Global City: Index for Industry Sustainable Development

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Abstract. Nowadays, discussion on global cities concept is been addressed at a European level. The concept is a consequence of the array of globalization processes, adding different analysis layers according to social, economic and environmental requirements, such as, cultural, user-friendly and amenity, assessable, sharing, energy, smart, green or city factory age-friendly cities and communities. Cities should also be analyzed as working systems, with the same needs and requirements in terms of safety and well-being that are considered for other systems. Taking this into consideration, the goal of being a Global City should also comprise the so-called occupational layer. Therefore, it is important, within a city context, to define indicators for Sustainability regarding the occupational Layer. This paper aims to develop a methodology helping cities, at a local level, to define an Index for Industry Sustainable development contributing for the global city model.

Keywords: Global cities · Sustainability · Occupational layer

1 Introduction

Nowadays, at a European addressed discussion on global cities concept. The concept is a consequence of the array of globalization processes, adding different layers according to social, economic and environmental requirements, such as, cultural, user-friendly and amenity, assessable, sharing, energy, smart, green or city factory age-friendly cities and communities.

According to [1], cities represents a certain geographic context where people leave, socialize, study, work and more recently are connected. Permanence on cities is depending on historical, cultural, environmental or religious attributes [2]. Several "smart" initiatives for improving cities' energy efficiency, human living and environment, economy and governance are identified by [3]. A study conducted on smart cities point out smart city neglected people and communities on the expense of a deeper understanding of the technological aspect of smart, meaning technological and structural aspects [4]. Despite all the technological progress, some authors [5] believe that people are the most important value in cities. Therefore, cities should have certain features to improve people's life quality and satisfaction so they identified themselves to the place and permanence there. Some authors [6] argue that for a city be livable it should have identified Physical features (including Culture, green areas, public transport efficiency

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and availability, Sports grounds and facilities, among others), Features of a Social nature (Neighborhood networks), Environmental features (calm, clean, good air quality, among others), Economical and Institutional features. Labor market opportunities are included on the last one – Economical and Institutional- considering private investments and public policies aiming to create more sustainable employment. Therefore, to a city be livable, it also should be attractive in terms of jobs opportunities and working conditions. More recently, [7] state that cities should also been understood as working systems, with the same needs and requirements in terms of safety and well-being that are considered for other systems. According to the holistic approach developed by Rasmussen [8], any work place should been understood in terms of social-technical system comprising the individual, technological and organization sub-systems. This approach also includes a view on an internal and external environment. In the external one, worker it is studied as an integrated part of society and in a narrow sense of a given community. The overall system performance (Working system) is analyzed by the way that worker conducts this interaction. At a business level, environmental-efficiency and socio-responsibility and ecological equity are often associated to sustainability [9]. Meaning that, natural, human, and social capitals are important to maintain the system performance. To ensure safe, healthy and functional workplaces, an organization must consider a system performance that ensures longevity and overall comfort and well-being of their workforces. Taking this into consideration, the goal of being a Global City should also comprise the so-called occupational layer. Therefore, Global means several layers that a city can add in order to achieve sustainable development in its different dimensions. A report supported by the European Union [10], identified several indicators for cities aiming to access their level/progress in terms of Sustainability development. These indicators included policies, infrastructure analysis, socio-economic factors, Water resource use, emissions and any other processes that contribute to city's metabolism, prosperity and above all to citizens' quality of life. This study presents several methodologies used to assess the sustainable status of a city. It is important to remark that the indicator to assess Industrial contribution for the city sustainable goal it is related to quantitative data from Energy consumption for industrial use, industrial waste, wastewater treatment, air quality and acoustic impacts.

Industrial Spatial planning and design of industrial parks have a long history, however just recently, their planning began to incorporate in a more integrated way new components, such as sustainable transportation and spatial articulation [11]. This new vision is part of an eco-industrial development and integrated development systems approach. On the other hand, current literature includes new trends in the development of industrial parks – the Eco-industrial parks, which includes green jobs, green marketing, environmental concerns, academic support for industrial ecology, renewable energy, restoration of contaminated land and public policies [12]. Less explored topics related to planning of an industrial park are the characteristics of the infrastructures, the use of green materials, the accessibility and the spatial articulation with the neighboring areas [13]. Moreover, transport and land are a major source of resources needs in an industrial area [14]. The integration of these new drivers is embedded within a holistic vision of development and sustainability, in which the industrial park acts as an interactive space with the surrounding territory.

Note that Public policies and governance aiming to define strategies for the economic development of a city are already indicators for the territory sustainable development. There is a lack of indicators regarding the Industrial sector/ Industrial parks to assess the impact of the implemented measures into the global goal of the city. In addition, the relation between livable cities concept versus occupational city, should been analyzed accessing if working condition improvements contributes to increase permanence. Meaning that, Private contributions to the so-called city goal should also be assessed in terms of policies to promote workers' green skills, to improve working conditions or to develop sustainable initiatives more environmental friendly such us sustainable mobility considering the trips work-home (carpooling, bike-sharing systems). Private policies such as investment on electrical fleet, innovation programs, new technologies implementation or plans for green areas preservation should be consider as indicators that contribute to city sustainable goal.

This paper aims to present the necessity of cities having an Index for Industry Sustainable development contributing for the global city model. General guidelines are presented in this paper. For that, a methodology was establish using a city considered a reference in sustainable development at National level, as sample.

2 Methodology

The methodology under this study, used as a context a city located in the North of Portugal named Guimarães. The first step of the methodology was to gather information of the city regarding (1) geographic reference, population and administrative organization, (2) a description of the territory in terms water resources, industrial activity, and technological centers helping the Industry development. The second step consisted in the identification of the main achievements of the city, considering the past years. Each achievement was a layer added in order to achieve the mail goal identified as the Sustainable Goal for the territory development. The third part comprises an analysis on the indicators that city is using to assess the progress in terms of sustainable goal. Finally, a first approach to a questionnaire development, was made. The objective of the questionnaire is to gather information on good practices that companies are implementing as well to understand the level of commitment to improving working conditions.

3 Comments

Guimarães is located in the North of Portugal; being this region the fifth most industrialized region in the European Union representing tradings' of 17 billion Euros. According to the 2011 Census, Guimarães has 158 124 inhabitants distributed by 240.955 km^2. In terms of administrative organization, the territory has 48 parishes, with a group of 17 medium size agglomerations, and 31 small sized (Fig. 1).

Fig. 1. Administrative organization of Guimarães, 2013 (From Guimarães City Hall website).

3.1 Context Characterization

Guimarães integrates the Sub-basin of Ave River, which has a total area of 1391 km^2 covering 19 municipalities. Ave River has more than 100 km length, a third of which is located within Guimarães. Note that this river is the main source of the water supplied to the city and is where most of the Industries are located. The River is the blue line presented on Fig. 2 and industries' distribution presented in purple. Footwear production, textile and cutlery are the main activities.

It is important to notice that the Region were Guimarães is included, one of the North Regions named Minho Region, was very affected by the 2008 National economic crisis being increasing unemployment the huge consequence. With this, several social problems affected our society. It was than necessary to adopted strategies and policies at local level turning over the page to recover its position in terms of industrial and exporting vocation.

To face global challenges, Guimarães industries invested in innovative industrial process less pollutant. Quality was preferred to mass production requiring Educational policies from local authorities to train people, creating new skills. Also, local authorities were challenged to create specialized departments in finances and economy helping Small Medium Size companies to face crisis, developing facilitating regulation, creating new business opportunities and promoting entrepreneurship helping Region' and consequently local development. Nowadays, the secondary sector is the dominant economic activity, in which 70% of the companies represent the textile industry. The metallurgical

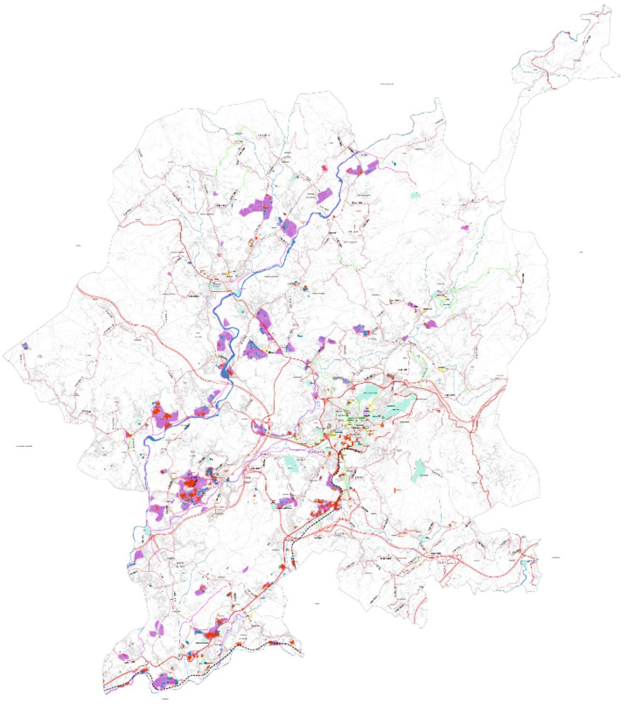

Fig. 2. Guimarães: Industries distribution (purple) (From Guimarães city Hall Website).

industry is also represented mainly the cutlery industries. Footwear and leather industries also have some representation. It is important to notice that a vast majority of Guimarães citizens work in the Industrial sector.

Over the years, several technological centers were created supporting companies in innovation and strategies to face global changes. Most of these technological centers are a part of the University of Minho having City Hall as a partner in the Institution Board. An example of that is the CVR – Center for Waste Valorization, the TecMinho – platform for knowledge and innovation transfer, PIEP – Innovation in Polymer engineering. The city Hall is also responsible for the management of the most important technological park in the Region, named Avepark where important spin-off and star-ups and research centers are located.

3.2 City Achievements

The main city achievements and Goals are presented in Fig. 3.

The historical center of Guimarães suffered for over 20 years a requalification focused on buildings refurbishment and public squares regeneration. This strategy improved the quality of life of citizens also a usufruct of the public space. The existent factories in this area were requalified being now important facilities for the Municipality. That is why in 2001, UNESCO recognize the work done. In 2012, Guimarães positioned in the map of Europe, being European Capital of Culture. Culture and History were

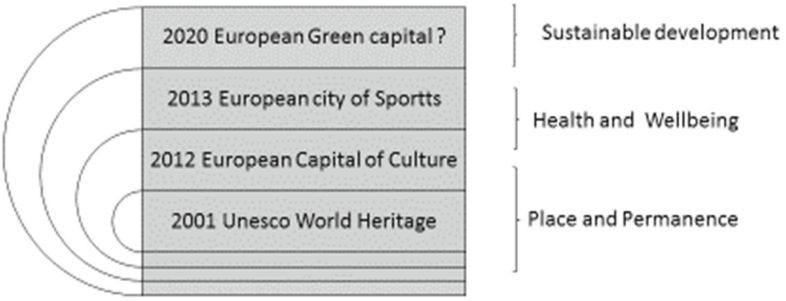

Fig. 3. Guimarães main achieves and goals.

brought to discussion and in that year the city host more than 5.000 events. A year after Guimarães was the European City of Sports. Once more, an investment in green areas, sport's facilities and events, was made to promote Health and Wellbeing among the citizens. In the meanwhile, the industry sector became one of the most important in Portugal. Guimarães is the 5th Municipality in terms of exportation ratio.

3.3 City Indicators

City uses to important methodologies in order to assess the sustainable development process: the 21 Indicators of ECOXXI-ABAE National contest and the 12 Indicators from the European Green Capital application form (Table 1).

Table 1. Indicators - ECO XXI vs. European Green Capital application form.

Methodologies to assess sustainable indicators	
European Green Capital	ECO XXI
Climate change	Environmental education|programs
Local transport	Communication
Green areas and sustainable use of the soil	Citizens' participation
Nature and biodiversity	Cooperation
Waste	Protected areas
Water quality	Forest protection
Waste water	Sustainable mobility
Eco innovation	Certification
Acoustic	Urban planning
Air quality	Nature and biodiversity
Integrated management	Water quality
	Air quality and public information
	Water quality services
	Waste management
	Municipality energy performance
	Sustainable tourism
	City acoustic quality
	Rural sustainable development
	Employment

Note that the each of the EGC indicators has details on past performance, current situation and proposals for future actions. Most of the indicators have quantitative data, including Strategies for Citizens engagement and stakeholders' involvement. The ECO XXI indicators are assessed by quantitative data. The year of reference is the previous year of the assessment. Meaning that this methodology allows the monitoring of each indicator' progress.

In 2015, Guimarães was 8th in ECO XXI National Contest. Last year, Guimarães was the third most sustainable Municipality in Portugal. Results of the European Green Capital candidacy will be known by 2018 as the submission process will take place in September during current year.

Both methodologies assess the indicators for economic development. ECO XXI assess City Hall performance in terms of increasing green jobs. In addition, a question on Municipality Employment Strategy for the territory. The indicator Eco-innovation (EGC) assesses not only the City Hall performance but also its capability on promoting initiatives to raise awareness among Privates to sustainable issues: Framework, Practices and Measurement of the initiatives.

3.4 Questionnaire Development - Validation

A questionnaire was developed to analyze Good practices that privates are implementing and that can contribute to the general goal of the city – become more sustainable and a global city; adding a new layer of sustainable development. The questions toke in consideration the indicators from both methodologies – ECO XXI and ECG. The questionnaire was divided in three main parts. The first part was related to a characterization of the Industry namely, localization, size, sector of activity and number of employees. The second part was related to the general practices in terms of industrial waste, certifications, green areas maintenance, Environmental Acoustic, company fleet. The implementation of good practices among workers such as carpooling, use of bike were included. The third part includes questions focused on working conditions. Several questions, were included focusing on investment constructive measures to promote health and wellbeing among workers; mainly when a risk factor was identifies. Investment on Personal Protection Equipment was also asked as well as training sessions.

To test the sensibility of the questionnaire a sample considering five industries, was used. All the industries were from Textile sector being Medium Size Companies (less than 50 employees and less than 10 million euros of Market Turnover). Two of them have certification for quality and Environment (ISO 9001; ISO 14001), one also have certification for Safety Systems (OHSAS 18001). All the Industries answered affirmably regarding waste treatment, industrial waste, green areas maintenance having also concerns on Acoustic and air quality. Nome of the companies promotes good practices among workers regarding sustainable mobility but one is investing in electrical cars (Industrial fleet). Regarding constructive measures or investment on Personal Equipment, they refer that only the necessary to fulfill the law requirements.

4 Final Remarks

It became important to analyze Guimarães Industries and Industrial parks in terms of sustainable performance due to city representability in terms of industrial tissue. This analysis should consider three premises: (1) the Occupational context is a part of a System (organization) [8], (2) the sustainable development of a company considers the working conditions [15], (3) Workers are also citizens of a given place (external environmental) that contributes to his permanence. Therefore, in terms of city global goal, an assessment on companies' investment on sustainable practices that can beneficiate-working conditions should be done.

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