

**Explaining the past, predicting the future:  
the influence of regional trajectories on innovation  
networks of new industries in emerging economies**

Monica Plechero (Monica-plechero@unifi.it)

University of Florence, Italy Kulkarni Mandar  
(mandar.kulkarni@iiitb.ac.in) International Institute of  
Information Technology, India

Cristina Chaminade (Cristina.chaminade@ekh.lu.se)  
Lund University, Sweden & Aalborg University, Denmark

Parthasarathy Balaji (pbalaji@iiitb.ac.in)  
International Institute of Information Technology, India

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Centre for Innovation, Research and Competence in the Learning Economy (CIRCLE)

Lund University

P.O. Box 117, Sölvegatan 16, S-221 00 Lund, SWEDEN

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Monica Plechero, Kulkarni Mandar, Cristina Chaminade, Parthasarathy Balaji

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**Keywords:** O30; O19; R50

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**Plechero Monica\***

*Department of Economics and Management (DISEI), University of Florence, Via Pandette 9, I-50127 Firenze (e-mail: [monica.plechero@unifi.it](mailto:monica.plechero@unifi.it)). <http://orcid.org/0000-0001-8854-1343>*

**Kulkarni Mandar**

*Centre for Information Technology and Public Policy, International Institute of Information Technology, 26/C Electronics City, Bangalore 560100, India (e-mail: [mandar.kulkarni@iiitb.ac.in](mailto:mandar.kulkarni@iiitb.ac.in)). <https://orcid.org/0000-0001-9629-0740>*

**Chaminade Cristina**

*Department of Economic History, Lund University, PO Box 7083 22007 Lund, Sweden (phone: +46 46 222 33 34; e-mail: [cristina.chaminade@ekh.lu.se](mailto:cristina.chaminade@ekh.lu.se)); CIRCLE, Lund University, Sweden and Dept. of Business and Management, Aalborg University, Denmark. <http://orcid.org/0000-0002-6739-8071>*

**Parthasarathy Balaji**

*Centre for Information Technology and Public Policy. International Institute of Information Technology, 26/C Electronics City, Bangalore 560100, India (e-mail: [pbalaji@iiitb.ac.in](mailto:pbalaji@iiitb.ac.in)). <http://orcid.org/0000-0002-4246-8918>*

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\*Corresponding author

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## **1. Introduction**

Economic geographers have long highlighted how the characteristics of a regional innovation system (RIS), and the specificity of an industrial sector, are related to the geography and dynamics of innovation networks. Contributions to evolutionary economic geography, for example, have linked the evolution of the industrial structure of a region with the structure, evolution and spatial configurations of networks (Boschma and Frenken 2010; Neffke, Henning, and Boschma 2011; Balland, De Vaan, and Boschma 2013) by looking at the variety of knowledge available in the region. Following this line of research, recent contributions have examined the role of international networks in the developmental trajectory of different European regions, considering not only the industrial specialisation, but also the organisational structure of regions (Isaksen and Tripl 2016; Tripl, Grillitsch, and Isaksen 2018).

On the other hand, evidence for specific sectors such as Information and Communication Technologies (ICTs), shows that firms in peripheral regions tend to use global innovation networks (GINs) as a means of taking advantage of more dynamic environments elsewhere and compensate for the lack of strong innovation systems in their near context. The results are consistent for both European firms and regions (Martin et al., 2018; Tripl, Grillitsch, and Isaksen 2018) and firms located in emerging economies (Plecherro and Chaminade 2016). The degree of involvement in GINs is triggered not only by firms' strategies, and by geographical distance and evolution of an industry, but also by the general quality of a RIS, in which a cluster or a sector is embedded (Asheim and Coenen 2005; Chaminade and Plecherro 2015; Martin et al. 2018).

While these contributions have shed new light on the relationship between RIS and firms' innovation networks in established industries, research on how specific RIS trajectories may shape the aim and the geographical setting of innovation networks in newly emerging industries is

underdeveloped. This gap is particularly evident in relation to emerging industries in emerging economies. In the case of RISs from emerging economies, the lack of data as well as more complex and different socio-economic and institutional conditions, when compared to developed economies, has made it difficult to analyse regional dynamics in relation to emerging industrial trends. The new media sector is a good example. While the new media sector has its origin in conventional media industries, it is now expanding to a variety of socio-economic domains including, but not restricted to, entertainment, education and health care, largely due to the diffusion and wider application of ICTs. As such, the new media sector merges different ICT competences with those related to cultural and creative industries (Kulkarni and Parthasarathy 2015; Martin and Rypestøl, 2018).

Using primary data collected in Bangalore and Beijing in 2016 and 2017 through interviews with New media firms, this paper compares and contrasts the influence of the main trajectories of two RISs in emerging economies, and its constituent elements, on the characteristic of innovation networks of new media firms in the two regions. In particular, the analysis will focus on 1) the historical evolution of the main regional industrial structure; 2) the main institutional and agency-enabling organisational settings in the RIS that hamper or favour certain innovation networks, and 3) the historical international linkages particularly crucial for implementing innovation in the region.

The paper is structured as follows. The next section provides a conceptual framework of the key constituent elements to assess RIS trajectories. Section three defines the Beijing and Bangalore RIS trajectories on the basis of those elements. In section four, we elaborate on how the two RIS trajectories have generated different innovation network configurations in the new media sector, and we relate this to the empirical material collected in the two regions. Section 5 concludes with some considerations on policy implications.

## **2. The constituent elements of RIS trajectories**

It is well-known that the quality of a RIS depends on the characteristics of its different elements such as the industrial structure of the region (particularly in terms of the dominant industrial specialization and its prevalent knowledge domain), the institutional environment (i.e. regulations, laws, values, norms, and attitudes) as well as organisational structure operating in that institutional environment (e.g. knowledge provider organisations influencing business and industrial specializations; government and business actors carrying specific actions key for RIS path development or transformation) (Asheim and Gertler 2005; Asheim and Coenen 2005; Zukauskaitė, Trippel, and Plechero 2017). But the quality of a RIS depends as well on exogenous multi-scalar forces such as the international flows of knowledge which inject new knowledge into the RIS as well as on the actions of other actors external to the RIS that may influence the objectives of the RIS development agenda (Oinas, Trippel, and Höyssi 2018; Zukauskaitė, Trippel, and Plechero 2017).

### ***2.1. Industrial structure***

Contributions in Evolutionary Economic Geography (EEG) have focused on the evolution of some of the above-mentioned elements to assess the possibilities of differentiated RIS trajectories. Most of the scholars have concentrated their analysis on the specific historical industrial structure of particular European regions and its ability to guide the RIS trajectory towards new and related industries. In particular, scholars in EEG have investigated how the evolution of the network structure and specific technological networks in the industrial space may influence not only industrial life cycles, but also regional paths (e.g. Boschma and Frenken 2010; Neffke,

Henning, and Boschma 2011). Their findings suggest that the more a network structure becomes densely rooted within a specific regional cluster, the more difficult it becomes for the region to open windows of opportunities for emerging industries. This may be because the regional industries remain technologically and cognitively too distant from the type of opportunities entering the regional space (Ter Wal and Boschma 2011).

Following this line of research, recent studies (Tripl, Grillitsch, and Isaksen 2018) provide further insights into how regions with different specializations tap into exogenous sources of knowledge by looking at the thickness of the regional organisational structure (i.e. density and efficiency of the organisations supporting the industry). Tripl, Grillitsch, and Isaksen (2018) show, for example, that organisationally thick regions with a diversified industrial structure, are more capable of attracting and tapping into exogenous sources of knowledge than regions with a specialised regional industrial structure. The latter have fewer opportunities since exogenous sources of knowledge tend to relate to the main industry and its functional organisational structure, thus reinforcing specific cognitive trajectories, i.e. the embeddedness in cognitive specialization and relations influencing technologies, skills, capabilities and learning (Boschma 2005).

## ***2.2. Institutional and organisational environment***

Other studies have focused on discussing the institutional environment influencing RIS trajectories (Rodriguez-Pose 2013; Zukauskaitė, Tripl, and Plechero 2017). Institutions evolve through time and their accumulation processes may create both favourable and constraining conditions for regional development depending on the different functions they play and the incentives they provide with respect to a specific context and phenomenon (Zukauskaitė, Tripl, and Plechero 2017). While the impact of institutions, such as regulations and laws, directed to support innovation in a region may be somehow assessed through the linked outcomes, activities

and resources, the role of some soft institutions such as values, beliefs, and attitudes, may be better understood if analysed in parallel with the main structure supporting those institutions (Ibid.). The influence of institutional conditions on RIS trajectory is therefore associated with the organisational structure that can take action or have an effective power to operate within that institutional environment (Evenhuis 2017; Njøs and Fosse 2019; Moodysson and Sack 2016; Zukauskaitė, Trippl, and Plechero 2017). In that sense, what counts is not the organisational structure in terms of the density of organisations and their relatedness specifically to an industrial specialization in the region. Instead, we refer here more to an agency-enabling organisational setting which may include government as well as non-government personnel and organisations operating in the region, leading key actions towards a specific development goal or specific innovation objectives (Grillitsch and Sotarauta 2019; Njøs and Fosse 2019).

### ***2.3. Exogenous sources of knowledge***

Lastly, when discussing exogenous sources of knowledge that may shape RIS trajectories, in particular the developing of specific industries in a region, different scholars of EEG refer mainly to international linkages for innovation which allow inbound flows of knowledge to enter the region. This concerns for example, the flows of key individuals such as returnees, transnational entrepreneurs, foreign skilled workers as well as the investments that organisations such as multinational corporations (MNCs) make in the local RIS (Crescenzi and Iammarino 2017; Grillitsch and Trippl 2014; Oinas, Trippl, and Höyssä 2018). The mobility of international workers has, for example, contributed to the recent development of one specific sub-sector of the new media industry in the Scania Region in Sweden: the game industry (Miörner and Trippl 2017). The local operations of MNCs, particularly in emerging economies may also create direct and indirect spillover and form relationships with local agents which may influence the regional path towards

the development of a specific sectorial specialization (Ivarsson and Alvstam 2009), or ensure re-combinative innovation processes in the regional industry (Crescenzi and Iammarino 2017). In addition, international connections of this type could shape a regional trajectory and particularly its innovative potential depending on how they tap into the local institutional and organisational setting of the RIS (Crescenzi and Iammarino 2017; Tripl, Grillitsch, and Isaksen 2018; Vang and Asheim 2006).

So far, most of the mentioned studies have undertaken a partial analysis of how the interrelationships among the different elements may support the trajectory of a RIS through self-reinforcing mechanisms. However, considering the co-evolution of those elements is a precondition for gaining a more systemic understanding of which main forces are in place, particularly when there is a need to apply a comparative perspective (Gong and Hassink 2018).

For example, while some regional systems may be the result of a trajectory more driven by ‘market’ institutions, and supported by bottom up cluster or industry relations, others may be the result of the dominance of government institutions and top down institutional relations structured at a broader scale (Evenhuis 2017). Furthermore, while some self-reinforcing mechanisms of the RIS trajectory have been analysed to understand the decline, renewal or creation of regional industries and to assess the quality of innovation policies (Isaksen and Jakobsen 2017; Grillitsch and Sotarauta 2019; Njøs and Fosse 2019), they have not been analysed to understand specifically their influence on innovation networks. Indeed, when assessing the relationship of the RIS trajectory and knowledge networks, most EEG contributions have looked at the influence of the latter on the RIS trajectories, often overlooking the influence of RIS trajectories on the objectives and geographical configurations of networks supporting innovation and knowledge exploitation in local firms, particularly in an industry that is at its infancy in the region.

This paper aims at addressing this gap. On the one hand, by explicitly looking at how regional trajectories in existing industries might exert strong influence in the network configuration of new industries. On the other hand, by moving away from the existing European focus to investigate the co-evolution of RIS and networks in two emerging economy regions: Beijing and Bangalore. Next section will provide an overview of the main elements of RIS and their joint role in shaping contrasting RIS trajectories in Beijing and Bangalore. Section 4 will be dedicated to analyse the influence of the two RIS resulted trajectories on the innovation networks in the investigated industry. Section 5 concludes.

### **3. Regional trajectories in Beijing and Bangalore**

#### ***3.1. Industrial structure***

In terms of industrial structure, Beijing represents an organisationally thick and diversified region with heavy investments in science and technology (S&T) driven sectors. Since the late-1970s, with the transition from a planned to a socialist market economy, Beijing has heavily invested in industrial growth. With the establishment of the Zhongguancun Science Park (ZSP) at the beginning of the 1990s, the region focused on diversified ICT industries such as computer, electronics and communications. Industrial clusters in the region evolved as a result of the interrelated technological domains, investments in S&T and human resources, and a common base of ‘backward and forward linkage patterns’ and political interventions sustaining these selective processes (Yang and Dunford 2017, 64). It is also important to underscore the relevance of the new media sector in terms of its capability to combine the patterns of development of ICTs with the traditional media sectors, which flourished in the capital area, and led to a high concentration of

media talent (Zhang 2013).

On the other hand, Bangalore represents an organisationally thick region that has reached a strong sectorial specialization in ICT (Plechero and Chaminade 2016). Bangalore was the first city-region to benefit from Software Technology Parks of India (STPI) initiative which proved key to the surge in the number of domestic and foreign firms in the ICT industry in the region in the 1990s (Parthasarathy 2004). The growth of the local industry has also been accompanied by the growth of a strong educational infrastructure in terms of engineering colleges, universities and research institutes<sup>1</sup>. The increase in technical and professional community, working in various government research laboratories, local service firms and offshore development centers (ODCs), has favoured the availability of 'home grown' local expertise in high value added software development, including R&D services in embedded-systems design work (Parthasarathy 2013). In sum, the strong regional specialization in software development and ICT services, which shaped the development trajectory of Bangalore and its evolution over the years, culminated in the development of a world leading ICT cluster.

### ***3.2. Institutional and organisational environment***

In terms of institutions and agency-enabling organisational setting, the local development of Chinese regions has been strongly influenced by collective values, particularly in relation to development goals and innovation, resulting from the interplay between the State and local institutions, both formal and informal (Breznitz and Murphree 2011, Liu et al. 2017; Zhang 2013). In Beijing, the key actors with the power to lead development and innovation include both the central government and the municipal public actors (Breznitz and Murphree 2011). These actors

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<sup>1</sup> In spite of that, the local linkages between the industry and local universities remain weak (D'Costa 2006; Vang, Chaminade, and Coenen 2008).

shaped the direction of S&T investment, drove the objectives of research institutes and universities, and favoured an arbitrary selection of the ‘most promising’ industries and enterprises to implement national goals through a series of top down and interventionist approaches (Liu et al., 2017). Easy access to numerous state agencies (Breznitz and Murphree 2011; Zhang 2013) and government research institutes in the capital region gives local authorities in Beijing an advantage in implementing and following central government directives.

Comparing the internet industries in Beijing and Shanghai, for example, Zhang (2013) demonstrates how the historical industrial structure and the political-institutional embeddedness of the former led to an interplay between local and national actors that generated unequal development opportunities for the two regions, and influenced not only the evolution of the sector, but also global connectivity.

In Bangalore, the trajectory for development and innovation is the result of more spontaneous and bottom up market and cluster institutions related to the ICT industry. While the government policies<sup>2</sup> gave the required support in the initial phase of the Indian ICT sector, the subsequent rise in entrepreneurial activities in various ICT clusters has been the driving force in the growth of this industry. Unlike in Beijing, the shared vision for development is less evident since the creation of market regulations and the generation of innovation through governance

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<sup>2</sup>The Indian national government introduced a host of policies targeting the Indian ICT sector such as the Computer Policy of 1984, the Computer Software Exports, Development and Training policy of 1986 and the Software Technology Parks of India (STPI) of 1990-91. By recognizing software development as an independent industry, these policies also helped increase the number of new entrants into the industry with infrastructural support and financial incentives. The rise of R&D services, such as the design of embedded systems, from the turn of the millennium also benefitted from policy changes such as the passage of the Semiconductor Integrated Circuits Layout-Design Act 2000, which provides for the registration and protection of integrated circuit layouts and designs for a 10-year period. (Parthasarathy 2004, 2013).

mechanisms are led principally by bottom up processes and entrepreneurial actors (Parthasarathy 2013).

### ***3.3. Exogenous sources of knowledge***

Historically, MNE driven international linkages have played a pivotal role in the regional development in both regions (Beijing and Bangalore). However, there are regional differences in the modus operandi of MNCs which cannot be overlooked. In Beijing, Foreign Direct Investments (FDI) has played a major role since the 1980s when the Chinese government partially opened up their economy to foreign investors who favoured local knowledge. This, in turn, pervasively influenced the sectors that were targeted by the government (Dennis Wei 2007; Liu et al. 2017). FDI in China was, initially, dominated by Taiwanese, Hong Kong and Japanese firms (Zhou 2008; Wei 1996). The foreign firms were not allowed to fully own a subsidiary, but encouraged to form partnerships with local firms. While this could have facilitated local spillover of knowledge, the autonomy of foreign MNCs was hindered. More recently, an increased role has been attributed to returnees who studied in Western universities and experienced different types of overseas jobs, particularly in North American MNCs (Breznitz and Murphree 2011; Zhang 2013).

In Bangalore, since the late 1980s, regional development has been strongly driven by offshoring processes that enabled local software firms to act as back offices servicing the IT service requirements of many global enterprises, especially from the US (Athreye 2005). Policy changes by the Indian government in the late 1980s and early 1990s, attracted FDI from the US and Western Europe, led by Texas Instruments, the US based MNC establishing its offshore development center (ODC) in Bangalore in 1985 (Parthasarathy 2004). The MNCs were allowed to have a fully-owned subsidiary in India, specializing in ICT services, which provided enough autonomy to them to pursue economic activities of their choice. This led not only to the prolific increase in MNCs and

their subsidiaries operating from India, particularly from the IT clusters such as Bangalore, but also to the spillover of technological knowledge within the region and a rise in the number of domestic ICT firms. More than half of the total FDI in Bangalore between the period of 1999-2000 and 2004-2005 was accounted for electronics and computer (hardware/software) including that in STPs, with the United States accounting for the largest share (32%) of that investment (Narayana, 2008).

Even before the presence of MNCs in Bangalore, local firms in Bangalore had other advantages. They had access to a well-educated labour force that was not only skilled and native English speaking but, whose proficiency with Unix, the most influential operating system ever, was crucial in gaining access to the international division of labour in the ICT services industry (Parthasarathy 2004). Local firms also benefited from strategic coupling with firms in Silicon Valley, mediated by the Indian diaspora, which became the key part of the “technical community” of the Valley, and continued to provide an interface between Indian knowledge seekers and global technological developments (Saxenian 2006). Further, not only did Indians become the largest beneficiaries of the H1B visa programme (Parthasarathy 2013)<sup>3</sup> but, the number of Indians living in the United States rose to 450,000 by 1990 and in 2005, India became the second highest source of legal immigration to the US after Mexico (Chacko 2007). Since 2000, the reverse migration of Indian IT professionals from the US, after spending years abroad, brought valuable work experience, entrepreneurial skills, access to global networks, and venture capital (Saxenian 2006).

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<sup>3</sup>The US Immigration Act of 1990 established the H1B visa programme to enable the employment, up to six years, of workers in a specialty occupation which requires the theoretical and practical application of knowledge and completion of at least a bachelor’s degree. As the programme was used extensively by firms of Indian origin and MNCs, Indians engineers routinely became the largest annual beneficiaries of H1B admissions. By 2008, Indians received 417,000 H1B visas, nearly 38% of all those that were issued (Parthasarathy 2013).

From the previous discussion (represented synthetically in Figure 1) we derive that in Beijing, institutional and political<sup>4</sup> aspects dominated the regional trajectory that supports also the growth and development of the new media industry. Bangalore has instead followed what we call a ‘cognitive trajectory’. In Bangalore, the knowledge structure that functions as a base for the ICT industry and its cluster seems, indeed, to cognitively limit the local capabilities to be employed in the new media industry.

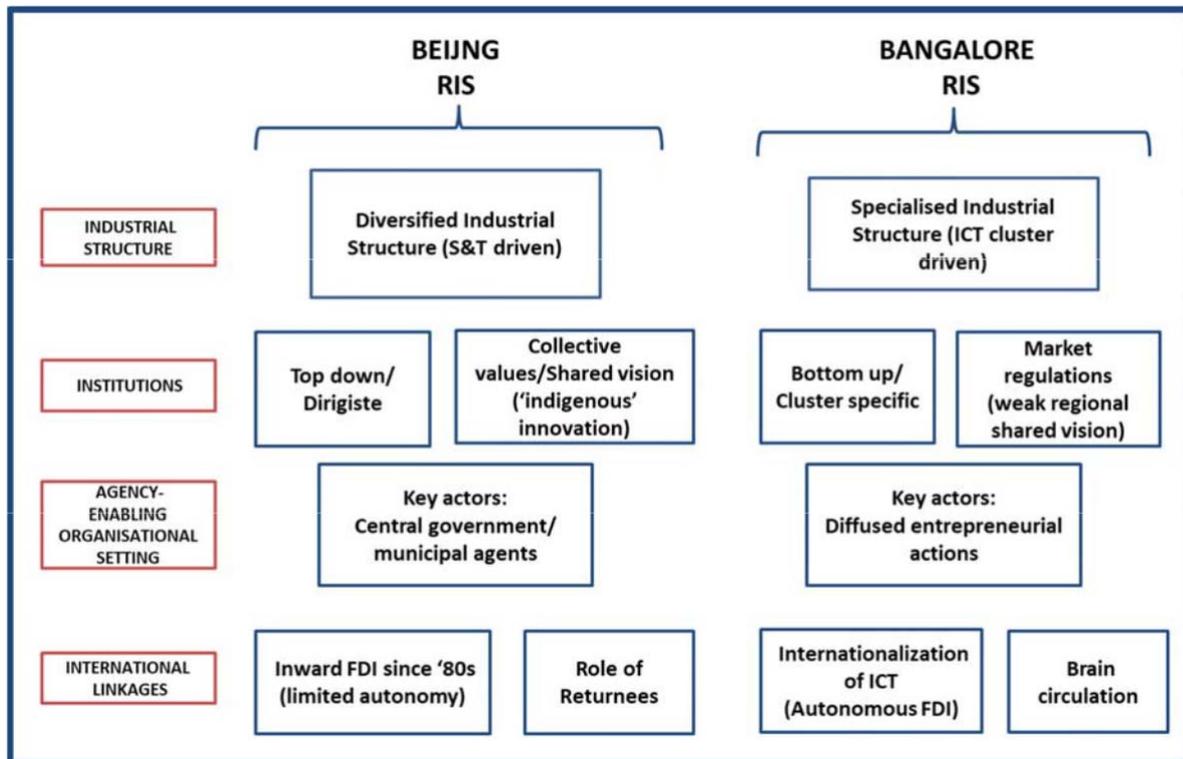
Beijing shows a hierarchical, national/regional top-down development trajectory, strongly anchored to general S&T investments and policies for indigenous innovation. In contrast, in Bangalore, the trajectory is mainly bottom up, tied to the ICT industry and a cluster-based organisational structure.

How the different regional trajectories, the first one institutionally and politically driven, and the second one cognitively driven, influence the spatial configuration and the development of innovation networks of the emerging new media industry in the two RISs will be investigated next.

Figure 1. Key elements of Beijing and Bangalore’s RIS trajectories

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<sup>4</sup>By institutional aspects, we mean here the specific institutional environment in terms of rules of the game (North, 1990) which finds an important ‘collective consensus’ due to the top down nature of these institutions in Beijing. By political aspects, we mean the power and the way government actors (national and regional) act in a specific institutional environment and implement the agenda for regional development which, in Beijing, shows some reinforcing and interrelated mechanisms between the central government and local authorities.



Source: Authors' own elaboration.

#### 4. The influence of RIS trajectories on the innovation networks of newly emerging industries

We make use of interviews with representatives of firms in Beijing and Bangalore regions to assess the relationship between RIS trajectories and innovation networks. The interviews (a total of 19 in each region) were conducted in 2016 and 2017 as part of an international project<sup>5</sup>, the aim of which was principally to assess, in a global comparative perspective, how and why firms in different locations and in a newly emerging industry such as New Media engage in knowledge networks.

<sup>5</sup> The project 'Global innovation networks, regional variety and its impact on the innovativeness of firms and regions' sponsored by Marianne and Marcus Wallenberg Foundation, which funds research projects of high scientific potential, has been running from 2014 to 2018 involving an international team of researchers and four different research institutes and universities. The project has investigated four regions around the world: Scania in Sweden, Oslo in Norway, Bangalore in India and Beijing in China.

All information gathered from the interviews is treated confidentially and therefore, firms, when mentioned in this paper are indicated with codes: A....Z if from Beijing and AA.....ZZ if from Bangalore).

#### ***4.1 Institutionally and politically driven regional trajectories and innovation networks: the case of Beijing***

In Beijing, the innovation networks in the new media industry reflect, in general, the historically government driven strategies and the associated institutional values, promoting an S&T culture and indigenous high technology industries. Recent policies supporting the internet and mass innovation, such as the Five-Year plan of 2011 (focussing on societal aspects), and the National Programme 2006-2020 (aiming to enforce indigenous innovation) (Liu and Peng 2015), have also visibly shaped the nature of networks in this industry and in many of the interviewed cases.

##### *4.1.1 Local and domestic linkages for innovation*

In Beijing networks remain strongly linked to locally specific innovation goals and the government's societal priorities and this is clearly visible in newly created industries. Some of the investigated cases were start-up firms linked to government related organisations for urban modernization, social services and cultural integrations. Some of them found business opportunities by targeting new media services where the government can provide strong knowledge support (in terms of, for example, access to database related to population) for their specific business. In this way, firms align their technology and services with many specific societal needs. As one interviewee recalled:

I would say that we are supported by our governments, [and in particular] high-level government employees. They provide us with knowledge about how important it is to take care of [this health aspect that we deal in our new media business]. ( S)

Firms that are favoured by the State are also well supported in their business and innovation strategies at different levels of governance as reflected in the following statement:

I don't know whether I should say this of [our company]. It is like a distinctive flag on the national level. From my point of view, if you can be influential in one place then in other ministries or municipal government agencies you become more [...] well-known. (W)

With the central government offices located in Beijing, the goals of many organisations overlap with governmental plans for innovation. This has also contributed to sustained collaboration for innovation not only with local but also national (mainly government related) knowledge providers, supporting requests related to different knowledge domains.

From this point of view, the government helped us with “bridge-building”, which means... during the process of investigating and inspecting our projects, they got to know our technology and our needs so they would give us suggestions and ‘build bridges’ for us [...] such as with Sichuan University and Institute of Automation, Chinese Academy of Sciences, they are all included. During the cooperation or the application process of the projects, when they think we need some technology, the government will arrange connections for us... (W)

Relationships between firms and knowledge providers, such as universities (e.g. Chinese Academy of Science), are often established between those who are supported by the local and central government. In general, firms maintain relations at a personal level with relevant professors who can, for example, assist in a way that helps to get funding (Shi and Rao 2010 as quoted in Liu et al. 2017), while ensuring some exclusive research results or an easy transfer of intellectual property (IP).

[We cooperate with universities but at personal level with professors] because they have been studying processes for years and they've already built a process base and process concept, those things are open and can be publicly released. But for companies, those things are secrets [...]. So we prefer to cooperate with professors. It's much easier, we cooperate together to do a project and then, at the end, we share the property rights. (B).

In recent years, in spite of the government's desire to extend its support to a larger number of private small and medium enterprises (SMEs), preferential treatment to state owned enterprises (SOEs), and the practice of picking 'winners' by bureaucrats in keeping with the government goals could not be avoided (Liu et al. 2017). This is also visible in the new media industry. The entrepreneur of firm S, for example, stressed that the local government agents now have a new goal of not only promoting firms that contribute to the GDP, but also those with the potential to patent in the targeted sectors. While this is in line with the indigenous innovation goals, identifying 'potential' firms could be arbitrary. Consequently, firms hinted at preferential channels in accessing knowledge.

For the interviewed firms, the preferential channels for local and national networking with the government and knowledge provider organisations which support innovation activities, are evident when the issue is having access to the 'right' places in Beijing. Such places could be, for example, special economic zones (SEZs) or incubators which are formally open to all firms but, in practice, might provide preferential treatments to firms which the government considers important to invest in or already has some investments.

In Zhongguancun area we have alliances with government and non-government organisations allied with the specific specializations we have... In the alliance we share the knowledge, share the market knowledge and deal with market crisis together..... The national government is also decentralizing its power by allowing the alliances to examine and verify the companies to assign subsidies. (B)

When discussing different policies (at the central and municipality level), one firm (D) located in an incubator revealed how government agents supported their business, favouring the access to policies emanated at different levels. In general, incubators are seen by the interviewed firms as positive places to build relationships and to get in touch with venture capitalists (L, M) as well as to create positive synergies for innovation among co-located firms (H).

The government also strongly influences informal networks and the culture of collaboration that prevails in Beijing. It emerged from most of the interviews that the positive regional environment that underpins the Beijing's business community is built on the common societal values towards innovation and a joint vision for regional development that the government has envisioned. This favours the establishment of 'soft' institutions influencing local networks to facilitate innovation.

[...] I think now in the Beijing area, innovation and entrepreneurship has been supported very well... and that atmosphere is also strong. It's not like Dalian or other second-tier or third-tier cities... I think here the innovative atmosphere is stronger. Especially on Innovation Avenue, you will see lots of people coming here everyday. (X).

Referring specifically to the ecosystem that the government created in Beijing for innovative entrepreneurship, a firm (A) said that this was one reason why they decided to move from Shanghai to Beijing. This firm considers the culture of collaboration in Beijing to be the best in China. Indeed, more than half of the interviewees explicitly underlined a favourable culture of collaboration in the region (willingness of other firms to exchange knowledge related to innovation). Moreover, local firms belonging not only to the IT and new media industry, but also to related industries are, on average, considered useful (even if not the key ones) sources of innovation for the interviewed firms. Besides, customers are among the most relevant actors in the local value chain. Many firms also stressed the positive level of trust among Beijing's actors.

‘Guanxi’ (i.e. the use of interpersonal relations and social networks in business), remains an important institutional Chinese peculiarity that spans the Beijing’s business community at large. However, as one firm (H) stated, trust is more difficult to build when actors are new to the system.

#### *4.1.2 International linkages for innovation*

As Liu et al. (2017) point out, the recent leadership of Xi Jinping has incentivised domestic innovation and emphasised some aspects of ‘techno-nationalism’. This is reflected in the types of global networks promoted by the government authorities and the directionality of international knowledge flows. Inbound flows of international knowledge which help to improve the indigenous technological knowledge, are more favoured than outbound flows. Some of the interviews highlighted how the ‘indigenous innovation’ policies could limit outbound activities of international technology seeking strategies in the new media sector.

In Beijing, the political efforts seem to favour the local organisation of international expo and exhibitions which, in turn, help the local community stay at the technological frontier in the new media sector. Various firms (e.g. A, O, V) stressed this effort of the government by referring to forums and conferences organised in Beijing, which serve as international platforms to build connections and trust among domestic industry players and global innovators, firms, and industry professionals.

Other incentives include attracting FDI from prominent global firms such as Samsung, Microsoft, IBM, and HP to name a few. It is also found that some of the key employees or managers in different firms in Beijing come from these firms (e.g., A, D, E, R, W). Government incentives are also extended to top talents abroad, encouraging them to return to China after gaining international experience (which many of the interviewed firms had taken advantage of). One of the interviewed firms (W) indicated how government initiatives are also dedicated to encourage firms’

overseas visits to apply for patents. So, there is a general interest to acquire state-of-the-art technological knowledge for Beijing-based firms as far as the *aim* of international networks is concerned. The firms' motivations for establishing contacts abroad are aligned with government goals and shared through common beliefs. Various firms (e.g., B, I, H and Z), stated that the domestic innovation processes remain below competitive global standards. In other words, it suggests that it is difficult to find the knowledge source in Beijing/China if the world leading technology is involved. Hence, many world-leading firms from the US are considered 'role models' to imitate, which incentivises different local firms to build international linkages.

[...] on the technological level, the majority of domestic enterprises have not yet reached their level. We can't find enterprises in China that have similar quality, so we have to get support from them [international companies]. Some problems can only be solved by those companies... yeah, that's the reason, so it depends on technological capability. (Z)

As stated by firm G and A, it is not only the foreign technology, but also highly skilled engineers that the local firms sought, particularly to deal with the sophisticated foreign technologies. The avant-garde technological knowledge for new media firms is still lacking in the local Beijing RIS, notwithstanding the investments in research and development made in recent years.

One of these firms established, for example, some contacts in Seattle mainly because of the difficulty of finding engineers with adequate competencies in Beijing. Firms W and A also show that linkages built by interacting with foreign MNCs in Beijing and abroad are not only useful for technological upgrading, but also for acquiring analytical knowledge and western managerial culture.

All in all, the principal aim of those international linkages related to knowledge seeking, shaped by Beijing's institutional setting and organisational dirigisme, is to allow local firms to

monitor and access advanced technologies, while avoiding knowledge spillovers beyond local/domestic borders.

The use of international channels to exploit new overseas markets remains less driven by government's direct policies, indicating a lack of strong support for outbound flows.

We do not have policies that push companies to go abroad, this is driven by the market, not by the government...The [mentioned] programme introduced by the foreign experts affairs,...have to be approved first by the government before entering China [...] Foreign experts affairs will invite American experts for guest lectures, introducing new technology or for collaboration [...]. (B)

To conclude, the role of the central and municipal governments in sustaining the development of international networks is mainly limited to 'inbound' flows related actions which favour the upgrading of local firms with foreign technology and knowledge and the circulation of human resources with foreign experiences. For now, the government initiatives are less dedicated to create potential markets for firms overseas or to build strong bilateral international collaborations. Indeed, years of government regulations, that involve internet restrictions, might have hampered the use of truly global networks for some firms, particularly when they are based on virtual spaces.

#### ***4.2 Cognitively driven regional trajectories and innovation networks: the case of Bangalore***

In Bangalore, we found a different situation. The growth trajectory, following a bottom up process along the lines of the local ICT cluster, has so far limited local innovation networking and favoured instead independent entrepreneurial initiatives to seek complementary knowledge overseas. This has also been sustained by international networking that has characterised the ICT industry since

the beginning.

#### *4.2.1 Local and domestic linkages for innovation*

Knowledge-provider organisations in Bangalore remain a prominent source of technical and engineering knowledge for the ICT sector. However, as a consequence of cognitive constraints, they are not the key anchors sustaining innovation and innovation networks in the various knowledge domains pertaining to the local new media industry. In particular, universities are not considered hugely relevant as a source of the technical knowledge of new media firms in Bangalore. The channels to establish connections with local universities and educational institutions are therefore still not well developed. Although one new media firm was incubated with technical knowledge acquired from a Bangalore based higher education institute for its product (online platform) development, exchanges with universities are still uncommon for firms as firm YY stated:

‘We don’t have any collaboration with universities. At best – we’re talking to universities to basically recruit people from there.’ (YY).

Another firm declared:

‘ [About] Universities and research centers, I think you’re the second person who is coming here....but engagement with universities is fairly low, whether directly or indirectly.’(VV)

The government’s role in pushing networking for innovation in the new media sector has, thus far, been minimal at all geographical scales. One firm (II) explicitly mentioned that the policies of the regional (state) government have done little to either help or hinder the digital marketing industry. The industry-government interactions in the new media industry are fairly low and

insignificant despite the availability of newly launched central government schemes and policies, including Startup India, as explained by another firm (VV).

Most new media firms in Bangalore do not see the government as a key player in their search for new knowledge, with the exception of one animation firm that finds the state government very helpful for sponsoring their visits to international events. As a consequence, the local networking for innovation by new media firms in Bangalore has two characteristics: (1) networks seeking technological and engineering knowledge, and (2) networks that rely on freelancers and consultants on a project-by-project basis. Firms in Bangalore leverage the technological advantage of the region which, in turn, attracts more firms with specialization in some technology. However, since all firms, particularly small sized firms, cannot internalise all the capabilities that they need to fulfil project requirements, they rely on the local network of skilled people who are available to work on one-off projects.

Although Bangalore is known as an IT hub and access to technology seems relatively easy, as one digital marketing agency (II) pointed out, developing partnerships and networks for business purposes are not easy, particularly for complementary knowledge and competencies.

Yeah there is no ecosystem that you can go to and say you know we'll get photographers, artists, things like that here or you know we'll get technology based solution providers here, it doesn't exist; there's no organised market place or ecosystem. (II)

Further, it is suggested that the local networks are grounded in informal relations that are built upon the personal and professional ties of entrepreneurs.

We don't work with consultants outside Bangalore.....So, [for] engineering, we have three people who we work with [as] freelancers. But not all at the same time, on a project basis. (MM)

But whenever I needed some help, I would, in an unorganised way, reach out to people, just get an exposure [about] what needs to be done, what has to be read and what skill set is needed and do it ourselves. (FF)

Hence, the local and domestic linkages for innovation are the result of bottom-up processes, governed less by shared goals and joint vision as is the case of Beijing. The driving force for Bangalore's new media firms to form locally grounded innovation networks, although not very substantial, lies in the cluster-based organisational setting evolved over a period.

#### *4.2.2 International linkages for innovation*

While new media firms prefer to work with local (Bangalore-based) freelancers and consultants, and a few firms tap into expertise from other regions of India, the local search for new technology and knowledge is constrained by the cognitively driven regional trajectory. Since competences in game design or simulation design, for example, are less embedded in the traditional ICT sector but serve important aspects of the new media sector, firms need to find them internationally. In keeping with the tradition of the ICT cluster, initiatives to establish international networks are left to individual entrepreneurial actions.

Prior international exposure through higher education and/or work experience at foreign firms helps many entrepreneurs to build global networks directly. One entrepreneur (HC) emphasised that the personal contacts he developed while studying and working abroad were helpful.

We don't have any partnerships in science and in engineering. We believe that's our core part of the company right now because we have a lot of programmers, so that is what we can handle. And the artistic part is where we have partners. We are collaborating with other people. For 'Bad Dream Brigade' we are collaborating with a UK based author. She has the IP— the Bad Dream, the whole monsters and everything; she is giving us a lot of the art. (HC)

Another firm (II) expanded its global footprints through partnerships with studios abroad, purely based on the contacts of its founder.

A lot of animation studios that we work with.....all over the country. You know, it's in Mumbai, all over, you know we use studios in Malaysia. We use studios in the U.S. We use studios all over, really, and we use freelance artists and writers from around the world as well.  
(II)

Firms seek collaborations and partnerships with international knowledge networks not only to access artistic knowledge but also to acquire new markets, since the new media industry represents a global industry. One of the new media firms in Bangalore mentioned that they adopt a marketing strategy in which they tie-up with consultants overseas; for instance, hiring a consultant to work with one thousand schools in the U.S. (HH).

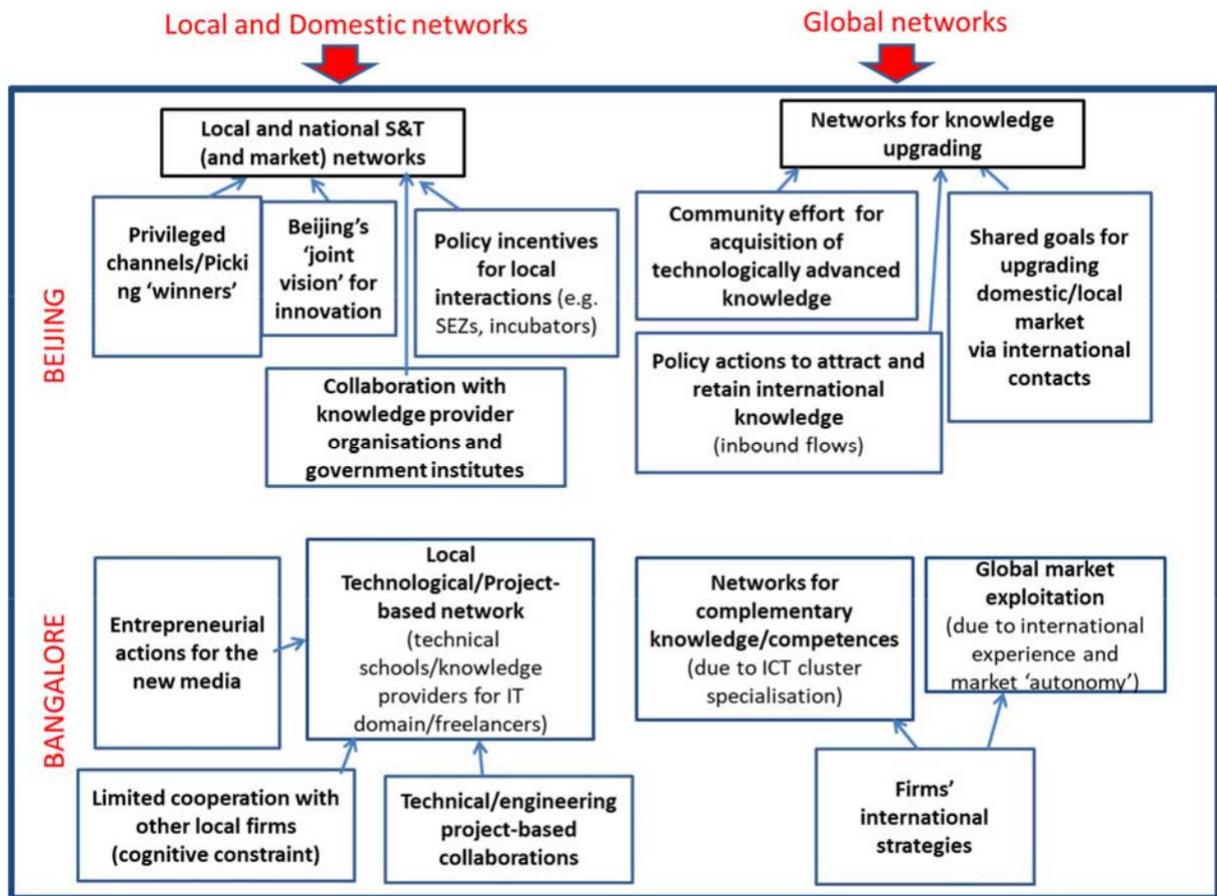
When it comes to sales, we have freelancers who work with us on a commission basis, right? ....So what happens is let's say I would have someone in the U.S., a client and he would like to meet us. But we have one person there who can go for meetings around the Texas area specifically. These people are more experienced, they would be around five years plus experience, and what they do is they set up the meetings, get the inputs, give it to our team of three people and then they work with the team to get things done. (MM)

Other than personal networks, a few new media firms in Bangalore also participate in international trade fairs and exhibitions overseas to acquire critical knowledge locally unavailable. Besides opening up different markets, the *aim* of international networks of Bangalore-based new media firms is to acquire complementary knowledge and competencies from domains other than ICTs, resulting into outbound linkages. This is different from what we found in the global networks of the Beijing-based new media sector, the aim of which is to access knowledge with mainly inbound linkages to advance the technological frontier or to produce innovation for the local market.

The bottom up process in Bangalore has led to the flourishing of entrepreneurial activities in the region in areas linked to the existing ICT cluster, directly or indirectly. Until now, the RIS has witnessed insignificant planning or prioritising for the new media industry. Firms face constraints posed by historically limited cooperation in the region (Chaminade and Vang 2008), something that does not allow for fuller exploitation of local linkages beyond those met by arms-length transactions for the specific competencies of local knowledge provider organisations and freelancers, or by clients' specification for the customization of products/services.

The findings highlight that the networks in Beijing and Bangalore RISs are manifested differently in terms of their objectives and spatiality (see fig. 2).

Figure 2. Key differences in the geography of innovation networks in the two RISs



Source: Authors' elaboration.

#### 4.3 Summary of findings in a comparative perspective

The systematic analysis conducted in the paper reveals that the development of innovation networks in the two regions have been shaped by different regional elements and that these elements continue to influence newly emerging industries such as new media. Those elements are: 1) the historical industrial specialization of the region, 2) the main characteristics of the institutional environment and the agency-enabling organisational setting of the region, and 3) the main experiences of the internationalization processes in the region.

The cases investigated in this paper show different dominant trajectories for the two RISs. In Beijing, the influential actions are taken by the principal meta-organisers: the central government

and municipal actors. This, in turn, has favoured the establishment of specific local and national networks for innovation via linkages between firms and the government, and based on preferential channels through select knowledge provider organisations, including incubators. In spite of a shared vision about innovation, collaborations between firms and other organisations are based on privileged channels built often through ‘Guanxi’. The power that the government exerts to influence domestic innovation and to some extent the presence of shared values towards innovation have shaped networking with international actors favouring inbound flows. The channels enabling networking include, for instance, association with Chinese returnees, and hosting fairs, exhibitions and expos in Beijing.

In Bangalore, the trajectory for the new media industry is the result of more spontaneous market mechanisms, as well as of the dynamics of the pre-existing ICT cluster. Innovation networking in the new media sector has to deal, principally, with cognitive trajectories of the regional specialization. From the interviews, it has emerged that the international networks are often established because of the difficulty of finding complementary knowledge within the region. This is due to the fact that regional collaborations are cognitively constrained by the organisational structure of the export-oriented IT cluster, and that the institutions of collaboration and trust are weakly shaped by ‘market/cluster rules’. Overall, the cognitive specialization in the IT industry has limited the development of cooperation among different organisations in the region for the emerging new media industry and this has incentivised firms in the industry to seek complementary knowledge outside the region.

In both the regions, the establishment of innovation networks and linkages outside national borders are left mainly to the initiatives of firms led by different strategies. New media firms in Bangalore are forced to seek knowledge and competencies from outside the region to complement those that are easily available in the existing IT cluster. In Beijing, initiatives for international

networking are in line with the institutional and political incentives for upgrading regionally/domestically owned, specific technological capabilities.

Table 1 provides a summary of main findings.

Table 1. Summary of main findings

Region	Type of RIS trajectory	Main agents influencing actions	Influence in local/domestic innovation networks In the new media industry	Influence in international innovation networks In the new media industry
Beijing	- Top down (hierarchical) - Institutionally and politically driven	- Central government /municipal actors	- Mainly local and national networks for indigenous innovation - Firm-government linkages - Preferential channels for S&T linkages	- Mainly Inbound linkages for knowledge upgrading
Bangalore	- Bottom up (from market and business opportunities) - Cognitively driven	- Fragmented entrepreneurial actions	- Few networks - Mainly cluster based and technological/project based linkages for innovation but not sufficient to sustain the growth of the new emerging industry	- Inbound and outbound linkages - Relevance of international linkages for complementary functions - Knowledge linkages for market exploitation

## 5. Conclusions

Using Beijing and Bangalore RISs and their new media sector as an illustration, this paper highlights how the specific trajectory of a RIS distinctly shapes the features of a region's innovation networks not only for existing industries, but also for newly emerging industries. In doing so, the paper made advances in the recent research which analyses knowledge and innovation networks from a territorial perspective and so far has mainly investigated the dynamic of networks shaping regional industries and clusters, but not the trajectories of territorial systems influencing network structures of new industries and clusters. The paper also contributes indirectly to the recent literature on the role of different forms of proximity in relation to industrial and cluster dynamics

(e.g. Balland, De Vaan, and Boschma 2013; Capone and Lazzaretti, 2018; Lazzaretti and Capone, 2016). Specifically, this paper illustrates how certain cognitive and institutional (and also social) proximities which support or hamper the constitution of innovation networks in a newly emerging industry emerge from the specific evolution of the territorial innovation system in which firms and other organisations are embedded. These proximities persist over time and play a strong role in shaping the features of innovation networks. The evolutionary aspects that emerge in the paper helps also to explain why in some regions hierarchical conditions (top down driven) influence the typologies of relationships and the nature and geographical configurations of innovation networks, while in others a stronger role is played by more bottom up driven opportunities and constrains.

The paper points out to the importance to recognise the regional differences in the historical co-evolution and combinations of different elements (regional sectorial specialization, institutional environment and organisational setting, and major channels for external influence) constituting a RIS trajectory while designing policies that support networking for a newly growing industry. Different policy initiatives are suggested for the two regions based on specific characteristic of their RIS trajectories and the way these trajectories contribute to shape innovation networks in the new media industry. In Beijing, policy initiatives directed toward diffusing incentives to local governments in order to enlarge the base of opportunities for firms' networking, particularly with knowledge provider organisations, should be encouraged. Policies should also sustain more open innovation initiatives which allow firms, besides individual agents (e.g. employees), to experiment with more autonomy in international market outbound linkages (e.g., through FDI or sales offices abroad). In Bangalore, on the other hand, policy initiatives should favour and 'empower' organisations and institutions, both public and private that build trust and enhance collaboration among various regional actors, spanning outside the boundaries of the ICT industry. There is also a need to focus on government initiatives that promote universities and research centers in the

region for domains other than ICT, which could support the emergence of a web of local networks of agents for the new media cluster.

Recognizing that the RIS trajectory and its constituting elements influence, but do not determine the actions of firms, since firms also rely on their specific individual strategies (Boschma and Frenken 2011; Moodysson, and Sack 2016), provides an argument to support firms' initiatives to establish international linkages which could create virtuous aggregated development trajectories for other local firms in the two systems, compensating for weaknesses of the network structures of the region.

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