

The Calatrava model: reflections on resilience and urban plasticity

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ABSTRACT

The article introduces a critical reflection on the effects that the version of cultural capitalism based on large events and architectural symbols has on the resilience of cities when used as an engine, and not as a complement to the policies of urban transformation. The article introduces as a case of study the so-called 'Calatrava model' of the city of Valencia. The model of a cultural bubble of Valencia, designed to enable a new space, is developed and contrasted with other two examples of urban transformation designed to revitalize spaces: Bilbao – symbolically represented by Frank Gehry's Guggenheim museum – and the Barcelona 22@ – symbolically represented by Jean Nouvel's Agbar Tower. Through the notion of 'plasticity' we analyse how, despite the overall failure of the Calatrava model and its negative effect on the short-term ability of the city to absorb shocks, Valencia is able to adapt and absorb the urban transformation around the Calatrava's architectural complex and to incorporate it into their processes of dynamic resilience.

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1. Introduction

A large amount of literature, from Touraine, Bell or Toffler in the 60s and 70s, to the most recent contributions of Castells or Rifkin, has observed the growing importance of the symbolic dimension as an attribute of goods, territories or human groups. Some authors (Rifkin, 2001; Scott, 2014) call cultural capitalism to this new framework for relations between meanings, territories, actors and individuals. The hypothesis of the cultural capitalism suggests that the processes of change and resilience rely, every time with more intensity, on the production of symbolic goods – among them the cultural ones – in comparison to the model of industrial and commercial capitalism, where the main source of creation of wealth was based on the production of tangible goods. What are relevant in this new environment are not only the physical or functional characteristics of things, places and people, but also their meanings.

In this context, the governance of cities tries to fix, in a mobile, liquid and accelerated world, all dimensions related to the flux of relationships between the represented and participant citizenship, the city as the space of production and creation of added value, and

the city as a vortex of consumption and attraction of flows. These strategies are not merely economic but have to do with the manipulation of the symbolic dimension and the construction of identities, including the construction of emblematic projects as part of the cultural regeneration of the city, production strategies based on the development of cultural and creative industries, and consumption strategies through the promotion and creation of the image of the city.

This framework serves as a starting point to explain the model of urban and urbanistic development of the city of Valencia in the last 20 years. The model was based on two pillars: the great sporting events of international scope (Formula 1 street circuit and the America's Cup) and a complex of unique buildings designed by star architect ('starchitect') Santiago Calatrava changing the baseline from one part of the city; a megalomaniac dream of progress, then transformed into a nightmare, with an exorbitant cost, and whose main objective was to use built artefacts to produce an image of 'packed city' ready for consumption that would attract tourism and business investment.

This article aims to introduce a critical reflection on the effects that this version of cultural capitalism – based on large events and architectural symbols – has on the resilience of cities when used as an engine, and not as a complement to the policies of urban transformation. The article contributes to the extant literature by introducing as a case of study the so-called 'Calatrava model' in the city of Valencia. The model of the cultural bubble of Valencia, designed to enable a new space, is developed and contrasted with two other examples of urban transformation: Bilbao – symbolically represented by Frank Gehry's Guggenheim museum – and the 22@ Barcelona – symbolically represented by Jean Nouvel's Agbar Tower – both designed to revitalize spaces. Through the notion of 'plasticity' we analyse how, despite the overall failure of the model and its negative effect on the short-term ability of the city to absorb shocks, Valencia is able to adapt and absorb the urban transformation around the Calatrava's architectural complex and to incorporate it into their processes of dynamic resilience.

The article is divided into five parts. After Section 1's introduction, Section 2 introduces the symbolic dimension and cultural capitalism in cities and discusses the applicability of the notions of resilience and plasticity to planning based on arts and culture in cities. Section 3 describes the Calatrava model of the city of Valencia, and two elements of contrast: the Guggenheim in Bilbao and the 22@ in Barcelona. Section 4 discusses the effects of the Calatrava model on the resilience of Valencia. Finally, Section 5 is devoted to conclusions.

2. Theoretical framework

2.1. Symbolic dimension and cultural capitalism in cities

The reasons for the success of the cities go well beyond the simple utilization of agglomeration economies. The city has always been a focal point for freedom, culture and innovation in its broadest sense. The exchange of ideas and experiences and the cultural mix that is consubstantial with the city have generated enormous positive externalities for the society as a whole.

Scott (2014) introduced the notion of 'cognitive-cultural capitalism' to argue that we are entering a period marked by a distinctive third wave of urbanization based on cognitive

skill and cultural assets. Where before we could talk about two concepts that made a difference between the city for industry and commerce and the city for arts and culture, there is a new type of urban organization in which economy and culture have fused together, in the sense that economic outputs are subject to ever-increasing injections of aesthetic and semiotic meaning, while the culture that is consumed is produced more and more by profit-seeking firms in the commodity form (Scott, 2014). It is obvious that not all cities access the cognitive-cultural phase the same way and it is possible to trace different paths, because different trajectories of industrialization and modernization paved the way for different forms of transition towards the creative economy (Trullén, Boix, & Galletto, 2013; Pareja-Eastaway & Miquel, 2015).

The relationship between physical factors (space, geography and infrastructures) and symbolic factors (messages, senses and meanings, and emotions), as well as the circulation and appropriation modes they make possible, determines many of the attributes of the cities and conditions their responses and reactions to the multiple changes and transformations of the variables that affect their mode of operation (Scott, 2014).

The cultural context of the cities includes not only their cognitive capital, which contains the creative class, but also the physical capital with symbolic meanings. One of the most common strategies to visualize these ambitions focuses on the utilization of architectural landmarks which symbolize the transition towards the city of global cognitive-cultural capital. Here, the modes, spaces and relational spaces that facilitate the creation, production, distribution, consumption and conservation of symbolic goods acquire significant importance.

Although there is room to believe that culture may indeed become a main driver in the development of urban systems, the relationships between culture and the city show a greater degree of complexity than previously surmised. It has only been in the last few decades that the economic functionality of the symbolic dimension of urban spaces has granted a certain theoretical consistency. Analysing the different approaches, we can identify four perspectives:

- (1) Culture as a *subject* that embodies its intrinsic value, be it as the foundation of human rights or as a sector that features prominently and is directly involved in urban development processes. It is in this dimension where the new phase of the cultural- cognitive capitalism of the cities can be found.
- (2) Culture as a *context*, where the symbolic dimension is just a space for reference in which economic processes, not necessarily related to culture, unfold. An example would be large iconic investments with a significant impact on the real estate sector.
- (3) Culture as a *pretext*, in which the valuation of economic or political processes is based on the reputation and legitimation of cultural and creative activities. Here, the symbolic dimension exists in the field of meanings and communication.
- (4) Culture as a *resource*, when the cultural dimension turns into an input for different productive processes.

The debate on cultural capitalism and the paper of the arts, culture and creativity show chiaroscuro. Largely, it focuses on the present effects of the analytical framework, leaving aside the deeper and highly heterogeneous aspects that can have an effect on short- and long-term resilience processes, as well as on how the very nature of the city reacts to

these cognitive and symbolic elements, and to their physical manifestations, and if they can have effects on the phenotype of cities.

In the next section, we discuss this issue, going from the most general notion of resilience to their application to the regional and urban economies, culture and creativity, and planning.

2.2. Resilience: a critical review

2.2.1. The many general notions of resilience

The term ‘resilience’ originates from the Latin noun ‘resilio’ and the verb ‘resiliere’, meaning to jump backwards, to bounce back or to rebound. Depending on the context in which it is used, we can distinguish between several types and notions of resilience, being usual the distinction between:

- (1) *Engineering (mechanical) resilience* (Holling, 1973), which refers to the capacity of a material (e.g. a metallic bar) to absorb energy when it is deformed due to pressure or other shocks, and release that energy returning to its original state after the shock.
- (2) *Ecological resilience* (Walker, Holling, Carpenter, & Kinzig, 2004, p. 10), defined as ‘the capacity of a system to absorb disturbance and reorganize while undergoing change so as to still retain essentially the same function, structure, identity, and feedbacks’. *Social resilience* (Adger, 2000; Cote & Nightingale, 2012), sometimes referred as a variation of the ecological resilience, is the capacity of communities to cope with external stresses and disturbances as a result of social, political and environmental change.
- (3) Engineering and ecological resilience are related to stability. Conversely, *evolutionary (socio-economic) resilience* assumes that the nature of systems changes over time even if there are no external disturbances, and refers to the capacity of complex socio-ecological systems to change, adapt and transform in response to stress (Davoudi et al., 2012).

2.2.2. Resilience in regional and urban research and practice

The generalized application of the notion of ‘resilience’ to cities and regions has become popular in economic and geographic studies to research recovery after disasters (Vale & Campanella, 2005) and in particular to study the effects of the economic crisis that affected developed economies in 2007. Nourished by numerous previous literature in other areas, the resilience approach in regional and urban studies and practice has become also multi-perspective, as well as its determinant factors, and its operationalization multidimensional (see Cooke & Eriksson, 2012; Eraydin, 2016; Fingleton, Garretsen, & Martin, 2012; Hassink, 2010; Hill, Wial, & Wolman, 2008; Lang, 2012). Thus, we can move from very general definitions of resilience such as that of the United Nations (2009, p. 25):

... the ability of a system, community or society exposed to hazards to resist, absorb, accommodate to and recover from the effects of a hazard in a timely and efficient manner, including through the preservation and restoration of its essential basic structures and functions.

to the more operative definition of the European Commission (2012, p. 5):

Resilience is the ability of an individual, a household, a community, a country or a region to withstand, to adapt, and to quickly recover from stresses and shocks. The concept of resilience has two dimensions: the inherent strength of an entity – an individual, a household, a community or a larger structure – to better resist stress and shock and the capacity of this entity to bounce back rapidly from the impact.

to arrive at comprehensive (although not always easy to operationalize) definitions such as that of Martin and Sunley (2015) of regional economic resilience as:

the capacity of a regional or local economy to withstand or recover from market, competitive and environmental shocks to its developmental growth path, if necessary by undergoing adaptive changes to its economic structures and its social and institutional arrangements, so as to maintain or restore its previous developmental path, or transit to a new sustainable path characterized by a fuller and more productive use of its physical, human and environmental resources.

The interpretation of shocks usually depends on the concrete theory used to focus on them, since the factors that explain the differences in regional and urban resilience and their interpretation are diverse (see Cooke & De Propris, 2012; Cooke & Eriksson, 2012; Martin & Sunley, 2015). Factors that can explain differences in urban resilience are factor endowment, labour and capital mobility, institutions, agglomeration economies, specializations, industrial variety and industry mix, relatedness, networking and assemblages, absorptive capacity, innovation capacity, environment characteristics, past trajectories, local culture and firm's culture. In addition, factors affecting resilience can be local or translocal.

2.2.3. Resilience in planning: cities never return to the same point

Resilience is a relatively new concept in planning but which is so rapidly gaining popularity and becoming a buzzword (Davoudi et al., 2012) to the extent that Cullingworth et al. (2014, p. 269) claim that 'if sustainability was the linchpin of planning in the 1990s, resilience is in the 2000s'.

From this point of view, a key characteristic of planning is that it intervenes not only on the social interface but also on the physical interface of places, restoring functions but often also creating new ones. In this regard, as Davoudi et al. (2012, p. 309) stated:

The message for planning theory and practice is that rather than viewing resilience as bouncing back to an original state following the external 'shock', the term should be seen in terms of bouncing forward, reacting to crises by changing to a new state that is more sustainable in the current environment.

2.2.4. Does resilience in arts, culture and creative industries improve urban resilience?

Although it is not unusual to find references to resilience in arts and cultural and creative industries, few publications address how a resilience approach to arts, and cultural and creative industries might be pursued in practice, as well as how resilience interrelates with culture and places. Exceptions are Cooke (2015), Cooke and Lazzarretti (2008), Lazzarretti and Cooke (2015), Cooke and De Propris (2011, 2012), Lazzarretti and Capone (2015), Pasquinelli and Sjöholm (2015), Pratt (2015) and Vanolo (2015).

Arts, culture and creativity affect urban resilience in several ways (Boix & Soler, 2015; Cooke & Lazzarretti, 2008; Lazzarretti & Capone, 2015; Pasquinelli & Sjöholm, 2015; Potts & Cunningham, 2008):

- (1) Creative industries are more resilient than other activities and improve the whole resilience of the city.
- (2) Producing innovations and impacting on the innovative capacity of the city thanks to higher creative adaptive capacity through cross-fertilization.
- (3) Improving the versatility and adaptability of workers and promoting new business models and institutions.
- (4) The business structure based on small firms and flexible combinations such as communities and platforms increase the flexibility and adaptive capacity of cities.
- (5) Providing evolutionary services that spill over to the rest of the city.

However, frameworks based on arts, culture and creativity can reduce the resilience of the cities, for example because of the precariousness of artists, the individual vulnerability of small creative firms, or when used as engines and their use is improper, incorrect or simulated (as a pretext for other practices), causing cultural bubbles characterized by an exaggerated growth of spending on arts and culture.

2.2.5. Criticisms, pros, cons and limitations of the notion(s) of resilience in their application to cities, arts, culture and planning

The popularity of the notion(s) of resilience in recent years in regional and urban research and practice, as well as in planning, and its increasing influence in arts and cultural and creative economics, is justified for several reasons: it recognizes that urban and regional environments are affected by a large number of processes and dynamics which take place at several scales; helps to think holistically in highly interconnected realities where shocks are covariate, being a consequence and affecting many dimensions simultaneously; and tries to provide a similar policy narrative facilitating an understanding between different communities of practice.

However, the notion of resilience is not without limitations and problems, both in general and in its application to urban resilience based on arts and planning:

- (1) More than unifying, the notion is fuzzy, vague, heterogeneous, complex and multidimensional, generating different definitions for different contexts. This makes the concept actually less intuitive and difficult to understand, causing confusion between interlocutors (Béné, Wood, Newsham, & Davies, 2012; Reghezza-Zitt, Rufat, Djament, Le Blanc, & Lhomme, 2012).
- (2) McGlade, Murray, Baldwin, Ridgway, and Winder (2006, p. 150) argue that Holling's model is essentially organic in nature. It is inappropriate for capturing the complexity of socio-economic systems because social systems 'are more than simply functional entities – they are defined by symbolic and cognitive attributes'. For Cote and Nightingale (2012), part of the problem is that epistemological and ontological issues remain to be clearly addressed, and there are inconsistencies in the way resilience research engages with normative issues in social and economic systems.

Porter and Davoudi remark that it is unclear what the notion of resilience adds to the already existing and interconnected notions and instruments in planning, and until what point it will become a real transformative tool in planning due to its limitations. Davoudi et al. (2012) also remark four critical issues in this translation to planning: first, a major difference with the natural ecosystems is the intentionality of human actions; second, the purpose of resilience in social systems is unclear and must be clearly defined; third, the definition of the system's boundary, which could lead to exclusionary practices and fourth, power, politics, conflicts, justice or fairness must be taken into account, as well as the effects of resilience in some places on the resilience of other places. Hassink (2010) and Gong and Hassink (2016) remark how regional resilience theories tend to neglect the state, institutions and policy at several spatial levels, as well as culture and social factors affecting adaptability.

- (3) As a multidimensional and open concept, it is difficult to measure and operationalize. This feature may cause a trap of resilience, where an incorrect operationalization or measurement can improve resilience in a part of the system but can reduce the resilience of the system as a whole or damage vulnerable social groups and create winners and losers of resilience (Béné et al., 2012; Pratt, 2015). At this point, specialized notions, concepts and tools of disciplines such as economics or planning are clearer and more operational.

A variation of this issue (Béné et al., 2012) is that usually dimensions of resilience (e.g. stability, adaptability and transformability) are presented as antagonistic, making necessary a more appropriate way to conceptualize resilience. For MacKinnon and Driscoll (2013), however, a major problem is that social sciences have tried to adapt the analogies and metaphors of resilience in natural systems without first problematizing social relations and structures. They claim that urban disturbances and resilience are inherent to the capitalist systems (see also Vanolo, 2015), and 'resilient spaces are precisely what capitalism needs – spaces that are periodically reinvented to meet the changing demands of capital accumulation in an increasingly globalized economy' (MacKinnon & Driscoll, 2013, p. 254). A direct conclusion is then that the processes that shape resilience operate at the scale of the whole capitalist system more than at a place level, whereas resilience frameworks often stress decentralized and local responses and policy-making.

- (4) There is an intrinsic problem to determine whether urban resilience is a result, a property or a process (Reghezza-Zitt et al., 2012). When defined as an outcome or property, there is no consensus about the criteria to say if an urban system is resilient or not. When defined as a process, there is no clear correspondence between the degree of transformation and the state of resilience (Reghezza-Zitt et al., 2012). This leads to another limitation of the concept when applied to cities. As McGlade et al. (2006) explain, all socio-economic systems (e.g. a city) that persist over long time periods can be described as being resilient because they have not collapsed.

But are cities always resilient? A subject little discussed in the case of cities is the 'failure of resilience' or whether some spaces do not display resilience of any meaningful kind. A controversial example is Detroit, which has lost about 700,000 inhabitants since 1950. However, even in this case the own interpretation of resilience as panarchy (e.g. Cooke & Eriksson, 2012; Davoudi et al., 2012) suggests that the city

probably is in a phase of creative destruction, characterized by chaos, collapse, destruction of accumulated capital and uncertainty, where resilience is slow but will increase (see Vale & Campanella, 2005), moving the city to a reorganization phase. The conclusion is that we do not know if Detroit is resilient or not, or how much, or whether the city will move to a new phase, and in this case, how long it will take and how to do it.

2.3. From resilience to plasticity

Based on the previous theoretical frameworks, we narrowly define urban resilience as a relative and compared dimension describing the capacity of an urban assemblage to:

- (1) *resist* in the short term, absorbing and containing shocks that can be positive (e.g. overgrowth) or negative (e.g. undergrowth) while maintaining functions;
- (2) *reorganize* in the mid-term, adapting their structures, assemblages, functions and trajectories and
- (3) *prevent* in the large term the effect of new shocks.

There are some additional limitations of the notion of resilience when the aim is the analysis of cultural renewal and cultural artefacts. Resilience is about ‘disturbances’ or ‘shocks’, whereas cultural renewal and cultural artefacts often involve ‘interventions’, whose effects on resilience may not appear until decades or even hundreds of years later.

Cultural renewal and cultural artefacts can have an immediate effect on resilience if they consume resources that could have been devoted to better use or have negative consequences on local finances, weakening the ability of local policies in the short and medium term, increasing vulnerability (Reghezza-Zitt et al., 2012). A typical example here are the ‘cultural bubbles’ (explosive overgrowth of the local expenditures in cultural interventions).

Positive effects of cultural renewal and cultural artefacts on resilience are less clear, especially in the case of big cultural artefacts (e.g. great museums or expensive buildings designed by ‘starchitects’). They need to be absorbed, digested and integrated by the built (physical), social, and economic systems of the city. The notion of resilience does not explain how this process takes place, under what conditions these artefacts can have any effect on the city or even if there is any real effect on some dimensions of urban resilience.

These processes will only impact on resilience if they not only affect the physical system of the city (built environment), but also the social and economic systems. We propose another analogy based on the notion of ‘plasticity’. In evolutionary biology, the notion of phenotypic or developmental plasticity refers to the ability of organisms to change their phenotype in response to changes in the environment (De Jong, 2005; West, 2003). The thesis here is that cultural renewal and cultural artefacts will only have real effects on the resilience of a city if they change the phenotype of the city, this is to be said, the structural characteristics of the city, from the morphology to, in particular, the behaviour and development. Although as in most analogies the argument does not seem new and can be derived from other theories of the city, it has a unique power to

emphasize how much the arts, culture and creativity, from ad hoc interventions, can change irreversibly the evolutionary trajectories of the city.

3. Three models: the city of Valencia and the Calatrava model, Barcelona's 22@ and Bilbao's Guggenheim

3.1. *The city of Valencia and the Calatrava model: from high culture to sparkling culture*

Valencia is a medium city of about 800,000 inhabitants and centre of a metropolitan area of about 1.6 million inhabitants, located in the East coast of Spain. Valencia, much like most of the Spanish cities, has gone through a powerful process of 're-imaginering' and international repositioning since the late 1970s. This change has physical references linked to urbanism, and the use of symbolic and cultural elements has been key in the reformulation of the city's image. We can identify five phases in this process for Valencia (Rausell, 2006):

- (1) A 'rational period' (1979–1985), based on the welfare model and focused on the creation of basic facilities. There was an urban transformation based on certain comprehensive rationality and the elaboration of a new urbanization plan for the city that included the transformation of the dry riverbed which crosses the city in an urban park. The iconography was based on the renewal of inner-city spaces to host cultural manifestation (high culture), such as the riverbed park, and the construction of a Music Hall next to the river. Other actions of cultural programming were designed to reinforce the symbolic leadership of the city in the Mediterranean basin. This period ended when the transition between planning and execution demanded high levels of governance, producing tensions between local and the regional governments, and the mobilization of forces contrary to the rationalization process.
- (2) The period 1985–1991 can be defined as the 'leap to modernity and high culture'. The Spanish economy went through a significant phase of expansion that allowed greater budgetary leeway and thus made it possible to focus on larger cultural infrastructure projects. In Valencia, in this phase the definition of the symbolic content of the city was left in the hands of the regional government, replacing the participative processes by a technocratic management with some emblematic projects such as the Valencia Institute of Modern Art.

The strategy also crystallized in a longing to build new icons. In 1989, the regional government proposed the project of the City of Sciences. The objective was twofold: first, to extend the city to the sea through the riverbed park and second, to give to the city a new urban axis articulated about a new scientific and cultural centre to serve the citizens and improve external visibility for tourists. The initial project included a communications tower, a planetary and a scientific museum, with a total cost of 150 million euros. The symbolic field of the project was based on a view of European modernity versus Mediterranean tradition and on the production of a new type of urban artefact, contrasting with the value of the rich heritage of the city's historical centre and local traditions.

- (3) The third period (1991–2003) is characterized by the change from a dream of high culture to a view of ‘sparkling culture’. The possibilities of urban transformation started being envisaged through the examples of Seville, Barcelona or Madrid, which were immersed in the organization and celebration of the events related to the year 1992 (Universal Exhibition, Olympic Games and Cultural Capital). When the socialist-technocratic governments in the city and the region were replaced by conservative-populist governments, the construction of the City of Sciences was redefined. The telecommunications tower, an icon of the previous government, was withdrawn and, in a skilful symbolic move, the government incorporated a ‘Palace of the Arts’, which turned the ‘City of Sciences’ into ‘The City of Arts and Sciences’.

The project was also extended from three to eight structures, of which finally seven were built: the Hemispheric (a planetarium), the Science Museum, the Umbracle (a semi-open garden), the Oceanographic (designed by Felix Candela), the Palace of the Arts (an auditorium with opera, music and exhibitions), the bridge of l’Assut d’Or and the Agora (a multifunctional space designed to hold a variety of events). In total, the complex spans almost two kilometres along the dry riverbed and the surface of the buildings reaches 350,000 square metres. The initial budget for these structures was set at 300 million euros, although incredibly the final cost exceeded 1200 million euros.

Surprisingly enough, the conservative local and regional governments took over the bid for modernity and elevated it to a new level, promoting large cultural events and containers, especially in activities such as theatre or visual arts. However, all these proposals in the field of culture and sciences were relatively artificial and showed structural weaknesses in terms of discursive sustainability, because they were projected and designed without taking into account the possible contributions to the city’s productive system (new areas of activity) and the knowledge system (i.e. the local universities, firms and research centres). This new strategy, aiming to place the city in a position of leadership in the fields of culture and science, was hardly believable. This period also coincided with the expansion of the city along different axes on the basis of an unprecedented real estate activity bubble that encroached on the agricultural terrain.

- (4) In the period 2003–2008, the strategy of a ‘sparkling culture’ was transformed into a strategy of ‘big events’, increasingly more related to sports and leisure but increasingly less to the culture, identity and treads of the city. The remaining structures of the Calatrava’s complex were finished during this period. The city intensified the formula of big events and practically all urban interventions were mediated by them: the America’s Cup (with a cost of 100 million euros, and close to the City of Arts and Sciences), the F1 Street Circuit (with a cost of 275 million euros, and also focused on the same sector of the city) or the organization of the World Meeting of Families with the Pope’s visit (with an estimated cost of 22 million euros, celebrated in the City of Arts and Sciences). Events acted as a pretext to accelerate and consolidate existing projects, and the meaning of the city shifted from culture to leisure and lifestyle.

This phase could be considered as the definitive consolidation of the success of the model of sparkling urban policies, which effectively corresponds, from an

iconographic point of view, to the massive expansion of Santiago Calatrava's architecture. Despite the obvious social and political legitimacy and the city's touristic take-off, the model was criticized due to the increasing concentration of public investment in certain spaces, the inefficient provision of some public services and the orientation towards the speculating interests of the investors focused on real estate.

- (5) The later phase (2008–2014) was characterized by the rise of the economic crisis, the bursting of the cultural and events bubble and the real state bubble, and the squandering and corruption cases. The blow of the financial crisis and the subsequent fiscal consolidation put an end to previous urban policies. Numerous corruption plots, frauds and squandering under the guise of urban policy interventions were uncovered, and the obvious financial unsustainability of some of the large events and facilities broke. The result was the paralysation of numerous urban projects, the excessive increase in the debt of the local and regional authorities, and the evidence of financial unsustainability of the large infrastructures or 'white elephants' (Rius-Ulldemolins, Hernández I Martí, & Torres, 2016). The majority of politicians who have been responsible for the management of the city (including the former major) and its events and those in charge of cultural facilities are being investigated for corruption.

3.2. Elements for contrast: Bilbao and Barcelona models

The Guggenheim museum was part of the reform of the Abandoibarra area, in Bilbao's Abando quartier, previously hosting the shipyards and the metallurgic industry that, after the crisis of these industries at the beginning of the 1980s, became an unused, degraded and polluted area, and the city lost population and activities. The project of transformation of this area, located in the centre of a city of 345,000 inhabitants and next to the river, encompassed 350,000 m² and the intervention of the local and regional government. The first stage of the transformation was to design a change in the economic model, from heavy manufacturing industries to knowledge-based services related to the industrial specialization of the area.

The second stage involved the provision of amenities to favour the cultural development of the area, including artefacts such as the Guggenheim museum and the Deusto University, and green areas covering a third of the total surface. The transformation recovered the old industrial area for the citizens with green spaces, avenues and business areas marked with architecture of quality, and created a new economic tissue based on services, culture and new manufacturing. Since the year 2000, the investment has been about 1000 million euros, including the Guggenheim museum (84 million euros), and the surplus obtained has been reinvested in the same area.¹

The 22@ Barcelona shares some similarities with Bilbao's project. The 22@ is also a project of urban renewal of an old manufacturing area, and also in the centre of the city. The quartier of Poblenou in Barcelona was the first industrialized area of Spain during the nineteenth century, and as a consequence of the relocation of manufacturing industries in the metropolitan area, in the middle of the 1990s, the quartier was becoming a degraded area and the city was losing a part of its economic base. The city hall led a project to, instead of transforming the area into residential, convert it into an 'urban

district of knowledge' and create more than 100,000 new jobs (most of them highly qualified) to reinforce the economic base of the city.

The economic base of the project was forged on the evolved idea of a Marshallian industrial district specialized in knowledge-intensive activities (with people working and living in the quartier), and also fostered by the intense urbanization economies granted by the location in the centre of a city of 1.6 million inhabitants and a metropolitan area of 5 million inhabitants. The project covered an area of 200 hectares for knowledge-intensive activities, residence and amenities, with a public investment of 180 million euros and an ideal period of realization of 15 years (from 2000 to 2015). It was designed to be self-financed through the surplus caused by the change in the use of the land, and included a new icon for the city: a crystal tower designed by Jean Nouvel to be the headquarter of the local big firm Aguas de Barcelona.²

4. Reflections on resilience and plasticity: a comparison of Valencia's Calatrava model with Bilbao and Barcelona

In this section, we analyse the effect of the Calatrava model on the resilience of Valencia and compare its features and results with the Guggenheim model of Bilbao and the 22@model of Barcelona.³

In the short run, the immediate result of the Calatrava model was an extraordinary growth of the population and employment in the city. From 1999 to 2007, employment grew faster in Valencia (27.5%) than in Barcelona (22.6%) and Bilbao (9.9%) (Table 1). Employment in knowledge-intensive activities also grew more in Valencia, leading the creation of jobs: 40.3% compared to 25% in Barcelona and Bilbao. Employment in culture, recreation and sports increased by 58.2% compared to 33% in Barcelona and 31.9% in Bilbao. The unemployment rate in Valencia fell to 5.9% in 2007, close to the 4.8% of

Table 1. Employment and unemployment dynamics in Valencia, Barcelona and Bilbao.

	Valencia			Barcelona			Bilbao		
	High	Low	Total	High	Low	Total	High	Low	Total
Jobs by knowledge intensity									
Growth rate 1999–2007	40.3	19.2	27.5	25.5	20.4	22.6	25.0	−0.7	9.9
Growth rate 2007–2015	−14.5	−22.0	−18.8	0.0	−10.7	−6.0	1.0	−14.0	−7.0
Growth rate 2007–lower peak year ^a	−19.8	−22.6	−21.4	−9.9	−13.1	−10.9	−4.7	−13.9	−9.8
Number of years decreasing	6	6	6	5	6	6	6	7	6
Jobs in arts and culture, recreation and sports ^b									
Growth rate 1999–2007			58.2			33.0			31.9
Growth rate 2007–2015			−11.7			−22.5			−33.0
Tourists (number of visitors)									
Growth rate 1999–2007			82			51			39
Growth rate 2007–2015			3			25			26
Unemployment									
Unemployment rate in 2007 ^c			5.9			4.8			5.8
Unemployment rate in 2015 ^c			12.7			8.5			12.8
Unemployment growth rate 2007–2015			71.6			55.7			72.1
Total unemployment growth rate 2007–peak year (2012)			91.6			78.4			80.2

Source: Elaborated from Ministry of Employment and Servicio Público de Empleo Estatal.

^aPeak year is 2013, except for Barcelona's high knowledge intensity (2012) and Bilbao's low knowledge intensity (2014).

^bCode 92 of NACE Rev.1 and codes 90–93 of NACE Rev.2.1.

^cUnemployment rate defined as unemployment/resident population 16–64 years.

Barcelona and the 5.8% of Bilbao. The exterior projection and the attraction of tourists were also remarkable, since in this period the number of tourist visiting Valencia increased by about 82%, more than in Barcelona (51%) and Bilbao (39%) (Table 1).

Unfortunately, the model also showed its weakness during the subsequent recession after 2007, proving it had actually increased the vulnerability of the city. During the period 2007–2015, employment reduced in Valencia 18.8%, achieving a peak of reduction of 21.2% between 2007 and 2013. Barcelona and Bilbao's loss of employment was significantly lower: in Barcelona, 10.7% with a peak of 13.1%, and in Bilbao, 7% with a peak of 9.8%. Figure 1 shows how the behaviour of Valencia was more expansive/contractive than that of Barcelona and Bilbao before and after 2007. As a consequence of the destruction of jobs, the unemployment rate grew in 2015 in all the cities up to 12.7% in Valencia, 12.8% in Bilbao and 8.5% in Barcelona (Table 1).

Knowledge non-intensive activities led to the destruction of jobs in the three cities between 2007 and 2015, particularly in Valencia, at 22.6%. The weakness of Valencia's model is observed in the behaviour of employment in knowledge-intensive activities: Valencia destroyed up to 19.8% of knowledge-intensive employment, Barcelona 9.9% and Bilbao 4.7%. However, knowledge-intensive employment recovered rapidly in Barcelona and Bilbao after 2012, so that in the accumulated period 2007–2015 Barcelona did not lose knowledge-intensive jobs and Bilbao increased it by 1%, whereas in Valencia they decreased by 14.5% (Table 1).

Even tourism, the flagship of Valencia's model of sparkling culture, proved to be more volatile in this city: between 1999 and 2007, the number of visitors in Valencia increased by an impressive 82%, boosted by the City of Arts and Sciences and big events, compared to 51% in Barcelona and 39% in Bilbao (Table 1). However, between 2007 and 2013, the flows of visitors in Valencia reduced by 8.3% and then rose again, so that between 2007

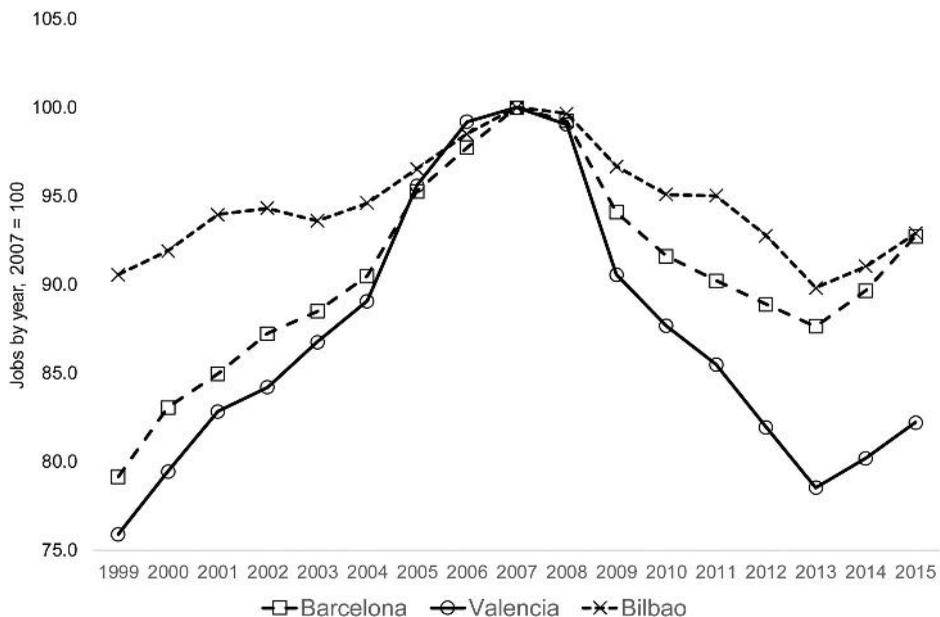


Figure 1. Jobs by year. 2007 = 100. Source: Elaborated from Ministry of Employment.

and 2015 there was a modest increase of 3%. By contrast, between 2007 and 2015, Barcelona and Bilbao increased the number of tourists by 25% and 26%, respectively (Table 1).

Figure 2 shows a complementary perspective of the effects of the cultural bubbles. For those Spanish cities of more than 350,000 inhabitants (the size of Bilbao or more), there is a remarkable correlation between the share of jobs in arts, entertainment and recreation in the city before the crisis, and the lower rates of destruction of jobs between 2007 and the lower peak of the crisis in 2013 (the correlation is -0.33 for all the sample, and -0.72 excluding Valencia from the sample). The trend line fits really well with the only exception of Valencia, which for its share of employment in culture should have destroyed 10 points less of employment. By contrast, Barcelona and Bilbao, where cultural transformations were well planned, show the lowest rates of job destruction of the sample.

These figures reflect substantial differences between the three models. On the one hand, Abandoibarra and 22@ are projects of urban renewal (recovering spaces), located in the city centre, the initial focus is on the economic base of the city, impulse a change from old manufacturing to knowledge-intensive services and culture (including business and universities), have a solid financial design and constant surveillance of the entire area, and the icons serve to give visibility to the area and the city but are not crucial artefacts of the strategy. On the other hand, the City of Arts and Sciences is a project of creation of a new space to expand the city, is located in a new area of the city, the initial focus is not on the economic base of the city, the financial design is absent, the patterns of edification of the area next to the Calatrava complex are questionable due to a certain relax in the supervision and an expansive real state bubble, and the artefact is the engine of the strategy.

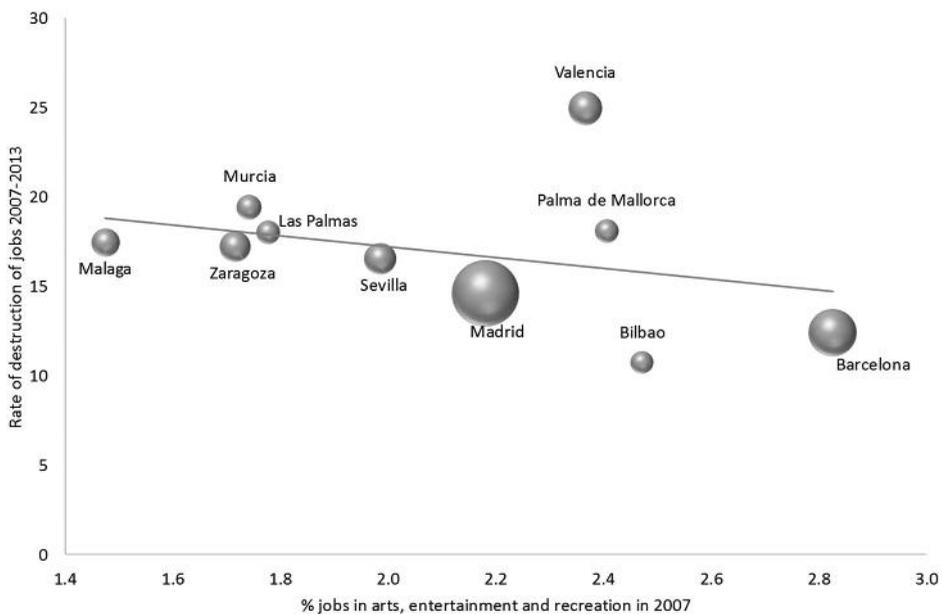


Figure 2. Culture, entertainment and recreation and rate of destruction of jobs for the Spanish cities of more than 350,000 inhabitants. The size of the bubbles indicates the number of inhabitants in 2007. Source: Elaborated from Ministry of Employment.

As a result, the responses of the three models on urban resilience are expected to be different. Bilbao's Guggenheim is a reactive model, focused on a response to the decline of industrial activity, supported by a well-structured strategy, although iconically based on a cultural infrastructure, and completely integrated in the socio-ecological system of the city. Barcelona's 22@ model is an example of reactive-projective planning, focusing not only on decline but also on the possibility of making better use of the opportunities available in the framework of the redefinition of the position of Barcelona in the global hierarchy, and again completely integrated in the socio-ecological system of the city. Valencia's Calatrava model is an example of circumstantial and adaptive planning, without a real conscience of the necessities or well-defined objectives, and apart from the socio-ecological system of the city.

However, some structural changes are detected in Valencia. In 1999, knowledge-intensive employment in Valencia was 37% of the total employment and this share grew to 44% in 2015, close to Barcelona (46%) and Bilbao (48%). Employment in creative services⁴ in Valencia also increased its share, reaching 8.3% of the employment in 2015, close to Bilbao (9.1%), although still far from Barcelona (12.2%). Between 2007 and 2015, the employment in culture, recreation and sports supported better the crisis in Valencia (decreasing by 11.7%) than in Barcelona (decreasing by 22.5%) and Bilbao (decreasing by 33%) (Table 1). As a consequence, in 2015, the share of culture, recreation and sports on the total employment was about 2.5% in Valencia and Barcelona, and about 1.9% in Bilbao.

It is difficult, however, to assess what part of the change was due to the main artefact of the model, since a recent study (Fundación Indea, 2014) proves that the number of knowledge-intensive activities and creative industries in the area of the City of Arts and Sciences is still far from other more creative quarters of the city, proving that the process of plasticity between the artefact and the city is still in an early stage. The Calatrava model had some effects on the adaptation of structures, assemblages, functions and trajectories of the city, although most of these changes would have occurred regardless of the Calatrava model.

In the long term, the functional integration of the artefact with the rest of the city, if successful, will be positive for preventing in the large term the effect of new shocks. The way in which the process of plasticity is realized will be determinant, since the urbanistic, economic and social bases of the Calatrava model were disperse and far from the real ecosystem of the city, although the artefact is aesthetically attractive and has the potential to reinforce the future resilience of the city.

5. Conclusions

It seems clear that the strategy in the use of culture in the case of Valencia has clearly been a pretext that had little to do with the structural needs of the city. Valencia's Calatrava model is an example of circumstantial and adaptive planning compared to Barcelona (reactive-projective) and Bilbao (reactive). Despite having little instrumental rationality, the results appeared to be successful until the beginning of the crisis, and the city showed good behaviour in terms of creation of jobs, especially in knowledge-intensive activities and in culture and entertainment, as well as an impressive increase in the number of visitors.

The previous positive differential effects were rapidly diluted with the first wave of the crisis. Huge opportunity and maintenance costs of large investments in equipment and

events increased the vulnerability of the city and weakened its response. Thus, a first conclusion is that a strategy based on arts, culture and big artefacts, and characterized by an exaggerated growth of spending on arts and culture (cultural bubble), can weaken resilience when its use is improper, incorrect or simulated. Bilbao and Barcelona showed better ability than Valencia to withstand the initial shock of the crisis and the subsequent effect of the austerity policies that arose in response to the crisis. In fact, results for the big Spanish cities suggest that arts and culture reduced the vulnerability to the shock, with the only exception of Valencia.

The effects of the Calatrava model on resilience when understood as a mid-term process of reorganization and adaption are less clear. The data show some changes in the adaptation of structures, assemblages, functions and trajectories of the city. Some changes are detected in the qualitative composition of employment: the share of jobs in knowledge-intensive activities, in creative industries and in culture and entertainment increased and are currently close to the shares of Barcelona and Bilbao. However, it is difficult to assess whether these changes could have also occurred in the absence of the Calatrava model. The area that concentrates the City of Arts and Sciences and the big events is still sparse in knowledge-intensive firms and creative firms and, although being a singular urbanistic space, has a high attraction potential for these kinds of activities.

This leads to a second conclusion: the medium and long effects on the resilience of a cultural artefact of this magnitude depend on the plasticity of the city to change its phenotype and incorporate the artefact in its developmental processes. Our results suggest that the vectors related to the Calatrava model that have initially weakened the response of the city are being absorbed, integrated and digested in the physical, economic and social system of the city, slowly transforming its structural characteristics. The very notion of resilience (including the narrowed one we have operationalized) makes it difficult to know whether the resilience of the city has improved or worsened, although the interpretation in terms of panarchy applied to planning (see Davoudi et al., 2012) suggests that plasticity has facilitated a reversion from a phase of 'exploitation' where resilience was high but decreasing, to a phase of 'restructuring', with higher levels of resilience.

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Notes

1. See Plaza, Tironi, and Haarich (2009), Plaza and Haarich (2015) and Heidenreich and Plaza (2015) for a more detailed explanation of the project and the success of the Guggenheim museum.
2. See Pareja-Eastaway (2016) for a more detailed explanation of the project and current achievements. Although we focus on the 22@, the effects of the project on the city should be understood as a part of other relevant planning activities, such as the previous Olympic reform of Barcelona and subsequent projects.
3. The explanation focuses on the labour market for simplicity and for being where the changes were most evident. A more consistent evaluation would require the use of more indicators and a longer period of time.
4. Audiovisual, broadcasting, computer programming, R&D services, publishing, architecture and engineering, advertising, design, and arts and entertainment industries.

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