

An Investigation of Emerging Issues in the Built Environment Due to Covid-19 Impact on life

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Abstract. Although in this pandemic time, the science of architecture could offer a remarkable contribution in rethinking new living and working spaces, COVID-19 pandemic has revealed -and is still doing- the weakness of a huge number of architectural design choices implemented until now. According to the Latin term *habitare* a space should meet users' needs and requirements "overtime". However, what we are specifically reminded of during these times, is that a space should be able to satisfy human needs by adapting them to society's changes and acting as a flexible tool in the service of the community, which is unfortunately far from the real situation. Hence, the impact of COVID-19 pandemic on the users' space fulfilment has been herein explored and analysed. This paper aims to carry out a literature review on the aforementioned topic used as starting point to critically analyse the main built environment issues in today's times. The Covid-19 pandemic and especially the quarantine constriction have revealed a high dissatisfaction with quality living space as well as lack of flexibility and adaptability. This presented study has outlined the main critical aspects to be taken into account suggesting future research directions. Informative research about the impact of spaces on high-quality living should be more comprehensively analysed through the use of objective and quantitative data by employing it not just as a tool to refer to when an emerging situation is faced but as a regular data-driven method.

Introduction

On March 9, 2020, the Italian Government signed an Executive Order that has marked the history of the Country: article 1, I of the DPCM¹ introduced restrictive measures against the spread of the Covid-19 virus starting from bans on travelling and restrictions on leaving home without "proven working reasons, situations of need and health reasons".

The restrictions have been firstly adopted by China (23-28 January 2020), the hearth of the pandemic, and then introduced worldwide through National Government orders. A slogan such as "stay at home" has been used in different languages to invite people to contain the spread of the pandemic. Moreover, schools, universities, offices, retail as well as commercial activities have been closed due to the increase of deaths and the rapid and unstoppable transmission. Consequently, people have been forced to stay at home and to reduce the use of public space in "lockdown" conditions by reinventing themselves and their available spaces for different and unforeseen functions. It was in this moment, more than ever, that people dealt with the importance of living's quality concerning their house and its spaces, their interior design, together with neighbourhood, city, streets and so forth. This unprecedented and unexpected condition has brought professionals such as architects, engineers, planners and designers to rethink spaces by offering suggestions for future development of new spaces.

However, the debate on city and house re-shape has mainly divided into two different categories: the first one is related to the idea that everything will not be the same and the design thinking should be completely reconsidered, the second one is that everything will back to the normal. On one hand, solutions on liveable spaces with physical distancing precautions as well as the introduction of a new design approaches taking into account flexibility have been proposed. On the other hand, the temporariness of this current pandemic situation has been pointed out by outlining that, even if we

¹ <https://www.gazzettaufficiale.it/eli/id/2020/03/01/20A01381/sg> viewed on 10th May 2021

are living in unique conditions, everything will come back to normal sooner or later by adopting the “business as usual” approach.

At the time of writing, approximately one year after the pandemic diffusion, it is difficult to say who’s right -if it can be traced-, but we found interesting to highlight how the pandemic forced us to reflect on high-quality living and the fairness of historical design choices adopted to date.

Houses have moved from the consideration of being a mere place in which to sleep” to “a place in which to live all day”. While houses, in fact, have jammed with all family members by becoming for necessity offices, gym, schools, restaurants, place of recreation and so on, public space (such as roads, streets, squares) and semi-public spaces (retail, offices, businesses) have been contemporaneously emptied and used just for “reasons of necessity”. All those aspects have contributed to an ever-growing acquired consciousness by the users and inhabitants of the importance of the quality living and of what they want and, especially, what they do not want for their spaces. Green spaces for example have obtained a common recognition for the proven correlation of their use and benefits of physical/mental health. The exploration of peer-reviewed articles has given other fundamental insights into what high-quality living means especially after the outbreak of the covid-19 pandemic time. This paper offers an observation on the theme by collecting and analysing peer literature review to offer initial documentation upon which studying what the emerging factors on the covid-19 impact will bring to light and what planning and design have failed during this recent time’s adopted solutions.

Methodology

In order to analyse how and to what extent covid-19 restrictions impacted the research on the built environment and its related issues, a systematic literature review process has been conducted involving peer-reviewed article journals and conference proceedings. The state of art methodology (Fig 1.) has been based on the research method of Content Analysis which is used to determine the presence of certain words, themes, or concepts within some given qualitative data (i.e. text). Using content analysis, researchers can quantify and analyse the presence, meanings and relationships of such certain words, themes, or concepts in a predefined domain of interest. There are two general types of content analysis: *conceptual analysis* and *relational analysis*. The first determines the existence and frequency of concepts in a text and the second develops the conceptual analysis further by examining the relationships among concepts in a text.

No matter what chosen method, the process of analysis reduces the volume of text collected, identifies and groups categories together and seeks some understanding of it, but the presented research has been carried out by using Conceptual Analysis and, according to the standardized research process, it has been developed in three main steps further subdivided into sub-sections:

- 1) *research’s definition* with (1.1) related area delimitation and (1.2) keywords’ search identification,
- 2) *data collection of articles within the research’s scope* with (2.1) literature search through selected databases, (2.2) limitation of articles depending on publication type and language, (2.3) selection of articles related to chosen keywords, with subsequent three levels of screening and selection in the field of interest,
- 3) *data analysis through words analysis* through (3.1) word analysis of databases results and (3.2) word analysis of selected articles.

The research definition has firstly been conducted through the delimitation of the research’s area of interest, namely the impact of covid-19 on the built environment’s perception and secondly through the identification of related keywords. Therefore, the search has been conducted through the following systems: “TITLE ((covid-19) or (covid) or (pandemic)) and TITLE ((architecture) or (“built environment”) or (“living space”) or (living))”. The second step of the state of art methodology has constituted of data collection with databases’ selection, articles’ limitation and targeted articles’ selection. Three academic databases have been screened for literature review: *Web of Science*, *Scopus* and *EBSCO*.

This choice guaranteed a large coverage of the theme in the field of the built environment, architecture, design, engineering and sociology. Thus, the research has been confined to peer-reviewed articles and conference proceedings written in English and Italian. The targeted selection of articles concerned three main screenings depending on field's consistency such as theme's congruence after abstract reading and theme's consistency after full article's reading. Finally, careful data analysis has been carried out through words and content analysis. A first-word analysis has been made on main results obtained through specific databases thanks to the use of Vos Viewer Software. A second world analysis on targeted selected articles has been done through *Voyant Tools*. The content analysis has involved the outline of the main impacted and discussed fields as well as the related main prominent issues.

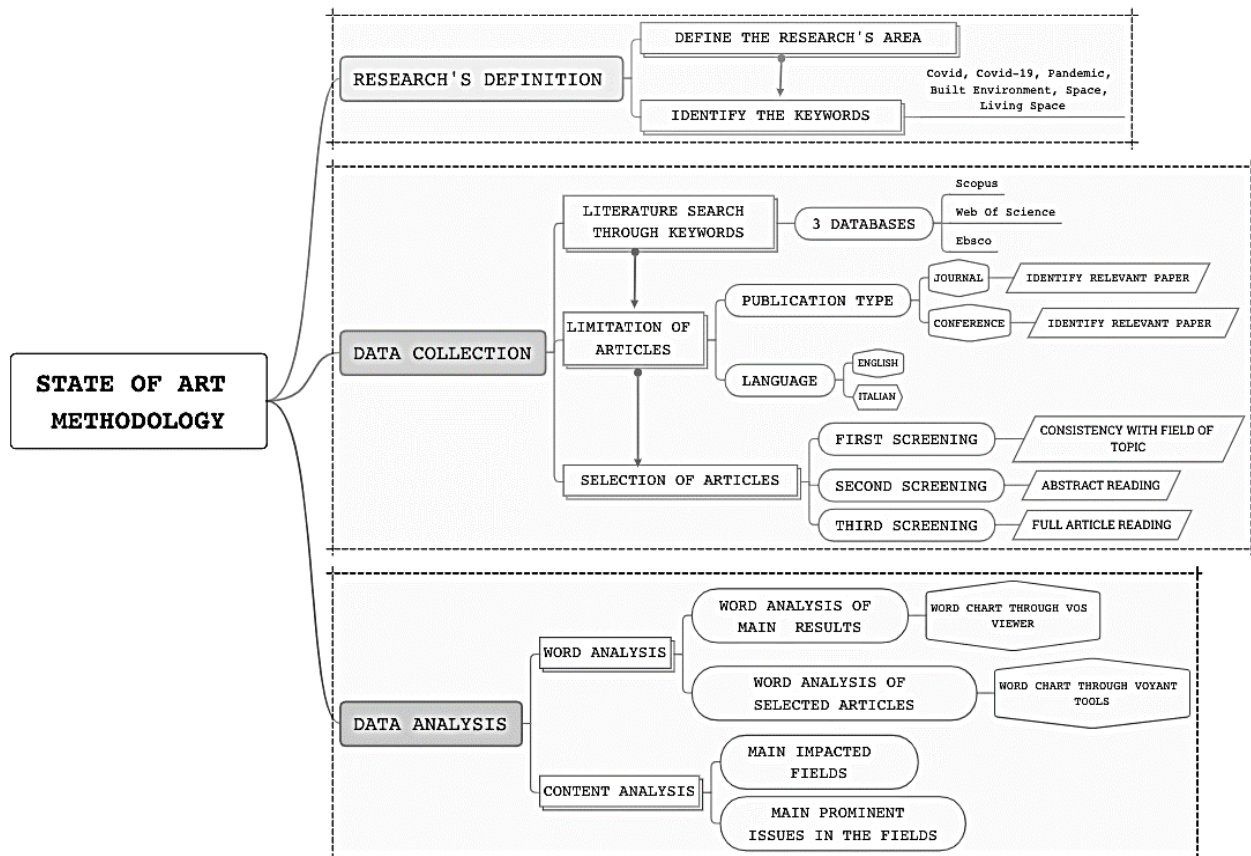


Fig. 1. State of Art Methodology

As shown in the following Table, a total number of 419 articles have been founded and, after the above-mentioned screening and the elimination of 22 repetitions, 49 articles have been deeply analysed.

Table. The total number of reviewed articles

Database	Total	Total after 1st screening	Total after 2nd screening	Total after 3rd screening
Wos	141	71	36	18
Scopus	223	110	19	15
Ebsco	55	54	22	16
Total	419	235	77	49

Results

In this chapter the data of the literature review of the founded articles are discussed. Results are divided into Word Analysis and Content Analysis in order to give a clear view of such a theme. Word analysis has been conducted in 235 articles available on the three chosen databases and associated to articles selected after the first screening related to the consistency of field. This choice has been

rightly used for finding purposes and theme's definition (such as covid, pandemic, architecture and so on), the focus on social and psychological aspects has been confirmed.

In the following section it will be discussed how the built environment has been intended in the founded articles and the main related aspects of relevance in terms of covid-19 impact.



Fig. 5. Word analysis and keywords detection through Voyant Tool



Fig. 6. World analysis and empirical content keywords through Voyant Tool

Content analysis. In all research, it is essential to begin by clarifying what the researcher wants to find out, from whom and how. The purpose may be of a descriptive or exploratory nature based on inductive or deductive reasoning. Inductive reasoning is the process of developing conclusions from collected data by weaving together new information. The researcher analyses the text with an open mind in order to identify meaningful subjects answering the research question. Deductive reasoning is the opposite. Due to the idea of the authors to identify future research lines based on a systematic investigation the adoption of an inductive reasoning it has been used and in this paragraph the results are presented, and Fig. 7 graphically depicts the results of the main impacted spaces and related issues due to Covid-19.

Five variables of spaces were identified and their main issues as well, indicating the main topics to focus on. As shown in fig.7, the identified peer-reviewed articles and conference proceedings focus mainly on *public spaces*, *green spaces*, *city*, *interior design/home* and generically *built environment*. Regarding this last aspect, the evaluation of covid-19 impact has been generally considered by authors at different scale starting from design scale to urbanism. In all scales of Built Environment, social inequalities have been pointed out by putting in correlation financial difficulties and dramatic inequalities among the spaces we live [1, 2, 3, 4]. Following this aspect, it is crucial to highlight also the association between poor spaces and mental health issues, especially related to poor quality view and poor indoor area that causes depressive symptoms [5]. Moreover, on the other hand, fewer symptoms of depression and anxiety have been demonstrated when inhabitants could access the garden or even just view on nature [6] and consequently the correlation between mental health and built environment has back in top gear [7, 8].

- *Built environment*

The importance of health spaces has been analysed in different scales as reported by Fezi [9] who outlined how the impact of covid-19 on built environment is related to, among others, *object scale* with the related issues of hygiene, *people scale* with distancing and isolation, *cities and transportation* with proximity, downscaling and mobility. According to Pinheiro [10], historical pandemics such as black death, cholera, tuberculosis have changed the design by moving forward to minimalist design. However, in the case of the covid-19 outbreak, one of the main aspects upon which we should reflect is also the temporarily positive effects on the environment with a win-to-win relationship between nature “breathe” and health safeguarding. Other studies have been conducted in order to highlight the association of built environments with covid-19 spread [11] with the aim to adopt new design strategies starting from air quality improving system [12] or rediscovering "filters" area such as courtyards, balconies, stairs, condominium terraces both for health and social reasons [13]. By saying it with the words of Keenan [14] we should “learn from disasters” and try to understand what is

members in the same place that resulted in absence of intimacy [19]. House is hosting more functions as well as more contemporary users in the same place. For this reason, the pushed forward higher quality living required today is shown also in the housing market as reported by Madeddu [20] since the question under which a house has been evaluated today regards if people could live in that location if lockdown will face it again. Finally, the house has now been considered a safe place to shelter and for this reason it has become a kind of “holy” place that sometimes has resulted also in an “entrance ritual” (PORCELLONI) with specific procedures such as taking off shoes, washing hands, changing clothes and so on by strongly shown the preferences on houses with hands-free contact and easy to clean materials [10]. Other relevant aspects such as the correlation between house and perception of *loneliness*, condition of *vulnerability*, *psychological* problems and *health* deal came out.

- *Cities*

Cities have been a crucial role in virus transmission’s shutdown. For this reason, the debate on the relationship between cities and covid-19 has been discussed by focusing on the main came out issues. According to Mazzolini [21], “each city manages covid emerge based on physical and conceptual specific to it” and this has led to the discussion of the main uncovered issues in city planning. High-density space in cities is undoubtedly a central problem that flowed into the consequent reclaiming of the streets for people and for nature by simultaneously replacing the car-centric city concept [21]. Another relevant term teamed with city is “smart city”, “iot city” with the use of new technologies to improve citizens life with health and safety purposes in mind: iot infections controls [22].

- *Green Space*

The most often discussed argument, regardless of the specific planning area, is the importance of green spaces. Nature has been considered the most important aspect to which refer during planning after covid-19 impact on people perception, whether it occurs for housing views reasons either for public spaces redesign or for cities project’s purposes. Nature also called “blue-green space” is hunted for the positive effects of mental health as well as for reduction of *anxiety* and *depression* [23], better *physical health* and *relaxing* [24] and activities’ *recreation* place [25]. The demand for green spaces has been measured also through Sina-microblog analysis [26] or a specific case study as in the case of Oslo [25]. However, probably more than in any other fields, green spaces are representing the current *social inequalities* through the inability to privately enjoying them for *financial difficulties* [4]. Since the green-blue space generates well-being and maximises health, this aspect merges with the following public spaces issues.

- *Public Space*

Public spaces seem to be the most impacted places due to the social interactions’ restrictions, social distancing and the reduction of leisure activities. Among others, the impact of covid-19 on the design of public spaces has been mainly discussed in terms of *inclusivity*, *accessibility* and *proximity* [3, 27, 28, 29]. For this reason, the study of possible best practices of public space design has been reported through the analysis of cities as case studies (such as Roma, Siena, San Benedetto del Tronto [27]) and to understand how we should rethink public space in times of pandemic. Streets, squares and, more generally, areas for the community have been reviewed for design optimisation: walkability, proximity, easy access and social inequalities have become the main key points [28, 30, 29]. In times where social distance (actually physical distance) is required, due to overcoming covid-19 transmission, *proximity* and short *walking distance* are demanded. Thus, the design of public spaces should be reconsidered taking into consideration the importance of community by guaranteeing easy access to services as well as wider spaces and careful analysis of flows’ *trajectory* [31, 32, 33]. Moreover, *proximity* and *flexibility* of public spaces are especially required in terms of green area for a higher quality of life as well as for mental/physical health benefits [34].

Conclusion

This study provides outcomes on the covid-19 impacts with reference to public and professional perception of the Built Environment and it should be taken into consideration as a benchmark to social satisfaction of spaces during the current pandemic time by showing the over-time

vulnerabilities of planning through an systematic literature review. The lockdown restriction has revealed a different fulfilment as well as different awareness of users compared to previous times. The pandemic has been -and it still has- an incredible opportunity to pause us for a moment and to understand what is working and what is not in planning's choices adopted to date, testing the resilience of spaces, both living and working. The change in frequency of living places such as the growth of hours spent at home and the parallel reduction of hours spent in public and semi-public spaces has contributed to change people's perception of spaces by revealing a high dissatisfaction exposed by covid-19 perspectives.

Thus, rather than focus on future solutions, this study had the aim to collect the main issues and opportunities of planning. The main critical aspects that came out on the literature review during this pandemic period are related to the importance of *flexibility*, *proximity*, *green space* and correlation between *mental/physical health* and architecture. *Proximity* is an ongoing debated aspect in architecture since it offers the possibility to determine a cohesive community while retaining social distancing. Over the recent years, we have witnessed the growth of cities with expansions of suburbs lacking in associated system services and mainly used as "dormitories" of the city. People are today asking themselves if they could live in a specific space if a lockdown will face again and for this, they are much more careful about what they have around them. The same goes to green spaces and environment: views over the green-blue spaces and easy access to them are highly demanded, although it is still difficult to enact due to the existed social inequalities and the connected high price of what today we could consider, more than ever, the new gold: *nature*. Moreover, *flexibility* is another concept to take into account in any scale of planning to start from design to urban planning. As living beings, we are continuously evolving and with us, nature is in an ongoing process of change too. We have learned that everything could change in a very short time and we probably need to address the term "resilience" not only to people and nature but also to design spaces that unavoidably surrounds us and affects us. Thus, what probably came out even stronger is the lack of a valuable transdisciplinary approach that could be able to address people's needs in order to design the best places for them not only from a stylistic point of view but also from a sociological, anthropological, psychological and health perspectives. Aspects that, judging the current opportunities in planning, were not considered significant so far. For this reason, informative research about what high-quality space means in different fields should be deeply analysed in order to refer to it as a regular informative method upon which planning should be based.

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