initiated in the 80s and e) the US CIS offshoring opportunities.

In methodological terms, we have mainly based our research on a literature review of the studies on the evolution of the Indian VC industry. The works of Dossani and Kenney (2001), Joshi (2015) and Mani (1994) on the Indian VC development, Bala Subrahmanya (2015) about the Indian entrepreneurial ecosystem and Joseph et al (2008) about the Indian NIS have been extensively used. In parallel, we have worked with primary data obtained through interviews with different official and private sources. Some key interviews with different Indian VC funds, entrepreneurs, policy makers and accelerators were also conducted.

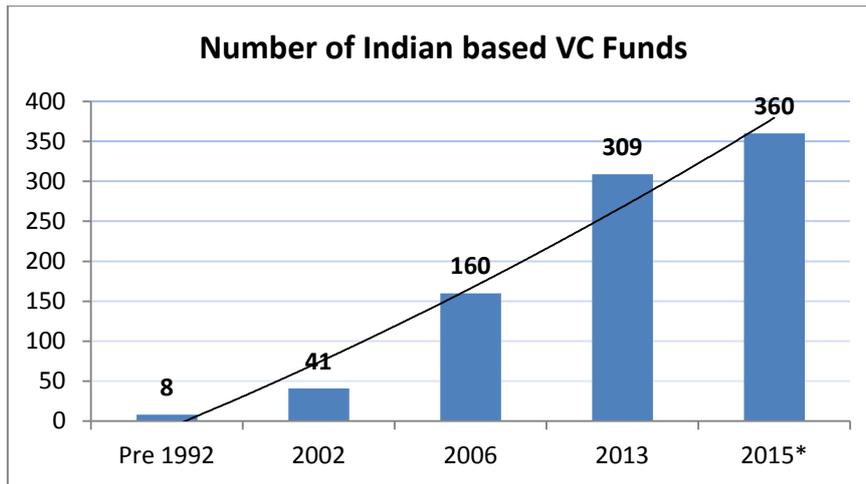
In the next sections, we first we present some data and figures about the recent VC industry dynamic. Then we characterized the different phases of development of the Indian VC industry and its institutional configuration since its emergence. After this, we highlight some key features of the Indian NIS and of the Indian CISEE that have clearly contributed to the development of the VC industry. After this,. We conclude with some final reflections.

2. An empirical snapshot of the Indian VC industry

In this section we will present some preliminary figures and data about the Indian VC funds. It is a first effort to dimension the phenomenon, although not conclusive given the limitations on the information availability. The main sources of VC data in India are private consultants such as Bain & Company, Venture Intelligence, Prequin, etc. NASSCOM also produce some own data. Subject to the information availability, we will use the four sources to give an initial snapshot.

According to Venture Intelligence (2014) the number of VC funds based in India has gone from 8 in 1992 to 309 in 2013 (Joshi, 2015). In 2015, it was estimated that there are around 360 Indian based VC funds. To this number, it should be added the VC funds that do not have offices in India, but they still invest in India, the Foreign VC funds. According to Joshi (2015), there were around 200 funds in this condition in 2013.

Number of Indian based VC funds. 1992-2015*

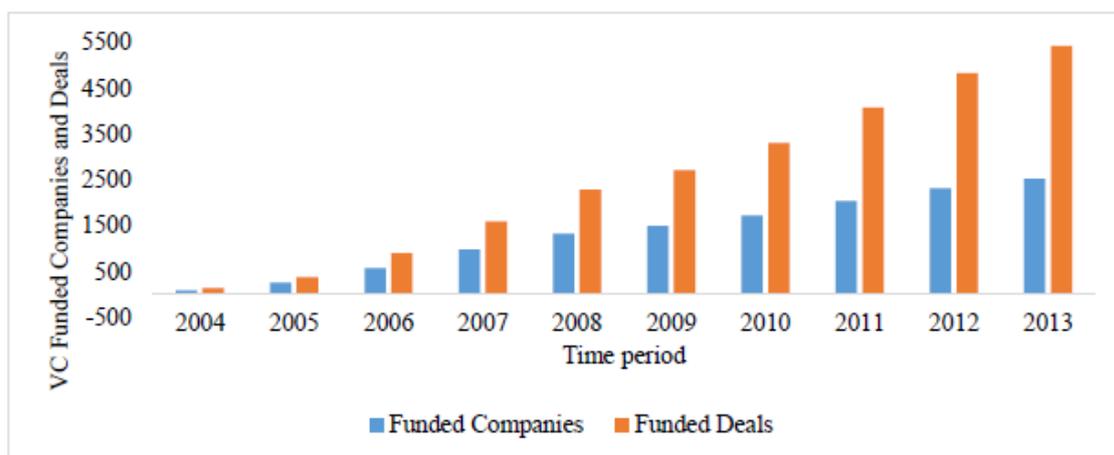


Source: Joshi (2015) based on Venture Intelligence.

The amount of VC deals and funded companies has grown steadily since 2004 according to Venture Intelligence (2014). The number of VC funded companies has gone up from 92 to 2,527 and the deals from 133 to 5,432 between 2004 and 2013. Particularly with respect to the CISEE entrepreneurial ecosystem, in 2016, 680 funding deals were celebrated and 650 tech startups were funded for a total funding of 4 billion dollars² (NASSCOM, 2016).

However, according to Committee on Angel Investment and early Stage Venture Capital report (2012, p,36) "At around Rs 5000 crore over the last five years (2007-2011), early-stage venture capital investment in India is very small compared to global peers. For example, during the same time frame, US invested nearly twenty six times as much at around Rs 1.5 lakh crore, almost three times as a percentage of cumulative GDP in that period".

VC Funded companies and number of deals



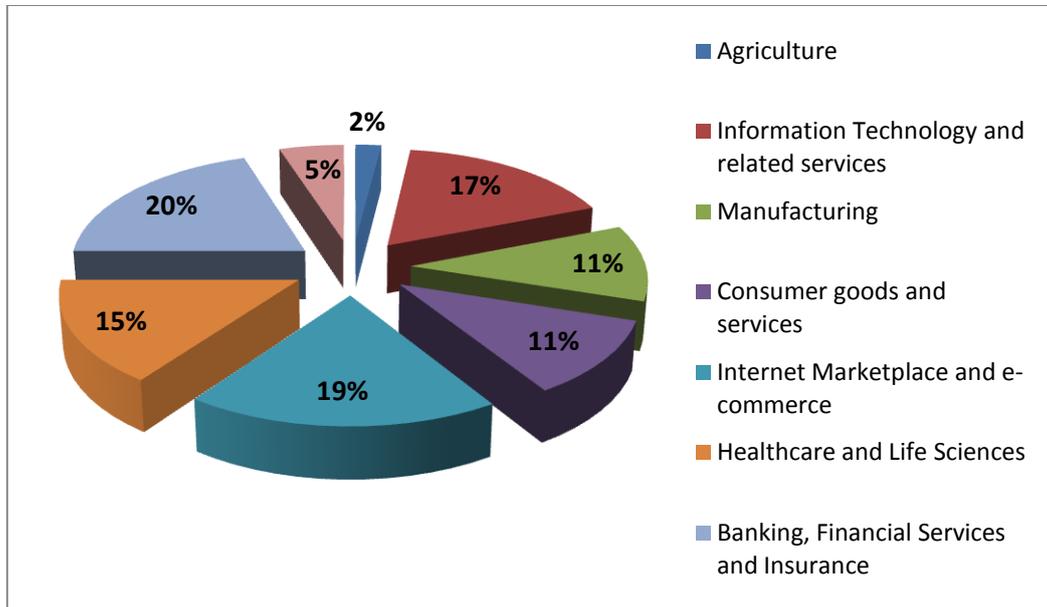
Source: Joshi (2015) based on Venture Intelligence.

With respect to the sector wise distribution of the Indian based VC funds in 2015, it can be observed the predominance of the "new economy" sectors: Internet marketplace and e-commerce (19%), IT and related services (17%) and Media and entertainment (5%) totalized

² These numbers include both VCs funds and angels.

41% of the investments in 2015. However, banking, financial services and insurance, which include real state and fintech firms, is the sector that registered more investments, with 20%.

Sector wise Indian based VC funds investments in 2015

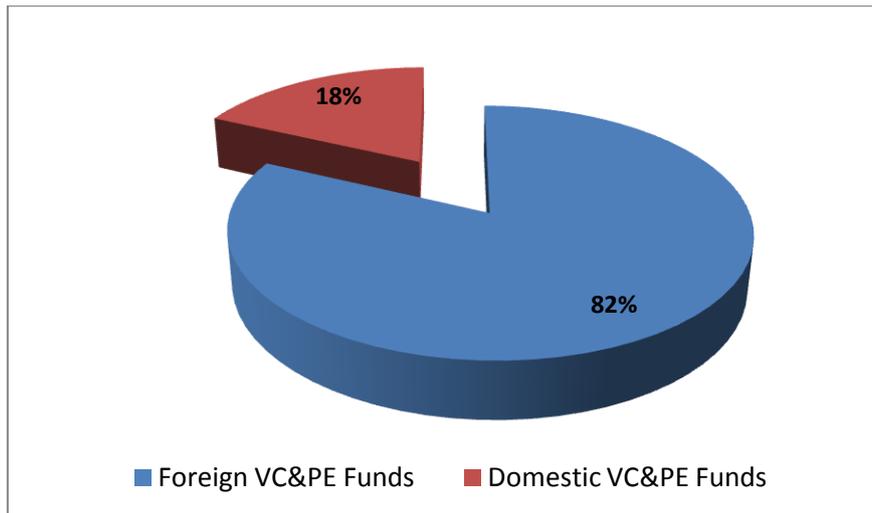


Source: India VC and Private Equity Report 2015

With respect to the origin of the funds, if we take together PE and VC funds, 82% of the investments between 2013 and 2015 were made by foreign funds. This means that the PE&VC industry is mostly dominated by foreign funds. As stated in the India VC and Private Equity Report (2015) the Investment made by foreign VC&PE funds exceed that of domestic firms in the ratio of 4:1 and the average investment by foreign investors are also higher at \$15.8 million per deal as compared to \$6.32 million for domestic investors. According to Joshi (2015) the domestic VC funds also raise overseas funds, although in definitional terms these still qualify as investments made by domestic VC investors. Moreover, as we will see in the next section, a large proportion of foreign VC funds bye-pass the Securities and Exchange Board of India (SEBI) route and are invested via the FDI route.

According to the Committee on Angel Investment and early Stage Venture Capital report (2012, p. p. 36) "*India also has a significantly large share of offshore funds - these funds arguably have a limited understanding of the local environment, both in terms of markets and working with local regulations and are thus tend to focus more on growth stage capital. Fund raising is much lower than global benchmarks. Over the last five years, domestic funds that focus on early, growth and late stage venture capital investing raised around Rs 27,000 crore in India whereas funds in China raised around Rs 2 lakh crore, or more than two times as a percentage of cumulative GDP in that period*".

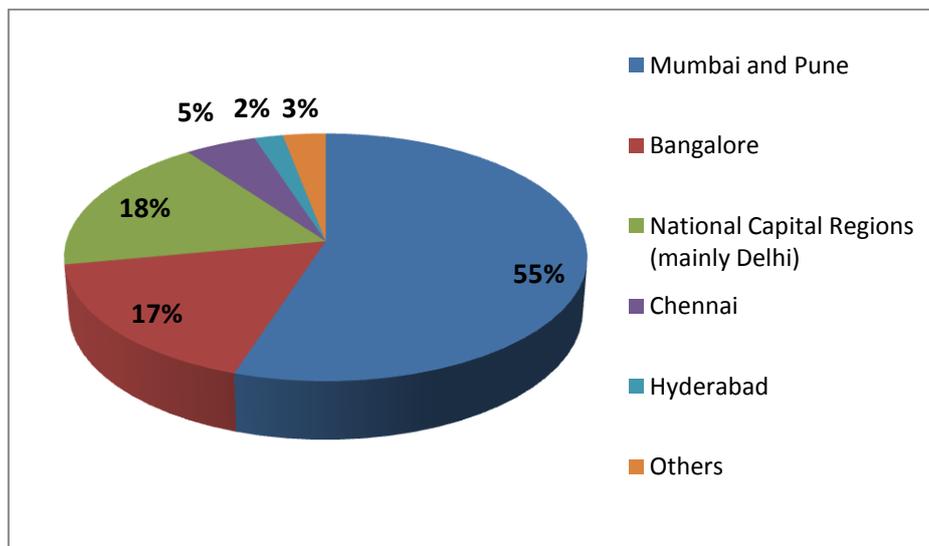
% of investment of Foreign PE&VC funds and Domestic PE&VC funds. Average 2013-2015



Source: India VC and Private Equity Report 2015

Finally, related to the regional distribution of the VC funds, as shown in the next chart, in 2014, Mumbai and Pune centralized 55% of them, Bangalore 17% and the National Capital Regions, that include New Delhi, Gurgaon, Noida, Ghaziabad 18%. Chennai and Hyderabad registered 5% and 2% respectively. However, Joshi (2015) points out that the importance of Bangalore as a main VC/entrepreneurial hub is understated: many VC funds that have registered offices in other cities also have secondary offices in Bangalore (E.g. SeedFund, Nexus Partners, Norwest Venture partners). Besides, most of the foreign VC firms that have relatively much larger fund sizes as compared to the domestic ones are located out of here (E.g. Sequoia Capital, Accel Ventures, ICICI Ventures).

Regional distribution of the VC funds. 2014



Source: Joshi (2015) based on Venture Intelligence.

In sum, this first snapshot shows: a) the number of VC funds based in India, the amount of deals and the amount of firms is growing since 2000s, b) the sectorial composition is mainly

related to IT sectors and banking and financial services, c) Bombay, Bangalore and Delhi are the main locations of the VC funds and d) the preponderance of foreign VC funds.

3. The historical evolution of the Indian VC: from state owned institutions to the Indo American connection and the Foreign VC Funds

In the next paragraphs, we will present an evolutionary and systemic perspective on the emergence of this industry.

3.1. Initial development led by State owned institutions and the World Bank: 1970s-1990s

As detailed in Nayyar (2015), India developed between the 50s and the 80s a dense network of development finance institutions³. However, since the liberalization, the role and significance of these institutions have decreased. Still in the decreasing role of the public development banks, they have had a pioneering role in developing the first risk-funds in India.

Dossani and Kenney (2001) and Rani and Arora (2003) sustain that the need for early financing and VC funding was first pointed out in India in 1973 by the Committee on Development of Small and Medium Entrepreneurs (Bhatt Committee). The committee suggested setting up a fund of 1 billion rupees to finance new entrepreneurs and technologists. Since then several initiatives were implemented. The first public agency for funding risk/high technology projects, the 'Risk Capital Foundation', was created in 1975 by the Industrial Finance Corporation of India (IFCI) (Rani and Aurora, 2003). One year later, the Industrial Development Bank of India (IDBI) introduced a seed capital scheme.

Ten years later, the Program for Advancement of Commercial Technology (PACT) was launched by the Industrial Credit and Investment Corporation of India (ICICI) for commercializing technologies in joint venture with partners from the USA (Rani and Arora, 2003). However, according to Dossani and Kenney (2001), all these initiatives were pilot ones, with not much impact neither resources.

The VC received a push with the election of Rajiv Gandhi as Prime Minister and the general climate in favor of the opening of the economy that increasingly installed in India since the 80s (Mani, 1994; Joshi, 2015; Dossani and Kenney, 2001). In particular, a keystone for the development of the private VC industry was the study conducted by the Technology Policy Implementation Committee and the United Nations Development Programme (UNDP). After this study, in 1988, the Indian government published the first guidelines (official regulations) to legalize VC operations (Bowonder and Mani, 2002). These regulations aimed at allowing state-controlled banks to established VC subsidiaries. Although there was not much interest in

³ Between others, the Industrial Finance Corporation of India (IFCI) was established in 1948 to provide long-term credit for medium and large industrial enterprises; the Industrial Development Bank of India (IDBI) was launched in 1964 to provide long-term finance in conformity with national priorities; the Unit Trust of India (UTI) was also established in 1964 as a mutual fund to provide small savers with investment opportunities. Many other financing institutions were created during these three decades, both at the central and the states level and with different focuses (industry, agriculture, housing, etc.).

the private sector, the guidelines included the possibility to create private VC funds, governing the details of establishment, management, the nature of assistance, size of investment, etc. (Mani, 1994).

The World Bank also advocated for the development of the private VC in India, observing that the focus on lending rather than equity investment became *"increasingly inadequate for small and new Indian companies focusing on growth"* (World Bank, 1986, p. 6, quoted by Dossani and Kenney, 2001). The World Bank provided 45 million dollars to create four public sector institutions to establish VC operations under the 1988 guidelines (Mani, 1994; Rani and Arora, 2003). In general, the World Bank encouraged a new trend in government policymaking towards shifting decision making with respect to technology choice and R&D to from state policymakers to industry specialists and a more open attitude towards the import of technology (Dossani and Kenney, 2001).

In the more specific case of the IT cluster of Bangalore, in 1988, it was launched the Technology Development & Information Company of India Ltd (TDICI). It was the first organization to define itself as a VC, as a subsidiary of the Industrial Credit & Investment Corporation of India, Ltd (ICICI). As said by Pandey (1998) ICICI had started a small investing division focus on early stage firms in it's headquarter in Mumbai in 1985⁴. In 1988, the ICICI division and the state-run mutual fund UTI were merged into the new TDICI launched in Bangalore. Bangalore was chosen because of its 'agglomeration' economies: Wipro, PSI Data, and Infosys were based there as well as the research activities of state-owned firms, the Defense Research Development Organization and the Indian Institute of Science.

According to Dossani and Kenney (2001, p.23) *"while the investment manager for the new funds was TDICI, it was a 50–50 partnership between ICICI and UTI, and the funds were registered as UTI's VC Unit Schemes (VECAUS)*.⁵. Vecaus I invested in different successful IT firms in Bangalore. Its first president was P. Sudarshan, a veteran of the Indian Scientific Research Organization (ISRO). In this context, several software firms received funds from TDICI. For instance, Wipro received resources for developing a "ruggedized" computer for army use. There were many successes, including a cohort of firms which went public: VXL, Mastek Software Systems, Geometric Software, Zip Telecom, Microland, Sun Pharmaceuticals, etc.

But there also were mistakes. Initially, TDICI did not focus upon commercial objectives, making investments in interesting technology but not, perhaps, in the best business opportunities (Pandey, 1998). Besides, according to Joshi (2015), due to the lack of experience in the domain of VC investing, TDICI engagement in other critical areas such as corporate strategy, business development and recruitment was rather limited.

During this first period of emergence of the VC institutional arrangement, the main achievements were to identify early financing as a policy issue and the development of some

⁴ For a detailed organizational analysis of the TDICI see Pandey (1998).

⁵ *Vecaus I, established in 1988, had a paid-in capital of 300 million rupees. Founded in 1991, Vecaus II had a paid-in capital of 1 billion rupees"*

public institutions, such as the TDICI, in order to structure a first supply of financing. In fact, several startups, mainly from Bangalore, were financed and went public.

3.2. The Foreign push: the Indo American Connection

VC development since the 90s should be understood in the context of the Indian liberalization and the growing role of the CIS industry in the Indian economy. As documented by Mani (2014), Parthasarathy (2004), Taganas and Kaul (2006), Joseph and Harilal (2001) and several other authors, roughly speaking, the Indian CIS boom could be understood as a mix of: a) an increasing demand from the US (the offshoring process), b) cheap and qualified Indian manpower and c) some specific and balanced policies mainly related with infrastructure, financing, education and business environment.

To Dossani and Kenney (2001) the great source of increase in VC funds supply was the entrance of foreign institutional investors, mainly from the US, that were attracted by the idea that India might have a good dealflow. Foreign in the Indian case means also the key participation of Non Resident Indians (NRI), or Indo Americans. They clearly played a key role both as investors and as managers of these foreign funds.

In regional terms, in a parallel way with the US, India also developed three venture capital locations. San Francisco, New York and Boston, in the US, and Bangalore, Mumbai and Delhi, in India. In 1993, public and private players formed the Indian VC Association (IVCA). TDICI's former leader, Nadkarni, became its first president. There were nine members, between the state-own ones, the most important were: TDICI, the Industrial Development Bank of India's VC division, APIDC's VC division, and Canbank ventures. The private members were Credit Capital Corporation, a joint venture with Commonwealth Development Corporation, headed by investment banker Udayan Bose, Indus Ventures of Mumbai, started by T. Thomas, an ex-Unilever board member, and the Mahindra Group, Grindlays and the British venture firm 3i Corporation (Dossani and Kenney, 2001).

However, the IVCA did not become an effective lobbying force during the 90s. Singhvi (1999) pointed out that in 1999 around 80% of the VC investments came from overseas firms, mainly from the US. Dossani and Kenney (2001, p. 29) highlight that *"These foreign firms registered in Mauritius as a strategy to avoid the onerous regulations and taxes imposed by the Indian government—a mechanism that foreign securities firms seeking to invest in India had pioneered. A Mauritius registry allowed tax pass through, and since they did not have other issues, such as finding funds, they had little incentive to join IVCA or actively lobby the Indian government. IVCA thus was a vehicle for Indian VC funds seeking to obtain a level playing field with the foreign funds"*. In this scheme, much of the lobbying for the Indian VC industry came from the Indian IT industry association (NASSCOM).

During this period, the Securities and Exchange Board of India (SEBI) redefined the guidelines for Indian VC firms in 1996 and the Foreign VC firms in 2000. According to Joshi (2015, p. 24) *"most of these recommendations were aimed at addressing fairly fundamental issues such as – fund – raising guidelines (eligible investors for fund raising; the minimum fund size contributed by each investor and so on), investment guidelines (kind of investee companies to fund, maximum permissible limits for investment in each of them and so on.), nature of investment*

instruments to be used while investing (debt, equity, a mix of the two) and lock-in periods (period for which the VC firm's share of equity was locked-in, in case of IPO exit)".

Summing up, in the 90s, the IT outsourcing demand pushed the need for VC industry development in India since new firms that responded to that commercial opportunity demanded financial resources. In this context, the foreign VC funds entered in scene. The Indo Americans (NRIs) from Silicon Valley played a key role in this story, both as founders of funds and as managers. The Indian VC Association (IVCA) creation was an expression of the VC sector emergence. Although most of the investments came from foreign VC mainly based in Mauritius, IVCA constituted as a syndicated institution to the Indian VC industry.

3.3. Post 2002: institutional (des)regulation⁶

In 2002, the SEBI was set as the central regulatory institution for both domestic and foreign VC funds. Meanwhile, SEBI also set up several committees such as the K. B Chandrasekhar Committee (2000) and the Ashok Lahiri Committee (2003) to look into regulatory support of VC funding. The India VC Association (IVCA) and National Association of Software Services Companies (NASSCOM) played an important role in highlighting different regulatory issues facing VC firms in India.

With respect to the foreign VC funds, Joshi (2015, p. 25) highlighted "*SEBI registration was never made mandatory for Foreign VC firms (Desai, 2002). However, registering with SEBI conferred other regulatory benefits on them which they could not avail if they invested in India via other routes... a large section of the Foreign VC firms are seen to by-pass the SEBI route and invest in India via the Foreign Direct Investment (FDI) route with the approvals from RBI and FIPB. Many others have registered entities in places such as Mauritius and Singapore and route their funds via those entities in order to take advantage of the Double Taxation Avoidance Act which enables them to escape from the purview of taxation in India*".

Several reforms have been implemented by SEBI after 2002 based on the recommendations of some these committees and the industry associations, . In general, the norms tended to be in line with the international practices to treat VC, mainly the US regulation. Joshi (2015) points out the main regulatory changes:

- a) **Tax Pass through Status to VC Firms:** In 2003 a tax pass through status was granted. Foreign VC funds were granted tax-pass through only if registered with SEBI.
- b) **Limited Liability Partnership:** Standard VC funds organization is Limited Partnership (LP), Limited Liability Partnership (LLP) or the Limited Liability Company (LLC). However, such structures were not recognized under the Indian Partnership Act and the Indian Companies Act. Acknowledging their significance, the Indian government passed the Limited Liability Partnership Act in 2008.
- c) **Qualified Institutional Buyer (QIB) Status to VC Firms:** Since 2009, about 70% of the public issue is reserved for QIBs. QIB status is important for the VC funds as it enables them to stake a claim in higher equity share of an investee firm and retain control by

⁶ This section is mainly based on Joshi (2015).

taking on a board position in the firm even after it has gone public. The VC funds were granted the QIB status in 2003.

- d) **Investment in Listed Securities:** During the initial period, VC funds were not allowed to invest in securities of listed companies. Internationally, there have been no such restrictions on PE and VC investments. This regulation was amended by SEBI in 2007 and today VC firms are allowed to invest about 33% of their funds in listed companies.
- e) **Investment by/in Overseas Firms:** During the initial days, it was extremely difficult to sell an Indian firm to an overseas firm. Similarly, Indian VC funds were not allowed to invest in companies abroad. Both these provisions have been changed and today not only can Indian VC funded entities be acquired by foreign entities but they can also invest about 10% of their corpus in VC funded ventures overseas.
- f) **SME Exchanges:** The norms for listing on the regular stock markets were usually quite stringent. Consequently, most technology oriented firms did not qualify for listing on the standard exchanges. The government established exchanges for listing shares of Small and Medium Enterprises (SMEs) in 2012. The listing requirements on these markets are much more relaxed as compared to those of the standard exchanges.

Thus, since 2002, the regulatory authority was consolidated under the figure of the Securities and Exchange Board of India (SEBI). Several regulations and procedures have been simplified and put on line with the lobby of the NASSCOM and the IVCA.

Summing up, the development of the VC industry in India is the result of an evolutionary process intervening several factors and players as it was explained in this section. The US demand for outsourcing generated new opportunities for the creation of an IT sector based on new firms that have taken advantage of the supply of an adequate equation price-quality to fuel that demand. This required, in turn, the supply of venture capital to finance this entrepreneurial process. The Indian diaspora played a key role in the emergence of VC industry. In this context, government has played a distinctive still active role shifting its previous focus on the development of a state owned VC funds industry to set the regulations and incentives to foster the development of a private led sector.

4. Broadening the lens: the role of the Indian National Innovation System (NIS) and the Computer and Information Services entrepreneurial ecosystem (CISEE)

The analysis of the VC development demands a systemic perspective. In the next paragraphs we will point out to some key assets of the Indian NIS and the CISEE, that precede the VC industry development and have clearly contributed to its performance. As mentioned earlier, the CISEE emergence has provided a relevant platform of dealflow for the VC funds. The broader systemic approach implies also to have in mind the Indian geopolitical influences, the role of regulations, the education system, the financial system, the macroeconomic and aggregate demand evolution, the entrepreneurial structure, between other relevant aspects⁷.

⁷ See Cassiolato and Lastres (2005) and Kantis et al (2013) for a further details on the systemic view of the NIS and the entrepreneurial ecosystems.

4.1. The Indian NIS: background capabilities

State owned enterprises, universities and civil/military R&D institution. Since its Independence, India adopted a central planning mode of development, with public enterprises in most of the sectors of the economy (Kapila, 2015). During the so-called *Neruvian* period (1947-1964), as detailed in Gonzalo and Cassiolato (2016), Joseph and Abrol (2009), Joseph et al (2008) between many others, most of the basic institutions of the Indian NIS were created (universities, basic research institutions, technical institutions, developmental banks, etc.). In particular, India has developed scientific and industrial capabilities in key sectors such as nuclear, aerospace and defense (Krishna, 2014; Joseph et al, 2008). For instance, the Atomic Energy Commission was set up in 1948; the Indian Space Research Organization (ISRO) was created in 1969 to supersede the Indian National Committee for Space Research (INCOSPAR).

The contemporary Bangalore's CIS and entrepreneurial booms are quite related to the institutional network developed in that period. As highlighted by Bala Subrahmanya (2016, p. 11) "*The late 1940s, 1950s and 1960s, in fact, laid foundation for the growth of Bangalore as a modern city, with the establishment of key Public Sector Undertakings (PSUs) such as Hindustan Aeronautics Limited (HAL), Hindustan Machine Tools (HMT), Bharat Electronics Limited (BEL), Bharat Heavy Electricals Limited (BHEL), Indian Telephone Industries (ITI), Bharat Earth Movers Limited (BEML)... Even prior to India's independence, Bangalore saw the emergence of two important institutions, namely, Indian Institute of Science (IISc) which had come up in 1909 due to the long-term vision of J N Tata and University Visvesvaraya College of Engineering (UVCE)... both of which would have played a pivotal role in the emergence of Bangalore as a start-up hub, as the sources of entrepreneurship as well as the much needed talented workforce*". Thus, in the 80s, a large pool of capable engineers and scientists were available in India for a cheaper salary than in the developed countries (Dossani and Kenney, 2001).

Furthermore, due to its geopolitical context, India also had to develop a dense network of military institutions.⁸ In particular, India developed some interesting productive capabilities in naval industry, aerospace, electronics and optical equipment (Krishna, 2014; Gonzalo and Cassiolato, 2016). The different military laboratories have function as training centers for engineers and other technical personnel (Mani, 2010).⁹ After the liberalization, the Indian private sector have gradually got involved in the defense sector, with groups such as Tata, Infosys, etc. as suppliers. Nowadays, the opening to forward direct investment, the partial privatization of some public enterprises and the spin off policy programs are trying to push the local entrepreneurial capabilities at the defense field. In fact, in the last Twelfth Five Year Plan 2012–2017 (2013) the defense spin offs are a policy target.

Indian Diaspora. Since independence, many students migrated overseas in search of better employment opportunities, in the so-called *brain drain* process. The Non-Resident Indians

⁸ The main military confrontations were with Pakistan in 1965, 1971 and 1999, with China in 1962 and the independence of Bangladesh in 1971.

⁹ The Defense Research and Development Organization (DRDO) is the main organization related to military R&D, the Hindustan Aeronautic Limited (HAL) is the aerospace enterprise and Bharat Electronics Ltd (BEL) undertakes design, development, manufacture, licensed and support of electronic equipment systems. See Mani (2010) for a deep analysis of the aerospace sectoral system of innovation.

(NRIs) are another key element to understand the contemporary development of the VC industry (Saxenian, 2005; Dossani and Kenney, 2001, 1999). From the 50s, well-educated Indian engineers attended US universities and remained to work in high technology firms. Dossani and Kenney (2001) stressed that these engineers initially worked for existing firms, but they gradually got involved in the Silicon Valley entrepreneurial ecosystem. For instance, Kanwal Rekhi, co-founded Excelan in 1981, a data networking firm that was purchased by Novell, leaving the founders with huge capital gains to reinvest in other firms. There are several cases like these, with the salient Indian entrepreneurs founding VC funds.

By the late 80s, the NRIs called the attention of the Indian policymakers and they gradually were re-conceptualized as a potential source of knowledge, connections and capital (Dossani and Kenney, 2001). According to Saxenian (2005, p. 34) "*by 2000, over half (53%) of Silicon Valley's scientists and engineers were foreign-born. Indian and Chinese immigrants alone accounted for over one-quarter of the region's scientists and engineers, or approximately 20.000 Indian and 20.000 Chinese...*". In more general terms, Indo Americans are the most socio-economically successful minority ethnic groups in the US, with 4 million people, they represented approximately 1% of the US population in 2015. Indo American entrepreneurs are playing a key role in the Indian entrepreneurial ecosystem, playing a role not just as managers of funds or investors but also as serial entrepreneurs (Mani, 2014; Bala Subrahmanya, 2015).

Public Policy and infrastructure for the CIS industry. The contemporary vibrant Indian CIS entrepreneurial ecosystem, a key element to develop any VC industry, has also its roots in the past. As explained by Parthasarathy (2004), the origins of a computer policy date to 1963 when the Committee on Electronics was established, following India's defeat in the war with China¹⁰. As electronics was perceived to have a strategic role in national development and security, different ways to strengthen the technological base in electronics in the country were advised. In the 60s, IBM and International Computers Limited (ICL) began their operations in India. IBM went on to dominate the computer market until the early 1970s, controlling nearly 75 percent of the market.

In the late 70s, IBM was demanded by the Indian government to reduce his percentage ownership in India to 40%. IBM refused and left India in 1978. So the state-owned Computer Maintenance Corporation gained the monopoly to serve all foreign systems. According to Lateef (1997), IBM left 1.200 software personnel that founded different small software firms. To Dossani and Kenney (2001), the protectionist policy had benefits and costs. On one hand, it contributed to the development of a local IT industry. On the other hand, despite the skills of its personnel, the industry was backward. Since the 80s, the industry began a liberalization process with different kinds of public supports, mainly related to the provision of adequate infrastructure such as the Software Technology Parks of India (STPI) (Joseph and Harilal, 2001; Mani, 2014).

According to Joseph and Harilal (2001, p. 3264) "*With the initiation of economic reforms in the early 1990s, there have been a number of other policy initiatives that have facilitated the growth of IT. The new policy initiatives included the provision of finance to software development through equity and VC, measures to make available faster and cheaper data*

¹⁰ For an in deep study of the history of computing in India see Rajaraman (2012).

communication facilities, removal of entry barriers for foreign companies and reduction and rationalization of taxes, duties and tariffs". In addition, "In June 2000, an STP (Science and Technology Park) was set up in Silicon Valley comprising a business support centre and an India infotech center, with a view to facilitate software export by small and medium firms to the US. The centre also fosters business relationships by providing access to financial institutions in the US, VC funds and specialized trade bodies to promote partnerships and strategic alliances between US and Indian IT companies" (Joseph and Harilal, 2001, p. 3264)¹¹. Nowadays, there are around 70 STPIs in India. Around 80% of Indian software exports come from the STPI (Mani, 2014).

To sum up, in section we have stressed on some key elements that configured the Indian NIS that have clearly contributed to the VC industry development as a source of entrepreneurial, technical and institutional support: a) the R&D labs and State own enterprises, b) the Indian Diaspora, c) the public policies oriented to the CIS industry.

4.2. The emergence of the Computer and Information Services entrepreneurial ecosystem (CISEE)

Since the late 80s, the emergence of the new techno-economic paradigm and the growing demand from the US has given space for the emergence of the Indian CSS industry (Mani, 2014; Joseph and Aprot, 2009; Bala Subrahmanya, 2015). According to Mani (2014), since mid 2000s, India has become world leader in the CIS segment of the computer software industry. The initial leader was the US, which is still the major market for software exports. However, the outsourcing process initiated by the US firms in the 80s, has increasingly stressed during the 90s and 2000s. Ireland was the world leader in rendering these services between mid 90s and mid 2000s, but India has managed to surpass Ireland in terms of export market share since mid 2000s. In this context, India has been consistently ranked as number one in the Global Services Location Index (GSLI) produced by AT Kearney.

For Lee et al (2013), the Indian firms have been able to developed different assets that made it able for her to capitalized the "window of opportunity" given by the new techno-economic paradigm shift. The CISs has become one of the fastest growing industries of India and its share in the GDP reached around 4% in 2016. Mani (2014) highlights that there are a large number of knowledge-based entrepreneurs and domestic firms that had emerged and acquired sufficient technological capabilities to compete globally, even using cross-border M&A as a way of enlarging the scope of the markets abroad. Exports represent more than 80% of firm's turnover.

As detailed in Bala Subrahmanya (2015, 2016) these new startup generation has multiple entrepreneurial sources such as ICT industries, higher education institutions, public sector units, R&D laboratories, technology business incubators and accelerators, return migration of highly qualified and resourceful Indians, both entrepreneurs as well as former employees of MNCs in the form of reverse brain drain. Mostly, the entrepreneurs of this new startup generation are technical graduates and postgraduates with management qualifications or

¹¹ For a deeper analysis of the role of the government in promoting innovation during this period see Mani and Kumar (2001).

doctorates with previous work experience or previous start-up experience (Krishna and Subrahmanya 2014).

Gradually, an institutional platform has emerged shaping the CISEE has emerged to support this new generation of startups in different cities. One of the first initiatives taken by the Indian policymakers was the launch of the *Technopreneur Promotion Programme* (TePP) by the Ministry of Science and Technology in 1998–99. The TePP is a mechanism to promote individual innovators to become technology-based entrepreneurs. Currently, TePP has 34 centers across the country to promote individual innovators (DSIR, 2014a).

This process does not stopped, confirming the importance of an evolutionary and systemic perspective. The formation of Technology Based Incubators (TBIs) by the National Institute of Science and Technology Entrepreneurship Development Board (NSTEDB) by the Department of Science and Technology (DST) and the Council for Scientific and Industrial Research (CSIR), through National Chemical Laboratory (NCL), are other quite relevant initiatives (Bala Subrahmanya, 2015). The introduction of PRISM (Promoting Innovations in Individuals, Start-ups and MSMEs) scheme in the Twelfth Five Year Plan is another important development. PRISM is open to any Indian citizen with an innovative idea and the wish to translate their idea into working prototypes/models/processes; or public-funded institutions or organizations engaged in the promotion of innovation (DSIR, 2014b).

With respect to funding, as said, the enactment of Limited Liability Partnership (LLP) Act in 2008 and the established of the SME Exchange platforms on the Bombay Stock Exchange (BSE) and National Stock Exchange (NSE) enables early corporatization and further fund raising. According to Joshi (2015), the India Opportunities Fund was launched in 2011 to seek a strategic stake in the funded companies with board representation. More recently, in April 2016 was launched *Startup India*, an initiative based on three pillars: to simplify the startups related bureaucracy, to provide funding support, and to deepen industry-academia partnership and incubation. A 'fund of funds' (FFS) of around 1,5 billion usd to support innovation driven Startups has been established over (INR 2,500 crore per year for 4 years). The FFS will not invest directly into Startups, but shall participate in the capital of SEBI registered Venture Funds. The FFS invests in SEBI registered Alternative Investment Funds (AIFs) which, in turn, will invest in Startups.

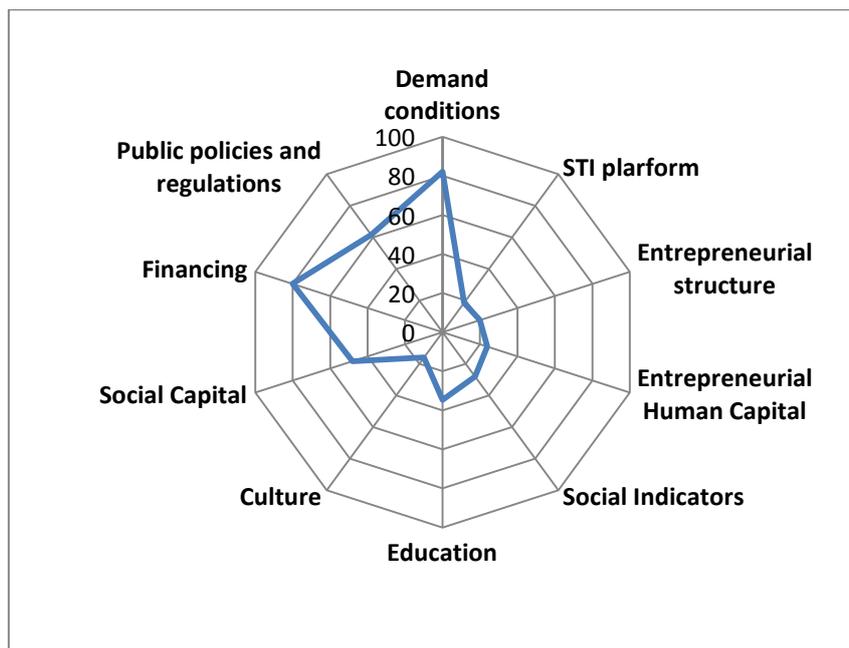
Among the private sector institutions, the National Association of Software and Services Companies (NASSCOM), Tata and some of the MNCs, such as Microsoft and Cisco are other relevant actors in the promotion of startups. According to Mani (2014), in 2013, NASSCOM had a membership of 1,400 firms, which accounted for 95% of industry revenues. NASSCOM has been active in promote the brand image of Indian software industry. It also works as a broker of ideas and market promoting networking, exchange of best practices and has contributed in the spread of certifications to enter to external markets (Karnik, 2012). NASSCOM has taken several initiatives focusing on different cities. The most notable one is the *Great Indian Start-up Carnival*, as part of which NASSCOM initiated *10,000 Start-ups Programme* with the support of Google, Microsoft, Kotak, Intel and Verisign. Recently, NASSCOM has launched a *NASSCOM Technology Start-up Registry* and introduced start-up skills initiative (NASSCOM, 2015). Microsoft and Google have also been active since the 2000s. Both of them have their own

accelerators. Finally, the Indian entrepreneurial ecosystem also includes numerous private websites such as *india.startuplogic.com*, *desistartups.in* and *StartupNews.in* in which they facilitate the diffusion of information and programs such as Start-up Garage to train entrepreneurial capabilities.

A snapshot on the Indian entrepreneurship context could be obtained by looking at the Index of Systemic Conditions for Dynamic Entrepreneurship elaborated by Prodem (Kantis et al 2014). The Index is built on the basis of ten dimensions that help to understand the existence of entrepreneurial human capital (social conditions, education and culture), the opportunities for innovation and growth (science and technology platform, industry structure profile and demand conditions) and the factors that contribute to the creation and development of the firms (social capital for networking, finance and policy & regulations).

As can be seen in the diagram below, India outperforms in some factors such as: demand conditions, financing and public policies and regulations. The Index clearly illustrates, as stated before, the important role of the opportunities provided by the external demand, the existing financial conditions and the activism of government. Besides this, it also shows important weaknesses in the rest of the dimensions that could affect the sustainability of the process in the long term.

ICSEd Prodem of systemic entrepreneurial conditions



Source: ICSEd Prodem (2017)

5. Final comments

The main objective of this essay was to present the development of the Indian VC industry from an evolutionary and systemic perspective. We first presented some figures to show, very brief, the status of VC funds in India allowing later to explain its emergence and development. Then we presented the different stages of development, focusing on VC institutional and industry arrangements and players. This included the role of NIS and the CISEE.

The institutional configuration and the role of the different factors that contributed to the development of early financing industry is context specific. In the case of India, the State owned organizations and the World Bank have had a prominent role since the 70s to the 80s as the Indian Diaspora and the Foreign VC funds as well. IVCA and NASSCOM have also contributed in institutional terms. During this process, different institutional arrangements and regulations were 'put in line' to allow the standards practices of the VC industry.

Then, using a systemic perspective, we have tried to show that the VC industry development should be understood in a broader context of: a) a booming economy, b) the capabilities accumulated between the 50s and the 80s, c) the role played by the Indian Diaspora, d) the deregulation process initiated in the 80s and e) the US CIS offshoring opportunities. All these aspects have been critical for the emergence of VC industry. Therefore, the evolutionary and systemic perspective on the VC industry shows that its emergence should not be attributed just to the liberalization process but to a more complex process where public and private sector inputs contributed both along the different stages of institutional learning.

Although the results are significant, both in terms of VC and CISEE development, further efforts should be made in order to achieve greater impact. Nowadays, most of the deals are being closed by Foreign VC funds. As we have seen, between them, we can identify three types of funds: a) the ones registered in Mauritius and Singapore, b) the ones entering to India as FDI, under regulation of the Reserve Bank of India (RBI), but not by the SEVI and c) the ones registered in India under SEVI regulation. At least, this represents a potential regulatory ambiguity. As highlighted by the Planning Commission (2012), the foreign VC funds tend to enter the firms after the first stages of early financing, which have the highest mortality rates, when the product/service is consolidated, in order to scale up the firms. We think that the contributions of the Foreign VC funds should be discussed. Besides the Fund of Funds (FFS) a broader strategy aimed at close the financial gap in its different segments should be considered, including the role of business angels and crowdfunding. Especially in a context where VC funds, along the world, tend to move towards later stages of lower risk.

Specifically, the following issues deserve further research: a) the role of the foreign VC funds in the firm long-term investment decisions, b) the impacts of the foreign VC funds entrance in terms of intellectual property, patents, and brands ownership, c) the (des)coordination in the regulation of the Foreign VC funds, mainly between the SEVI and the RBI, d) the long-term commitment of the Foreign VC funds with the Indian entrepreneurial ecosystem¹².

¹² Some preliminary research on this issue was presented for the case of Latin American firms in Gonzalo et al (2016) and Gonzalo et al (2013). In more general terms, among the international literature, some scholars such as Lazonick and Mazzucato (2012), Pisano (2006), Chesnais (2014) between others sustain that VC funds are not the best at providing "patient money", which is a need of any innovation process.

There are also other important limitations, as shown by the Index of Systemic Conditions. Much more public and private investment and institutional strategic efforts seem to be needed to strengthen the role of the endogenous forces including the enlargement of entrepreneurial human capital and its determinants (education, culture and social conditions) and the platform of science and technology for innovation. This is very relevant in a highly heterogeneous country such as India.

They stress that VCs are not stimulating innovation at the ecosystem level, on the contrary, they are increasingly entering to scale up firms, but not to contribute in the early financing.

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