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SUSTAINABLE DEVELOPMENT IN URBAN AREAS

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Abstract

Like in other EU countries, in Poland can be observed many ecological activities that play an important role in a balanced development of the society. Bicycle-sharing systems get more and more popular. In urban areas, tramway lines are being constructed. Local governments promote healthier and faster means of public transport. However, there are many problems waiting to be solved. This article describes a complexity of problems related to the sustainable development in urban areas. This kind of activity is represented by many different undertakings (projects) aiming for an improvement of human life while remembering about future generations. Like any project, eco-urban-projects have several important aspects that need to be considered (managed). Among them there are a cost, a scope and a schedule of the project. A quality seems very important too. Apart from the constraints represented by the Iron Triangle¹, eco-urban-project planners and managers should remember about its uniqueness based on a significant impact on the environment. None undertaking is successful if it is not consulted with all stakeholders, especially those who are engaged in a dialogue on better development based on sustainability (e.g. civil society or public authorities). In the article, some examples of best practice for sustainable development in city areas were presented. A risk of eco-urban-projects was discussed.

¹ Iron Triangle (also called Project triangle), a project management concept consisting of three (sometimes four) constraints: time, cost, scope (and quality).

Introduction

A term *project* relates to an original undertaking, aimed at solving some particular problems, while taking an opportunity or fulfilling some other business requirements. A project owner achieves a specific, detailed goal, in accordance with a schedule (start and end dates). To do so, it uses particular resources – especially a project budget. [1]

In construction investment projects there are many processes that can be defined as series of coordinated actions leading to an execution and a maintenance of a planned construction investment within a limited time and a budget. [2]

A complexity of the construction-investment projects results in a risk of achieving some established goals. In this case, *risk* can be defined as a probability of lack of the success of taken actions. [2] [3]

Nowadays, more and more people realize that limited resources are not only a matter of the limited money they have but also and maybe primarily it is a matter of the resource limitation itself. Moreover, many urban areas all over the world have been developed rapidly. It caused some serious environmental problems including pollution, floods, smog etc. These occurrences evoked a need for immediate changes. Today, a concept of the ecological perspective gets more and more popular and for many, a *sustainable development* is the only way to get rid of this problem.

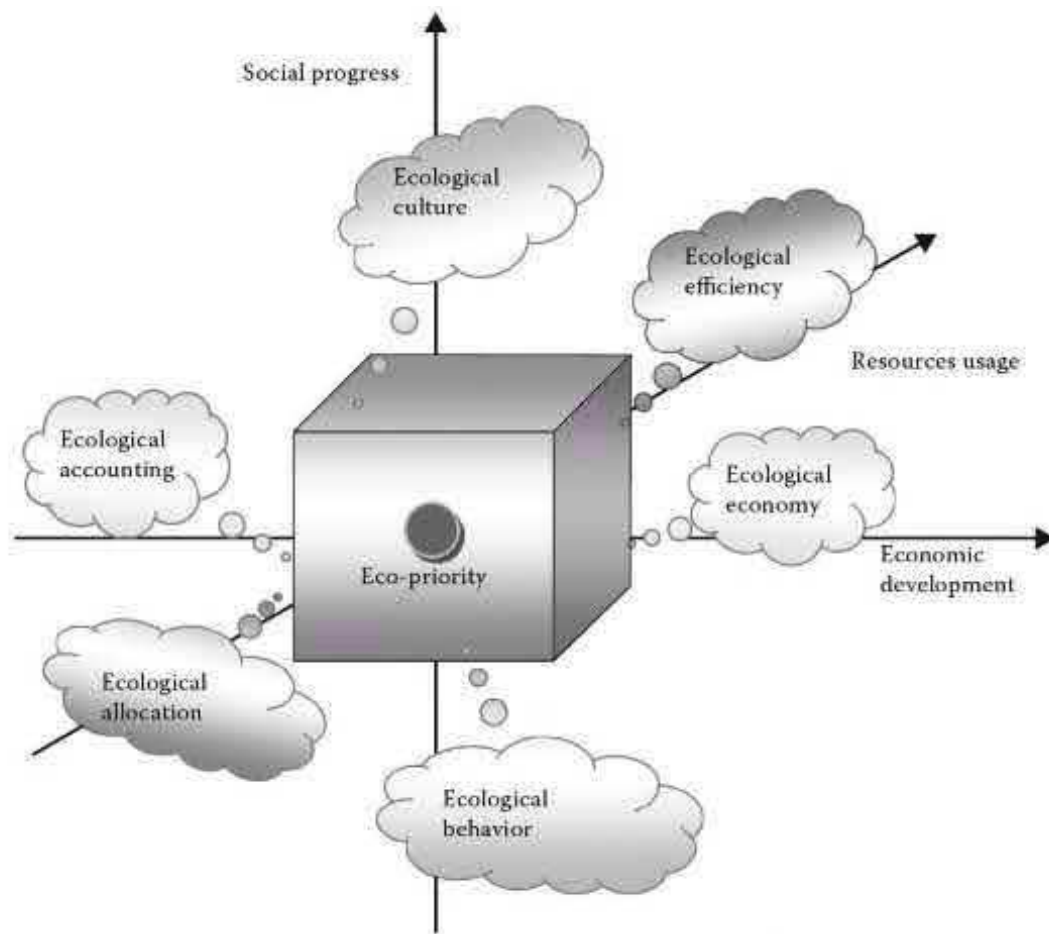
Sustainability in urban areas

According to [4], researchers and urban planners of urban systems are increasingly concerned about a question if cities can adapt to new, very drastic biological, geophysical and social changes that are caused by a process of industrialization and globalization? It seems that only quick and definitive decisions can help to avoid an ecological disaster in urban areas. In fact, a sustainable development, as an element of the permanent change in policy of companies or authorities and a change in behavior of every particular person, can become a solution of this problem.

As a matter of fact, there is no official definition of a sustainable city and many interpretations exist of which characteristics a city should present to be considered sustainable, and many are the criteria and indicators developed to assess them. They often include aspects of urban planning and community development [5].

A sustainability can be treated as an ability to improve the quality of human life while remembering about future generations. A development may be treated as a set of activities connected with executing construction-investment projects. Together they mean an attitude towards an eco-development so crucial in the construction industry. Figure 1, presents a concept of eco-priority cube of eco-city planning.

Fig. 1. A concept of eco-priority cube of eco-city planning



Source: [4]

A global urbanization trend seems inevitable and therefore cities are now subject to frequent assessment with the results often used by city leaders to announce and explain some of their investment decisions in urban areas. The challenges cities face are large and varied since sustainable development requires a wide range of outcomes to be achieved [6]. The way in which urban areas are planned, built and operated has a huge social, environmental and economic impact.

According to some research, across the world, cities are performing better for being sustainable for economic and environmental purposes, but are failing to sufficiently meet the social needs [6].

European leaders in sustainable development

According to [5], it is strongly believed that developing more sustainable cities is not just about improving the abiotic and biotic aspects of urban life, it is also about the social aspects of city life, that is - among others - about people's satisfaction, experiences and perceptions of the quality of their everyday environments.

There are many regional and international reports presenting official and unofficial sustainability rankings of cities [6] [7] [8] [9]. Majority of the reports maintain that European countries are leading most of the sustainability classifications. A world-wide sustainable cities top ten is very often dominated by European urban areas [6]. Significant is a number of places belonging to the European Union (EU). It proves a high dedication of the organization to ecology and sustainability issues.

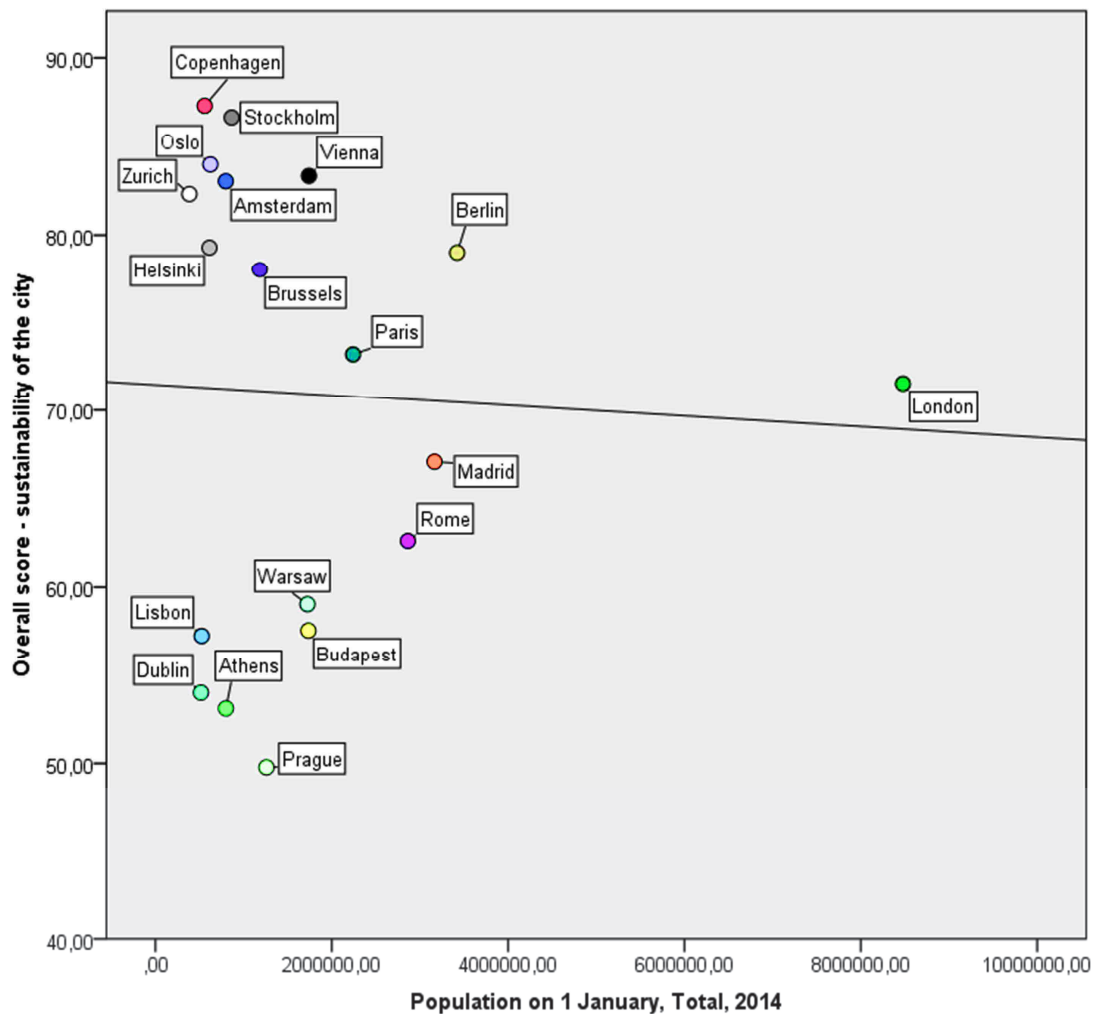
An initial assumption was very clear. The longer participation of a country in the European Union, the higher environmental performance of the leading city representing the country. This attitude was made on the basis of some remarks connected with an environmental policies on the EU market. A contribution of the European Commission to sustainable development is very common. The European Council in 2009 confirmed that "sustainable development remains a fundamental objective" of the European Union under the Lisbon Treaty. According to some reports, a number of unsustainable trends require urgent action: significant additional efforts are needed to curb and adapt to climate change, to decrease high energy consumption in the transport sector and to reverse the current loss of biodiversity and natural resources. Moreover, governance, including implementation, monitoring and follow-up mechanisms should be reinforced for example through clearer links to the future EU 2020 strategy and other cross-cutting strategies [10].

Another hypothesis was based on a relationship between a size and a wealth of the city and its environmental performance. Sustainable development seems quite expensive and - to some extent - luxury. Many cities can't afford some investments leading to cleaner and healthier procedures. On the other hand, the more citizens, the more problems local authorities have. Some problems may not be present in small communities whereas large agglomerations might face them all the time.

A research was prepared on the results of the European Green City Index report [7] and Eurostat databases.

Originally, The European Green City Index measures and rates the environmental performance of 30 leading European cities from 30 European countries. It takes into account 30 individual indicators per city, touching on a wide range of environmental areas, from environmental governance and water consumption to waste management and greenhouse gas emissions [7]. Intentionally, there were chosen 19 cities (17 EU members as well as Oslo and Zurich) from the original report. A connection between a size of the city and its sustainability performance is presented in the Figure 2.

Fig. 2. A correlation between population (2014) and sustainability performance (2009) in chosen European cities

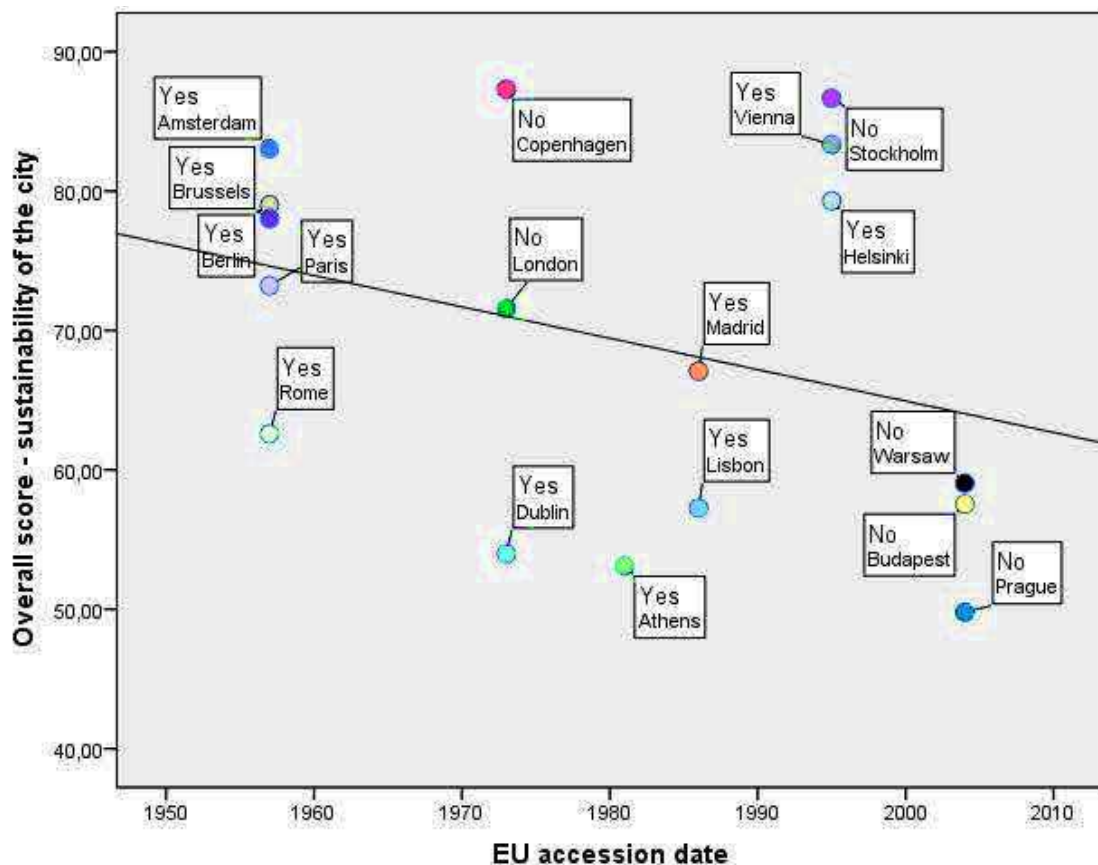


Source: own elaboration

It seems quite evident that the higher population the more environmental problems occur and the lower overall score in sustainability of the city. Moreover, it is very significant that leading cities from northern (with exception of Zurich) European countries invest more in sustainability in comparison to cities from countries of Southern Europe.

Additionally, it is very interesting that the longer participation of a country in the European Union, the higher environmental performance of the leading city from this country. According to Figure 3, where presented 17 EU members, the initial assumption was true. An enlargement of the European Union in 2004 started an improvement of the sustainability in cities of Eastern Europe but still Prague, Budapest and Warsaw need to follow the “senior” peers.

Fig. 3. A sustainability performance (2009), EU accession date and Eurozone membership (2016) of the country

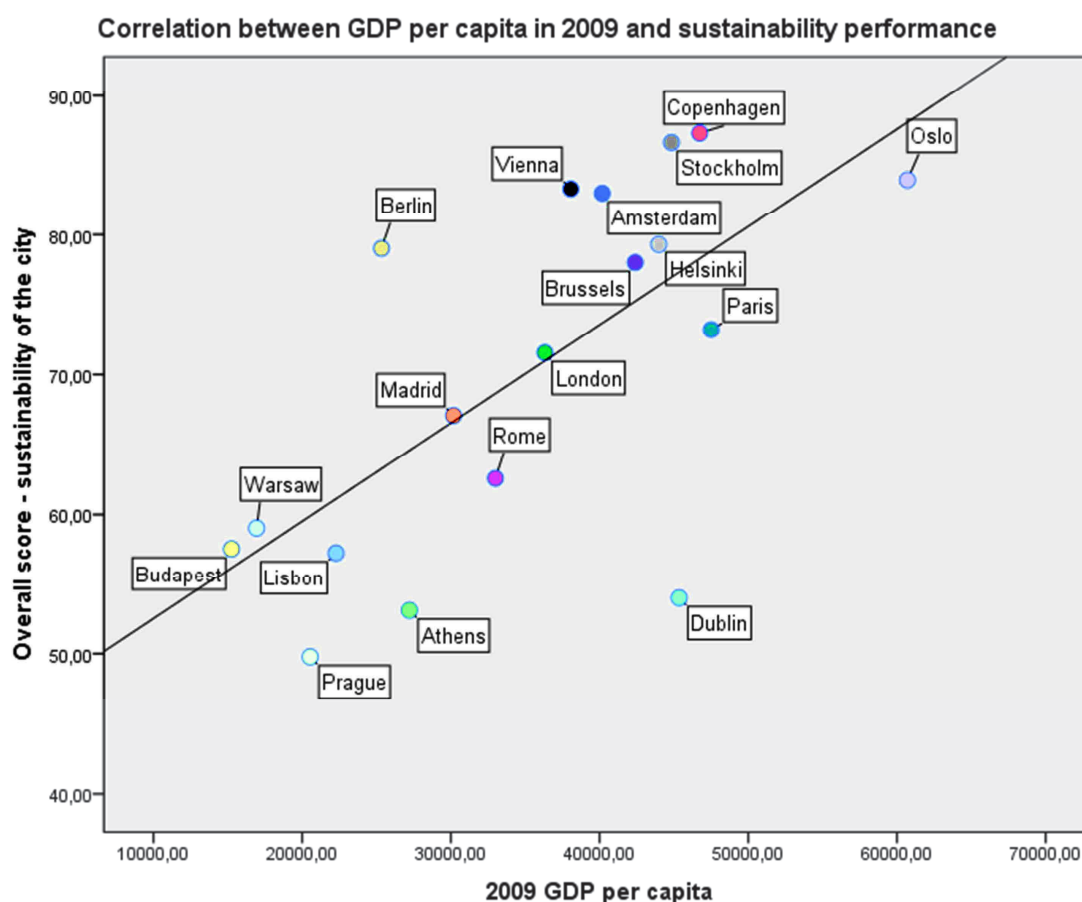


Source: own elaboration

Additionally, according to the results presented in the Figure 3, it is quite evident that apart from some exceptions, Eurozone membership has an impact on the overall score of the environmental performance. This phenomenon might have a relationship with a level of wealth of the country.

A correlation between 2009 GDP per capita of the city and its sustainability performance is presented in the Figure 4. The chart reveals the strong correlation between the two variables. The wealthier city, the higher sustainability can be observed in the urban area.

Fig. 4. A correlation between GDP per capita (2009) and sustainability performance (2009) of chosen European cities



Source: own elaboration

Scandinavian cities are the undisputed leaders of sustainability. On the other extreme, there are urban areas from the new EU-members and the southern countries. It can be noticed that developing cities like Warsaw,

Prague and Budapest should treat a regression line as a baseline for their balanced development.

According to [7] [8], there is a moderate positive correlation (0.64) between air quality (objective parameter, indicator from 0 to 10) treated as an independent variable (X) and air quality satisfaction (subjective parameter, indicator from 0 to 100) treated as a dependent variable (Y) in the seventeen, mentioned before, EU-member cities. A relation between those variables is presented in the Figure 5.

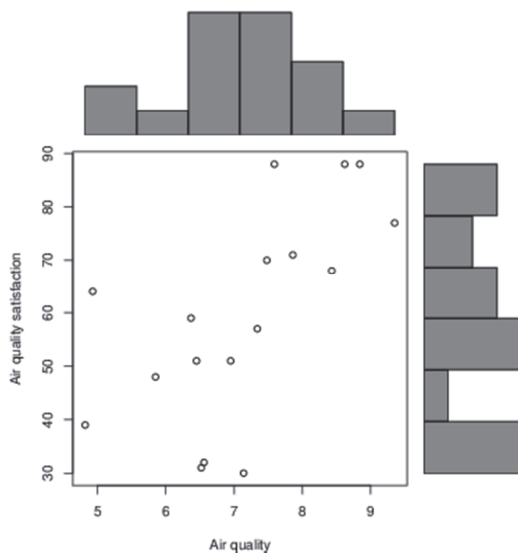


Fig. 5. A relation between air quality and air quality satisfaction among citizens according to the research [7] [8]

Source: own elaboration, based on: Wessa P., (2015), Pearson Correlation (v1.0.10) in Free Statistics Software (v1.1.23-r7), Office for Research Development and Education, http://www.wessa.net/rwasp_correlation.wasp

Moreover, a given data demonstrates characteristics of a normal distribution. Both variables pass the Anderson-Darling normality tests (p -values greater than 0.05). It allows to state that no significant departure from normality was found.

Results of the statistical analysis, i.a. normality tests are presented in the Table 1.

Table 1. Results of the statistical analysis of air quality and air quality satisfaction

Variable: X	Variable: Y
Name: air quality	Name: air quality satisfaction
Mean: 7.12	Mean: 59.53
$A = 0.17278$, $p\text{-value} = 0.9132$	$A = 0.28735$, $p\text{-value} = 0.5762$

Source: own elaboration, based on: Wessa P., (2015), Pearson Correlation (v1.0.10) in Free Statistics Software (v1.1.23-r7), Office for Research Development and Education, http://www.wessa.net/rwasp_correlation.wasp

Steps in right direction

According to [3], construction investment projects consist in spending money on creating the brand new or some additional assets that a company (or a community) intends to convert into future benefits. A typical goal of this kind of projects is to build/construct, renovate, or improve a building or an infrastructure that is a result of the project.

Like any project, eco-urban-projects along with construction investment projects have several important aspects that need to be managed. Among them there are: a cost, a scope, a schedule and a quality of the project. A high complexity of the projects comes from their specificity. Unique features are connected both with the structures (results of the project) as implants of the environment as well as with the whole investment process and the project's stakeholders.

Projects are prone to a changeability of their circumstances what can cause a risk. An essence of the risk is a possibility of occurring unexpected changes in comparison to initial frames. The risk is usually associated with a negative situation. However, some planned values may vary from the real ones what might mean, for example more profit than previously expected. Outcomes of the decisions may be connected with losses or gains relatively to a plan, nevertheless, in both cases a risk occurs.

The risk assessment process is very valuable. Within the COSO framework, it follows event identification and precedes risk response. Its purpose is to assess how big the risks are, both individually and collectively, in order to focus management's attention on the most important threats and opportunities, and to lay the groundwork for risk response [11].

Risk response is a process of preparing strategic options, and determining actions, to get the most from opportunities and reduce threats to the project's objectives (e.g. to avoid, to transfer, to share, to mitigate, to accept risk etc.). However, the investors of eco-urban projects might plan them in such a way to avoid some risk factors (e.g. inefficient use of space) from the very beginning of the project.

Scandinavia can be treated as a source of best examples, including vehicles bans, "green waves" and bike lanes for cyclists etc. However, some good examples can be observed also in southern countries. Likewise other Italian urban areas, local authorities in the capital of Tuscany, Florence, have decided to introduce a limited traffic zone in the downtown, making the city pedestrian friendly zone. The idea proved to

be effective in reducing carbon emission. This zone is marked with signs indicating a start of the restricted traffic zone (zona a traffico limitato, ZTL) as well as telling when you can and cannot enter (Figure 6). Moreover, to use area more efficient, for those cars that cannot be banned from the city center, there were created special car parks in the place of empty market stalls which normally surround market building at Piazza Lorenzo Ghiberti (Figure 7). Drivers are allowed to leave their cars during market-off hours (Figure 8). The idea is not unique but even quite popular in other southern countries. Such experiments can be noticed also in Spain and France.

Fig. 6. Limited traffic zone, Florence (Italy)



Source: own elaboration

Fig. 7. Piazza Lorenzo Ghiberti, Florence – market-on hours



Source: maps.google.com

Fig. 8. Piazza Lorenzo Ghiberti, Florence – market-off hours



Source: own elaboration

Errors beyond repair?

The restricted traffic zone in Florence is open to limited number of cars including electric public buses. For example, small and silent Gulliver vehicles (Figure 9) are allowed to enter a historical center of the city.

In contrast to Tuscany, some risky and not entirely reasonable ideas are brought to life in Poland, namely in Bydgoszcz. Recently, some historical bus lines were established. They are operated by old fashioned and, to make matters worse, highly polluting Ikarus (Figure 10) and Jelcz buses. Is it really appropriate for the city which tends to be “eco” in some aspects of life (waste management, energy efficiency etc.) to fail in the others? In this case, taking no account of an evident ugliness of the Ikarus bus, it has to be underlined that the best place for such vintage buses is in the automobile museums not in the historical center of the city.

Fig. 9. Electric Gulliver bus in the city center of Florence



Source: own elaboration

Fig. 10. Historic Ikarus bus in the city center of Bydgoszcz (Poland)



Source: own elaboration

In EU countries, can be observed many ecological activities that play an important role in a balanced development of the society. Bicycle-sharing systems get more and more popular nowadays. One of the most popular European public bicycle network was created in Paris and called Vélip'. It is operated as a concession by the famous French advertising corporation. It is the largest European bike-sharing program by the number of bicycles in circulation [12]. A redistribution of the bikes is also possible thanks to the clean natural gas maintenance vehicles owned by the Vélip' operator (Figure 11).

Moreover, having a respect for the environment, the operator launched a Cyclocity boat which floats on the river Seine (Figure 12). The boat is a moving workshop. Public bikes can be collected on the boat, repaired and redistributed by this mean of transport.

Unfortunately, not everywhere a concept of the bicycle-sharing system was designed with a full care of sustainability like in Paris.

Like in other EU countries, in Poland public bicycle networks are also very common. A brand new public bike system was launched in Bydgoszcz in 2015 (Figure 13). It became the most popular bicycle-sharing system in Poland in the first year of operation [13]. A position in the ranking may be a reason for a satisfaction, but on the other hand, if it used some recommended solutions from Paris, the system would be more efficient and have more contribution to sustainability than it has now and indeed some improvements are not impossible.

Besides some gaps and errors have been made, Bydgoszcz still have a possibility to become a leader of sustainability in Poland. According to latest reports, a capital of the Kuyavian-Pomeranian Region is known as “a green city located on the river” and is in the top 9 of the Polish sustainable cities [9]. All recent efforts of the authorities let to believe that in the upcoming rankings a position can only be higher.

Fig. 11. Clean natural gas maintenance vehicle of Vélib', Paris (France)



Source: wikipedia.fr

Fig. 12. Cyclocity boat of Vélib', Paris



Source: www.gettyimages.com

Fig. 13. A station and a maintenance vehicle of the public bike system, Bydgoszcz



Source: own elaboration

Summary

A complexity of problems related to the sustainable development in urban areas are evident. This kind of activity is represented by many different projects aiming for an improvement of human life while remembering about future generations. Eco-urban-projects have several important aspects that need to be managed. There are four determinants of the project success: a cost, a scope, a schedule and a quality.

Apart from these constraints, eco-urban-project planners and managers should remember about its uniqueness based on a significant impact on the environment. None undertaking will not be successful if it will not be consulted with all stakeholders, especially those who are engaged in a dialogue on a balanced development (e.g. civil society or public authorities).

Nowadays, more and more people realize that limited resources are not only a matter of the limited money they have but also it is a matter of the resource limitation itself. Moreover, a rapid development in many urban areas all over the world causes some serious environmental problems including pollution, floods, smog etc. These occurrences evoke a need for immediate changes.

Today, a concept of the ecological perspective gets more and more popular and for many, a sustainable development is the only solution.

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