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SMART CITIES, HUMAN RIGHTS AND SOCIAL SUSTAINABILITY

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ABSTRACT

This paper intends to analyze the main technological aspects of the smart city as a solution to the problem of social exclusion that has been observed with the implementation of the New Information and Communication Technologies (NICT). To this end, it is questioned: How can the social dimension of sustainability – understood as access to basic Human Rights – be implemented by smart cities, especially to foster the right to democratic participation? Aiming at this, the research treats, as specific objectives, the conceptualization of the smart city and the analysis of new technologies that provide its operation; characterize the new data-driven urbanism and, study the Human Right to social participation. It is concluded that the new forms of social participation, such as e-democracy and e-participation, aim

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at the reaffirmation of democratic principles discredited by a disengaged citizenship. To this end, it was observed that the smart city is capable of promoting citizen engagement, since NICT provide low cost and the capacity to be defended as a free and egalitarian social sphere above individual interests. Methodology: Bibliographic review technique, dialectical procedure method and qualitative approach.

Keywords: exclusion; human rights; participation; smart city; sustainability.

CIDADES INTELIGENTES, DIREITOS HUMANOS E SUSTENTABILIDADE SOCIAL

RESUMO

O presente artigo pretende analisar os principais aspectos tecnológicos da cidade inteligente como uma solução para o problema da exclusão social que vem sendo observada com a implementação das Novas Tecnologias da Informação e Comunicação (NTIC). Para isso, questiona-se: Como a dimensão social da sustentabilidade – compreendida como o acesso aos Direitos Humanos básicos – pode ser implementada pelas cidades inteligentes, especialmente para fomentar o direito à participação democrática? Objetivando isso, a pesquisa trata como objetivos específicos, a conceituação da cidade inteligente e a análise das novas tecnologias que proporcionam o seu funcionamento; caracterizar o novo urbanismo orientado por dados e, estudar o Direito Humano à participação social. Conclui-se que as novas formas de participação social, como a e-democracia e a e-participação, têm como objetivo a reafirmação de princípios democráticos desacreditados por uma cidadania desengajada. Para isso, observou-se que a cidade inteligente é capaz de promover o engajamento do cidadão, pois as NTIC proporcionam baixo custo e capacidade para ser defendida como âmbito social livre e igualitário acima de interesses individuais. Metodologia: técnica de pesquisa de revisão bibliográfica, método de procedimento dialético e abordagem qualitativa.

Palavras-chave: cidade inteligente; direitos humanos; exclusão; participação; sustentabilidade.

INTRODUCTION

Smart cities are part of a notorious social and urban phenomenon, being that it is not uncommon to see that expression as advertisement for both the Public Administration or the companies that market and maintain urban management systems nowadays. The term is originated from a project by International Business Machines (IBM), called “Smarter Cities Challenges”. It is also part of a corporate narrative incorporated by public management of cities, serving to demarcate an objective for “smart” urban projects, which use technologies for better urban development.

In that scenario, this research focuses on the analysis of aspects that make the city become “smart”, focusing on the implementation of information and communication technologies in urban management, in all relevant aspects to urban planning, aiming to present the smart city as a viable hypothesis to deal with the research problem: how is it possible to avoid social exclusion of citizen in the participatory scope of urban management in this new technological/informational environment? Therefore, the main concern of the research is the concern with the social dimension of sustainability, focused on the realization of basic Human Rights – given the rapid implementation of new Information and Communication Technologies (ICT).

Bibliographic review technique, dialectical procedure and qualitative approach were used here, being noticed that although research on urban themes raise empirical analysis on a specific city or context, the adopted methodology allows and requires a fundamentally theoretical reflection on the historical, social and economic context in which smart cities are asserted, reflecting on the necessary depth to formulate a relevant critique of this production of urban space.

Thus, the first part of its development presents conceptual aspects of smart cities and postulates a new informational political economy based on the central importance of data in this new social configuration. In the following parts, it is analyzed how new technologies transform legal-spatial relations and urban planning through the constitution of an informational space and new paradigms related to data management. Finally, it deals on technological alternatives that can solve or mitigate the impossibility of inclusion by Human Rights.

1 THE POLITICAL ECONOMY OF SMART CITIES

“Smart” are the cities that operate under a platform that allows the connection of intelligent systems, that is, ICT mechanisms used as a means of operating the city’s equipment, such as energy system through smart grids, capable of, in real time, intelligently distributing energy by efficiently interconnecting production sources, producing data on consumption and production in an accessible way (FARHANGI, 2009; EKANAYAKE *et al.*, 2012); intelligent mobility – linked to constant information on traffic conditions and the pace of transport, making decisions live according to reality, promoting better mobility conditions (BENEVOLO; DAMERI; D’AURIA, 2016; SOMOV; DUPONT; GIAFREDA, 2013; SILVA-MARTINS; GONZALES-TACO, 2020); intelligent waste management – which promotes better waste disposal, in accordance with environmental and sanitary principles, identifying materials and possibilities for reuse, whether in the city’s waste management work or in the technology of residential garbage cans capable of producing data (JIA *et al.*, 2020; HARIBABU *et al.*, 2017).

They are a reflection of the change in certain paradigms of political economy – directly linked to the rise of information and communication technologies – in the face of capitalist urbanism, that is, a transformation of the city derived from industrial capitalism to the city derived from informational capitalism. But they are not a chance or pure act of urban creativity,⁴ being a product of the political economy renewed by the paradigm of new ICT, resulting from the social production of informational space and platforms, due to the rise of goods and services related. Viewing them from the political economy allows us to identify this production of space under changes in the production, exchange and circulation of goods, having fundamental implications in the spheres of work, society and economy – from industrial goods to the commodification of digital data and algorithms.

What effectively could make them “smart” would be, with great promise, the use of these network infrastructures and massive data analysis to

⁴ This shows that the concept of “smart city” is not unanimous in its use, although it has gained significant traction among academics, businessmen, governments and the media – according to Kitchin (2015) this use has relapsed into being idealistic or purely technical, or even that criticism that is absent from the nuances of the complex of processes that constitute it, that is, absent from empirical evidence. It is necessary to analyze the history of the concept of “smart city” and what they actually are from a perspective that goes beyond the unilaterality of the “corporate narrative” – limited to corporate attitudes and interests (SODERSTROM; PAASCHE; KLAUSER, 2014) – comprising socio-historical analysis that implies the complexity of associations and problematizations that include the use of the term (YANG, 2020).

produce, according to Kitchin (2015: (I) a smart economy, which promotes entrepreneurship, innovation, productivity, competitiveness, such as the economics of applications and sharing; (II) smart governance, or the establishment of new forms of digitized government, capable of producing better-informed decisions and delivering better services; (III) smart mobility, when creating efficient, inter-operational and multiple transport systems; (IV) smart environments, which promote sustainability and resilience; (V) intelligent life, promoting quality of life and safety; (VI) smart people, using technologies and services that better inform citizens and promote creativity.

Regardless of the critical view, the origin of the term “smart city” is disputed. The main reason for the popularization of the term may be the large-scale initiative of the International Business Machines (IBM) corporation in 2010, called “Smarter Cities Challenge”,⁵ which used the adjective “smart” to characterize the use of smart system technologies as solutions to urban problems (NAPHADE *et al.*, 2011, p. 32).

IBM projects the rise smarter cities from a process, or “journey”, not as an immediate transformation, which requires (DIRKS; KEELING, 2009): (a) instrumentalization and digitization, as the ability to identify the urban processes – becoming the city a “system of systems”; (b) interconnection – the dialogue between systems and managers; and (c) intelligence – the ability to use information in large quantities to create and interpret models of behavior, capable of translating them into real and applicable knowledge.

Smarter Cities Challenge initiative signals how corporations understand their updated role in urban management, as a “partner” for the realization of urban rights. That is a process that comprises the informational political economy, both in the affirmation of non-state transnational technological agents, and in the valorization of the information commodity. Explicitly, they consider necessary to explore three themes: (I) the paradigm of new information and communication technologies – how and what these new technologies are, as well as how they influence society; (II) the reflection of this as a result of an urbanism specific to smart cities, based on the management of digital data and its effects on urban governance, in order to point out how these factors create a new perspective for (III) participation in the context of smart cities, both through new forms of institutional

⁵ IBM’s strategy raises a strategic plan for the use of ICT precisely in an environment of economic recession, with a view to improving technologies to make up for deficits in public administrations (PAROUTIS; BENNETT: HERACLEOUS, 2013).

participation made possible by technologies, and through a new form of citizenship based on the information society.

2 THE CURRENT PARADIGM OF ICT

ICT are, according to the first use of the term, the synthesis of information transmission processes and the hardware and/or software that allow these events (STEVENSON, 1997). The aggravation of this trend towards the expansion of information transmission processes characterizes the so-called “new” information and communication technologies (NICT). The NICT refer specifically to the moment of the informational revolution – a nomenclature used to refer to the streamlining, expansion and digitization of these communications, effectively arranging them into a network, thus giving rise to ideas such as the “information society”, “economy informational” and “informational space”. It is essential to understand that the informational paradigm does not only undertake a technological revolution, although it is central, but a complete revolution – as announced by Lojkin (1995) – in the role of information in society, economy and city.

The proliferation of these forms of communication shows a trend towards the formation of computerized networks by society and the economy, with bureaucratic and centralized communication paradigms being overcome, having the internet as its main structure (CASTELLS, 2001). This “network society” is a reflection of the informational mode of development and restructuring of recent capitalism, which directly affects the social structure by exposing the role of technologies as a transformer of social dynamics – being that such a form of society also transforms the production of urban space (CASTELLS, 1996).

The current stage of this development of the information economy, as well as the allied development of technologies, is consistent with what Kitchin (2021, p. 219) refers to when saying that “we live in a data-driven world”, considering that increasingly the world is mediated by data-rich technologies – which marks the rise of digital work, automation, platforms and data capitalism. Following Kon and Santana (2016), the most important technologies to explain the infrastructure of a smart city are: (I) internet of things, because of the need to connect devices, sensors and users – a scenario in which explain concepts such as “context-sensitive technology” and “artificial intelligence”; (II) Big Data, as the current data storage and processing paradigm; (III) cloud computing, which makes it capable and

scalable to provide sufficient computing potential remotely, allowing the exercise of applications and software as a service (SaaS).

According to the Institute of Electronic and Electric Engineering (IEEE, 2015), IoT is a framework that includes all things that have representation and presence on the Internet, which bridge the virtual and physical world through applications and services based on machine-to-machine (M2M) communication, that is, they are applications capable of producing and managing information in accordance with the equipment programming, being that they are connected to the internet without any input from a user to do so. IoT is the basis for smart city platform applications, mainly due to its capabilities to enable monitoring, management and remote control of devices (such as scanners, GPS, sensors, radio frequency identification, among others) – which can process data in real time and promote important new decisions in city management without a manager (who would read any and all data acquired) (KIM; RAMOS; MOHAMMED, 2017) – and to promote customized services⁶ (GAUR *et al.*, 2015).

This context imposes the explanation about context-sensitive technologies. This is a term directly linked to the idea of ubiquitous computing, which comprises the incorporation of computing into everyday life, seeking almost imperceptible interactions with users, being that context sensitivity is the characteristic that allows applications to understand the environment (space, processes, conditions, interactions, etc.) in which they are being used, changing the users' experience accordingly to their own behavior (WANT, 2010). A system is context-sensitive when it uses the context in which it is located – for example, location, time, temperature, among others, as needed – to provide relevant information or services to users (DEY, 2010).

In smart cities, the promotion of context-sensitive platform architectures is essential, as they can provide common semantics between the facts that occur in the urban space and the digital data that circulate between networked devices (SHOLLA; NAAZ; CHISHTI, 2018). In the economy of smart cities, the notion of “context-sensitive services” emerges, capable of satisfying individual and community needs according to information processed in an uninterrupted manner – such as data relating to temperature, humidity, wind, energy, pollution, dispersion of pollen, among others (FUJIWARA *et al.*, 2015). An essential ally of other technologies presented

⁶ For this characteristic linked to adaptation, context-sensitive applications for smart cities based on IoT are also called adaptive services (URBIETA *et al.*, 2017).

here, AI is the key to “a world in which objects become intelligent” (HENNING, 2021, p. 9), as it enables these interconnected devices, so essential to city platforms intelligent, to be effectively intelligent, becoming able to connect to each other and change their behavior according to the context, delivering services to users dynamically and efficiently – especially when machine learning algorithms learn, after sensor perception, with data on people’s interests, actions and intentions (STUDLEY; LITTLE, 2021).

AI is the field of developed techniques that allow computers to act in a similar way to intelligent organisms, such as humans (RAYNOR JR, 1999), and the main characteristic for this is the capacity of these machines to learn on their own, through the so-called machine learning, which is nothing more than the capacity of a system (software and/or algorithmic) to acquire or develop new knowledge or skills, through different methods – such as neural networks, structures that contain multiple elements based on artificial neurons (mathematical models that simulate the information processing methods of neurons) capable of understanding information and adopting strategies for recognizing patterns (KOVÁCS, 2006).

The technology that allows this ubiquitous computing to work is “cloud computing”. This condition is structural for the proper functioning of IoT-related applications, as it allows the use of specific platforms and programs autonomously, without having to deal with the necessary infrastructure, just being connected to the internet – these are service models such as “software as a service” or “platform as a service” (PaaS), accessed by the user when hiring functions of a system, without having to maintain its structure (BEIMBORN *et al.*, 2011; GUO; MA, 2018).

Finally, Big Data can be defined as the stage of knowledge and application of digital data sciences. In smart cities, this technology is essential due to the need to trace patterns of behavior and identify variables in urban dynamics – which can provide more sophisticated knowledge about the city in the era of Big Data, on a large scale, refined, in real-time and capable of controlling several aspects of urbanity – for example, related to the environmental issue, such as finding detailed information about the city’s energy use and waste disposal (BRIBI; KORGSTIE, 2018).

For this kind of space and cities, obviously, there must be an urban science, as well as an urban planning adequate to it – in other words, an urbanism for the space of data flows and digital cities, which incorporates and adapts concepts, techniques and technologies experienced by digital platforms (FREITAS; MAMEDE; LIMA, 2002). However, this urbanism

is more than the mere adoption of technologies and the creation of a merely “digital” city: it is the incorporation of governance principles and a specific logic, with objectives that are marked by business competitiveness, innovation and territorial marketing (FERNANDES; GAMA, 2006), linking it to the privatization trends of urban management, the valorization of information and the globalization of the economy.

3 THE URBANISM OF SMART CITIES

Smart city urbanism is data-driven, presented through service provider application platforms directly linked to data management technologies in Big Data, with connected and context-sensitive equipment. Data inform urban planning by demonstrating the functioning of the city and opinions about it, producing urban knowledge. This kind of knowledge is important for understanding urban life, solving urban problems and formulating policies. The complexification of information and communication technologies promoted in the information age brought digitization to the field of data, transforming data analysis and establishing a paradigm on the quantity, quality and speed of information produced and analyzed – the Big Data paradigm – and providing mechanisms through which urbanism becomes data-driven in a ubiquitous way, avoiding previously data-informed intermediaries through algorithms that make urban management decisions.

Data turn out to be directly related to the production of urban experience, and the ways through which data are relevant to urbanism forge new spatial organizations and experiences – a situation that conditions algorithms and digital data to behave as producers of a new urban culture (DE WAAL, 2017). And the incarnation of this scenario linked to new information and communication technologies is the notion of “smart city”, which comprises a data-based life, in which places are increasingly composed and monitored by ubiquitous computing, economics and governance; it is driven by innovation, creativity and entrepreneurship.

Given the relevance of data for urban planning and the advancement of technological development of information and communication, a new era of urban planning emerges: data-informed urbanism is replaced by data-driven urbanism, which constitutes the contemporary paradigm and affirms the conceived space of the so-called “smart cities” (KITCHIN, 2015). It is the technical-scientific platform on which urbanism is based that makes decisions about the future of the city – that is, more than “digital

cities” (worthy of the implementation of recent technologies), but located a step further, incorporating governance principles and specific objectives for transforming urban life (WEISS; BERNARDES; CONSONI, 2015).

Data-driven urbanism is the conceived dimension of the city’s dignified space under the paradigm of Big Data, which is that of urban living linked to complex flows in large information networks, which are increasingly larger and diversified by promoting constant correlations with other data being produced all the time. Therefore, it is about the ability of data on the functioning of cities to be represented in real time, bringing a diversity of complex information, reflecting different feelings at the same time and promoting views of complex issues – something that did not occur under the guise of traditional data analysis, which created patterns according to their needs (BATTY, 2017).

The capacity that defines the paradigm of data-driven urbanism is the assessing or processing urban information in real time – in order to be able to efficiently distinguish relevant data from available data, without the need for lengthy intermediaries to make this judgment. This data processing must be ubiquitous – hence the use of AI. In other words, this urbanism is based on the capacities to solve possible issues at the same time they are developed (KITCHIN, 2014) and to be able to process in real time data acquired over a long term, linked to repeated practices, jointly those produced instantly and immediately (KANDT; BATTY, 2021).

One of the ways through which this urbanism manifests itself in front of the public and demonstrates its performance are the so-called city dashboards, framework that provide a visual element through dynamic and/or interactive graphics, infographics, three-dimensional models, and images that demonstrate information about performance, structure, patterns and trends in each city, which are valuable data about urban systems, infrastructure, society, population and the environment they are displayed on screens accessible to the government and the general public. These models demonstrate the standards of urban management systems, determining deficiencies and objectives of the city (KITCHIN and MCARDLE, 2017).

In practice, it is about the way urban management computer systems collect and check data in various databases in real time, always updated with new data produced by security cameras, thermal analysis, maps and other data sources, forming coherent knowledge at all times. An example of this are the “data-driven smart sustainable cities”, in which the behavior of the algorithms and the decisions taken are directly based on paradigms linked to the sustainable development of the environment, optimizing,

regulating and managing operations in accordance with these principles (BRIBI, 2019).

Generally the aim or objective of data-driven urbanism is revealed in the collection and processing of digital information on urban issues such as infrastructure and mobility, under the standards imposed by the Big Data paradigm, and in the recent systems that make cities more manageable, coherent, sustainable and safe – that is, in smart cities, urban activities are made coherent through extensive data mining that informs the functioning of all urban infrastructure through the implementation of computerized systems, as well as interconnected and optimized sensors (NICA; KLIES-TIK; KONECNY, 2020).

Bribi (2019) points out several practical applications and strategies for urban planning through data-driven urban systems: (I) Total integration of urban systems, coordination of urban domains, and coupling of urban networks to improve use and soil development, optimize resource use, reduce city costs and streamlined processes; (II) To help cities quickly identify underperforming domains, assessing improvements and cost savings potential and prioritizing domains and actions for energy and performance efficiency interventions using decision support tools; (III) Development of intelligence functions for the efficiency of energy systems, the improvement of transport and communication systems, the effectiveness of distribution networks, the optimized use and accessibility of facilities, and the optimization of the ecosystem and human provision services; (IV) To use urban simulation models to assist urban planners and strategists in understanding under what conditions urban systems and domains may fail to deliver or underperform at the level of sustainability and what to do about it; (V) To use advanced modeling and simulation systems to predict changes and forecast potential problems and, consequently, to improve current designs, to mitigate environmental impact and avoid public health risks; and others.

4 E-PARTICIPATION AS EFFECTIVATION OF SOCIAL SUSTAINABILITY

According to a United Nations (2015), an adequate environment for governance in a smart city involves a synergy between (I) infrastructure and platforms – through technical improvement of platforms and the good use of public data; (II) transparent governance – based on reciprocal accountability, transparency of algorithms and also on the orientation of used

technologies; (III) people-resources and capabilities –the development of digital literacy and civic involvement in decisions regarding technologies.

The rise of NICT marks an era of new possibilities for the State and politics, a moment when there is a simultaneous construction of an electronic government and a digital democracy, being the first linked to the expansion of public services and the quality of government practices, bearing in mind the possibility of simplifying procedures, integrating information and government agencies, as well as public servants (ROVER, 2006); but in the second, the rise of a digital democracy also means the emergence of new needs, in view of the possibilities of citizen participation in decision-making processes of management, renewing representative democracy at the same time that it questions it. The axis of democratic participation is the key to understand this transformed democracy, since the citizen is closer than ever – mainly due to internet access – to information related to management, and can no longer be passive in relation to Public Administration.

The increasing access to the internet, by its turn, makes (physical and presential) barriers that limit the participation of citizens possible surmountable in the name of public debate arenas with a relevant degree of flexibility, spontaneity and self-governing, being that NICT could make democratic processes more efficient – or else, more than a digitization of the same democracy, “the set of resources, tools, projects, experiments, experiences and initiatives in which technologies are used to produce more democracy and better democracies” (GOMES, 2018, p. 50). Thus, the possibilities of expanding social participation in urban management are inserted in a new context, which imposes innovation both in the form of government – transforming democracy and government related to it under the auspices of technological principles – and in the very expression of citizenship – comprising an expanded participatory role in relation to the possibilities provided by technologies, and also worthy of new concerns regarding their defense, such as the protection of personal data.

The digitization of democracy is seen as a way to face the deficiencies of the current stage of liberal democracy – among them, that which concerns the impossibility of “inclusion of all” – precisely because it allows for a new democratic experience. The internet is the most relevant technology and at the same time the place that expresses the greatest possibilities for expansion of political participation and thus allows for the emergence of qualities cherished by democratic theory, but understood as difficult or

impossible to put into effect (ROTHBERG, 2010) given the difficulties related to physical mobility and the achievement of sufficient cohesion to implement local events of participation and deliberation. This is the possibility that Levy (1999) announces for digital cities under the cloak of e-democracy, which through electronic conferences, enables the confrontation of opposing positions, making cyberspace, thus, to be used in favor of collective intelligence based on a logic of proximity and citizen involvement – and this may be expanded in the reality of data-driven urbanism, in which the possibilities linked to technologies are greater and more accessible than when the time of the mere digitization of processes and communication, recognizing differences while promoting widespread inclusion.

e-Participation is nothing but the use of NICT aiming the expansion or improvement of the manners through which citizens influence political decision-making. According to Ronchi (2019b), NICT are innovative precisely because of the possibilities for empowering citizens in their involvement in political decision-making, not only allowing these processes to be more efficient and faster, but also increasing transparency and accountability, and encouraging better communication among all involved actors.

The realization of active citizen participation is inserted within the concept of sustainability, which is seen as “something that seeks to guarantee life, not simply related to nature, but to an entire relationship between the individual and the environment around him” (GARCIA; GARCIA, 2014, p. 37-54). Sustainability encompasses several dimensions – according to the chosen doctrinal line – being the main ones: environmental, economic and social dimensions. Social dimension is achieved through the implementation and enforcement of social rights, intrinsically linked to human dignity – such as health, democracy, access to food, and education. Participation as the realization of the social dimension of sustainability can also be observed in the Brazilian City Statute (Lei 10.257/2001), being one of its fundamental principles, implemented through collegiate bodies, public consultations, debates, conferences and popular initiative projects (NASCIMENTO; CAMPOS; SCHENINI, 2006).

By recognizing the human right to participation, the United Nations places the digitization of participation as a key to promoting civic engagement, enabling “inclusive governance” (LE BLANC, 2020). Almada *et al.* (2019) give examples of possible “e-participation” initiatives, such as: (I) digital platforms for conducting public consultations; (II) institutional online forums; (III) electronic petitions; (IV) digital voting mechanisms;

(V) good practices database (sending suggestions); and (VI) ombudsman (sending suggestions and criticisms).

Among the initiatives of e-participation in Brazil, at the Federal level⁷ – not to mention the failure of the extinct Decree 8.234/2014⁸ – are the “e-democracia”⁹ portal developed by the Brazilian Chamber of Deputies, and “e-cidadania”¹⁰ developed by the Brazilian Federal Senate, providing participatory mechanisms in legislative processes through forums, chats, wikis,¹¹ virtual libraries, interactive events (public hearings and thematic debate sessions) and public consultations, in addition to the “Vote na Web”¹² system that makes public bills in Congress, through which citizens can register and vote for or against the proposals on the agenda; the portal “participa + Brasil” portal, linked to the Special Secretariat for Social Articulation of the Presidency of the Republic, which seeks to participate in the “formulation, implementation, monitoring and evaluation of public policies, reducing intermediaries and facilitating direct dialogue between government and citizens” (BRASIL, 2020), through public consultations on projects by ministries that allow users to submit their opinions, and any executive body may submit a topic for consultation.

Considering smart cities, their relationship with “e-democracy” is direct, given that the technologies used are connected to all political and managerial aspects of the city (from the need to repair the pavement of public roads to electoral contests), expanding the possibilities for debate on urban issues, making them inevitably public – as in the example of Kumar (2017), “e-democracy” in smart cities is not about paying fines to the Municipality online, but to consult the population about what should be the speed limits on the avenues, and explain the decisions about this. Participation is a key factor for smart cities (VRABIE; TIRZIU, 2016), and the stated principle of innovation requires the possibility of “co-creation” of public services, thus guiding an open innovation, with direct effects on

7 A broader and more detailed mapping of initiatives can be seen in Avelino, Pompeu and Fonseca (2021).

8 A Decree that instituted the National Policy for Social Participation and the National System for Social Participation, placed among its objectives “encouraging the use and development of methodologies that incorporate multiple forms of expression and languages of social participation, through the internet, with the adoption of free communication and information technologies, especially software and applications, such as free and auditable source codes, or those available on the Brazilian Public Software Portal”.

9 Available from: <https://edemocracia.camara.leg.br/>.

10 Available from: <https://www12.senado.leg.br/ecidadania>.

11 Acronym for *What I Know Is*, a term used to refer to collaboratively edited websites.

12 Available from: <http://www.votenaweb.com.br/>

emergence of new ways of thinking about the city (MAINKA *et al.*, 2016).

In the context of data-driven urbanism, cities' Big Data needs to be a common participatory resource, in which space and human actors act as the city, the city's smartness becomes the capacity of the NICT to allow exchanges of knowledge between users and things – that is, an approach guided by participation with a series of methods and tools capable of reading the multicultural processes, deterritorialization of urban environments and the regulation of all those interested in the city (ARTOPOULOS; COSTA, 2019).

As Dahlberg's (2001) critique points out, as much as digital media expand forms of participation and promote the expansion of public spaces for deliberation, it is necessary to inform and educate citizens to effectively engage in participatory practices, given that they were dominated by commercial and individualistic values – this is why e-democracy and e-participation end up having the reaffirmation of democratic principles, discredited by a disengaged citizenry, as their objective. Also, from a material point of view, the possibilities linked to e-democracy, often linked to the technical advantages provided by NICT, accompany the need for digital inclusion (ROVER, 2008), considering that digital citizenship presupposes universal access to technologies. However, despite this clear difficulty, there is no doubt that the internet ends up being more accessible than previous alternatives (in-person public hearings, council meetings and participatory budgeting) for promoting citizen engagement, as it provides a relatively low cost to provide and receive information for both public authorities and citizens (HANSEN; REINAU, 2006), with the direct relationship between e-democracy, citizenship and human rights being the guarantee that the internet is universally accessible and defended as a free and egalitarian social environment above monopolistic, oligarchic and business interests (PEREZ LUÑO, 2014).

In the smart city, the digital citizen is manifested by the ability to participate in urban management, providing new means of organizing and defining the collective, also changing the framework of responsibilities between citizens, the State and other agents – mainly due to the rise of transnational private organizations and their role, and in them the inherent risk of co-opting these collective practices (WAAL; DIGNUM, 2017).

Therefore, digital citizenship is manifested in the request of rights, especially those associated with expression, access and privacy (ISIN; RUPPERT, 2020), which include freedom of association and ideas, using

the communicative potential of NTIC. Digital citizenship is directly linked to the expansion of rights conquered in the social, political, economic and cultural fields now for digital networks (CARVALHO, 2014) and through its own characteristics such as transparency and access to information, also the realization of all other human rights (LIMBERGER; SALDANHA, 2012) and principles of social sustainability.

CONCLUSION

Smart cities directly impact social participation in urban management. Both as an urban and ideological project, these cities are a reflection of the material conditions of production within an informational age – that is, they are nothing more than the urban space under the informational economy in its data-driven phase, which results from the development of ICT and related techniques, such as data mining, big data analysis and the Internet of Things (IoT), with the criticism of this text also directed at that form of political economy.

Faced with the challenges faced by the complexification of society oriented by new technologies – especially social exclusion – the smart city presents itself as a thesis of technological corporations to overcome urban problems, including political participation. It is a technological or technocratic “solutionism” that presents the innovations of ICT as the missing element to end the distances that did not allow equal access to the city for all, as a reflection of the development of the informational economy, which reaches a phase in tandem with data-driven technological development, playing such a large role in transforming information into knowledge for this political economy.

Then, it is concluded that the complex systems based on the latest advances related to AIs, cloud computing, data mining, internet of things, among others, present themselves as sophisticated proposals for facing urban deficits, specifically to participation. On the other hand ICT, by allowing remote communication and real-time data processing, could promote mechanisms of democratic participation that are richer, more intense, and counting with properly informed citizens.

Therefore, the smart city should be more than an urban project, thus starting to be understood as a historical movement that is directly associated with the rise of the so-called “e-democracy” and digital citizenship,

in which ICT are offered as a way of more efficient and expanded democratic practices and exercise of citizen power, remedying past restrictions by building environments that are easily accessible to political debate, a space in which interests can be heard and a democratic culture without borders will be formed. In this sense, the (re)appropriation of technologies is shown to be necessary as a human right to a radicalized participation that even makes sustainability effective.

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