

# Citizens' quality of life and the conceptual relationship with smart cities: A literature review

Anderson Saccol Ferreira

Department of Architecture and Urbanism – Unoesc, University, Brazil

Received: 03 Jun 2021;

Received in revised form: 01 Jul 2021;

Accepted: 08 Jul 2021;

Available online: 17 Jul 2021

©2021 The Author(s). Published by AI  
Publication. This is an open access article  
under the CC BY license  
(<https://creativecommons.org/licenses/by/4.0/>).

**Keywords—** *Quality of life, smart cities,  
literature review, citizens, conceptual.*

**Abstract—** *By 2050 about 80% of the world's population will live in cities. This is a scenario that worries planners and managers in the search for solutions capable of improving cities and citizens' quality of life. Smart cities have the potential to achieve ideal conditions for housing, health, education, environment, economy, service infrastructure and information with quality of life. This study aims to identify the conceptual relationship between smart cities and citizens' quality of life. The study analyzed 16 scientific journals relevant to the research objective. Twelve key concepts were found that demonstrate the way to relate a smart city and citizens' quality of life. This research is a literature review where three stages were adopted to describe the direction that the research directed.*

## I. INTRODUCTION

The large concentration of people living in urbanized areas has required cities to seek to meet the minimum quality of life for people. About 55% of people lived in 2018 in urbanized areas, with a trend towards a gradual and continuous increase in population in the coming decades [47], [27]. Society increasingly demands effective, creative actions, planned for urbanized centers so that they can improve the dynamics of social life [42], [44].

Nowadays, cities are considered complex urban centers, inhabited by people with the most varied interests and can collaborate with each other in order to allow a sustainable environment with quality of life [12], [11], [27]. In this scenario, the quality of life in smart cities can represent a situation of subjective, affective and cognitive well-being of people [15], [21]. And these situations, behaviors and emotions allow for increased socialization [5], [17], [22], [40].

This factor can be achieved with the use of information technology (IT), which allows cities to point out solutions and conditions for improvements that involve jobs, housing, reduction of social inequality, health, reduction of violence, mobility, making these centers more inclusive. Guimaraes *et al*, [27] points out that cities can take

advantage of IT in governance processes as a way to create intelligent ways to meet various demands of the private and public sectors. In this context, the question is: there a conceptual relationship between smart cities and people's quality of life?

The objective of the research is to identify the conceptual relationship between smart cities and citizens' quality of life. This work is a literature review that adopted three stages to describe the direction that the research directed. The first stage describes the research planning, then addresses the literature review through a descriptive analysis and ends with a synthesis analysis of the results according to the research objective. Sixteen manuscripts relating the link between the smart city and citizens' quality of life were analyzed. It is noticed that the quality of life in smart cities is related to twelve key concepts that together show the path that smart cities should follow to obtain quality of life for citizens.

According to the result, meeting these criteria tends to improve cities and people's well-being by building a stronger community within the city. In addition to this introduction, the research is structured with a brief description of the relationship with governance and the challenge to quality of life. Next, the research method,

followed by the results found, ends with the study's final considerations.

## II. THE GOVERNANCE AND THE CHALLENGE FOR QUALITY OF LIFE IN SMART CITIES

In recent years, there has been an extensive migration from rural areas to urban centers and from smaller to larger urban centers, a fact that has given rise to several problems that affect the quality of life. Among them are the lack of clean water, sanitation, work, unhealthy conditions, economic growth, increasing inequality and irresponsible consumption of goods. This factor is related to population growth, increased resource consumption combined with vigorous industrialization, urbanization, globalization and agricultural intensification, in addition to the lifestyle driven by excessive consumption [20], [54], [55].

Cities can be characterized as a driving force of the economy and provide better opportunities for work, education, health and several centers struggle to organize and manage population growth, accessibility of economic inclusion and air quality [51]. Air quality is a key factor for quality of life and the greater the number of people living in urban areas can lead to an increase in greenhouse gases harmful to health [45]. In this scenario of urban chaos, actions aimed at sustainable development linked to the UN's SDGs Sustainable Development Goals seek to reduce poverty and create healthy planning to ensure a proposed future [46], [25].

Quality of life is related to the decisions that managers take when planning cities [25], and affects the relationship between health, safety and well-being of populations in urbanized areas [24]. At this point, the link between health, quality of life and sustainable development becomes more integrated [31], [49]. This relationship can be achieved through smart cities. In theory, this city model can contribute to the formation of high-quality, healthy urban spaces with regenerative environments modeled on the premise of circulating economy reducing negative impacts on the natural environment [30], [3], [7], [8].

From this perspective, issues related to health, quality of life, safety, well-being, environmental pollution, loss of biodiversity, resources, scarcity, traffic congestion, inequalities are highly problematic for urban administrations [18], [36], [53]. One of the most effective ways to manage these problems is through data with real and continuous indicators, which enable the manager to make decisions safely. In this aspect, the city comes to represent efficiency, based on management supported by an urban system using information and communication technology (ICT) [6].

Technologies can influence and be useful in the way administrations manage the quality of life [26]. This is because the reality of cities changes daily, in a short space of time it undergoes transformations that can be found in the technology of information a valuable [27]. The smart city can improve people's quality of life as several projects pertaining to smart cities such as: a) urban mobility and travel behavior; b) urban modeling and land use; c) integrated database; d) work and the impact of social networks; e) participatory governance; f) transport and economic interactions, and; f) and decision support as urban Intelligence [4].

In this perspective, a city will only become intelligent when aspects related to human and social capital, communication infrastructure (ICT) support economic growth and quality of life [35]. Bibri and Krogstie [6] go further, describe that there are two approaches to the city: a) oriented towards technology and ICT and b) oriented towards people. There are currently strategies that focus on the efficiency and advancement of infrastructure and technology systems improving transport, energy, communication, waste and water that are managed through ICT and enable the development of strategies that focus on light infrastructure and people, or that is, social, human capital in terms of knowledge, participation, security, quality of life and equity [3].

These aspects are directly related to the governance of cities, which currently, in the traditional model, tends to devalue society's participation and the use of technologies [27]. Blanco [9] emphasizes that this bureaucratic governance model can be replaced by new, more collaborative mechanisms.

Social participation and the use of technology are in line with improving the quality of life, as society's demands can be debated and resolved, while the use of ICT facilitates its development. In this aspect, governance can become intelligent, when it uses this information, seeking forms of social and political change, improving decision-making in the management of cities [43]. Currently, cities face barriers that, according to Bolívar [10], go beyond the usual conservatism and demand new ways to govern, that is, intelligent governance is nothing more than social participation and its actors using ICTs to improve decision-making by cities [50].

In fact, governance becomes one of the instruments that can improve the quality of life, but how to measure the quality of life and how the intelligence of cities can favor this process. It is currently relevant when we think about policy planning and municipal territory management [39].

### III. REVIEW METHODOLOGY

This article seeks, through a literature review, to identify the relationship between smart cities and citizens' quality of life. Thus, three stages were adopted to describe the direction in which the research was directed. The first stage consists of planning, which defines research sources and procedures. The next stage addresses the literature review through a descriptive analysis. The review ends with the synthesis analysis of the results according to the research objective.

The analysis was based on selected articles from 2015 to 2021. For the search, the keywords were used: "quality of life in cities" or "smart city and quality of life" or "quality of the city" or "quality and intelligence". The criteria for selecting the research articles are based on: (i) focus: the text addresses the issue of quality of life and smart cities; (ii) characteristics: the text deals directly with the chain of quality of life and the smart city and their specificities; (iii) access: the document in its entirety online, written in English. (iv) quality: peer-reviewed scientific articles; and (v) Unit of analysis: Chaining: quality of life, ICT, citizen, society, environment, sustainability, governance, economy and mobility, smart city. The database used to develop the research was: Scopus, Science Direct and Web of Science.

The second stage was the literature review, in this aspect we identified 245 articles, where duplications were removed and the relationship with the theme was evaluated. Sixteen scientific articles were selected and the information collected is analyzed and tabulated in the order: author, year, study objective, main variables, concept of smart and sustainable cities used as a guideline and/or reference in the study, smart city practices, benefits the adoption of smart cities, theoretical contribution of the study, research findings, research limitations and recommendations for future studies. The third stage points to a synthesis of the results according to the research objective.

### IV. QUALITY OF LIFE AND THE RELATIONSHIP WITH THE SMART CITY

Urban centers are complex, sophisticated, complicated systems involving various sociocultural, economic, environmental, management and technical aspects [1]. No study was noted that there is little discussion of quality of life related to smart cities. There is a greater approach to urban planning and quality of life. But few studies bring contributions to meaning as interconnected faces of quality of life domains in Smart Cities. There were about 245 manuscripts with references to quality of life, but

only 16 works provide pertinent information about the research objectives.

We found the key concepts that demonstrate the way to relate a smart city and citizens' quality of life. These factors are: (i) efficient governance; (ii) well-being and environment; (iii) social inequality; (iv) urban services; (v) sustainable development; (vi) economic growth; (vii) human, social capital and ICTs; (viii) sustainable economic growth; (ix) private and public collaboration; (x) innovations and technologies; (xi) education and citizen participation; and, (xii) public policies. All these concepts integrate the smart city with quality of life.

When referring to people's quality of life, we are talking about a combination of several factors that involve human capital, economic capital and infrastructure capital. These elements support the concept of smart cities. Technology makes it possible to provide infrastructure and services immediately in various situations [33], while city governance becomes a key organism, capable of solving various urban problems such as sustainability and quality of life in the environment urban [14], [31], [34], [36].

Quality of life can be understood as a perception of one's position in life, that is, in the sociocultural context and values in which they live and in relation to their goals and expectations, parameter and their social relationship [52]. In the view of Skevington et al. (2004), physical and psychological health, level of independence and social relationships can affect the individual's quality of life. In this context, we find several definitions and relationships that involve the quality of life in cities. Let's look at some definitions in Table 1.

*Table 1: Synthesis of the relationship between smart cities and quality of life*

Relationship	Author
Managerial responsibility through efficient governance enables economic development, improves well-being and is responsible for reducing social inequality in access to urban services, that is, improving the quality of life.	Healey [29].
In the smart city, efforts are focused on economic growth and sustainable development, providing better quality of life for its citizens, becoming a key element for the smart city.	Giffinger et al., [23]; Nam & Pardo, [41]; Thuzar [44],
Investments in human capital, social and communication infrastructure drive sustainable economic growth and quality of life, as well as natural	Caragliu, Del Bo & Nijkamp

resource management and participatory governance make the city smart. [13].

In the context of smart cities, quality of life aims to promote sustainable development and is related to actions to encourage collaboration between the private and the public. The city uses resources to efficiently provide adequate health, education and safety conditions, through joint work between the state and people. Governance uses technological innovation resources to offer products and services that influence the quality of life.

The design of a smart city impacts the quality of life of citizens, promoting information, education and citizen participation.

The development of public policies generated by smart cities contributes to a better city and to the evolution of citizens' quality of life

The combination of human, social and information capital combined with the use of ICTs generates economic development, improves well-being and quality of life, becoming the basis of smart cities.

The concept of smart cities goes beyond technology, including concern for the well-being of citizens, infrastructure for education and innovation, partnerships between companies, government and quality of services

A smart city with the domain of smart life can be achieved by providing the four factors a) socio-structural relationships; (b) environmental well-being; (c) material well; and (d) integration with the community, the result of these criteria improves the citizen's quality of life and allows for a stronger community within the city.

Quality of life is related to participation and partnership in the context of smart cities. Quality of life is related to the

Chourabi et al. [16],  
Harrison et al. [28].

Albino, Berardi & Dangelico [2].

Meijer & Bolívar [37];  
Meijer, Gil-Garcia & Bolívar [38],  
Van Winden et al., [48].

Capdevila & Zarlenga [12]; Dumay [19].

Bibri & Krogstie [6]

Macke et al. [35]

Guimaraes et al. [27]

collaboration of people in the context of the smart city.

*Source: Research data.*

All aspects that characterize smart cities seek to improve people's quality of life and well-being. Efficient governance allows for the economic development of actions and greater quality for people. Another key point is education, the higher the educational level, the more qualified people will be, in other words, we have smart people. Collaboration between private and public actions tends to encourage sustainable development and efficient public policies. Investments in human and social capital and ICTs promote economic, sustainable growth and improve the quality of life in cities.

In a smart city, good indicators such as education, longevity, mortality, income, employability, housing, economic dynamism, basic sanitation coverage, environmental management, environmental preservation, revenue capacity, financial incentives, planning capacity, quality of staff, transparency, electoral participation and gender representation may indicate better quality of life and intelligence of people in cities. In a way, the entire context of the smart city causes significant changes in the context of people, [2] points out that one of the impacts caused by smart cities is the quality of life, because it promotes more information, education and participation in issues related to the city.

To make a city smart it will be necessary to have smart people and this is only achieved through initiatives between private and public partnership where governance will lead the city towards smart sustainable development. However, positive aspects such as greater competition between urban centers in the search for investment and qualified personnel tend to improve the quality of life of citizens.

## V. CONCLUSION

The survey points to a relationship between the smart city and the quality of life of citizens. Twelve important factors were noticed that demonstrate the path to a smart city with quality of life. The study reveals that intelligence starts with efficient governance, environmental well-being, reduction of inequality, efficient urban services, sustainable development and growth, technological innovation, education and citizen participation in the elaboration of public policies.

Considering these findings, it is recommended that cities seek to develop through public policies with the participation of citizens and private initiative. From this perspective, the need to include governance with



collaborative involvement in decision-making processes. Another aspect perceived is that this relationship between quality of life and intelligence involves the need for human and social capital and ICTs. It is noteworthy that the study corroborates the view of Bibri and Krogstie [6], Macke et al [35] and Guimaraes et al [27], and that to achieve people's quality of life, smart cities must go beyond technology, they must be concerned with well-being, with quality education combined with the infrastructure of services and partnerships between institutions.

This is a theoretical study that can contribute to the advancement of research on smart cities and their relationship with quality of life. The research has several limitations, the structure of the aspects that identify quality of life is based on empirical paths, although associated with the aforementioned strategies, it can improve the quality of life of people in cities. It is not possible to guarantee that these relationships alone make cities smarter and improve the quality of life, but they can help to achieve paths for development.

Based on these results, it can be suggested that future studies investigate what are the interferences between well-being in smart cities, in the same sense, what factors can be measured and what strategies municipalities can follow to achieve better standards of quality of life. Based on these results, it can be suggested that future studies investigate what are the interferences between well-being in smart cities, in the same sense, what factors can be measured and what strategies municipalities can follow to achieve better standards of quality of life.

## REFERENCES

- [1] Albeverio, S. Andrey, D. Giordano, P. Vancheri, A. (2007). The dynamics of complex urban systems: an interdisciplinary approach. Springer Science & Business Media.
- [2] Albino, V. Berardi, U. Dangelico, R. M. (2015). Smart cities: definitions, dimensions, performance, and initiatives. *J Urban Technol*, 22 (1), 3-21. DOI: 10.1080/10630732.2014.942092
- [3] Angelidou, M. (2014). Smart city policies: a spatial approach. *Cities*, 41, 3-11. DOI: <https://doi.org/10.1016/j.cities.2014.06.007>
- [4] Batty, M. Axhausen, K. W. Giannotti, F. Pozdnoukhov, A. Bazzani, A. Wachowicz, M. (2012). Smart cities of the future. *The European Physical Journal*, 214, 481-518. DOI: <https://doi.org/10.1140/epjst/e2012-01703-3>
- [5] Bertram, C. Rehdanz, K. (2015). The role of urban green space for human well-being. *Ecol. Econ.* 120, 139-152. DOI: 10.1016/j.ecolecon.2015.10.013
- [6] Bibri, S.E. Krogstie, J. (2017). Smart sustainable cities of the future: an extensive interdisciplinary literature review. *Sustainable Cities and Society*, 31, 183-212. DOI: <https://doi.org/10.1016/j.scs.2017.02.016>
- [7] Birkeland, J. (2002). Design for sustainability: A sourcebook of integrated ecological solutions. London: Routledge.
- [8] Birkeland, J. (2014). Positive development and assessment. *Smart and Sustainable Built Environment*, 3, 4-22. DOI: <https://doi.org/10.1108/SASBE-07-2013-0039>
- [9] Blanco, I. (2015). Between democratic network governance and neoliberalism: a regime-theoretical analysis of collaboration in Barcelona. *Cities* 44, 123-130. DOI: <https://doi.org/10.1016/j.cities.2014.10.007>
- [10] Bolívar, M.P.R. (2018). Governance in smart cities: a comparison of practitioners' perceptions and prior research. *Int. J. E-Plan. Res.* 7 (2), 1-19. <https://doi.org/10.4018/IJEPR.2018040101>
- [11] Camboim, G.F. Zawislak, P.A. Pufal, N.A. (2019). Driving elements to make cities smarter: evidences from European projects. *Technol. Forecast. Soc. Chang.* 142, 154-167. DOI: 10.1016/j.techfore.2018.09.014
- [12] Capdevila, I. Zarlenga, M.I. (2015). Smart city or smart citizens? The Barcelona case. *J. Strategy Manag.* 8 (3), 266-282. <https://doi.org/10.1108/JSMA-03-2015-0030>.
- [13] Caragliu, A. Del Bo, C. Nijkamp, P. (2011). Smart cities in Europe. *Journal of Urban Technology*, 18, (2) 65-82. DOI: <https://doi.org/10.1080/10630732.2011.601117>
- [14] Carrillo, J. Yigitcanlar, T. Garcia, B. Lonnqvist, A. (2014). Knowledge and the city: concepts, applications and trends of knowledge-based urban development. New York: Routledge. DOI: 10.4324/9781315856650
- [15] Carvalho, J.M.S. Costa, R.V. Marnoto, S. Sousa, C.A.A. Vieira, J.C. (2018). Toward a resource-based view of city quality: a new framework. *Growth Chang.* 49 (2), 266-285. DOI: doi:10.1111/grow.12237
- [16] Chourabi, H. Nam, T. Walker, S. Gil-Garcia, J.R. Mellouli, S. Nahon, K. Pardo, T.A. Scholl, H.J. (2012). Understanding smart cities: an integrative framework. In: *IEEE e 45th Hawaii International Conference on System Sciences*, 2289-2297. <https://doi.org/10.1109/HICSS.2012.615>.
- [17] Corrado, G. Corrado, L. Santoro, E. (2013). On the individual and social determinants of neighbourhood satisfaction and attachment. *Reg. Stud.* 47 (4), 544 -562. DOI: 10.1080/00343404.2011.587797
- [18] Dizdaroglu, D., Yigitcanlar, T., & Dawes, L. (2012). A micro-level indexing model for assessing urban ecosystem sustainability. *Smart and Sustainable Built Environment*, 1, 291-31. DOI:10.1108/20466091211287155
- [19] Dumay, J. (2016). A critical reflection on the future of intellectual capital: from reporting to disclosure. *J. Intellect.* 17 (1), 168-184. DOI: <https://doi.org/10.1108/JIC-08-2015-0072>
- [20] Epstein, M. J. Buhovac, A. R. (2014). Making sustainability work: best practices in managing and measuring corporate social, environmental, and economic impacts. San Francisco: Berrett-Koehler.
- [21] Florida, R. Mellander, C. Rentfrow, P. J. (2013). The happiness of cities. *Reg. Stud.* 47 (4), 613-627. DOI: <https://doi.org/10.1080/00343404.2011.589830>

- [22] Gehl, J. (2010). *Cities for People*, 1st. Island Press, Washington DC. Giffinger.
- [23] Giffinger, R. Fertner, C. Kramar, H. Kalasek, R. Pichler-Milanovic, N. Meijers, E. (2007). *Smart Cities: Ranking of European Medium-Sized Cities*. Centre of regional science (srf), Vienna University Of Technology, Vienna, Austria
- [24] Giles-Corti, B. Vernez-Moudon, A. Reis, R. Turrell, G. Dannenberg, AL. Badland, H. (2016). City planning and population health: a global challenge. *The Lancet*; 388, 2912-2924. DOI: 10.1016/S0140-6736(16)30066-6
- [25] Giles-Corti, B. Lowec, M. Arundel J. (2019). Achieving the SDGs: Evaluating indicators to be used to benchmark and monitor progress towards creating healthy and sustainable cities. *Health Policy*. <https://doi.org/10.1016/j.healthpol.2019.03.001>
- [26] Gil-Garcia, J. R. Helbig, N. Ojo, A. (2014). Being smart: emerging technologies and innovation in the public sector. *Government Information Quarterly*. 31, 11-18. DOI:10.1016/j.giq.2014.09.001
- [27] Guimaraes, J. C. F. De, Severo, E. A., Felix Júnior, L. A., Da Costa, W. P., & Salmoria F. T. (2020). Governance and quality of life in smart cities: Towards sustainable development goals. *Journal of Cleaner Production*. 253, 1-13. DOI: <https://doi.org/10.1016/j.jclepro.2019.119926>
- [28] Harrison, T.M. Guerrero, S. Burke, G.B. Cook, M. Cresswell, A. Helbig, N. Hrdinova, J. Pardo, T. (2012). Open government and e-government: democratic challenges from a public value perspective. *Inf. Polity* 17 (2), 83-97.
- [29] Healey, P. (2006). Transforming governance: challenges of institutional adaptation and a new politics of space. *Eur. Plann. Stud.* 299-320. DOI: <https://doi.org/10.1080/09654310500420792>
- [30] Heo, T. Kim, K. Kim, H. Lee, C. Ryu, J. Leem, Y. Jun, J. Pyo, C. Ypp, S. Ko, J. (2014). Escaping from ancient Rome: applications and challenges for designing smart cities. *Transactions on Emerging Telecommunications Technologies*, 25, 109-119. DOI: <https://doi.org/10.1002/ett.2787>
- [31] Kickbusch I. (2016). Global health governance challenges – are we ready? *International Journal of Health Policy and Management* 2016;5(6), 349-353. DOI: doi 10.15171/ijhpm.2016.27
- [32] Kourtit, K. Nijkamp, P. (2012). Smart cities in the innovation age. *Innovation: The European Journal of Social Science Research*, 25, 93-95. DOI: <https://doi.org/10.1080/13511610.2012.660331>
- [33] Lee, J. H. Hancock, M. G. Hu, M. C. (2014). Towards an effective framework for building smart cities: Lessons from Seoul and San Francisco. *Technol. Forecast Soc. Change*. 89, 80-99. DOI: <https://doi.org/10.1016/j.techfore.2013.08.033>
- [34] Lee, J.H. Phaal, R. Lee, S. H. (2013). An integrated service-device-technology roadmap for smart city development. *Technol. Forecast. Soc. Chang.* 80, 286-306. DOI: <http://dx.doi.org/10.1016/j.techfore.2012.09.020>
- [35] Macke, J. Casagrande, R. M. Sarate, J. A. Silva, K. A. (2018). Smart city and quality of life: citizens' perception in a Brazilian case study. *Journal of Cleaner Production*, 182, 717-726. DOI: DOI:10.1016/J.JCLEPRO.2018.02.078
- [36] Mahbub, P. Goonetilleke, A. Ayoko, G.A. Egodawatta, P. Yigitcanlar, T. (2011). Analysis of build-up of heavy metals and volatile organics on urban roads in Gold Coast, Australia. *Water Science & Technology*, 63(9):2077-2085. DOI: 10.2166/wst.2011.151
- [37] Meijer, A. Bolívar, M. P. R. (2016). Governing the smart city: a review of the literature on smart urban governance. *Int. Rev. Adm. Sci.* 82 (2), 392-408. DOI: <https://doi.org/10.1177/0020852314564308>
- [38] Meijer, A.J. Gil-Garcia, J.R. Bolívar, M. P. R., (2016). Smart city research: contextual conditions, governance models, and public value assessment. *Soc. Sci. Comput. Rev.* 34 (6), 647-656. DOI: <https://doi.org/10.1177/0894439315618890>
- [39] Molina-Morales, F. X. Marínez-Fernández, M. T. (2010). Social networks: effects of social capital on firm innovation. *J. Small Bus. Manage.* 48 (2), 258-279. DOI: <https://doi.org/10.1111/j.1540-627X.2010.00294.x>
- [40] Montgomery, C. (2013). *Happy City: Transforming Our Lives through Urban Design*. Penguin Books, London.
- [41] Nam, T. Pardo, T.A. (2011). Conceptualizing smart city with dimensions of technology, people, and institutions. *Proc. Annu. Int. Conf. Digit. Gov. Res.* 282-291. DOI: <https://doi.org/10.1145/2037556.2037602>
- [42] Pratt, A. C. (2008). Creative cities: the cultural industries and the creative class. *Geogr. Ann. Ser. B Hum. Geogr.* 90 (2), 107-117. DOI: <https://doi.org/10.1111/j.1468-0467.2008.00281.x>
- [43] Razaghi, M. Finger, M. (2018). Smart governance for smart cities. *Proc. IEEE* 106 (4), 680-689. DOI: <https://doi.org/10.1109/JPROC.2018.2807784>
- [44] Thuzar, M. (2011). Urbanization in South-East Asia: developing smart cities for the future? *Reg. Outlook* 96-100. DOI: 10.1355/9789814311694-022
- [45] UN Habitat. (2011). *Cities and climate change: global report on human settlements*. London: United Nations Human Settlements Programme.
- [46] United Nations General Assembly (2015). Resolution adopted by the General Assem - bly: Transforming our world: the 2030 agenda for sustainable development A/RES/70/1. New York: United Nations.
- [47] United Nations (2018). Department of economic and social affairs, population division. *World urbanization prospects: the 2018 revision*.
- [48] Van Winden, W. Oskam, I. Van Den Buuse, D. Schrama, W. Van Dijck, E. J. (2016). *Organising Smart City Projects: Lessons from Amsterdam*. Hogeschool van Amsterdam, Amsterdam. Wijs, L., Witte, P., Geertman.
- [49] Watts, N. Adger, W. N. Agnolucci, P. Blackstock, J. Byass, P. Cai, W. (2015). Health and climate change: policy responses to protect public health. *The Lancet*.
- [50] Wijs, L. Witte, P. Geertman, S. (2016). How smart is smart? Theoretical and empirical considerations on implementing smart city objectives e a case study of Dutch railway station areas. *Eur. J. Soc. Sci. Res.* 29 (4), 424-441. <https://doi.org/10.1080/13511610.2016.1201758>

- [51] World Health Organization, (2016). The World Health Organization Quality of Life (WHOQOL). [http://www.who.int/mental\\_health/publications/whoqol/en/](http://www.who.int/mental_health/publications/whoqol/en/)
- [52] World Health Organization. UN-Habitat. (2016). Global report on urban health: equitable healthier cities for sustainable development. Italy.
- [53] Wu, Y. Zhang, W. Shen, J. Mo, Z. Peng, Y. (2018). Smart city with Chinese characteristics against the background of big data: idea, action and risk. *Journal of Cleaner Production*, 173, 60-66. DOI: 10.1016/j.jclepro.2017.01.047
- [54] Yigitcanlar, T. Dizdaroglu, D. (2015). Ecological approaches in planning for sustainable cities: a review of the literature. *Global Journal of Environmental Science and Management*, 1, (2), 159-188. DOI:10.7508/gjesm.2015.02.008
- [55] Yigitcanlar, T. Teriman, S. (2015). Rethinking sustainable urban development: towards an integrated planning and development process. *International Journal of Environmental Science and Technology*, 12, 341-352. DOI: <https://doi.org/10.1007/s13762-013-0491-x>