City of Proximity: A Participative Methodology to Evaluate and Regenerate Residual and Underused Urban Areas

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Abstract. This paper returns the first stages of preliminary investigation for a research path that involved the Faculty of Engineering and Architecture of Kore University in Enna, the Interateneo Department of Science, Design and Territorial Policies of the Polytechnic University of Turin and the Department of Architecture of Roma Tre University.

The proposed research pathway, still in its early stages, is aimed at the definition and the application of a methodology to select the most suitable and effective locations to perform local urban transformations on abandoned, residual, unused, and underused places.

The purpose is to provide local communities with services that are not available on a small scale, to achieve the realization of the x-minute city model or the neighborhood city.

The realization of an x-minute city model accomplishes several Missions of Italian NRRP, especially in relation to Sustainable Mobility, Inclusion and Cohesion, and Health.

It encompasses the reduction of daily distances, the decongestion of main urban roads, which contribute to decarbonization, and the improvement of citizens' well-being by realizing a human-scale environment. The final result of the research project will be achieved through the application of logic, tools, and methods drawn from the field of appraisal. They will allow considering at the same time multiple and heterogeneous variables and endogenous/exogenous characteristics, synthesizing them into indicators for global evaluation.

After outlining the structure, path, objectives and expected results of the research, the paper tries to outline the outcomes of the preliminary investigations.

Keywords: urban walkability · city of proximity · evaluation tools · liveable city

1 Introduction

Underlying the proposed research project is the intention to combine some of the most recent input from theories and research on urban development issues, the city models most widely pursued by international urban policies, and the contribution of the

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most advanced evaluation methods and techniques. To this end, it is deemed necessary to briefly introduce the main references guiding the research path, namely: the Network Analysis of Urban Systems, the Urban Model of the x-minute city, Multicriteria approaches and indices for urban analysis and, finally, the crowdmapping processes.

1.1 Urban Planning and x-Minute Cities

Concerning the evolution of urban planning, a first x-minute planning model for residential development in metropolitan areas is associated with Clarence Perry's proposal (1929): a pedestrian unit, where, within ¼ mile, one reaches shops, schools, parks, community institutions, rapid transit and arterial streets.

It has had a certain influence on the evolution of modern urban form, and at the same time has been the object of debates, which last until today (Mehaffy et al., 2015). This debate was followed by several x-minute city *or* x-minute neighborhood (they are two different things) idea, e.g. see the New Urbanism, the urban quarter, Traditional Neighborhood, Transit oriented development (Acampa et al, 2019), including the Isobenefit Urbanism concept (D'Acci, 2013, 2014, 2019) aimed at the development of a more walkable city. These models, suggest a way to guarantee the residents of urban areas access to residential functions within a walking distance – e.g. work, services, education, entertainment.

1.2 Multi-criteria and Indexes for Urban Analysis

In the context of the service-proximity evaluation, several recent attempts have been proposed to evaluate the quality of urban accessibility. For instance, Borghetti et al. (2021) develop an evaluation model which, through a set of indicators, considers the distance between service sand railway stations to evaluate their accessibility; Graells-Garrido et al. (2021) aim at measuring the correspondence of the city of Barcelona to the 15-min city concept by calculating the number and diversity of amenities within15-minutes walking distance from any specific neighborhood and analyzing different local patterns of human mobility in relation to urban amenities. In the context of urban transformations, a wider approach is the use of Multicriteria Analysis (MCA) methods to include different types of indicators simultaneously (qualitative and quantitative, as well as heterogeneous in nature), aiming at considering the complex interrelation among urban sustainability aspects (Bottero et al., 2019). Furthermore, these methods are characterized by a strong interaction between the Decision Makers and the stakeholders (citizens, investors) involved in the process, allowing for a higher level of participation (Munda, 2005).

1.3 Crowdmapping

In urban themes, crowdmapping has contributed to democratizing the planning process, thanks to citizens' contribution to providing real-time, low-cost data, which are useful for planning and mitigating the limits of traditional data collection methods, such as census data (Griffin and Jiao, 2019). In the field of urban planning, crowdmapping is

vastly discussed in the scientific literature concerning themes such as problem-solving, idea proposal, and collaborative mapping, integrating different platforms to enhance participants' familiarity with the involved area, through an imaginary street level that facilitates participants in the simulation of the walking process along streets, hence providing detailed 3D information of the visible spatial elements.

2 Research Approach: Themes and Objectives

The contemporary cities are congested by a strong need for vehicular mobility due to the distance from services, and lack of diffuse public spaces for social aggregation. The contemporary scenario imposes a need for transformation and devehicularization of cities: the EU Missions in the framework of the Horizon Europe project, which are aimed at achieving tangible results by 2030, include the "Climate-Neutral and Smart Cities" mission. This Mission involves specific urban actions in European cities for the achievement of climate neutrality goals set by the European Green Deal, that is the reduction of emissions by 55% by 2030, and zeroing by 2050, as they play a major role in global decarbonization: despite covering just the 4% of Italian territory, they host 75% of citizens, and contribute to climate-altering emissions by 65–70%. Mobility has a decisive weight in this regard: low-emissive vehicles are still a very limited share (11.5%) of the total number of private cars in Italy (MIMS, 2022), while, concerning public transport, especially buses, a consistent quota (above 25%) is represented by vehicles of Euro 4 class or below (MIMS, 2022). Hence, the contribution of urban mobility to pollution is all but negligible, and actions to affect it involve changing regulations on emission thresholds, and increasing walkability, both by educating urban societies to perform different behaviors and operating on the material urban fabrics to allow performing daily functions in the proximity of residential households. In most areas, basic services and spaces (green areas, entertainment, education, work, social aggregation) are not immediately available. This leads to a majority of hard-mobility movements, with an impact on pollution, but also on the health and well-being of residents.

This spatial and functional problem has deeply rooted origins, dating back to the industrial revolution and the sprawl that affected urban centers while creating productive areas that lacked any kind of centrality, and has evolved through ages, leading to a strong complexity. In addition to that, its solution is often regarded as difficult to achieve for municipalities, due to the disproportion between the available budget and the economic expense required for an urban-scale plan. For this reason, a methodology for the individuation of the most impactive opportunities for the local achievement of this improvement can stand as the missing link to trigger the start of these urban regeneration processes, taking moves from residual, abandoned, underused, and unused areas to create walkable city areas.

Because of this problem the underlying assumption of the research lies in the fact that it becomes necessary to individuate and determine the most effective and suitable locations to perform punctual urban transformations, aiming to the achievement of local walkability, and hence fostering administrations to use economic resources for this purpose by demonstrating their optimal allocation.

The research, which in its early stages was named InTenTCity (Inclusive Networks to deliver the fifTeEn miNuTes City concept) aims at devising, applying, and validating

an appraisal-based methodology to determine the most effective and suitable locations in an urban fabric to perform a transformation, aimed at providing residents of the involved area with walking-distance services, amenities, centralities, and spaces for social relationships.

The general goal of the research can be summarized as follow:

- To collect, analyze and systematize data on an x minutes city model, including its best practices and the factors underlying its goals, and on the useful methods and tools for the individuation and evaluation of its optimal opportunities (network analysis, multicriteria, crowdmapping).
- To achieve a taxonomic classification of residual, abandoned, unused, and underused places in urban areas through a crowdmapping methodology, and of the morphology of urban fabrics.
- To codify the transformations associated with the functions to implement for the local realization of x-minute cities, establishing and calibrating parameters for the evaluation of their impacts and benefits.
- To elaborate the methodology for the evaluation of the selection of the optimal locations and transformations, developed according to an Optimal Computing Budget Allocation (OCBA) structure.
- To validate the methodology and its databases through its application selected sites and the comparison with their specific contexts, engaging local communities and improving the methodology through internal and external feedback.

3 Methodology and First Understanding of the Investigation

From the early stages of preliminary investigation, it seems clear that research project encompasses several disciplinary aspects, among which sociology, ecology, urban planning, transportation, urban economics, and decision making. At the same time, it is considered useful that the guidance is strongly based on the techniques of economic evaluation drawn from the field of Real Estate Appraisal. The above can be considered reasonable for the following reasons:

- on the one hand, appraisal techniques now encompass a wide variety of methodologies to evaluate heterogeneous aspects through multi-criteria structures, allowing the combined consideration of social and environmental aspects, economic costs, and benefits.
- On the other hand, economic feasibility– or rather, the emphasis on the economic point – is deemed to be the key factor for the achievement of the goal. Indeed, the "x-minute city" is an increasingly discussed theme but defining programmatic and realistic steps for its progressive realization is now the task to accomplish to fill the gap with the current situation.

3.1 Urban Sustainability, x-Minute City and Isobenefit Models

In order to improve life quality, well-being, and social inclusion, the research is adopting urban planning tools to guide transformations along the principles of urban livability, defined as a behavior-related function of the interaction between environmental characteristics and personal characteristics (Ahmed et al., 2019). In this regard, the research is

considering the Sustainable Development Goals presented by the United Nations, specifically Goal 11 "Sustainable cities and communities," which states that urban development will have to be more inclusive and sustainable, encompassing participatory, integrated, and sustainable settlement planning. In Italy, the targets set by the NRRP, represent tools to address urban regeneration issues in terms of innovation, sustainable mobility, cohesion, inclusion, and health.

The research, that aims at enhancing urban sustainability through the walkable city model, is evaluating best practices and experiences of it, and is implementing a literature review regarding theoretical aspects about nodes and networks evaluation. The walkable city model takes the long-standing idea of a city in which residents can do their main daily activities by walking. The concept is also present in D'Acci's Isobenefit Urbanism since 2013: "the Isobenefit Urbanism approach aims to create cities in which each dweller can do her/his usual main daily activities by walking or at maximum biking" (D'Acci 2013).

This theme is strongly linked with the individual and collective dimensions of urban society. In this framework, the research is moving toward crowdmapping methodologies.

3.2 Identification and Selection of Areas: The Crowdmapping Method

Crowdmapping can be defined as "the aggregation of crowd-generated inputs such as text messages and social media with geographic data to provide real-time interactive information about events, such as wars, humanitarian crises, crime, elections or natural disasters (the results are sometimes referred to as crisis maps)" (Quaintance, 2014). Thanks to residents' cooperation, these tools can drive the individuation of suitable locations for transformation based on their perception of their living environment in terms of needs, expectations, and vacancies. The crowdmapping method, being public and participatory, and connected to large possibilities of subjects through web 2.0 technologies (the set of all online applications that allow a high level of site-user interactions such as social media, forums, etc.) has lifted the spatial and temporal constraints associated with data collection in public participation processes (Diop et al., 2022).

What has been understood so far in the course of this initial investigation is that it might be useful to set up a platform where anyone can upload photographs, coordinates, characteristics, frequency of use, and state of conservation on locations that he deems to be susceptible – and in need of – the introduction of new use. The structure of the platform is based on a fixed number of typologies of places (under definition) and characterizers so that users will be guided to provide the information needed for the taxonomic classification.

The crowdmapping platform will be operational throughout the whole duration of the research and should be diffused and advertised both through institutional communication and through non-institutional communication, using social media and organizing meetings with residents, especially in the researchers' territories. The goal is to reach as many users as possible; for this purpose, digital crowdmapping should also be integrated with traditional forms (surveys, interviews) when possible, to include those with no access or familiarity with digital technologies, such as the elder population. The obtained data will be filtered and processed to achieve the classification of the places according to the defined characteristics, in terms of typology, morphology, dimensional parameters, accessibility, and state of conservation.

The working hypothesis for crowdmapping is based on a double level of quali-quantitative data input: one has a technical nature, while the other has an informal or communitarian one. In addition to formal quali-quantitative data (such as ownership, surface area, volume, state of the art, urban forecasting, etc.) that can be implemented by a technical nature component, for each space, it is possible to detect, through the input of additional information elements from the community, other social, community-related, and possible-use values (e.g., stories, local information, community desires, possible informal or improper uses, perceived dangerousness, etc.). The concepts of democratization of information are overlapped in a bottom-up production of information by users and users of places, inclusion of weaker actors, transparency of information, and empowerment of citizens who are involved in processes of reflection on their relationship with the territory (Parker, 2006). In addition, users who participate in mapping can contribute by providing the location (even an approximate one) of their home and the possible route to reach the main services, including the route to the mapped space.

3.3 Defining the Set of Possible Transformations

Once the areas have been identified, the next step is the actions to perform on them, through the codification of the functions to implement and the required – and feasible – transformations to realize them. This is in the process of being structured as an articulation of the function classes from the "x minutes city" model to define sets of specific functions, calibrated according to the variable needs of different social fabrics; then, the compatibility of each function with the typologies of locations is assessed, and the parameters for the evaluation of the results of the transformations are established, modeled, and codified. Hence, the accomplishment of this phase consists of the following elements:

- a set of functions.
- A matrix of transformations, showing the compatibility between the typologies of locations and the single functions, hence indicating the possibilities of transformations;
- A vector with the parameters that characterize the results of the transformations.

This will be compounded by a review and identification of the existing plans, agreements, and contracts supporting the development and management of these transformations and their products, which can also involve a co-management between original private owners (in the case of abandoned and unused businesses, for example) and the Municipalities, to achieve a complete operational framework.

In addition to the reconfiguration of abandoned spaces, at this early stage of research are emerging recent legislative and regulatory innovations that are aimed at facilitating and structuring processes of co-design or co-management of services in properties or spaces to be taken care of.

One of the recent introductions is the regulation for the Shared Administration of Common Goods, adopted by more than 80 Italian municipalities (including Turin) and in the process of approval in another 80 municipalities (such as the case of the Municipality of Rome), which provides for "Goods and pacts of collaboration" as implementation tools. The Collaboration Pact is the act through which citizens and administrations

agree on the intervention of care, regeneration, and management of a common good in a shared form. On such assets (areas or buildings, including privately owned ones) it is possible to make interventions of social innovation, collaborative services, regeneration, and shared management by establishing, through the pact, objectives, and duration of the agreement, modes of action and collective use of the asset, governance tools, and mutual responsibilities.

3.4 Optimization of Possible Choices

Finally, in relation to the methodology for the selection of the optimal locations and transformations, the research is directing its gaze toward the category of Optimal Computing Budget Allocation tools. The intent is to inspire the operational approach to the industrial field while dealing with a deeply social and human-scale theme. On the one hand, the goal of producing the most effective improvement with respect to the budget will be drawn from the business sector; on the other hand, the multi-faceted and multi-actor nature of the urban field in which the project operates will lead to a careful analysis and modeling of the parameters that make up the evaluation system.

This is resulting in largely drawing from the field of multicriteria analyses: these methods serve as integrations to the main structure, providing the possibility to interpret and elaborate economic, social, environmental, and human benefits, in addition to aspects related to sustainability and resilience, by giving the correct weights to the complex characteristics that involve them.

The method, once fully operational, will compute all the possible transformations of the available locations by assessing the virtual benefits deriving from each of them and hence comparing them to establish which one produces the optimal results, and finally providing its user – identified with local administrations – with an overview of possible recommended choices.

Moreover, the research is including the multi-criteria evaluation models for social and environmental aspects. The review of recent application suggests considering the concept of social multi-criteria evaluation as a framework for a tool to implement a multi/inter-disciplinary approach (Munda, 2003) and focus on the issue of the complexity of social environments. This is also allowing the investigation of ways to enhance social aspects through the construction of matrices that consider the impact of the actors involved with qualitatively measurable criteria and aspects in environmental and economic matters through quantitative criteria (Baratta et al., 2021).

4 Conclusion

The complex set of actions proposed in this initial research reconnaissance survey need two steps that will need to be implemented:

– the specific in-depth study of each proposed step for theoretical verification and implementation.

– a series of concrete applications on one or more existing urban fabrics, aimed at experimental verifications of the proposed procedure.

In relation to the latter point, the choice of sites is based on the recognition of the 9 Italian cities involved in the "Structure for the Ecological Transition of Mobility and Infrastructure" (STIME): toward the end of 2021, the European Commission chose 100 European cities to participate in the "Climate-neutral and smart cities" mission within Horizon Europe program, and among them are the Italian cities Bergamo, Bologna, Florence, Milan, Padova, Parma, Prato, Rome, and Turin. These cities are set as front runners for the achievement of climate neutrality by 2030, requiring actions in several fields, including the improvement of energy efficiency, reduction of pollution, and the implementation of mobility strategies: with reference to the latter, the STIME report specifically focuses on integrated urban and transport policies and mentions several European best practices related to "15-min cities" –walkable communities, "20 min neighborhoods", and "superblocks" – since enhancing walking-distance services contributes to decarbonization.

Among the 9 cities of the program, 3 were chosen in light of their shared nature of congested, overpopulated cities:

– Florence (Tuscany), suffers from a strong dualism between the outstandingly touristic city center, specifically the quartier inside the mostly destroyed Medieval walls, and the peripheral areas out of the walls. The services used to be located in the center but now they moved to the peripheral areas increasing the process of emptying the downtown from residents. Out of the walls, the residential areas are mostly neglected from a service perspective as the basic ones are not grouped and no new small-scale center emerged;
– Rome (Latium), which is a monocentric city that suffers from the continued failure to transition to polycentrism and a slow process of administrative decentralization to the municipalities; dispersed from an urban perspective (often referred to as an archipelago territory) and, except for the central and semi-central areas, has tracks lacking essential services, far from the 15-min model, where community relations revolve around large commercial hubs. Due to its extension and heterogeneous urban management, a single Municipality will be chosen as a site for the application of the method, also to achieve similarity with the other ones.
– Turin (Piedmont), which suffers from extremely high levels of air pollution and, despite having a relatively good street network and public transport system, has the problem of congestion and difficulty in getting to pedestrianized areas; showing, also, criticalities in providing high social and urban quality spaces in its peripheral areas.

The same sites will also provide the local reference of the litmus test for the verification of the comprehensiveness of the taxonomic classification. The administrations of the three cities involved have already signed endorsement letters for the project, showing their interest in its development.

Concerning the validation, a key element for the comparison of the results is represented by proximity indicators. In particular, the ones proposed by the International Transport Forum of the OECD (an intergovernmental organization) include: a) Absolute Accessibility: Number of destinations reachable within a fixed amount of time with

a given mode, i.e. accessible destinations. b) Proximity: Total number of destinations within a certain distance, i.e. nearby destinations. c) Transport performance: Ratio of accessible destinations to nearby destinations. The indicators are then calculated for different destinations through a set of parameters. Another research work (Pucci et al., 2021) developed an Inclusive Accessibility by Proximity (IAPI) based on the concept of basic accessibility understood as a minimum threshold that allows each person to take part in different activities, ensuring quality public spaces to support active mobility and to rethink a route design. Basic accessibility returns the ability to enjoy the activities that are presumed to be necessary to prevent the social exclusion of families.

Then, feedback will be collected from both the researchers in the RUs, and the residents and stakeholders involved in the transformations individuated by the methodology: concerning the latter, suitable inclusive processes will be chosen, adopted, tested, and codified in this context.

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