A Literature Review on Street Experiments: A Preliminary Step Towards Adaptive Planned Solutions from Bottom-Up Experiments

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Abstract. From the first parklet established in 2005 in San Francisco by Rebar, an art-design-activist organisation, to the latest urban experimentations launched during the Covid-19 pandemic, street experiments are an established trend in the tactical urbanism. During these experimentations, city streets become key spaces not only for testing alternative form of transportation, integrating various urban activities, such as commerce, recreation, social interaction, and leisure, but also for suggesting innovative models for environmentally friendly public spaces. These reversible and temporary practices often originate from a bottom-up approach and seek to raise public awareness about current and widely debated issues such as sustainable and active mobility, as well as improving quality of life. The increasing understanding of their beneficial impacts is supported by numerous research and studies proposed by the scientific community. However, cutting-edge framework for street experiments has not been developed. This paper is part of an ongoing research and it seeks to address this gap through a systematic and critical literature review. In particular, the research examines the potential of street experiments, specifically parklets, with the aim of proposing operative process able to change these temporary experimentations in adaptive planned solutions, to transform and enhance the urban landscape sustainably, to promote active mobility, and enhance accessibility.

Keywords: Accessibility · Bottom-Up Approach in Urban Planning · Parklets · Participatory Planning · Sustainable and Active Mobility · Tactical Urbanism

1 Introduction

The transformations of the streetscapes have been significantly influenced by the aims of the current urban agendas (i.e. active and sustainable mobility and liveability of city). Over the last two decades, several cities throughout the globe have seen changes in their streets, adopting a 'tactical urbanism' strategy that involves temporary experimentation.

These transformations have been often object of criticisms, but, at the same time, they have been widely recognised with great optimism by public opinion. Nowadays, perhaps due to the impact of Covid-2019 epidemic limitations, there has been a rise in

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street experiments aimed at raising public awareness about pressing and highly discussed issues like sustainable mobility, as well as improving quality of life. Furthermore, they serve as a vital element in the field of urban planning.

Within this framework, city streetscapes lose their primary purpose as places for vehicular traffic and instead transform into pivotal areas that serve many functions and accommodate diverse users. These spaces are used for experimenting with alternative modes of transportation and facilitating a range of urban activities, including commerce, recreation, social contact, and leisure. In this context, these concepts are regarded as unique prototypes for environmentally conscious communal areas.

City street experiments, as described by Bertolini, refer to «intentional, temporary change of the street use, regulation and/or form, aimed at exploring systemic change in urban mobility, away from "streets for traffic", and towards "streets for people"» [1, p. 735].

Therefore, within the realm of tactical urbanism, street experiments have become a well-established trend, with Parklets being the most well recognised instances [2–6].

In 2005, Rebar, an art-design-activist organisation, made a payment to a parking metre in downtown San Francisco for a duration of two hours, thereby creating the first parklet. The roadway was adorned with a seat, a tree, and some sod. This action later resulted in the establishment «of an official planning programme in San Francisco and the yearly international event Park(ing) Day», which seeks to stimulate a significant discussion on the importance and on desire for a different public space [2, p. 165].

Parklets, along with other street experiments, exemplify the complex issues that modern cities must deal with, such as financial limitations, fast urban growth, and increased population density. These urban initiatives place additional demands on the availability of public space. Furthermore, parklets serve as economical and semi-permanent projects that align with the need of finding new models for public space. These projects are established via a public-private partnership model [2, p. 165].

This has facilitated their swift global dissemination and an increasing achievement of their implementation. Moreover, other instances were introduced in response to the need for social isolation during the Covid-19 epidemic [7].

Research on tactical urbanism, street experiments, reorganising of the public spaces [8–11], and parklets have shown significant growth and diversification in the last decade. They include several disciplines, ranging from social science to environmental science. Some researchers contemplate the evolution of phenomenon and its actual potential to revolutionise urban mobility [1]. Other scholars scrutinise the idea of formalising these temporary experiments into a permanent framework via systematic planning, considering the significant positive reaction they received during the worldwide epidemic [12–15]. Furthermore, many academics have engaged in the task of cartography, emphasising the distinctive environmental characteristics of these events on a worldwide scale [7], while others have examined the progress and transformation within more limited settings to highlight the strengths and vulnerabilities [16]. However, cutting-edge framework for street experiments has not been developed.

Starting from these considerations, this study proposed is part of an ongoing research that examines the potential of street experiments, specifically parklets, with the aim of

proposing operative process suitable and able to change these temporary experimentations in adaptive planned solutions, to transform and enhance the urban landscape sustainably, to promote active mobility, and enhance accessibility.

Specifically, the objective of the study is to address this gap by identifying relevant literature and establishing a comprehensive understanding of the current state of knowledge in the field. In order to achieve this aim, the paper is organised into four sections: After the *Introduction* (1), the *Methodology* is described (2), before going in a depth detail by defining *The state of art on street experiments* (3). The *Conclusion* (4) discusses the results obtained from the literature evaluation, as well as the main findings of the study, and the research agenda.

2 Methodology

The study aims to analyse the existing literature on street experiments in order to create an innovative framework through a methodical and evaluative literature review.

Following the prevailing approaches and methodologies [17, pp. 4–11], the literature review is conducted in five steps, described in Fig. 1: 1. Problem formulation; 2. Data collection; 3. Data evaluation; 4. Analysis and interpretation; and 5. Public presentation.

The primary step, *Problem formulation*, aims to identify and define previously the research questions to guide the literature review, and then, to determinate the criteria for inclusion and exclusion. In particular, the literature review goals are to establish the phenomenon of the street experiments in the current context, to frame its evolution, to highlight its strengths and weaknesses, and to understand its role in the cities' transformation and in the urban planning.

For these goals, the literature review starts at first clearly defining the topics necessary to delimit the research, and then, selecting keywords to further filter search results. The first are Tactical Urbanism, Street experiment and Parklet/parklets; while the second are Active Mobility, Built Environment, Street experiments, Sustainable Mobility, Urban design, Urban planning, Walkability.

The second phase, *Data collection*, begin with the choice of Scopus as a search database among the many currently available [18].

The queries utilised for the research of the relevant literature on Street Experiment contained into the Scopus Database are: Tactical [and] Urbanism, Street [and] experiments, parklet/parklets.

In the early search, a considerable number of results has been selected [19]. Thus, subsequently, the search has been delimited by filters.

It considers the chronological range 2012–2024 (first trimester) as time span. The 2012 was chosen as the starting year of the survey because it was observed that before this date the contributions of the different topics are rather sporadic and not continuous.

Then, the subject area taken into consideration are Social Sciences, Engineering, Environmental Science, and Art and Humanities. While Article, Book chapter, Book, Conference paper, and review, in English language, are the document types selected.

In order to further delimit the field in the street experiment topic, the selected keywords have been searched in the title, abstract and between the authors' keywords.

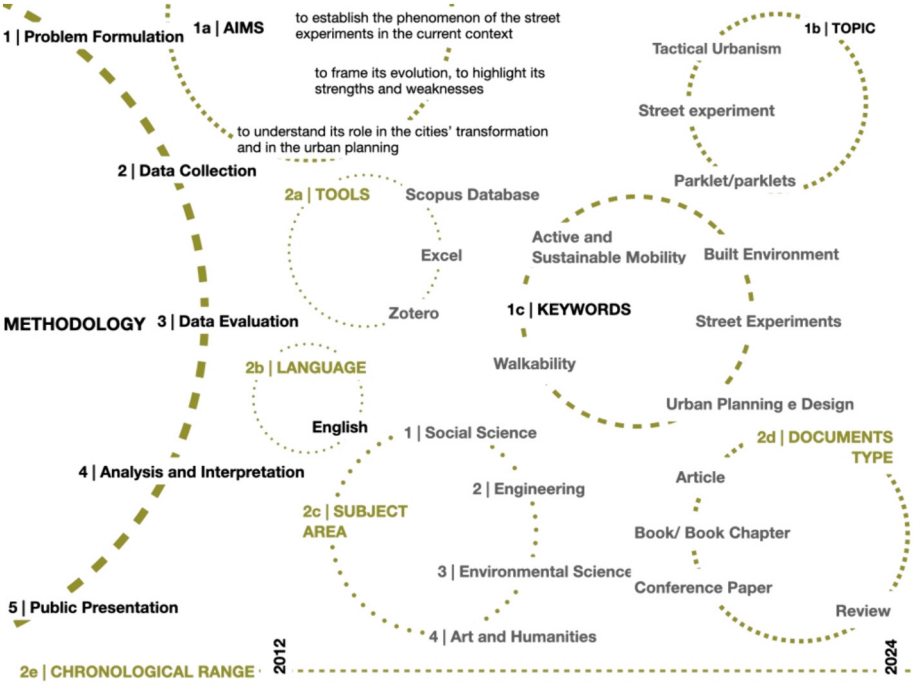

Fig. 1. Methodology's Scheme (MSP).

Ultimately, 485 is the total number of contributions selected. The different and numerous data and information of the several contributions was collected in an Excel sheet. In addition, all contributions were recorded in a Zotero library dedicated [20].

The study has been then carried out in the next phase, *Data evaluation*, through reading the abstracts to evaluate the usefulness of the sources found. After discovering a valuable article, the mentioned sources were examined to include further sources in the bibliography. Subsequently, the evaluation procedure of the sources is conducted with the objective of determining the ones that are most pertinent to be included. Lastly, the analysis and the interpretation of the data has been conducted using a thematic approach. Identifying patterns in literature, such as recurring themes, ongoing debates, and research gaps, has shown to be especially important.

This paper presents the initial findings of a study that focuses on contributions related to street experiments and parklets. It specifically examines contributions that mention "street experiment" in their title, text, author's keywords, as well as contributions that refer to parklet/parklets.

3 State of Art on Street Experiments

3.1 Quantitative Synthesis

The research of the relevant literature on street experiment contained into the Scopus Database has selected about 485 contributions, in English language, divided into Article, Book chapter, Book, Conference paper, review. As mentioned above, it has been investigated the chronological range from 2012 to 2024 (first trimester) as time span.

As shown in the Fig. 2a, from chronological point of view, it is possible to note a significant increase of the contributions in reference to the topics, from 2018 (from a distribution of 2–3% between 2012 and 2017 to 8% in 2018, a peak of 18% in 2022).

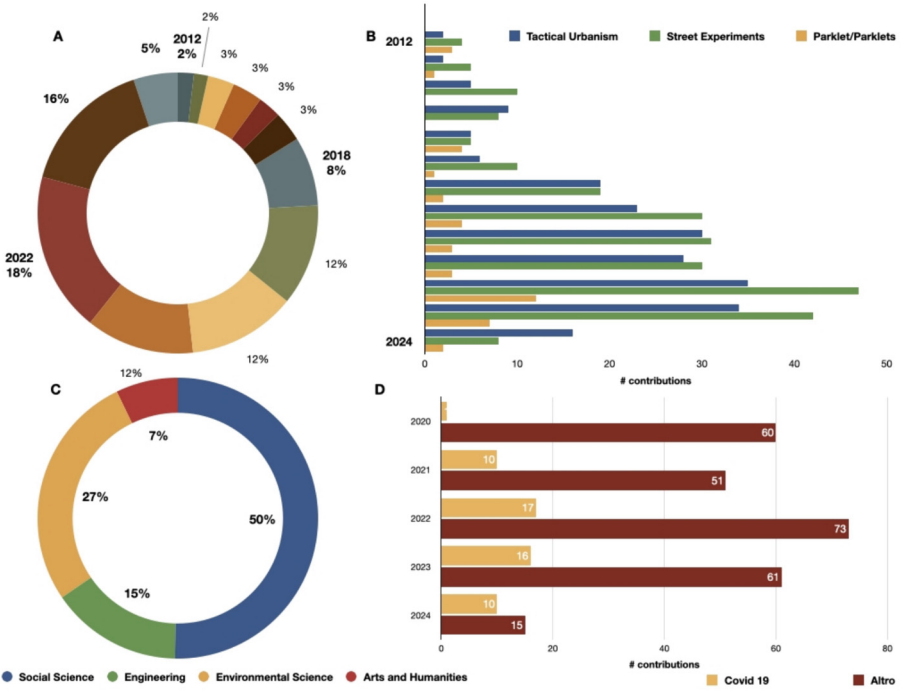

Fig. 2. Graphitisation of the research results. Distribution of the relevant literature selection from a point of view: A. Chronological; B. Topic; C. Subject Area; and regarding Covid 19 pandemic (MSP).

Moreover, as shown in Fig. 2b, among the three topics, the contributions focused on street experiments are considerably higher, especially in 2022. As for the references to Parklets, the first years are infrequent and of little number, while there has been a consistent increase since 2016, with a significant increase in 2022 (about three times more than 2016). As previously said, the chosen themes are the focal point of investigation in several disciplines. The planned study primarily focuses on the fields of Social Science, Environmental Science, Engineering, and Arts and Humanities.

The distribution of the relevant literature selection is shown in Fig. 2c and is as follows: Social Science (50%), Environmental Science (27%), Engineering (15%), and Arts and Humanities (7%).

Another finding that arises from this quick quantitative assessment is the dissemination, starting in 2020, of research that investigates street trials generated by the Covid-19 pandemic (11%).

The geographical situations under investigation are different. Europe, Canada, and the United States are the primary areas of investigation, with further exploration of other settings including Latin America, Asia, and Australia.

3.2 Towards a Thematic Framework

The early analysis and the interpretation have been carried out for the contributions related to street experiments and parklets, previously selected because they mention "street experiment" in their title, text, author's keywords, as well as contributions that refer to parklet/parklets.

This phase, characterised by a thematic approach, allowed us to identify recurring themes, ongoing debates, and research gaps.

In particular, from the contents of the contributions, it is possible to identify 5 general themes, later explained and here summarise: 1. The phenomena of street experiments and its connection to urban mobility; 2. Legislation, conflicts, and criticism; 3. Involvement of stakeholders and communities, and assessment by citizens; 4. Street experiments prompted by the Covid-19 pandemic; 5. Ensuring safety.

3.2.1 Street Experiments Phenomenon and Its Relationship with the Urban Mobility

Numerous scholars investigate the phenomenon of street experiments. Furthermore, Luca Bertolini has the highest number of citations. In 2020, he conducted research to define street experiments and to identify the different intervention types, considering their specific environment and characteristics. The aim was to determine whether street experiments can effectively contribute to the improvement of urban mobility [1, 21].

These purposes are essential in the special issue of *Journal of Urban mobility*, entitled *Street experiments*, edited by Enrica Papa (University of Westminster), Benjamin Büttner (Technical University of Munich School of Engineering and Design) and Luca Bertolini (University of Amsterdam). It is an open reflection on the phenomenon of street experiments, their connection to urban mobility, and their potential as catalysts for transformative change in urban mobility.

Many studies focus on the dynamic development, programming, permission procedure, and public acceptance of street experiments, particularly parklets, frequently using real case studies as examples [5, 22–26].

Krity Gera and Peter Hasdell's research aims to comprehensively analyse street experiments and their impact on mobility and on access. They specifically focus on the influence of gender on the social-spatial environment [27].

Simultaneously, another study seeks to investigate the use of street experiments to enhance gender-specific movements and design urban landscapes that prioritise the

requirements of women in enhancing their access to public transportation, which in turn enables them to engage in many aspects of city life. The researchers critically evaluate the Topuk project, which aims to enhance women's access to public transit in Maltepe, Istanbul. The analysis focuses on assessing different methods of people involvement used in the street tests [28].

A very widespread and debated issue in ongoing research is the possibility of processing the street experiments from temporary events to permanent changes [12, 29].

3.2.2 Street Experiments: As Matter of Policies?

The transition capacity of street experiments often can be limit by institutional barriers. Thus, their success or their failure are certainly connected to the specific policies and planning instruments of the examination contexts, as well as the deep conflicts and criticism. Thus, many researchers offer a reflection about the regulation [3, 30–33], the criticisms and the conflicts that arise between different street users [34, 35].

Some research reports the positive example of the Living Street program of in Ghent (Belgium), where the municipalities have played a crucial role in the street experiments, improving their transitional capacity [36, 37].

Others research, by contrast, examine failed street experiments in order to address planning and governance policies in similar contexts. An example of this is the Asian area, characterised by a high-density urban environment with highly intensive use of streetscape, and conservative and prescriptive planning. Specifically, the researchers Caterina Villani and Gianni Talamini examine Hong Kong context, its policies and planning instruments, and illustrate two representative cases failed due the competing roles and pratical uses [38].

3.2.3 Stakeholder and Community Participation and Citizens' Evaluation

Other aspects investigated in the research are the stakeholder and the community participation in the street experiments process and the citizens' evaluation of the street experimentations. On the one hand, actively engaging the stakeholders and the community, sharing the aims, and the phases of the street experimentation process with them, understanding their needs, is decisive for success of the street experiments. On the other, exploring what the citizens value about the street experiments allows to propose a more effective and inclusive design.

For these purposes, for example, Karyn Scerri and Maria Attard created Virtual Urban Living Lab (VULL), a virtual platform to engage the local community, for a street experimentation process in Malta. Here, it can access in an interactive space where it is possible identify the barriers, explore, and evaluate the street experimentation proposes [39].

Smeds and Papa offer inductive and qualitative survey method for understanding citizens' qualitative evaluations of street experiments, considering both use value and the social meanings of streetscape changes. Specifically, they analyse the citizens assessment of five street experimentation, parklets and plazas, in three neighbourhoods of London, Munich, and Bologna [40].

It is particularly interesting what emerges from the investigation of four case studies in Sweden, where many temporary street experiments realised with the aim to create public spaces that enhance social inclusion and quality of life. The investigation has been carried out through an interdisciplinary approach, based on the exploration of the physical parameters and psychosocial processes that concern people's acceptance and place usability during car-free initiatives. In addition, the four case studies have been analysed from an environmental psychological, landscape architectural, urban transport and planning point of view. This put in evidence how, in the residents' perception of street experiments, acceptance and usability of the street experimentation depend on the perceived qualities of the physical urban settings and on interceding psychosocial processes such as, neighbourhood attachment and perceived quality of life [41].

At the same time, others research are addressed to the knowledge of the users 'perceptions (city centre residents and street users) with the aim to improve using interim design strategies. This approach has been proposed for a *Complete Street* in Norwegian [42].

As well as investigative methodologies, also the tools used to analyse the evaluation of street experiments are diversified. In particular, it is interesting the analytics approach, based on deep learning video, for the assessment of temporary street experiments, and for evaluate the effectiveness of intervention. This has been experimented on a tactical urban planning and participatory design, realised in Bologna in March 2022 [43].

3.2.4 Covid 19 Pandemic-Induced Street Experiments

As mentioned above, the street experiments have been really numerous in worldwide cities during the Covid-19 pandemic. They have been highly recognised and accepted by public and authorities, allowing the communities to live safety in the streetscapes and the urban spaces, according to physical distancing requirements. Some researchers have explored these pandemic-induced street experiments in order to demonstrate that these offer an efficient solution, to specific challenges to mobility and public space [15, 44]. Others research analyse and map the pandemic-induced street experiments on global scale. On the hand, 539 street experiments in 333 cities have been registered through a geospatial database (PISE Database) developed with a standardised template, characterised by built environment indicators and quantitative approach, able to facilitate comparisons between different cities [7]. On the other hand, the *Shifting Streets Database* has interested 524 cities around the world, for understanding the processes, their implications [14].

Others still study the phenomenon of Covid 19 Pandemic-induced Street experiments in a more restricted context [45–47]. For example, the research of Meredith Glaser and Kevin J. Krizek observes the street-focused emergency response measures from 55 largest cities in the US through a rubric to understand if these measures can trigger a transformation in the transport system [16]. The series of street experiments realised in Chilean intermediate cities during the global pandemic have been analysed by the research group led by Luis Vàsquez. The aim is to understand which measure has been most frequent, which area has been most interested, what type of funding or fund has been used, and the public perception associated with the street experiments [48].

In addition, the Covid-19 pandemic has conducted many studies to address a reflection on the need of change the public spaces, rethinking the urban green spaces as sensitive places for physical exercise and mental recreation [49–52].

3.2.5 Ensuring Safety

The street experiments, as is known, determine a reduction the number of vehicular through lanes and, consequently, these can be reallocated to other uses such as bicycle lane, parking, sidewalks, transit use, turn lanes, curb extensions, parklets or pedestrian refuge islands. This circumstance greatly enhances safety both pedestrians and vehicles. In this sense, the searches address both to the evaluation of the safety effectiveness of these spaces [53, 54] (i.e., The case of an intervention in Virginia using the empirical Bayes method) [55, 56]; and to the investigation for ensuring adequate ventilation of exterior and interior urban spaces for essential for safety and comfort of inhabitants, with the aim to share the result for the design for urban structures such as parklets [57].

4 Conclusions

Implementing a 'tactical urbanism' approach, which involves street experimentation, is of the utmost importance for addressing the issues of active and sustainable mobility and transitioning towards a liveable city, as outlined in current urban agendas.

For the last two decades, streetscapes in many cities across the globe have been undergoing temporary experimentation, sometimes welcomed with great enthusiasm by the street users. These experimentations improve the safety of the streets and the cities, and the quality of life. The Covid-19 pandemic has led to widespread street experiments that have quickly gained global traction and achieved significant success. This has prompted consideration of the potential for these experiments to become regularised via systematic planning.

This aspect is essential subject for the ongoing research, of which this study is part. Specifically, the research examines the potential of street experiments, in particular parklets. The research aim is to propose operative process suitable and able to change these temporary experimentations in adaptive planned solutions, to transform and enhance the urban landscape sustainably, to promote active mobility, and enhance accessibility. In order to achieve this aim, for the research is essential the analysis of the context in which the interventions will take place, and the synergy and participation of all the actors involved (administration, experts in mobility and planning, citizens and various users of the spaces, object of study).

The first step is to develop a cutting-edge framework for street experiments. The goal of the literature review is to establish the phenomenon of the street experiments in the current context, to frame its evolution, to highlight its strengths and weaknesses, and to understand its role in the cities' transformation and in the urban planning.

As mentioned above, due to the multitude of contributions found on the research object, the research achieves the first results from the investigation of the contributions related to the street experiments that include 'street experiment' in their title, in the text and author's keywords and a part of those referring to parklet/parklets.

The next phase will focus on the exploration of the literature review of tactical urbanism with the aim to highlight the relationship between this approach and the street experiments.

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