

Guimarães 2030: A new governance ecosystem

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Abstract Nowadays there is near consensus that cities have an important role to play in the pursuit of global climate protection and Sustainability. However, local strategies for sustainable development require a holistic and systemic approach, enabling multiscale involvement dynamics from a variety of stakeholders. Because Sustainability objectives are multifaceted, they often do not align with local governments' typical organizational structures, which compartmentalize expertise around core service functions. This paper intends to analyze the Governance Ecosystem Guimarães 2030 highlighting on the practical implementation of the quintuple helix model at local level. Available Information allowed characterizing Guimarães' Governance model as well as understanding how it evolved overtime. Projects were selected for each of the five-helix showcasing the continuous circulation of knowledge that is contributing for local sustainable development.

Keywords: Governance, Sustainability, Knowledge, Helix model, Transformation

1. Introduction

According to the United Nations, half of the world population live in cities and these will reach more than 5 billion inhabitants by 2030 (United Nations, 2018). With such a high rate of urbanization, cities are growing faster than their population (El Hilali and Azougagh, 2021). Yet, there is near consensus that cities have an important role to play in the pursuit of global climate protection and Sustainability (Krause et al., 2021). Indeed, as politically organized entities, cities are also catalysing Sustainability solutions (Forman and Wu, 2016). The role of cities is even more relevant if they gather into a common goal that in this particular case could be "to make a difference in saving the Planet". According to Saviano et al. (2019), despite Sustainability being considered a global goal, it should contemplate the local conditions of development and should be implemented in a collectively way from a local to a global dimension. There is no doubt that Sustainability has grown into a key concept in both scientific research and policy agendas (Billi et al., 2021) and it is widely agreed that to accomplish true sustainable development it is necessary to act in the three pillars: Economic, Social and Environment. Urban Sustainability requires a system-wide effort and needs a multiscale involvement from a variety of governmental and non-governmental organizations, often including local governments, regional

planning organizations, universities, non-profit groups, and professional and business associations (Bai et al., 2016). In this sense, Sustainability is more than a triple bottom line represented by three circles. According to a System Thinking perspective, Sustainability should also represent the interactions and dynamics between the pillars as suggested by the "helix" models. These dynamics are not static, they change overtime (Scalia et al., 2018). Carayannis et al. (2021) provide an explanation about helix models. Triple Helix innovation model focuses on university-industry-government relations. Also, according to Carayannis, and Campbell (2009), this model allows and emphasises the co-existence and co-evolution of different knowledge and innovation paradigms: the competitiveness and superiority of a knowledge system is highly determined by its adaptive capacity to combine and integrate different knowledge and innovation modes via coevolution, cospecialisation and cooperation knowledge stock and flow dynamics. The Quadruple Helix embeds the Triple Helix by adding 'media-based and culture-based public' and 'civil society' as a fourth helix. In Quadruple Helix framework, civil society is seen not just as the social context of innovation dynamics, but also as an additional and crucial actor in innovation processes (Koleh Mainen et al., 2016). This concept goes beyond thinking the citizen as a source of data but utilizing them as a source for ideas. However, this process is only suitable to a limited category of citizens that have some kind of expertise. That is why is crucial to act directly on transforming citizens through education. Finally, the Quintuple Helix stresses the socioecological perspective of the natural environments of society. Social ecology focuses on the interaction, codevelopment and coevolution of society and nature (Carayannis et al., 2012). The Quintuple Helix, thereby, visualizes the collective interaction and exchange of knowledge in a state (nation-state) by means of the five helices presented in Figure 1: (1) education system, (2) economic system, (3) natural environment, (4) media-based and culture-based public (also civil society), and (5) the political system. According to Krause and Hawkins (2021), cities are touted as leaders and innovators in Sustainability policy, but face significant challenges with its implementation. Because Sustainability objectives are multifaceted, they often do not align with local governments' typical organizational structures, which compartmentalize expertise around core service functions. Improving how cities manage and implement their climate and Sustainability initiatives is of fundamental importance.

Even though the quintuple helix provides a more comprehensive model for sustainable development, there is a lack of understanding how the collaborations are carried out in multi-actor partnerships (Bellandi et al., 2021).

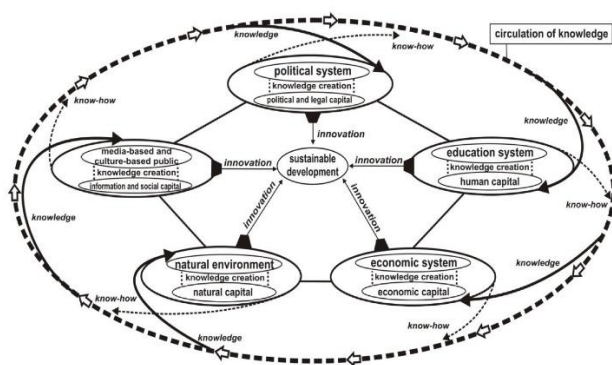


Figure 1. Quintuple Helix (Carayannis et al., 2012).

A question arises: how to put in practice, at local level, governance models that need leadership, continuous coordination, planning, and monitoring? In this sense, this paper aims to provide the Ecosystem for Governance Guimarães 2030 as a practical example of the quintuple Helix model in the basic understanding of the complexity of local governance for Sustainability.

2. Methodology

2.1. Governance Ecosystem Guimarães 2030: Background

Governance models must be integrative, multidisciplinary and participatory. "Guimarães 2030: Governance Ecosystem" (GGE) is an initiative that sought to bring together the public sector, universities, non-profit associations and citizens. In 2013, Guimarães anticipated Agenda 2030 and had set up a new era for governance, creating a shared vision "Guimarães more than green" and encouraging public participation. GGE is an innovative model able to face society's primary challenges by increasing public participation in the conception, design, and proposal of solutions aimed at transforming the territory. This holistic and participatory model promoted sustainable policies and contributed to the citizens' quality of life. GGE started as a local governance model, but nowadays, several initiatives reached a national level. This new governance ecosystem recognized the importance of transforming the planet, from the local to the global dimensions.

2.2. Guimarães 2030 Governance Ecosystem: Framework

Sustainable Development of Guimarães should be analysed in two different stages: transition and transformation. The transition stage is related to the need of set up a process that enables establishing a strategy focused on diagnosis and improvement of environmental indicators as well as raise awareness among citizens for local sustainable development (externalization). Transformation stage is related in one hand to the internalization of the concept of Sustainability in day-to-day City Hall practices, on the other hand it should demonstrate how different stockholders are getting

involved and how measures are influencing citizens and territory. Transition stage started in 2014 when the Mayor of Guimarães Municipality, after elections, requested from the University of Minho a diagnosis on the Environmental situation of Guimarães. Guidelines of the European Green Capital award were followed and 12 indicator Areas were assessed (Table 1, presented in section 2.2). Some of the Areas needed short term strategies and objectives as, up to that time, they were not considered a priority. For this purpose, in 2015, a Mission Structure (MS) was established by the Mayor, aiming at i) transfer knowledge and innovation to territory management, ii) establish a short-term local action plan for sustainable development iii) gather the private sector and iv) involve citizens into the goals of sustainable development. A smart objective was then set: to apply Guimarães for the European Green Capital Award, cycle 2020, meaning by 2017. The candidacy comprised 12 Indicator areas that were assessed during diagnosis phase. Applicant cities should provide information about past situation (up to 5 years from the candidacy's year), present situation and future plans. MS comprised a Board that included Guimarães Mayor and Rector from the University of Minho. They were responsible for the visioning process in terms of sustainable development. An Executive Committee was also set, including the councilors for Environment, Finance, and the Pro-Rector of University. MS also comprised an External Advisory Committee with well-known and recognized individualities for the work done in global scale in terms of Climate Change (Mohan Munasingh), Environmental History (Jane Carrethurs) and Energy Performance (Will Win). They were responsible for the validation of the overall strategy. Also, an Advisory Council was established, comprising local associations, all the political parties and directors of local schools. A Monitoring Committee was also defined by the Municipal Assembly to follow-up the implementation process (Figure 2).



Figure 2. Governance Ecosystem Guimarães 2030: Framework

To work on the indicator areas, 12 operational units were established comprising City Hall technicians and Experts from Academia. Together they had the objective to establish a local Action Plan for the 12 Indicators for the

period 2015-2017. In addition, a program to involve, raise awareness and sensitize as much as possible all the citizens of Guimarães was developed (Guimarães getting greener program). An external expert coordinated the MS. Besides the responsibility of coordinating, she was also the contact point for some important networks for Sustainability and was responsible for introducing a monitoring process to evaluate the progress of the transition.

The headquarters of MS was the Landscape Laboratory that was established by the City Hall together with the University of Minho and the University of Trás-os-Montes and Alto Douro. This is a research Centre that uses the context of Guimarães to test some important and innovative solutions, on the following areas: Nature and Biodiversity, Landscape, Geography, Rivers Management, Circular Economy and Urban Development. It also supports the local strategy for sustainable Tourism. In addition, Landscape Laboratory is also the Municipal Educational Centre for Environment Education, being responsible of the Municipal Program PEGADAS that has the objective of educating future generations towards sustainable behaviors and it is responsible for mobilizing, engaging and raise awareness among citizens on the importance of persevering local Natural Capital.

Guimarães candidacy to the European Green Capital Award was submitted in 2017 and in 2018 Guimarães got the evaluation by a panel of recognized Experts on the 12 Indicator Areas. Guimarães got the five out of 13 positions. Governance indicator area got the second position and the Jury emphasized, “The City has a vision based on achieving an ‘unrivalled quality of life’ and describes the importance of environmental sustainability and cultural heritage to this goal... The City has a range of ways of involving citizens in the analysis of problems, decision-making and development of proposals. Guimarães has developed a ‘Mission Structure’ for the delivery of its environmental goals...”. After the results announcement, Guimarães Mayor decided go further putting more efforts in the transformation of citizens and territory. Therefore, in December 2018, MS was reorganized and three more Universities were invited to join the initial MS (University of Trás-os-Montes and Alto Douro, United Nations University and Polytechnic Institute of Cávado and Ave). Executive Committee went from 2 councilors to all elected ones covering more areas (Environment, Urban Planning, Education, Culture, Tourism, Social Affairs, Economic Development). The 12 operational units gave rise to 10 multidisciplinary groups that began to address 19 topics related to the Sustainable Development Goals 3, 4, 6, 7, 8, 9, 11, 13, 15, 17. These groups were responsible for the development of the second local action plan for Sustainable Development for the period 2020-2022 with more than 200 actions for implementation, including those specifically focused on citizens’ mobilization and engagement. It is important to remark that the majority of members of the groups in this MS are technicians from City Hall, demonstrating the internalization of climate ambitions established by MS Board. Furthermore, representatives of National Authorities for Environment, local institutions and several research Centres were included in these teams.

Table 1. Areas covered by Mission Structure in Transition and Transformation phase

Transition	Transformation
Climate Change: Adaptation	Leadership, Education, Sharing, Involvement
Climate Change: Mitigation	Climate Change: Adaptation and Mitigation
Waste Management	Nature, Biodiversity, Landscape, Water Resources and Sustainable Tourism
Nature and Biodiversity	Waste, Resources and Innovation
Green Areas	Air Quality and Acoustic Environment Quality
Sustainable Mobility	Sustainable Mobility
Sustainable use of soil	Energy Performance
Water Management	Water Management
Air Quality and Acoustic	Monitoring Systems
Eco Innovation and Green Growth	Sectorial Thematic sessions
Energy performance	
Governance	

3. Results

The quintuple helix model is characterized by a continuous circulation of knowledge between the five helix, being this circulation the basis for sustainable development. Guimarães 2030 Governance Ecosystem has showed evidence of this circularity. Regarding the Political system (1st helix), Guimarães shows a strong commitment to the European goals in terms of sustainable development, being one of the signatories of Green City Accord and Paris Agreement. It is also member of Covenant of Mayors reinforcing it’s targets for Climate neutrality. Guimarães is co-chair of Eurocities Green Areas and Biodiversity Working group. Eurocities is the network of more than 190 cities in 38 countries, representing 130 million people. Within this network joint work, knowledge sharing is promoted between cities. Concerning the Education system (2nd helix), Guimarães has its own local program for sustainable development (PEGADAS) launched in 2014. This program is in line with the Portuguese Strategy for Environmental Education 2020 (PSEE, 2020). In addition, it anticipates UNESCO wiling of integrate environmental issues in education as expressed in the 2021 Unesco Report. The report emphasized that “Governments, education policy-makers, academics, and education and environmental stakeholders need to further commit to Education for Sustainable Development.” PEGADAS covers all schools affecting more than 15,000 students and gathering more than 30 partners. Under this program, several themes comprising more than 300 actions *per year* were presented and discussed with students aimed at raising their level of knowledge for the importance of local Natural Capital. The program is coordinated by a

specialized team of the Landscape Laboratory that supports knowledge transfer in the thematic areas presented on Table 1. Guimarães circular economy program (G4CE) showcase on the Economic system (3rd helix). The multidisciplinary team of MS “Waste, Resources and Innovation”, led by the head of City Hall Waste division (Loureiro et al., 2017) is working on this subject on a regular basis. The transfer of knowledge for Natural system (4th helix) in being achieved by the Landscape Laboratory through the development of several knowledge and participatory-based projects supported by the teams of R&D and Environmental Education (<https://www.labpaisagem.pt/>). Guimarães 2030 Governance Ecosystem has shown evidence of the existence of the fifth helix; related to media-based and culture-based public including civil society participation. Green Brigades program was selected as it includes the proactively participation of civil society in actions to preserve local Natural Capital. City Hall launched this program to engage and mobilize citizens to act directly in their green areas, rivers, and other spaces. Landscape Laboratory supports the Brigades with knowledge and technical experience. For now, more than 500 volunteers are a part of this program.

4. Conclusions

Guimarães 2030 Governance Ecosystem merges different stakeholders, disciplines and teams that are exploring ways to maintain a coexistence and evolution of human and nature. That is why Guimarães 2030 is also considered to be an Ecosystem. Guimarães intends to evolve further as a bio cultural and sustainable territory that meets the needs of all its citizens. In fact, citizens are in the center of challenges faced by Guimarães and the solutions, supported with scientific and technical knowledge are in their hands. Guimarães 2030 Governance Ecosystem is based on a quintuple helix model where knowledge is being transferred in their five helixes. Knowledge supports the decision-making process, is the foundation for the preservation and valorization of local Natural Capital, is the base of the local Educational Program also supported by scientific research and finally is contributing to raise awareness among citizens for the importance of acting local to make the change Global.

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References

Bai X., Surveyer A., Elmqvist T., Gatzweiler F. W. Güneralp, B., Parnell, S. Prieur-Richard A. H., Shrivastava P., Siri J. G., Stafford-Smith M., Toussaint J. P. and Webb, R. (2016), Defining and advancing a systems approach for sustainable cities. *Current Opinion in Environmental Sustainability*, **23**, 69-78.

Bellandi M., Donati L., Cataneo A. (2021), Social innovation governance and the role of universities: Cases of quadruple helix partnerships in Italy, *Technological Forecasting and Social Change*, **164**, 120518.

Billi M., Mascareño A. and Edwards J. (2021), Governing Sustainability or sustainable governance? Semantic constellations on the Sustainability-governance intersection in academic literature. *Journal of Cleaner Production*, **279**.

Carayannis E. G. and Campbell D. F. J. (2009), 'Mode 3' and 'Quadruple Helix': toward a 21st century fractal innovation ecosystem, *International Journal of Technology Management*, **46**, 3-4.

Carayannis E. G., Barth T. D. and Campbell, D. F. (2012), The Quintuple Helix innovation model: global warming as a challenge and driver for innovation, *Journal of Innovation and Entrepreneurship*, **1**, 2.

El Hilali S. and Azougagh A. (2021), A netnographic research on citizen's perception of a future smart city, *Cities*, **115**, 103233.

Portuguese Strategy for Environment Education (PSEE) https://enea.apambiente.pt/sites/default/files/documentos/AF_Relatorio%20ENEA%202020_A4%20102017%20electronico.pdf.

Forman R. and Wu J. (2016), Give cities a seat at the top table, *Nature*, **537**.

Krause R. M., Feiock R.C., Hawkins C. V. (2016), The Administrative Organization of Sustainability Within Local Government, *Journal of Public Administration Research And Theory*, 113–127.

Krause R. M. and Hawkins C. V. (2021), Viewpoints: Improving cities' implementation of Sustainability objectives. *Cities* **113**, 103167.

Loureiro I., Ribeiro C., Cristino J., Sepúlveda D., Carvalho, J. and Vilarinho C. (2017), Guimarães: Circular Economy Towards a Sustainable City. *European Journal of Sustainable Development*, **6**, 3, 69-74.

Saviano M., Sciarrelli F., Rinaldi A. and Alowanou G. G. (2019), Healthcare and SDGs Governance in Light of the Sustainability Helix Model: Evidence from the African Continent, *Sustainability*, **11**, 1203.

Scalia M., Barile S., Saviano M. and Farioli F. (2018), Governance for Sustainability: a triple-helix model, *Sustainability Science*, **13**, 1235–1244.

Unesco (2021), Learn for our planet: A global review of how environmental issues are integrated in education. Published in 2021 by the United Nations Educational, Scientific and Cultural Organization, 7, place de Fontenoy, 75352 Paris 07 SP, France.

United Nations (2018), The Sustainable Development Goals *Report*, United Nations Statistics Division (UNSD); a division of the Department of Economic and Social Affairs (DESA).