Measure Urban Regeneration: An Assessment Framework for European Cities

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Abstract. Despite multiple definitions and understandings given both as part of the scientific and professional contexts, there is still no unequivocally recognized definition of urban regeneration. Under this expression are included a multiplicity of approaches ranging from recovery of abandoned areas and buildings to diversification of economic activities, redefinition of territorial development strategies, preservation or reuse of cultural heritage, recovery of public spaces and increase in the supply of services. Therefore, in this contribution, the indications provided by UN-Habitat revealing the complexity and multiplicity of the issues at stake, have been assumed. The paper aims to outline a tool to measure urban regeneration as part of a multidisciplinary and multi-level process able to include key qualitative and quantitative parameters specifically formulated for analyzing and monitoring European cities. The methodological framework has been developed in the context of the Horizon research project Bauhaus of the Seas Sailing (BoSS).

Keywords: urban regeneration · multidimensional evaluation · regenerative sustainability · indicators · port city

1 Introduction

An increasing focus on urban regeneration has been found over recent years. At the European level, echoing the political, economic, and social role recognized to design from the Bauhaus movement, which emerged in the 20th century, the New European Bauhaus (NEB) advocates the Green Deal implementation through regenerative approaches based on cultural values of aesthetics, sustainability, and inclusion [28]. Even public bodies of national relevance have expressed their views. Among them the National Order of Architects of Italy (CNAPPC), which has recently outlined some key principles as part of the "National Plan for Sustainable Urban Regeneration" [9] drawn in coordination with other relevant stakeholders, including the National Association of Italian Municipalities (ANCI), Region Authorities, National Association of Building Constructors (ANCE) and Italian Environmental League (Legambiente).

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In scientific literature, over the last decade, a steadily growing publication on urban regeneration topics should be noted and explored in the context of different fields of investigation. As inferable searching on Science Direct, from 2014 to 2024, 13,968 contributions on urban regeneration have been produced, only considering the fields of "Environmental Science" (10.923), "Social Sciences" (5.282) and "Business, Management and Accounting" (1.084), of which 798 in 2014 and 2.330 only in 2022.

Despite multiple definitions formulated, a uniform definition of urban regeneration is still lacking. Under this expression, both as part of the scientific and professional contexts, a multiplicity of approaches ranging from recovery of abandoned areas and buildings to diversification of economic activities, redefinition of territorial development strategies, preservation or reuse of cultural heritage, recovery of public spaces and increase in the supply of services have been included.

In this contribution, the indications provided by UN-Habitat [30], revealing the complexity and multiplicity of the issues at stake, have been assumed. Defined as a crucial tool for urban development until the 20th century, urban regeneration consists of the process through which it is intended to contrast economic, demographic, and social decline starting from interventions of recovery and reconversion of buildings and urban areas, which are currently widespread, especially in consolidated urban areas, such as those of Italian and European port cities.

The abovementioned definition is in continuity with the Regenerative Sustainability (RS) theoretical approach already systematized as part of the scientific literature as the most recent achievement gained in the context of the evolutionary process involving approaches for pursuing sustainability objectives [11, 17, 29].

Already Reed [23] pointed out the need for a new cultural approach to effectively pursue sustainability by focusing on the importance of adopting a multidimensional and place-based vision. Over time, the focus of sustainability paradigms has increasingly shifted away from minimizing the damage caused by excessive use of resources to defining development models inspired by the dynamics of ecological systems, to such an extent that some authors have begun to discuss the transition from Sustainable Development Goals (SDGs) to Regenerative Development Goals (RDGs) [1, 4, 13, 20].

Based on a holistic view of territorial contexts, regenerative sustainability has been made operational for over fifty years through the Regenerative Development (RD) approach leveraging on place-based development and design methodology, which has only recently been theorized [12, 15, 24].

Although the emerging field of Regenerative Development (RD) offers practical and theoretical guidelines in defining indicators and tools useful for the multidimensional assessment of sustainability, these last is still in its infancy [6, 16, 19]. Although focused on some relevant aspects such as biodiversity, energy, water, transport, climate, air quality, waste management, land use, poverty, and education, in fact, leaving out the ecological and socio-cultural components, the sustainability indicators are not yet able to fully grasp the complexity of the contexts of analysis [3]. Regarding RD evaluation tools, the achievements that have been found are useful on a hyperlocal, while a gap is highlighted against wider geographical levels.

Due to the complexities of coastal areas, stand out from the others some studies that have already investigated the regeneration of brownfield sites therein located, both from the point of view of theoretical models and in relation to the analysis of practices [2, 10, 18].

The contribution fits into the scientific-cultural debate on the definition of indicators and assessment tools for sustainability [3, 5, 7, 14, 22]. More specifically, recognizing some of the issues that emerged both from literature and from research contexts, the paper aims to outline a tool allowing for considering the hyperlocal context in relation to its broader territorial context and is useful for the analysis of practices and for the comparative study of territorial contexts distant from each other both culturally and geographically.

In this way, it is believed to support policymakers in identifying local strengths and opportunities and promote mutual exchange and learning between cities.

The tool proposed for the definition and evaluation of plans and programs assumed as dynamic processes, whose evolutionary logics are like those of living systems, in line with the perspective of Regenerative Development (RD), must be understood as a tool useful to carry on the analysis as a preparatory step for the implementation of Evolutionary Evaluation (EE) methods and techniques [27].

The analysis of the socio-economic, morphological, and environmental characteristics is considered essential and fundamental for the identification of specific criticalities and areas by intervening on which it is believed to be able to trigger regeneration processes which, over the short and medium-long term, should have positive impacts on a wider geographical context.

The framework has been developed as part of the Horizon research context Bauhaus of the Seas Sailing (BoSS) [36].

In summary, the first part of the paper (Sect. 2) describes the research context; the second one (Sect. 3) shows the methodological approach; in the third one (Sect. 4) the assessment framework is outlined; in the fourth part (Sect. 5) the early results obtained through the framework implementation are set out, and the last part (Sect. 6) concerns with discussion and conclusion.

2 Bauhaus of the Seas Sails Research Context

The contribution has been developed as part of the Horizon research project Bauhaus of the Seas Sails (BoSS) in the context of which, in line with the strategic objectives of the New European Bauhaus (NEB), is intended to leverage sustainability, social inclusion, and beauty to implement the Green Deal principles assumed as guidelines for Regenerative Development of coastal cities (Fig. 1).

In this perspective, port cities have been assumed as contexts of research and experimentation, with the aim to define and promote innovative and nature-based solutions as part of the design approach assimilating territories to complex and dynamic socio-technical-ecological contexts, in line with the theoretical approach provided by Regenerative Sustainability (RS) and the United Nations SDGs and EU strategic priorities.

In particular, in order to implement the objectives of the Horizon Europe mission, seven lighthouse demonstrators located in four different regions and aquatic ecosystems in Portugal (estuary), Italy (lagoon and gulf), Sweden/Germany (strait/northern sea/river) and the Netherlands/Belgium (delta) have been selected as pilots to define and test innovative design solutions through which it is intended to provide tangible examples of mission-oriented approaches that are impactful, measurable, and targeted.

Furthermore, although concerning the local scale, the design solutions are conceived as an integral element of a wider context since the impacts that could be deployed up to the city and regional level have been considered.

Therefore, in the context of such a multi-level perspective, for each pilot, the project includes the proposal of an intervention on a local scale ("drop") generating impacts ("ripple effects") on the local context (demonstrator) at the city/region levels (demonstrating effects of scale) and at a broader level (demonstrating the replication). Hence the need for a framework to be understood as a decision support tool allowing both analysis and assessment of practices to allow their replicability.

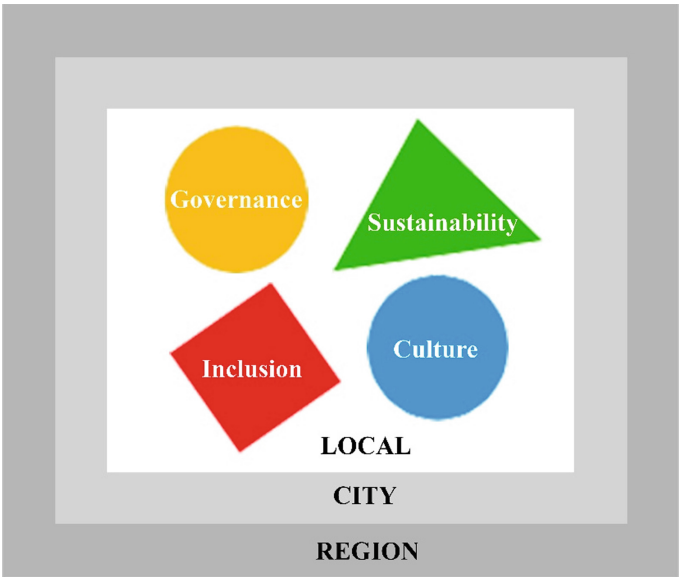


Fig. 1. The approach of BoSS research project

3 Methodological Approach

Assuming the measurement of urban regeneration as a crucial aspect both for the analysis of the territorial context preceding the definition of an urban regeneration plan (ex-ante), and for monitoring in the phase following its implementation (ex-post), the article focused on the definition of a framework of analysis for assessing a specific territorial context under the perspective of RD approach.

Therefore, in line with the Regenerative Development approach, the collection of quantitative-qualitative data has been carried on through the structuring of a place-based and multi-level assessment framework suitable both as a knowledge and management tool in exploring European contexts at the Regional and City level. In particular, the proposed framework has been structured, including the ecological, socio-cultural, and procedural components and the more purely technical ones.

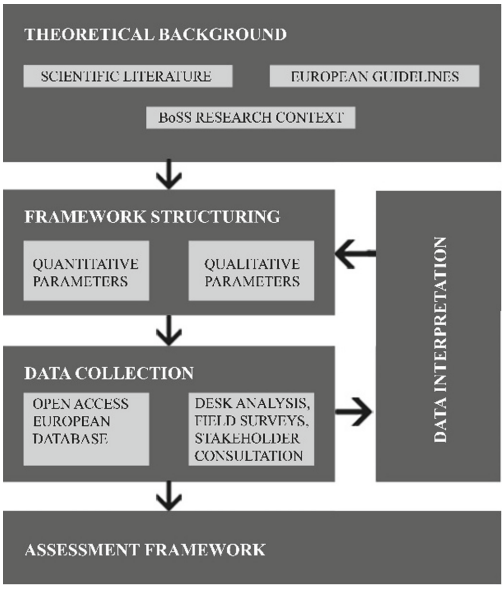


Fig. 2. The methodological approach

In this perspective, the methodological process (Fig. 2) that has led to the construction of the assessment framework is divided into four consecutive and consequential phases:

1. Theoretical background. This phase is focused on identifying the theoretical models based on which is intended to structure the assessment framework to measure urban regeneration. Hence, the investigation in the field of scientific literature and the exploration of the research project context has been carried out.
2. Framework structuring. It includes two distinct sections specifically formulated based on the type of data content. In the first section, the aspects considered significant to grasp ecological and socio-cultural components of the local context have been identified and described qualitatively. In the second section, recourse has been made to quantitative data, taken from specific European open-access databases. For each of the four thematic pillars proposed by the BoSS research project, in line with NEB recommendations, two key fields of investigation have been identified, each of them has been, in turn, considered in relation to both city and regional levels (Table 1).
3. Data collection. According to the framework structure, this phase is tackled in two distinct steps. For the collection of quantitative data, open access databases are consulted, while for the compilation of the information material expressed in qualitative

terms, a specific research phase. The latter could be based on information inferred from desk analysis, field surveys, interviews and/or consultation with stakeholders.
4. Data interpretation. This phase allows you to analyze the study context. Based on the findings, making some adjustments to the framework may be necessary. Data interpretation could also be carried out in relation to the specific features of different territorial contexts under a comparative perspective. Furthermore, the same analysis framework could be assumed as a monitoring tool, if employed before and after the implementation of the urban regeneration plan.

4 Assessment Framework

The selection of the parameters presented has been carried out based on the most frequent critical issues in urban contexts, that are most evident in coastal zones. However, considering the heterogeneity of the study contexts as well as the multiplicity of the issues at stake, the framework provided (Table 1) must be understood as a tool of general validity which has to be suitably modified according to specific local features.

4.1 Indicator Sources

To facilitate data retrieval, thus allowing immediate comparison among European cities and supporting the replicability of solutions, the proposed parameters have been selected and collected among the ones available from four of the main European databases set out below.

In particular, reference has been made to the Cultural and Creative Cities Monitor from Joint Research Center (JRC) - European Commission, whose composite indicators have been specifically designed to support policymakers and researchers in analyzing and monitoring their cities, also facilitating comparison with other urban centers on the role of culture and creativity in cities' social and economic well-being [32].

In analyzing and monitoring the environmental conditions, the European Environment Agency (EEA) database has been queried. Designed to support all stages of environmental policymaking, it includes indicators that report the trend (or state) of different phenomena analyzed in a given period in relation to the associated political objectives. Data collection refers to cities [33].

Some data have been inferred from the Eurostat database, the statistical office of the European Union, which publishes data referring to both cities and regions of the euro area, processed using data collected by national statistical authorities according to harmonized criteria and methodologies [34].

Other insights have been carried out by the Organization for Economic Cooperation and Development (OECD), with the aim of measuring regional welfare in policy assessment. In this perspective, each region has been measured against eleven themes (income, work, housing, health, access to services, environment, education, security, civic engagement and governance, community, and life satisfaction), each of which a quantitative score has been assigned [35].

While data inferred from JRC and EEA databases are related to the city level, OECD platform describes quantitatively the topics measuring regional well-being. Instead, Eurostat database includes both city and regional parameters.

Table 1. The assessment framework

Qualitative Parameters					
Territorial features					
Morphological features					
Neglected and/or underutilized buildings and spaces					
Local stakeholders					
Main uses/cluster of uses					
Government entities					
Leading sectors and local know-how					
Leading sectors of local economy					
Relevant projects					
Recent projects					
Quantitative Parameters					
Thematic Pillars	Key fields	Level	Parameters	Sources	Year
Sustainability	Human Impact	City	PM2.5 annual mean concentration	EEA	2021
		Regional	environment		
	Mobility	City	Local & International Connections	JRC	2019
		Regional	networks total railway lines, air transport of passengers, motorization rate, air quality (PM 2.5)	Eurostat, OECD	2017, 2022
Inclusion	Population	City	total population, foreigners as a proportion of population	Eurostat	2017
		Regional	total population, less than 15 years, 15–64, crude rate of net migration plus statistical	Eurostat	2017
	Employment	City	GDP per capita, employment rate, unemployment rate	Eurostat, JRC	2017, 2019

(*continued*)

Table 1. (*continued*)

		Regional	GDP (2020), employment rate, unemployment rate, economic activity rate, NEET	Eurostat	2020, 2021
Culture	Education and work	City	person (aged 25–64) with ISCED level 5, 6, 7 or 8 as the highest level of education, creative and knowledge-based jobs	Eurostat, JRC	2017, 2019
		Regional	tertiary educational attainment, adult participation in education and training	Eurostat	2019
	Human capital	City	human capital and education	JRC	2019
		Regional	human resources in science and technology	JRC	2019
Governance	Society	City	cultural participation and attractiveness	JRC	2019
		Regional	life satisfaction, access to services	OECD	2022
	Institution	City	quality of governance	JRC	2019
		Regional	civic engagement, community	OECD	2022

5 Venice Study Context

In order to test the assessment framework, a first implementation to analyse Venetian territorial context has been carried out. Venice is a seaside city, included within the administrative boundaries of Veneto Region, located in northern Italy.

Venice is a lagoon city, whose economy is mainly based on agriculture, fishing, handicrafts, industry and tourism. The analysis of the characteristics corresponding to

the remaining qualitative parameters is more significant if conducted in relation to a circumscribed area and specific objectives.

From the analysis of the quantitative parameters collected (Table 2), on the other hand, although data referred to different geographical levels are not always directly comparable as they are taken from different databases elaborated in different moments in time, some issues emerge clearly.

Table 2. Venetian information framework

Quantitative Parameters						
Thematic Pillars	Key fields	Level	Parameters	Data	Sources	Year
Sustainability	Human Impact	City	PM2.5 annual mean concentration	15–25 (poor air quality)	EEA	2021
		Regional	environment			
	Mobility	City	Local & International Connections	19.9	JRC	2019
		Regional	networks total railway lines, air transport of passengers, motorization rate, air quality (PM2.5)	68, 4293, 657, 19.0	Eurostat, OECD	2017, 2022
Inclusion	Population	City	total population, foreigners as a proportion of population	261.905 13.2	Eurostat	2017
		Regional	total population, less than 15 years, 15–64, crude rate of net migration plus statistical	4.879.133 633.774 1.135.667 3.2	Eurostat	2017
	Employment	City	GDP per capita, employment rate, unemployment rate	27.000–35.000, 70–75, 6.9	Eurostat, JRC	2017, 2019
		Regional	GDP (2020), employment rate, unemployment rate, economic activity rate, NEET	31.600, 70.8, 5.3, 69.4, 13.6	Eurostat	2020, 2021

(*continued*)

Table 2. (*continued*)

Culture	Education and work	City	person (aged 25–64) with ISCED level 5, 6, 7 or 8 as the highest level of education, creative and knowledge-based jobs	31.333, 30.5	Eurostat, JRC	2017, 2019
		Regional	tertiary educational attainment, adult participation in education and training	19.7, 10.6	Eurostat	2019
	Human capital	City	human capital and education	21.1	JRC	2019
		Regional	human resources in science and technology	35.4	JRC	2019
Governance	Society	City	cultural participation and attractiveness	61.9	JRC	2019
		Regional	life satisfaction, access to services	5.0, 5.8	OECD	2022
	Institution	City	quality of governance	39.4	JRC	2019
		Regional	civic engagement, community	7.9, 6.3	OECD	2022

Among the most relevant issues, the progressive depopulation that Venice port city is undergoing becomes evident. The resident population in Venice, in fact, is only a small part of that residing in the Veneto. Furthermore, the low incidence of the young population describes the phenomenon of demographic winter, which is accompanied by a consistent migratory trend that is also found at the city level. On the other hand, there is a discrete presence of foreigners.

However, there is good cultural liveliness in terms of civic participation and level of education. The degree of participation in "tertiary education" recorded at the regional level is in line with what was found at the city level in terms of "human capital and education". To the high rate of "cultural participation and attractiveness" found at the city level corresponds to comparable levels in terms of "civic engagement" and "community" at the regional level.

As for the labour market, Venice boasts a good score for "creative and knowledge-based jobs" and a good level of employment above 70%.

The environmental issue is quite critical. At the regional level, although there is a low "rate of motorization", the "air transport of passengers" is widely used, and there are low scores with respect to environmental quality. Both at the regional and city level, there are high levels of PM 2.5, one of the main air pollutants.

The main topics deriving from data interpretation are in line with the ones that emerged in the context of a cycle of focus groups wherein expert local stakeholders were asked to provide a critical synthesis of the local context under a multi-level and multidimensional perspective from a socio-economic viewpoint. The meetings have been organized as part of a collaboration between Ca' Foscari University of Venice and tertiary sector institutions, to investigate the main socio-economic issues concerning sustainability and competitiveness in northeast Italy [21, 26].

6 Discussion and Conclusion

Despite the growing interest in scientific and professional fields, a uniform definition of urban regeneration is still lacking. Assuming the indications recently provided by UN-Habitat [30], in line with the RS theoretical approach [11, 29], in this contribution, a place-based and multi-level framework as RD evaluation support tool [15, 16] has been outlined.

This approach is also consistent with the regulations in force on port planning, both in reference to the European regulation, which has already recognized Maritime Spatial Planning (MSP) [31] as a decision-making process, and to the Italian national one, wherein the careful analysis of the territorial context constitutes a crucial step prior to the definition of strategic planning documents, which are mainly focused on regeneration processes, as can be seen from the study of the approved documents.

The framework has to be understood as a first result in the attempt to define a tool to measure the regenerative development of European cities. It has been designed both as an analytic tool, to explore in depth a territorial context and as a monitoring tool, to evaluate urban transformation interventions and policies, configuring itself as a support tool in the context of RD evaluation.

Furthermore, since it has been developed as part of the BoSS research project, it has been also designed to compare different urban contexts. Therefore, considering the heterogeneity of the issues found at various levels, in the different territorial contexts, the framework is a specific and overarching tool, allowing for both in-depth analysis (wherein suitably tailored based on the specific objectives) and comparative analysis.

It should be noted that for the same key field of investigation, the parameters selected may vary according to the significance they assume in relation to the specific features of the study context, the availability of data and the scale of a given phenomenon. Despite the versatility of the tool, however, there are also limitations. The main drawbacks are related to the availability and comparability of data. In fact, the same data are not always available at both the city and region levels. (e.g. population is differently quantified at the city and regional level, whereas the classification of training varies from country to country). This could represent an obstacle in the exploration of a given phenomenon under a multi-level perspective.

Furthermore, as can also be seen from Table 1, it should be noted that not all the available data refer to the same year. This problem could be overcome by setting a

time frame of 3–5 years, whose significance must be verified in relation to the specific historical moment. In this perspective, it is easy to understand that certain issues that emerge from the interpretation of the collected data could require an adjustment of the analysis framework or could highlight significant aspects to be considered in the subsequent phase of structuring the problem preparatory to the actual implementation of decision support methods and techniques in the context of RD evaluation.

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