

Digital transformation policies to develop an effective startup ecosystem: the case of Barcelona

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Abstract

Purpose – The role of government in the global digital transformation is to ensure that digital infrastructure is reliable and efficient enough to guarantee an entrepreneurial ecosystem for investment in innovation and startups. This paper presents a case study showing how local policies have been used to create an effective startup ecosystem in Barcelona. This paper aims to provide a detailed analysis of the key elements of the startup ecosystem, including the role of local government.

Design/methodology/approach – This study uses an exploratory case research approach and proposes a theoretical framework to study the Barcelona innovation ecosystem, drawing on interviews, research observations and an analysis of the literature.

Findings – By applying its conceptual framework tools, the research is able to identify the key elements making up the startup ecosystem and classify the impact of digital transformation policies into three stages: creating the ecosystem, fostering feedback within the ecosystem by encouraging the first generation of entrepreneurs to interact with the second and third and attracting foreign capital and talent to this innovation ecosystem.

Originality/value – The novelty of this work lies in its time frame and geographical scope, as it provides an analysis of the digital transformation policies in Barcelona's local startup ecosystem over a 30-year period. This research offers deeper insight into the role of public policies in the startup ecosystem in Barcelona, as well as the impact of digital transformation policies on startup ecosystems in general.

Keywords Digital transformation, Startups, Innovation ecosystem, Digital policies, Entrepreneurship, Innovation, Framework

Paper type Research paper



1. Introduction

Digital transformation has become an important factor in the global economy, with governments around the world placing great emphasis on the development of digital infrastructure and services (Lytras *et al.*, 2019). Such development has the potential to make a significant impact on international trade and countries that are able to seize the opportunities presented by digital transformation to ultimately gain a competitive advantage (World Economic Forum, 2018).

Overall, digital transformation can potentially exert a major impact on the global economy, with governments around the world focusing on digital infrastructure and service development to secure a first-mover advantage and become more competitive in the global economy (Wong *et al.*, 2005). Digital transformation can have a positive effect on international trade, geopolitics and supply chain efficiency, as well as improving access to digital services and reducing costs.

Over the past decades, local and national governments have tried to create successful ecosystems for startups and entrepreneurs (Pustovrh *et al.*, 2019). Entrepreneurial activity improves labor market fluidity (Evans, 1989) and is associated with the creation of employment opportunities (Fölster, 2000), the introduction of innovative products and services that provide value to consumers (Schumpeter, 1934) and general wealth generation that can spill over into areas such as education, social services and the arts (Mair and Marti, 2006).

Entrepreneurial ecosystems are complex networks of interdependent actors and factors that support productive entrepreneurship. Despite being an undertheorized concept (Cantner *et al.*, 2021), research has shown that they are composed of several domains, including culture, formal institutions, infrastructure and amenities, IT, the melting pot and demand (Audretsch and Belitski, 2017). According to Cavallo *et al.* (2019), the traditional linear value chain model fails to fully capture the interdependencies and complexity of entrepreneurial ecosystems. Indeed, systemic conditions such as networks, leadership, finance, talent, knowledge and support services all play a critical role in how they function (Cavallo *et al.*, 2019).

Government policies to create successful ecosystems for startups and entrepreneurs can take many forms, ranging from the provision of financial support and advice to regulatory incentives and the creation of supportive infrastructure and networks. Governments have also created incubators, accelerators and coworking spaces; launched programs to provide mentorship and support to entrepreneurs and invested in education programs to foster entrepreneurial skills and knowledge (Acs, 2008).

Governments have also provided access to public–private partnerships and networks to facilitate the exchange of ideas, resources and knowledge. These networks are important for startups and entrepreneurs, as they allow them to access new markets, customer segments and partners, as well as connect with mentors and investors. In addition to providing financial and operational support, governments should also create conditions that are conducive to the development of an entrepreneurial culture. This includes promoting a positive attitude toward risk-taking and innovation and establishing a “culture of entrepreneurship” characterized by social networks, knowledge sharing, and collaboration (Fayolle, 2006). Governments can also facilitate access to the resources and networks necessary for successful entrepreneurship, such as mentors, investors and skilled labor (Valerio *et al.*, 2014). Finally, governments have sought to reduce legal and administrative obstacles to encourage and support entrepreneurs (Fritsch and Wyrwich, 2014).

All in all, governments have a key role to play in creating successful ecosystems for startups and entrepreneurs, namely, through digital transformation policies. As stated

above, they must provide financial and operational support, create conditions that are conducive to the development of an entrepreneurial culture and facilitate access to the resources and networks necessary for successful entrepreneurship. Together, these measures can help create a fertile environment in which startups and entrepreneurs can thrive and contribute to economic growth and social well-being (Elert *et al.*, 2017).

2. Global perspective, local digital transformation: the case of Barcelona

Local digital ecosystems are self-sustaining systems made up of diverse digital entities and their connections. Their focus is on fostering interactions among these entities to enhance the system's overall usefulness, generate benefits, facilitate information sharing, promote internal and external collaboration and drive system innovation. Local digital ecosystems are scalable and self-organizing. Meanwhile, entrepreneurial ecosystems also have properties of self-organization, scalability and sustainability at the socioeconomic level. These are complex socioeconomic structures that start with the individual and are energized institutionally (Sussan and Acs, 2017).

Many regions around the world are committed to policies that aid in the creation and development of local digital ecosystems for startups and innovation. In this paper, however, we will analyze the specific case of Barcelona, with the launch of Barcelona Activa in 1986 as a business incubator and the ODAME program, which supports women entrepreneurs and has become, over the years, one of the Barcelona's main assets both for attracting talent and foreign investment, as well as for boosting local economic activity. It was only in the late 1990s, with the emergence of the internet, that the local policy agenda was able to unfold its full potential and enable the growth of a digital ecosystem that would eventually become an ideal place to do business on a global scale.

These policies have culminated in the Barcelona Green Deal, a new strategic framework set in place by Barcelona Activa in 2023. As an evolution of the digital entrepreneurial ecosystem, this framework serves as the main source of guidance for all local policies. It is intended to retain and cultivate local talent, promote economic activity and draw in more and better investments related to the digital ecosystem. This is borne out in the creation of a startup-friendly environment with a strong focus on creating an attractive business climate for entrepreneurs. An example of this is the Barcelona Tech City initiative, which aims to create world-class digital infrastructure and promote innovation and creativity. Before this initiative, which is supported by local policies, Barcelona Activa had led this environment through the city's 22@ district. Another example is the development of world-class digital infrastructure, with high-speed broadband connectivity based on state-of-the-art technology. The Supercomputing Center and trade fairs such as the Mobile World Congress also illustrate this point.

Other public policies consist of continuous investment in education and training, with a focus on providing digital skills and entrepreneurship education in collaboration with universities and business schools or supporting internationalization to attract foreign startups and investors to Barcelona. An example of this is 4YFN, the startup event that takes place as part of the world's largest exhibition for the mobile industry, GSMA's Mobile World Congress.

Barcelona is currently a hub for new economic activities linked to strategic sectors such as ICT, biotechnology, sustainable mobility, aeronautics and the environment. The digital sector has been consolidated by local entrepreneurs. Barcelona has managed to create its own entrepreneurial and innovative story, which integrates local and international entrepreneurs and companies (Condom-Vilà, 2020). This is illustrated by successes that reinvest in the city and confirm the ecosystem concept (Autio *et al.*, 2014).

3. Generating a framework for an efficient startup ecosystem

In this paper, we analyze the Barcelona startup ecosystem based on a three-stage framework:

- (1) creation of the ecosystem;
- (2) feedback given by the ecosystem's first generation of entrepreneurs to its second and third; and
- (3) attraction of foreign capital and talent.

We take these three stages as a potential deployment playbook for any city or region wishing to build a new ecosystem. To create this framework, we carried out a qualitative analysis of secondary sources and conducted in-depth interviews. The result is a framework based on the three stages described in [Figure 1](#).

This research follows a qualitative methodology and exploratory design, using semistructured interviews and the observation method. In line with [Schein \(2004\)](#), semistructured (and unstructured) interviews are an effective method for understanding or discovering insights regarding organizational policies. This methodology was applied to the case of Barcelona's startup ecosystem, with the aim of researching, studying and evaluating the enabling factors considered for developing a startup ecosystem through digital policies. The sample is based on 53 interviews with local public employees, venture capital investors and serial entrepreneurs in the city. Interviews were conducted throughout 2022. The sample is considered satisfactory based on the total number of startups established in the time frame of the research.

Overall, the entrepreneurial ecosystem framework provides a comprehensive overview of the different stages and components required to create and sustain a successful entrepreneurial ecosystem. The framework is intended as a guide to help stakeholders develop and maintain a thriving entrepreneurial ecosystem. Once applied, policymakers should set up a mechanism to track and monitor progress in the startup ecosystem and create a framework for evaluating its success and making changes to ensure its long-term sustainability ([Iansiti and Levien, 2004](#)).

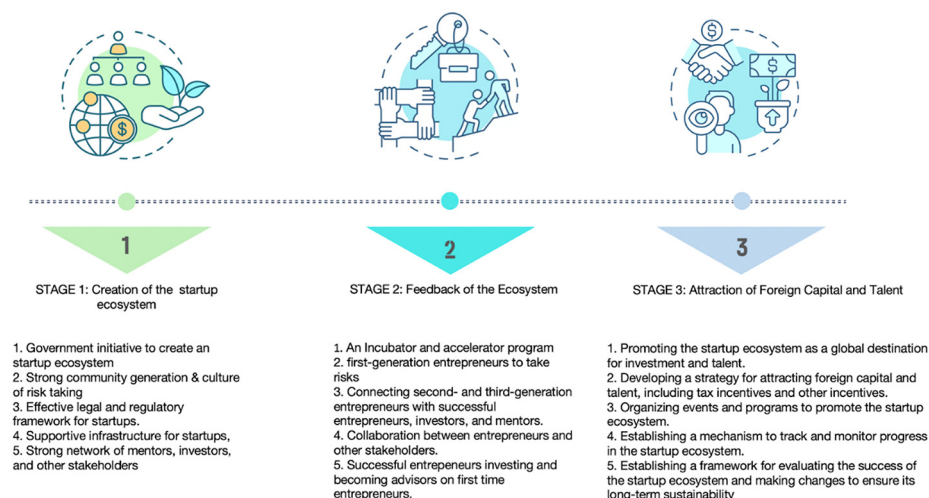


Figure 1.
Startup ecosystem
stages

Source: Authors' own work

3.1 Stage one: The impact of local policies in the creation of the ecosystem and its first generation of entrepreneurs and startups

With the creation of Barcelona Activa, Barcelona City Council began to pursue its goal of creating an ecosystem that could feed back into the city. To do so, some initial success stories and local champions were needed. Barcelona Activa's vision has always been to make Barcelona an international benchmark for work, entrepreneurship and living with social and environmental values (Watson *et al.*, 1998). It fosters employment, boosts entrepreneurship and supports companies, with a particular focus on local development. It also offers advice, training, support and networking for professionals, entrepreneurs, the self-employed and companies and supports specific organizations and projects that contribute to the social and solidarity economy.

3.1.1 Creating a playbook for an entrepreneurial development ecosystem. Barcelona Activa started in 1986 with one founding mission: to create an ecosystem for startups and innovation. To do so, its employees (who work to aid companies and the ecosystem) understood that every startup ecosystem needs the following key conditions:

- Investors provide capital for businesses.
- Support organizations provide resources, mentorship and training to entrepreneurs.
- Business incubators provide space, technology and infrastructure for startups to develop their businesses.
- Mentors provide guidance and advice to entrepreneurs.
- Networking opportunities allow entrepreneurs to meet potential customers, partners and investors.
- Financial services provide entrepreneurs with access to capital and financing.
- Regulatory support helps entrepreneurs navigate the legal and regulatory landscape.
- Talent provides the skills and expertise necessary to develop and launch successful businesses.

As described in *The Entrepreneurial Ecosystem Building Playbook* created by the Ewing Marion Kauffman Foundation (2019), an ecosystem culture that is rich in social capital – that is, the networks, norms and social trust that facilitate coordination and cooperation for mutual benefit – is like rocket fuel for entrepreneurial growth.

3.1.2 Beginning of Barcelona Activa. It was at the end of 1986 that Barcelona Activa began operations in a unique building that was representative of the change in the city and its economy. It decided to set up its headquarters to support entrepreneurs and innovation in the former Olivetti typewriter factory. It converted a factory building of typewriters that were replaced by computers into a center for entrepreneurship and innovation, where companies could stay for a period of three years, generating a necessary culture for networking, sharing know-how and receiving support, training and advice from local experts.

Barcelona Activa as it stands today and the current ecosystem cannot be understood without those beginnings in the accelerator located in what is now 22@, Barcelona's startup district *par excellence*. The first companies launched in that accelerator planted the seed of what would become the Barcelona ecosystem. It was a starting and meeting point for entrepreneurs at the end of the 1980s. However, the ecosystem did not truly begin to flourish until the end of the 1990s and the beginning of the 2000s, illustrating how instrumental policymakers' long-term commitment and investment were in generating what was to be the

first startup ecosystem in Spain and, eventually, a benchmark for all of southern Europe (Miller and Bound, 2011).

3.2 Stage two: When the creation of the entrepreneurial ecosystem in Barcelona feeds back positively onto second- and third-generation startups

The findings show that serial entrepreneurs obtain temporary benefits from spells of venturing which eventually die away (Parker, 2013). Thus, even when entrepreneurs have not been successful in their first venture, the second and third generations of entrepreneurs will have a better chance of success.

The creation of Barcelona's entrepreneurial ecosystem has led to a positive feedback loop for second- and third-generation entrepreneurs. By providing a supportive environment, resources and access to mentors and investors, Barcelona has become a destination for entrepreneurs looking to develop their skills and launch their own businesses (Clarysse *et al.*, 2005). Furthermore, the city has also seen the emergence of incubators and accelerators that provide financing and resources to startups. This has created an environment where second- and third-generation entrepreneurs have a much better chance of succeeding. Moreover, the presence of successful and experienced entrepreneurs in Barcelona has created a culture of mentorship, where founders can learn from those who have already achieved success (Thorgren *et al.*, 2016). This has enabled second- and third-generation entrepreneurs to benefit from their predecessors' experiences and apply their knowledge to their own ventures. This has helped them to avoid common pitfalls and increase their chances of success.

The highly developed startup ecosystem in Barcelona has helped to create a community of entrepreneurs and investors who are willing to take risks and invest in new ventures. This has helped to create a climate of investment in second- and third-generation startups and has enabled these startups to access the resources and funding they need to succeed. Not only is it beneficial for new second- and third-generation entrepreneurs but also for those investing in these new ventures with their experience and knowledge. These new businesses can secure bigger and faster funding opportunities, as venture capitalists "almost blindly" invest (Vasylyk, 2018) in founders with previous exits. This is because:

- Exited founders are much more likely to succeed again.
- Later successes are larger than previous successes and most unicorns were started by experienced founders.
- Many successful founders initially fail, so betting on first-time founders is risky.
- Few investors are able to attract exited founders, but those who do make more money.

It is when the ecosystem gets into this loop that Barcelona moves into a privileged position, becoming the fourth ecosystem in the whole of the European Union in number of scaleups and also the seventh startup hub in number of unicorns.

3.3 Stage three: How Barcelona's entrepreneurial ecosystem and local policies are attracting the attention of international entrepreneurs and investors – closing the loop

Business ecosystems generally emerge in strategic locations, and the literature illustrates that various factors are important for their growth and development. There is no doubt that Barcelona emerged as a strategic location and the capital of the Mediterranean area. But beyond its strategic location, Barcelona and its metropolitan area have several key factors that influence the growth of the startup ecosystem:

- As we have seen in the previous point, Barcelona’s ecosystem is able to benefit from the previous experiences of entrepreneurs that feed back onto new entrepreneurs. Whether by direct investment from one to another, by sharing know-how (vision, solutions to problems, contacts, etc.) or by mentoring, having previous generations of entrepreneurs accompanying new generations positively influences growth (Juma and McGee, 2006).
- As the ecosystem grows, academic institutions are starting to offer specific knowledge in innovation and entrepreneurship (Eurydice Report, 2016). Both public universities (universitat autònoma barcelona (UAB), universitat barcelona (UB), universitat pompeu fabra (UPF), universitat oberta catalunya (UOC), etc.) and business schools (IESE, ESADE, etc.) have adapted specific programs to support the specialized training required by startups (Siegel and Wessner, 2012), including very successful MBA programs (Rybka-Iwańska and Serradell-Lopez, 2019). Much of this training has also been shaped and delivered by first-generation entrepreneurs.
- Thanks to this ecosystem, which is mature and creates quality employment, the state has been able to pass specific laws to attract foreign capital, allow tax breaks for those investing in startups and create specific subsidies for the startup sector. Crowdfunding has also become a clear alternative method of financing that is well regulated by law.

While building a great startup ecosystem, Barcelona has taken care of its international connections. Its port (one of the most important in Europe), airports and rail and motorway connections are assets of great importance. In addition to this, there are industrial zones, technology parks and training institutions (both universities and prestigious business schools) that provide excellent coverage for new companies (Van de Ven, 1993).

Our analysis of the Barcelona ecosystem and its maturity shows that it encourages entrepreneurs and international funds to set up new businesses in the area (Wright *et al.*, 2016).

The key factors for attracting international funds to an ecosystem may depend on the characteristics of each ecosystem, but there are some that are crucial across the board, as shown in Figure 2. Policymakers in Barcelona, the wider regional government (the Government of Catalonia) and the Spanish government were able to identify these factors and have been applying them over the past decades:

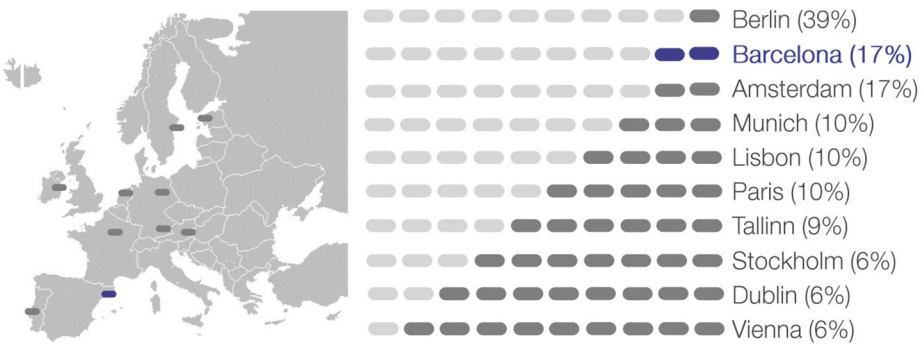


Figure 2.
Most attractive cities
of founders for
setting up a startup

Source: Startup Heatmap Europe, SHM2021: The Power of the Ecosystem, 2021

- *Tax incentives*: Tax incentives such as tax credits and exemptions can help reduce the risk associated with investing in a new ecosystem.
- *Infrastructure*: The development of infrastructure such as roads, ports and airports is essential to facilitate the movement of goods, services and people within an ecosystem.
- *Education and training*: A highly skilled and educated workforce can attract international investors.
- *Access to finance*: By providing access to finance, businesses can secure the capital they need to grow and expand. This can help to attract international funds, as investors feel more confident investing in a well-funded and supported ecosystem.
- *Regulatory framework*: By establishing a regulatory framework that sets out the rules, procedures and regulations for businesses, investors can be assured that their investments are safe and secure.
- *Promotion of innovation*: By investing in research, development and innovation, businesses can develop new products and services that will attract foreign investment.
- *Networking*: By forming relationships with businesses, investors and government bodies, businesses can access new sources of capital and increase their chances of success.

External conditions can be investigated by adopting the perspective of business ecosystems. In this way, ecosystem health and performance can be understood through the interactions between companies and their environment. Companies can be seen as the driving force of the ecosystem, as they are the ones that create the conditions for interactions to take place and for the ecosystem to function. Companies are also responsible for the health and performance of the other stakeholders within the ecosystem, as their presence and activities often shape the environment (Roper and Hart, 2013). For example, a company's presence in an ecosystem can lead to competition between other companies, which can put pressure on other ecosystem stakeholders. Furthermore, the activities of one company may have positive or negative impacts on other stakeholders in the ecosystem, depending on the type of activities and the nature of the interactions (Feldman, 2001).

4. Conclusion

This paper provides a theoretical look at how implementing digital transformation policies can help create and energize entrepreneurial ecosystems by applying effective strategies and providing new incentives to stimulate and support the creation of new companies. An example of this is the BCN Green Deal agenda, a road map open to all social actors that outlines the main strategic lines that should guide the digital economic future of the city and its promotion (Collboni, 2021).

In addition to all these policies, we see that consolidated ecosystems end up generating factors that feed back into the dynamization strategies of local policies, creating even stronger ecosystems.

By providing a supportive environment, resources, mentors and investors, Barcelona has become a magnet for entrepreneurs seeking to hone their skills and launch their own businesses. This is exemplified in the 22@ district, an ecosystem focused on digital transformation that benefits from local policies. Paradoxically, the 22@ district, located in Barcelona's Poblenou neighborhood, was once the epicenter of the city's manufacturing industry. Today, however, it has become an ideal ecosystem for digital transformation and innovation with the impulse of local policies to transform this area.

With its ecosystem established and its initial local advocates in place, Barcelona's sophisticated startup environment has encouraged a culture of risk-taking among entrepreneurs and investors who are eager to invest in emerging companies. This has generated an atmosphere of investment in succeeding and tertiary startups, thus providing them with the essential resources and capital to be successful. This has allowed novice entrepreneurs to benefit from the guidance of experienced advisors or serial entrepreneurs, who in turn have access to the necessary resources and investment to succeed.

Beyond the critical factors for attracting venture capital to the city, Barcelona has also managed to identify the factors that make it an attractive city for entrepreneurship, as shown in the [Atomico report \(2022\)](#) *The State of European Tech 2022*, which ranks it as the third most desirable city in Europe for entrepreneurship. The reasons given are as follows:

- *Access to talent:* Barcelona has a large pool of skilled and educated professionals, with almost 60,000 students from over 140 countries in the city.
- *Access to markets:* Barcelona is the perfect gateway for startups to access the European market, due to its location and strong transport links.
- *Quality of life:* Barcelona has a high quality of life, with excellent health care, education, infrastructure and culture.
- *Supportive ecosystem:* Barcelona has a vibrant startup ecosystem, with a range of incubators, accelerators, coworking spaces and other support initiatives.
- *Government support:* The Catalan Government has created a range of initiatives to support startups, such as public funding, tax breaks and grants.
- *Digital infrastructure:* Barcelona has a strong digital infrastructure, with high-speed internet and a range of telecoms and data services.
- *Cost of living:* Barcelona has a relatively low cost of living compared to other major cities in Europe.

While startups must be aware that without a competitive business model, they have no hope of surviving and developing ([Groenewegen and De Langen, 2012](#)), many other factors identified here play a role in driving startups' success. The proposals suggest that, to create a space that is conducive to business creation and development, the strength of the various enablers and the way in which each factor interacts with the others are explanatory variables for whether and how the entrepreneurial ecosystem works.

Several implications emerge from this study. The theoretical implications relate to the operational synergies of the ecosystem once it is up and running. The practical implications relate to management and policy issues. Managers and policymakers need to take into account and monitor entrepreneurial ecosystems and the dynamics of these factors to define and implement effective strategies and provide new incentives to stimulate and support startups. As we can see from this study, these policies will differ depending on the maturity of the ecosystem. Barcelona's entrepreneurial ecosystem feeds itself by increasing the number of participating companies, maximizing the number of connections between them and facilitating spillovers caused by the sharing of ideas, knowledge, resources and experiences among its members. Although the concept is easy to understand, it is not necessarily easy to reproduce in other cities or local governments, at least not in the short term.

Finally, it is important to note that the success of a startup ecosystem is not a static process, but a constantly evolving one. As the ecosystem matures, it is important for local policies and government interventions to adapt, providing the necessary support to ensure the ecosystem's continued success.

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