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SUSTAINABLE CITIES AND COMMUNITIES: WHAT ARE THE "BEST" WAYS TO DEVELOP THEM?

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ABSTRACT: In a wide view, what are the "best" ways to develop sustainable cities and communities? And what and which ones are them? Even though that question seems to be too complex, it is one the main subjects of United Nations agenda to 2030, according to the Sustainable Development Goals. This study aims to discuss the highlights approaches about this theme, bringing the great areas of innovation (quintuple helixes) and sustainability (UN SDG 11) to organize concepts, to analyze top ranked cities considered working successful according to SDG politics and to create a framework and a agenda with the analyzed "best" ways to develop sustainable cities and communities. The purpose is to produce theoretical and managerial contributions, consequence of the discussions and purposed solutions.
Keywords: Sustainable City; UN SDG 11; Innovation Quintuple Helixes.

RESUMO: Em suma, quais seriam os "melhores" modos para desenvolvermos cidades e comunidades sustentáveis? O quê e quais seriam essas? Apesar de parecerem questões de alta complexidade, esse seria um dos principais objetivos da Agenda 2030 da Nações Unidas, conforme os Objetivos do Desenvolvimento Sustentável. Este estudo objetiva discutir as principais abordagens sobre o tema, a contemplar as grandes áreas de inovação (quíntupla hélice) e sustentabilidade (ODS 11 da ONU), a organizar conceitos, analisar as principais cidades posicionadas conforme os parâmetros da ODS 11 e elaborar um modelo e uma agenda com os considerados "melhores" caminhos para se desenvolver cidades e comunidades sustentáveis. A proposta é produzir contribuições teóricas e de gestão, consequência das discussões e soluções propostas.
Palavras-chave: Cidade Sustentável; ODS 11 ONU; Quíntupla Hélice de Inovação.

1 INTRODUCTION

When we investigate the Administration knowledge field, we face the tendency of an economic scope and context intra and extra organizational, that are in a process of adaptation to the factors of culture and society and of better use of the natural resources (Sampaio, 2010). The regional development itself must also be adapted to the scenario of using these conditions, by strategies that contemplate the three dimensions of sustainability, or triple bottom line: environmental (planet), economic (profit) and social (people) (Elkington, 2001). Elkington (2001) also points to the importance of a management revolution, among other factors, for sustainable development.

In territorial analysis, the search for a sustainable regional development, the leaderships of most of the spheres first create projects of, first, a local and after, global impact. In this sense, innovation environments are instruments of developed and developing countries that confer greater local competitive advantage by transforming content of knowledge into wealth (Steiner; Cassim; Robazzi, 2008; WCDE, 1987).

An example is innovation environments whose function is the endogenous development from the application of knowledge - the creation of innovation - and to contribute to local businesses and initiatives, as well as to provide strategic alliances of the region in question; for mutual benefit (Medeiros, 1993; Rodrigues, 2013). According to Barbieri (2000), organizations that seek to collaborate better with the environment in which they interact, - the model of innovation environments - tend to provide a governance policy that prioritizes aspects not only economic, but also social and environmental. Consequently, a position that will contribute to sustainable regional development.

Ideas and business deployed in the 1950s in the stagnant San Francisco Bay (State of California, USA) - a pioneer in the concept of technology parks. Be this use of electronic devices, software, social networks and other applications. Observation given to account of the state economy, although diversified, rely on the innovation environments The Cartesian approach, which is only cost-effective in the short term, remains a priority in many respects in the corporate world. A model that does not privilege strategic thinking about business continuity and its legacy for stakeholders (Mattos et al., 2005). In the case of innovation environments for sustainable regional development, the role of these initiatives as potential income generators is explained (Medeiros, 1993).

A posture of a sustainable innovation environment, in addition to a likely financial return, could create indirect feedback from community; such as the public/private installation of education and training institutions for local inhabitants, as well as the improvement of access infrastructure, through the attraction of other businesses or properly government investments. The sense of collectivity for local progress begins to increase (Vedovello; Judice; Maculan, 2006). However, according to Melo (2011) and Etzkowitz (2012), even though such environments have the capacity to develop sustainable competitive advantages, they still do not contribute decisively to this, with the participation of other spheres - fundamental factor.

When analyzing the tripod of sustainability, or triple bottom line, the studies of the social and economic contributions are, by themselves, of wide discussion. Results indicates one of the principles of the academic institution, - disseminator of teaching, research and extension and cradle of innovation - development of being and community (Santos, 2011). According to Jara (1998), the economic dimension is only sustainable, at the point where the quality of life prevails over the concern with the amount of production. As the cradle of knowledge, universities have a considerable contribution to the establishment of these innovation environments. Such relevance is due to the development of research that takes them as an object of analysis, both for innovation and development studies, and for possible

improvements and experiments in the performance of their activities and policies. As a consequence of such practices for improvement in the processes of innovation environments. Vedovello (2000) states that these are treated as instruments of regional development policy, to make the cities more intelligent. *In this context, in a wide view, what are the best ways to develop sustainable cities and communities?*

Even though that question seems to be just a subjective and wide reflection, it is one the main subjects of United Nations agenda to 2030, according to the Sustainable Development Goals. The one that represents it is the Goal number 11 named Sustainable Cities and Communities.

Therefore, this study aims to discuss the highlights approaches about this theme, bringing the great areas of innovation and sustainability, being it on the evolution of cities until the models that their managers and involved actors can articulate to improve their quality of life, and as consequence, the community and the city.

The relevance of this work is justified because the thematic of innovation and sustainable development is inherent to the development of a nation and with this, the creation of more intelligent citizens. Mainly, because this knowledge area opens a huge offer of study possibilities, being it interdisciplinary, and, at the same time, an scarce field of sources and basements, given that it is a recent scientific topic, even more in Business and Economics area. It is possible to notice this subject as a remarkable field of knowledge for the area of administration, not only public, but also to the academic, business interests and other existing organizations; to investigate the understanding of relationships and attitudes, at institutional levels, concerned with sustainable development.

Then, I intend to explore what can we absorb from innovation and sustainability bases to help to solve theoretically, in fist time, the problem of UN Goal 11. More specifically, first we try to understand how sustainable development, innovation approaches and development can be associated with UN Goal 11. Finally, in order to overcome possible barriers, I propose possible alternatives that could solve this problem.

As a pathway for achieving it, I will analyze the object – sustainable cities and communities – in three ways, on the following:

I. *To identify the main relationships between sustainable cities and innovation helixes development;*
II. *To analyze top cities that are considered working successful according to the SDG politics, by the quintuple helixes approach;*
III. *To organize and create a framework and an agenda with the analyzed the "best" way to develop sustainable cities and communities.*

On the next sections we advance in the discussion, indicating theories and possible paths to consider. In the next sections we aim to discuss the following questions: What are the main references we can have from innovation and sustainability theories and how to develop sustainable cities and communities?

For sure, not an easy pitch. But here, I start the journey, registering and organizing findings to understand better the sustainable cities and communities scenario, based on UN agenda, and to improve the next steps of my dissertation study, together to my advisor and appraisers.

2 UN SUSTAINABLE DEVELOPMENT GOALS

In this section, I aim to present the main points of the United Nations Sustainable

Development Goal 11, according to United Nations Development Program – Agenda 2030 (UN, 2015).

From the beginning, the Sustainable Development Goals (SDGs) ignited at the United Nations Conference on Sustainable Development in Rio de Janeiro in 2012 (RIO+20). The objective was to produce a set of universal goals that meet the urgent environmental, political and economic challenges facing our world. They are consequence of the document "The Future We Want", result of the event, which originated the Agenda 2030, formalized in 2015. The Agenda is considered as a plan of action for people, planet and prosperity, by eradicating poverty in all its forms and dimensions, including extreme poverty, is the greatest global challenge and an indispensable requirement for sustainable development. Another characteristic of the goals is they are integrated and indivisible and balance the three dimensions of sustainable development: the economic, social and environmental. (UN, 2015).

Furthermore, the purpose is that the goals action until 2030 in five highlighted areas of critical importance for humanity and the planet (figure 1).

Figure 1: Agenda 2030 – Areas of Critical Importance

Agenda 2030 - Areas of Critical Importance	
People	We are determined to end poverty and hunger, in all their forms and dimensions, and to ensure that all human beings can fulfil their potential in dignity and equality and in a healthy environment.
Planet	We are determined to protect the planet from degradation, including through sustainable consumption and production, sustainably managing its natural resources and taking urgent action on climate change, so that it can support the needs of the present and future generations.
Prosperity	We are determined to ensure that all human beings can enjoy prosperous and fulfilling lives and that economic, social and technological progress occurs in harmony with nature.
Peace	We are determined to foster peaceful, just and inclusive societies which are free from fear and violence. There can be no sustainable development without peace and no peace without sustainable development.
Partnership	We are determined to mobilize the means required to implement this Agenda through a revitalized Global Partnership for Sustainable Development, based on a spirit of strengthened global solidarity, focused in particular on the needs of the poorest and most vulnerable and with the participation of all countries, all stakeholders and all people.

Source: UN (2015).

Therefore, the SDGs replace the Millennium Development Goals (MDGs), which started a global effort in 2000 to improve the income inequality. The MDGs settled measurable and universally-agreed objectives for reducing extreme poverty and hunger, preventing deadly diseases, and expanding primary education to all children, and other development priorities (UN, 2015).

Then, the Sustainable Development Goals are composed by 17 goals and 169 targets (figure 2).

Figure 2: 2030 Sustainable Development Goals

Source: UN (2015).

Subsequently, we can see the goal with their brief description (figure 3).

Figure 3: SDGs Description

Sustainable Development Goals		
Goal		**Brief Description**
1	No Poverty	End poverty in all its forms everywhere
2	Zero Hunger	End hunger, achieve food security and improved nutrition and promote sustainable agriculture
3	Good Health and Well-Being	Ensure healthy lives and promote well-being for all at all ages
4	Quality Education	Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all
5	Gender Equality	Achieve gender equality and empower all women and girls
6	Clean Water and Sanitation	Ensure availability and sustainable management of water and sanitation for all
7	Affordable and Clean Energy	Ensure access to affordable, reliable, sustainable and modern energy for all
8	Decent Work and Economic Growth	Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all
9	Industry, Innovation and Infrastructure	Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation
10	Reduced Inequalities	Reduce inequality within and among countries
11	Sustainable Cities and Communities	Make cities and human settlements inclusive, safe, resilient and sustainable
12	Responsible Consumption and Production	Ensure sustainable consumption and production patterns
13	Climate Action	Take urgent action to combat climate change and its impacts
14	Life Below Water	Conserve and sustainably use the oceans, seas and marine resources for sustainable development
15	Life on Land	Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss
16	Peace, Justice and Strong Institutions	Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels
17	Partnerships for the Goals	Strengthen the means of implementation and revitalize the global partnership for sustainable development

Source: UN (2015).

Given that, in the next section I highlight the SDG 11, which one the work of my dissertation is going to be based on.

2.1 UN SDG 11: Sustainable Cities and Communities

Cities are becoming bigger! According to UN (2015), by 2050, 70% of the world's population will live in cities, making cities critical in achieving a sustainable future for the world. Businesses, together with Governments at various levels, and civil society organizations and citizens are collectively engaged in pursuing ambitious objectives to make cities more competitive, safe, resource-efficient, resilient and inclusive. Key areas of need in achieving progress on Goal 11 are:

1) identifying and agreeing the most sustainable ways to achieve the targets- what activities should be ceased and which ones accelerated;

2) building appropriate capacity and skills across these stakeholder groups to deliver;

3) attracting/securing finance, innovative designs and delivery models and projects for integrated city infrastructure– including buildings, energy, mobility, telecommunications, water, sanitation and waste management services, and;

4) ensuring practical processes for multistakeholder engagement in all stages of urban development that build consensus, inclusion, resilience and sustainability.

Then, it was disposed the key business themes addressed by SDG 11 (UN, 2015):

- Access to affordable housing;
- Infrastructure investments;
- Sustainable transportation;
- Access to public spaces;
- Sustainable buildings.

Hence, as each SDG has its target, the SDG 11 has its own that each country should work to achieve them (figure 4).

Figure 4: SDG Targets

SDG 11 - Targets	
11.1	By 2030, ensure access for all to adequate, safe and affordable housing and basic services, and upgrade slums.
11.2	By 2030, provide access to safe, affordable, accessible and sustainable transport systems for all, improving road safety, notably by expanding public transport, with special attention to the needs of those in vulnerable situations, women, children, persons with disabilities and older persons targets.
11.3	By 2030 enhance inclusive and sustainable urbanization and capacities for participatory, integrated and sustainable human settlement planning and management in all countries
11.4	Strengthen efforts to protect and safeguard the world's cultural
11.5	By 2030, significantly reduce the number of deaths and the number of affected people and decrease by y% the economic losses relative to GDP caused by disasters, including water-related disasters, with the focus on protecting the poor and people in vulnerable situations and natural heritage
11.6	By 2030, reduce the adverse per capita environmental impact of cities, including by paying special attention to air quality, municipal and other waste management
11.7	SDG By 2030, provide universal access to safe, inclusive and accessible, green and public spaces, particularly for women and children, older persons and persons with disabilities
11.a	Support positive economic, social and environmental links between urban, peri-urban and rural areas by strengthening national and regional development planning
11.b	By 2020, increase by x% the number of cities and human settlements adopting and implementing integrated policies and plans towards inclusion, resource efficiency, mitigation and adaptation to climate change, resilience to disasters, develop and implement in line with the forthcoming Hyogo Framework holistic disaster risk management at all levels

11.c	Support least developed countries, including through financial and technical assistance, for sustainable and resilient buildings utilizing local materials

Source: Adapted from UN (2015).

By that myriad, UN (2015) presents the process of the SDG 11 until 2020. According to it, substantial progress has been made in reducing the proportion of the global urban population living in slums, though more than 1 billion people continue to live in such situations. With the areas occupied by cities growing faster than their populations, there are profound repercussions for sustainability.

Between 1990 and 2016, the proportion of the global urban population living in slums fell from 46 to 23 per cent. This progress was largely offset by internal population growth and rural-urban migration. In 2016, just over 1 billion people lived in slums or informal settlements, with over half (589 million) living in East, South-East, Central and South Asia. The proportion of urban residents who have convenient access to public transport (defined as living within 500 m walking distance of a bus stop and within 1,000 m of a railway and/or ferry terminal) remains low, particularly in developing countries. Based on data from 227 cities from 78 countries in 2018, on average, 53 per cent of urban residents in all regions had convenient access to public transport, from a low of 18 per cent in sub-Saharan Africa to a high of 75 per cent in Australia and New Zealand. In some regions that have low access to public transport, informal transport modes are highly prevalent and, in many cases, provide reliable transport for the majority of urban populations. (UN, 2015).

Between 2000 and 2014, areas occupied by cities grew 1.28 times faster than their populations. Closely related to this trend is that the urban densities of cities have been declining, creating profound repercussions for environmental sustainability at the local, regional and global scale. Better management of urban growth will be crucial in order to guarantee sustainable urbanization. Globally, 2 billion people do not have access to waste collection services and 3 billion people lack access to controlled waste disposal facilities. With increasing urban populations and the existence of consumer-oriented economies amid rising income levels and rapid urbanization, it is estimated that the total waste generated in the world will double from nearly 2 billion tons in 2016 to about 4 billion tons by 2050. While from 2010 to 2018 the proportion of solid waste collected was about 81 per cent globally, in sub-Saharan Africa it was only 52 per cent (UN, 2015).

In 2016, 9 in 10 people living in urban areas still breathed air that did not meet the World Health Organization's air quality guidelines value for particulate matter – that particulate matter 2.5 microns or less in size (PM2.5) not exceed an annual mean of 10 micrograms per m3 or a daily mean of 25 micrograms per m3 – and more than half of the world population experienced an increase in PM2.5 from 2010 to 2016 (UN, 2015).

Most cities have struggled to ensure that their populations have convenient access to open public spaces (defined as spaces within 400 m walking distance of their residence). Based on data from 220 cities in 77 countries in 2018, only 21 per cent of the population had convenient access to open public spaces. However, these results do not necessarily mean that there is an inadequate share of land dedicated to open public spaces in these cities, but rather that their distribution across urban areas is uneven. National urban policies are policy strategies that specifically respond to the urbanization challenges of today. As of the beginning of 2020, 150 countries had developed such policies, and almost half are already implementing them (UN, 2015).

It is important to analyze and consider these indexes and percentages for a better understanding of the context of cities and how relevant is to study the Sustainable Cities and Communities goal.

This way, about actual and future cities, we can merge directly to innovation, that is even one of the goals (SDG 9). How can a innovator citizen and innovative institutions and

organizations can improve the quality of life in a city? A really wide question, but it is also fundamental to bring the ascension of technologies to this discussion, but not just hardware innovation, but too software, as people and institutions relationships and sharing processes.

3 INNOVATION AND SMART CITIES

The level of competitive advantage in the markets instigates companies to be attentive to what is happening in their macroenvironment (stakeholders) and to seek differentials based on innovations that hinder the benchmarking of their competitors. According to Schumpeter (1985), innovating means recombining existing forces and materials, producing the same or other things, from the use of new methods. Thus, these authors (1985) also listed five forms of innovation: a) the creation of a new product; (b) introduction of a new production method; (c) opening up of a new market; (d) the discovery or acquisition of a new source of raw materials or semi-finished products (new suppliers) and (e) the creation of a new industry or monopoly. When imagining the process of innovation as waves over time, it is increasing its amplitude and reducing its frequency. That is, access to new technologies has allowed society to innovate more in a shorter period of time (Schumpeter, 1985; Tidd; Bessant; Pavitt, 2005; Takahashi & Takahashi, 2007).

The current technological areas are the development of information and communication technologies. However, these areas are no longer new where they came from. According to Lundvall (1988), universities, which foster innovation, by joining high-tech companies in the Bay Area (California, USA) during the Second World War period, promote the debate on complementarity between science and technology, with additional exchanges. The beginning of this was still in the 1930s, on the initiative of Stanford University (Stanford, California, USA), with the creation of scholarships and accompaniments to students who wanted to open businesses. New businesses were coming in, and the old ones remained, resulting in increased facilities and the establishment of Stanford Industrial Park in 1950.

The rationale was that companies of the future would be increasingly linked to their alma mater, not losing their ties to the knowledge environment. In 1974, the park had about 70 companies, and in 2005, 150. Silicon Valley (Silicon Valley), as it became known worldwide for clustering cutting-edge innovative companies, was the first real model of an innovation environment: the largest agglomeration of high-tech industries. Along with him, Route 128 (Massachussets, USA), sought to stimulate their stagnant economies by war. (Spolidoro & Audy, 2015). With the success of these two regions, the first European innovation environments emerged, with emphasis on the British (Massey, Quintas & Wield, 1992). Such characteristics make this technological pole a model for other projects around the world (Ganzert & Martinelli, 2009). The nations, institutionalized in the figure of the United Nations (UN), has been working since the 1970s in encouraging the creation of business incubators and technology parks. Competent assignment to UNESCO, in the section Universities-Industries Partnerships (UNESCO, 2015). With this, it is noticed that amid so many devices and tactics in the race for competitive advantage, the innovation factor is always successful. Nations that have decided to invest in research and development (R&D) institutions, finance and labor market legislation, and industrial policies have progressed (Fritsch & Mueller, 2004).

This fact evidences the relation between technological progress and economic development, when investing in science and technology (Stopper, 1995). Although the presence of the academy generates greater numbers of innovations and patents, it can still negatively interfere in the business processes (Albahari et al., 2013). It remains to seek a balance on both sides, which according to many studies, prove successful when

complemented. To this end, incentives from the public sector become necessary in order to make cities smarter. For Coffey and Polèse (2005) the development of a place refers to the capacity of a locality in the production and sale of its goods and services and, therefore, to involve the capacity of its inhabitants in the generation of income. Issues of characterization and interrelation between social, environmental and economic dimensions are in vogue (Jacobi, 2003).

Thus, Amaral Filho (1996) states that the term "development" has related variables such as: the use of competitiveness in an efficient way, social equity and the reduction of environmental impacts. With this, the sustainability tripod is necessary, in the concept of development of a given region, so that the progress of the region is sustained by policies and practices developed by a mutual articulation of its agents. Public management began to think globally, with a constant search for innovation, knowledge of the environment and its trends; but to act locally, favoring the territory in which the market of interest was concentrated. (Thompson & Strickland, Gamble, 2008).

The evolution of the concept of development occurred with the greater awareness of the future generations, the idea of sustainable regional development will emerge, to make cities more intelligent. This approach, which is based on the principles of sustainability, is described as practices and policies that respect three fundamental criteria: social relevance (social viability), ecological prudence (environmental viability) and economic viability (Sachs, 2002). Complementing these principles, the United Nations (UN) (2003) stresses that the construction of regional development from a sustainable standpoint reflects a series of discussions on the economic, social and environmental dimensions.

As Boisier (1996) argues, it is a process of social transformation, aiming at the permanent and sustained progress of the territory in question, with the direct participation of the actors who live there. As for its design and relationship, Coe et al. (2004) argue that in sustainable regional development, territories are shaped by occurrences in both the endogenous environment (internal relations) and exogenous (external relations - competitive environment and markets).

This is a process characterized by a strong interest of local societies in formulating regional policies. This is so that the main topics of the present day are debated and for the region to be the main driver of its own development process (Dallabrida, 2000). On this evolution of innovation environments, we can find the appropriability of the urban space by people in a more innovative and sustainable place, where information technology is combined a sustainable process (social, economic and environmental) (Townsend , 2013).

According to Kitchin (2014), they are cities that are increasingly composed of and monitored by technology and its economy and governance is driven by innovation, creativity and entrepreneurship, by smart people. Scholl & Al-Awadhi (2015) complements it brings innovation, attractiveness, competitiveness, sustainability, and livability of an urban space. It could be about smart governance; smart human capital; smart environment; smart living; and smart economy (Lombardi et al., 2012).

4 CITIES AND DEVELOPMENT HELIXES

Innovation must take place in a region that needs to be stimulated through the adoption of certain public policies that to regional development as a means of integrated, rather than fragmented and reductionist. In this way, the adoption of a new methodology is necessary as a strategy to cover all regional actors responsible for leveraging development.

As a way of highlighting the importance of innovation in the process of developing a region is that it highlights the concept that evidence of a joint action by the as Etzkowitz (2009)

points out. The Triple Helix paradigm comes to the to the social aspirations of the adoption of policies of the governmental transversality, where it is necessary and fundamental for the participation of industry (private companies) with the contribution of capital, universities giving support and conceptual framework, together with the government acting through policies of tax incentives, with a view to the regional."

The Triple Helix describes this new model innovation and helps students, researchers and legislators in addressing issues such as: how we broaden the role of universities in social and regional development? How governments at all levels can encourage citizens to play a key role in active role in promotion and innovation and, conversely, how citizens can encourage their governments to do this? As the companies can collaborate with one another and with universities and governments to become innovative? What are the key elements and challenges to achieve such goals?

As you can see, innovation becomes an instrument of power, generating a competitive advantage, which emphasizes the adoption of this partnership methodology government - university - company with purpose of developing public policies of science and technology based on the interaction of triple helix. Thus, within the contribution of innovation, the Triple Helix dynamics, the government is the main protagonist and partner-supporter innovation and development together with the companies that bring together the productive country, based on universities, where the knowledge is the raw material.

Etzkowitz (2009) presents the Triple Helix as the key for innovation everywhere, being societies based on knowledge. Since the creation, dissemination and use of knowledge move from the periphery to the center of governance and production industry, the concept of innovation in products and processes, is itself being transformed into (Etzkowitz & Leidesdorff, 1995).

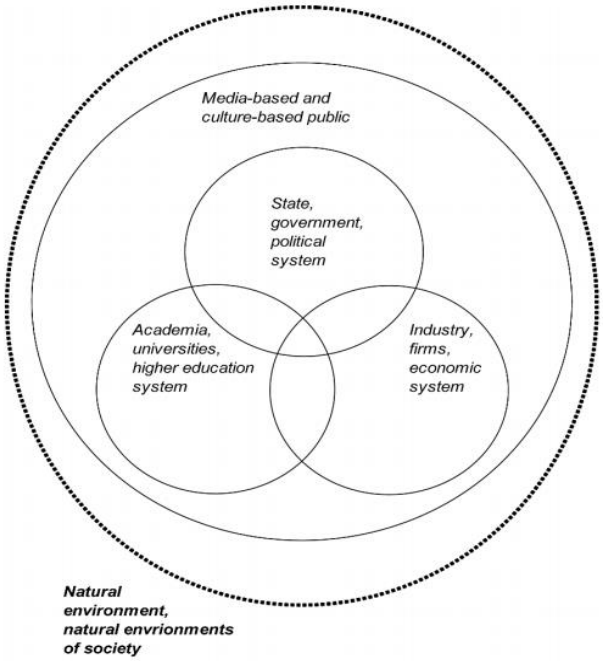
The authors Carayannis and Campapbell (2010), propose an interdisciplinary and transdisciplinary framework of analysis relating three important concepts, knowledge, innovation and the environment. Concepts that in themselves have a high complexity. The model title quintuple helix includes in its model the natural environments. These natural environments describe the complex relationship between different political, economic, and social systems that involve society.

Although the term natural environment gives an idea of the concept of nature, linked to ecology, the authors' proposal treats society as a "natural environment". Society with its multiple levels of aggregation: local - regional - supranational - global, formed by diverse actors. The natural environment includes the process of knowledge and innovation as intrinsic characteristics of society.

According to the Oslo Manual OECD (2018), the natural environment can be an important external factor that influences the decisions of firms, including changes in environmental amenities, flooding and other natural disasters, pandemics and epidemics, climate change, and water, soil and air pollution.

Figure 5 presently visible the model proposed by Carayannis and Campapbell (2010).

Figure 5: The Four and Five-Helix Model



Source: CARAYANNIS AND CAMPAPBELL (2010)

The quintuple helix covers, first, the triple helix - university, industry and government relation, and the quadruple helix with the media-based and culture-based public.

In this conception, the knowledge and innovation achieved in the previous phases would extend the capacity of non-linear models of innovation, where the application of development practices would overflow. According to the authors, Carayannis and Campapbell (2010), the Quintuple Helix has the potential to serve as an analytical framework for sustainable development and social ecology, by conceptually relating knowledge and innovation to the environment, besides enabling the description of what sustainable development, as well as issues such as eco-innovation and eco-entrepreneurship.

To Carayannis, Barth and Campbell (2012, p. 1), "The Quintuple Helix supports here the formation of a win-win situation between ecology, knowledge and innovation, creating synergies between economy, society, and democracy". Opportunity use for global sustainability issues.

On the following, I present the tools and the framework for achieving the goals of this study.

5 METHOD

Although this study area - the management of cities and communities to become more sustainable – has the management in that essence, unfortunately, it is not common to find those issues on management studies. Thus, we can consider this work such as an explorative-descriptive one, using some metanalysis for a better understanding on management's terms and knowledges.

Then, to give one possible scientific answer to my study question "*what are the best ways to develop sustainable cities and communities?"*, I present the way I tracked my road, according to the purposed goals, by a pragmatic line, given the cities' complexity. The

intention is that each goal configurates one published paper.

5.1 Goal I

The first goal is about to identify the main relationships between sustainable cities and innovation helices development.

The chosen method is the Systematic Literature Review (SLR) that according to Dewey & Drahota (2016) identifies, selects and appraises critically the research, in order to answer a clearly formulated question.

Then, the platform for sources and search chosen is Scopus Database by Elsevier, usual on management area. The research protocol is the following:

Keywords: "sustainable cit" AND "innovation helix*"/"smart cit*" AND "innovation helix*"AND"sustainability";*
Year 2011 to 2020 (10 years);
Areas: Business, Management and Accounting; Economics, Econometrics and Finance amd Social Sciences;
Document Type: Article;
Source Type: Journals;
Language: English;

Afterwards, the studies collected will be read and organized in categories, according to its main object and results. Then it will be put together to the quintuple helixes approach and building a figure organizing them, highlighting its correlations.

5.2 Goal II

The second goal is about to analyze top cities that are considered working successful according to the SDG 11 politics, by the quintuple helixes approach.

The method chosen is a comparative analysis between the top 5 cities listed on SDG Index & Dashboards (Sustainable Development Report) (2020), organized by United Nations, applying with its free and open data, organizing the relationships according to the quintuple helixes constructs. At figure 6 it is possible to see the indicators used for each target on SDG 11.

Figure 6: SDG Indicators

SDG 11 - Indicators	
11.1	Proportion of urban population living in slums, informal settlements or inadequate housing;
11.2	Proportion of population that has convenient access to public transport, by sex, age and persons with disabilities;
11.3	1. Ratio of land consumption rate to population growth rate; 2. Proportion of cities with a direct participation structure of civil society in urban planning and management that operate regularly and democratically;
11.4	Total expenditure (public and private) per capita spent on the preservation, protection and conservation of all cultural and natural heritage, by type of heritage (cultural, natural, mixed and World Heritage Centre designation), level of government (national, regional and local/municipal), type of expenditure (operating expenditure/investment) and type of private funding (donations in kind, private non-profit sector and sponsorship);
11.5	1. Number of deaths, missing persons and persons affected by disaster per 100,000 people; 2. Direct disaster economic loss in relation to global GDP, including disaster damage to critical infrastructure and disruption of basic services;
11.6	1. Proportion of urban solid waste regularly collected and with adequate final discharge out of total urban solid waste generated, by cities; 2. Annual mean levels of fine particulate matter (e.g. PM2.5 and PM10) in cities (population

	weighted);
11.7	1. Average share of the built-up area of cities that is open space for public use for all, by sex, age and persons with disabilities; 2. Proportion of persons victim of physical or sexual harassment, by sex, age, disability status and place of occurrence, in the previous 12 months;
11.a	Proportion of population living in cities that implement urban and regional development plans integrating population projections and resource needs, by size of city;
11.b	1. Proportion of local governments that adopt and implement local disaster risk reduction strategies in line with the Sendai Framework for Disaster Risk Reduction 2015-2030; 2. Number of countries with national and local disaster risk reduction strategies;
11.c	Proportion of financial support to the least developed countries that is allocated to the construction and retrofitting of sustainable, resilient and resource-efficient buildings utilizing local materials.

Source: Adapted from UN (2015).

According to the presented key business themes pointed by SDG 11, it is possible to organize them by the relationships with each indicator (figure 7). The secondary data will be collected from institutional websites, documents and reports from that 5 cities.

Figure 7: SDG 11 Key Business Themes and Indicators

SDG 11 – Key Business Themes and Indicators		
Theme	**Related Indicators**	**Variable**
Affordable Housing (HOU)	11.1	HOU1
Infrastructure Investments (INF)	11.3.1	INF1
	11.3.2	INF2
	11.4	INF3
	11.5.1	INF4
	11.5.2	INF5
	11.6.1	INF6
	11.6.2	INF7
	11.a	INF8
	11.b.1	INF9
	11.b.2	INF10
Sustainable Transportation (TRA)	11.2	TRA1
Public Spaces (PSP)	11.7.1	PSP1
	11.7.2	PSP2
Sustainable Buildings (BDG)	11.c	BDG1

Source: Authors (2020).

Then, to align it to the purpose of this study, it is chosen the Innovation Quintuple Helix constructs (Penta Helix Variables) from Sudiana et al. (2020) and organized consonant to enforce them (figure 8), detailed on Appendix.

The choice of this metric is about the arrangement the authors made with in agreement to various authors cited here before, on the Quintuple Helix area and by its wide range. The sample will be 3 startup managers from each city and the data treatment and analysis will happen using NVivo software, by content analysis, creating categories and word clouds.

Figure 8: Dimensions of the Penta Helix Variables

Dimensions of the Penta Helix Variables		
Dimensions	**Indicators**	**Variable**
Academicians	Number of Educated Human Resources (Graduates)	ACA1
	Research Quality from Campus	ACA2
	Distance from Campus	ACA3
	Loan Capital Support	BUS1
	Investment Cooperation	BUS2

Business	Business Interactions/Transactions	BUS3
	Corporate Social Responsibility (CSR) from Business Entities	BUS4
Government	Licensing	GOV1
	Pro Small and Medium Enterprises (SME) Polices	GOV2
	Taxation and Retribution	GOV3
	Aid and Other Grant	GOV4
Community	Community Adoption in Startup Products	COM1
	Community Input/Information on Startup Products/Businesses	COM2
	Supply Human Resources (HR) and Other Business Needs from the Community	COM3
Media	Publicity by Medias	MED1
	Ideas, Voice of Customers and Other Useful Information from Medias	MED2
	Startup Communication with Stakeholders through the Medias	MED3

Source: Adapted from Sudiana et al. (2020).

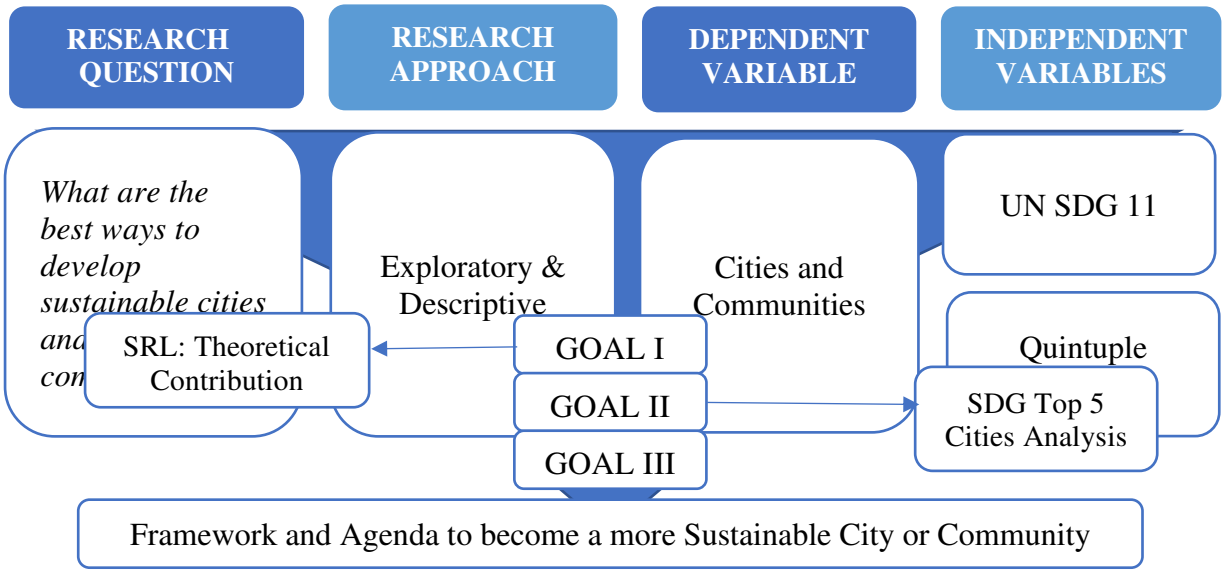
Applicating this constructs (by the 32 variables) on the top 5 cities ranked on the general UN SDGs index, it will be possible to analyze how can they guide us about to be a more sustainable city or community. And innovative. The sample will be 3 startup managers from each city

5.3 Goal III

The third goal is about to organize and create a framework and an agenda with the analyzed "best" ways to develop sustainable cities and communities, according to the previous goals – the theory research and the top 5 database organizing. The purpose is to produce theoretical and managerial contributions, consequence of the research and its analysis.

This way, the research framework is presented (figure 9).

Figure 9: Method Framework



Source: Author (2020)

Hence, that is the project of this dissertation, resulting in three papers, according to its goals.

6 FINAL REMARKS

Finally, according to UN (2015), a city is a hub for ideas, science, culture, commerce, productivity, social development and many other characteristics. At their best, cities have enabled people to advance socially and economically.

By this view, businesses can help cities navigate these challenges and turn a high-level vision into practical and implementable action plans. Business can provide not specific infrastructure, technology, services and financing solutions, but also in contributing to the strategy that will support the overall optimization of urban systems to create inclusive, safe, sustainable and disaster resilient cities. Cities seeking to realize their sustainability objectives can benefit from engaging with business early in the planning and strategy development process, leveraging the capability of business to identify innovative and cost-effective solutions to complex, cross-cutting urban sustainability challenges (UN, 2015).

Given that approach, it is possible to identify that is a hot potato theme – many countries thinking on it together by UN policies and development program and working to achieve the purposed targets – with diverse approaches and aspects that can be studied to. In my case, I intend to organize the literature production about the thematic of SDG 11, smart cities and innovation helixes of development.

Then, to investigate a comparative analysis between 3 cities that are working efficient with the SDG politics, by the five helixes point of view, and finally, to build a framework, based on their practices and experiences, of how to be a sustainable, and consequently, an smarter city, improving the economic, environment and social development of their citizenships and, if possible, being example to other ones.

Another relevant issue, that deserve space here is about the impact of Coronavirus Disease (COVID-19) in cities and communities, resulting in more than 1.000.000 deaths (September, 2020) worldwide and over 90% of cases happened in urban areas (WHO, 2020). For sure, a fact that still is changing patterns and bringing us new challenges about sanitary security, economic crisis and lifestyle; foregrounding known problems and deficiencies as huge rent inequality, inequal health plan quality access, low rates in investments on scientific researches development, etc.

In summary, the way we can design and think our cities and lifestyle tell us too much about our future. Which one do we want? Just from the nowadays complexity, we can consider the best solutions and adapt the society advances direction.

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APPENDIX

Figure 1 – Penta Helix Variables

Variable	Question
ACA1	How is the quality and availability of workforce that graduated from the local Higher Education Institutions who works at your startup?
ACA2	To what extent does your Startup utilize research results from the local Higher Education Institutions?
ACA3	How far is the location between the Science and Technology Centres Area where your startup is located from the local Higher Education Institutions?
BUS1	To what extent does your Startup utilize bank loans as capital?
BUS2	How often does your startup have an investment partnership with other businesses?
BUS3	How often does your startup perform business interactions with other companies?

BUS4	How often does your startup get guidance / sharing experiences / knowledge from established business people?
GOV1	What do you think about the ease of the startup licensing process in your region?
GOV2	In your opinion, how does government policy support startups?
GOV3	Taxation and user charges are easy to deal with and are not burdensome?
GOV4	Government assistances are available and easily accessible?
COM1	The quality of basic infrastructure at STP such as electricity, roads, water is good enough?
COM2	My product is consumed by the community I targeted?
COM3	Startups get lots of ideas and information from the community?
MED1	We get a lot of human resources and other needs from our community?
MED2	We get lots of ideas, input and other valuable information from medias?
MED3	The mass media publicize many of our products and businesses?

Source: Adapted from Sudiana et al. (2020).