How Do Southern European Cities Foster Innovation? Lessons from the Experience of the Smart City Approaches of Barcelona and Milan

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Abstract Innovation, and technological innovation in particular, can help city governments meet the challenges of urban governance, improve urban environments, become more competitive, and address sustainability concerns. To prevent and manage these challenges, cities need to operate in an innovative way. In this context, the smart city approach is emerging as a way of solving tangled and difficult problems. However, there is not a unique and right strategy to develop a smart city. By drawing on a comparison between the experiences of Barcelona (Spain) and Milan (Italy), this chapter aims to explore similarities and differences in the way these two Southern European cities, both being the second largest in their respective countries, are building their smart city agenda. The ultimate aim is to identify the main features of two still developing approaches, which appear to be influenced by the increasing integration of smart dimensions and initiatives in the cities' strategic agendas and the related opportunities and challenges.

Keywords Smart cities · Barcelona · Milan · Urban planning · Innovation

Abbreviations

BIE	Bureau International des Expositions
EU	European Union
ICT	Information and Communication technologies
IT	Information Technology
LGP	Local Government Plan

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1 Introduction

Over the past few decades, the challenges faced by municipal administrations, such as urban growth or migration, have become increasingly complex and interrelated. In addition to the traditional land use regulation, urban maintenance, production, and management of services, governments are required to meet new demands from different actors regarding water supply, natural resources' sustainability, education, safety, or transportation (Naphade et al. 2011; Albrechts 2006). Furthermore, today, cities are in strong competition for companies, tourists, and most of all talents (Zenker et al. 2013), and they are also experiencing unprecedented socioeconomic crises.

Innovation, and technological innovation in particular, can help city governments meet the challenges of urban governance, improve urban environments, become more competitive, and address sustainability concerns. To prevent and manage these challenges, cities need to operate in an innovative way. In this context, the smart city approach is emerging as a way of solving tangled and difficult problems (Nam and Pardo 2011a).

Although the literature is rich in references to the smart city, it is also fragmented: this is still a fuzzy concept that is not being consistently used (Meijer and Rodríguez-Bolívar 2014). Nevertheless, agreement exists on the fact that "smart cities" is a construct in which to frame local government transformation by using innovative technologies. In this respect, a smart city is one with a strong commitment to innovation not only in technology but also in management and policy (Nam and Pardo 2011a).

This fragmentation is also reproduced in terms of the strategies that different cities follow to become smarter. There is no single route to becoming smart, and different cities have adopted different approaches that reflect their particular circumstances. According to the Centre for Cities (2014), this is dependent on a number of factors, ranging from the financial and managerial capacity, private sector offerings, and what citizens and businesses want.

Given this context, this chapter aims at comparing how two Southern European cities, Barcelona and Milan, both being the second largest in their respective countries, are building their smart city agenda. The ultimate goal is to identify the main features of two still developing approaches, which appear to be influenced by the increasing integration of smart dimensions and initiatives in cities' strategic agendas and the related opportunities and challenges.

The two cases, which are of great relevance for Spain and Italy have been particularly hit by the economic crisis. Their cities have a strong need to be (more) innovative in their pursuing of new engines of growth and competitiveness.

The remainder of this chapter is organized as follows. First, we present the literature on smart cities. The data and methods used to analyze and compare the strategic plans and processes of the two selected European cities are then explained. Subsequently, we describe the cases of Barcelona and Milan as well as the results of their comparison and discuss our findings. Second, we bring to a close, drawing some conclusions.

2 Smart Cities: A Conceptual Framework

Various attempts have been made to academically define and conceptually describe a smart city (AlAwadhi and Scholl 2013). Although no generally accepted academic definition has emerged so far, several works have identified certain urban attributes that may characterize what a smart city is.

Giffinger et al. (2007) rank 70 European cities using six dimensions: smart economy (competitiveness), smart people (human and social capital), smart governance (participation), smart mobility (transport and Information and Communication Technologies (ICT)), smart environment (natural resources), and smart living (quality of life). As a result, they define a smart city as "a city well performing in a forward-looking way in these six characteristics, built on the "smart" combination of endowments and activities of self-decisive, independent, and aware citizens" (p. 11). According to Lombardi (2011), these dimensions, which have been used by several authors, connect with traditional regional and neoclassical theories of urban growth and economic development.

As a result of the review of multiple smart city's definitions and related terms, Nam and Pardo (2011b) suggest three conceptual dimensions of a smart city: technology, people, and community. For them, technology is the key ecause of the use of ICT to transform life and work within a city in significant and fundamental ways. However, a smart city cannot be built simply through the use of technology. Hence, the role of human infrastructure, human capital and education, on one hand, and the support of government and policy, on the other, also become important factors. Considering these three variables, the authors conclude that "a city is smart when investments in human/social capital and IT infrastructure fuel sustainable growth and enhance a quality of life, through participatory governance" (p. 286).

In turn, Leydesdorff and Deakin (2011) introduce a triple helix model of smart cities. They argue that cities can be considered as densities in networks among three relevant dynamics: the intellectual capital of universities, the wealth creation of industries, and the democratic government of civil society. Lombardi et al. (2011) build on this model and refer to the involvement of the civil society as one of the key actors, alongside the university, the industry and the government. In Lombardi's words (2011): "this advanced model presupposes that the four helices operate in a complex urban environment, where civic involvement, along with cultural and social capital endowments, shape the relationships between the traditional helices of university, industry and government. The interplay between these actors and forces determines the success of a city in moving on a smart development path" (p. 8).

Yet, one of the most comprehensive and integrative frameworks for analyzing smart city projects has been presented by Chourabi et al. (2012). The model has already been tested, and several cities' smartness strategies and initiatives have been assessed using them. Chourabi et al. (2012) present a set of eight dimensions, both internal and external, that affect the design, implementation, and use of smart cities initiatives: management and organization, technology, governance, policy context, people and communities, economy, built infrastructure, and natural environment (see Table 1).

Table 1 Smart cities integrative framework. (Source: Chourabi et al. (2012))

Dimensions	Description
Management and organization	Managerial and organizational factors, such as project size, managers' attitudes and behaviors or organizational diversity, influence projects broadly
Technology	A smart city relies on a collection of smart computing technologies applied to critical infrastructure components and services. However, ICT impact is unclear and it can either increase the quality of life of citizens or the digital divide
Governance	Processes, norms, practices that rule the exchange of information among different stakeholders. It involves several factors such as leadership, collaboration, communication, data exchange, partnership, or service integration
Policy context	Political (e.g., policy agendas) and institutional (e.g., regulatory barriers) components of the environment
People and communities	Individual persons and communities of the city affecting and affected by the implementation of smart city initiatives. It involves several factors such as participation and partnership, accessibility, quality of life, or education
Economy	Economic inputs to and economic outcomes from smart cities initiatives such as innovation, productivity, or flexibility
Built infrastructure	Availability and quality of ICT infrastructure such as wireless infrastructure and service-oriented information systems
Natural environment	Sustainability and good management of natural resources

3 Research Methods

Focusing on the two smart city cases (Barcelona and Milan), this empirical study aimed at exploring similarities and differences between the two cities. Rich data were collected through semi-structured interviews with individuals in charge of the smart city strategy of the cities, with people in charge of specific smart city projects, and with experts on smart cities. In the case of Milan, four interviews took place. Also, the authors attended four out of the seven public events organized by the municipality and had the opportunity to talk to participants and organizers. In the case of Barcelona, 19 interviews were conducted. Many documents were analyzed as well. Some of them were official documents and presentations by the respective city councils, while many others had been written by researchers or academic authors. This was particularly in the case of Barcelona, a city whose smartness strategy has already been widely studied.

4 Case Descriptions

4.1 Barcelona

After the local elections of June 2007, the organizational structure and the unit in charge of promoting ICT adoption in the city of Barcelona and within the Barcelona

City Council experienced some changes. As a result, an ICT master plan was defined and implemented in September 2008. The plan pursued: (1) to improve the municipal functions and services by focusing on citizens and quality, (2) to reinforce proximity by developing a new territorial model based on 73 neighborhoods instead of 10 districts, (3) to achieve processes innovation by intensively using new technologies, and (4) to measure management. In sum, the new model was intended to make Barcelona a smarter city by means of having a simple and effective, closer to citizens, connected, ubiquitous, and innovative public (local) administration. As a result, three main areas were prioritized: infrastructures, smart services, and citizens' interaction.

Although 2011 was witness to a change of government, the vision on the smart city strategy did not change because it was already shared by the two main parties since the beginning (Gavaldà and Ribera 2012). Thus, during the new term a phase of relative policy continuity began in which already started projects kept developing while new ones were planned.

The new government approach is based on the will of reinforcing the smart city brand of Barcelona as a promoter of a new economy of urban services. The goal is to show Barcelona as an essential reference for all those cities which seek to redirect its economy and its external promotion following this paradigm (Gavaldà and Ribera 2012). The Smart City Expo and World Congress, held for the very first time in 2011, was the starting point of this policy, which has evolved around two main projects based on public–private partnerships: the Smart City Campus at 22@ and the development of the City Protocol.

Other ICT-related initiatives, particularly regarding the urban transformation and the development of city-wide ICT infrastructures, have also played an important role in the city governance model that has tried to change Barcelona into the ICT metropolis of the Mediterranean. It has been the case of the 22@ Barcelona project.

22@ Barcelona is the result of an urban strategy, that dates back to 2000, aimed at transforming 200 ha of industrial land of Poblenou into an innovative district offering modern spaces for the strategic concentration of intensive knowledge-based activities in five strategic fields: media, ICT, energy, medical technologies, and design. In this sense, this is a project of urban, economic, and social refurbishment.

According to the last available data (June 2012), 4500 new companies have moved to the district since 2000 (an average of 545 per year and 1.2 per day). Of them, 47.3 % are new start-ups and 31 % are technological or knowledge-based companies. As a result, the number of people working in Poblenou has risen significantly. There are currently more than 56,000 new workers (about 71 % with University studies).

From an urban point of view, since the beginning of the project, approximately 70 % of the refurbishment of the industrial area has already been accomplished, under 141 plans for urban amelioration. The said projects will result in obtaining 3031.510 m^2 of floor plant for new production facilities, social housing facilities, and technical services. The real estate sector has decisively supported the project: 85 out of the 141 plans approved are promoted by the private sector.

However, assessments of the 22@ project have not always been that positive, particularly, when such assessments have been related to the contribution of 22@ to the development of a smart city. Leon (2008) and Charnock and Ribera-Fumaz

(2011), for example, state that the district hosts a poorly educated capital, a low level of local entrepreneurship, venture capital scarce resources, little presence of large international firms, and little connectivity to businesses located in other European and Latin American cities. In this regard, companies based in 22@ with a turnover of over €15 million are only 8.1 %, 68 % are microenterprises with up to 10 employees, and less than a quarter part export goods or services to other countries.

From a social perspective, according to Gavaldà and Ribera (2012), 22@ has given rise to functional specialization, which has favored the concentration of talent and the advent of a new type of residents: the so-called creative class. However, at the same time, another phenomenon has taken place: the displacement of part of the population residing in the district—mostly low-middle socioeconomic class, vulnerable in terms of housing—and its replacement by a new middle class.

Since 2011, ICT-enabled urban development has clearly become part of the Barcelona smart city strategy, although, it is still very much related to the development of 22@, it has surpassed it. So, among other initiatives, the Barcelona City Council has promoted the setup of the Institute of Technology for Urban Habitat (BIT for the Habitat), a new foundation that fosters innovation in new urban services (such as planning and infrastructures, housing, and environment) through new forms of collaboration with private companies, and which is supported by Cisco. The yearly appointment of the Smart City Expo World Congress and the official naming of Barcelona as the resident place of the World Mobile Congress have also contributed to the development of the current smart city strategy.

As a result of its smart city strategy, Barcelona has designed 24 programs for 2014, which are driven by five values: an efficient, sustainable, productive, social, and free Barcelona. Three of them (the new telecommunications network, the urban platform, and the intelligent data project) are transversal. The rest of them have to do with diverse areas such as smart lighting, smart parking and transportation, smart water, optimized waste collection, smart regulation, or open government.

Most of them are underway and results are not clear yet. In this respect, Gavaldà and Ribera (2012) declare that probably the projects lack an environmental sustainability perspective as well as bottom-up approaches, which give users a more important role in shaping the city and its services. Having said this, Barcelona is worldwide perceived as a leading smart city. Several studies have ranked the city among the smartest in Spain, Europe, and even at the international level. Just recently, in March 2014, the European Commission awarded the European Capital of Innovation ("iCapital") prize to Barcelona for introducing the use of new technologies to bring the city closer to citizens.

In sum, although a lot remains to be done, it seems that the city has taken a unique position of not only advancing its own initiatives but also trying to provide support for the smart cities movement around the world.

4.2 Milan

Following a reform introduced by Lombardy's Regional Law 12/2005, in 2011 Milan's City Council approved its first Local Government Plan (LGP), which

implied a wider and more strategic approach to local development and required citizens' participation from the early stages of the process. By focusing on issues such as greening, infrastructures, and public services, the plan aimed at simplifying access to public services and promoting the contribution of the private sector (both for profit and nonprofit) in the pursuit of public sector interests (Mingione et al. 2010). Different from the past was the method through which the plan itself was built: rather than relying exclusively on the internal department responsible for urban planning, the administration also involved a group of external experts and contributors drawn from the design and environmental planning sectors, academia, communication, and program management.

Although the LGP featured a much more strategic approach relative to past planning efforts, there was no specific focus on ICT use to support local development or internal reorganization within the municipality. However, several programs aimed at enhancing citizens' quality of life, services' provision, business support, and local development have recently been explicitly reframed and grouped within a more comprehensive smart city strategy: this involved increased investment in ICT instruments and infrastructures, with an acceleration related to the upcoming Expo 2015. The main driver for the municipality at the beginning of the process was the EU's Smart Cities and Communities Initiative, which provided the opportunity to obtain funding for environmental sustainability and energy projects. In the year 2012, the municipality, therefore, devised a strategy for the construction of its smart city agenda based on coordination rather than implementation. Responsibility for such coordination effort was given to the Councilor for Employment Policies, Economic Development, University and Research, the member of the municipal government who is responsible for these areas, as well as to a municipal manager, the head of the department in charge of Economic Innovation, Smart City and University.

The method is based essentially on coordination, rather than implementation, because it implies a critical coordination effort on the part of the department both internally (within the municipality) and externally (in the municipality's interaction with external stakeholders and with the citizens). Internally, the department became quickly aware that Milan had already started to develop or implement a number of projects or programs with "smart" features. By grouping them under a common smart city development plan, they could be better appreciated and developed. This effort was not easy due to the difficulties of involving different departments, but the focus on a "cross-sectional" theme such as the smart city, sustained internal motivation. As a subsequent step, the following macro-areas were identified as priorities for the development of Milan's smart city strategy: digital city, mobility, environment, inclusion and cohesion, and services to citizens.

In terms of the process for the construction of the smart city strategy, the coproduction of such strategy with the citizens and selected categories of stakeholders (firms, universities, financial institutions, the third sector, and other public administrations) assumes a particularly high value for the municipal administration. The consultation process with these categories of stakeholders involved the creation of six working groups linked to the six pillars of a smart city (smart economy, smart living, smart environment, smart mobility, smart people, and smart governance), in addition to a seventh one linked to Expo 2015, and by organizing over the course

of 1 year—from mid 2013 to mid 2014—one large public and participatory event related to each pillar. This process was constructed and carried out with strong cooperation and involvement on the part of the Chamber of Commerce of Milano, also with the aim of identifying an appropriate governance structure. A website for Milano Smart City was built only in April 2013, but as of March 2014 (when this Chapter is being written) it is far from being comparable with other similar websites, as it only acts as repository for the documents and presentations of the public events mentioned above. As of March 2014, no independent or autonomous agency for the management of the smart city strategy has yet been established in Milan, though there are plans for the establishment of a shared governance body involving other stakeholders in addition to the local municipality. The municipality of Milan is also heavily relying on the collaboration of large private high-tech firms in the construction of Milano Smart City: this is evident both in the consortia that were established to apply for national or EU-based financing, and in the partnerships that were developed especially, though not exclusively, for Expo 2015.

From the perspective of specific smart city programs and mechanisms, several new projects have been introduced over the past few years, while previous or existing services and instruments have often been restructured with ICT-enabled new features and/or a more citizen-centered approach. This includes, for instance, the establishment of an incubator for social enterprises, or the EU-financed My Neighborhood-My City project (implemented in a formerly run-down neighborhood) that, building on open innovation, moves from citizens' needs to renew the area also through the ICT. Numerous specific projects were also developed that relate to the above mentioned six pillars of a smart city and which leverage the opportunities provided by the ICT to provide better services to citizens as well as to public and private institutions.

The smart city drive provides an opportunity for greater coordination relative to the past. Over the past decade, the municipality has focused itsattention on large events, such as Expo 2015, interventions such as the Fashion City Project (Citylife) and the resolution of specific problems, such as pollution, through instruments such as the congestion charge. However, according to Mingione et al. (2010), these interventions have rarely been interrelated and have hardly communicated with each other: sectorial focus and separation are the main characteristics of these actions. On the other hand, precisely because of its scope and international visibility, Expo 2015 will be an opportunity to accelerate and drive to convergence a number of trends and developments which will contribute to wider recognition of Milan as a smart city.

The implementation process of Expo 2015 has not only experienced various governance-related difficulties but also drastic reductions in the available resources as a result of the economic crisis that broke out shortly after the approval of the project by the BIE in 2008. For this reason, the initial design has undergone many changes, with the gradual elimination of entire works. Starting in 2012, the project and its implementation have experienced a significant rethinking in a smart city perspective (Gallione 2012; Morandi et al. 2013), with three technology platforms especially developed to support the event. While obviously maintaining its overarching

theme—Feeding the Planet, Energy for Life—Expo 2015 is now taking advantage of a number of partnerships and collaborations with technological partners, who not only provide much needed funds but also an acceleration of technological developments that will benefit Milano Smart City in the longer run. At the same time, this allows to link the development of the municipality's smart city strategy to Expo 2015, thereby creating a mutually reinforcing process.

5 Comparing Barcelona and Milan

This section compares Barcelona and Milan in terms of their smart city strategies using Chourabi et al.'s integrative framework (2012).

Table 2 lists both the similarities and differences of Barcelona and Milan's efforts to become smart cities.

Table 2 Comparing Barcelona and Milan

Dimensions	Barcelona	Milano
Management and organization	New public management approach, planning tools, definitions of priorities, change of the organizational structure	Coordination by different bodies (internal and external)
Technology	Core	Residual in the beginning, more important nowadays
Governance	Leadership by the city council. Participation of private actors and collaboration with, mainly, the Autonomous Government of Catalonia	Coordination by specific department within the municipal administration. Leadership by large events' organizers. Difficult collaboration among different levels of government. Participation of private actors (including Expo 2015 SpA, the company in charge of Expo 2015 implementation)
Policy context	The smart city within a broader ICT policy/strategy	The smart city within a broader urban planning policy/strategy
People and communities	Citizens hardly participate	Citizen participation is important in the process of building the smart city
Economy	Economic competiveness (lower than Milan)	Economic competitiveness (higher than Barcelona)
Built infrastructure	Very important. The smart city project started with a smart district project, so to speak (22@) based on building IT infrastructure. The city has one transversal project around building/strengthening IT infrastructure, which is key	Not relevant. Infrastructure development was left to the private sector although, recently, more has been done within the smart city drive and the acceleration prompted by Expo 2015 implementation
Natural environment	Projects designed under the 2014 smart city strategy lack an environmental sustainability perspective	Environment matters

Regarding management and organizational issues, the approaches adopted by the two cities differ. It seems that Barcelona's management and organization are part of a broader management model based on the new public management stream of theory and, among other, on territorial decentralization, service externalization, and the adoption of managerial tools (such as strategic plans). The smart city strategy has been led politically and executively. The Computer Municipal Institute has played a key role in the development of the strategy. The Institute has adapted to the evolution of the strategy. Currently, the city has created a Smart City Personal Management Office within the Institute in which the projects belong, which coordinates all the projects in the city that are classified under the smart city tag. This has meant transitioning from siloed work to transversal work. Milan has not set up a separate organization in charge of the smart city strategy implementation, although it seems a Milano Smart City Association will be announced soon. So far, the traditional structure has taken on the responsibilities on the smart city strategy by coordinating internal and external efforts: the main actors are two individuals within the municipal administration, and their respective teams: the *Assessore* (member of the municipal executive) for Employment Policies, Economic Development, University and Research, and the Head of the Department for Economic Innovation, Smart City, and University. All activities are carried out by these two units in strict cooperation with the Milan Chamber of Commerce.

Although technology can be said to be the key for both cities nowadays, this has not always been the case, which gives rise to a new difference between Barcelona and Milan. For the former, technology has been at the core of its urban development model. In this respect, ICT have been an essential crosswise tool that has supported the multi-faceted innovation process. In the case of Milan, technology has been less important. The smart city has not been built around ICT although their relevance is actually growing: at the moment, many smart city projects are clearly based on ICT adoption. The differences between the city's most important projects also show this contrast: on one hand, Barcelona's key smart project, 22@, is clearly one that shows the strategic use of ICT by the city; on the other, Expo 2015 in Milan is an umbrella event, with not only links to the different dimensions of the smart city strategy (and therefore, to technology) but also an event that goes beyond that.

Both Barcelona and Milan have involved several stakeholders in the definition and implementation of their smart city's strategies. But there is also divergence regarding their respective governance approaches in terms of leadership and involvement of third actors. Clearly, it has been the Barcelona City Council the one to lead the efforts in the city. On the contrary, only recently the Municipality of Milan has devoted increasing efforts toward the development of the smart city strategy. In a way, the Barcelona City Council has led in isolation, that is, there has been participation of other actors, as will be explained at once, but the city council has explicitly given direction. The Municipality of Milan has coled the process. In this respect, large events' organizers and, particularly, the Milan Chamber of Commerce have taken an important leading role. It is interesting to note that this collaboration has materialized in Expo 2015 S.p.A., the public company in charge of Expo 2015 implementation, whose shareholders are the four administrations at different levels (national, regional, provincial, and municipal), together with the Chamber of

Commerce. Public–private partnerships have proved central in the implementation of the smart city's strategies of both cities. So has collaboration with other public administrations, although it has taken place differently. Thus, in the case of Barcelona, support/collaboration has come from the Autonomous Government of Catalonia, particularly in relation to wider projects that have included other territories (other than strictly the city of Barcelona). Regarding Milan, collaboration has taken place among local administrations at different levels (such as the Lombardy region or the Milan Metropolitan Area), but these relationships have often been difficult and forced by necessity (e.g., Expo 2015 implementation in the face of significant delays). Finally, European Union (EU) funding programs have been very important for both cases.

In terms of the policy context, the Barcelona's smart city strategy has clearly expanded within the framework of a broader ICT policy/strategy that has developed throughout time always having in mind the four dimensions of the so-called Barcelona model. This model gave a lot of importance to territorial decentralization and, therefore, to urban development in districts and neighborhoods, resulting in the prioritization of urban transformation projects, such as 22@. Although urban planning has also been a driving force in the case of Milan (actually, urban innovation in the city dates back to the 1980s), more traditional perspectives, accompanied by laws and regulations, have predominated: territorial governance, integrated planning, or urban and environmental policies. Also, in the case of Milan, urban governance and planning are much less structured and ordered compared to other Italian and European cities: strategic planning at the urban and metropolitan level not only tends to be driven by large events, such as the Expo 2015 but also includes a number of regular international exhibitions which have become very important for Milan's economy (such as the International Home Furnishing Exhibition or Milan Fashion Week).

Smart cities require smart citizens, individuals, and groups (communities) that participate in the building of the city. Barcelona and Milan are not alike in this respect. The former has hardly implemented participation projects and, generally speaking, in Barcelona, there is a lack of bottom-up approaches. Although there have been slight changes in the past few years, the unsuccessful electronic consultation on the transformation of the Diagonal Avenue, the city's main street, carried out in 2010 has forced the city council to be cautious regarding participation. Milan has adopted a totally different approach: the smart city strategy is being developed with the active involvement of citizens. Actually, the people in charge refer to the coproduction of the smart city with citizens (and other stakeholders as well).

Despite the differences listed so far, both cities have a dynamic economic environment, which has been recognized worldwide. Barcelona was awarded in March 2014 the European Capital of Innovation. Milan has also implemented an innovative approach prize due to its efforts to promote a broad-based innovative culture. Other factors also make it a competitive economy, such as its entrepreneurial culture (several events, many led by Barcelona Activa, take place to promote entrepreneurship) or the promotion of ICT-based economic activities located in the 22@ district. Milan is also a vibrant city from an economic perspective. It has stimulated innovation not only in creative and knowledge sectors but also in traditional core

industries. Actually, Milan is the most important economic center of Italy and a major financial and business center. Interestingly enough, the process by which these cities have become economically important is quite different, for Barcelona's has been particularly led by the public sector (both the city council and the Autonomous Government of Catalonia) and Milan's has been characterized by private efforts, although, some public attempts to coordinate collaboration among local industries have been made at the regional level.

Regarding built infrastructures, Barcelona and Milan differ; although the latter is given growing importance to this dimension within the new smart city strategy. Barcelona has always prioritized the development of ICT infrastructure. In particular, within the Barcelona 2.0 model framework, several projects were put in place such as Barcelona Wi-Fi (a service that allows the citizen to connect to the Internet through Wi-Fi access points) and the Wi-Fi mesh network (a municipal network for ubiquitous services). On the contrary, Milan has paid much more attention to physical infrastructures (roads, highways, subway, and railway) and only, recently and shyly, there has been some investment in terms of wireless infrastructure and service-oriented information systems. Actually, the smart city in Barcelona is developing around the main smart project the city has—22@, which has given rise to infrastructures plans aimed at building a modern network of energy, telecommunications, district heating and pneumatic refuse, and waste collection systems, whereas Milan's smart city project is focusing on delivering smart services, that is ICT-based public services, such as the Readt application (to access the services of municipal libraries), the new tourism portal, or Infoalert (a service that aims at reducing road congestion by means of information shared in real time). A recent acceleration both in terms of coverage and intensity is linked to Expo 2015.

Finally, dissimilarities also arise for the last dimension: natural environment. Concerning Barcelona, it was already advanced that, according to Gavaldà and Ribera (2012), generally speaking, smart city projects lack an environmental sustainability perspective: "the effects of the economic crisis have put in standby the achievement of higher levels of quality of life and have paralyzed investments in environmental sustainability at macro level" (p. 24). Quite the reverse, in Milan, sustainability and the better management of natural resources matter. Lombardy's regional law 12/2005 clearly shows so, as it includes elements with a renewed emphasis on the environmental sustainability of territorial developments. Also, in Milan, the start of the smart city strategy was linked to the EU's Smart Cities and Communities Initiative, which provided the opportunity to obtain funding for environmental sustainability and energy projects, showing an important emphasis on the natural environment. Finally, nowadays, one of the core dimensions of such strategy has to do with the smart environment.

6 Conclusions

Two common trends seem to arise from the previous comparison. On one hand, the relationship between innovation and the development of a smart city is not obvious. It may seem that Barcelona is more innovative than Milan, not only because of the

iCapital award but also because many of its smart cities projects are technology driven. But Milan has invested in the open innovation approach, emphasizing the need to cocreate and coproduce with citizens. Thus, there is not enough evidence to draw a conclusion on innovativeness. On the other hand, from a general point of view, objective results are still unclear in both cases. So taking these two aspects into consideration, it is not possible to say that Milan's strategy is working better than Barcelona's, or the other way round. Still, we can timidly refer to the following:

- There are important differences between the two cities. Yet, none of them is throwing clear positive results, at least, in terms of outcomes (citizens' quality of life improvement, economic development, and sustainability). However Barcelona's reputation is much better than Milan's in this area. As already stated, the former is worldwide perceived as a leading smart city to which many other cities turn to in order to "copy" some of its ideas. Barcelona is building a smart city and, at the same time, is successfully managing a brand: the Barcelona Smart City. It is doing so simultaneously, following a city management model that has already proved successful in the past regarding other topics. In sum, real projects matter but image is also important. In this respect, Barcelona has taken better advantage of its assets than Milan.
- It may be inferred from our findings that there are different ways to develop a smart city depending on the wider institutional/policy/governance context as well as the economic environment. It seems that Barcelona and Milan are developing their smart cities strategies according to their wider context and, therefore, to their traditional way of doing things. What is not clear is their city model and the type of city they want to become. It is about being faster, more intelligent, or more technology oriented. These tools only shape the city according to the city model that should guide all the efforts.
- Building on the above conclusion, it seems that there is not only a single strategy but also, by definition, there is no single way to carry out a strategy. Mintzberg's (1994) concept of a realized strategy being the result of two components is very useful in this respect: a strategy that was actually planned by the relevant actor (the "deliberate" strategy) and the "emergent" strategy that results from learning and interaction with other stakeholders. Taking this distinction into account, the planned component seems more important in the Barcelona case while the emergent component seems more relevant in the Milan case. This may explain the important differences in terms of leadership. Regarding Barcelona, the public sector, and particularly the city council, has always been a strong leader. It is the city council the one which has conceptualized the smart city strategy and implemented it. The city council had a clear direction, a clear concept of what a smart city should be ("something" around the 22@ project). It has involved other actors in terms of what the city council thought it was best. In the case of Milan, leadership is not obvious. Even, coordination by the municipality is weak. The city has been developed in collaboration. In the beginning, there was no clear idea of what to achieve but the city has taken advantage of different opportunities that has come along the way, which have been the result of cooperation.

Finally, although our intention was not to test Chourabi et al.'s model (2012), implementing it has raised a few issues worth taking into account for its future

improvement. We have found that the model is useful to describe a smart city strategy's components and, probably, to organize the various perspectives and focuses of the smart city literature. But it is not enough to understand results. It is not an analytical model. Therefore, it cannot be used to give an answer to questions related to success or failure of smart city strategies. The model does not clearly state the direct effect of the dimensions onto results. It does not take into account cross-dimensional issues either.

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