Paper Formatting Template[1]

[1] This template is adapted from several sources.

SUSTAINAIBLE AND SMART CITIES: A REVIEW

Dos-Santos, Maria José Palma Lampreia[1],

[1]ISCTE-IUL-DINÂMIA´CET, ESCS-IPL. Department of Social Sciences, Portugal

Abstract (250 words)

This paper addresses the main challenges to be overcome so that cities in the future can be sustainable and also smart cities in the African Continent. The main goal of the paper is to analyses the main constraints to urban development in the African Continent in order for these cities to became smart cities in the future. The methodology was based on a literature revision of all the papers referred in Social Science Citation Index and SCOPUS Elsevier from Q2 to Q1. The results confirm the existence of huge challenges, problems and restrictions on social, economics, environmental and political issues in Africa and also confirm that smart cities will only be possible in Africa when the current problems of sustainable development (economic, social, environmental and political) are overcome. However, the paper allows us to understand why, this is the first paper in the literature to address the topic of smart cities in Africa. It should be noted that in this continent there are at least two of the world's largest cities in terms of inhabitants and the growth of population rate of the African continent is about 2.5%. This is a global problem to handle. The concern about the problems of sustainable development in this region and how to promote it towards sustainable cities concerns everyone and the next steps will affect all of the world's sustainable development.

Keywords (up to 10): Africa, cities; smart cities; urban sustainability; sustainability.

Track No: **General Track**

SUSTAINAIBLE AND SMART CITIES: A REVIEW

Abstract

This paper addresses the main challenges to be overcome so that cities in the future can be sustainable and also smart cities in the African Continent. The main goal of the paper is to analyses the main constraints to urban development in the African Continent in order for these cities to became smart cities in the future. The methodology was based on a literature revision of all the papers referred in Social Science Citation Index and SCOPUS Elsevier from Q2 to Q1. The results confirm the existence of huge challenges, problems and restrictions on social, economics, environmental and political issues in Africa and also confirm that smart cities will only be possible in Africa when the current problems of sustainable development (economic, social, environmental and political) are overcome. However, the paper allows us to understand why, this is the first paper in the literature to address the topic of smart cities in Africa. It should be noted that in this continent there are at least two of the world's largest cities in terms of inhabitants and the growth of population rate of the African continent is about 2.5%. This is a global problem to handle. The concern about the problems of sustainable development in this region and how to promote it towards sustainable cities concerns everyone and the next steps will affect all of the world's sustainable development.

Keywords: Africa, cities; smart cities; urban sustainability; sustainability.

Introduction

In the last decade there have been unprecedented and often unforeseen changes of an economic, political, social and environmental nature with direct impacts on the urban environment in general in the world and in Africa in particular.

At the political level the instability arising in some regions of Africa and the Middle East such as the swift rise of the Islamic State (Fisher & Rucki, 2017), allied to the unfavorable economic conditions (due to the fact that they are mostly African countries in development), as well as economic volatility in the energy sector (Brewer et al., 2014), combined with change in environmental conditions, because nowadays climate change has severe implications for the security of individuals, communities, cities, regions in Africa and in the planet (Yigitcanlar & Kamruzzaman, 2018; Fann et al., 2015). All these factores combined has led to migratory movements out of African countries and tending towards urban centers in Africa and abroad.

Nowadays 40.6 % of the population in Africa lives in urban areas (World Bank, 2018), but the urbanization and urban rates vary across the region in the African continent. Increasing urbanization in sub-Saharan Africa was recognized by Schlesinger et al., (2015), as well the impacts and spatial configurations transformations in and around towns and cities.

Some of the biggest cities on the world are in the African continent, namely, Lagos (Nigeria) among others on the Mediterranean/African Continent. The grow rate of urban population is increasing following the world trend when about 55% lives on urban areas in 2017 (World Bank, 2017). But the year of 2007 marked an important development in the history of urban cities in the world, because, for the first time, the share of total population living in cities exceeded 50%. Urbanization has become a major global trend, with ever increasing degrees of urbanization reaching 70% (Kourtit et al., 2017, Dos-Santos, 2016): By 2050, 75% of the world's population will be living in urban areas (United Nations, 2015) and this figure will reach to over 80% at the end of the century (Dizdaroglu and Yigitcanlar, 2014; Yigitcanlar, & Kamruzzaman, 2018).

This situation implies that cities in African continent need also to be sustainable and smart. Over the last decades, these interlinked issues developments have started to converge under the new heading of smart sustainable cities (Höjer & Wangel, 2015). In recent years, the concept of smart sustainable cities has come to the fore and it is rapidly gaining momentum and worldwide attention as a promising response to the challenge of urban sustainability (Bibri & Krogstie, 2017). Despite numerous research opportunities are available and worth exploring, the field of smart sustainable cities is still in its early stages of development (Bibri & Krogstie, 2017). According to these authors, this pertains particularly to ecologically and technologically advanced nations, but are in absence in African cities. So far, there are yet few links between sustainability and smart cities in the developed countries. However, there are not yet any reference on the literature on smart sustainable cities referred to Africa. Similarly, in Africa, cities now face much greater challenges than those affecting developed countries. These challenges are related to economic, social, environmental and political factors. Therefore, in order for cities in Africa to move towards the smartness in the future it is necessary to previously solve the problems of sustainability which nowadays affects them.

In order to address the critical issue of whether smart city policy leads to sustainability of cities, the paper focuses on the following two research questions:

(1) Does smart cities bring sustainability to African cities in terms of economic, social, political and environmental impacts or the analysis must be done on the opposite way?

(2) What are the main factors that lead to sustainability and smartness of African cities.

More specifically, this paper aims to:

a) To analyze the main economics, social, and environmental problems in the main urban region of Africa;

b) the current state of the art in the literature about the topics of urban development, smart cities and smart cities sustainable;

c) To analyze if the actual developments concerned about smart cities and sustainability are adjusted to African cities;

d) To understand the main social, economic, environmental problems in African cities that can compromise the long-term sustainable development and smartness.

1.1. Contribution of the paper to the literature

This paper making a fourfold contribution in the literature:

1) Although there are many studies in the scientific field of smart cities, few of them had analyzed the topic smart cities and sustainability and none of them so far analyzes the complex situation in African cities nor brings to the scientific debate and forecast new insights about these topics.

2) This holistic approach used to analyses the sustainable and smart cities in Africa is believed to be the first of its kind and hence has not been, to the best of one's knowledge, produced elsewhere.

3) This paper gives insights to stakeholders and public decision-makers about the way forward in the promotion and development of cities in Africa in a sustainable way, in order to foster research in these innovative areas.

4) Broaden new research opportunities to explore and bring more knowledge in smart sustainable cities in general and in Africa in particular.

1.1. The African cities: Main challenges to sustainable development

Laros & Jones, (2014) analyzing the actual situation of the major urban areas and cities in African continent. Due the fact of the big differences among all the major cities in Africa the authors and the literature separate the continent by different areas and challenges of development. According to these authors the overarching challenge for Africa in the decades to come is massive population growth in a context of wide-spread poverty that, in combination, generate complex and interrelated threats to the human habitat (Laros & Jones, 2014). Table 1 presents the main challenges of social, economics; environmental and political problems in African regions main challenges to sustainable development.

Table1: Main of social, economics; environmental and political problems in African regions/cities

The analysis of all the problems presented in Table 1 on the African continent shows that it is still difficult in most of these cases and urban regions to promote and develop smart cities. However, if we do not move towards good urban management and sustainability in all its dimensions, Africa's current problems will tend to increase and development will be a more distant target.

1. DETAILS EXPERIMENTAL

2.1. Materials and Procedures: . Smart cities

The topic of smart cities brings together a large number of previous studies, including research directed at conceptual, analytical, and overarching levels, as well as research on specific technologies and their potentials and opportunities. (Bibri & Krogstie, 2017). Indeed, recent years have witnessed a great interest and a proliferation of academic publications on the topic of smart cities. This reflects the magnitude and diversity of research within the field according these last authors. (Bibri & Krogstie, 2017).

Smart cities are known not only from a technological point of view, but also for its economic, social and environmental sustainability. Smart cities aim to mobilize all knowledge centers and

information and communication technologies (ICT) into innovation hubs in order to strengthen the socio-economic around the world (Dos-Santos, 2016).

The focus of smart cities has been and still is seen only from the point of view of ICT, which is a reductive vision for both the cities of the world in general and those of the African continent in particular that present major challenges in the field sustainable development.

2.3. Sustainable urban areas and sustainability

The notion of sustainability appears from long decades on scientific, political and managerial debate and involve all the societal actors. This concept applied to the rural or urban, at the micro or macro level, always involves the traditional dimensions of the sustainability, namely, economics, social and environmental component. Lately, this concept has become even more comprehensive and still includes the political component, as it has become a global goal and is currently a concern of international Organizations, namely the United Nations (UN); through the Millennium Development Goals) (Dos-Santos and Diz, 2019; Kumar et al., 2016) the FAO, as well as, governments at the country level.

The notion of urban sustainability was born from the realization that the predominant paradigm of social, economic, environmental, political and urban development was oblivious to the risks of and triggering environmental crises as well as to the implications of and worsening social decays, causing ecological and social deprivation and imperiling future life (Bibri & Krogstie, 2017). Sustainability epitomizes a holistic, long–term perspective based on the premise of consciously and incessantly going with the grain of nature and providing the conditions for deploying the frameworks necessary for its operationalization and its translation into practices in a more intelligent way in order to reach a sustainable society (Bibri & Krogstie, 2017). In the light of global commitments to achieving sustainable development goals, we have to see how the corporate interest to enhance economic prosperity is in conflict with the other two pillars such as environmental and social equity (Kummitha & Crutzen, 2017).

As a societal thinking paradigm, sustainability is espoused to guide and configure societal development in its prominent spheres, including science and innovation, technology, economy, urban planning, policy, politics, and institutionalization (Bibri & Krogstie, 2017).

2.4. Sustainable Urban Development and Sustainable Cities

With more than half of the world's population living in urban areas and about 41% in Africa, this is also where the use of energy, land, food, and other resources and logistic is increasingly originating (Höjer, Wangel, 2015; Dos-Santos, 2016). The ongoing concentration of the global

population in urban areas thus implies that these are increasingly important when it comes to addressing issues of sustainable development, that imply that sustainable urban development has become a prerequisite for sustainable development according to Höjer, Wangel, (2015).

Combining sustainable development and urbanization issues, the area of sustainable cities has become of interest for research, education, policy making and businesses—an interest that has been manifested in all parts of society. In academia it can be seen in scientific journals, university education, research programs and university departments specifically devoted to addressing sustainable urban development. (Höjer, Wangel, 2015).

Despite this interest by the theme smart cities and sustainable development, the research developed is still in the beginning, being addressed in a partial way and even with some contradictions. These contradictions begin with the concepts of smart cities and sustainability.

According to Vanolo (2014), smart city is an efficient, technologically advanced, green and socially inclusive city. Follow that line the focus of smart city is the technology at the forefront of generating solutions for ecological, societal, economic, and politics challenges (Yigitcanlar and Kamruzzaman, 2018). In spite of this, that point of view has been criticized by various authors for being based almost exclusively on Information and Communication Technologies (ICT) information technologies as a way of solving the majority of problems of cities. In fact, ICT is nowadays present in our life in all the domains. Therefore, the immediate association between smart cities and ICT is reductionist. Follow Höjer and Wangel (2015), most of the ICT included in the smart city concepts already exist. According to these authors the novelty is thus not so much the individual technologies, products or services but the interconnection and the synchronization of these and the systems they include, so that they work in concerted and coordinated action in all the domains in a city (urbanization; health; transport; communication, education; commerce and e-commerce, etc.). In urban or in rural environments, the use of ICT must be managed, mostly based on big data and artificial intelligence, being part of our daily lives and presenting the best solutions in various domains and are not exclusive from smart cities (Dos Santos, 2018). The major complexity occurs because nowadays the majority or near of the population lives in urban areas.

3. RESULTS AND DISCUSSION

3.1 The challenge for African urban areas toward smart and sustainable cities

The results presented for the different urban/rural regions of Africa show that despite the diversity of social, economic, environmental and political problems, there is a matrix, practically common in all regions of the African continent. This common problem involves serious social, economic and environmental risks stemming from the phenomena of climate change, and safety and food subsistence may be even more important, which will further widen the development gap and long distance of smart cities and sustainable development. Programs of technology transfer and development aid by developed countries will therefore play a key role in this region.

CONCLUSION

The main results highlight confirm the importance of minimizing the problems of sustainable development on the African continent, otherwise the developed world will suffer the impacts in the future. It is also clear that the development of smart cities, not being a mirage in Africa, needs a long way in the direction of sustainable development. In other words, prior to the development of smart cities, it will be necessary in Africa to create an environment that provides development in a sustainable way. Only in this way, reducing and minimizing social, economic and environmental gaps will it be possible in the future to build smart and sustainable cities.

REFERENCES

Brewer, J., Nelson, D. M., & Overstreet, G. (2014). The economic significance of gasoline wholesale price volatility to retailers. Energy Economics, 43, 274-283.

Bibri, S. E., & Krogstie, J. (2017). Smart sustainable cities of the future: An extensive interdisciplinary literature review. Sustainable Cities and Society, 31, 183-212.

Dos Santos, M. J. P., & Diz, H. (2019). Towards Sustainability in European Agricultural Firms. Advances in Intelligent Systems and Computing, 783, pp. 161-168.

Dos Santos, M. J.P.L. (2018). Nowcasting and forecasting aquaponics by Google Trends in European countries. Technological Forecasting & Social Change, 134, 178-185.

Dos-Santos, M.J.P.L., (2016). Smart cities and urban areas—Aquaponics as innovative urban agriculture. Urban Forestry & Urban Greening, 20, 402-406.

Dos-Santos, M.J.P.L., Diz, H. (2016). Impact of Corporate R&D on efficiency in OECD industries. Book of Proceedings of the 9th Annual Conference of the EuroMed Academy of Business entitled Innovation, Entrepreneurship and Digital Ecosystems, Cyprus: EuroMed ISBN: 978-9963-711-43-7; 645-659.

Fann, N., Nolte, C. G., Dolwick, P., Spero, T. L., Brown, A. C., Phillips, S., & Anenberg, S. (2015). The geographic distribution and economic value of climate change-related ozone health impacts in the United States in 2030. Journal of the Air & Waste Management Association, 65(5), 570-580.

Fisher, J., & Rucki, K. (2017). Re-conceptualizing the science of sustainability: A dynamical systems approach to understanding the nexus of conflict, development and the environment. Sustainable Development, 25(4), 267-275.

Höjer, M., & Wangel, J. (2015). Smart sustainable cities: definition and challenges. In ICT innovations for sustainability (pp. 333-349). Springer.

Yigitcanlar, T., & Kamruzzaman, M. (2018). Does smart city policy lead to sustainability of cities?. Land Use Policy, 73, 49-58.

Laros, M., & Jones, F. (2014). The state of African cities 2014: re-imagining sustainable urban transitions. Re-imagining sustainable urban transitions. United Nations.

Kummitha, R. K. R., & Crutzen, N. (2017). How do we understand smart cities? An evolutionary perspective. Cities, 67, 43-52.

Kourtit, K., Suzuki, S., & Nijkamp, P. (2017). Tracing high-sustainability performers among world cities-design and application of a multi-temporal data envelopment analysis. Habitat International, 68, 43-54.

Kumar, S., Kumar, N., & Vivekadhish, S. (2016). Millennium development goals (MDGS) to sustainable development goals (SDGS): Addressing unfinished agenda and strengthening sustainable development and partnership. Indian journal of community medicine: official publication of Indian Association of Preventive & Social Medicine, 41(1), 1.

Miličić, V., Thorarinsdottir, R., Santos, M. D., & Hančič, M. T., (2017). Commercial aquaponics approaching the european market: To consumers' perceptions of aquaponics products in Europe. Water, 9(2), 80.

SCOPUS Database., 2017. Document search (https://www.scopus.com/search/form.uri?display=basic&clear=t&origin=searchauthorlookup&txGid=33ff54ca7f5876f7bc12cdc40745372b Retrieved at 22/08/2017).

Smith, S., & Cameron, A., 2017. Horticulture: Outlook to 2021-22. Agricultural Commodities, 7(1), 73.

Schlesinger, J., Drescher, A., & Shackleton, C. M. (2015). Socio-spatial dynamics in the use of wild natural resources: evidence from six rapidly growing medium-sized cities in Africa. Applied Geography, 56, 107-115.

United Nations. (2015). World urbanization prospects. the 2014 revision. New York: Department of Economic and Social Affairs.http://esa.un.org/unpd/wup/Publications/Files/WUP2014-Report.pdf (Accessed 22.7.2018).

Kumar, S., Kumar, N., & Vivekadhish, S. (2016). Millennium development goals (MDGS) to sustainable development goals (SDGS): Addressing unfinished agenda and strengthening sustainable development and partnership. Indian journal of community medicine: official publication of Indian Association of Preventive & Social Medicine, 41(1), 1.

Vanolo, A. (2014). Smartmentality: The smart city as disciplinary strategy. Urban Studies, 51(5), 883-898.

World Bank (2018) World Bank Database. https://data.worldbank.org/ (Retrived on 12/07/2018)This template provides authors with most of the formatting specifications needed for preparing their paper/abstract submission. Margins, column widths, line spacing, and type styles are built-in and examples of type styles used are provided throughout and identified in italics within parentheses. (*Use style: AR Main Body*)