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MANAGEMENT | RESEARCH ARTICLE

The renaissance of the city as a cluster of innovation

Jerome S. Engel¹, Jasmina Berbegal-Mirabent^{2*} and Josep M. Piqué³

Abstract: The first part of the twenty-first century has witnessed a rebirth of “the City” as an engine of innovation. This renaissance has been an organic response to technological and societal pressures, opportunities, and norms. This is a sharp reversal from the latter half of the twentieth century, which saw the decay and erosion of the City as a place of economic value creation. In spite of the best efforts of governments and city planners, suburbanization, first of residences, and then industry, led to a hollowing out than in some areas decimated urban life. What lessons can we learn from the emergent reversal of this trend? We explore in depth the examples of San Francisco, Austin (Texas), and London to discover lessons that may be broadly adopted.

Subjects: Urban Studies; Management of Technology & Innovation; Entrepreneurship and Small Business Management; Urban Geography

Keywords: clusters of innovation; urban platform; cities; entrepreneurship; innovation

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PUBLIC INTEREST STATEMENT

Driven by a globalized and dynamic economy, cities are competing for attracting talent and retain investments that help them engage locally and compete globally. Dense urban areas are regarded as centers of innovation, and are acknowledged to be more productive. Grounded in the Clusters of Innovation framework we argue that policy makers should not only boost the development of hard factors (universities, government, entrepreneurs, venture capital, mature corporations, research centers, and service providers) but more importantly, proactively promote soft factors (behaviors and structures—mobility of resources, entrepreneurial process, global strategic perspective, alignment of interests, and global connections) if the ultimate goal is to design and implement favorable policies for the sustainable development of innovative urban areas. Given current trends toward increasing regional nationalism, legal and barriers, these findings have increasing importance. Evidence from San Francisco, Austin, and London are reported and discussed.

1. Introduction

What makes San Francisco, Austin (Texas), and London such exciting magnets for young Technorati, driving self-generating and viral urban renewals that city planners celebrate but fail to reliably replicate? It is the convergence of technology, lifestyle trends, and cultural preferences that provide key inputs for the spontaneous emergence of clusters of innovation in cities, such as the three examples mentioned above.

The urban setting can nurture the emergence of a synergistic innovative community where the density of infrastructure and the culture of the city support the interaction among the components vital to an innovation cluster. Cities facilitate face-to-face communication and networking, encouraging industries to break down their traditional boundaries, alter the design of their spaces, both virtual and real, making the process of innovation more porous among the different actors involved in the ecosystem. Rather than being anchored on big physical assets or single anchor businesses or industries, cities are increasingly facilitating the mobility of people, technology and capital among businesses, and opportunities (Mori & Christodoulou, 2012). Drawn by work and lifestyle opportunities, opportunity seekers bring their talent and expertise; leveraging emerging technologies and capital that empowers the innovators and entrepreneurs. Recently, we have seen how cities that are able to leverage these trends become the focal points of expanding innovation clusters, not defined by industry concentration, but rather by innovation acceleration. This process exploits a virtuous cycle of compounding acceleration and concentration that yields highly positive economic and lifestyle benefits for the constituents and the ancillary contributors.

Rooted in the clusters of innovation (COI) framework (Engel & del-Palacio, 2009), this paper investigates how the specific characteristics of the city—including national and regional policy, history, and cultural heritage—shape the behaviors and structures (soft factors) that are needed to develop clusters of innovation in urban areas. In an effort to capture the lessons from different parts of the world, we review the cases of three cities that differ in geographical location, in the nature of their origin (organic or inorganic), in their stage of maturity and in the type of interventions experienced and the local context. The selected cases are examples of economically successful models that are currently emulated by cities around the world.

2. Historical context

Throughout human history, cities have been centers of production, trade, and the innovation that emerges from new markets, cross-fertilization of ideas and cultures. As employment and wealth creation opportunities drew more workers and enterprising individuals from the surrounding hinterlands, cities grew in size and complexity (Duranton & Puga, 2014). Some cities reached climax development and then regressed or disappeared due to economic failures, social conflict and war, or even unknown reasons. Other cities survived and thrived, riding the waves of evolving trends, transforming and adapting to new industries, new means of production and commerce, and new social and political structures. City centers were the hubs of industrial production and business. The last century was an era in which humankind experienced one of the largest waves of urban growth in history. According to the United Nations Population Fund (UNPF) 30% of the world's population was living in urban areas in 1950. Today, this figure has risen up to 55%, and by 2050 it is projected to be circa 68% (UN, 2018).

In the second half of the twentieth century, however, another trend appeared as cities began to be ringed by sprawling suburbs to which urban residents and then urban businesses fled, seeking safer, more affordable lifestyles and cheaper, scalable production. This trend was supported by the economic benefits of industrial clustering, often spurring the growth of new industrial complexes outside the city cores. Deprived of economic vitality, city centers often deteriorated in infrastructure, employment opportunities, social services, and cultural activities (Katz & Wagner, 2014).

While since the late 1990s the clustering of companies outside metropolitan areas was conceived as one of the most effective strategies to create innovation and economic value in a region, with the

dawn of the twenty-first Century, the pendulum began to change direction, and innovation ecosystems are now emerging in the heart of cities. This model represents a unique opportunity to resurge from the economic downturn and promote a prolific, inclusive and economically sustainable development of cities in the long run. Cities such as Austin, Barcelona, Berlin, Boston, London, Montreal, San Francisco, Seoul, and Toronto are just some examples of successful stories of urban territory transformation. These initiatives can be powered or enhanced by local governments with the support of private actors, universities, philanthropic associations, venture capital investors, and mature corporations who recognize the inherent advantages that an urban environment provides.

People: Cities are full of job opportunities. Cities are magnets for educated millennials and have become the archetypes of the lifestyles of people aged between 20- and 50-somethings. Cities are a medley of urban living, public transit, and entertainment options. They represent vitality, livability, and create a sense of belonging.

Technological advances: Technology drives markets' agenda. The time needed for inventions to get commercialized and enter mass use has steadily decreased. Products have shorter half-lives, there is a lower cost of disrupting incumbents and an increasing vulnerability of incumbents. Firms that leverage markets are those that are constantly in vigil of new trends, even before the demand exists.

Capital: Financial capital enables entrepreneurs to start up their business, develop new products or ideas within their existing business, scale and face shortfalls in operating capital in periods of recession. Investors are spurring the recolonization of urban cores with highly profitable, knowledge-based industries. A high mobility of financial capital fuels the engine of business development.

Regional context: Economic activity is necessarily associated with a particular geographic area, and the territory is more than the basis for business location. Cities are embedded in a particular regional context, and therefore, need to be explored in the light of their historical background, culture, and traditions (Comunian & England, 2018).

The dynamic and highly volatile environment has led cities to look for innovative, sustainable growth models to absorb this massive mobilization of people and to offer a rapid response for product innovation and technological progress (Viitanen & Kingston, 2014). Redevelopment of specific areas within the cities, with emphasis on businesses geared toward innovation and creativity, revitalizes the urban core and potentially ushers in a new era of well-being, resource efficiency, and economic growth. Clean, light, and mobile cities are appealing to newcomers, creating a self-reinforcing cycle of rejuvenation and growth (Hunter & Haughton, 2004).

3. Cities as innovation hubs

Discussions about innovation systems and how knowledge is capitalized and exploited have led to an exhaustive number of works (Cooke, 2002; Freeman, 1988; Lundvall, 1985). These studies aim to find new formulae and configurations that help territories improve their competitiveness and obtain benefits in the cultural, social, and economical spheres.

More recently, it has been realized that although the production of new knowledge takes place on a global scale, innovation processes take place on the local space (Marceau, 2008). New conceptualizations have thus been put forward linking innovation processes with other constructs such as proximity, social integration, learning capabilities, and economic performance. Such approaches highlight that because of specialization, close proximity, and industry density, there is a concentration of resources (e.g. technology, skills, information, and capital) which builds competitive advantages for participants in that community through economies of scale and reduced transaction costs. Furthermore, these studies highlight the new role of cities in the knowledge-based economy, and the opportunity they represent in transforming the downtowns and abandoned areas. In this respect,

investigations on the location of innovation in inner cities has provided the literature with different research streams, ranging from *urban regeneration polities* (Atkinson, 2004; Thomson, Atkinson, Petticrew, & Kearns, 2006), *urban knowledge parks* (Bugliarello, 2004), *creative and knowledge cities* (Costa, Magalhaes, Vasconcelos, & Sugahara, 2008; Florida, 2005; Yigitcanlar, O'Connor, & Westerman, 2008), *smart cities* (Batty et al., 2012; Caragliu, Del Bo, & Nijkamp, 2011), *intelligent cities* (Komninos & Tsarchopoulos, 2013), *ubiquitous cities* (Greenfield, 2006; Townsend, 2013), and more recently, *innovation districts* (Katz & Wagner, 2014).

Today the focus of innovation is centered on creative hubs, *smart* and *intelligent* cities, and *digital districts* (Albino, Berardi, & Dangelico, 2015; Anthopoulos, 2015). Driven by a globalized and dynamic economy, cities are competing for attracting talent and retain investments that help them engage locally and compete globally. Dense urban areas are regarded as centers of innovation, and are acknowledged to be more productive (Caragliu, Del Bo, Karima, & Nijkamp, 2016). They benefit from knowledge externalities and agglomeration economies, therefore they enjoy of larger and more diversified markets with international reach (Angelidou, 2015). However, despite the existent literature's delineation of the new role of cities in the knowledge-based economy, many questions remain concerning how the components and behaviors of innovation clusters interact in urban settings and how the innovation process is influenced by the specific conditions, constraints, culture, and constituencies of the urban location.

Grounded in the Clusters of Innovation (COI) framework (Engel & del-Palacio, 2009), we argue that it is necessary to explore the hard factors (key components of universities, government, entrepreneurs, venture capital, mature corporations, research centers, and service providers) and more specifically the soft factors (behaviors and structures such as mobility of resources, entrepreneurial process, global strategic perspective, alignment of interests, and global connections) that shape the development of COIs in metropolitan areas.

To this end, we define an area of innovation (AI) as a geographical location that stimulates and manages the ecosystem of innovation. This definition implies that AIs are not restricted to cities, but might also refer to any other type of urban location—e.g., districts, metropolitan areas—that fuels the creation and development of cluster of innovation. We posit that AIs are a subset special case of the general COI framework, applied to the specific case of the urban setting. This concept is important because it makes the city itself an active component of the cluster of innovation. AIs concentrate highly skilled people with entrepreneurial mindsets, services, and resources in urban environments that provide excellent possibilities for communication. The proximity between innovation-driven actors and the city intensifies social relations and the interchange of ideas, creating a model rooted in the open innovation paradigm, collaborative work spaces and horizontal structures (Brown, 2017). Said differently, AIs materialize in a geographical location within the urban setting that generates economic growth and is appealing to different stakeholders for locating there.

4. Research methodology

For the purpose of this study, we selected three cities: San Francisco, Austin (Texas), and London. While the former was purposefully chosen as the archetype of a mature area of innovation, Austin (Texas) and London were chosen as they followed a different development model and are in a different stage of development. Table 1 summarizes their main features, paying special attention to the mobility of resources—people, technology, and capital—the alignment of interest between the different stakeholders and the entrepreneurial drivers. In the next section, we further elaborate on all these characteristics and how they shaped the development of these urban clusters.

As for the research method, we use a historical case-study approach. The rationale behind this choice is to establish accurate accounts of a phenomenon—the development of areas of innovation in the inner cities—by carefully considering all relevant and available data (Rowlinson, 2005). We first performed a desk research reviewing the literature. The literature included academic

Table 1. Main features of the cities under analysis

City	San Francisco (California, US)	Texas (Austin, US)	London (UK)
Growth model	Organic	Inorganic	Organic augmented
Stage of development	Mature. Experiencing rapid and continuing expansion.	Emerging. Approaching sustainable critical mass.	Growth. Role of epicenter for European VC and market entry critical.
Mobility of people	Immigration and between sectors. Close to/merging with/Silicon Valley ecosystem. Ties and mobility of people within the cluster and outside (e.g., Israel, China, Australia, Brazil...) Attractors: Walkable areas, climate, strategic location, public transport network, shuttles from the city to the workplace, youth culture.	Mainly between sectors. Global ties thanks to the powerful linkages of the ATI. Attractors: Green areas, rhetoric of sustainability, music and youth culture.	Immigration and home of many US high-tech firms. Mobility between sectors. Attractors: Green areas (parks), cosmopolitan, history of the city.
Mobility of technology	Evolution from financial center to tourism, high-tech and media-related industries. Co-location of different sectors, close to and integrating with Silicon Valley. IP commercialization from Stanford and Berkley.	Evolution from agriculture, to high-tech, electronics and arts. Likewise, moving from manufacturing to services (chip design, mobile, cloud) with a green approach.	Evolution from finance and tourism to technocreative industries, media and telecoms.
Mobility of capital	Large pool of VC, with strong diversity from early to late stage and international in-flows.	Good early stage VC. Low foreign VC (mostly local). Emerging connections to Silicon Valley.	Well-established financial center with best VC (largest, diverse, experienced) in Europe.
Alignment of interests and intervention	Un-related sectors that benefit of co-location. The growth was formalized by a rich compost of government investing in science and technology, Bay-Dhole Act, tax exclusion to revitalize Market Street corridor.	Joint initiatives between the Chamber of Commerce, City of Austin, UT, high-tech and small firms, business groups, citizens (e.g., Smart City Initiative, Opportunity Austin, redevelopment of the Mueller Airport).	Unrelated sectors that benefit of colocation. Examples of interventions include East London (Hoxton, Shoreditch), Tech City, Seed Enterprise Investment Scheme, Canary Wharf, London Fields and Deptford.
Entrepreneurial drivers	Entrepreneurial mindset (Gold Rush), universities (UC Berkeley, UC San Francisco and Stanford), start-up accelerator programs.	University of Texas, ATI, Moot Corp Completion and startup accelerators.	Universities, start-up accelerators (Seedcamp, Techstars London, Startupbootcamp FinTechLondon).

publications, policies, and laws obtained from official websites, historical records documenting the evolution of the three cities, articles from relevant newspapers, consultancy reports, and other reliable sources such as reports from well-known international organizations.

Second, data collected were augmented with unstructured interviews with key informants. Personal connections were used to contact some of the initial interviewees, and those then suggested other relevant informants, following the “snowball” technique (Trost, 1986). Data were collected from February to June 2016. The wide diversity of sources revised was critically evaluated to ascertain the authenticity and credibility of the evidence, following the guidelines as in Golder (2000). Reliance on multiple sources sought to minimize potential sources of bias.

Therefore, data were triangulated to validate facts (Keep, Hollander, & Dickinson, 1998). Supplementary material obtained through the interviews was used to confirm consistency of observations derived from the literature with the perceptions of experts. Similarly, all facts and figures provided by the participants were cross-checked with official statistics to confirm their accuracy.

Third, using the COI framework, the authors classified and categorized all the information in order to characterize how San Francisco, Austin, and London have become such a hub for technology and innovation. The next section describes the evolution of these cities and the main events that shaped their development.

5. Case studies

5.1. San Francisco

Silicon Valley is the result of an organic growth that emerged from a rich compost of government investment in science and technology (Engel, 2014). While benefiting from its initial foundation as an industry cluster, the valley has evolved into a horizontal cluster that spreads across different industries and sectors (Coletti, 2010). Today it has become the archetype of a COI. The convergence of talent, technology and capital has created a vibrant and dynamic ecosystem that is unceasingly creating and exploiting new ideas as they arise, which rapidly take the form of a new company and drive markets. Silicon Valley roots are in thousands of venturesome individuals around the world that came to California because of the Gold Rush seized by the opportunities that gold offered. During this period a wide range of entrepreneurial activities spawned in the area leading to the creation of new ventures that provided services around the gold mining industry. Diversification of industries and sectors made possible technological dissemination across sectors (St. Clair, 1998).

In the second half of the nineteenth century, interactions between enterprises were augmented with the creation of the University of California in Berkeley (1868) and the Stanford University in Palo Alto (1891). Soon, these universities took the lead in the establishment of university-industry collaborations. A community was rapidly created, driving further innovation and business creation. In response to the demand for industrial land near the university resources and the emerging electronics industry, in 1951 the Stanford Industrial Park was created. Very soon, large corporations such as General Electric, Hewlett-Packard, IBM, and NASA showed their interest and opened their R&D centers there. In the mid-fifties, the Valley was in a nascent but growing stage, and in the early 1970s the number of corporations engaged in the production of semiconductors increased considerably, companies which in turn, supplied their counterpart firms that were working in the computer field area. This growth was driven by the parallel development of the venture capital industry.

In 1980, the Patent and Trademark Law Amendments Act changed the technology transfer system, enabling universities, small businesses, and nonprofit organizations to retain title to inventions made under federally funded research programs and take the lead in patenting and licensing discoveries. The law originated a new wave of venture capital investment. Venture capitalists become professional investment managers, investing other people's money and leveraging their own capital and expertise for a significant multiplier effect (Engel, 2014). Money, people, and technology were liberated to pursue opportunity.

In the last 20 years two main booms have shaken the economic landscape of San Francisco. By the late 1990s, with the dot-com bubble entrepreneurs and start-up companies in the technological sphere invigorated the economy of the city, followed by professionals in other sectors. Demands for new housing and office space ignited a construction wave of new buildings, gentrifying once-poorer neighborhoods such as the South of Market district. In 2001 the bubble burst, and 94,000 jobs disappeared. Despite the market fell, entrepreneurs,

and high technology remained as a mainstay of the local economy. A boom in social media and the advent of social mobile technology took place in the mid-2000s.

The growth of Silicon Valley as an innovation cluster in the formerly agricultural valley at the south end of San Francisco Bay is an example of the powerful influence of the key COI components of university expertise, government investment, and a pool of eager entrepreneurial individuals. Together they created a vital cluster, attracting investors, and specialized service providers and together evolving the behaviors and culture that characterize an innovation cluster—mobile resources, entrepreneurial process, aligned interests, and global scope.

In the beginning decades of the twenty-first century, however, Silicon Valley began to experience a new relocation phase (Engel & Forster, 2014). With the generation of consumer-facing Internet ventures and the explosion of social network ventures, companies are increasingly being founded or relocated to the urban core of San Francisco. This tech migration is not unique to San Francisco, but the urban tech model seems to fit particularly well in the city's downtown area. This city exemplifies an organic bottom-up model of private-public partnership governance. Nowadays, it is one of the most vibrant and dynamic urban areas of the Bay Area despite its history of waves of prosperity and decline. While some years ago San Francisco was a popular place to live for people employed in Silicon Valley companies, in the recent years companies have started seeing the city as the place to locate (McNeill, 2016). The thrilling atmosphere of its inner-city neighborhoods is a huge magnet for millennials, a generation with strong propensity for walkable areas that enable them to live close to their friends and the amenities they need, rather than living in cookie-cutter isolated houses in the suburbs. To capture these workers, companies such as Google run daily shuttle buses between the city and their suburban campuses in the South Bay. However, recent moves from Palo Alto to San Francisco are evidencing a center of gravity shifting away from suburban Silicon Valley to urban San Francisco (Florida, 2012).

In addition to the inherent urban attractions and the supportive role of major corporations, municipal government has also played a role stimulating the regeneration of San Francisco's urban core. In 2011, the administration of Mayor Ed Lee embarked upon a plan to foster a technology hub along the Market Street corridor. Twitter anchored the move and established its headquarters in a formerly vacant 1937 Art Deco landmark in Mid-Market Street. Just a year before the area was known for drug deals and homeless people. This trend was not new; a similar pattern was observed before the dot-com bust (1995–2000) when many companies settled in the South of Market neighborhood (SOMA), a former warehouse and industrial district. From 1996 to 2003 nearly 7.7 million square feet of office space were built (San Francisco Planning Department, 2014). Today, SOMA is the home of a comprehensive cultural offer. Due to its older, smaller office spaces and greater opportunities to convert former industrial spaces into live-work lofts San Francisco costs are advantageous for would-be entrepreneurs (Stehlin, 2016).

The city also benefits from a good climate and strategic location. It has good living standards, combing the hustle and bustle of a big metropolis with the stillness of the bay and relaxing green zones within walkable distance. The international airport and the Port are leading hubs for freight and passenger transportation around the world. Similarly, an adequate public transit network—BART, Muni Metro, Caltrain, and buses—easily connects the city to Silicon Valley firms. In terms of demographics, the city is renowned for its diverse and cosmopolitan population. This diversity generates a space for dialogue and exchange of ideas that fosters social networking and professional growth. People are also highly educated, with 53.8% of the population over 25 years old owning a bachelor's degree or higher (United States Census Bureau, 2015). The median age is 38.5 years old, and almost 60% of the population is single. These figures suggest an agglomeration of young talent with promising careers that help fuel community and economic sustainable development. Nonetheless, socioeconomic inequalities are increasingly recognized as a matter of political attention.

The metropolitan area is also characterized by the concentration of highly ranked universities, research centers, and hospitals. The dense urban core of the city facilitates close collaboration of these institutions with businesses, resulting in cutting edge developments and inventions with a markedly practical application, which in turn, attracts more talent, firms, and investments. According to the *Entrepreneur VC 100* list of top investors in early-stage start-ups, 12 venture capital firms are located in San Francisco. The city is also the home of nine of the Fortune 500 companies in 2015. It hosts the Federal Reserve Bank, the United States Mint, and more than 60 foreign banks have their offices here. San Francisco is the new place to be for start-ups. It offers training programs, access to capital for new business, start-up accelerator programs and shared workspaces (e.g., Matter, Highway1, 500 Startups, Tech Liminal). The city is also immersed in the provision of value-added services to its citizens. For instance, the city has implemented networked metering in water, electricity, and gas using low-frequency RF sensors. Such services open up new economic opportunities in the ICT domain.

All the above ingredients make the city attractive to people, and consequently, to firms. However, the shift to urban tech is not without its problems. The influx of skilled workers and new companies is driving up housing prices and rental costs. San Francisco's neighborhood transformation and gentrification has aggravated social inequality. The creative class is strongly concentrated in the city's central core, while the blue-collar and lower-wage service workers are displaced in the suburban areas. Creative strategies to deal with these challenges must be developed for San Francisco's urban core to continue to prosper and grow.

5.2. Austin, Texas

Over the past three decades Austin has emerged as an innovation hub, with an explosive growth of technology companies, established firms, and start-ups. There have been many contributors to this evolution of a sleepy government-dominated state capital to a thriving innovation metropolis, spawning companies, and products of national and international significance. In a state dominated by natural resource exploitation (oil) and agriculture, the emergence of this high-tech innovation hub was not inevitable. While having many of the core elements of a COI, such as a fine research and engineering university—University of Texas (UT) at Austin—what makes Austin so interesting is that the city has exploited its attractiveness as an urban center and sophisticated place to live. Its notable creative culture and lifestyle elements have driven an innovation boom, attracting and retaining the fresh young talent. Austin is one of the fastest growing cities in the US (Carlyle, 2015). Today, the City of Austin has a population of 931,830 living in 321 squares miles, from which 73% are in civilian labor force. Its citizens are relatively young (median age of 31.8 years old), educated (47% hold a bachelor's degree or higher), and economically secure (median household income \$57,689) (US Census Bureau, 2014).

Until the 1970s, environmental and recreation amenities were the key components of the marketing strategy of Austin (Long, 2016). The economy was mainly dominated by state government and by the UT, and high-technology activity was quite modest (Chapple, Markusen, Schrock, Yamamoto, & Yu, 2004). By the end of the 1970s, notable tech firms such as Advanced Micro Devices, IBM, and Motorola located there (Humphrey, 1997). This situation would be soon accelerated, spurred in great part by a campaign to lure mobile capital, high technology and small electronic firms (Tretter, 2013). By providing generous incentives targeted to R&D-based activities and investing in science and engineering departments at UT, the headquarters of many prominent technology corporations soon began being settled in Austin (Oden, Byung, & Young, 2007). The strategy was successful and the city earned the nickname of Silicon Hills.

Coinciding with the tech-based development strategy, the city also boosted its investment in the arts. A popular national television show run by the American public television service, "Austin City Limits" exemplified the City's robust lifestyle brand, and marketed the City as the place to be. Together with a strong public relations scheme Austin become widely known as the "Live Music Capital of the World."

Austin transformed from a small state capital to a center of high technology with an appealing environment for a skilled work force who seeks for a medley of urban living, public transit, and entertainment options. Contrary to other industrial cities that were suffering from pollution, in Austin technological and economic progress was bolstered whilst not sacrificing the quality of life. Achieving such a balanced equilibrium was not easy. The rapid emergence of a home grown innovation economy brought a major real estate and construction boom. In 20 years, the population nearly doubled and the employment in the high-tech sector experienced more than 80% growth (McCann, 2007). This rapid growth raised important concerns. Business interests seemed to be sacrificing Austin's environmental quality for economic prosperity. Yet, this tension was not enough to slow down the pace of growth. Tech companies continued arriving and emerging (e.g., Microelectronics and Computer Consortium, Dell, 3M, Sematech, Samsung), and expanding their operations (e.g., IBM, Motorola).

The public opposition to such uncontrolled growth—rapid urban sprawl, population growth, traffic issues, housing needs, and environmental degradation—was reaching a boiling point, not only because of neighborhood and environmental groups' mobilizations but also because of the savings and loans crisis (Swearingen, 2010). A new narrative emerged from public forums, stressing the need to manage technological progress and economic growth while preserving Austin's quality of life and sense of place. In 1999, under the mandate of mayor Kirk Watson, the Smart Growth Initiative was established to reduce peripheral expansion and stimulate development in the central city and surrounding areas, particularly the downtown and East Austin. These areas showed the potential for brownfield redevelopment. Another area that was redeveloped was the former site of Austin's Mueller Airport. According to the official website (<http://www.muelleraustin.com>), as of today, the 700-acre area is an eco-friendly new urbanist community that houses approximately 14,300 residents, 14,500 employees, and 4 million square feet of office and retail space. By 2002, the city began to look more seriously at how to diversify economic development. Recognizing the ability of Austin's reputation to attract talent, capital and industry, in 2003 mayor Will Wynn formalized one of the largest financial investments of the city under the shelter of the Austin Chamber of Commerce and several businesses and community leaders. The plan aimed at fostering job-creating investment in Central Texas. The plan was first launched in 2004 as "Opportunity Austin 1.0" with subsequent development strategies called OA 2.0 (2009–2013) and OA 3.0 (2014–2018).

In 2008, the global economic downturn hampered Austin's high-tech sector. By the end of 2009, the number of jobs in this sector slumped to less than 82,000, below the 91,000 jobs in 2007 (IBM, 2012). As a response, tech firms began started to develop a diversified portfolio in hardware but also in software and tech services. Tech giants such Dell and IBM drove this move from manufacturing to services. Today, Austin is top in chip design and is also strong in mobile and cloud technology. According to the Metro Monitor elaborated by the Brookings Institute Austin is one of the top 10 recovery economies in the US. This diversification of sectors mirrors one of the key distinctive characteristics of the COI framework: agglomeration benefits defined by the stage of development and innovation rather than by industry specialization. Austin had talent, know-how and technological capabilities, which were used by firms to embark in innovation processes that allowed them to survive.

Today, the city enjoys of a healthy start-up cluster ecosystem, consisting of approximately 2,200 active tech start-ups. In this respect, Austin has a solid background. The UT was one of the first ones to promote entrepreneurship in an academic program. Started in 1984 as a new challenging activity designed by two Texas MBA students, the Venture Labs Investment Competition (formerly known as "MOOT Corp"), is the oldest operating inter-business school new-venture competition in the world. Today, business plan competitions in business schools are almost as popular as moot court competitions in law schools.

According to the Global Start-up Ecosystem Ranking, Austin's consistent performance in the tech sector has led to a tech-savvy workforce of over 100,000 people, yet Austin supply can still not keep up with demand. Recent success stories include born global companies such as HomeAway and RetailMeNot which have together created over 5,000 new jobs. In terms of venture capital, Austin has been called the "new destination of choice" because of its organic and sustainable ecosystem for technological innovation. Innovation and tech entrepreneurship are highly tied to the Austin Technology Incubator (ATI) at IC² Institute, UT. Since its foundation in 1989, ATI has incubated around 200 companies, which have collectively raised more than \$1 billion (ATI, 2014). ATI is appealing—only 5–10% of the applicants are admitted each year—because of its connections to local business, tech communities, major individual and institutional investors, and state and federal funders. This multidimensional web of interrelationships combines weak ties and durable bonds, which gives entrepreneurs access to international assets and collaborations that fulfill their needs for resources.

Austin is a clear example of a city with a locally driven creativity and innovation policy, the result of collaboration among an active citizenry, private enterprise, government, and university. With the convergence of music, film, and entertainment into a digital media sector the urban core has seen an unprecedented residential development, and streetscape improvement becoming one of the most vibrant in the country. Austin's recreational amenities and music scene, a low cost of living, and a skilled workforce are core characteristics that make the city a stunning place to live and work. The city has received numerous awards and recognitions for constantly embarking on a variety of initiatives to strengthen its creative collaboration between business interest, city governance, and higher education. Some recent endeavors include the Imagine Austin Comprehensive Plan (2012), and the innovation district anchored by the Dell Medical School called Capital City Innovation Inc. (2016). Austin also hosts the South by Southwest (SXSW) Conferences & Festivals, which offer the unique convergence of original music, independent films, and emerging technologies. Begun in 1987, SXSW can be conceived as a "pop-up community," that is, the physical representation of technocrats who are seeking the new ideas and creative technologies that will shape the future. This festival is comparable to some of the major forums of the twenty-first century—TED talks, COMDEX, Burningman, or Sundance.

The main current challenge the city is now facing relates to the increased cost of living—fast rising food prices, utility costs, basic services, costs of housing and rental. Addressing these concerns is a major priority for future growth and prosperity of this urban innovation hub.

5.3. London

While finance and tourism have traditionally driven London's economy, today creative industries—technology, media, and telecoms—are playing a dominant role. London is a strategic choice for fast growing companies to set up offices outside the US. The roots of this innovation cluster are found between the 1970s and the 1990s, when East London started to become a progressive area, with artists, designers, fashion, and furniture makers settling there. Old buildings with cheap renting options were soon redeveloped into studios and cultural spaces (Lee & Rodríguez-Pose, 2014). In the late 1990s, other creative professionals in the media, advertising, graphic design, consultant, and architectural service industries moved to this area. In the early 2000s, the area was considered the epicenter of the new media industry in the UK, coinciding with the first dot-com boom (Pratt, 2011), and during the last decade high-tech industries have formed a rapidly growing start-up community which is the nucleus of London's COI. Its spontaneous foundation and organic growth are key distinctive features (Evans, 2009).

London's start-up boom began in 2007 when technical innovation and recession were both focusing effort on maximizing the effectiveness of business-to-business creative services (Foord, 2013). The cluster initially developed without any government backing in and around the Old Street Roundabout, in the confluence of Hoxton and Shoreditch, two inner city districts in the

historic East End of London and modern Central London. This had been a relatively run down area and companies were encouraged by the historical low rents.

The term “Silicon Roundabout” rapidly gained currency, and in 2 years the number of companies established in the area expanded. A blend of dot-com firms, creative digital agencies, branding, and marketing research corporations and web designers settled there. These firms, in turn, stimulated demand for software and applications development (Comunian, Chapain, & Clifton, 2010). The rationales used by start-ups to locate in east London reflected the benefits of colocation of hitherto unrelated sectors: agglomeration of similar and complementary firms, access to tacit knowledge, constant inflows of people and ideas, and flexible workspace able to accommodate the ebb and flow of contracts and changing work practices. Since then, the district continued evolving with little public policy intervention. In a period characterized by successive rounds of public sector cuts and forecasts of economic stagnation and recession, the central government, through UK Trade & Investment focused on leveraging inward investment from global technology companies. Direct policy intervention was avoided but encompassed practical support with a visible presence of government agents.

The organic growth was accelerated by direct policy input. In November 2010, the UK government rebranded the district as “Tech City,” aiming at attract large-scale foreign investment and develop a corridor expanding the cluster’s boundaries. A wide range of national and city-level policies were implemented to build one of the world’s great technology centers. The Tech City Investment Organization was created to lead cluster’s development. Initially, Cameron’s plan received a sceptical response from founders and investors. Nevertheless, by the end of 2011 circa 200 firms were settled there, and in March 2012 Google opened there its largest office outside Silicon Valley. Compared to 2007, London’s economy grew by nearly 12.5% in little more than 4 years (Malik, 2013). Turning to employment, the digital economy in Inner East London also rose faster than in the city. While for the period 2009–2010 London’s digital job counts fell by 16,000, job opportunities inside the cluster increased mainly driven by digital content sectors (Nathan & Vandore, 2014).

Today, entrepreneurs and investors are benefiting from a reform of intellectual property law as well as policy changes. Nevertheless, it is perhaps the introduction off the Seed Enterprise Investment Scheme what has provided more substantial benefits for firms. Launched by the UK government in 2012 it encouraged investors to finance start-ups by providing tax breaks for backing projects might otherwise be viewed as too risky. As a result, the number of angel investors exploded and many seed stage ideas were funded. At the end of 2012, the number of start-ups in greater London was higher than 330 (DueDil, 2011), with Tech City concentrating more than half of them.

London hosts some of the largest accelerators in Europe including Seedcamp, Techstars London, and Startupbootcamp FinTech London, which are all connected to seed investors from Europe and the US. The large number of causal interactions has helped build trustful relationships which have evolved into durable bonds that permit a fluid mobility of resources. The venture capital community in London is supported by a network of well-established venture capitalists and investors. Since 2010, tech-based start-ups in London have collectively raised \$5.2 billion of venture capital funding, from which \$2.28 billion in 2015 (London & Partners, 2016). Today, Tech City is an essential component for the further redevelopment of London. Current policy for the east London digital cluster consists in leveraging foreign direct investment. Additional support includes legislative help for firm relocations and property investment (Foord, 2013).

Tech City differs from high-tech archetypes such as Silicon Valley and other top-down clusters in Europe (Bresnahan & Gambardella, 2004). The foundational geographies of Inner East London are multiple. It combines physical traces of its industrial past with recent cultural, leisure, and residential layers (Nathan & Vandore, 2014). The area has a significant diversity bonus across innovation, market orientation, and entrepreneurship. Its digital economy combines an established ICT sector with a number of creative industries, software developers, and data science analysts.

Such a mix of colocated activities is an expression of a three-dimensional assemblage of actors and sectors that takes advantage of overlapping circuits of information flow and current market fluidity. Technocreative digital agencies are the result of such spatial and temporal contingencies.

Around the creative cluster a sense of community has been created. Monthly meet-ups and annual festivals are organized, evidencing the importance of physical proximity and face-to-face contacts. In April 2014, London was among the first cities to receive a geoTLD, enabling local businesses, organizations, and individuals to associate their online presence with the territory and the tech and cultural community of the city (.London).

The city's cultural diversity is another economic strength (Leadbeater, 2008). Thousands of highly skilled immigrants arrive each year (del-Palacio & Chapman, 2014). Because linkages with the home country are usually maintained, collaborations beyond the boundaries of the cluster and interrelations with others are created. Such a mix of cultures and international connections facilitates start-ups' growth and a global focus from inception. This high mobility of people and global focus is a key characteristic in the COI framework.

As in other COIs, London is also a global center for higher education, having one of the greatest concentrations of world-leading universities. Its preeminence is reaffirmed by the leading position some of London's universities occupy at the top of rankings. Universities located in London are the academic partners of the cluster.

London's attractiveness is proven in global rankings. In 2016, the city ranked first in the Global Financial Centres Index. London is also top in the Global Power City Index for 5 years in a row, stressing the city's "magnetism" for attracting creative individuals and business enterprises. Forbes' list of World's most influential cities also includes London. In the 2014 edition, London appears as the preferred domicile for technology start-ups, reinforcing its status as a powerful media hub and advertising center, and in the 2017 report the Startup Genome project has ranked London in the third place.

With a thriving economy, an unrivalled cultural offer, numerous sporting venues, a quality higher education system and a low crime rate, London is appealing to tech firms and also to people. London enjoys the fruits of a long cycle of urban redevelopment which has helped the city renew its DNA and make it a better place for walking and cycling. East London is not the only area of London that has suffered a profound urban and economic transformation. Start-ups are growing fast and are increasingly seeking larger offices. Canary Wharf, a former dock located in Tower Hamlets is today the home of regional and world headquarters of major banks, professional services firms, and media companies. London Fields and Deptford are other areas that have also witnessed a renewal process.

London has made great progress in densifying the city center and transforming the older suburbs. However, the rapid growth of the cluster has met with some criticism. The key challenge is the housing imperative. London's economy has significantly rebounded since the financial downturn and this is now reflected in the soaring prices of houses. Additional current needs are bridge capital, experienced investors, mentoring services, and UK exit opportunities. Other big issues refer to air quality, public health, extra investment in public transport, airport capacity, and the devolution of greater decision making powers from central government.

6. Discussion: Clusters of innovation on urban platforms

Cities are filled with spaces such as old industrial complexes, factory lofts, abandoned warehouses, and other mixed-use buildings that can be easily retrofitted into flexible, open, and creative spaces where new companies can be established, giving birth to a new community of urban life and amenities that contributes to economic growth.

The above cases illustrate how cities such as San Francisco, Austin, and London have experienced an urban transformation process with each city having its own specific renewal pattern and different anchor institutions leading the process. Today these cities are the new places to be for start-ups. The start-up ecosystems created in these cities are aligned with the attributes of the COI framework—mobility of resources, entrepreneurial process, alignment of interest, global strategic perspective, and global ties and bonds. The next sections illustrate how these attributes are exemplified and how the urban setting creates a synergistic situation where the culture of the city supports the interaction among the components of the innovation society.

6.1. Mobility of resources

Openness to newcomers keeps cities moving forward. San Francisco and London are clear examples of this. Both cities attract a trained work force from all over the world, registering high percentages of foreign-born residents with solid educational backgrounds. This mix of cultures and ways of doing things elevates the cultural and intellectual level of the city. The urban architectural design of these two cities evidences the efficacy of open structures and spaces for dialogue. The role of the city is therefore to serve people by fostering interactions. When people rub together in a compact location, ideas are sparked more easily. Networking elements facilitate random collisions of people, which in turn, boost the size and rate of growth of the ecosystem.

Mobility of people is also visible. The colocation of different industries in a same geographic area accelerates knowledge spillovers. For instance, in the San Francisco Bay Area, it is very common to find not just entrepreneurs but also employees rapidly moving from one job to another. Physically condensed urban neighborhoods enable this frequent interfirm mobility, which in turn fosters knowledge and technology transfer. A similar path is observed in Austin, jumping from hardware to software and tech services. In London, mobility of people is best exemplified by the constant flow of workers among creative industries and tech firms, and the increasing creation of new jobs in related industries. Knowledge and technology naturally migrate with people from one venture to another.

A similar behavior is observed in the mobility of money. Similar to Silicon Valley, what distinguishes the venture capital community in San Francisco is its willingness to invest in early-stage development of new firm creation. Then, capital is reinvested and recycled in new technology development. Investors and serial entrepreneurs are continuously recycling their profits into financing new ventures. In London, the venture capital industry combines a well-established network of mature corporations with an emergent pool of small investors, and in the recent years it has started attracting capital from overseas. Austin is in a more embryonic stage. Although new companies are raising significant amounts of capital, the venture capital community is still mostly local.

6.2. Entrepreneurial process

All three cases show that economic development does not follow a straight line; on the contrary, it encompasses fluctuations and waves. It is precisely in periods of economic recession when San Francisco, London, and Austin have found the way to rise from their ashes and confront an uncertain and dynamic economic context. Taking advantage of a talented workforce these cities have reinvented themselves and started operating in new sectors in which they had few or no historical tradition.

San Francisco and London exemplify this transformation process. While for decades these cities enjoyed from a solid reputation as trade and financial centers, when the banking industry moved to other regions and the city was immersed in a profound recession, a spontaneous and unplanned spatial concentration of innovative activity originating from independent initiatives by actors located in a particular area reactivated the economy, restoring confidence of investors, and the integrity in the markets. New jobs emerged, generating new opportunities in apparently unrelated industry sectors.

The emergence of high-tech industries in the finance and media cluster of London and the shift from a hardware-intensive industry to a narrative of sustainability and the development of tech-services in Austin were possible because of the presence of entrepreneurial behavior. Proximity to

other specialized firms, suppliers, and customers, among whom information and other resources easily moved, accelerated new venture creation. Agglomeration benefits, not from industry specialization but from the stage of development and innovation, were found to play a paramount role. As in other COIs, entrepreneurs and founders recycled their expertise and new wealth in new ventures. This informal spin-out process was repeated over and over, creating a virtuous cycle.

In Austin, the entrepreneurial behavior is mainly illustrated by the university and the business incubator which acted as anchor institutions by supporting venture creation and seed funding in the initial stages, as well as by providing the technical expertise to move forward and rapidly scale. Universities have also played a fundamental role in London and San Francisco. All notable universities in these cities have technology transfer offices with solid alliances and collaborative agreements with industry. Entrepreneurial programs are also abundant, expanding beyond business schools. Business incubators and major start-up workshops and conferences reinforce the entrepreneurial ecosystem.

6.3. Alignment of interests and affinity for collaboration

According to the open innovation principles, the sum of the whole is greater than the sum of the individual parts. If a company stays isolated from outside, it will not be exposed to and be able to exploit the best ideas and opportunities. Shared core values and a heightened propensity to collaborate with the other members of the ecosystem are distinctive characteristics of a COI. This culture of collaboration is secured if there is an alignment of interests.

The city of Austin typifies this alignment of interests with the financial investments under the shelter of the Austin Chamber of Commerce and several businesses and community leaders. The Smart Growth Initiative and the Opportunity Austin subsequent plans resulted from a robust partnership among the public sector, businesses, universities, and community organizations, which received the support of its citizenship, after a period of conflicts and citizenship mobilizations. Austin success is thanks to its ability to empower the public to take action on local problems. Their feedback was heard and their ideas were used to redefine the roadmap to be followed in pursuit of a sustainable transformation model.

In the case of London, although initially following an organic growth with little public intervention, the city benefited from Cameron's Tech City initiative that helped hastened the refurbishment of East London with tax exemptions and other fiscal benefits. By addressing business needs, corporations were encouraged to move there and revitalize an abandoned area with high poverty and crime rates. Similarly, in San Francisco a set of incentives were designed to incentivize firms to relocate in the SOMA and mid-Market Street.

6.4. Global strategic performance

As in other COIs, start-ups created in San Francisco, Austin, and London are born global and with short business cycles, two characteristics that allow them to rapidly adapt to new market demands and make better use of their limited resources. Many of these start-ups will exit in the upcoming years and their founders will get involved in other endeavors, either as entrepreneurs or investors, leveraging their skills to exploit new opportunities, identify new markets, mitigate, and take risks.

However, a key distinctive feature of many of the new ventures created in these three cities is their duality of global and local interests. On the one hand, start-up companies plan their businesses based on global strategic perspectives. Pursuing global opportunities contribute to the international mobility of resources in the cluster, and support the internationalization of start-ups, particularly in early stages. However, the urban platform in which such firms have emerged demands commitment with the territory, meaning that the local agenda needs to be also considered. This global-local perspective is specific of COIs that emerge on a urban platform.

6.5. Global ties and bonds

International connections contribute to increasing the vitality of cities. According to the COI framework, these linkages—either formal or informal—are categorized as weak ties, durable bonds and covalent bonds. In all the three geographies, but in San Francisco and London in particular, the global ties and bonds are fuelled by highly skilled international immigrants. Immigrant communities, especially those among engineers and scientists have facilitated connections with other COIs. The concentration of actors from different cultures offers opportunity and favors opportunism. Yet, both the immigration policy in the US and the effects of Brexit in the UK have created great uncertainty and disruption across the economy, being this especially acute for tech start-ups that heavily rely on international talent (DCMS, 2018; Franklin, 2018; Longlands, Round, & Kibasi, 2018). This situation has forced some companies to move their engineering teams totally or partially abroad. However, both cities are still driving innovation processes and continue growing as entrepreneurial urban hubs.

The report of Atomico, 2017—a London-based venture capital firm—analyzing the state of European Tech, further confirms that despite concerns about Brexit, London is still the most preferred location to start-up by European founders, though it has lost some share to the neighboring Germany (Berlin), France (Paris), and Spain (Barcelona). Similarly, data from Dealroom¹ indicate that 2017 was a record year for start-up investment with UK companies, raising \$7.7 billion (more than doubling the figures in 2016). Admittedly, start-up companies are looking at a difficult future; yet, recent endorsements from tech giants are signaling that London is still an attractive location (Kuppers, 2017). Similarly, the Trump administration's immigration policy has threatened the livelihoods of tech workers and researchers in the US. The restrictions introduced make harder to recruit and retain top talent from abroad, being particularly troublesome for the US tech-hub—circa 71% of tech employees in Silicon Valley are foreign-born and 43% of Fortune 500 companies in 2017 were founded by immigrants and their children (Hathaway, 2017). Notwithstanding, the US is still leading the markets.

Irrespective of government policies, we argue that global ties and bonds with other regions of the world might help overcome the collateral effects of this new political landscape and, thanks to the new technologies it is feasible having teams highly connected although being geographically distant. Yet, we claim that in order to promote economic growth, governments should closely work with those sectors making a valuable contribution to the economy and explore solutions in relation to access to people, finance, global interconnections, and conducive regulation in order to ensure commercial success.

In San Francisco, there is also the effect of local proximity with Silicon Valley. The interaction of both ecosystems can be understood as a Super-COI, being the two geographies mutually reinforcing thanks to a high mobility of people, technology, and capital. London and Austin are in a process of transforming the weak ties into more durable and stable bonds. Many US firms have entered the European market and selected London as their destination. US investors are not passive toward the entrepreneurial activity of the city, and several fast growing US start-ups have established their European headquarters there. Similarly, US investors have teamed up with London-based start-ups. It is also remarkable that London is the first non-US location to host the Tech Stars accelerator. In Austin, global ties are represented by major corporations that have their headquarters in the city. Also, the connections of the ATI to tech communities facilitate knowledge flows between local players and international partners.

7. Conclusions

In this century, cities have become active components of COIs, providing unique advantages for the development of innovation clusters in their urban cores, leading to revitalization of those areas with economic, infrastructure, employment, cultural, and social benefits. These urban clusters are a subset of COIs known as AIs and are the basis for urban renewal.

The unique characteristics of the urban center have led to this growth. In cities, the economy is more robust and dynamic. The production structure is diversified—mature corporations, start-ups, entrepreneurs, universities, and research centers—supporting the development of synergies. This spatial agglomeration of actors is a powerful cocktail that has caught the attention of people and firms. The urban lifestyle is attractive, providing a thrilling environment where to work and life. On the one hand, people do not want to commute long distances every day, they want to work where they live and live where they work. Inner cities are well-connected, with liveable mixed-use infrastructure, micro housing, restaurants, and cultural venues that attract a high-energy workforce. On the other hand, major corporations, firms, and entrepreneurs, want to be close to other firms, research labs, and universities. The compactness of the metropolis and the commercial urban facilities are more suitable for the interchange of ideas. This interconnectivity hastens innovation processes while recreates the city.

The cases of San Francisco, Austin, and London illustrate how cities, by being continuously on the move, persistently innovating and creating value, have become knowledge corridors that combine high-tech employment with amenity-laden housing and recreational spaces that encourage citizens to congregate and interact. Local governments from around the world are now trying to replicate these successful cases to revitalize the economic activity of their cities and strengthen their global competitiveness. Initiatives range from small-scale applications of information technologies to ambitious projects to transform entire urban areas through master planning and infrastructure development.

However, the rapid growth of cities as COIs is only sustainable if there is a culture of collaboration among academia, government, entrepreneurs, investors, and service providers. The different yet complementary linkages formed by these key actors must further be aligned with respect to their developmental stage and should be embedded in the cultural context of the city. In this respect, local adaptation is crucial. The cases reviewed show that building upon existing local capabilities and sources of competitive advantage is more efficient and congruent with the local environment rather than trying to attract new industries from scratch. It is therefore essential to empower and enable innovation from the bottom, building on local innovations and successes.

Governments should proactively promote the conditions for the development of COIs in the urban context. In this respect, the public sector is a key agent in driving innovation and should play a “catalytic” role (Mazzucato, 2013). This role involves making choices about where resources should be invested, preserve variety, address radical uncertainty, and facilitate coordination between public-private. By “directing” change, the ultimate goal of the public sector should be to create new markets and industrial landscapes, rather than just fixing and controlling them (Lin & Rosenblatt, 2012). Following this line of thought, some authors have advanced the idea of the State as a risk enabler, nurturing tech hubs and acting as an entrepreneur. This role materializes in large scale investments in infrastructures (e.g., science parks, government laboratories, public-private partnerships) (Link & Link, 2009), technologies characterized by high uncertainty (e.g., green technologies) (Mazzucato, 2013), strategic industries (Aghion et al., 2015; Acemoglu, Aghion, Bursztyn, & Hemous, 2012), or mission-oriented R&D policies (e.g., health, agriculture and energy) (Foray, Mowery, & Nelson, 2012). Innovation is a collective process that requires the alignment of a number of different actors.

Government policies should trigger the self-sustaining interactions between demand and supply of funding. Accordingly, lessons for policy makers which may be inferred from the effects of intervention, the patterns of growth, and the remaining challenges refer to three major issues: (1) recognize entrepreneurial patterns, (2) interiorize and transmit a culture of innovation, and (3) design and implement favorable policies for this transformation process to effectively take place.

First, there is an urgent need to recognize that the strength, vitality, and allure of cities is thanks to entrepreneurs, innovators, and venture capitalists. Their contribution goes beyond job creation,

becoming a source of collective prosperity. Their entrepreneurial spirit and drive to create better opportunities generate economic prosperity. Their success is therefore, the city's success.

Second, policy makers should be purpose followers of entrepreneurs. By supporting this community they are strengthening the entrepreneurial foundations of cities and enabling new businesses become more competitive in the marketplace. In this respect, it is paramount how these values are articulated within the branding of the city. City leaders need to communicate a coherent message to residents and stakeholders, highlighting the benefits of an entrepreneurial and creative society. This message—city branding—should help visualize and value all the initiatives and assets aimed at positioning the city as the place where entrepreneurial talent and economic activity meet, creating a space that is engaging, energetic and supportive of bold ideas. A continued collaboration between key public but also private city leaders is paramount to successfully articulate this message.

Third, government's influence and impact in implementing this message is evident. Governments must create an enabling environment for clusters to emerge in the urban core. It is their responsibility to design policies that recognize the contribution of entrepreneurs and young companies to the urban quality of life. Start-ups and innovation agents add vibrancy to cities; however, they are fragile elements. These communities are still in an embryonic stage; consequently, erroneous regulations can fracture their growth, impeding the creation of COIs. Evidence shows that when economies move forward governments are tempted to start implementing taxes and regulations to take advantage of the economic activity generated (Forte & Magazzino, 2011). It is therefore of utmost importance not to mistake this new vitality with industrial robustness. Historical taxation, employment and based-land use rules should be carefully reviewed to avoid fracturing this emerging ecosystem. Central to this point is the provision of appropriate places for new firms to locate with affordable and flexible real estate opportunities—including living spaces—, offer tax reliefs, deliver prompt, and responsive legal and technical assistance, and help entrepreneurs and small business owners identify potential sources of capital and walk them through the application process. Universities and other educational institutions are also key components in providing cohesion in a COI. Governments should encourage these institutions having a presence in the city. Through teaching activities, they provide the firms with employees with the needed educational level, and in terms of scientific research, they are effective catalyst for technology commercialization, new venture creation and community development.

Going beyond the influence of governments and the actions of single institutions, COIs in cities have emerged as a natural response of technology advances, lifestyle trends, and cultural preferences. As innovation cycles are shortened and technological speed increases, mobile resources—people, technology, and capital—need to be better connected. The increased urbanization of society mirrors this transformation process that is changing how we operate and live. Yet, the challenge remains in finding sustainable methods for maintaining this growth over time.

Despite following a rigorous methodology, this study has a series of limitations which, in turn, represent avenues for future research. First, this study adopts a historical case-study approach, with a limited sample of cases. As for the selected cities, the choice has been threefold: (i) they differ in location, development model and are in a different stage of development, (ii) the components of the COI framework materialize in a different form from city to city, and (iii) access information was easy. Taken all together, we concluded that meaningful insights have been obtained from comparing them. To further extend the geographical scope of this research, we encourage future studies to analyze other AIs and see how the different components of the COI framework are articulated. For instance, as reported by the Global Tech Hubs, metropolis such as Beijing and Shanghai are emerging as spawning grounds of entrepreneurs and large companies. Data reveal that 29% of unicorns today are based in China, meaning that entrepreneurs are also looking beyond Silicon Valley. Therefore, it might be interesting conducting additional research in other second-ranked cities or locations outside core countries which have also experienced economic and urban transformation. On the other hand, cases of failure would also be worth to be examined.

Second, this research is grounded in the COI framework. While this model seems appropriate for the purpose of this work, future studies should consider adding other perspectives and theories—articulating the merits and demerits of each approach—in order to better understand how the city is an active component of the innovation cluster. Third, this study has a markedly qualitative approach. Empirical case studies would bring new insights. We also encourage works focusing on the analysis of the metrics urban policy makers use to measure their performance and investigate how well these metrics serve their purpose.

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Note

1. https://app.dealroom.co/companies.startups/f/locations/anyof_Europe_United%20Kingdom.

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