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URBAN RESILIENCE AND THE RIGHT TO THE CITY: CIVIL DEFENSE AS A STRUCTURAL FACTOR IN SMART CITIES

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ABSTRACT

This article addresses the importance of Civil Defense as a structuring element for building urban resilience in smart cities, guaranteeing citizens' right to the city. From a literature review, concepts such as the right to the city, urban resilience and the role of technologies in strengthening Civil Defense are discussed. In addition, it explores how urban planning integrated with Civil Defense can improve the capacity of cities to respond to emergencies, promoting inclusion and security. The study concludes that the articulation between these factors is essential for the sustainable and equitable development of smart cities.

Keywords: Urban Resilience. Right to the City. Smart Cities. Civil Defense. Town planning.

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INTRODUCTION

Growing urbanization and the challenges it imposes on contemporary cities have generated debates about new forms of urban management and planning. In this scenario, the concept of smart cities emerges, which refer to urban environments that use information and communication technologies (ICT) to improve the efficiency of public services, promote sustainable development, and increase the quality of life of citizens (Hollands, 2008; Chourabi et al., 2012). However, the construction of smart cities cannot be seen only from a technological perspective; it must necessarily be aligned with urban planning that ensures the right to the city, a concept that refers to equitable access to urban space, ensuring that all citizens can participate in the social, political and economic life of the city (Lefebvre, 1968; Harvey, 2012).

URBAN RESILIENCE AND CIVIL DEFENSE

One of the great challenges faced by these cities is to ensure their urban resilience, that is, the ability to absorb, resist and recover from crises, natural disasters and extreme events. Urban resilience is a concept that goes beyond mere infrastructure; it also involves the ability of cities to respond to socioeconomic and environmental crises, in addition to ensuring that their urban systems are adaptable and can evolve in the face of these adversities (Meerow et al., 2016). According to Godschalk (2003), a resilient city is one that combines rapid response capacity, flexible organizational structures and governance that integrates the different layers of society.

In this context, Civil Defense plays a key role in ensuring that the city is prepared to respond to disasters, mitigating the impacts of these events on the population and urban infrastructure. Civil Defense, in smart cities, goes beyond a simple alert or emergency response system; it must be integrated with cutting-edge technologies, using real-time data, sensors, and artificial intelligence to predict risks and mobilize efficient responses (Chan et al., 2020). The integration of Civil Defense systems in smart cities is crucial to ensure the safety of the population and the continuous functioning of the city, thus ensuring the right to the city for all.

RIGHT TO THE CITY IN THE CONTEXT OF SMART CITIES

The concept of the right to the city was initially proposed by Henri Lefebvre (1968), who defined it as the right of all citizens to actively participate in the construction and

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transformation of the city. For Lefebvre, the city is a social space that belongs to all its inhabitants, and therefore urban planning must be inclusive, promoting equal access to urban services and resources. In recent decades, the right to the city has gained relevance in the field of urban studies, being widely discussed by authors such as David Harvey (2012), who emphasizes that the right to the city is not only about accessing urban infrastructure, but also about having a voice in decisions about the future of cities.

In the context of smart cities, the right to the city takes on a new dimension. If, on the one hand, smart cities promise greater efficiency, inclusion, and accessibility through the use of digital technologies, on the other hand, there is the risk of digital exclusion, which can reinforce preexisting inequalities (Cardullo & Kitchin, 2019). Therefore, guaranteeing the right to the city in a smart city means ensuring that all citizens, regardless of their social, economic or digital condition, can benefit from these technologies and participate in urban decisions (Kitchin, 2014).

PROBLEMATIZATION: THE RELATIONSHIP BETWEEN URBAN RESILIENCE, CIVIL DEFENSE AND THE RIGHT TO THE CITY

Given the context of smart cities and the concept of urban resilience, the question arises of how Civil Defense can be structured to guarantee the right to the city in times of crisis. Civil Defense, traditionally seen as a disaster response system, needs to be rethought in the context of smart cities, where the use of digital technologies can make the response more agile and effective, but can also create new challenges, such as unequal access to these technological resources.

Natural disasters and urban crises do not affect all citizens in the same way. The most vulnerable populations, such as those living in at-risk areas, in conditions of poverty or with less access to technologies, tend to be the most affected (Pelling, 2011). In this sense, for Civil Defense to contribute to urban resilience and guarantee the right to the city, it is necessary that it be planned to include these populations, using the technologies available in smart cities to reach all citizens, in an inclusive and equitable way.

OBJECTIVES

The main objective of this article is to analyze the role of Civil Defense as a structuring factor in the construction of urban resilience in smart cities, ensuring the right to the city for all citizens. To this end, a literature review will be carried out on the concepts of

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right to the city, urban resilience, smart cities and Civil Defense, seeking to identify how these concepts can be integrated to promote safer, more inclusive and resilient urban development.

JUSTIFICATION

The need to discuss these issues is urgent, given the increase in the frequency and intensity of natural disasters, such as floods and landslides, which affect Brazilian cities, as well as the impact of economic and social crises in urban areas. In a context of growing urbanization, climate change, and the adoption of technologies in cities, it is essential to rethink the role of Civil Defense and how it can contribute to building more resilient and inclusive cities. Smart cities, with their technological innovations, offer a unique opportunity to restructure urban governance, but it is necessary to ensure that these innovations are at the service of all citizens, promoting the right to the city and not widening existing inequalities.

ARTICLE STRUCTURE

The article will be structured as follows: after the introduction, the concept of the right to the city and its relationship with urban inclusion in smart cities will be discussed. Next, the section on urban resilience will present the challenges that cities face in terms of crisis preparedness and response. The subsequent section will address Civil Defense in the context of smart cities, exploring how technologies can be used to improve the efficiency and inclusiveness of emergency systems. Finally, the article will conclude with an analysis of how the integration of these concepts can contribute to safer, more equitable, and more resilient urban planning.

METHODOLOGY

This article adopts a literature review approach to investigate the role of Civil Defense as a structuring factor in building urban resilience and guaranteeing the right to the city in smart cities. The literature review allows a comprehensive analysis of the existing literature, identifying trends, gaps, and relevant connections between the concepts covered, as well as establishing a solid theoretical basis for future empirical research (Tranfield, Denyer, & Smart, 2003). This section details the methods used to select, review, and analyze bibliographic sources.

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TYPE OF RESEARCH

The research conducted in this article is a systematic review of the literature. The systematic review aims to collect, analyze and synthesize the available scientific literature in a rigorous and objective manner (Kitchenham, 2004). This methodology was chosen for its ability to provide a holistic view of the topics under study, in addition to ensuring that the conclusions are based on a consolidated body of scientific evidence. The systematic review allows the identification of patterns, theoretical gaps and practical implications for the development of smart cities, focusing on the articulation between urban resilience, civil defense and the right to the city.

SELECTION CRITERIA

To ensure the relevance and timeliness of the data, specific criteria were established for the selection of the articles and materials analyzed. These criteria include:

- Databases Consulted: The Scopus, Web of Science, Google Scholar, and ScienceDirect databases were consulted, as they are widely recognized in academia for their rigor in indexing high-quality scientific publications (Gusenbauer & Haddaway, 2020).
- Publication Period: The research focused on publications between 2010 and 2023, a period that corresponds to the growth of academic interest in smart cities, urban resilience, and the right to the city, as well as technological advances that impact civil defense. Studies prior to this period were included only if they were considered seminally important for the theoretical foundation, such as the works of Henri Lefebvre (1968) on the right to the city and David Harvey (2012) on critical urbanism.
- Inclusion Criteria: Articles published in peer-reviewed scientific journals, international conferences, and book chapters that directly addressed topics such as smart cities, urban resilience, civil defense, or the right to the city were included. The research focused mainly on empirical and theoretical studies that discussed the interconnection between these concepts, as well as literature reviews on each of the topics.
- Exclusion Criteria: Studies that addressed the themes tangentially or with a focus restricted to a very specific dimension, without considering the intersection between urban resilience, the right to the city, and civil defense, were excluded.

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Opinion pieces, editorials, and publications without peer review were also disregarded.

KEYWORDS USED

The bibliographic research was structured with the use of keywords that reflected the main dimensions of the study. The keywords were grouped into different combinations to increase the comprehensiveness of the results and ensure that the interrelationships between the concepts were captured. The main keywords used were:

- Urban resilience
- Smart cities
- Civil defense
- Right to the city
- Town planning
- Technology in smart cities

The combination of these keywords generated a diverse range of results, covering articles in social sciences, urban planning, disaster studies, and information technology applied to the urban environment. The searches were conducted in English, Portuguese, and Spanish to capture studies from different geographic contexts.

SEARCH STRATEGY

The search strategy was divided into three phases:

1. Initial Broad Search: In the first phase, a broad search was carried out in the aforementioned databases, using keywords in different combinations, to collect the largest number of relevant studies. This phase allowed the identification of central studies for the research, both theoretical and empirical.
2. Relevance and Quality Analysis: The second phase involved reading the titles and abstracts of the retrieved studies to determine their relevance. Duplicate studies and those that did not address the intersection between the core concepts of the article were excluded. To ensure the quality of the review, priority was given to studies published in journals with a high impact factor and classified in Qualis CAPES, as well as publications in prestigious internationally recognized conferences (Cronin, Ryan, & Coughlan, 2008).

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3. Selection of Additional References: In the final phase, the snowballing technique was used, where the references of the selected studies were analyzed to identify other relevant works that had not been retrieved in the initial search. This technique allows for the expansion of the sample of studies, ensuring a more robust and in-depth review (Greenhalgh & Peacock, 2005).

DATA ANALYSIS

The analysis of the selected studies followed a thematic analysis model, which is appropriate for literature reviews and allows the data to be organized into categories, facilitating the interpretation of the main themes found (Braun & Clarke, 2006). The thematic analysis was structured in three main axes, according to the objectives of the article:

1. Right to the City: This category analyzed the studies that address the concept of the right to the city, its origin, and how it can be applied in the context of smart cities and urban inclusion.
2. Urban Resilience and Civil Defense: Here, the studies were classified according to the discussion on urban resilience and the role of Civil Defense in planning and responding to emergencies in modern cities. The focus was on how smart city technologies can enhance the efficiency of civil defense actions and how these actions can contribute to the construction of resilient cities.
3. Smart Cities: The third category addressed the concepts of smart cities, emerging technologies applied to the urban environment, and how these innovations affect both resilience and the right to the city. The relationship between technological inclusion and the challenges of the digital divide was also investigated.

LIMITATIONS OF THE RESEARCH

Although the systematic review offers a comprehensive and rigorous approach, it has some limitations inherent to the methodology. First, the search was limited to articles published in journals indexed in the selected databases, which may have excluded relevant studies that are not available on these platforms. In addition, the research focused on publications in English, Portuguese, and Spanish, which may have left out important studies in other languages, such as French or Chinese, especially considering the advancement of smart cities in Asia.

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Another limiting factor is the constant evolution of the topics investigated. Technologies associated with smart cities and Civil Defense are advancing rapidly, and the data used reflect the state of knowledge up to the period of 2023. Therefore, future technological advances can significantly alter the current perspectives and challenges related to urban resilience and the right to the city.

VALIDATION OF RESULTS

To validate the findings of the literature review, the studies were classified according to their relevance and contribution to the central theme. In addition, the triangulation of sources, that is, the comparison of different studies on the same topic, was used to increase the reliability of the conclusions (Denzin, 1978). Studies from different countries and contexts were contrasted to verify the validity of theories applied to different urban realities, ensuring a comprehensive and reasoned review.

THEORETICAL FOUNDATION

The theoretical foundation of this article is based on three main concepts: the Right to the City, Urban Resilience and the role of Civil Defense in the context of Smart Cities. These concepts are interconnected in order to provide a complete analysis of how the integration of technology, urban governance and citizen participation can contribute to a more equitable, resilient urban planning prepared to deal with crises and emergencies.

RIGHT TO THE CITY

The concept of the Right to the City was introduced by Henri Lefebvre in 1968, in his seminal work Le Droit à la Ville. Lefebvre defined the right to the city as the right of citizens to participate in and influence the construction and transformation of the city, encompassing access to urban space and essential services (Lefebvre, 1968). This concept has profound implications for urban planning, as it suggests that urban space should be shaped according to the needs of all citizens, not just the most privileged groups or market forces (Harvey, 2012).

Lefebvre argues that capitalist urbanization often excludes certain layers of society from the full enjoyment of the city, by concentrating resources and services in wealthy areas and neglecting the most vulnerable. The Right to the City is therefore a demand for social

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justice, active participation and inclusion, where all inhabitants have the right to a city that meets their needs (Lefebvre, 2009).

In recent decades, the concept has been expanded and adapted to the contemporary context by thinkers such as David Harvey (2012), who stated that the right to the city is "much more than the right of individual access to urban resources: it is a right to change ourselves by changing the city" (Harvey, 2012, p. 4). Harvey highlights the need for citizens not only to have access to the city, but also to participate in its transformation, which implies democratic control over urban processes. Thus, the right to the city has become a cry of resistance against the privatization of urban space and social exclusion.

In the context of Smart Cities, the right to the city takes on new challenges and opportunities. The digitalization of urban services and the introduction of information and communication technologies (ICT) promise to democratize access to public services and increase the efficiency of cities. However, these advances can also exacerbate inequalities, creating new forms of digital exclusion (Cardullo & Kitchin, 2019). To ensure the right to the city in a smart city, it is crucial that the technologies implemented are accessible to all and that citizens can actively participate in urban decision-making.

URBAN RESILIENCE

The concept of Urban Resilience refers to the ability of cities to absorb, adapt and recover from shocks and stresses, whether they are of an environmental, social, economic or technological nature. Initially, the term "resilience" was used in the natural sciences to describe the ability of a system to return to its original state after a disturbance (Holling, 1973). However, in recent decades, the concept has been widely applied to urban planning, where resilient cities are those that can face and overcome adverse events such as natural disasters, economic crises, and social conflicts (Meerow, Newell, & Stults, 2016).

According to Godschalk (2003), urban resilience involves the creation of urban systems that are capable of withstanding crises and, at the same time, adapting to new circumstances, ensuring the continuous functioning of essential urban services, such as transportation, energy, water, and public safety. To be resilient, a city needs to be flexible, inclusive, and innovative, involving all stakeholders, including governments, businesses, and civil society.

Urban resilience is also directly related to the concept of urban justice. Crises and natural disasters, such as floods and earthquakes, often disproportionately affect the

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poorest and most vulnerable populations. These communities often live in at-risk areas, with less access to quality infrastructure and with limited capacities for adaptation and recovery (Pelling, 2011). Therefore, to build resilient cities, it is necessary to consider the social and economic inequalities that shape the vulnerability of urban populations.

In Smart Cities, urban resilience can be strengthened through innovative technologies such as the Internet of Things (IoT), big data, and artificial intelligence. These technologies can be used to monitor and predict disasters in real time, improve the coordination of emergency responses, and optimize the use of urban resources. Cities such as Singapore and Barcelona have already implemented risk monitoring systems that use distributed sensors to detect floods, fires, and other disasters, allowing for faster and more efficient responses (Kitchin, 2014).

However, the implementation of technological solutions must also take into account the inequalities that exist in the city. For urban resilience to be inclusive, it is necessary to ensure that all communities have access to these technologies and that critical infrastructure is distributed equitably throughout the city (Zhou et al., 2020). Otherwise, smart cities may inadvertently increase inequalities, reinforcing the vulnerability of populations that already face significant risks.

CIVIL DEFENSE AND SMART CITIES

Civil Defense is an essential component of urban resilience, responsible for planning, coordinating, and executing preventive and emergency actions in situations of natural or man-made disasters. Traditionally, Civil Defense has focused on mitigating the impacts of disasters by providing immediate relief, evacuation, and assistance to the population. However, as urban challenges become more complex and the frequency of extreme events increases due to climate change, Civil Defense needs to evolve to be more proactive, integrated, and connected to the use of digital technologies (Alexander, 2002).

In smart cities, Civil Defense can benefit enormously from the use of emerging technologies. The Internet of Things (IoT) allows for the installation of sensors throughout the city to monitor risks in real time, such as rising river levels, landslides, and air quality. This data can be processed by big data systems to predict impending disasters and optimize resource allocation, ensuring that responses are swift and effective (Chan et al., 2020).

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In addition, Artificial Intelligence (AI) systems can be used to analyze large volumes of data and detect patterns that humans could overlook, improving the ability to predict and prevent disasters. AI can also be used to coordinate complex emergency responses, such as mass evacuations, and to optimize the distribution of relief resources (Yigitcanlar, 2020). In Singapore, for example, Civil Defence uses AI algorithms to optimise evacuation routes and predict the demand for medical services during disasters (Chin & Lee, 2018).

However, the digitalization of Civil Defense also presents significant challenges. One of the main risks is the digital divide, that is, the fact that part of the population may not have access to or knowledge about the technologies used in smart cities. In an emergency scenario, this could mean that the most vulnerable communities, often without access to smartphones or the internet, may not receive emergency alerts in a timely manner or lack the tools to seek help. Therefore, it is critical for Civil Defense in smart cities to develop digital inclusion mechanisms and ensure that its strategies reach all citizens (Crawford & Finn, 2017).

INTERSECTION BETWEEN THE RIGHT TO THE CITY, URBAN RESILIENCE AND CIVIL DEFENSE

The integration between the Right to the City, Urban Resilience and Civil Defense in Smart Cities is crucial for the development of a safe, inclusive and sustainable urban environment. While the right to the city ensures that all citizens can participate in urban life and have equal access to city resources, urban resilience ensures that cities can adapt and withstand crises, and Civil Defense acts as the first line of response in emergency situations.

These three concepts, when integrated, create a more robust urban system where the use of smart technologies not only improves the efficiency of public services but also promotes social inclusion and equity. To ensure that smart cities do not become environments of exclusion, it is necessary for urban planning policies to prioritize universal access to technologies and integrate citizen participation into the city-building process (Zhang, Liu, & Wang, 2020).

CIVIL DEFENSE IN SMART CITIES

Civil Defense plays a central role in urban planning by protecting populations from the impacts of natural and man-made disasters, such as floods, fires, earthquakes, and

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landslides. As cities become more complex and connected, the role of Civil Defense needs to adapt to meet the challenges posed by accelerated urbanization, climate change, and new technological threats. Smart Cities offer a unique opportunity to modernize and integrate Civil Defense functions through emerging technologies such as the Internet of Things (IoT), big data, artificial intelligence (AI), and cyber systems (Chen et al., 2020).

In this item, we will discuss how these technologies can transform Civil Defense, making it more efficient, proactive, and capable of dealing with contemporary challenges in smart cities. Practical examples of technological application in Civil Defense in cities around the world will also be analyzed, as well as the challenges and risks associated with the implementation of these technologies, with an emphasis on the digital divide and cybersecurity risk.

EMERGING TECHNOLOGIES IN CIVIL DEFENSE

The transformation of Civil Defense into smart cities involves the adoption of a variety of emerging technologies, which play a crucial role in modernizing prevention, mitigation, response, and recovery processes in crisis situations. These technologies include the Internet of Things (IoT), big data, artificial intelligence (AI), and cloud computing. Together, they create an interconnected ecosystem that enables continuous, real-time monitoring of city conditions, as well as increased emergency response capacity (Allam & Dhunny, 2019).

Internet of Things (IoT)

The Internet of Things (IoT) is one of the pillars of Smart Cities and its application in Civil Defense is essential to ensure a quick and efficient response in emergencies. IoT refers to the network of connected devices that collect and share data through the internet. Sensors, cameras, environmental monitoring devices, and communication systems are interlinked in a network that provides real-time data on city conditions (Batty, 2018).

In the context of Civil Defense, IoT is used to monitor various risk factors, such as the water level in rivers to predict floods, smoke and heat sensors to detect fires, or seismic devices to identify earthquakes. A practical example of the use of IoT in Civil Defence is the system implemented in Singapore, which uses sensors installed in areas vulnerable to flooding to monitor water level rise in real time and automatically alert emergency services

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and local people (Chan & Lee, 2018). The integration of this data allows the Civil Defense to make informed and quick decisions, reducing response time and minimizing damage.

Big Data and Data Analytics

The use of big data is another essential component in Smart Cities for Civil Defense. Big data refers to the analysis of large volumes of data generated by sensors, social networks, historical records, and other connected devices. The analysis of this data allows civil defense managers to identify patterns and trends that may indicate the occurrence of a disaster, improving the prediction of critical events (Manyika et al., 2011).

In Amsterdam, for example, the use of big data has been essential for emergency management, especially in relation to flood control, a constant risk in the city. The collection of data from weather sensors, rain gauges, and social networks is used to monitor weather conditions in real time and predict the occurrence of floods. This data is analyzed by intelligent systems that issue automatic alerts, allowing the Civil Defense to take proactive measures to protect the population (Hashem et al., 2015).

In addition, big data analytics can be used to optimize real-time response during crises, allocating resources more efficiently, such as vehicles, rescue teams, and emergency medical services. Identifying areas of greatest vulnerability and prioritizing evacuation actions can be guided by this data, improving the effectiveness of response operations.

Artificial Intelligence (AI)

Artificial Intelligence (AI) has significant potential to transform Civil Defense in smart cities, especially with regard to process automation and predictive analytics. AI algorithms can process large volumes of data in real-time and identify patterns that indicate the imminence of a disaster. This allows Civil Defense to anticipate critical events and act in a preventive manner, before the damage becomes severe (Yigitcanlar et al., 2020).

A relevant example of AI applied to Civil Defense is the automated evacuation system in Tokyo, Japan. The system uses AI algorithms to simulate disaster scenarios and predict the effects of earthquakes and tsunamis, allowing authorities to identify the safest and most efficient evacuation routes in different situations. In addition, AI is used to coordinate emergency resources, optimizing the allocation of ambulances, firefighters, and rescue teams, according to real-time needs (Murata et al., 2016).

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Another promising application of AI is in the detection and mitigation of cyber risks. As Smart Cities become more digitized, they also become more vulnerable to cyberattacks. AI systems can be used to monitor networks and detect suspicious activity, helping Civil Defense prevent or mitigate the impacts of potential cyber intrusions that compromise the city's critical infrastructure (Crawford & Finn, 2017).

URBAN PLANNING AND CIVIL DEFENSE

Urban planning in smart cities needs to deeply integrate Civil Defense, ensuring that disaster mitigation strategies are an essential part of the city's development. Urban resilience, which involves the ability of cities to withstand disasters and recover quickly, must be incorporated from the design phase of urban infrastructure. This involves both the implementation of technologies and the creation of public policies that encourage collaboration between government, civil society, and the private sector (Meerow, Newell, & Stults, 2016).

For example, the city of Barcelona, one of the main models of Smart Cities in the world, integrates Civil Defense into its urban planning by using a digital platform that connects different city services in a single system. This platform allows city authorities to monitor everything from traffic to environmental conditions to energy consumption, using this information to predict risks and allocate civil defense resources more efficiently (Batty, 2018).

In addition, the development of public policies is essential to ensure that civil defense acts in an integrated manner with other areas of urban management, such as transportation, health, and the environment. An integrated planning approach strengthens the city's capacity to respond to complex crises, which involve multiple sectors, such as natural disasters that affect urban mobility and critical infrastructure (Godschalk, 2003).

CHALLENGES AND RISKS IN TECHNOLOGICAL IMPLEMENTATION

While emerging technologies offer opportunities to improve Civil Defense in Smart Cities, their implementation also presents significant challenges. One of the main challenges is the digital divide. Vulnerable populations, who often live in areas at higher risk of disasters, may not have access to smartphones or the internet, which limits their ability to receive alerts and guidance in the event of an emergency (Graham, 2011). This aggravates

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existing inequalities and compromises the effectiveness of Civil Defense responses, as these communities may not be reached by digital solutions.

Another key risk is cybersecurity. As Smart Cities become more digitized and reliant on connected technologies, they become potential targets for cyberattacks. Hackers may attempt to compromise critical systems, such as power grids or water systems, during a natural disaster, exacerbating damage and hampering emergency responses (Crawford & Finn, 2017). Thus, cybersecurity must be a priority in the development of the technological infrastructure of Smart Cities, and Civil Defense needs to be equipped with the necessary tools to deal with these new types of threats.

PRACTICAL EXAMPLES

The application of technologies in Civil Defense is already underway in several cities around the world, serving as examples of good practices. In addition to the examples of Singapore, Amsterdam and Tokyo, already discussed above, we can mention:

- Los Angeles, in the United States, which implemented a system of seismic sensors connected to the Civil Defense network to detect earthquakes seconds before they happen, allowing emergency services and the population to take preventive measures (Koerth-Baker, 2021).
- Mexico City, where earthquake early warning systems, integrated with Civil Defense, are widely used to reduce the impacts of frequent earthquakes in the city (Aguilar & Santos, 2011).

These examples demonstrate how the integration of technologies in smart cities can strengthen Civil Defense, improve urban resilience, and at the same time ensure the safety and well-being of citizens.

URBAN RESILIENCE AND THE RIGHT TO THE CITY IN SMART CITIES

The concept of urban resilience has become increasingly relevant as cities face increasing challenges, such as the impact of climate change, natural disasters, economic crises, and the demographic pressure resulting from accelerated urbanization. In addition, the emergence of smart cities has brought new dynamics to the urban environment, with the application of emerging technologies to improve governance, the efficiency of public services, and the quality of life. However, these technological innovations also raise questions about social inclusion and urban justice, especially in relation to the Right to the

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City (Harvey, 2012), which advocates for the active participation of citizens in the construction and transformation of urban space.

In this context, the articulation between urban resilience and the right to the city in smart cities becomes essential to ensure that cities not only respond effectively to crises, but also promote social justice and inclusion, ensuring that all citizens have equal access to the benefits of smart urban development.

URBAN RESILIENCE IN THE CONTEXT OF SMART CITIES

Urban resilience refers to the ability of cities to absorb and withstand the impacts of natural disasters, environmental changes, and socioeconomic crises, as well as to adapt to and recover from these adversities (Meerow, Newell, & Stults, 2016). In practice, urban resilience involves everything from the preparation of critical infrastructure to the implementation of public policies that mitigate the effects of crises in vulnerable areas of the city.

Smart cities use technologies such as the Internet of Things (IoT), big data, artificial intelligence (AI), and cloud computing to monitor and predict critical events in real-time, improving cities' ability to respond quickly and effectively to emergencies. These technologies enable the monitoring of critical systems such as transportation, energy, water networks, and public health, increasing the adaptive capacity of cities (Batty, 2018).

Smart cities such as Amsterdam and Singapore exemplify the application of these technologies to increase urban resilience. In Amsterdam, sensor systems monitor weather conditions and water levels, enabling a rapid response to floods and helping to manage the impact of climate change (Hashem et al., 2015). Similarly, in Singapore, the use of AI and IoT has been essential in flood forecasting and real-time traffic management, improving the city's resilience to environmental and urban crises (Chan & Lee, 2018).

Moreover, urban resilience goes beyond immediate responses to crises. According to Vale (2014), a resilient city must also be able to transform its urban systems to avoid collapse in the long term, considering not only the physical infrastructure, but also the social and economic systems. To this end, the participation of civil society is key, ensuring that resilience policies are equitable and inclusive.

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RIGHT TO THE CITY IN SMART CITIES

The concept of the Right to the City was formulated by Henri Lefebvre (1968) as a collective right of all inhabitants to enjoy urban space and to actively participate in its production. For Lefebvre, the city is not just a physical place, but a social and political space where inequalities can be contested and transformed. The Right to the City, therefore, is not limited to access to urban goods and services, but involves the active participation of citizens in decisions that shape the urban environment (Harvey, 2012).

In smart cities, the Right to the City faces new challenges and opportunities. On the one hand, the application of digital technologies can increase the efficiency of public services and improve the quality of life of citizens. On the other hand, unequal access to these technologies can exacerbate existing social disparities, creating new forms of digital exclusion. Populations that do not have access to connected devices or that live in areas with poor digital infrastructure are at risk of being marginalized in the processes of participation and urban governance (Cardullo & Kitchin, 2019).

An example of the application of the Right to the City concept in smart cities can be found in Barcelona, where the use of digital platforms has been incorporated into urban policies to promote citizen participation. The Decidim Barcelona project allows citizens to actively participate in the decision-making process through a digital platform, ensuring that their voices are heard in debates on issues such as urban planning and sustainable development (Capdevila & Zarlenga, 2015). While initiatives like this can promote inclusion, it is critical that access to these platforms is universal and that digital participation is accompanied by policies that combat digital exclusion.

INTERSECTION BETWEEN URBAN RESILIENCE AND THE RIGHT TO THE CITY IN SMART CITIES

The relationship between urban resilience and the Right to the City is fundamental for the development of inclusive and equitable smart cities. Resilience in smart cities depends not only on the ability to respond to crises, but also on social justice and the active participation of citizens in the decision-making process. Resilient cities are those that incorporate the diversity of voices and needs of the population, especially the most vulnerable, into their emergency planning and response policies (Pelling, 2011).

This intersection is especially critical in the context of crises and natural disasters. In times of crisis, such as floods, earthquakes, or pandemics, the poorest and most

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marginalized populations tend to be the most affected, either because of their location in at-risk areas or because of a lack of access to emergency resources and information (UN-Habitat, 2020). A truly resilient and smart city must ensure that all citizens have the right to equal access to critical infrastructure and emergency services, while promoting digital inclusion so that no one is excluded from the technological solutions that underpin smart cities (Graham, 2011).

On the other hand, the Right to the City involves the recognition that the technologies implemented in smart cities must be at the service of all citizens, and not just a technological elite. Urban infrastructure and digital services need to be designed to meet the needs of both the richest and most vulnerable populations. Democratic participation in urban planning and crisis management is therefore essential to ensure that smart cities promote both resilience and social justice (Zhang, Liu, & Wang, 2020).

CHALLENGES AND OPPORTUNITIES FOR RESILIENCE AND THE RIGHT TO THE CITY

Despite the promises of efficiency and innovation brought by smart cities, there are numerous challenges that need to be addressed to ensure that urban resilience and the Right to the City are fully achieved. One of the main challenges is the digital divide, which could worsen as cities become increasingly reliant on connected technologies. In urban areas where internet access is limited or non-existent, populations are at risk of being excluded from the benefits of smart cities and resilience policies (Graham, 2011).

In addition, the process of gentrification and the concentration of investments in wealthier areas can aggravate social inequalities, making certain parts of the city more resilient and technological, while others remain vulnerable to disasters and crises. This phenomenon undermines the Right to the City, as the poorest populations are often displaced to peripheral areas without access to resilient infrastructure (Harvey, 2012).

On the other hand, smart cities also offer significant opportunities to improve urban resilience and secure the Right to the City. The application of technologies such as big data, artificial intelligence, and the Internet of Things (IoT) allows for real-time monitoring of risks and the coordination of faster and more efficient responses in cases of emergencies (Hashem et al., 2015). In addition, digital platforms for citizen participation offer new forms of democratic engagement, allowing citizens to influence urban policies in a more direct and transparent way (Capdevila & Zarlenga, 2015).

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PRACTICAL EXAMPLES

Several cities around the world are already implementing policies and technologies that seek to balance urban resilience and the Right to the City in the context of smart cities:

- Singapore: In addition to being an example of a resilient city, Singapore has implemented the Smart Nation Program, which aims to utilize technology to ensure that public services are efficient and accessible to all citizens. The city uses big data and IoT to monitor environmental risks, while also implementing inclusive policies to ensure that technologies reach all layers of the population (Chourabi et al., 2012).
- Barcelona: The Decidim Barcelona project promotes citizen participation in urban planning through digital platforms. By ensuring that citizens have an active voice in decisions about the city, the project seeks to promote the Right to the City, while resilience technologies monitor risks in real time, creating a safer and more inclusive city (Capdevila & Zarlenga, 2015).
- New York: After Hurricane Sandy in 2012, New York implemented a set of measures to improve its urban resilience, using climate prediction technologies and smart infrastructure to protect the most vulnerable populations in coastal areas. The NYC Resilience project integrates climate justice policies, ensuring that resilience is equitably distributed throughout the city (Vale, 2014).

CONCLUSION

This article explored the intersection between urban resilience, right to the city, and smart cities, with a particular focus on the key role of Civil Defense. As cities face complex and growing challenges, such as natural disasters, climate change, and rapid technological transformations, building a resilient and just urban environment becomes a priority for governments and urban managers. The development of smart cities offers an unprecedented opportunity to improve crisis management, increase the efficiency of public services, and improve the quality of life for citizens. However, this technological advance also brings new challenges in terms of digital exclusion and urban justice, requiring urban policies to integrate both social inclusion and technological sustainability.

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TECHNOLOGY INTEGRATION AND SOCIAL INCLUSION

The concept of urban resilience deals with a city's ability to absorb, adapt, and recover from adverse events, whether they are natural disasters, socioeconomic crises, or health emergencies. In the context of smart cities, emerging technologies — such as the Internet of Things (IoT), big data, artificial intelligence (AI), and cyber systems — are powerful tools that can significantly strengthen cities' ability to prevent and mitigate the effects of these crises. The application of these technologies in Civil Defense can predict disasters more accurately, coordinate faster responses, and allocate resources efficiently, as shown in the examples of Singapore, Barcelona, and Tokyo (Allam & Dhunny, 2019; Hashem et al., 2015).

However, the success of smart cities depends on their ability to incorporate principles of social justice and digital inclusion, so that technological innovation is accessible to all layers of the population. As discussed in the article, the digital divide is one of the main challenges faced by these cities, as marginalized and vulnerable populations suffer the most from a lack of access to crucial technological resources and information in times of crisis (Graham, 2011). Thus, guaranteeing the Right to the City in these circumstances requires that public policies include mechanisms to combat the digital divide, ensuring that smart city technologies serve the population equitably.

CIVIL DEFENSE AS A PILLAR OF URBAN RESILIENCE

The role of Civil Defense is essential for building urban resilience, as it acts as the main line of defense against disasters and crises. In smart cities, Civil Defense is no longer limited to reactive response, but becomes a proactive system, supported by technologies that anticipate and mitigate disasters even before they occur (Chan et al., 2020). The integration of real-time data, sensors distributed throughout the city, and artificial intelligence platforms allow cities to make accurate predictions about floods, landslides, earthquakes, and even cyberattacks, significantly improving population protection and minimizing the impacts of disasters.

However, the article also highlighted that the technological modernization of Civil Defense needs to be accompanied by inclusive urban planning, which takes into account the needs of the most vulnerable populations. Resilient smart cities need to adopt a climate justice approach, ensuring that urban resilience efforts are distributed equitably and that all communities have access to emergency warning and response systems (Pelling, 2011).

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The case of New York after Hurricane Sandy, for example, demonstrates the importance of integrating climate resilience with social inclusion policies, protecting the most vulnerable areas and ensuring that all citizens are treated fairly in emergency situations (Vale, 2014).

THE RIGHT TO THE CITY IN TIMES OF CRISIS

The Right to the City, as outlined by Henri Lefebvre (1968) and expanded by David Harvey (2012), defends the idea that all citizens should have the right to enjoy and participate in the construction of urban space. In the context of smart cities, the Right to the City takes on new relevance, as technological innovations can be an inclusive or exclusionary force, depending on how they are implemented (Cardullo & Kitchin, 2019). This article demonstrated that, in order to guarantee the right to the city in times of crisis, smart cities must promote democratic participation in their planning and resilience policies.

Cities like Barcelona are leading this movement by allowing their citizens to actively participate in urban decisions through digital platforms, such as Decidim Barcelona (Capdevila & Zarlenga, 2015). Initiatives such as these exemplify the potential of smart cities to strengthen citizen participation and ensure that urban planning is inclusive and reflective of the needs of the entire population. However, it is essential that these platforms are accessible to all, including those who traditionally have less access to technology, such as low-income populations and marginalized communities.

FUTURE CHALLENGES AND OPPORTUNITIES

As smart cities continue to develop, they will face a range of challenges and opportunities. The increasing digitalization of cities offers a unique opportunity to enhance urban resilience and promote the right to the city, but it also requires cities to address issues such as digital exclusion, cybersecurity, and technological gentrification. Without proper urban governance, the risk that these technologies will reinforce social and urban inequalities is significant (Zhang, Liu, & Wang, 2020).

On the other hand, smart cities offer extraordinary opportunities for creating safer, more sustainable, and fairer cities. The application of emerging technologies in Civil Defense and urban planning can transform the way cities face crises and disasters, allowing the most vulnerable populations to be protected more effectively. Furthermore, by promoting citizen participation in urban decisions and ensuring that all communities have

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equal access to digital services, smart cities can become not only more efficient but also more democratic and inclusive (Kitchin, 2014).

IMPLICATIONS FOR POLICY AND PRACTICE

The implications for policy and practice are clear: urban managers must adopt a balanced approach that integrates technology, social inclusion, and urban justice. For smart cities to truly deliver on their promise of improving the lives of all their citizens, policymakers need to ensure that technological infrastructures are accessible to all, and that urban resilience policies are designed inclusively. This requires a coordinated effort between governments, the private sector, academia, and civil society, so that the development of smart cities is guided by principles of social justice and human rights (Harvey, 2012).

This article demonstrated that the intersection between urban resilience, Right to the City, and Civil Defense is critical to ensuring the success of smart cities in the twenty-first century. Only by integrating these principles into urban planning and governance will cities be able to meet the challenges of contemporary crises and ensure a fairer, safer, and more sustainable future for all.

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