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CHALLENGES OF POST-PANDEMIC URBAN RESILIENCE MANAGEMENT

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Abstract:

The crisis caused by the Covid pandemic is certainly the major disruptive event of this first quarter century, the Russian-Ukrainian military crisis also having the potential (in terms of the global dysfunctions generated) to fit into this typology. Beyond the clear negative effects (social, human, economic, etc.) of the Covid pandemic, however, we must also consider the possible challenges it may pose. The research question of the present article is situated in this thematic register, on a niche topic, urban resilience, re-evaluated, following the materialization of this pandemic context, both in academic research and in terms of contemporary management practice. It is intended, in conjunction with a bibliometric analysis, to highlight possible directions of action within the triple and quadruple helix models for strengthening urban resilience based on the lessons learned from this crisis, directions that are considered useful to a wide range of stakeholders in academia, industry and government. While there is sufficient concern directed towards determining resilience indices, the main thesis considered for this article is that there is a need for synergistic stakeholder action, integrating such elaborations into the proactive framework of a robust yet scalable urban resilience profile in relation to a wide range of events across the urban community security threat spectrum, as was the case with Covid 19.

Key words: *urban resilience, Covid19 pandemic, management*

1. Introduction related to contemporary cities realities

Naturally, unpredictable or unexpected events disrupt society, organizations, groups, communities, individuals but constitute, in many cases (in principle correlated with the impact), favorable contexts for resetting the functionality of the macrosystems in question, with all the subcomponents and intra and inter relations specific to the organizational architecture in question at that time. The category of such events includes threats that go beyond the stability and tolerance of a framework of organizational normality and maturity, with the relevant standards (e.g. ISO 22301 - BCMS - Business Continuity Management) indicating natural disasters, epidemics, wars, breakdowns of critical services essential to the vitality of society, etc. as potential threat events (Kohl,

2020). A characteristic of these is that they cause domino effects and also, in an increasingly volatile, uncertain, complex and ambiguous global environment (VUCA) they can manifest themselves in combination. Their impact is all the greater as they affect a larger number of inhabitants, different activities, different economic branches, economic, administrative and political collaborative frameworks, etc. This is also the case of the Covid 19 pandemic, which had a profound impact on urban activity given the presence of the characteristics mentioned above, a fact highlighted by Dudian, M., Abramiuc (Todoran), T. and Popa, R. A. (2022, 58) as follows: "From March 2020, organizations have been forced to continuously adapt their business strategies, work models, cultural and organizational values". The issue is not necessarily why such *black swan* events happen (Taleb, 2018) but how do we perceive them so that they can unbalance communities as little as possible (in magnitude and time) and we can create appropriate internalization capabilities (which affect us as little as possible) and subsequently, realize the need for new organizational designs while adapting and reassessing learning capabilities appropriate to the new realities experienced.

From ancient times, towns have been poles of development (multidimensionally, as typologies of activities) and generic indicators of the level of development achieved by a community. It is important to underline in relation to the topic of the article that phenomena and processes specific to cities and urbanism have increased quantitatively in the attention of researchers through the central role performed in processes of social change and, in subsidiary, through the recognition of cities as focal point in the manifestation of contemporary crises (Acuto et al., 2020). By assuming the existing observation in the literature (Webb et al., 2018) that urban change processes are essentially characterized by both a social and a technological component, the premise is created to expose a current trend that encompasses the urban world, namely, the creation of smart cities, a specific concept evident in the urban environment, generating diverse opinions on content and meaning. As early as ten years ago, at European level (European Commission, 2013) the "smart city" was presented as "systems of people interacting and using flows of energy, materials, services and finance to catalyze sustainable economic development, resilience and increased quality of life", a point of view also developed in the Romanian national strategic documents (National Strategy for Sustainable Development of Romania 2030, 2018, 73) by defining this new urban dimension as "a process of continuous transformation through technological, urban or managerial innovation, through which cities become more comfortable and resilient, able to respond quickly to new challenges". Both approaches focus on the goal of developing resilient cities. Six dimensions of the smart city are increasingly used by the international academic community (Ramirez Lopez & Grijalba Castro, 2021) to replicate the main contemporary societal functionalities: smart economy, smart mobility, smart environment, smart citizens, smart lifestyle, smart governance.

2. Urban resilience - a topic of interest for management

Resilience has become a topic of interest for researchers and practitioners alike in complementarity with another topical concept for contemporaneity, sustainability, both of which require integrated implementation within strategic organizational approaches

(Ogrean, 2018). Accepting the proximate gender - specific difference relationship, the same can be inferred for urban resilience and implicitly, a certain role of urban resilience in achieving sustainability (Bautista-Puig et al. 2022). The working definition for urban resilience (based on considerations of conceptual balance, author's comprehensiveness and notoriety) has been adopted throughout this research as the explanation that highlights "the ability of an urban system-and all its constituent socio-ecological and socio-technical networks across temporal and spatial scales-to maintain or rapidly return to desired functions in the face of a disturbance, to adapt to change, and to quickly transform systems that limit current or future adaptive capacity" (Meerow, Newell & Stults, 2016, 45). The last part of this definition refers to and should be correlated with the pair of steps/phases (Linkov, Trump, 2019) specific to the resilience approach (defining the system, assessing resilience, enhancing resilience, maintaining, restoring, transforming, detailed through preparing, preventing, protecting mitigating, absorbing, adapting, responding, recovering, learing), treated from the outset in a managerial register and which can of course be applied to urban resilience. Note the clear mention, after the occurrence of the disruption, of the transformation stage (and implicitly, corresponding in the binomial invoked above, learning) compared to the specific approach strictly specific to standardized resilience measurement (Haring et al., 2017) which includes: context analysis, system analysis, identification of system performance functions, identification of disruptive events, pre-assessment of criticality of system functions under threat exposure, quantification of aggregate resilience, resilience assessment, selection of resilience improvement options, development and implementation of resilience improvement options. Equally important to support an increased focus on addressing urban resilience in the management domain is the link between risk and resilience, in the sense of similarities in the stages of approach. Risk management can be seen as much more static and instinctive, whereas the approach to resilience is much more dynamic and flexible, starting from the components identified in the risk analysis. In the most recent World Economic Forum Global Risk Report (2023) it is noticeable that most of the perceived risks (in a ranking of 32 places) for the short term will most severely impact cities: cost-of-living crisis (place 1), natural disasters and extreme weather events (place 2), geoeconomic confrontation (place 3), widespread cybercrime and cyber insecurity (place 8), misinformation and disinformation (place 16), infectious diseases (place 20), breakdown of critical information infrastructure (place 24), digital power concentration (place 29). Some of these have the potential to generate crises, thus constituting tests for the maturity of urban resilience, which calls for a managerial approach to harmonizing inter-institutional, public and private decision-making alike.

Based on the theoretical construct exposed so far, the urban resilience profile mentioned in the abstract as a conceptual need for the development of solutions to cope, at least under average conditions, with a threat, includes: typologies of urban infrastructures, urban territorial management structures, behavioral attitudes to security adversity, processes and interactions specific to urban infrastructures.

In an increasingly technological world, quantitatively and qualitatively, management as a science, process, organizational entity and art maintains its mission to add value to organizations, becoming more and more a *soft power* organizational tool in

this context. Like any science, management is undergoing a continuous process of conceptual and practical renewal, and is increasingly present in the most diverse types of activities and organizations. Given the complexity of the processes specific to the urban environment (with the city at its core), management science is now also applicable here, in interdisciplinary cooperation with approaches from the fields of engineering, spatial planning, urban planning, life sciences, etc. The urban environment is made up of many functionally interrelated parts, with dependencies and interdependencies, and systems theory is a reference framework on which to model this reality. Depending on the level of decomposability or hierarchy applied, the focus is on (or the premises for distancing are created) the citizen, with all his or her needs and with an increase in the dynamics, intensity and comprehensiveness of the approach to the steps of Maslow's pyramid. The picture that lends credibility to the use of management is complemented by the financial and budgetary component, as day-to-day processes or in programme and project-based approaches. By considering the city as an open system and being aware of the typological differences and diversification of the conditions and the current stage of development of different cities, the minimum conditions are met for the inclusion, in principle, of the urban resilience approach in what in the evolution of management science, as a current of thought, is known as the contemporary approach (since the 1960s), through the two main perspectives considered (Robbins, Coulter, 2016) the systemic one respectively, situational.

3. Bibliometric analysis of the literature

3.1 Dimensions Analysis based on publications in the Dimensions database

The bibliometric analysis consists of investigating the Dimensions and Web of Science databases by the terms "urban resilience" and "Covid" over the period 2020-2023. The analysis of both databases aims to create as complete a profile as possible of the topic under discussion. The search of the Dimensions database by title and abstract resulted in 151 publications. Taking the country of origin as the unit of analysis of co-authors resulted in a total of 39 entities, of which 35 countries with links were analyzed. The 35 entities were grouped into 8 clusters. China stands out with the highest number of publications (28), most of them between 2021 and 2022. Romania has 4 articles published in early 2022, linking authors from Turkey, the Netherlands and Poland.

The 151 materials selected from the Dimensions database are built on 4800 key terms. A filtering of these terms based on the criterion of a minimum of 10 occurrences per text resulted in 122 terms, of which, based on an analysis of their relevance, 60% were selected, i.e. 73 terms which are subject to the co-occurrence analysis in Figure 2.

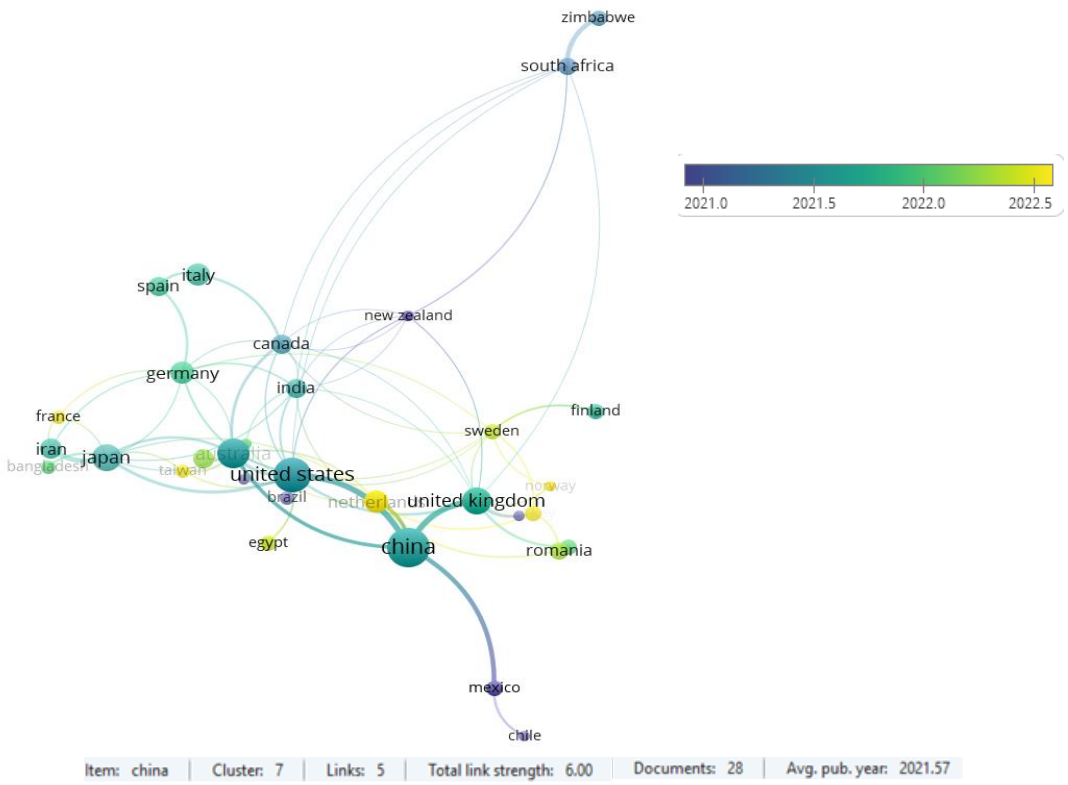


Figure 1. Analysis of publications by country
Source: Author processing in VOSviewer

The figure highlights the role of China, which, with 129 links created, is an important connection point for urban resilience studies following the Covid-19 crisis, explained by the role China played during the pandemic.

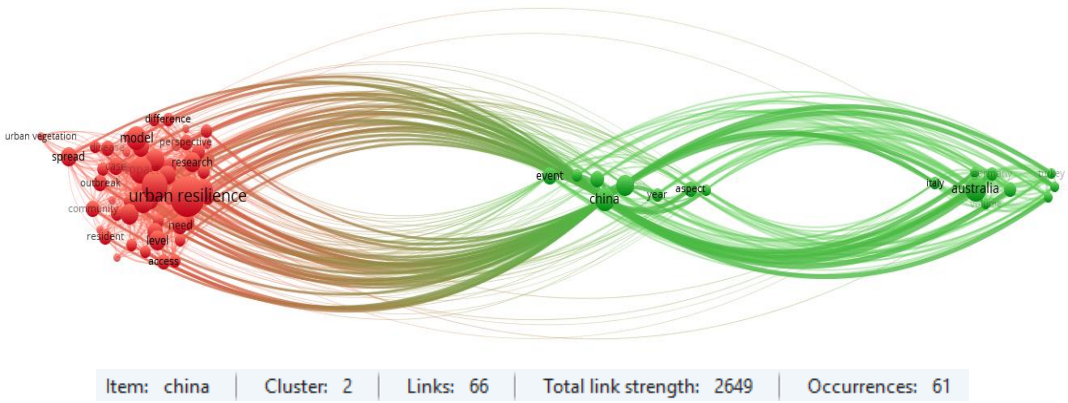


Figure 2. Co-occurrences of key terms in the Dimensions database
Source: Author processing in VOSviewer

The 73 items were grouped into two clusters. The first cluster, consisting of 56 items, connects terms from the sphere of urban resilience, studies on the impact of pandemics on the population, building a resilient city, studies on sustainable development of cities, connecting urban strategies and policies in times of crisis.

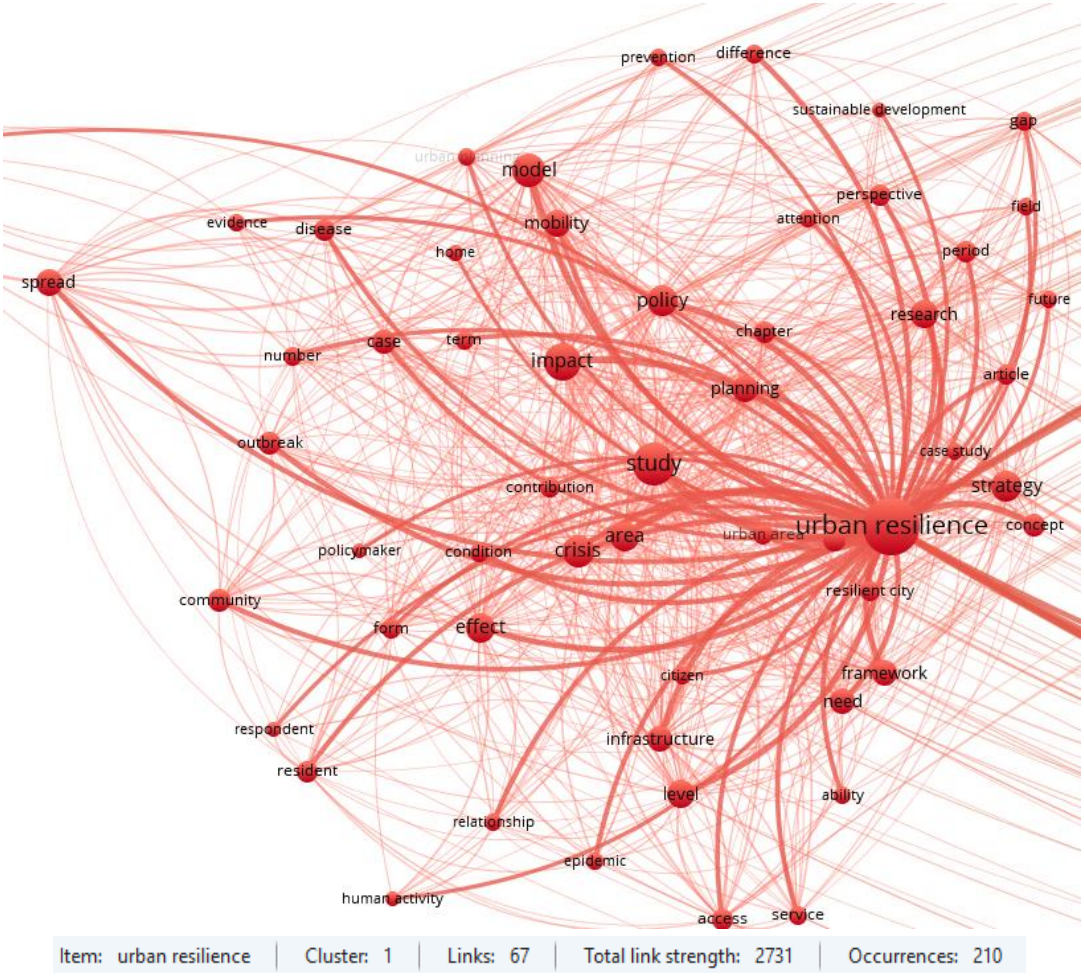


Figure 3. Co-occurrences of key terms in the Dimensions database - cluster 1
Source: Author processing in VOSviewer

The second cluster, consisting of 17 items, groups locations around the globe that have been subject to disaster management analyses, a consequence of the pandemic crisis. Of these, Australia stands out with the strongest linkage to other studies, although China generated the most links.



Figure 4. Co-occurrences of key terms in the Dimensions database - cluster 2
Source: Author processing in VOSviewer

A citation analysis was conducted to analyze the authors' output. Out of 151 materials in the Dimensions database, 81 met the criterion of a minimum of one citation/work. The database was refined to a minimum of 3 citations/work, resulting in 50 publications. For each of the 50 documents, the total strength of the bibliographic coupling links with other documents will be calculated. The documents with the greatest total link strength will be selected.

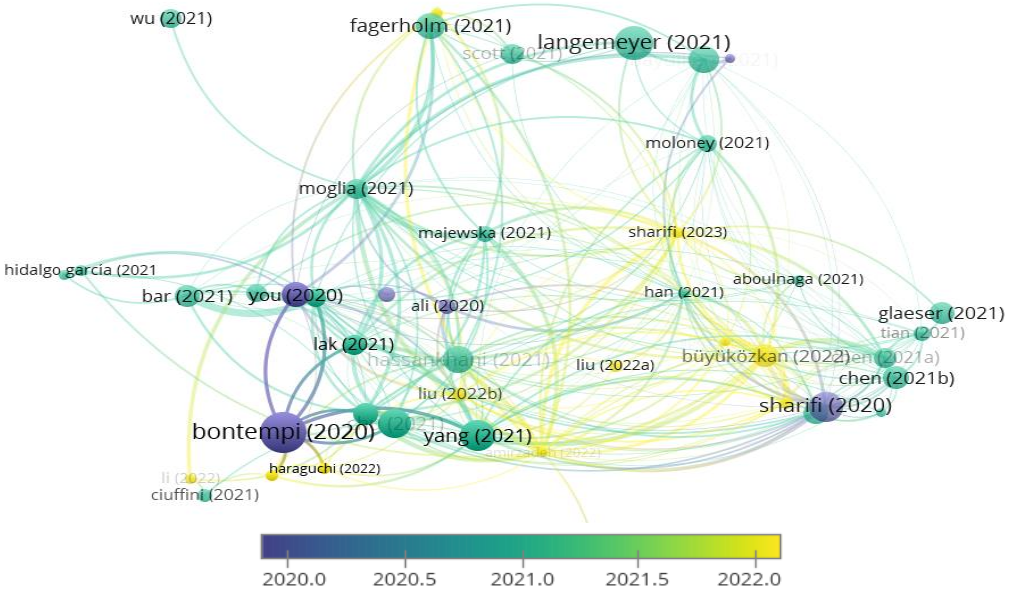


Figure 5. Analysis of the number of citations of publications in Dimensions
Source: Author processing in VOSviewer

Table 1 compares authors' notoriety according to two indicators: the number of publications and the number of citations obtained by papers published in the Dimensions database. The table will be the basis for comparison with information on authors' relevance obtained from the Web of Science database.

Table no. 1. Relevance analysis of authors in the Dimensions database

Most relevant authors by number of publications	Most relevant authors by number of citations to publications
Sharifi Ayyoob (Japan) – 9 publications	Bontempi, Elza (Italy) – 120 citations
Ali Cheshmehzangi (China) – 3 publications	Langemeyer Johannes (Germany), Madrid-Lopez Cristina (Spain), Beltran Angelica Mendoza (The Netherlands), Mendez Gara Villalba (Spain) – 84 citations
Innocent Chirisa (Zimbabwe) – 2 publications	Sharifi Ayyoob (Japan) – 63 citations
Nora Fagerholm (Finland) – 2 publications	Tianren Yang (England), Haozhi Pan (China), Xiaoling Zhang (China), Andrew Greenlee (USA), Brian Deal (USA) – 55 citations
Aleksandra Krstikj (Mexic) - 2 publications	Mahnoosh Hassankhani (Iran), Mehdi Alidadi (Iran), Sharifi Ayyoob (Japan) – 49 citations
Sisi Zlatanova (Australia) – 2 publications	Bogachan Bayulken (Cyprus), Donald Huisingh (USA), Peter M.J. Fisher (Australia) – 49 citations
Chiara Ravagnan (Italy) – 2 publications	Chu Zhen (China), Cheng Mingwang (China), Song Malin (China) – 48 citations

Japanese author Sharifi Ayyoob has published the largest number of articles based on Dimensions. Sharifi's most cited topics point to how smart city technologies have helped increase resilience by improving planning, absorption, recovery and adaptation

capabilities (Sharifi et al., 2021). The author has pointed out since 2020 certain gaps related to the resilience of urban environments in relation to economic and health risks, demonstrating, based on a bibliometric review of the literature, that intellectual concerns for urban resilience only intensified after 2010. Sharifi (2020) drew connections between urban resilience and digitization, pointing out that digitized cities could ensure the well-being of their residents and maintain the continuity of urban functions in the event of crisis situations. (Hassankhani et al., 2021)

Authors' approaches to urban resilience differ. Some authors (Toriro & Chirisa, 2021) from less developed countries analyze the effectiveness of urban policies as a matter of survival as a result of climate change coupled with other global crises. Chinese authors (Yang et al., 2021) are keen to share from their pandemic management practices, highlighting the performance of policies undertaken to improve healthcare infrastructure and urban governance capacity followed by studies focusing on post-Covid recovery through rebuilding urban resilience and sustainability, emphasizing the importance of sustainable urban food system development. Zou et al. (2022) also an argument for China's very large city governance capacity is that localities with high levels of smart city construction were better able to prevent and control the pandemics, indicating that smart cities are the solution to better address public crises (Chu et al., 2021).

The pandemic and the policies developed during its period have led to some different approaches to urban resilience. While some authors focus on technologies and digitization (Sharifi & Salehi, 2022), others focus on increasing the share of green infrastructure, which could bring health benefits (Fagerholm et al., 2021). The importance of spatial planning for ensuring human well-being in exceptional situations has been demonstrated (Fagerholm et al., 2022). Experts have scientifically proven that nature-based solutions integrated into urban policies and strategies improve the resilience and equity of cities, reduce the impact of climate change and contribute to the development of urban sustainability (Bayulken et al., 2020).

The ranking of authors according to the number of citations changed the hierarchy, with the most cited article based on Dimensions belonging to the Italian author Bontempi, who presents a comparison of the restrictions imposed on the population during the covid-19 pandemic in the context of the second wave of covid. The article shows that some policies are more effective in limiting the spread of the virus, and that some constraints imposed by the authorities and people's capacities to receive them are fundamental parameters that must always be taken into account in determining the expansion of the virus (Bontempi, 2021). Italy, a country heavily affected by the virus in the first wave of infection, has benefited from several plans and studies to return to normal life, integrating post covid funds (Cerasoli et al., 2022).

3.2 Analysis based on publications in the Web of Science database

Searching the Web of Science database for the terms "urban resilience" and "Covid" over the same time period, 2020-2023, resulted in 87 items, searching by topic. Considering all countries of origin without any restriction results in 35 units, of which 23 connect to each other in a network. If we analyze the materials according to the country of

origin of the authors, we obtain a diagram consisting of 8 small clusters (containing between 2 and 5 items), as can be seen in Figure 6.

China stands out again with the highest number of publications (18) and a link strength of 18. The similarity with the Dimensions base can also be seen through the lens of Australia, which has a link strength of 9. The novelty lies in the articles published by British authors, who created the most links in the network, with a link strength of 13, although the number of publications is only 12.

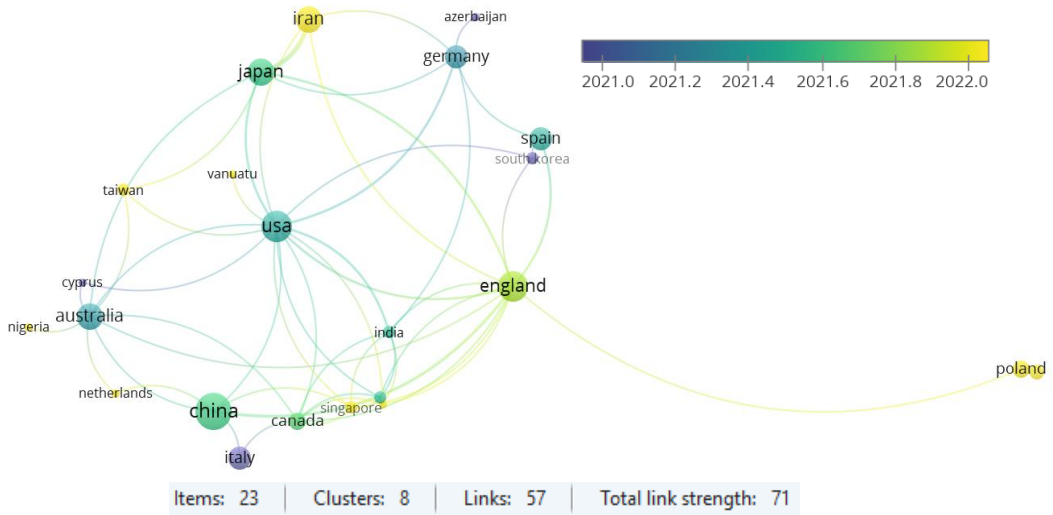


Figure 6. Analysis of publications by country based on Web of Science information
Source: Author processing in VOSviewer

For a better understanding of the research directions followed by the authors in correlation with the terms investigated, a keyword grid was created. All keywords with at least two occurrences were considered. Thus, out of a total of 508 keywords, 101 terms resulted on the basis of which the network in Figure 7 was constructed.

The network comprises 7 clusters, consisting of a maximum of 20 terms, and most of the articles are placed in the time frame 2021-2022. Table 2 highlights the frequency of occurrence of keywords. A similarity with the results of processing the information extracted from Dimensions is the high number of occurrences of the term urban resilience, alongside covid-19, sustainability and community resilience. One difference is that the Dimensions studies focus particularly on countries severely affected by the pandemic, unlike the Web of Science studies, which place the analysis on cities as urban environments (China has an occupancy of 5).

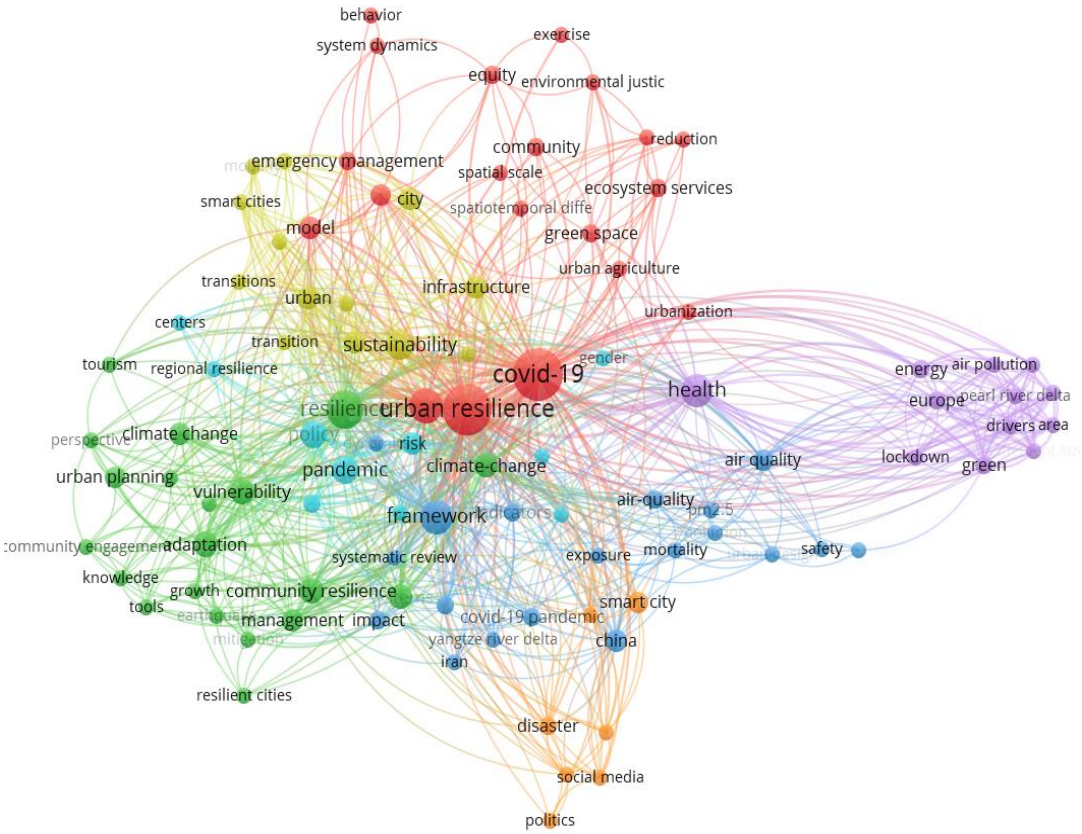


Figure 7. Keyword occurrence density in the Web of Science database
Source: Author processing in VOSviewer

Table no.2. Terms with the highest occupancy

Crt. no.	Keyword	Occurrences	Total link strength
1	covid-19	42	192
2	urban resilience	40	181
3	cities	21	120
4	resilience	19	92
5	framework	14	84
6	health	13	83
7	climate change	11	82
8	sustainability	10	60
9	pandemic	10	36
10	policy	8	43
11	community resilience	7	47
12	vulnerability	7	47
13	adaptation	7	45
14	systems	6	44
15	infrastructure	5	38
16	urban	5	35
17	China	5	34
18	management	5	31
19	city	5	27
20	governance	5	25

Very interesting is the conclusion of the relevance analysis of the authors of the articles extracted from the Web of Science database. Table 3 compares the authors' notoriety according to 2 indicators: the number of publications and the number of citations obtained by the papers published in the Web of Science database. By number of publications, the ranking is also led by Sharifi Ayyoob, an author of Japanese origin, who has published on Web of Science 8 out of 10 publications affiliated to Japan, creating connections with other co-authors from Iran or the United States. In the rankings of most cited papers, the author stands out in fifth and sixth place. The similarities between the databases stop here in terms of the rest of the authors.

Table no. 3. Relevance analysis of authors in the Web of Science database

Most relevant authors by number of publications	Most relevant authors by number of citations of publications
Sharifi Ayyoob (Japan) – 8 publications	Bontempi, Elza (Italy) – 95 citations
Chen Yu (China) – 2 publications	Langemeyer Johannes (Germany), Madrid-Lopez Cristina (Spain), Beltran Angelica Mendoza (The Netherlands), Mendez Gara Villalba (Spain) – 67 citations
García David Hidalgo (Spain) – 2 publications	Ntounis Nikos (England), Parker Cathy (England), Skinner Heather (England), Steadman Chloe (England), Warnaby Gary (England) – 58 citations
Khavarian-Garmsir Amir Reza (Iran) – 2 publications	Chen Jie, Guo Xiaoxin, Pan Haozhi, Zhong Shihu – 48 citations
Tchetchik Anat (Israel) – 2 publications	Sharifi Ayyoob (Japan), Khavarian-Garmsir Amir Reza (Iran), Kummitha Rama Krishna Reddy (England) – 42 citations
Zhou Qian (China) – 2 publications	Sharifi Ayyoob (Japan) – 36 citations
Acri Marco (Slovenia) – 1 publications	Chu Zhen (China), Cheng Mingwang (China), Song Malin (China) – 32 citations

Regarding the topics addressed, some authors (Chen et al., 2021), in the idea of reaching a level of convergence of urban resilience, have analyzed the spatial-temporal evolution of the concept, highlighting a significant spatial heterogeneity of urban resilience. The analysis is carried out on 281 Chinese cities with the objective of homogenizing the response to challenges arising from global crises. On the other hand, Spanish author García David Hidalgo presents the positive side of the pandemic crisis, the opportunity for specialists to research and better understand the impact of human activity on environmental pollution and urban climate. García has demonstrated, through a study of eight cities in southern Spain, the positive impact of disrupting daily human activity on the environment by reducing contaminants, restoring the ozone layer, etc. (García & Díaz, 2022). Solutions for increasing urban resilience have also been found in the principles of the circular economy (Acri et al., 2021). Thus, cities, by reducing consumption become resilient circular centers and more sustainable and citizen-oriented living spaces. Urban missions have even been defined that will stimulate a green urban recovery: accelerating the urban mobility transition, regenerative urban development and creating resilient urban infrastructure (Moglia et al., 2021).

The importance of urban resilience is also demonstrated by Tchetchik Anat, who tested the resilience of the tourist city of Eilat, an isolated city with all the attributes to experience significant population immigration. However, during the pandemic crisis, its

residents did not opt for migration due to previous investments in resilience measures that strengthened and united the local community (Gafter et al., 2022).
On both the Dimensions and Web of Science databases, Italian author Bontempi Elza has the highest number of citations. The second most cited article connects the pandemic crisis to the possibility of increasing the share of urban agriculture to enhance the resilience of cities, arguing the economic, social and cultural benefits of this challenge (Langemeyer et al., 2021). The paper is the result of the collaboration of four authors affiliated to organizations in three countries: Germany, Spain and the Netherlands. A survey of 1016 private organizations in English cities demonstrates the vulnerabilities of some sectors to health crises. Ntounis et al. (2022) identified the specificities of each business sector, allowing prioritization of measures to improve resilience within the different types of business that make up a sector.

4. Managing post-pandemic urban resilience. Lines of effort

After any major event experienced by humanity, some of the paradigms that made functionality possible until then change or reconfigure. The current global social context is dominated by the lessons of the Covid pandemic and the Russian-Ukrainian military crisis. Regionally, in varying intensities, the effects of these two major events overlap with local conditions, dominated by other vulnerable situations.

If we consider as an objective function, the performance of urban resilience management, corroborated at macro level (the system is the city) with socio-technical theory, then social and human improvements must be harmonized with those of a technological nature, otherwise conditions of instability of the system in question are ensured. In connection with the idea that there is a need for urban innovation (and therefore cities with an increased level of resilience) carefully and opportunely designed and managed in the new political, economic, social, technological, legislative and ecological realities, the general framework is thus outlined in which new directions for post-pandemic action can be discussed, at the level of the main categories of stakeholders, set by the triple helix model (university/educational organizations, industry/firms, government/public sector) or quadruple (appears in addition to the elements of the triple helix model, citizens/civil society). A similar idea of using the above innovation models is presented for sustainable regional innovation in the research of Roman M., Varga H., Cvijanovic, V. and Reid A. (2020). It is also stressed (Matei, Dobre, 2023, 272) the need "for inclusive but also innovative city governance in the "smart" era, starting from the urban problem/need for innovation, promoting demand-driven modes of governance and shaping innovative urban ecosystems to be socially oriented. In addition, collaboration between actors needs to be improved."

At the level of educational institutions, their own lines of effort in the next period should be directed towards the following actions:

- reviewing plans for the continuity of specific activities;
- identifying opportunities to innovate the educational offer by introducing subjects or curricula dedicated to urban resilience;

- diversifying training or specialization programs in the field of resilience, in partnership with the business sector;
- accelerating the digitization processes of its own activities and in relation to other organizations;
- developing laboratories for modelling and simulating resilient human behavior in different security contexts;
- designing and testing viable action plans in different risk situations;
- the use of virtual and augmented reality technologies for an increasingly diverse range of activities, depending on the profile of the existing disciplines in the curriculum;
- the creation of regional training centers (educational hubs), possibly in university consortia and public-private partnerships, providing general educational and counseling services related to urban resilience issues but also adapted to societal resilience issues in the respective geographical area;
- strengthening cooperation and creating a collaborative framework with institutions in the field of defense, security, public order and national security.

In the field of business environment, although a diversity of types of activities, markets, consumer segments and technological processes is specific, there are some standard priorities that would be important to consider in the context discussed in this article:

- reviewing business continuity plans, especially for industrial organizations providing critical services or products (water, gas, electricity, etc.);
- reviewing inventory management policies and strategies;
- analysis of suppliers of products (sub-assemblies, components, materials, etc.) essential to the company's activity and reconsideration (cost, time, effectiveness) of geographically wide supply chains;
- increased investment, adapted to the specificities of production flows, in automation, robotization, digitization;
- re-evaluating paradigms of thinking about the market economy and free trade and, in particular, the changes that have occurred in terms of their applicability to one's own sector of activity;
- establishing possibilities for real cooperation with local emergency management institutions and testing the viability of industrial accident safety plans.

Regarding the activities of governmental institutions (from central to local level) the following measures can be considered as priorities:

- setting funding mechanisms for programs and projects to increase urban resilience in complex security contexts;
- practicing, through table top exercise campaigns, intervention procedures and inter-institutional decision-making mechanisms, based on incident scenarios affecting the urban environment;
- investing in differentiated training programs for employees to increase individual resilience;

- checking and replenishing, where appropriate, the stocks of state reserves in the case of institutions responsible for preparing the economy and the territory for defense;
- initiating the development of resilience management guidelines for territorial administrative units, with a particular focus on urban areas;
- computerization, automation and digitization of specific business processes horizontal (with similar institutions) or vertical (with institutions in the hierarchical chain) cooperation).

Last but not least, at the level of the citizen, through awareness, co-involvement and co-interest, there is a need to create a security culture that will enable resilient urban behavior in different security contexts affecting the urban environment. It is basically a question of a heightened sense of responsibility shared in the relationship with the other components of the helix model.

As a good practice indicated in the literature in terms of integrating efforts to improve urban resilience, the idea launched in the *100 Resilient City* program to have *Chief resilience officers* at the city level is eloquent and welcome: „Chief resilience officers have the ability to transgress and bring multiple sectors together because they can understand and address the city challenges in a prudent manner. Chief resilience officers can be great supporters in arranging funds and resources and would have the high-level priority to reach different sectors." (Afrin, S., Chowdhury, F. J. and Rahman, M. M., 2021).

5. Final discussions and conclusions

The post-pandemic context is a time for all organizations to reflect on the future, with a focus on setting the actions needed to deal well with possible future threats. With post-pandemic lessons learned in mind, questions such as "where are we heading?" are anchored in the current global environment with its macro trends. One of these, certainly accelerated by the conditions of societal functioning during the pandemic, under the auspices of which a new urban resilience mindset will be rebuilt, is the so-called "phygital" trend (Purcarea, 2021) that consensually combines, through the technological vector, the experiences and platforms of the physical with the digital. This raises the issue of urban resilience management to a new level of sophistication, where the convergence of stakeholder actions in the helix model considered is all the more necessary. It is advisable to keep the focus on the actions necessary to be implemented in the future to increase the level of urban resilience at the level of the citizen based on the following considerations: he or she is the direct beneficiary of ensuring a high level of resilience (in other words, adverse events do not substantially affect his/her daily life); he/she is the best sensor of the lack of resilience being also an essential contributor, as an individual or integrated organizational effort, to the design of urban resilience policies. Connected to the idea from the beginning of the paragraph, including in the framework of another socio-technical paradigm that brings to attention a topical dimension of humanity and the urban environment, industry 5.0, the role of the human-centered approach is highlighted (Alves, Lima and Gaspar, 2023). Accepting the irreversible trend of making cities smart, this also brings with it the problem of ensuring cyber security, which is very expensive to implement,

based on an audit, and to maintain, compared to the specific processes of city management. Reluctance on the part of municipalities to implement these solutions needs to be replaced by a proactive attitude, which also facilitates increased urban resilience.

Reflection on the future must be based on analysis of the past and the present. This was the aim of the bibliometric study and literature review. A number of conclusions stand out: the intensification of concern for urban resilience after 2010 (the 2008 financial crisis was an accelerating factor); the nuancing of efforts to strengthen resilient urban environments by new global trends (digitization, application of circular economy principles, green infrastructure) against the backdrop of the pandemic crisis we have been through and the economic and security crises still affecting society.

The shift from city to complex urban environments challenges the field of urban resilience management to carry out serious scientifically based studies on the scalability of the solutions intended to be adopted at a given time, otherwise creating premises for a fragile level of urban resilience.

6. References

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