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Understanding the failure of the replication of the Chinese economic reforms in India through the study of Gujarat RIS and Karnataka REE

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ABSTRACT

India has failed to develop merchandise exports as China has. The Indian government is aware of this challenge and hence has created a specific plan for the industry called Plan 2025 to benchmark Chinese reforms. However, Plan 2025 fails to enhance the industry at this stage. This paper examines how some successful economic reforms in China did not have the desired impact in India. This paper shows that some key success factors of the Chinese experience have deliberately not been included in India (absence of agglomeration effect with emerging neighbours, rent capture behaviour at a political level, same focus on IT & service instead of manufacturing from the SEZs, absence of upgrade to the current Chinese reforms). Still more significantly, there were policy mistakes. The Indian willingness to focus on knowledge generation for the manufacturing sector (as it has always done for IT & services) instead of on knowledge exploitation as China did, prevented India from using the backwardness advantage to obtain technology transfer and spillover to the rest of the economy. Therefore, this paper makes some recommendations for Indian policy-makers on how to improve the current flaws detected in the application of some Chinese economic reforms. As there is a need for state level analysis, the methodology consisted in comparing the past economic history and trajectories of two Indian States (Gujarat & Karnataka) with two Chinese Deltas (Yangtze River and Pearl River) using the approaches of the regional innovation systems (RIS) and the regional entrepreneurial ecosystems (REE).

Introduction

Whereas China and India had similar GDP per capita in 1973, Chinese GDP per capita is currently more than four times higher than India's (8,500 USD vs. 2,000 USD on average). Despite having one of the highest GDP growths in the world, India struggles to develop its industry. Indeed, its merchandise exports represent less than 10% of that of China with a productive specialization more focused on services than on industry. The Indian government is aware of this challenge and, hence has created a specific plan for industry called Plan 2025, designed to boost the Merchandise Exports from India Scheme (MEIS) and Special Economic Zones (SEZ) (Press Information Bureau Government of India, Ministry of Commerce and Industry, 2018). However, Plan 2025 fails to match Chinese performance with regard to 1) attracting and generating innovation in India and 2) triggering local-scale knowledge spillover (Aggarwal, 2011, 2012; CTIER, 2018; Sharma et al., 2012; Tandri, 2012).

One of the focal points of the deepening growth in India under PM Modi's second mandate is to strengthen the pace of innovation "by implementing effective technology transfer and strengthening the distributive power of the economic system as a whole" (Fu, 2015, p. 2). Another focal point is to achieve a duality in the Indian economy where cutting-edge practices in IT and services coincide with traditional and informal Indian grassroots innovation systems and jugaad innovation; jugaad being a Hindi term referring to frugal innovation. (Gupta, 1997; Prahalad & Mashelkar, 2010; Radjou et al., 2011).

To face this challenge as a federal country, India needs scholarly/academic work to be carried out at state level. Nevertheless, most of the studies were undertaken at the national level until the 2010s. This paper is a contribution to fill the gap where more and more studies enter this category (Alkon, 2018; Jenkins et al., 2013; Panagariya et al, 2014; Panagariya & Rao, 2015), regardless of the discipline.

Therefore, it is logical to have chosen a methodology,

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which focused on Indian States. More precisely, it consisted in comparing the past economic history and trajectories of two Indian States (Gujarat & Karnataka) with two Chinese Deltas (Yangtze River and Pearl River) using the approaches of the regional innovation systems (RIS) and the regional entrepreneurial ecosystems (REE).

A regional innovation system approach (RIS) as originally defined by Cooke (2001), Asheim and Isaksen, (2002) has been chosen to illustrate situations where the "RIS emphasize the role of the region as locus for interactive learning and knowledge exchange, stressing the importance of (geographical) proximity for innovation" (Martin et al, 2017, p. 3). Nevertheless, entrepreneurship is not considered like this within the RIS approach unlike the recent evolution concerning the literature about the regional entrepreneurial ecosystem (Hannah & Eisenhardt, 2018; Jacobides et al., 2018). As such, the methodology chosen in this article was to contrast ceteris paribus the past tracks of China and India, each through one RIS and one REE.

In order to provide some insights into the failed replications of Chinese reforms in India, the comparison will be based on the Chinese experience (here called the "Chinese prism"). We will first examine the development of the Pearl River Delta (PRD) with a strong focus on electronics and entrepreneurship (and considered therefore as a REE) and then on the Yangtze River Delta (YRD), known for its manufacturing exports as the backyard of Shanghai (and considered therefore as a RIS).

Next we will examine, two of the best performing Indian States, more specifically Karnataka, host of the Indian Silicon Valley based in Bangalore, and Gujarat, former State where Modi used to be the Chief Minister and famous for its friendly policy of welcoming foreign direct investments (FDIs). We will check the impact of the Chinese prsim, which have been scrutinized in sectors such as automotive, infrastructure and chemicals.

Specific attention has been paid to the dynamic ability of institutions to overcome dilemmas (Heidenrich, 2004) and investigate institutional bottlenecks, whether due to a lack of performance, alignment, quality or scarcity (Adner, 2012; Baldwin, 2015; Zukauskaite, 2018).

The results of this paper shows that some key success factors of the Chinese experience have deliberately been excluded in India. It is impossible to obtain support from the higher economic culture of emerging neighbors and rent capture behavior at a political level. State owned development corporations prevent a change of focus of the SEZs from IT & service to manufacturing and there is a lack of upgrade to the current economic landscape to avoid bottlenecks in the RIS and REE.

Even more importantly, there were policy mistakes as well. The Indian willingness to focus on knowledge generation for the manufacturing sector (as it has always done for IT & services) instead of the knowledge exploitation in the Chinese approach, prevents the South Asian giant from using the backwardness advantage to obtain technology transfer and spillover to the rest of the economy based on the agglomeration effects linked with spatial distribution.

Therefore, this paper makes some recommendations for Indian policy-makers on how to improve the current flaws detected in the application of some economic reforms stemming from China as an alternative to reforms put in place in Silicon Valley. Indeed, within an innovation based economy, it provides a complementary focus to the one focusing on Silicon Valley (Ciesinski, 2016; Gauthier, 2018, 2019; O´Mara, 2019), as well as studies focusing on emerging markets going to the Silicon Valley to launch successful ecosystems with incubators and accelerators using Silicon Valley (Bartlett & Mrockowski, 2019). Finally, this paper delivers insights concerning the set up of entrepreneurial ecosystems in emerging markets (Lyortsuun, 2017; Mrkajic, 2017; Rogova, 2014; World Economic Forum, 2014).

The paper is structured as follows: first, the literature review concerning the RIS and the REE. Second, the methodology concerning the theoretical framework is explained in detail, paving the way to the hypotheses. Third, the results of the framework are explained and this leads to a discussion in a fourth section. Some limitations concerning the paper are discussed in a fifth section before the conclusions of the paper are presented in the final section.

Literature Review

Regional Innovation System (RIS)

The first reference to the national innovation system (NIS) was made by Freeman (1987), Lundvall (1988, 1992), Nelson and Rosenberg (1993), Niosi (1993) and Patell and Pavitt, (1994). As Lundvall (2009) defined it, it refers to "an evolving and complex system that encompasses relationships within and between organizations, institutions and socio-economic structures which determine the rate and direction of innovation and competence building emanating from the process of science based and experience learning" (p.6).This concept was used initially in the small Scandinavian countries and Japan. However, the ability to provide some satisfying results on a country-continent scale such as India was more complex as the Science-Technology-Innovation system, defined according to the National Innovation System (NIS), varies too much within national geographic borders. Therefore, there is a need to adopt a smaller geographic unit as a new point of reference. The "role of the

region as locus for interactive learning and knowledge exchange, stressing the importance of (geographical) proximity for innovation" (Martin et al, 2017, p. 3) appears as the most appropriate as it was stressed initially by Asheim & Isaksen (2002), Braczyk et al. (1998), Cooke et al. (1997), and Cooke (2001). Three levels of analysis were considered: actors, networks and institutions. Indeed, RIS are of special interest as they "explain differences in sectoral patterns of innovation mainly in terms of ability to exploit technological trajectories, by technology transfer, intramural R&D, spillovers, networking, articulation of demand factors" (Ranga, 2009, p. 11).

It should be noted that despite the many studies concerning the RIS, the adoption of empirical studies presented a set of advantages and drawbacks. The main advantage was linked to the adoption of the main variables of the local reality and the main drawback was a direct aftermath of its main advantage. As the level of definition concerning regions and innovation systems was extremely accurate, the validation of such a theory has encountered some difficulties to grasp the key success factors, as Doloreux and Parto, 2005 summarized. Additionally, it may lead to incomplete representations of the field analyzed (Bettis & Prahalad, 1986) and cause confusion between the description of the field with the relevant prescription the field should obtain (Casillas & Acedo, 2007). Lastly, Krishna (2007) noted the lack of articulation and coordination 1) between the regional innovation systems (RIS) among others and 2) between each of the RIS with its National Innovation System (NIS), something which was a notable obstacle for policymakers in federal countries when articulating policies among different states, regions or provinces.

Despite the fact that these issues were not fully solved, it has to be noted that the concept has received new interest in recent years. Indeed, RIS are of special interest as they can "explain differences in sectoral patterns of innovation mainly in terms of ability to exploit technological trajectories, by technology transfer, intramural R&D, spillovers, networking, articulation of demand factors" (Ranga, 2009, p. 11).

Moreover, the approach provided by Zukauskaite (2018) concerning three types of institutional bottlenecks (absence or poorly developed, institutions, inappropriate institutions and poorly aligned institutions) can help to provide a better understanding of why successful reforms in China did not provide the expected impact in India.

As the RIS is a theory based on empirical studies (Doloreux & Porto Gomez, 2017) and on the variety of contexts (Cooke, 2001), comparing China and India is relevant with this tool. This issue offers even more current perspectives as there are always more contributions in this regard considering the global flow of knowledge (Martin et al., 2017). More specifically, there is a willingness to generate a "new regional industrial path development" (Isaksen, 2015, p. 585; Isaksen & Trippl, 2016, p. 66) in Indian states based on the lessons obtained from the success of Chinese economic reforms.

Regional Entrepreneurial Ecosystems (REE)

Turning our attention to REE, it is important to indicate that "the importance of actors such as entrepreneurs, in universities and firms, for innovation performance are much less considered" in RIS as Isaksen et al. (2018, p. 2) pointed out. Thus, the notions of RIS and REE are complementary for the purposes of this study. Whereas initially the literature on entrepreneurship centered on individual behavior and on the firms themselves (Shane, 2003; Shane & Venkataraman, 2000). The number of papers published around regional entrepreneurial performance has been growing constantly (Acs et al, 2014; Audresch & Belitski, 2017).

Theoretical Framework & Method

The focus of the paper is to understand that although some economic reforms were successful in China, their replication in India did not generate the same positive impact on its industry. The authors explain that some key success factors of the reforms in China were not implemented in India.

In order to understand that these factors were not locally and properly adopted in India, the two main economic geographies in India were scrutinized without considering the capitals, that is to say:

1) Karnataka or the Indian Silicon Valley around Bangalore and
2) Gujarat or the Indian state that decided to copy China in terms of attraction of Foreign Direct Investment (FDI)

The comparison took into consideration the specialization of the two Indian states with two Chinese Deltas. The Pearl River Delta specializes in Information and Communication Technology (ICT) and entrepreneurship as did Karnataka and the Yangtze River Delta initiated its economic take off thanks to manufacturing exports (even though its range of specialization is much higher now) as in Gujarat

To understand the failure of the reforms in India, the past economic history and the trajectories of the States and Deltas are critical. In that sense, the choice of the regional innovation system (RIS) theory is the best possible choice as it enables us to consider the different stakeholders over time as explained below. The comparison between Gujarat

and the Yangtze River Delta entered this category.

However, in Karnataka and in the Pearl River Delta, the role of entrepreneurship is much bigger. Therefore, it should be taken into consideration. As Isaksen et al. (2018, p. 2) admits, the "importance of actors such as entrepreneurs (…) for innovation performance are much less considered" in the RIS. The Regional Entrepreneurial Ecosystems (REE) favors this approach. Therefore, the comparison concerning Karnataka and the Pearl River Delta was centered on the idea of REE.

As such, Table 1 summarizes the elements of comparison between the Indian States that are scrutinized in relation with the Chinese prism taking into consideration either a Regional Innovation System (RIS) for the comparison between Gujarat and the Yangtze River Delta or the Regional Entrepreneurial Ecosystem (REE) for the comparison between Karnataka and the Pearl River Delta.

Table 1
Methodology: Elements of comparison between India & China

	Indian States Scrutinized		Chinese Prism	
Comparison of RIS	Gujarat		Yangtze River Delta	
Comparison of REE		Karnataka		Pearl River Delta

Source: Own elaboration

Before defining the "Chinese prism", the paper will insist on the failure of Indian reforms to replicate Chinese reforms due to 2 types of factor (F1 and F2):

Factor 1. Some key Chinese success factors were deliberately not implemented in India (lack of willingness to explore complex relationship conflicts with neighbors as China did, and no change of the political rents existing at the State level and no change in the Special Economic Zone focus in favor of manufacturing).

Factor 2. India made some policy mistakes. India wanted to promote knowledge generation instead of knowledge exploitation, which happened in China. This prevented Indian companies from using the backwardness advantage for technology transfer and spillover to the rest of the economy and prevented the Indian economy from upgrading its RIS and REE.

Both factors will appear in the comparison between Indian and Chinese RIS and REE and will be correlated to the hypotheses. Table 2 sheds light on what will be considered as the critical factors and hypotheses to explain the failure of the replication of Chinese reforms in India taking into consideration the regional differences in terms of innovation systems and entrepreneurial ecosystems. These elements indicate the advantage of taking into consideration different states as it shed light on different behaviors (the hypotheses) despite the appearance of some recurrent pattern.

Hypotheses

Before describing the extent of the reforms in India, we will explain in detail the economic reforms as they took place in China, more specifically in the Pearl River Delta and in the Yangtze River Delta.

Defining the "Chinese Prism"

Before differentiating between the YRD and the Pearl River Delta (PRD), it seems relevant to provide some insights concerning the Chinese economic model. Indeed, Xu (2011) referred to China as a "regional decentralized authoritarian" (p, 1078) system, which implies: 1) central government that controls personnel, land and wages on the one hand and 2) subnational governments incentivized economic reforms on the other hand. As such, some margins of manoeuver exist at state level for economic reforms as will be explained through the differences between the Yangtze River Delta (YRD) and PRD.

When Deng launched the "Four Modernizations", innovation was characterized locally by 1) scarcity of the resources for innovation, 2) weak regional innovation systems, 3) forced reliance on external sources for innovation, 4) unstable institutional system and 5) informality through guanxi networks (Fu, 2015).

A set of elements appears to be the same throughout Chinese clusters. Indeed, Zeng (2012) insisted on the willingness to attract FDI to later develop a low cost manufacturing export-led growth regime that will progressively upgrade its technology. China was aware that the content of innovation had to be incremental rather than abrupt (Fu, 2015) to fully use the advantage of the backwardness (Nolan & Lenski, 1985). Indeed, for latecomers, knowledge exploitation is more important than knowledge generation when 1) technology transfer happens and 2) access to knowledge widens.

The ability of China to upgrade its innovation framework was based on the exploitation by firms of both the external knowledge (via the foreign direct investment) and the local interdependency for enhancing the competitive-

Table 2
Critical factors and hypotheses to explain the failure of the replication of the Chinese economic reforms in India

	Comparison Between REE in Karnataka & Pearl River Delta	Comparison Between RIS in Gujarat & Yangtze River Delta
FACTOR 1: Choice not to Replicate Chinese policy	**HYPOTHESIS 2.** Lack of willingness to give up some political rents and an existing specialization in the ICT sector despite insufficient results in manufacturing	**HYPOTHESIS 3.** Lack of willingness to obtain the the support of neighboring countries has limited the learning curve potential of the agglomeration effects. Therefore, the model is necessarily bound to FDI.
FACTOR 2: Policy Mistake	**HYPOTHESIS 1.** Initial mistake to focus on knowledge generation in ICT instead of knowledge exploitation as it prevented the use of backwardness advantage and spillover to the rest of the economy	**HYPOTHESIS 4.** The lack of understanding that agglomeration effects are bound to spatial level is a policy mistake

Source: Own formulation

ness (Asheim & Isaksen, 2002). Even more importantly, the dynamic ability of institutions to overcome dilemmas and meet the challenge of market change and organizational restructuring (Heidenrich, 2004) has played a key role in obtaining technology transfer and local scale spillover of knowledge thanks to agglomeration effects (Matthews, 2010).

If both PRD and YRD focused on knowledge exploitation, FDI and manufacturing to enable massive economic (manufacturing and exports) (Liu & Li, 2015). The approach in the PRD initially prioritized Special Economic Zones (SEZs) to later embrace entrepreneurship using Shenzhen as a driving force. The policy makers in the YRD decided to carry out different reforms where Zhejiang Province was characterized by the motto "one village producing one product, one town building one industry". Jiangsu was attracting FDI to "development zones" and "industrial districts" and Shanghai was becoming the economic, financial and trade center of China (Wei et al. 2015).

Moreover, at the national scale within China, the evolution of State Owned Enterprises (SOEs) has been similar in both deltas, which has been less favorable of private companies. The role of entrepreneurship has been more relevant within the PRD than in the YRD to leverage entrepreneurships.

The differentiation between the PRD and YRD will be examined through a historical approach with secondary data, including the Chinese Statistical Yearbooks and existing literature. In order to be able to later identify some major differences between the deltas and their Indian counterparts and establish some hypotheses concerning the supposed lack of success of Indian reforms inspired by the Chinese prism. These hypotheses will be centered on historical choices made by each country, which are difficult to modify with success and constant upgrades of the Chinese model, which always makes it more difficult to copy (and benchmarked properly).

Beijing and its Silicon Valley, Zhongguancun, were not chosen for a comparison with Delhi and NCR as both are country capitals, something that implies different dynamics that can hardly be replicated in other ecosystems within the same country.

Pearl River Delta (PRD)

The Pearl River Delta refers to the Guangdong, Honk-Kong and Macao Greater Bay Area, with a population of 120 million people. The Pearl Delta River experienced a spectacular level of development in China following the creation of the Special Economic Zones (SEZ), and more specifically Shenzhen becoming home to the headquarters of Tencent, Huawei and Build your Dreams (BYD). Even more striking, 90% of global electronics firms are located in Guangdong Province, manufacturing 50% of the world´s desktop computers and 40% of personal computer (PC) components (Guangdong Provincial Bureau of Statistics, 2016).

Historically, the use of the coastal SEZs has been paradigmatic of Chinese strategy in that delta. Even though Special Economic Zones (SEZs) were launched first in India in Kandla Gujarat) in 1965 and only 14 years later in China with Deng in the PRD, it has to be said that the Chinese success has never been fully copied despite many attempts (Aggarwal, 2011).

By 1980, the first three SEZs had been launched in Shenzhen, Zhuhai and Shantou in Guangdong. Province, followed two months later by Xiamen in Fujian Province, and later still by Hainan SEZ (Yeung et al., 2009). It has to be said that the SEZs had a common background with strong ties with the rest of the world and connections with Hong Kong, Macao and Taiwan (Zeng, 2012). In 1981, the SEZs represented 60% of the FDI, principally located in Shenzhen. In 1987, their share of FDI went down to 20% but it was still relevant (Wong, 1987). As the importance of copying becomes less and less relevant as the economy reaches the technological frontier (Acemoglu, 2006), the importance of an innovation-based strategy linked with entrepreneurs becomes more relevant. In that sense the silo specialization in ICT explains the expansion of entrepreneurship around Shenzhen. This led to the elaboration of an entrepreneurial ecosystem first in Shenzhen and then in Dongguan, albeit to a lesser degree (Fu, 2015).

Globally, the PRD was extremely successful as China constantly upgraded its SEZs with the inclusion of High-Tech Industrial Development Zones (HIDZs), Free Trade Zones (FTZs) and Export Processing Zones (EPZs) in different provinces and for different sectors. The process was not fully linear as many investments came from the Real Estate Sector initially and there were some local issues with the land as well (Aggarwal, 2011). Nevertheless, the overall benefits of a policy based in SEZ linked with Hong Kong, Macao and Taiwan was the upgrading of the knowledge exploitation system. The knowledge links that were created locally paved the way to some knowledge generation processes and to the creation of an entrepreneurship ecosystem in the PRD.

Yangtze River Delta (YRD)

The YRD represents Shanghai, Zhejiang and Jiangsu provinces which is one percent of the total land area of China, 5.8% of its population and 20% of its GDP. As Xie & Du (2008) explained, the development of the YRD is designed to make Shanghai the leading city in the fields of trade, business, finance & shipping, acting as a dual platform between the 15 major cities of these two provinces, including Nanjing, Suzhou, Wuxi, Hangzhou and Ningbo and the rest of the world.

The development of linkage effects and spillover was managed following the Zhang & Zhou (2004) model through five stages: 1) technology introduction, 2) technology learning, 3) technology integration, 4) independent innovation and 5) radical innovation. In this model, it is clear that the whole process depends on the ability to have access to knowledge exploitation and consequently, to insights from other countries.

In this case, unlike the PRD, where the focus was mainly on ICT, specialization took place in various sectors such as IT, chemical textile, automotive industry, machine, medicine and metallurgy. The PRD managed to create some agglomeration effects and knowledge upgrade thanks to an increasingly effective spatial distribution with Hong Kong, Macao and Taiwan. The YRD created the same process internally, as Wei et al (2015) demonstrated using Global Moran´s I Index. Indeed, this tool serves to measure the degree of concentration or dispersion of activity in a specific region first, and second, across neighboring regions. In that sense, the YRD region created a set of mechanisms where – beyond geographical borders of counties or cities or provinces – the clusters could expand successfully without geographical proximity. For instance, in the textile sector, there are positive spatial correlations between Wuxi, Suzhou, Jiaxing, Hangzhou and Shaoxing. In that sense, it is clear that Krugman (2000) was right when he referred to the fact that the initial growth in Asia was linked to resource mobilization rather than efficiency. The lack of an increase in productivity and the amount of resources available in the YRD illustrate this trend.

The concern in the last decade within the Yangtze River Delta has been to figure out a way of upgrading to become a global innovation center managing the "two firsts" based on a well-off society and economy modernization (China State Council, 2010). The development of Eastern China around Shanghai has favored a newer specialization of these clusters in more valuable manufacturing sectors leaving to Western China the specialization in low cost exports (Liu & Li, 2015).

Even though the process of moving towards becoming a global innovation center is not yet fully achieved and although some risks remain in terms of market fluctuations, low barriers to entry, "lemons problems" (where bad clusters can harm good ones), and low positions in the global value chain (Wei et al., 2015). The homogenization of the spatial distribution within Eastern China through an agglomeration effect ensures an extremely positive dynamic that should be benchmarked in many countries.

In the case of the YRD, success came from the convergence of infrastructure around Shanghai from Jiangsu and Zhejiang. Similarly, as in the PRD, the agglomeration effects around several clusters enabled massive manufacturing FDI to be set up in this delta, progressively extending the quality of all clusters and the subsequent strategic alliances among local companies.

The Indian Case

From independence in 1947 until the 1991 bailout, India focused on protectionism as a major axis of its economic policy with the raj license system; this did not facilitate innovations. The issue, here, is not to discuss whether the cause of these failures could be attributed to inclusive policies and extractive economics (Acemoglu & Robinson, 2012), to high level of inequalities (Sen, 2006) or to historic legacy (Das, 2002; Parthasarathi, 2011; Roy, 2012). These facts are assumed. Nevertheless, the magnitude of the past failures have prevented analysts from making a fair analysis of some policy reforms that were set up in India in recent decades and that started to generate some results in terms of innovations.

In that sense, the development of the National Innovation System in India presents some paradoxes. For instance, the study of the Science-Technology-Innovation (STI) system offers a well-organized structure that paved the way to extremely valid and recognized institutions such as the Indian Institutes of Technology (IITs) and Indian Institute of Management (IIMs). However, Shan et al. (2018) and CTIER (2018) have perceived some major flaws in terms of innovation within the STI system that were not corrected over time, such as decreasing R&D and the lack of commitment of Indian companies and institutions in this field.

At policy level, the lack of alignment between the Central Government and the States and Union Territories (Jaffrelot, 2014; Saint Mézard, 2015) also generates an under-optimization of FDI throughout the country. However, despite recent reforms reflected in the World Bank (2017) Ease of doing Business report, such as the Goods & Services Tax (GST) at a fiscal level, have favored the increase of FDI in India.

Informality occurs through Jugaad in India and Guanxi in China. Indeed, this Hindi term refers to bottom up and frugal innovation informality, mainly for SMEs. A handful of SMEs may have managed to become successful through these types of innovation most of the time. Successful Indian companies such as Tata, Reliance or Birla are family businesses with private shareholders, whereas China managed its growth from the 1980s thanks to SOEs.

The focus on knowledge generation in ICT, services and financial offshoring in India does not seem to match the focus on knowledge exploitation that China had been pursuing historically in manufacturing. In that sense, this initial situation does not seem to be the most appropriate to initiate a comparison with China.

However, India under PM Modi has become increasingly dirigisme in terms of policy and therefore the differences between the largest democracy in the world and China are less patent. Moreover, as China provides its provinces with some margins for manoeuver in terms of economic policy, the comparison with a federal country such as India makes more sense. Finally, and most importantly, the comparison makes sense as India has decided to copy Chinese policy to boost manufacturing exports, but without success. Two of the crucial questions are 1) Which Chinese reforms have been copied by the Indian Government? Moreover, 2) were they copied properly? Indeed, through the study of the YRD and the PRD, it was possible to understand the existence of several Chinese models. Moreover, the upgrade at different speeds of these Chinese models makes it even more complex to benchmark and replicate the manufacturing models within India.

Therefore, the study of two Indian States, Karnataka & Gujarat, where some policies are similar respectively to PRD in terms of entrepreneurship and Special Economic Zones (SEZs) and YRD in terms of agglomeration effects through clusters, should provide some insights to Indian policy makers as to why the Indian policy has failed to replicate reforms inspired by Chinese policy makers.

Karnataka REE

Karnataka, a state in the heart of India to the South of Maharashtra is a success story, which can be explained by several factors (Government of Karnataka, 2006; Paul, 2000). Apart from the strong legacy in education this state had in the XIX Century, Nehru decided to focus on the need for modern technology and thinking in India, in the same way as Deng with its 4 modernizations for China (Vogel, 2013).

Many factors could have generated the definitive economic upgrade in India, but none of the following did. Nehru promoted the creation of the Indian Institutes of Technology (IIT) and Indian Institutes of Management (IIM), the second IIM was created in Bangalore, capital of Karnataka, in 1962, following the one in Ahmedabad, Gujarat in 1961. The creation of Special Economic Zones (SEZs) happened in India before it did in China. Two SEZs were created one in Mumbai and one in NCR Delhi. Nevertheless, the creation of the SEZ in Indian did not happen as the Regional Innovation System was not sufficiently solid (Tandri, 2012). The decision to empower national champions through the creation of Tata Consultancy Services (TCS) at the end of the 1960s took time to generate the desired outcome. Even though Bangalore benefitted from the presence of a defense sector and local Indian blue chips as in Silicon Valley and unlike Ahmedabad, this was still not yet enough to achieve the take-off of the IT offshoring in India.

As Aiyar (2013) explained, the building up of the soft-

ware export cluster was linked to "computers, telecommunications and a reasonably liberal foreign exchange regime. (…But). Every element that the sector required was shackled" (p. 233). Change happens only when some variables are taken into consideration. In that sense, Amable, Barré and Boyer (1997) remind us that: "each innovation system depends on a dual dynamics" (p, 6). One is linked to the national innovative path and the second to the internationalization of the R&D. In the case of Bangalore and Karnataka, the decision of Texas Instruments (TI) to locate to Bangalore in 1984 was critical to reach a level of cutting-edge technology in terms of connectivity and R&D. Moreover, the 1991 bankruptcy of the Indian State favored the need to have a more liberal foreign regime that was finally implemented by the regulator (Aiyar, 2013). The Y2K bug in 2000 definitely enabled Bangalore to become the Indian Silicon Valley (Messner, 2010) with an increase of 12 times the revenues of the Indian IT industry between 2000 and 2008, representing at this period total revenues of more than 48 billion USD. Therefore, Hypothesis 1 can be summarized as follows:

Hypothesis 1. The Karnataka situation implied a policy mistake and thus a Factor 2 situation.

The Karnataka innovation system was initially focused on knowledge generation with local firms. Only the successful arrival of TI promoted the change to empower ICT through knowledge exploitation, and FDI generated a vibrant ecosystem. At this stage, the take-off of this sector did happen progressively around Bangalore and with the support of two other clusters, defense and pharma.

At this stage, it is clear that no efforts were made to encourage manufacturing into this state. Nevertheless, as CTIER (2018) pointed out, the focus of the Innovation policy, as set up in Karnataka from 2001 did not bring any major support for manufacturing export and relied even more strikingly on defense, pharma and Business Process Outsourcing BPO. The major insights concerning the evolution of the innovation policy in Karnataka are commented in Table 3.

The only relevant change took place with the saturation of Bangalore to develop some new technological hubs in Hyderabad in Telangana and in Coimbatore and Chennai in Tamil Nadu. In that sense, the copying the PRD has been relevant as it has enabled an increase in the possible strategic alliances among local firms. These strategic alliances were more enhanced in the service sector than in the manufacturing sector.

Additionally, the increase of the activity in the manufacturing sector could have taken place as in the PRD with

Table 3
Set up of innovation policy per sector from 2001 – Current in Karnataka

Year Policies were Set Up	Sector in which the Policies were Launched
2009	Renewable Energy Policy
2011	IT Policy ICT
2013	Aerospace & Defense
2014	Industrial Policy
2015	Start-Up Policy
2017	Biotech

Source: Own formulation from CTIER (2018).

the implementation of the SEZs. Three factors explain the failure of this policy. First, the lack of aptitude of the different local governments to create a framework comparable to the PRD to generate a success story has to be noted. Indeed, some states began a process of creating many SEZs in India following the 2005 Special Economic Zone (SEZ) Act that gave some directives at National level complementary to the state Special Economic Zone Decrees that were voted for in the different states in India. As such, the number of SEZ in India increased exponentially to more than 4700 SEZs (Factsheet SEZ India, 2018). Although initially these Laws favored and increased the exports, later it has provoked an internal fiscal war among the states in India to attract FDI as it did in Brazil in the automotive sector at the beginning of the 2000s when all Brazilian states were offering fiscal packages to the carmakers (Jacopin, 2002).

The second reason for this lack of impact concerning the SEZs was the turmoil that had occurred in almost all states in Union Territories throughout India (Jenkins et al, 2014, Alkon, 2018). Their implementation in India was extremely complex due to the existence of rent seeking behaviors adopted by regional politicians and real estate sectors at the expense of citizens with low income. Indeed, the compulsory acquisition of the land for SEZs implied a transfer from low-income communities to the private sector and profit-making entities with the support of the government in terms of infrastructure. This reform was then considered as a wrong and perverse incarnation of redistributive land reforms (Jenkins, 2014). In that sense the opportunity to use SEZs had been missed at a global scale within India. However, the few conflicts that had arisen in Karnataka, two related to SEZ located in Mangalore and Suzlon could have paved the way to a new narrative (Mody, 2014). In any case, the local legislation, Karnataka´s 2009 SEZ policy, did not force the state to resettle and rehabilitate displaced popula-

tion. The opposition was then justified to a certain extent if the government did not protect its citizens.

The last reason is even more striking considering the willingness to compete in the manufacturing sector and the state of this support. Indeed, as of mid-2012, "Karnataka-based SEZ proposals had received formal approval from the Board of Approval (BoA) in Delhi. 48 were in the IT sector. Of the remaining 13, five were in manufacturing" (Mody, 2014). Karnataka is the state with highest number of SEZs in all of India. Even though the size of the SEZs may vary considerably, the ratio 1-10 in favor of ICT vs. manufacturing clearly indicates that the productive specialization of Karnataka has not switched to another pattern despite the approval of the Plan 2025.

Nevertheless, a lower number of SEZs could have a bigger impact, as was the case in the PRD. Indeed, this strategy would force Indian States to define clear targets in favor of manufacturing instead of pollinating all sectors. This leads us to the second hypothesis:

Hypothesis 2. The Karnataka situation implies a choice (Factor 1) not to give up some political rents and an existing specialization in the ICT sector despite the poor results in manufacturing.

A proper analysis of the PRD SEZ reforms would have enabled India to select few states to be the driver for launching SEZs in the manufacturing sector. The lack of capacity of the Indian federal government to proceed in that context and the Karnataka State government's own lack of willingness has prevented the Karnataka State from diversifying its economy to develop an alternative to its current specialization in the ICT sector, making this state more vulnerable to external shocks. Their entrepreneurial ecosystems do not yet manage to generate many unicorns (CB Insights, 2020). The internal linkage effect in terms of knowledge is still too dependent on FDI, unlike the PRD, which has generated a much more solid ecosystem through economics of agglomeration.

Gujarat RIS

Gujarat is an Indian State located in the North West on the Pakistan border, with an internal geographical border with Maharashtra whose capital is Mumbai. This is the state where Modi used to be the Chief Minister before becoming the Prime Minister of India. It is a state with a strong tradition of merchants and SMEs specializing in textile and relevant harbors. If entrepreneurship was a sufficient condition for success in terms of regional innovation systems, then Gujarat would be the home of the Indian Silicon Valley. However, the quality of the regional innovation system relies on the bottom-up innovation that SMEs may generate at a micro level.

Historically, Gujarat has been a state with a higher standard of living than the rest of India and focused on entrepreneurship and textile. However, the decline of the textile sector at the beginning of the 2000s forced Modi, then Chief Minister of Gujarat, to use the rule of law to ensure investments by Indian blue chips in heavy sectors such as infrastructure, and the pharmaceutical and automotive sector (Hensmann, 2014; Hirway & Mahadevia, 2004). The best known example in favor of attracting Multi-National Corporations MNCs was the re-location of the Tata Motors plant in Gujarat after the difficulties this firm had with the launch of its facilities for the Nano car that were supposed to be located in West Bengal. Modi's policy in Gujarat between 2001 and 2014 was not the most effective over time from the point of view of State Domestic Product growth (Shah, 2014), but he managed an inflexion to change the state dynamics focusing on clusters with laws favoring the entry of foreign capital to palliate the weakness of the current regional innovation system in Gujarat. Therefore Hypothesis 3 can be elaborated as follows:

Hypothesis 3. The choice (Factor 1) not to manage the support of neighboring countries has limited the learning curve potential of the agglomeration effects. Therefore, the model is necessarily bound to FDI.

Similarly to the YRD region, and unlike the PRD, Gujarat cannot obtain the support of neighboring regions due to the existing conflict with Pakistan. Only historical trade with the Arabic Peninsula and trading can help this region to grow from an international perspective. The domestic perspectives are not so relevant either as the Mumbai-Pune cluster specializes respectively in finance and automotive.

Consequently, the willingness to copy the Chinese model for the infrastructure and the MNC FDIs was generated under-optimized knowledge exploitation. The only way to empower agglomeration effects is therefore to stop confrontation and to deliver messages not only in terms of GDP growth but as a Statesman on Stability.

The race for innovation started in Gujarat in 2014 when Modi was no longer the Chief Minister of Gujarat. The Bharatiya Janata Party (BJP), Modi´s party, was still leading the state but was eager to be a knowledge generator instead of a knowledge exploiter.

Interestingly, similarly to what happened for the SEZs in India, the race to attract FDIs within the same sectors occurred among the different Indian States. All wanted to focus on renewable energies, Biotech, start-ups and aerospace

and defense without having (as they did in the PRD) a policy centered on agglomeration effects with a high level of specialization within two adjacent clusters or states. In that sense, the innovation policy in Gujarat reflects this trend to concentrate on the same sectors, independently of the previous productive specialization and the R&D centers. Table 4 sheds light on the industrial policy that were backed by the State since 2001.

Table 4
Set up of innovation policy per sector from 2001–Current in Gujarat

Year Policies were Set Up	Sector in which the Policies were Launched
2015	Industrial Policy
	Renewable Energy Policy
2016	Biotech
	IT Policy
	MSME Policy
	Start-Up Policy
	Aerospace & Defense

Source: Own formulation from CTIER (2018).

Comparative data across these two states from 2016 corroborate the analysis in terms of FDI (2244 million Indian Rupees (INR) in Gujarat vs. 4121 million INR in Karnataka). Funding for start-ups (irrelevant in Gujarat vs. 1.9 billion USD in Karnataka) and R&D Centers (254 in Gujarat vs. 289 in Karnataka) (CTIER (2018), DIPP, (2017), that the innovation policy was far better designed in Karnataka than in Gujarat. This issue questions the reasoning according to which Modi could be the author of the Indian economic miracle.

This point is even more relevant when the evolution of some other states such as Tamil Nadu, Maharashtra, Delhi (NCT) and Haryana shows these states to be the best in class with regard to FDI, start-up funding and R&D Center as it appears in Table 5. The legacy could become negative in that sense for Karnataka and Gujarat. This led us to the elaboration of the fourth hypothesis:

Hypothesis 4. The lack of understanding that agglomeration effects are bound to a spatial level is a policy mistake (Factor 2).

A change in terms of policy from knowledge exploitation to generation can only be successful as the YRD example indicates when successful agglomeration effects take place at the spatial level; which is not the case either for Gujarat or for Karnataka. Therefore, it is not surprising that Indian states with more dynamism disrupt states suffering from a negative legacy such as Gujarat and Karnataka. Table 6 summarizes these findings.

Table 5
FDI, start-up funding and R&D Centers within the best performing Indian states

State	FDI	Start-Up Funding	R& D Centers
Gujarat	2244	Irrelevant	254
Karnataka	4121	1.9	289
Tamil Nadu	4528	0.4	253
Maharashtra	9511	7.6	667
Delhi (NCT)	12743	2.0	28
Haryana		4.2	165

Source: Own formulation from (CTIER, (2018), DIPP, (2017))

In that sense, both Karnataka & Gujarat combine inadequate choices for their policy mix on top of mistakes. The next session summarizes the main mistakes that were made at the policy level and the unfortunate choices that prevented India from benefiting from the success of Chinese reforms.

Discussion & Implications

Throughout this paper, a clear distinction appears between Indian and Chinese experiences. In China, as the PRD and the YRD cases have shown, the specificities of each delta are taken into consideration to create a multiplier effect based on the spillover generated by the knowledge transfer from the knowledge exploitation. In India, be it in Karnataka or in Gujarat, the Indian state policy-makers propose all of them a set of reforms according to "policy-fads". Historically, some measures included SEZs and more recently sectors such as biotech, start-ups or aerospace and defense retained all the attention of these policy makers. Therefore, the states propose mechanisms to attract FDI with the aim to generate knowledge. However, as the states have not yet maximized their potential in terms of the backwardness advantage, this implies fiscal wars at the expense of the development of powerful regional innovation systems that could compete at worldwide level.

In that sense, the absence of agglomeration effects at a spatial level prevents Indian RIS and REE from taking off. It is clear that while the Indian states are far from being at the cutting-edge technologically, a focus on knowledge exploitation and backwardness advantage should be prioritized at the outset. If, on the contrary, some Indian

Table 6
Summary of the findings

Summary/ Variable	Pearl River Delta REE	Karnataka REE	Yangtze River Delta RIS	Gujarat RIS
Agglomeration effect	Based on SEZs and proximity with Hong Kong, Macao & Taiwan in manufacturing and ICT	Not possible to have initially but extended later to Hyderabad & Coimbatore in ICT.	Based on strengthening Shanghai platform from Jiangsu & Zhejiang in the first place and FDI on a set of sectors bound with finance, trade, economics & shipping	Poor. No option to work with Pakistan. No relation with financial center of Mumbai. Indirect ties with Arabic Peninsula as traders.
Focus of the economy	From manufacturing to ICT	From ICT knowledge generation to ICT knowledge exploitation	IT, shipping, finance, auto, textile, manufacturing, metallurgy	Pharma, Auto, Infrastructure, Textile. From knowledge exploitation to generation
Innovation (Incremental vs. Radical)	Incremental then disruptive	Radical to incremental	Incremental	Incremental
Knowledge (Exploitation vs. Generation)	Exploitation then Generation	Generation then exploitation	Exploitation	Exploitation
Knowledge linkages (External vs. Internal)	External through SEZs (FDI from 1980s)	External (forced to open 1991 but focus 2000s)	External (FDI)	Internal with little external initial inputs
Interactive learning process	Guanxi. Informal but strong networks through society	Imperfect mobility due to cast system	Guanxi. Informal but strong networks through society	Imperfect mobility due to caste system
Technology Transfer	Major aim & constantly upgraded	Secondary aim (Develop IT cluster WW)	Major aim & constantly upgraded	Secondary aim. Primary is to improve infrastructure and ensure legal security for FDI
Use of backwardness Advantage	Systematically used to become the World fabric. Nevertheless less relevant over time	Systematically in ITC as offshoring centre	Systematically used to become the World fabric but less relevant over time	Systematically for auto (last decade) & pharma (generics) but not for manufacturing
Major Actors (Sharma, 2018)	SOEs but private companies with growth now, even start-ups that are unicorns	Foreign + start-ups but few unicorns	Foreign + MNCs + Private companies in many sectors	Foreign + few MNCs apart from Auto and Pharma + Private companies
Governance infrastructure +	Strong and no more brain drain at education level	Improving but deficient	Best in India but deficient and strong education brain drain	Saturated & quite deficient and relative brain drain to US
Ability RIS to overcome dilemmas (Heidenrich, 2004)	Alignment of Institutions even if central political gvt and decentralized economic power	Strong interstate misalignments with central gvt	Diversified and with support of President Xi from Zhejiang.	Improving interactions as BJP in State & Fed. Gvt
Unstable Institutions	Institutional uncertainties provoke short term focus on innovations. Strong commitment over time however for more than 30 years.	Instability in terms of relations between state and Gvt + start-ups want more protection for expansion	Institutional uncertainties provoke short term focus on innovations. Strong commitment over time however for more than 30 years.	Stability at head of state but instalibity in key sectors such as agriculture, textile & pharma and measures taken with head of State that arises tension with Pakistan

Source: Own formulation as a summary of findings.

RIS or REE reach the technological frontier at worldwide level, then the switch towards knowledge generation and entrepreneurship becomes increasingly relevant. Managing and understanding how the technology transfer should take place becomes then fundamental to move from knowledge exploitation to knowledge generation.

The difficulties perceived in the REE of Karnataka and in the RIS of Gujarat in relation to the REE of the Pearl River Delta and the RIS of the Yangtze River Delta demonstrated that the Indian position in the global value chain is far from being secure. Indeed, it is not even secure within India as the surge of the states of Maharashtra and Delhi/ Haryana indicates.

The constant upgrade of the Chinese deltas, both the PRD and the YRD, whether at a domestic level or increasingly at an international level through the Belt and Road Initiative (BRI) in surrounding India, Asian and African countries, should force the Indian states to investigate these innovation models in the future.

Limitations

While there is a rising interest in comparing India to China in terms of research, some critical elements have to be mentioned to ensure the quality of these works.

First, even though India has a long tradition of statistics, far more data are available in China, and this has a series of consequences. First, without metrics, India cannot create a state of the art in some specific fields unlike China, which uses the same parameters in all its statistics (e.g. China Statistical Yearbook, 2018 & 2019). It is imperative then that India generates more statistics to be able to emulate Chinese economic performance.

Second, initial legacies with countries/states or deltas without a common background may prevent comparisons from being fully effective. Benchmarking and replication are extremely complex to manage.

Third, the choice of the methodology implies the restrictions already stated concerning the RIS with regard to case studies and description vs. prescription as was mentioned in the literature review.

Fourth, the existence of data concerning incubators and accelerators and their role in the making of the Karnataka and PRD REEs has not been discussed in this paper and conclusions cannot be highlighted yet in this dimension. Nevertheless, the impact of business incubators and accelerators on the survival of firms/businesses should be assessed and compared (Más-Verdú et al., 2015)

Conclusions

Contrasting and comparing different RIS and REE in China and India is complex due to the lack of exact recording of statistics between both countries. Assuming this difficulty, a historical approach has seemed the most appropriate to shed light on the reason why the impact of Chinese reforms in India is lower than expected.

The results of this paper show that some key success factors of the "Chinese prism" have deliberately been unincorporated, such as a correct implementation of the SEZs with regard to emerging neighbours and the subsequent consequence that India has to improve its geopolitical relationships with its neighbours to generate a profit multiplier in terms of FDI agglomeration effect through trading.

Moreover, despite an officially stated policy to strengthen manufacturing exports, India has not fully given up its existing productive specialization based on ICT and services. On the contrary, existing Indian firms in this sector, lobby to defend their market share in their market. The role of Indian SOEs should be re-evaluated under this prism.

Apart from these two elements, it seems that the impact of the reforms is lower than expected due to policy mistakes:

1) Cannibalization among Indian states to launch the most successful fiscal campaigns to attract some FDI instead of having a federal catalyst that determines the resource assignation as in China

2) Too many similar focuses throughout India drastically lowering the number of SEZs, and a policy in favour of some clusters

3) Properly boost the switch from knowledge exploitation to knowledge generation as Chinese PRD and YRD did, or on the contrary, continue to use the backwardness advantage

4) The constant upgrade of the Chinese models be it the YRD or the PRD, as mentioned here, makes it more difficult to assess the replicability of a priori similar reforms in India

Globally, Indian policymakers have to seriously review the analysis that led to their decision making in terms of replications of Chinese reforms. Many mistakes need to be addressed as well as choices that represent strong lobbies in India in favour of all Indians.

Future Research

This paper opens opportunities in terms of a research agenda:

- The evolution of Indian specialization from knowl-

edge generation to knowledge exploitation in the manufacturing sector and specific states.
- The reorganization of an Indian Special Economic Zone (SEZ) by changing a service orientation to a manufacturing orientation
- The role of incubators and accelerators in the regional entrepreneurial ecosystems of Bangalore
- The conditions necessary to effectively benchmark Chinese reforms in other emerging markets

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