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THE RESILIENCE CITY / THE FRAGILE CITY. METHODS, TOOLS AND BEST PRACTICES.

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Laboratory of Land Use Mobility and Environment
DICEA - Department of Civil, Architectural and Environmental Engineering
University of Naples "Federico II"
Piazzale Tecchio, 80
80125 Naples
web: www.tema.unina.it
e-mail: redazione.tema@unina.it

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Methods, tools and best practices.

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GEOGRAFICH DETERMINISM VS URBAN RESILENCE: AN ITALIAN SCENARIO ANALYSIS

STEFANO DE FALCO

IRGIT - Istituto di Ricerca sulla Geografia della Innovazione Territoriale, Università degli Studi di Napoli Federico II
e-mail: s.defalco@unina.it

ABSTRACT

It has been for many years that the analysis of the resilience concept has transversally enriched the scientific debate, both from the technical-scientific view to the socio-humanistic one.
In urban areas, particularly, scientific literature offers a consolidated panorama of theories and applications.
The present work is animated by the objective of complementing this background with a geographic approach in which the characteristics of urban resilience, synthesized by a wide review of scientific articles, are associated with determinants of geographic type (urban dimension, latitude, and prevalent urban attribute).
The proposed analysis introduces methodological elements of evaluation useful for this topic, as well as demonstrates, based on the stratification of real data regarding some main urban variables (Living, Environment, Mobility and Legality), the scenario of Italian cities characterized by high, medium and low resilience actions as a function of their geographical characteristics. It will try to make clearer the question regarding the geographic determinism paradigm respecting the urban frame, analyzing the eventual geographical influence on the processes of urban resilience

KEYWORDS:
Resilience; geography determinism

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地理决定论与城市复原力:

意大利情景分

STEFANO DE FALCO

IRGIT - Istituto di Ricerca sulla Geografia della Innovazione Territoriale, Università degli Studi di Napoli Federico II
e-mail: s.defalco@unina.it

摘要

多年来，对“复原力”概念的分析横向地丰富了从科学技术观点到社会人文主义科学观点的科学讨论。
特别是在城市地区，科学文献提供了理论和应用的综合概述。
本文从地理方法这一补充角度切入，通过对科学文献的广泛梳理和整合，研究城市复原力特征与地理类型决定因素（城市维度、纬度及城市普遍属性）的关联。
本文提出的分析引入了对这一主题有用的评估方法要素，并基于对一些主要城市变量（生活、环境、流动性和合法性）实际数据的分层，将意大利城市高、中、低复原力作为其地理特征的功能。本文将试图提出有关尊重城市框架的地理决定论范式问题，分析地理因素最终影响城市复原力的过程

关键词:
复原力、地理

1 CONCEPTUAL FRAMEWORK

The topic of geographical influence on anthropic, as well as other, processes finds remote origins, but its most scientific formulation can be traced back to the end of the 1800s with the geographer Ratzel who identified the territory and defined it as a tangible material item made up of elements connected to each other in a Cartesian vision in which it is possible to analyze causal relationships and their effects.

Therefore, by inserting itself into all those sciences founded upon the scientific rigor of the cause-effect relationship, scientific debate began to speak about geographic determinism: cause function for the territory, and the way of inhabiting and using the terrestrial surface for the relative effect.

According to an approach of this type, therefore, the specific ability to react from man, in the specific topic of urban areas, to phenomena of shock, for example the urban resilience, could change according to the territorial or more generally geographical features.

The objective of this study is to evaluate, through some real data on Italian cities, how this correlation could be true and possibly for which variables. For over fifty years scientific literature has suggested an interpretation of the city as a system; in the last twenty years, the evolution of the complexity paradigm has awarded a central role to a dynamic reading of urban systems (Batty, 2008), more and more widely interpreted as complex systems, non-linear, capable of self-organization, which constantly change themselves by the action of perturbing factors, owned to internal processes or owned to exogenous factors.

Climate change, resource scarcity, individual or concatenated risks, and environmental degradation are just some of the many and varied factors that threaten contemporary cities and are now the pressure factors capable of triggering processes and modifications of urban systems, altering or changing their status. These factors are characterized by different natures and impacts: some may induce long-term changes (lack of resources); others cause immediate shock (risks). Faced with the various factors mentioned above, cities seem to play a dual role: on the one hand, they constitute systems that are highly vulnerable to the potential impacts of such factors, while on the other hand, in many cases, the characteristics and evolution modes of urban systems are themselves able to generate or amplify these factors.

The complexity of the various pressure factors, their close interactions and the characteristics of the urban systems, seem to suggest the need to analyze and manage the response of urban systems to potential impacts of these factors through a systemic approach, able to grasp the complexity and interactions between factors and better understand the ways in which the various elements of the urban system react to each factor and react to their interactions, at different scales and in the course of time.

Unfortunately, despite an awareness that cities are complex systems to manage, and considering that connections come even before the individual parts (Kanter & Litow, 2009), the different pressure factors are almost always treated separately, both by researchers as well as technicians with the result of an increasing fragmentation, and subsequent ineffectiveness, of urban policies.

Against this, a growing number of researchers and international organizations seem to agree on the key-role relative to the concept of resilience, which it can play in order to increase the capacity of social and territorial systems in order to adapt or to change themselves as an effect of heterogeneous pressures (Folke, 2006; Bahadur et al. 2010). This concerns both slower ones, related to climate change, as well as those such as instant risks (De Falco, 2014, 2015a, b, c).

2 LITERATURE REVIEW OF RESILIENCE ATTRIBUTES

The concept of resilience is well known in a number of scientific fields, including physics (applied in engineering and construction, for instance) and ecological studies. Although there is not only one definition, in an intuitive way resilience is basically understood as the buffer capacity or the ability of an element (for example, a material or an ecosystem) to absorb perturbations (for example, by deforming elastically), or the magnitude of disturbance that can be absorbed before a radical change in its structure (for example before reaching

deformation, in the case of a material, or collapse, in the case of a building). In the last two decades, the idea of resilience has been translated into a number of human and social sciences, including psychology, organizational studies and network studies (Vanolo, 2015).

The centrality of the concept of resilience in the scientific debate of recent years in various fields requires a deeper analysis: it is, in fact, a controversial concept, characterized by many definitions and approaches, which risks becoming an empty shell, difficult to translate in operative terms (Rose, 2007; Grünewald & Warner 2012). The concept of resilience has deep roots and a complex evolutionary path. Born in physics to describe the resistance of the materials in presence of external disturbances, the concept of resilience has its main developments during the late sixties and early seventies in the field of ecology. Holling (1973) is one of the first to use the term to describe the behavior of natural systems in presence of external disturbances. And it was still Holling who proposed, in the mid-nineties, an interesting distinction between “engineering resilience” and “green resilience”. The first one, strictly connected to the concept of stability, was based on characteristics such as efficiency, return to an earlier time condition and, and above all, on the uniqueness of the equilibrium state. The second one, was defined as “magnitude of the disturbance that can be absorbed before the system changes its structure (Holling, 1996), was based on the possible plurality of equilibrium states and allows for a dual possibility for a system to absorb adverse disturbances within a certain threshold, while maintaining its own characteristics and structure, or change, when the level of pressure exceeds this threshold, in a different system, not necessarily better than the previous one.

The interpretation from the ecological point of view concerning resilience is strengthened further when the concept began to be used in the study of socio-ecological systems characterized by the close interrelationship between anthropogenic components and natural components and their further correlations with studies on adaptive capabilities of complex systems, based on learning by experience, and the ability to adapt to changes (Holling, 2001; Walker, Holling et al. 2004; Bankoff et al. 2004). Analysis of ecosystems using the resilience model allows one to consider nature not only as a system that constantly seeks equilibrium, but also as a system able to evolve, depending on specific inner conditions and on the contest that surrounds it. There are four crucial aspects of resilience (Walker et al., 2004, 2-3). The transposition of the concept of resilience to complex adaptive systems is closely linked to the concept of “Panarchy”, introduced by Gunderson and Holling (2001) to explain the evolutionary and dynamic nature, in time and in space, of such systems: the term describes the evolution of the systems according to evolutionary cycles as characterized by different phases. These cycles are developed in a domain of reality in three dimensions: the potential, i.e. the availability of accumulated resources (and for the socio-ecological systems which can be understood as natural capital and socially available); the connection, which is the system’s ability to control its own destiny or, conversely, its vulnerability to unexpected changes that exceed the system’s control capabilities; the resilience, that decreases when the system settles down in a stable condition and increases in reorganization phases and in growth, allowing the system to start a new cycle. The most recent developments of studies on resilience, strongly linked to the metaphor of panarchy, have further expanded the concept by proposing an interpretation as a result of three dynamically interacting components: persistence, adaptability, and transformability (Folke et al. 2010). Persistence, nearest to the concept of engineering resilience, expresses the ability of the system to resist impact, while preserving its own characteristics and structure, subject to a temporary removal from ordinary operating conditions. Adaptability expresses its capacity for social-ecological systems of learning, combining experience and knowledge, in order to regulate the response to internal or external disruptive pressures, changing the system in order to keep it within its domain of stability. Convertibility expresses the system’s ability to modify its own characteristics and its own structure, entering a different stability domain. This interpretation of resilience, thereby inspired by an evolutionary vision (Davoudi, 2012), seems to be the one most responsive to the nature of urban systems considered as complex systems: finally overcoming resilience’s idea as recovery of a previous equilibrium condition, it seems far more adapted to the dynamic nature of urban systems that constantly change themselves under the influence of endogenous and/or external

factors. As described above, in scientific literature there are different approaches to the concept of resilience applications on different systems (from the social to the economic and infrastructural). The main features of a resilient system are thus: persistence, adaptability and transformability as identified by Folke et al. in 2010. These traits are recurrent in scientific literature, although terms such as robustness or strength are often preferred to the term persistence. These terms, referring however to the ability of a system to face an event without undergoing alterations, can be easily interpreted as specifications of the persistence concept. Regarding sustainability, according to Folke et al. (2002), Chelleri (2012) and Colucci (2012), the target of sustainability can be achieved by enhancing urban resilience, especially "optimizing available resources, making a rational use of them, and contributing to increasing the amount of available resources" (Galderisi & Ferrara, 2012). Cities, in fact, are key players in energy and climate challenges, as they are responsible for the most energy consumption, and at the same time they are vulnerable to the effects of climate change (Gargiulo & Zucaro, 2015). Some capabilities are recurring regardless of the approaches and systems considered: diversity, for example, crucial in ecological systems, has been recognized as essential in the economic and social fields; learning ability, the feature of adaptive systems and the central purpose of their self-organization, interpreted as the capacity to learn from past events in order to confront the future. Table 1 provides a broad overview of scientific literature identifying the skills that, in different disciplines, are most used to describe a resilient system (Galderisi, 2016).

Field	Representative Author	Characteristics of Resilient Systems
Complex adaptive systems	Folke et al. (2002)	Diversity; redundancy; adaptability; self-organization; innovation; storage; experience; knowledge; learning ability; convertibility.
Systems thinking	Fiksel (2003); Bahadur et al. (2010).	Adaptability; cohesion; diversity; effectiveness and reliability of institutions; efficiency; control mechanisms; participation; knowledge; preparation; equity; networks; learning ability; multi-scale perspective.
Urban systems	Godshalk (2003); Ahern (2011); Desouza & Flanery (2013); Papa R., Gargiulo C. & Galderisi A., (2013).	Diversity; redundancy; resistance; adaptability/flexibility; collaboration; interdependence; autonomy; efficiency.
Communities	Bruneau et al. (2003); Chang & Shinozuka (2004); Davis (2005); Tierney & Bruneau (2007); Norris et al. (2008).	Redundancy; strength; availability of resources (resourcefulness); rapidity/capacity for mobilization.
Socio-ecological systems	Walker et al. (2004); Folke et al. (2010).	Resistance; latitude; precariousness; panarchy, persistence; adaptability; convertibility.
Ecosystems	Adger et al. (2005); Gargiulo C., Zucaro F. (2015); R. Papa, A. Galderisi, M. Vigo Majello, E. Saretta (2015); Colucci (2012).	Sustainability; diversity; redundancy; space organizations
Economic systems	Van der Veen et al. (2005); Briguglio et al. (2008).	Redundancy; sustainability; transferability; efficiency; rapidity; flexibility.
Urban communities	Chuvarajan et al. (2006).	Diversity; redundancy; self-organization; storage; networks; innovation; individual capacity; spatial interactions; temporal

		interactions; self-confidence; feedback.
Social systems	Maguire & Hagan (2007)	Resistance; resilience; creativity.
Social-ecological and economic systems	UNESCAP (2008)	Redundancy; strength; availability of resources.
Infrastructural systems	McDaniels et al. (2008)	Strength; rapidity.
Organizational theory	Gibson & Tarrant (2010)	Resistance; reliability; flexibility; redundancy.

Tab.1 Synthesis of literature for tge capacity of resilience

In table 2, after data sorting (figure 1), terms characterized by major occurrences in scientific literature can be deduced.

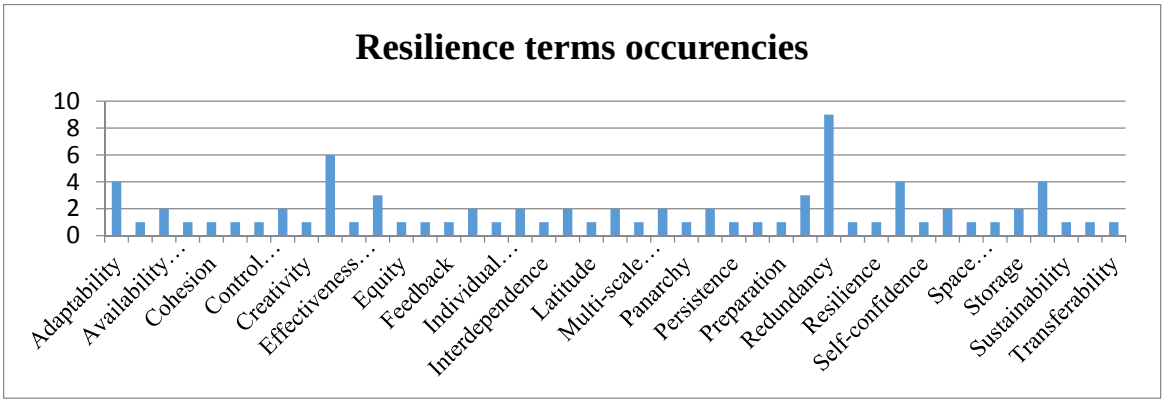

Fig. 1 Major resilience term occurrences in scientific literature

3 METHODOLOGY

The proposed methodological approach is based on some sequential phases. First of all, the resilience attributes, considered as prevalent inside the data set identified from literature review, have been defined starting from figure 1. The second step was the definition of the geographical features, in terms of the reference variables and relative levels of their respective variations, according to which stratify the data of the analysis to be conducted. In the present work, three urban geographical variables have been considered: size, latitude and type. Three levels of variability have been considered as well, as shown in table 2.

	Level 1	Level 2	Level 3
Size	Small	Medium	Metropolis
Latitude	South (S)	Middle (M)	North (N)
Type	University City (UC)	Cultural and Tourustic City (CC)	Industry City (IC)

Tab.2 Variables and level of geographical characterizations

Through appropriate filters related to the different levels of table 2, set in the processing software, the data were stratified according to their different geographical determinants.

In the following discussion, the main characteristics of the "type" characterizations of geographical determinants are chosen:

- *University City,* University cities are characterized by a young and lively context, innovative but with a long academic history. In fact, the element that unites the Italian university cities, similar to European ones, is represented by an almost oxymoronic union between rooted tradition and a propensity to the future. In the described context of these university cities, access to knowledge resources is potentially favored;

- *Cultural and Touristic City,* the touristic and cultural cities are those characterized by large tourist flows, as they are rich in monuments, churches, castles, museums, and historic houses. All preserve a historical, artistic, and architectural heritage that relate centuries of history. Often characterized by an urban fabric that preserves its original structure, whether it is a castrum or a medieval village, Italian cities of art represent vestiges of the times, frozen in their transformations. Marked by the activity of great artists and patrons, these cities are not only the container of relevant artistic expressions but are themselves works of art, characterized by festivals and theaters that combine traditions, culture, and entertainment;
- *Industry City,* Industrial cities are those cities polarized as an organizational and life model, mainly, to the presence of industries. Typical Italian industrial cities are Turin, a Fordist city par excellence thanks to FIAT, and Taranto which has the ILVA plant.

Next a correspondences matrix between resilience attributes and main urban characteristics is defined. These characteristics are Living, Environment, Mobility and Legality as shown in table 3, while sub-variables and metrics of these four variables are reported in the Appendix.

To assess the resilience of Italian cities with respect to these four identified urban variables, and for which data are available concerning both 2015 and 2016 through the source of the Icityrace report, two conditions have been considered in the analysis, in compliance with the pure definition of the concept of urban resilience:

- the first condition is the presence of low values of urban indicators;
- the second condition is the presence of a detected variation delta Δ for the variables of the first condition.

In this way, resilient cities can be characterized as those that, starting from a negative situation, reacted positively.

For those cases in which the data of the analysis will show a great intensity for this resilience action, the municipality policy and programmatic guidelines of those cities will be also analyzed to confirm the deterministic and non-random will of a municipality regarding the positive variation detected concerning these specific urban variables.

The results of the analysis shown in the next section will highlight, in the first case, a geographical dependence on urban variables and, in the second case, a possible relationship between some resilience attributes and geographical features, thus satisfying the objectives of the work.

4 DATA ANALYSIS

The analysis was conducted by considering the last 50 Italian cities from a total of 106, in the Icityrace 2015 ranking for each of the four urban variables: Living, Environment, Mobility, and Legality. These samples, each of them consisting of 50 units, represented cities with the worst values for the four variables considered. Then, for the same cities from each of the four samples, the respective values for the year 2016 were evaluated and the change, positive, null, or negative was used as a resilience metric.

Figures 2, 6, 10 and 14 show the variations of each city for each urban variable in decreasing order, while figures 3-5, 7-9, and 11-13 show the stratifications of data relative to figures 2, 6, 10 and 14 according to the three geographic variables chosen by size, type, and latitude, and according to their three variation levels (as shown in table 2).

	Urban Variables			
Resilience Attribute	*Living*	*Environment*	*Mobility*	*Legality*
Adaptability	▲	▲	▲	▲
Autonomy				
Availability of resources				
Capacity for mobilization			▲	
Cohesion	▲			▲
Collaboration			▲	▲
Control mechanisms		▲		
Convertibility	▲	▲		
Creativity	▲	▲		
Diversity				
Effectiveness and reliability of institutions				▲
Efficiency		▲	▲	
Equity				▲
Experience				▲
Feedback	▲	▲	▲	▲
Flexibility	▲			▲

Tab.3 Corresponding matrix

4.1 LIVING

The living dimension measures the livability of a city in terms of basic services and personal security as well as social cohesion, cultural offering and job opportunities. Therefore, in reality, the overall rating summarizes variables for which the distribution is extremely heterogeneous.

Global data shown in figure 2 reveals an almost univariate distribution more shifted towards positive variations rather than negative ones. The data stratifications in terms of geographical characterizations are reported in figures 3, 4 and 5.

From stratification data in figure 3 it emerges that the small and medium cities are characterized by better changes than the metropolis cities. Some sub-variables (see Appendix) such as school dropouts, infancy care, and elderly assistance have a very positive effect on the medium-sized size of cities, compared to other sub-variables such as amenities and entertainment, and the offer of cultural internationalization that are better for big cities. But the data clearly reveals a predominance of the medium-small size for the living variable.

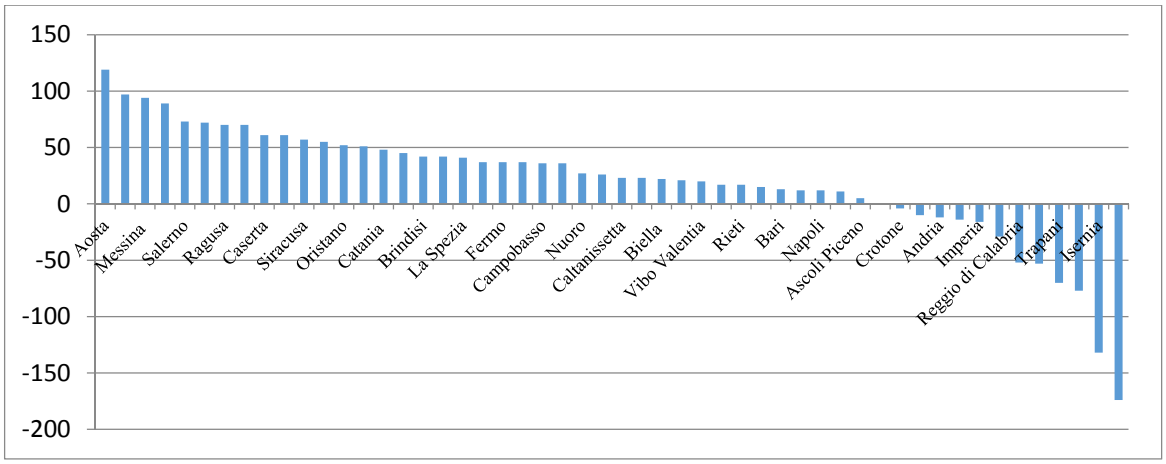

Fig. 2 Δ Living

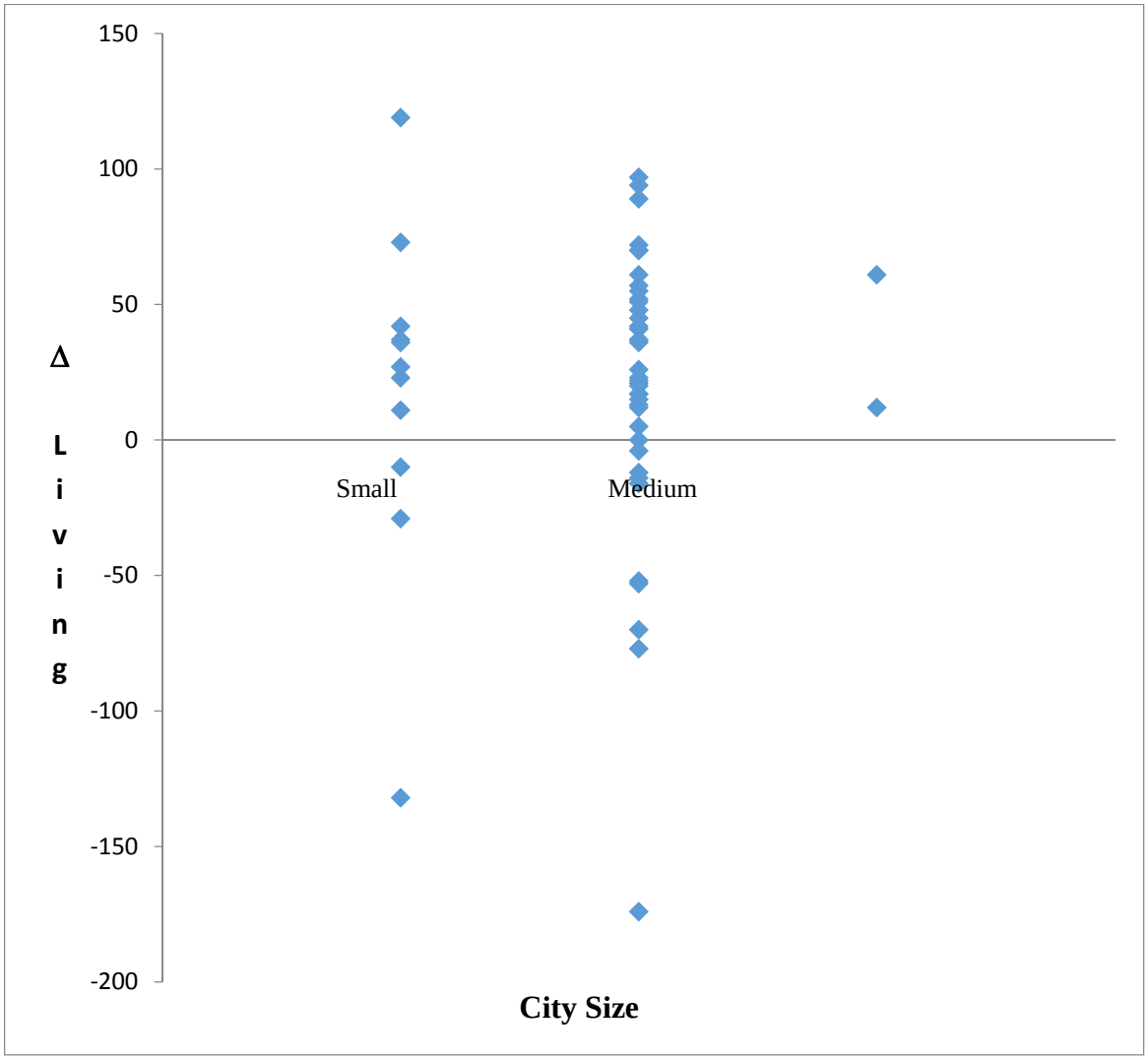

Fig. 3 Δ Living – size stratification

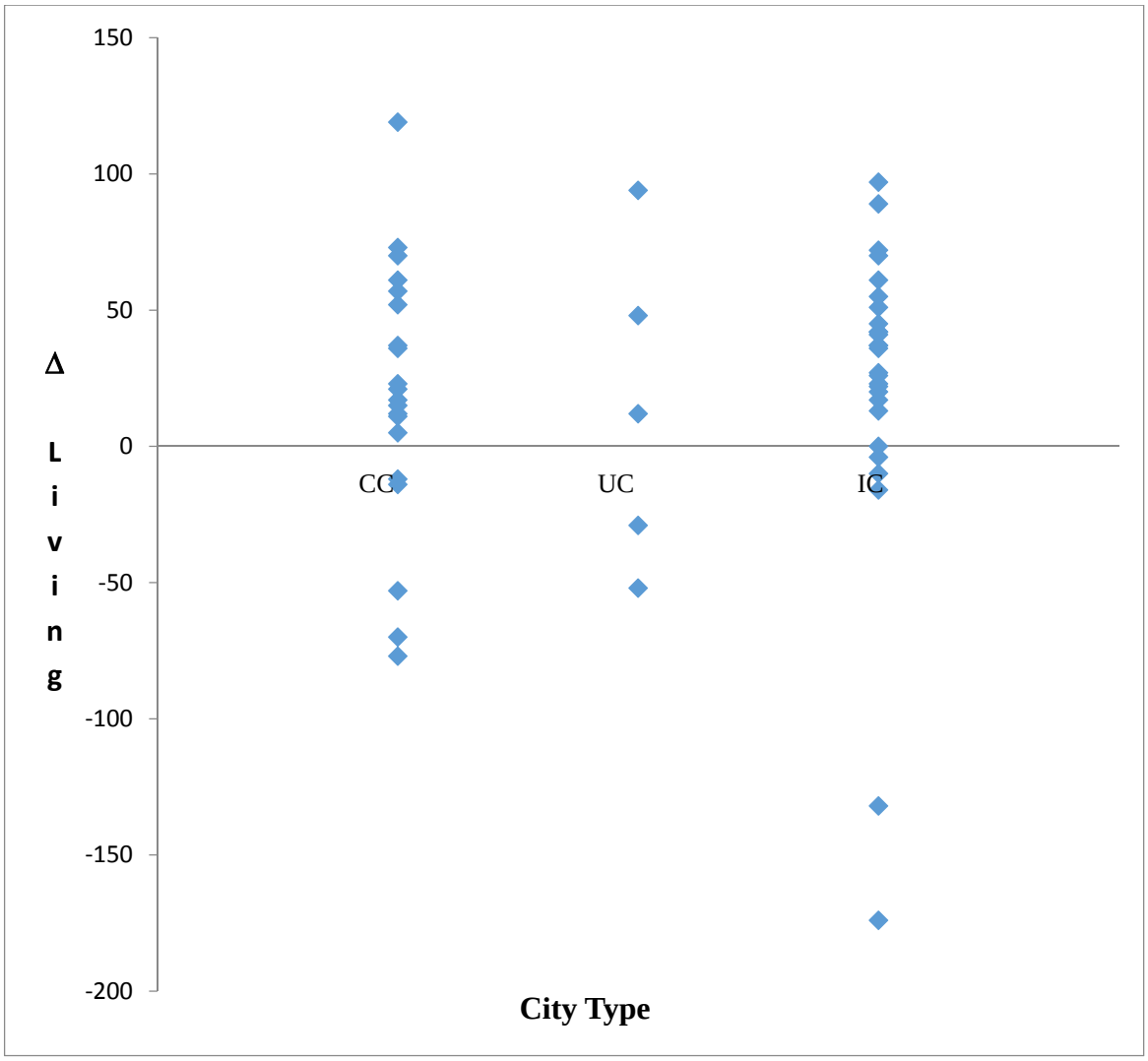

Fig. 4 Δ Living – type stratification

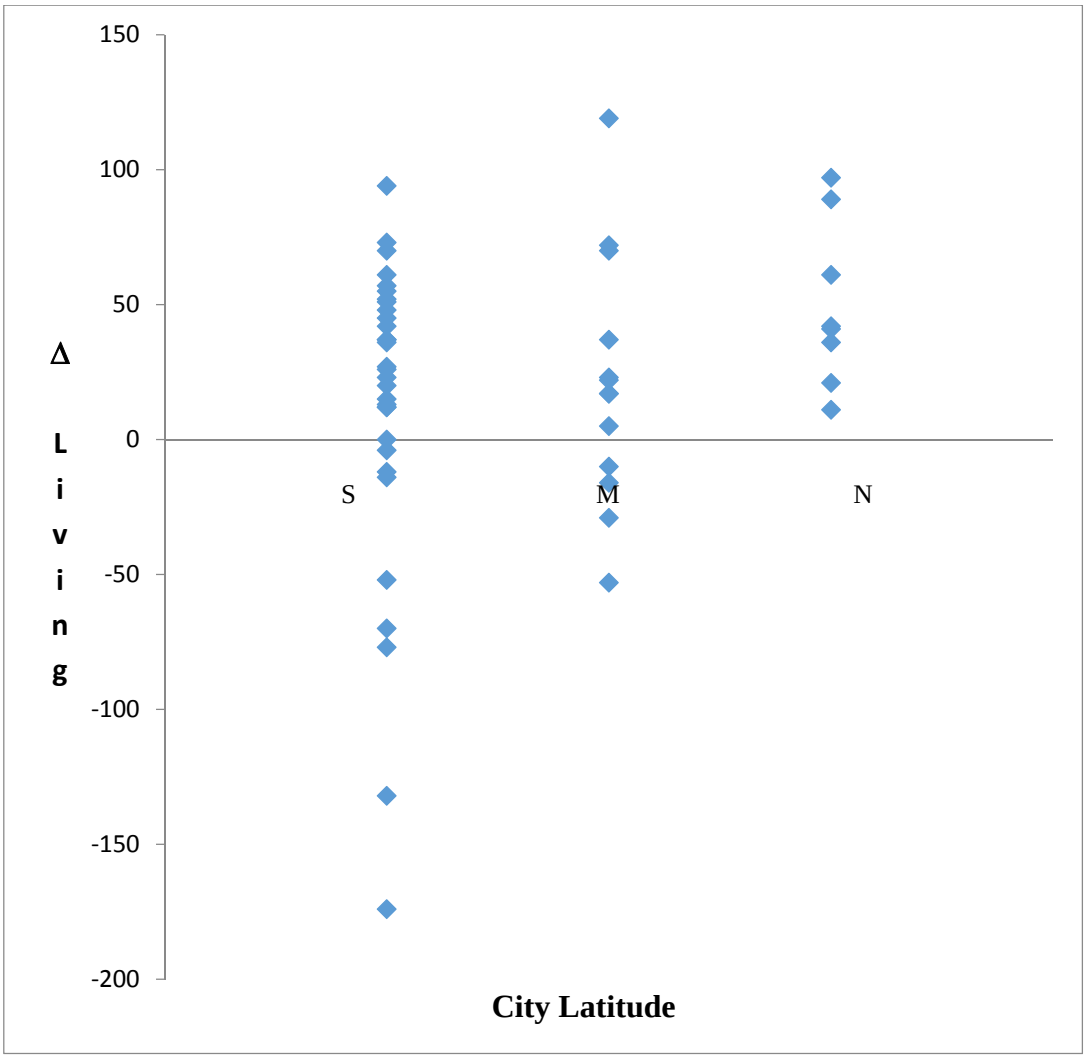

Fig. 5 Δ Living – latitude stratification

As shown in the graph stratification of figure 4, cities, regardless of their type, are in most cases prone to positive variations in regard to living. Thus the distribution of resilient actions can be considered uniform.
The stratification of data by latitude confirms an intense resilient action on urban livability in the cities of middle and northern Italy, while for the southern cities, even there is some positive data, it still shows many negative deviations, indicators of a degradation process that has not stopped.

4.2 ENVIRONMENT

The environment dimension describes the environmental sustainability of cities. The metrics, as shown in the Appendix, are oriented towards quality environmental protection measurement and public protection policies. Global data shown in figure 6 reveals a symmetric balanced bi-variate distribution. The data stratifications in terms of geographical characterizations are reported in figures 7, 8 and 9.

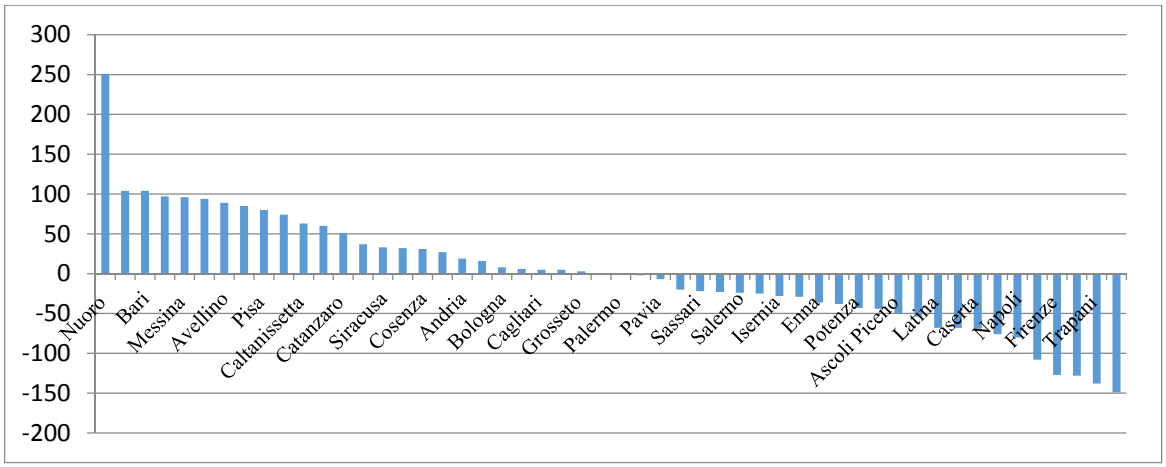

Fig. 6 Δ Environment

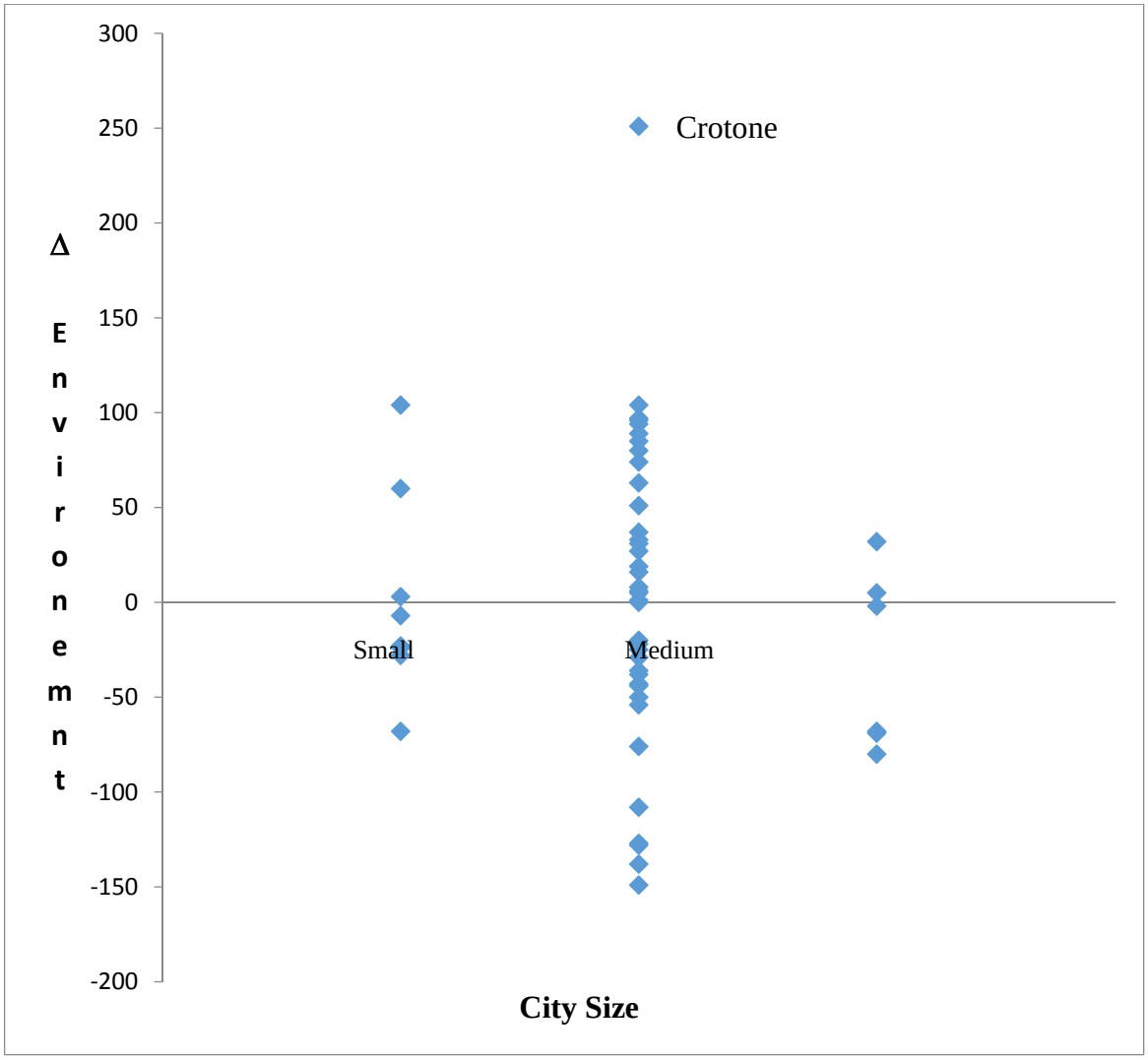

Fig. 7 Δ Environment – size stratification

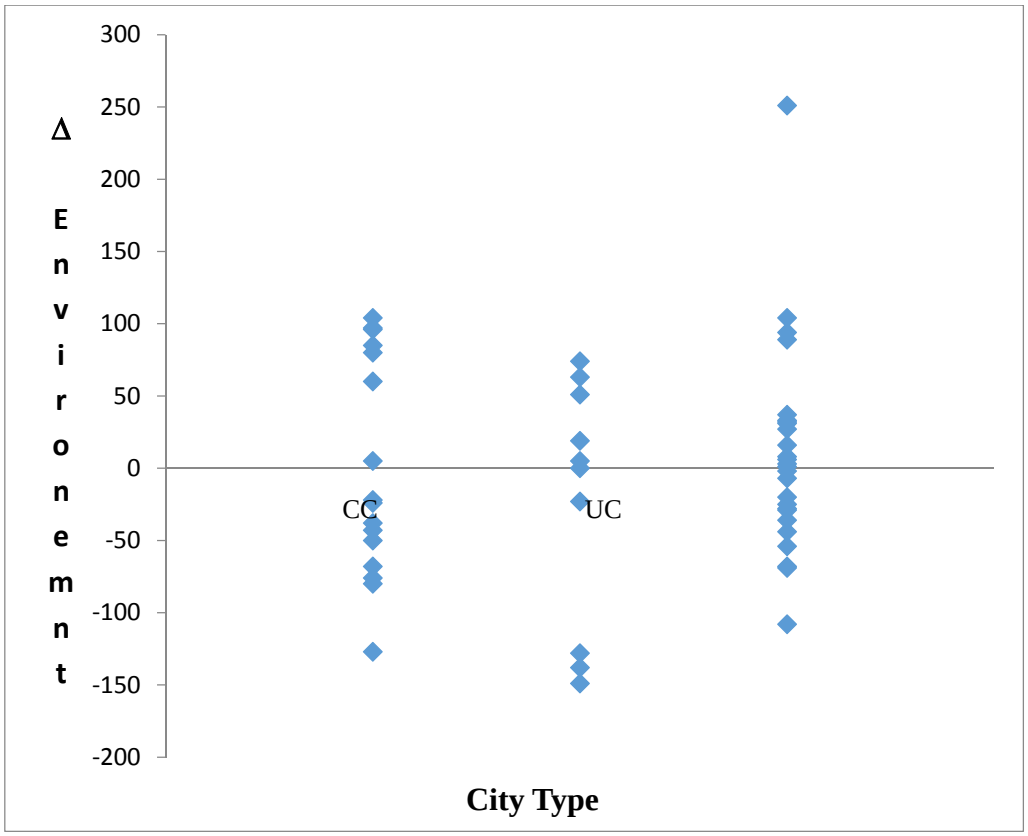

Fig. 8 Δ Environment – type stratification

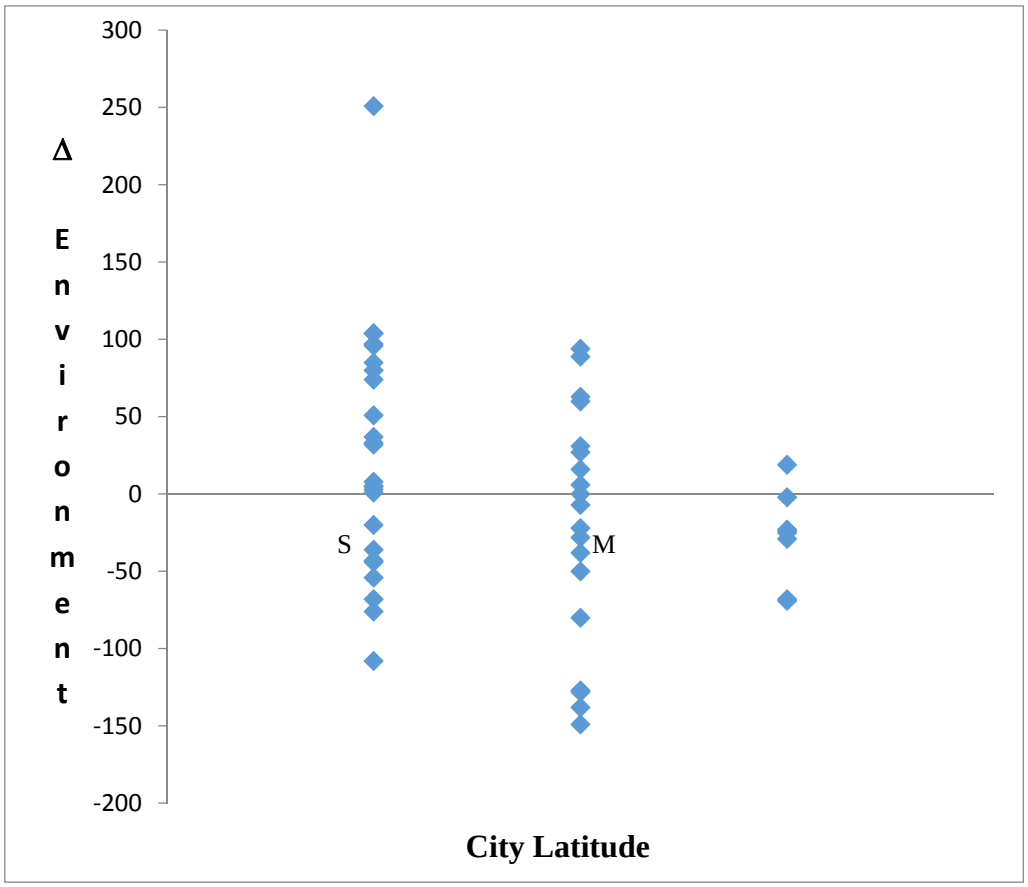

Fig. 9 Δ Environment – latitude stratification

In all cases, the stratifications both in urban size, type, and latitude as shown in figures 7,8 and 9, reveal an almost uniform bi-variate distribution, as global data profiles, representative of an Italian scenario in which both small and medium-sized cities are equally divided between those that have implemented the SEAP (Sustainability Environment Actions Plan) with innovative solutions for the use of renewable energy sources in their territories with the European objective of reducing carbon emissions by 20% by 2020, and those still unable to adopt solutions for the implementation of policies in the field of sustainable energy.
The geography of the resilience on the environment of Italian cities attenuates, at least partially, the ancient North-South difference.

4.3 MOBILITY

The mobility dimension measures the capacity of cities to promote models of sustainable mobility. The variables considered in the field of mobility synthesize the external accessibility and the internal fluidity of cities and their commitment to improvement.
Global data shown in figure 10 reveals an imbalanced bi-variate distribution almost shifted on the side of negative variations. In terms of geographical characterizations the data stratifications are reported in figures 11, 12 and 13.

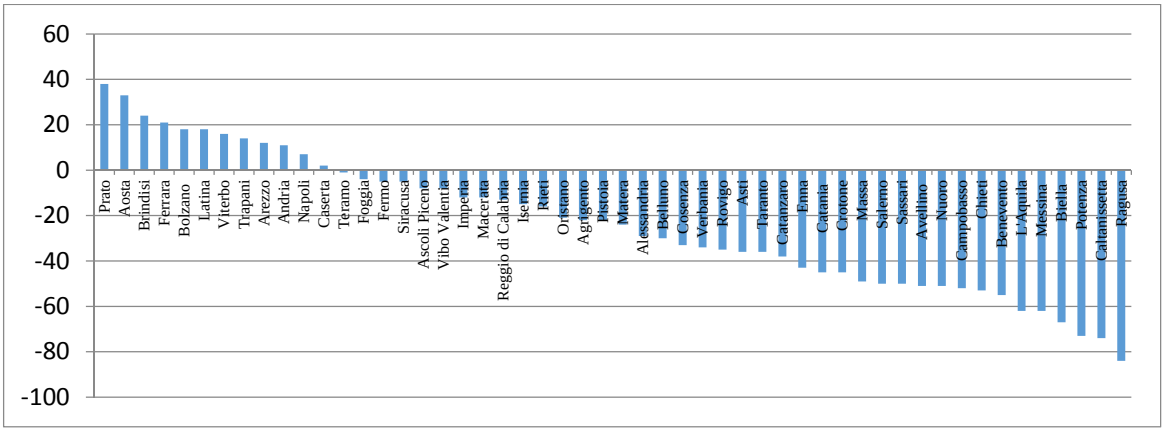

Fig. 10 Δ Mobility

With the exception of only two big cities that have shown an increase in the value of the variable compared to the low values from which they started the previous year, most cities, both small and medium, show signs of deterioration in mobility. Considering the indicators taken in analysis for mobility, shown in the appendix, the scenario highlighted by the stratifications is in compliance with a phenomenon, unfortunately, known for the Italian cities concerning distance compared to the target mobility parameters of European cities: cycle paths, shared transport, as well as green and efficient transport services.
The phenomenon of low resilience in the field of mobility does not show exception, even for the university cities, where it seems easy to imagine a relevant contribution of technologies to improve the efficiency of transport and, above all, to make them greener and sustainable.

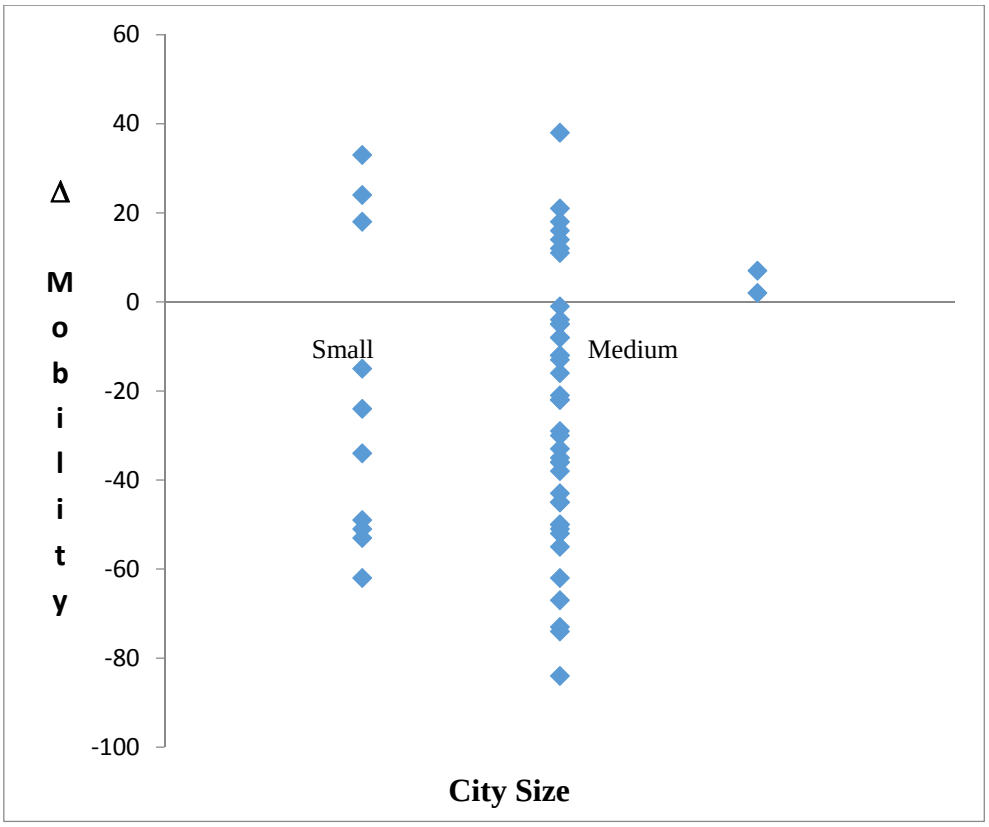

Fig. 11 Δ Mobility – size stratification

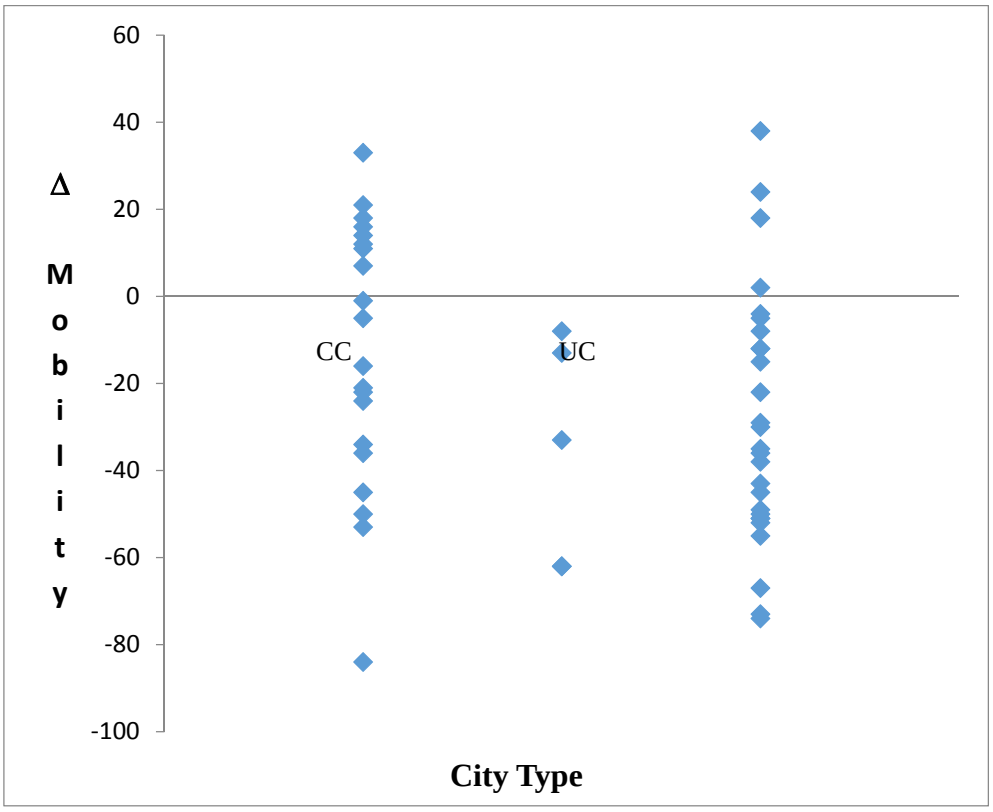

Fig. 11 Δ Mobility – tstratification

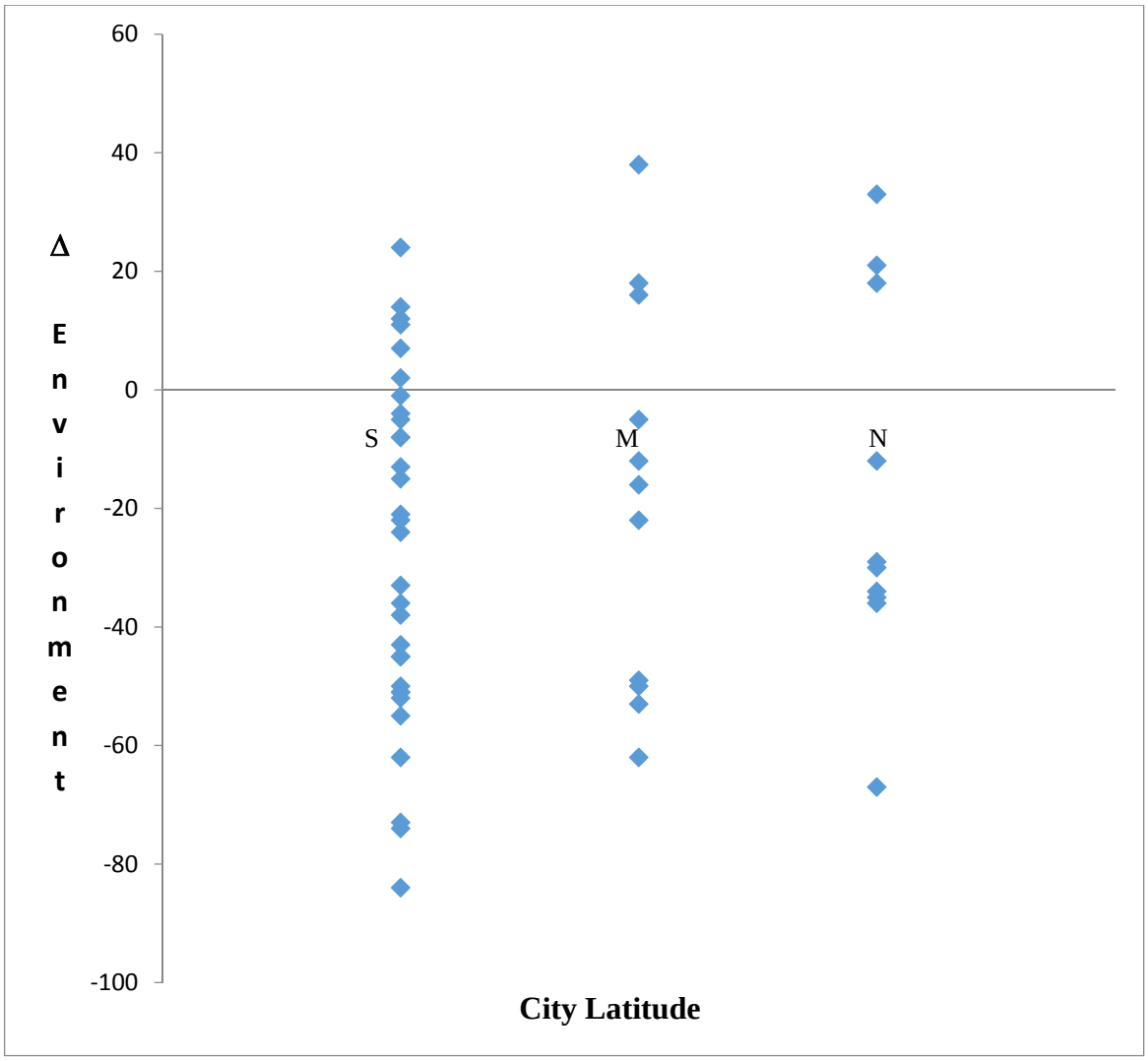

Fig. 13 Δ Mobility – latitude stratification

4.4 LEGALITY

The legality dimension describes the secure social network of cities and administration efficiency.

Global data shown in figure 14 reveals almost a positive (and very positive) distribution with only a few cities as outliers (Isernia, Latina, Catania, Nuoro and Naples), therefore also the data stratifications in terms of geographical characterizations as reported in figures 15, 16, and 17 show the same profile for each of the geographical determinants.

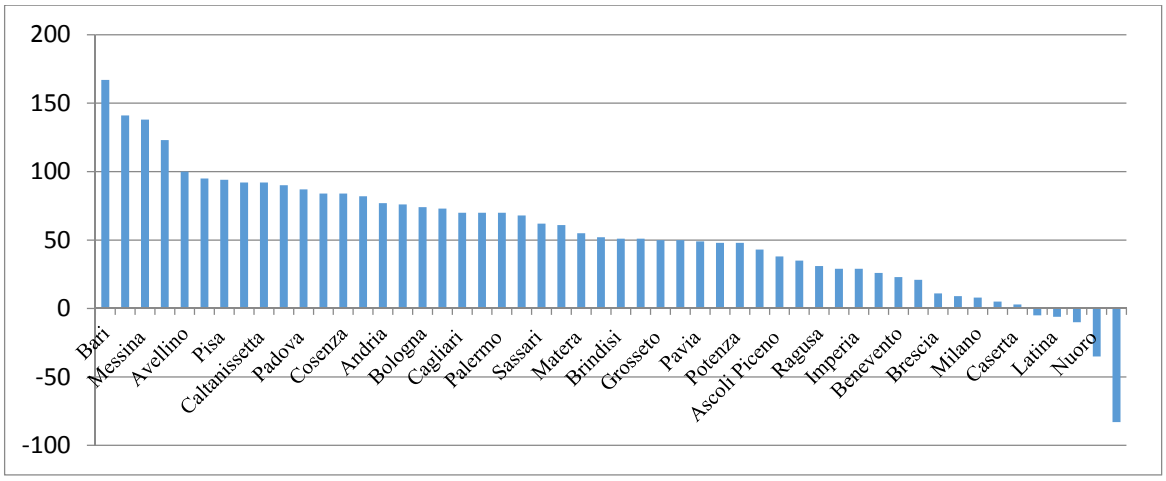

Fig. 14 Δ Legality

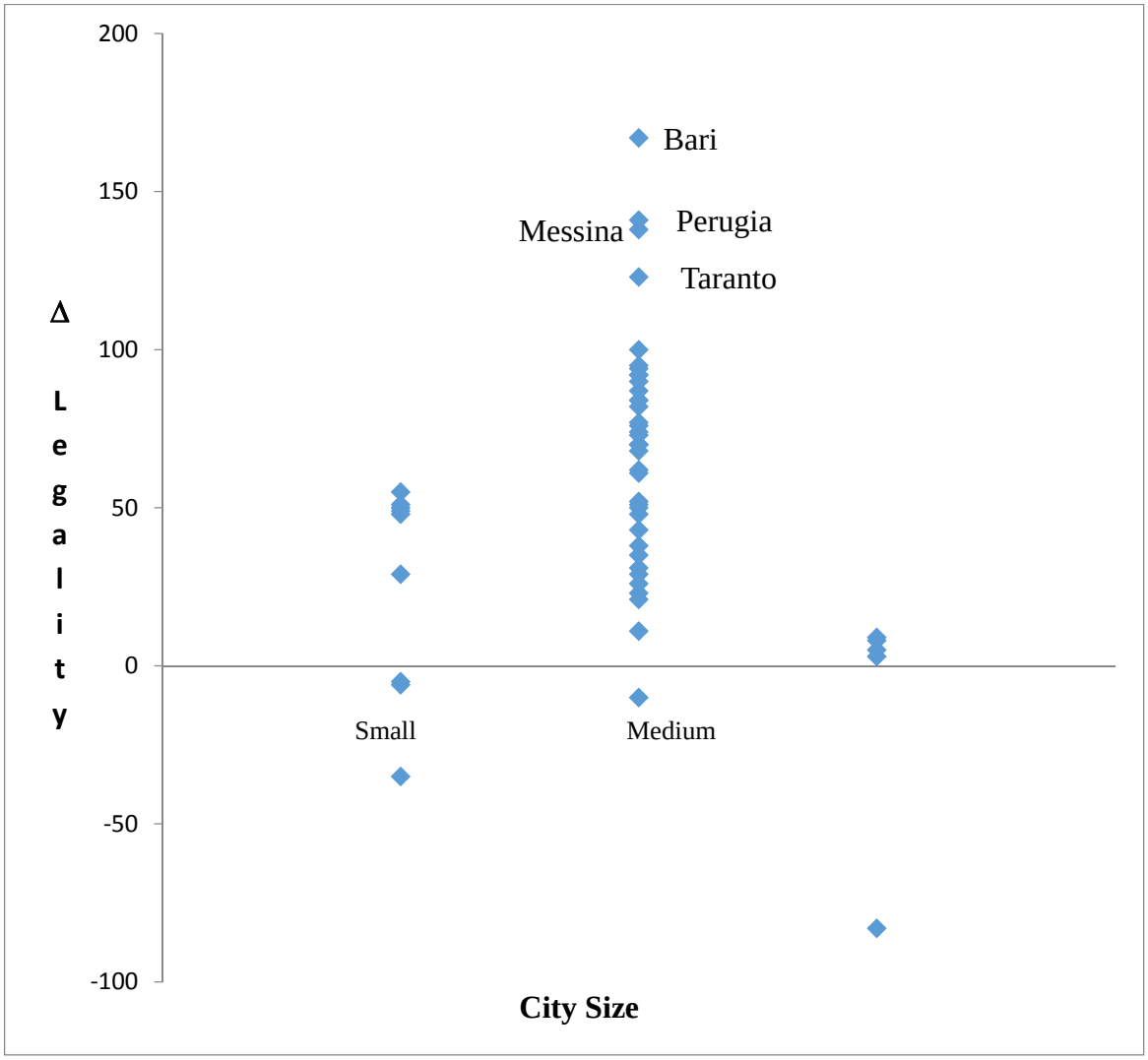

Fig. 15 Δ Legality – size stratification

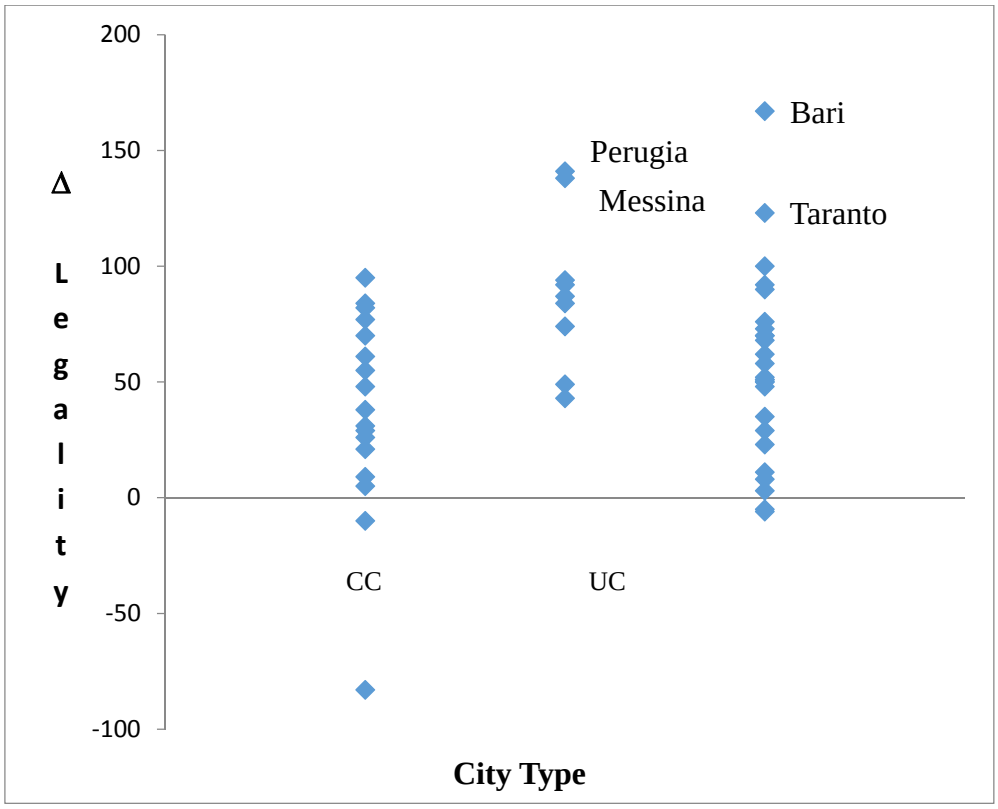

Fig. 16 Δ Legality – type stratification

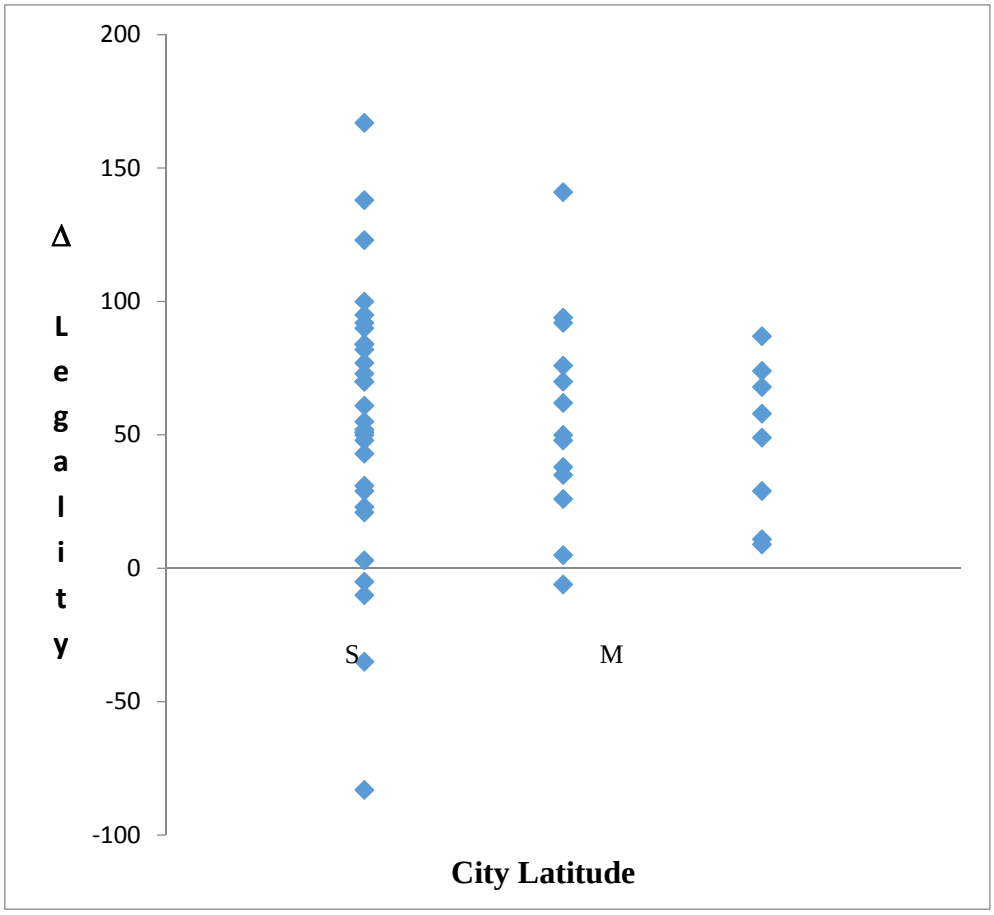

Fig. 17 Δ Legality – latitude stratification

5 CONCLUSIONS AND FINDINGS

The present work has proposed a geographic approach to the theme of urban resilience in order to verify the eventual relationship between some geographical and some urban variables involved in urban resilience actions. From the analysis carried out on data related to the scenario of Italian cities, the following paradigms emerged. Both the medium-sized cultural and industrial cities of the South are those characterized by a medium to high increase in the Living variable. Unlike the medium-sized cities, both small and large cities and northern cities have not been sensitive to the theme of the environment and there are no significant differences between cities of different types (as data are uniformly distributed). Only the medium and southern cities have proved sensitive to the issue of mobility and, as shown in figure 10, the deviations for this variable were generally quite negative. Finally, the southern medium-sized cultural and industrial cities are those characterized by a medium to high increase in the Legality variable.

Among the geographical variables, the one that seems to have the greatest influence on the processes of variation in urban variables is size; in fact, the middle cities have proved to be the most sensitive (both positive and negative) to the detected deviations. Understanding the phenomena of influences between geographical variables and urban variables can be a strategic element for all local stakeholders in terms of choosing appropriate assets, specific to that city or territory, through which to express the best resilience actions.

In fact, the principles and abilities related to the resilience approach can support a general framework and strategic visioning which is able to move and activate different interests and stakeholders (citizens, institutions, private sectors, professionals, academics and educators) towards integrated multi-issue projects. Existing trends and initiatives, and new polices and projects need to be integrated with a strategic vision (on a regional, metropolitan, or territorial scale, and at the local level), in order to be supported by technical and methodological innovative instruments that are able to orient the decision-making process and lead to the implementation of innovative governance solutions (Colucci, 2015).

Therefore, a geographic determinism can be considered in the phenomena of urban resilience and through the correspondence in table 3 it is possible to obtain a further correspondence between geographical characteristics and resilience's attributes as shown in table 4.

Geographical Characteristics	Resilence's Attributes
Medium-sized Cultural and Industrial Cities (E.g.: Aosta, Novara, Messina, Rovigo, Salerno, Cagliari, Ragusa, Sassari, Caserta, Pordenone, Siracusa, Benevento, Oristano, Enna)	Adaptability Cohesion Convertibility Creativity Feedback Flexibility
Medium-sized Cities of Middle and South (E.g.: Bari, Perugia, Messina, Taranto, Avellino, Lecce, Pisa, Siena, Caltanissetta, Catanzaro, Padova, Siracusa)	Adaptability Control mechanisms Convertibility Creativity Efficiency Feedback
Medium Southern Cities (E.g.: Brindisi, Caserta)	Adaptability Capacity for mobilization Collaboration Efficiency Feedback
Southern Medium-sized Cultural and Industrial Cities (E.g.: Bari, Messina, Taranto, Avellino, Crotone, Oristano, Lecce, Cosenza, Caltanissetta, Catanzaro, Siracusa, Agrigento)	Adaptability Cohesion Collaboration Effectiveness and reliability of institutions Equity

Tab. 4 Relationship between geographical characteristics and resilience's attributes

For those cases in which the data of the analysis showed a great intensity in those resilience actions, the municipality policy and programmatic guidelines of those cities, regarding 2015, have also been analyzed. This confirms the deterministic and non-random variables, and the declared will of the municipality regarding the positive variation detected about these specific urban variables as shown in table 5.

Urban Variable	City	Programmatic Policy Guidelines	Source
Living	Aosta	▲	Aosta Official Municipality Website
	Novara	▲	Novara Official Municipality Website
	Messina		Messina Official Municipality Website
	Rovigo		Rovigo Official Municipality Website
Environment	Bari		Bari Official Municipality Website
	Perugia	▲	Perugia Official Municipality Website
	Messina		Messina Official Municipality Website
	Taranto	▲	Taranto Official Municipality Website
Mobility	Prato	▲	Prato Official Municipality Website
	Aosta		Aosta Official Municipality Website
	Brindisi		Brindisi Official Municipality Website
	Ferrara	▲	Ferrara Official Municipality Website
Legality	Crotone	▲	Crotone Official Municipality Website
	Isernia		Isernia Official Municipality Website
	Oristano	▲	Oristano Official Municipality Website
	Catania	▲	Catania Official Municipality Website

Tab. 5 Random and determinism analysis of resilience trough municipality programmatic policy guidelines

In most cases, the result obtained from the data available from the official municipality website of each city demonstrates that the positive resilient action which emerged from the analysis of this work is explicitly provided in the programmatic policy actions, therefore demonstrating an evident cause-effect deterministic character of such actions and not a statistical error. The proposed work, also if somewhat based on an observatory window, showed that resilience is a possible cultural paradigm change for Italian cities and the ability to be resilient in terms of efficaciousness in urban strategy it is necessary to take the influence of geographic determinism in count.

Urban Variable	Sub – variables	Metrics
Living	Economic suffering	Declaration number less than 0 euro + number of declarations 0-10.000 euro/ Total number of declarations
	Coworking	Percentage of co-working services on the total recorded in Italy
	Urban attractivity	Index of the migratory balance 2015 (migratory balance 2015 / population 1 January 2015 x 1.
Environment	Nets for sustainability	Number of municipalities that have reached step 2 or 3 of the SEAP (Sustainability Environment Actions Plan) over total municipalities in the province
	Common Sspaces	Urban green area for urban gardens, equipped green areas, sports areas outdoors / per capita
Mobility	Railway utility	Share of stations gold, platinum, silver on the total
	Bikesharing	Availability of bicycles for 10 thousand inhabitants
Legality	Organized crime	Ranking of provinces for the presence of crimes related to organized crime (average 2010 - 2013; Italy index number = 100)
	Commercial illegality	Ranking of provinces due to the structural presence of commercial illegality, crimes reported per inhabitant (average 2010 - 2013, values normalized, Italy = 100
	Recycling	District ranking by the structural presence of money laundering crimes (average 2010 - 2013, Italy index number = 100)
	Voluntary homicides	Voluntary murders consumed per 100,000 inhabitants (number per thousand inhabitants)

Appendix. Source: Author's elaboration on Icityrace data

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IMAGE SOURCES

Fig. 1; 2; 3; 4: 5; 6; 7; 8; 9; 10; 11; 12; 13; 14; 15; 16; 17: Author's elaboration

Stefano de Falco

Stefano de Falco is Chief of IRGIT, Research Institute of Territorial Geographical Innovation and Chief of CeRITT, Research Centre for Innovation and Technology Transfer of *University of Naples Federico II* and he is President of AICTT (Italian Association for Technology Transfer Culture promotion). His research interests concern the modelling and testing of geography of innovation.