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Sustainability charter for innovative cities and safe mobility. Case study: Sestri Levante

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Abstract

In order to make our cities more innovative and responsive, the paper reports a study aimed at defining a new sustainability tool, in the context of Agenda 2030, to be adopted in urban realities. It has to do with the 'Sustainability Charter', a city decision-making process, designed with researchers, local communities and companies.

The research analyses the Sustainability Charter and develops a methodological approach aiming at the systemization of all sustainable actions related to different urban topics. In particular, indicators were identified to assess the sustainability of these topics, graphically represented by chart and defined as sustainability maps. In the paper, among the priority issues at urban level, sustainable mobility is explored.

The current health emergency has highlighted all the problems related to urban mobility. This situation can represent an opportunity to improve, revise or update cities' governance tools. It is necessary to build safe soft mobility infrastructures, and to reorganize the existing ones -redesigning urban space-, by promoting a new culture of sustainable mobility. The Sustainable Urban Mobility Plan (SUMP), should integrate the Urban Sustainability Charter and all the underlying strategies to promote sustainable mobility.

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1. Introduction

In order to make our cities more innovative and responsive, the paper reports a study aimed at defining a new sustainability tool, in the context of Agenda 2030, to be adopted in urban realities. This is the 'Sustainability Charter',

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an instrument that brings together researchers, entrepreneurs and citizens to establish guiding principles for decision-making in a city.

Sustainability plays a key role for governments, research institutes and the general public, which is why in recent years there has been an increase in studies and measures to disseminate education for sustainable development on the one hand and to identify the factors that have the greatest impact on the environment on the other. Education for Sustainable Development requires a change in mentality: the need to consider our intentions, i.e. our propensity to consume resources, even if this is still a challenging goal. The evolution of our society is a constant search for new ways of developing energy sources, industrial techniques, cultivation, locomotion and communication systems. The acquisition of environmental awareness requires principles, values and processes that must be developed through planning and converge with an engineering discipline that pays attention to respect for the environment.

The 2030 Agenda, adopted by 193 countries of the United Nations Assembly during the 2015 Summit on Sustainable Development, aims to solve a set of socio-environmental and economic problems by 2030 from a global perspective. Goal 11 of Agenda 2030 addresses sustainable cities and communities to make cities and human settlements inclusive, safe, durable and sustainable. The city in the 2030 Agenda is seen as 'a rope that connects all the other goals together'. Sustainable urban development as defined by the ESDN (European Sustainable Development Network) is "...the sum of ongoing transformation processes applied to help cities in transition (or urban areas) towards a more sustainable future". The phenomenon of urbanisation is increasing dramatically, so proper planning is important. Since the industrial revolution, cities have been the main centres of economic and productive development and now are responsible for 70% of global carbon dioxide emissions. This contributes to making cities the key players in the 2030 Agenda for Sustainable Development. They must be the starting point for implementing policies aimed at the sustainability of cities and their inhabitants.

The current health emergency has highlighted many urban problems, especially the ones related to urban mobility. This situation can represent an opportunity to improve, revise or update cities' governance tools. We need to increase sustainable mobility "discouraging the use of private vehicles is a priority, as they significantly contribute to congestion and pollution of the city. At the same time, encouraging soft mobility (bicycles, pedi-buses, etc.), with the necessary health precautions, also reducing the overcrowding of public transport is desirable. Soft mobility (bicycles, scooters, etc.) is a great alternative to focus on, especially in cities where it is "uncomfortable" to travel on foot but perfectly accessible by bicycle. It will therefore be necessary to identify protected routes for bicycles, which may be able to use the corridors of the Local Public Transport (LPT). Promoting safer ways and means of sustainable mobility also means reviewing the design of some parts or entire cities. In reaching conflicts between these modes of transport, to create new infrastructures, reorganize the existing ones and, in general, think about the management and re-design of urban spaces is necessary (Spadaro, 2021). But it is also important to promote a new culture of sustainable mobility and best practices.

This paper analyses the "Sustainability Charter" a city decision-making tool, designed with researchers, local communities and companies. The authors developed a methodological approach aiming at the systemisation of all the sustainable actions related to different urban issues. In particular, indicators related to sustainable mobility were identified to assess the real sustainability of the actions to improve urban mobility. These indicators are an objective tool. In order to be clearer, the approach defined in the paper uses the CBA method, also known as the three variants method (developed by the Research team in Urban Planning of the University of Genoa - DICCA, 2010), aimed at representing these indicators using maps, which can be defined as sustainability maps.

Finally, the Sustainability Charter to promote urban sustainable mobility should be integrated into the Sustainable Urban Mobility Plan (SUMP). The SUMP is "a strategic plan designed to satisfy the mobility needs of people and businesses in cities and their surroundings for a better quality of life. It builds on existing planning practices and takes due consideration of integration, participation and evaluation principles" (Eltis, 2014).

2. Research contribution

The paper aims to develop a methodological approach starting from the Sustainability Charter and indicators of sustainability. The Sustainability Charter is designed by researchers, local communities and companies. It was first adopted in North America as an agile and easily updated tool for defining guiding principles in a city's decision-making process. The Sustainability Charter is a high-level policy tool to guide the administration and the community

towards a sustainable future. At the heart of this instrument are the social, cultural, economic and environmental needs of a community and the idea that these needs can continue to be met in the future. The Sustainability Charter aims at short-, medium- and long-term participatory goals, defining priority issues and key indicators to achieve adequate levels of sustainability. The main objective is to inspire residents to think, make decisions and act with an eye to the future in their daily lives.

Langely City's Sustainability Charter (Canada) deals with infrastructures: transportation, energy and climate, water, material and waste and telecommunications. The goal is "effective infrastructure and services that meet the current and future need of the city, while protecting the natural environment and supporting urban growth" (Township of Langley, 2008). Main objectives are: the definition of a walking and cycling infrastructure and specific support for soft mobility, the improvement of safety and accessibility and the identification of the best mode of travel to work.

In this context, it is essential to have sustainability indicators, which are discussed in more detail in the research presented here. The use of sustainability indicators, as is well known, has established itself at international level (UN, OECD, EU) as a fundamental tool for: analysing the environmental and economic state; clarifying objectives and setting priorities; assessing policy performance and monitoring progress towards sustainable development. The term "indicator" is derived from the Latin "*indicare*", which means to announce, point out or indicate. Chambers Dictionary defines an indicator as "...something that provides an indication, a pointer...any device for exhibiting conditions for the time being" (Von Schirnding, 2002).

In the literature there are several definitions of an indicator, for example:

- a synthetic representation of a complex reality, i.e. a characteristic or set of characteristics that allow a given phenomenon to be captured (Schimdt, 1987);
- a parameter, or a value derived from parameters, which points to/provides information about/describes the state of a phenomenon/ environment/area with a significance extending beyond that directly associated with a parameter value (Organisation for Economic Co-operation and Development OECD, 1993);
- an indicator constitutes the link between the raw data and the set of theoretical statements (Gallina, 1996).

Indicators can help monitor the regular reporting on the state of the environment of various sectoral policies. Such an approach makes it possible to regularly review progress in achieving policy objectives and to communicate the results to stakeholders. Indicators are particularly important tools for accountability and transparency. This presupposes that they are few in number, relevant, responsive, simple and policy-specific (European Commission, 1999).

Indicators provide a solid basis for decision-making processes at all levels of planning and can summarize complex information useful to the observer. They concentrate the complexity and quantity of information into a small meaningful subset of observations that gives us useful information for choosing and directing our actions. You cannot manage what you cannot measure. The success of current and future integrated policies can only be judged, guided and monitored by identifying key indicators that can be recorded and compared with concrete policy objectives. The scientific nature of the indicator lies, therefore, in making explicit the pattern that links the measurable entity with the non-measurable entity.

The most important point is the role played by the indicator as a tool that allows us to quantify and qualify the dynamics taking place within a given simple or complex system. The indicator quantifies what has happened, what is happening and what will happen in a specific system. An indicator is effective and efficient if it provides answers to these objectives:

- to facilitate the decision-maker's task by giving congruent answers to the issues raised;
- to decide what the priorities are on the issues addressed;
- to follow the effectiveness and efficiency of the policies, actions or instruments implemented;

Furthermore, an indicator, for this research, should be:

- Relevant, i.e., relevance to the issues proposed in the objectives;

- Significant, i.e., the ability to represent issues in a clear and effective manner;
- Updatable, i.e., the possibility of having new values of the same historical series that allow for updating;
- Easy to communicate, i.e., immediate comprehensibility by a public of technicians and non-technicians, and simplicity of interpretation and representation through the use of tools such as tables, graphs or maps (ENPLAN Project, 2004).

3. Methodology

The research analyses the Sustainability Charter and the sustainability indicators and develops a methodological approach aiming at achieving adequate levels of sustainability for different urban issues, in particular mobility.

The Sustainability Charter can be structured into a fac-finding survey, an analytical phase and a planning phase. The fac-finding survey consists of collecting all useful data and information about the area under consideration in order to elaborate a project as accurately as possible. The morphology and socio-economic characteristics of the case study are studied, as well as the transport supply and demand and the physical and functional elements in order to reach a better understanding of the current state of the infrastructure system. In addition this phase includes: information and constraints dictated by urban planning instruments, potentialities and aspects to be exploited in the area, current initiatives and projects, information on traffic and the main means of sustainable mobility, data on tourism, etc..

In the analytical phase, information, documents and data are analysed. The SWOT methodology is used to analyse information on the Strengths, Weaknesses, Opportunities and Threats of the area under study. The aim of this technique is not to achieve a detailed analysis of the situation but to define local strategies based on development opportunities through the strengths enhancement and the control of weaknesses, while considering positive and negative scenarios that may influence local strategies.

In the planning phase, starting from what emerged from the analytical phase, and in line with the guidelines of Agenda 2030 and ASVIS (Italian Alliance for Sustainable Development), the objectives are related to the actions/interventions to be implemented. For each action, the necessary timeframe, actors and funding are identified. Some examples of possible sustainability indicators specific to the issue of urban mobility are: accessibility, safety and efficiency of the public transport network, reduction of motorised traffic, quality of the area and public space, etc. Once the objectives have been defined, it is necessary to plan the actions. To do this, the Sustainability Charter identifies specific indicators and follows the CBA method, or the three variants method, to assess their sustainability (Pirlone, 2010). This method stems from the revision of the DCBA method, or of the four variants, proposed by the Dutch University of Delft, which aim to design new eco-friendly neighbourhoods. The method provides the analysis of 4 levels of sustainability: LEVEL D: linked to the limits set by legislation; LEVEL C: current use; LEVEL B: minimization of damage and LEVEL A: where the ecological autonomy of the neighbourhood is envisaged.

In 2010, the University of Genoa revised the CBA method with the aim of measuring in comparative (not absolute) terms the current and expected level of sustainability.

The CBA involves three different steps:

- the choice of indicators for each priority identified;
- the assignment of C-B-A levels and consequent elaboration of the relative weights of the indicators;
- the mapping of indicators.

The three different threshold levels introduced refer to:

- C: the current level obtained with different values for each indicator;
- B: the level of regulation in force, obtained by analysing the laws, to be reached in a short time through a series of sustainable actions;
- A: the optimal target to be reached.

Once the indicators have been quantified, they need to be compared with level C -current- with level B -standard- or A -optimal to achieve. In this way it is possible to see if the sustainability levels are met and to identify priorities for action. If the value in level C is higher than B or A, it is necessary to introduce specific actions/interventions.

At this stage, to facilitate the decision making process among different actors (administrations, citizens, companies, research, associations) of the Sustainability Charter, a Survey was elaborated. The survey is useful to choose priority indicators for each of the issues considered. Specifically, in order to promote sustainable mobility, participants were asked to indicate the level of priority of each indicator by giving a rating between 0 and 2, where 0 means a marginal indicator with respect to the achievement of the objective, 1 if it is secondary and 2 if it is important (see Fig. 1).

METHODOLOGICAL APPROACH FOR THE NEW SUSTAINABILITY CHARTER



Fig.1 The CBA method and the Survey -aimed at defining priority indicators of sustainable mobility- for the New Sustainability Charter

In order to make the results even clearer, specific sustainability maps are proposed for the case study indicators. Sustainability maps are a suitable tool for an immediate visualisation of the sustainability level of the represented indicator on the territory. They are a useful tool as they can be directly superimposed and compared with the maps of the urban planning instruments in force. This approach makes it possible to identify objective lines of action or actions to be implemented in order to achieve adequate levels of sustainability, verifying their effects through appropriate monitoring.

4. Results and conclusion

In the research presented here we report a first application of the Sustainability Charter drawn up for Sestri Levante in Liguria (starting from the elaborations of Pareto, 2020). Sestri Levante is a coastal municipality of 17.970 inhabitants in the metropolitan city of Genoa. It is located on the eastern Ligurian Riviera and is one of the last towns on the eastern side of the Gulf of Tigullio, east of Genoa. Sestri Levante is famous for the morphology of its territory. The historic centre overlooks two bays, divided by an isthmus that joins the promontory, the oldest part of the village, to the mainland. It is famous for its cultural and seaside tourism, which presents several criticalities related to urban mobility, as the analyses of the area have shown.

Recently, two urban planning instruments have been approved: one at municipal level, the PUC - Municipal Urban Plan and one at metropolitan level, the PUMS - Sustainable Mobility Urban Plan of the Metropolitan City of Genoa.

In the tourist centre of Sestri Levante, as well as in the historical centres of the other towns on the Ligurian coast, there is a considerable gap between the resident population in winter and in summer (almost three times as much). Added to this is the fact that in summer people are concentrated on the coastal strip and in the town centre, where there is a greater presence of public and private services, bathing establishments, leisure facilities, shops, restaurants, etc.. This concentration of people and movements generates an intense traffic of vehicles, both sustainable and not, of parked cars and people that engage in particular the sea promenade.

In the analytical phase, weaknesses from the SWOT analysis include: low use of public transport due to sub-optimal supply, inadequate number of parking spaces and interchange car parks, excessive number of private vehicles, pavements that are not passable for long stretches, high traffic congestion points, limited number of bike sharing facilities,... Therefore, the mobility objectives identified in the Sestri Levante Sustainability Charter are: to reduce traffic congestion; to decrease CO₂ emissions; to promote soft mobility.

To complete the planning phase, a questionnaire was administered to a heterogeneous representative sample of Sestri Levante's stakeholders through which priority indicators were identified. Thanks to the CBA method they were then quantified and implemented. Figure 2 shows the indicators that in the current situation (level C of the CBA method) do not reach the levels of sustainability foreseen by legislation or emerged from the questionnaire (Level B) for which it is therefore necessary to propose actions/interventions.

PARAMETER FOR THE CBA ANALYSIS	C CURRENT STATE		B LEVEL RECOMMENDED BY THE REGULATION IN FORCE		A OPTIMAL TARGET FOR THE 2030	
	Value	UM	Value	UM	Value	UM
CO ₂	1,8	µg/m ³	10	µg/m ³	- 37,5%	µg/m ³
PM ₁₀	19,23	µg/m ³	40	µg/m ³	- 20%	µg/m ³
NO _x	18,52	µg/m ³	30/40	µg/m ³	- 50%	µg/m ³
SO ₂	21	µg/m ³	20	µg/m ³	- 20/25%	µg/m ³
Number of bike sharing places	40	number	Not enough	number	88	number
Total km of cycling and walking routes	3,95	Km	Not enough	Km	6,26	Km
Km ² of pedestrian areas, Controlled Traffic Zone(ZTL) and 30 zones	52,75	Km ²	Not enough	Km ²	70	Km ²
Electricity supply columns	4	number	Not enough	number	10	number
Motorisation rate	531	car/1000 residents	Too high	car/1000 residents	450/470	car/1000 residents
Number of interchange car parks	1104	number	Not enough	number	1740	number

Fig. 2 Extract from the planning phase - CBA method of the Sestri Levante Sustainability Charter

In this regard, a Master Plan was defined with the actions/interventions for the Charter of Sustainability in order to requalify the sea promenade, through structural interventions: road network, parking spaces and soft mobility.

Specifically, Figure 3 shows the application of the CBA method useful to support the administration in the choice of the proposed interventions and Figure 4 shows a Master Plan and some of the main measures considered: bike sharing spaces, electric supply columns, interchange car parks, new cycle lanes.

	Level C	Actions / interventions	Level A
Bike sharing stations	40	Areas identified : Sestri Levante harbour; Sant Anna; Mandela Park; Piazza Brigate Partigiane	88
Bike lanes (Km²)	4	Areas identified : Via Vincenzo Fasce; Via Vattuone; Via A. Terzi; Via XX settembre; Via Sertorio; Via Maria Teresa; Via Dante Sedini	6,3
Pedestrian zones, ZTL, 30 zones (Km²)	52,7	Areas identified for ZTL : Via Dante Sedini; Viale Rimembranza Areas identified for pedestrian zones : Lugomare Desclo-Via Vittorio Veneto 30 zones : via Nazionale	70
EV charging stations	4	Areas identified : Sturla Park station; Via della Chiusa; Via Nazionale; Via Giovanni Caboto	10
Park places	1104	Areas identified : Via val di canepa; Piazza della Repubblica; Via Vincenzo Fasce; Via Antica Romana occidentale	1740

Fig.3 CBA and interventions to improve sustainability in Sestri Levante



Fig.4 Masterplan of Sestri Levante – actions/interventions identified thanks to the CBA methodology

Finally, Figure 5 shows the sustainability maps referring to the initial level - Level C - and the optimal level - Level A, referring to the standards linked to the 2030 Agenda or identified thanks to the questionnaire.

The new Sustainability Map, together with the CBA method and the sustainability maps, provides a sort of “Decision Support System” useful for the local administration of Sestri Levante to find the best interventions and to supervise using a geo-referred tool.



Fig.5 Sustainability Charter of Sestri Levante – Sustainability maps for urban mobility

The Sustainability Charter provides guidelines to be taken into account in existing urban basic and sectoral tools specific to the issues considered. In the case of mobility, analysed by the authors, strategies and related actions emerging from the Charter to promote sustainable mobility should be incorporated into the existing Sustainable Urban Mobility Plan (SUMP). Only through strategic, long-term planning is it possible to define and implement interventions and good practices that lead to safe (also in terms of health emergencies) and sustainable mobility and contribute to improving the quality of life in urban areas.

Notes

Ilenia Spadaro has deepened the virtuous experiences existing in terms of sustainability at an international level and has structured a methodological approach aimed at achieving adequate levels of sustainability, for different urban issues, in particular for mobility.

Francesca Pirlone has developed the methodological approach aimed at achieving adequate levels of sustainability, in particular for mobility, by introducing the CBA method, relating to sustainability indicators and maps.

Selena Candia has developed a first application of the methodological approach aimed at achieving adequate levels of sustainability, in particular for mobility, in the context of Sestri Levante in Liguria.

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