

Sustainable Strategies in Mobility Planning towards Resilient Cities

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Abstract

The recent times see cities at forefronts in the fight against the pandemic in the framework of the harmful effects of climate change and urban inequalities issues. This territorial and urban condition is emphasizing the need for a 'holistic' approach to urban resilience and the importance to focus on sustainable mobility policies and planning towards green and inclusive metropolis. The main goal of this paper is to investigate and highlight innovative approaches in European Sustainable Mobility Plans, aimed at overcoming the sectoral critical aspects within a metropolitan resilience perspective. Bologna represents a paradigmatic case of sustainable metropolitan area with new plans based on resilience, cohesion, connectivity. Findings and lessons are expected to be useful in order to extract relevant suggestions for the specific interpretation styles of resilience in planned strategies and specific projects to be applied, notably in the European context.

Keywords

Resilience, Mobility, Metropolitan Cities

1. Resilient cities in changing scenarios

The contemporary city is characterized by high levels of soil sealing and private mobility which contribute to air pollution, a progressive lack of biodiversity, water risks, global warming fostering frequent calamitous events in the framework of climate changes (IPCC, 2014). Urban sprawl is also accompanied by a fragmentation of public space, urban fabrics and local communities which feed the metropolitan socio-economic polarization, exacerbated in the new millennium by the economic crisis of 2008 and the pandemic of 2020. In particular, the recent times see big cities at forefronts in the fight against the pandemic facing the spatial, environmental and social issues of poor accessibility to public facilities, lack of open green and blue spaces and infrastructure, imbalanced distribution of commons, discontinuity of pedestrian and cycle networks, worsened by social distancing measures related to Covid-19 (Un-habitat, 2020; OECD, 2020a).

These issues have increasingly emphasized the need for an authentically 'holistic' perspective to urban resilience (UNDRR, 2010), already fostered by the Sustainable Development Goals and European Policies. Unfortunately, when a term is so successful to permeate the common international lexicon, it runs the risk of becoming trivial and suggests a clarification in order to define specific theoretical and operational references.

In this context, the paper intends to highlight how resilience can be considered the key to rethink the multiple dimensions of regeneration in a holistic approach, combining spatial, environmental, social and

institutional issues. In consistency with the recent theoretical and operational references for urban resilience (§ 1.2), this concept is reflected in the integrated approach of mobility strategies between public, green and movement spaces in the framework of climate changes and pandemic issues (§ 2). Furthermore, the concept is supported by a strategic set of planning tools, as in the case of Bologna (§ 3); hence the possibility to argue some main references for plans able to entangle the structuring choices for urban and environmental sustainability, tactical urbanism and participatory approach (§ 4).

1.1 Paper goals and methodology

Starting from the topics of common research projects and scientific collaborations, the main goal of authors in this paper is to investigate and highlight innovative approaches in mobility planning practices, aimed at overcoming the sectoral critical aspects in a holistic perspective of metropolitan resilience. Looking at the emerging interpretative trends of issues arising from climate change and pandemic phenomenon, it is possible to focus on different cultural models through the analysis of one specific case-study – Bologna metropolitan City – with particular reference to recent mobility strategies and tools. The work has adopted the inductive method and the classic case-study interpretation keys (Yin 1984) developed with a qualitative approach and supported by direct sources, in order to extract relevant suggestions to support the interpretation of urban resilience in planned strategies and specific projects to be applied, notably in the European context. In particular, virtuous experiences in Italy, France, Spain have delivered significant results and references useful for introducing innovation in policies and planning practices in the Italian context. To this end, the integrated and participated planning process in the metropolitan area of Bologna for the Sustainable Mobility Plan appears particularly advanced due to its consistency with the holistic approach promoted in EU policies.

2. Emerging mobility for resilient metropolitan cities

In a theoretical perspective, the polysemous nature of the term "resilience" in urban policies is enabling innovative multi-disciplinary entanglement, implementing a virtuous dialogue between several knowledge domains (such as health, ecology, environment, socio-economy, law, planning). Resilience is an answer to urban complexity and interactions, guiding all these sectors towards a sustainable urban metabolism, the use of smart technologies, the implementation of eco-friendly and adaptive urban spaces and networks. "Urban Resilience is the capacity of individuals, communities, institutions, businesses, and systems within a city to survive, adapt, and grow no matter what kinds of chronic stresses and acute shocks they experience" (Rockefeller Foundation, '100 Resilient Cities' initiative).

2.1 Towards a holistic approach to urban resilience

Moreover, resilience, deepened in the framework of an ecosystemic perspective (Acerno, 2015), is related to the concept of anti-fragility (Taleb, 2007, Blecic & Cecchini, 2016) that fosters the capability of adaptation to external perturbations, facing vulnerability and preventing risks, offering multiple and coordinated actions and ways of interventions that enable improvements of systems within rapid stresses and long-lasting changes. This concept thus fosters a proactive character of dynamism and adaptation of transformation choices to environmental, economic and socio-cultural changes and pays attention to the uncertainty of the scenarios and the scarcity of resources and the need for data analysis, flexibility, and reversibility. At the same time, it affirms the importance of being rooted in the *milieu* and place-based approaches, focusing on the overall and multi-scale quality of the networks of physical, cultural, economic and social relationships. With such objective, it is evident that urban resilience requires an integrated innovation between material networks (infrastructures and transports as well as green corridors) and immaterial networks (ICT, regulated social interactions and institutional cooperation) considered strategic vectors for a 'smart city' and for the 'right to the city' (Amato et al., 2019; Lauri, 2021).

In an operational perspective, the post-pandemic recovery policies, launched in 2020-21 through the allocation of huge public resources at international level (i.e. the USA 'American Jobs Plan' or the 'Next Generation EU'), put the emphasis on the resilience concept (Italian 'National Recovery and Resilience Plan', 2021) that fosters an integrated strategy on material and immaterial networks (from the ecological transition of rails to MaaS), in consistency with the cohesion principles of territories and civic communities. Furthermore, the documents point out the importance of the strategic dimension for planning in order to coordinate the different interventions and actions coming from the stakeholders and the city-users and to mend the separation between top-down policies and bottom-up practices.

2.2 Mobility strategies and urban regeneration

The post-COVID-19 phase brings with it the potential to build "a new normal" (OECD, 2020b) in cities, placing issues related to the health and social distress of citizens but also to the vulnerability of economic systems at the centre of regeneration strategies. Urban planning, which was born in the industrial age as a discipline aimed at addressing sanitation problems and the organization of urban networks and services, took on new responsibilities in the twentieth century, starting from the awareness of the complexity of contemporary city, and of the deep interrelations between anthropic and natural dynamics in the Anthropocene era (Crutzen, 2000).

In this context, mobility models and infrastructures assume a central role, starting from data that confirm not only the contribution of road transport to greenhouse gas emissions in European urban areas (equal to about 25%) but also the related economic and health effects (EEA, 2021).

The global and European agendas offer a reference framework for national, regional and local governments to promote a new paradigm of sustainable development, giving priority to investments and resources that hold together objectives intervention (environment and landscape, mobility and infrastructures, public space and urban services), tools (policies, plans, programs, projects) and scales of intervention (European, national, regional, local) placing the theme at the centre of a multilevel governance framework of resilience.

Urban resilience finds particular concreteness in the choices aimed at strengthening sustainable mobility and ecosystem services in the construction of urban networks, reconfiguring the methodological references for the planning, design and management of urban space. Integration of urban and mobility strategies and tools are the base for innovation and the keys of best practices. Looking at the 'space of movement', new planning tools can overcome ancient separations with the land use design and the open space system by concretely implementing integrated regeneration strategies (Un-Habitat, 2020; OECD, 2020a).

First of all, the EU SUMP (Sustainable Urban Mobility Plan) officially introduced through the 'Mobility Urban Package' [(COM 2013) 913] and the following and progressively implemented by the 27 member states represents the ambition of combining mobility and transport infrastructures with the urban space design in order to implement the ecological transition through the coordination of different infrastructure networks and urban spaces, overcoming a sectoral approach. The main good practices have been held in Bologna as well as in Bruxelles Capital Region, Grenoble and Great Manchester.

Furthermore, the combination of cycle, green and public spaces networks are the specificity of Spanish practices experimented in the context of the arising role of the *Estrategia Nacional de Infraestructura Verde y de la Conectividad y Restauración Ecológicas* through new tools that integrate the construction of mobility, public spaces and green networks: emblematic examples are the tools place put in in Vitoria-Gasteiz such as the integrated *Mobility and public space Plan* and the *Plan de Acción Territorial de la Infraestructura Verde del Litoral de la Generalitat Valenciana* (Ravagnan, 2019) where the cycle system is a backbone for the construction of a multiscalar green infrastructure.

Additionally, many Mobility Plans are developing “local mobility grids” (Cerasoli & al., 2021) in order to improve local accessibility of facilities and centralities. This goal is supported by the theoretical concept of the “ville du quart d'heure” (Moreno, 2020) consolidated within years of studies and pointed out in the phase of Pandemic in the Paris case study. The 15 minutes-city promotes a reorganization of local accessibility with compact fabrics and services, in order to enable an increase in the quality of life in the ordinary phases and risk reduction during environmental and health crises. A proposal for a local grid is also developed in the Good Move Mobility Plan for the Capital-Region of Bruxelles 2020-2030 (awarded as best SUMP in 2020), where the design strategy of the ‘Espace rue’ proposes an hypothesis to organize relationships, interactions and conflicts between public spaces and mobility space at local and urban scale, highlighting the importance of an integrated approach to streets, in consistency with the indicators of the “healthy street” defined by Transports for London (Transport for London, 2020).

Finally, the flexible and reversible expansion of the space dedicated to pedestrians and local greenery in the framework of “tactical urbanism”, from the Superillas in Barcelona (Rueda, 2016) to “Piazze aperte” in Milan is clearly paying a growing attention to cycle paths, as a method for the implementation of temporary bike lanes or as an experimentation for future structural projects of cycle systems in SUMP, in order to test the interest of citizens and the possible synergies and conflicts with other forms of mobility and public spaces (Amato et al., 2019).

These strategies are the common keys of numerous experiments and studies at an international level that reveal an acceleration and timeliness of practices in some metropolises: Bologna, Milan, Paris, Brussels, Barcelona, Madrid, New York, Bogotá, Lima (OECD, 2020a). This timeliness is closely linked to the consolidation of structural choices on sustainable mobility considered a priority both by the administration and by the citizens, who have been involved for years in participatory processes and debates on urban regeneration. Among these, Bologna represents an emblematic case in Italy, also for being the first metropolitan city to approve the Sustainable Urban Mobility Plan following the EU format.

3. Bologna Metropolitan City: holistic approach to mobility

Bologna represents a paradigmatic case of sustainable, thriving community, a surprising cradle of policies, plans and projects conceived, developed and implemented following the idea of an emerging identity of ‘small metropolis’ based on resilience, cohesion, attractiveness, and connectivity to be pursued through the construction of innovative tools in which mobility networks are not conceived as a sectoral dimension but as crucial bridge connecting ‘polis’ to ‘civitas’ and ‘urbs’.

Within few years the local public institutions, the Metropolitan City and the Municipality of Bologna in particular, have been able to pursue an extraordinary rich and effective path conceiving, discussing and approving numerous integrated and coherent tools in order to face the emerging challenges of contemporary urban communities. Bologna Municipality has recently approved an intriguing new General Urban Plan (July 2021) pursuing an advanced strategic profile according to the innovation principles introduced by the Emilia Romagna Regional law (n. 24/2017). Looking at the inter-municipal level, recent planning tools as the Metropolitan Strategic Plan, the Metropolitan Territorial Plan and the Sustainable Urban Mobility Plan (SUMP) are proving to be original interpretations of integrated and inclusive planning process, particularly consistent with the holistic approach promoted by European policies. In the following lines it is particularly highlighted the crucial role played by mobility and its plans in pursuing and interpreting urban resilience.

3.1 The ‘architecture’ of plans supporting the emerging metropolis

In Italy, metropolitan areas are still a young, ‘in progress’ juridical reality. The first legislative measure that had instituted them more than 30 years ago (l. 142/1990) didn’t find mature conditions to be implemented. The relaunch occurred only few years ago by the re-introduction of the ‘Metropolitan City’

institution (l. 56/2014), whose primary mission was the identification and coordination of development strategies for the whole metropolitan area through a Strategic Plan.

Within the framework of the UN 'Agenda 2030' objectives and the 'Bologna Charter for Environment', Bologna - the first new Metropolis constituted in Italy (2015) - approved its Metropolitan Strategic Plan (PSM 2.0) in 2018 with the aim of pursuing three fundamental dimensions: sustainability, inclusiveness and attractiveness. Sustainability in its environmental, economic and social dimensions nourished by the culture of legality and education in civic values. Inclusiveness, interpreted as the ability to enhance differences and peculiarities, transforming them into common assets and wealth. Attractiveness as openness to the original, unexpected, different issues, aware of how to increasingly strengthen its international and cosmopolitan identity.

The Metropolitan Territorial Plan (PTM) fosters a sustainable and resilient, attractive territory, in which the protection of the environment, the beauty of urban and natural places, work and innovation can find unitary and propulsive synthesis.

The plan, approved in 2020, already in full Covid-19 emergency, is the main vector of new tasks: promoting urban regeneration, enhancing ecosystem services, managing the progression towards 'zero new land consumption', redistributing in an equalized way, on a metropolitan scale, the resources generated by the main urban transformations. The 'territorialization' of development strategies represents the specific object and added value of PTM with particular attention to territorial and urban resilience, risk prevention, service accessibility, welfare system, quality of production areas and above all the adequacy of mobility networks and infrastructural connections.

3.2 Sustainable Urban Mobility Plan: cultural roots and Bologna interpretation

At the end of 2019, Bologna was also the first metropolitan city to approve the Sustainable Urban Mobility Plan (SUMP), the 'Italian interpretation' of the EU strategic tool designed to meet the mobility demand of residents, economic activities and city-users for the quality-of-life improvement. SUMP promotes the innovation of traditional approaches between 'settlement' and 'movement' space through the principles of resilience, integration, participation. Its formalization at EU level represents the climax of an evolutionary path starting from the Action Plan on Urban Mobility (COM 2009, 490) and the Transport White Paper (2011), as well as through a consultation conducted on behalf of the European Commission from 2010 to 2013 with the involvement of numerous experts and sector players; the work finally led to the 'Urban Mobility Package' [(COM 2013) 913] which recognized the SUMP as a new strategic tool for integrating mobility, accessibility and the city realm all over EU urban and metropolitan areas. In some countries as France or Italy it has become compulsory for cities or polycentric areas with at least 100,000 inhabitants. The joint work has merged into the first and second edition of SUMP Guidelines (Rupprecht Consult 2013, 2019), official documents by the European Commission addressing public and private stakeholders towards the collective conception, implementation and management of the plan with the ambition of integrating mobility networks, transportation systems and urban planning strategies.

Unlike the more traditional approaches to mobility planning, the SUMP philosophy hinges on main axes as the participatory involvement of citizens and diffused stakeholders, the coordination of administrations at different levels, the harmonization of sectoral strategies enhancing the synergy between existing and in progress tools. The SUMP aims at participatory democracy, processualism, prefiguration and evaluation of evolutionary scenarios, careful monitoring and remodelling of the implementation phases.

In Italy the mobility plan concept represents the mature evolution of the 'Mobility Urban Plan' (PUM), originally introduced in 2000 drawing inspiration from the French '*Plan de Déplacements Urbains*' (PDU), born in 1982 with the law LOTI (*Loi d'Orientation des Transports Intérieurs*). Originally the French model

was based on the principle of 'right to transport' mostly meant in its technical-functional dimension; afterwards, the plan profile was enriched with themes and contents related to the emerging ecologic-environmental dimension (law LAURE, *Loi sur l'Air et l'Utilisation Rationnelle de l'Énergie*, 1996) and 'urban welfare' policies (law SRU, *Solidarité et Renouvellement Urbain*, 2000). In the last decades, PDU has reached an explicit organic integration with urban and inter-municipal planning tools, strengthening its 'strategic' role by denying the sectoral dimension and expanding urban and metropolitan identity. Therefore, if the mobility plan allows the virtuous integration of social, environmental and symbolic dimensions with land use and infrastructural design, it could give substance to the original Lefebvrian idea of the 'right to the city' (Lefebvre 1968), recovered and interpreted with growing awareness in the literature that discussed the metamorphosis of urban lifestyles (Mitchell 2003, Harvey 2013, Secchi 2013).

Indeed, the French model of 'movement space' and 'network urbanism' (Dupuy 1991), which has inspired the EU idea of sustainable mobility plan, is not limited to pursuing the efficiency (and safety) of displacement vehicles, the rethinking of parking system or the rational circulation of people and goods, but proposes a more inclusive idea of urban welfare policies, prefiguring the passage from '*droit au transport*' (LOTI, 1982) to '*droit à la mobilité*' (*Loi d'Orientation des Mobilités*, LOM, 2019), tackling every form of inequality, marginalisation and isolation in the city.

In the first national Sustainable Mobility inter-municipal plan, the vision aims to "make Bologna metropolitan area more attractive through high levels of urban quality and liveability in order to enhance the cohesion and attractiveness of the territorial system as a whole and strengthen the role of its capital as international city".

The tool pursues the objectives of territorial development and regeneration by placing the crucial focus on values, rights and primary needs of the community, from health to safety, from accessibility to essential services and social inclusion, from education to work and leisure.

The holistic approach evoked in the disciplinary debate finds concreteness in the macro-objectives that outline the pillars of urban and territorial sustainability. The mobility and accessibility issues stand out in their kaleidoscopic interpretations: from the physical-spatial dimension of the reconnection between centrality and peripheries, to the "environmental imperative" of tackling emissions and fostering resilience to climate change.

The accessibility ensured by collective transport networks and by encouraging micro-mobility is then seized as an opportunity to restore urbanity, social cohesion, proximity facilities and a 'sense of belonging' to the communities widespread across the territory (Monardo 2020). Bologna, even in times of pandemic, confirms the rule that requires the administrations traditionally active in outlining integrated policies and open processes to be resilient and embrace adaptive flexible geometries facing striking times and undesired events.

In the Bologna SUMP the resilience approach is highlighted by the "Biciplan", a sort of ecological cycle metro (inspired by the Réseau Vélo of the Paris region), conceived 'ex-ante' and integrated into the new plan, a precious resource for its capacity to create an organic framework, the 'Bicipolitana', bike structural and interconnected network that proved to be very effective both for the tactical interventions solicited by the health emergency and for the long term strategic relationship system.

4. Metropolitan resilience and urbanity. Open issues

In the pandemic season, cities and metropolitan areas have been identified as the privileged domain for rethinking plans, programs and projects useful to manage the community health issues looking at specific

problems as the correlation between settlement densities, public transportation and virus spread or the pathological rise of structural inequalities at social and economic level (Nomisma, 2020).

According to emerging principles in the scientific-disciplinary debate, despite the persistent crisis, this condition represents the trigger to speed up processes of urban regeneration requiring an integrated approach to urban planning and mobility, in order to create the conditions for more inclusive, green and resilient cities (OECD, 2020a, 2020b), mostly aiming at proximity displacements (Moreno, 2020), non-polluting active mobility, flexible and inclusive public spaces (Un-Habitat, 2020) (Honey-Rosés 2020).

Are local administrations proving to be equipped to manage conditions and opportunities suddenly opened up by the crisis and design virtuous scenarios of transformation? Ideas and initiatives paint a multicolour landscape and reveal the pendulum between many tactical, pop-up initiatives and rare strategic scenarios. Urban and metropolitan actors are called to face a terrific challenge: issues at stake are relevant and the cultural 'dna' of mobility styles, more or less sensitive to sustainable displacements, is making the difference even in emergency contingencies. The temptation to encourage micro-mobility with "pret à porter" tactical urban planning has proved unavoidable, but international cases clearly demonstrate that the short-term approach cannot be enough.

The local administrations that have responded more promptly and effectively to the pandemic challenge seem to largely coincide with those traditionally active in designing integrated policies, and therefore equipped with new plans, programs and other tools consistent with a vision of overall strategic transformation. In fact, the implementation of coordinated actions between short and long-term choices requires a wide range of strategic and operational tools able to manage emergency and temporary interventions within balanced relationship frameworks, maximizing the virtuous effects in space and time (Lydon 2015).

The Bologna experience shows how the cities that have adopted timely and convincing measures are those with a consolidated cultural background, capable of promoting and implementing tools characterized by holistic and strategic approaches able to re-boost synergistically physical and intangible networks for urban and metropolitan resilience.

The integrated and inclusive planning process in the metropolitan area of Bologna appears particularly advanced due to its consistency with the holistic approach promoted in EU policies and implemented by significant metropolitan areas in western Europe. Its recent planning path shows the integration of mobility networks and public transportation systems with urban patterns, green-blue corridors and public spaces to be planned through participatory democracy's steps. Recent Bologna metropolitan tools represent the essential matrix useful to rethink and adapt spaces and forms of mobility, struck by unpredictable emergencies.

Original principles of new mobility plans escape from the sectoral dimension, assuming a strategic role through the ambition to integrate infrastructural space and land use design at metropolitan scale. It's the attempt to prefigure a "new urbanity" based on the synergy between the dimension of movement and the space of stasis that we all have experimented during lockdowns.

What is meant by "new urbanity"? It is one of the most complex and polymorphic concepts: prestigious schools of thought speak of urbanity as "the reciprocal adaptation of urban fabric morphology and conviviality form" (Choay 1994, 1996). It represents the intertwining of the social '*mixité*' which promotes integration, and the public space in all its forms, which becomes the privileged place for its development. And the mobility spaces, with particular attention to the pedestrian and cycle paths, offer original and creative interpretations of urbanity (Levy 1997, 2004).

The lesson that emerges from the change in lifestyles as a result of the pandemic cannot therefore concern only the optimization of what already exists: it is necessary to rethink the infrastructural sites in the intertwining with urban functions, reflect on the consequences of the density remodulation, not only residential, but that of workplaces, university towns, urban services for education, free time, consumption and above all the flow densities in the space of movement, with a regulated downsizing of the capacity of collective transport carriers to be made more attractive and safe, preventing at the same

time dangerous crowds during peak hours. All features that must find a new interpretative key in terms of public health protection.

Mobility is not just an opportunity of creating relationship spaces but embodies the 'place' essence wherever it is produced. Not just a technique to connect nodes and areas, but the vector of an everlasting new 'urbanogenesis'.

Research context and authors' contribution

This paper illustrates the first findings of some investigation paths within the 'Sapienza' University of Rome International Research Project "Infrastrutture per la mobilità. Verso nuovi paradigmi interpretativi e nuovi strumenti operativi per la resilienza delle città metropolitane europee" (coord. Monardo B. and Ravagnan C.) and of the participation to the Working Group "Covid-19, Cities and Governance" of the Global Pandemic Network (coord. Lauri C. and Crispi G.). In this framework §1 and 2 are attributable to C. Ravagnan, and § 3 and 4 to B. Monardo.

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