EVALUATION OF THE IMPLEMENTATION OF THE SMART CITIES CONCEPT FROM THE POINT OF VIEW OF THE BENEFIT FOR THE URBAN FORESTS OF THE CITY OF BRNO

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Abstract

The scope of Smart City issues is very wide and affects all areas of the city of Brno. When the term "city" appears in the concept, it is always taken as a whole, including municipal companies and established contributory organizations. Smart City is therefore significantly associated with the involvement of the urban ecosystem in the development of the city, where each of the actors has an irreplaceable role. This can take the form of participation in events, workshops and meetings, which serves to find the future direction of the city, gather ideas for its development, as well as to test the functionality or verification (proof of concept) of individual projects. There are many positive and interesting ideas, concepts and projects that incorporate digital technologies in urban forest management being supported by smart urban forest strategies and tree management policies. The contribution evaluates how these concepts affect the suburban forests of the city of Brno.

Key words: smart city, urban forests, development, smart urban forest

Introduction

In the last century, two important phenomena could be observed in the world, namely the increasing urbanization and the rise of information and communication technologies (ICT). Advances in technology have been most evident on the face of major cities. This has led to a slow movement of rural populations to the cities, and this has brought some positives for the cities, but it has also meant that new challenges have emerged that have had to be faced. For example, the increased concentration of people in cities led to road infrastructure becoming inadequate, increased concentrations of carbon dioxide and other greenhouse gases, and this pollution had negative impacts on citizens' health (Caragliu and Nijkamp, 2011). In conjunction with the Kyoto Protocol, the concept of 'smart cities' was born at global level. It combined smart innovative technologies and projects with sustainable development, i.e. development that is environmentally friendly and respectful of both current and future generations. A universal definition has never been established, but major world organizations (European Commission, UN, OECD) have all adopted the concept in more or less the same form (Caragliu, Nijkamp, 2011). The European Commission defines a smart city as "a place where traditional networks and services are streamlined using digital and telecommunications technologies for the benefit of citizens and businesses" (European Commision, 2019). Smart city is not limited to the information and communication technology (ICT) component. A smart city goes further and seeks to achieve more efficient use of resources and reduce emissions. It also lists the areas that such a smart city focuses on and tries to innovate. These include modernizing the transport network, water supply or waste management. In addition, more efficient ways of lighting and heating buildings, interactive city management that communicates with its citizens, safer public spaces and last but not least, the European Commission places emphasis on meeting the needs of an ageing population (European Commision, 2019). The Smart City concept was first discussed at European level in the Strategic European Technology Plan (SET Plan) in 2007. The aim of the plan is to achieve energy savings through a range of measures and to open up issues related to the future of energy (Ministry of the Environment, 2015). In 2011, the Smart Cities & Communities Industrial Initiative was launched to address in particular transport and energy issues. This initiative was followed up in 2012 by The European Innovation Partnership for Smart Cities and Communities, whose main objective is to find solutions to the various problems facing European cities (traffic congestion, greenhouse gas production, excessive energy consumption, etc.). According to the Ministry of Regional Development of the Czech Republic (2015), the comprehensive Europe 2020 Strategy (Europe 2020), which aims, among other things, to promote a low-carbon economy, can be considered as a starting document that also touches on the issue of Smart Cities.

Material and methods

The article was prepared by researching the available information on the smart city concept from the European and national perspectives and especially with a focus on the city of Brno. A literature search

was performed online in multiple databases using terms such as 'smart city concept' 'urban forest', 'urban forest planning', 'smart urban forest'. Information was obtained mainly by studying websites and strategic documents or individual concept documents. On the basis of available data, an assessment of the importance of this concept for suburban forests was prepared. The Czech Republic does not have a single strategic document directly addressing Smart Cities. Individual elements that are part of the Smart City concept are addressed in various sectoral documents (MMR CR, 2015):

▪ State Environmental Policy ▪ State Energy Concept
▪ Transport Sector Strategy
▪ Digital Czech Republic 2
▪ Action Plan for the Development of the Digital Market ▪ National Action Plan for Clean Mobility

Despite the absence of a single Smart Cities document, the Czech Republic is responding to this issue. Under the Government Council for Sustainable Development, a working group on Smart Cities has been created to try to create the necessary basis for documents of a strategic nature. In addition, it has the task of organizing seminars on Smart Cities, which are attended by various experts, academia or the private sector (Ministry of Regional Development of the Czech Republic, 2018). The smart city concept includes a smart environment. The challenge of recent years has been episodes of drought, which, as a result of climate change, are affecting the whole world, Europe and the Czech Republic included. Water is also an important element in the landscape, especially its successful retention in the landscape so that there is no rapid surface runoff and subsequent runoff from the landscape. Even in the city, there are countless rainwater retention measures. A smart city is therefore also a city that actively participates in water retention in the urban environment. Manville et al. (2014) conducted an analysis of cities at the European level. Only cities with more than 100,000 inhabitants from all EU Member States were included in the city assessment (the total number was 468). The evaluation method consisted first of creating a custom definition of a Smart City. To be considered "smart" a city had to fulfil at least one of the identified characteristics. The authors applied a classical approach and selected the individual subsystems of the Smart Cities concept as indicators - Smart Governance, Smart Economy, Smart Mobility, Smart Environment, Smart People and Smart Living. The cities were further subjected to a thorough investigation, e.g. whether the city has a Smart City strategy or whether a pilot testing and implementation of the strategy has already taken place. Manville et al. (2014) concluded that the frequency of occurrence of Smart Cities is directly proportional to population. Of the 52 cities with more than half a million citizens, only six could not be considered 'smart'. This phenomenon shows that the concept of Smart Cities is a growing phenomenon and is receiving the most attention, especially in large cities. Cities are particularly successful in the area of Smart Environment. This is, of course, because cities are increasingly committed to sustainable forms of development, recognising that environmental protection must be a priority. Albino et al (2015) provides more detail about the definitions, dimensions, and evaluation of the smart cities concept through time. Smart city definitions include six main components: smart "governance, economy, people, mobility, living and environment" (Lombardini et al., 2012) while assessing the performance of the smart cities (Yigitcanlar, 2015). Smart environment is mostly promoted in the field of water conservation and air quality improvement. Alternatively, increasing the amount of urban green space. The focus on suburban forests is still in the background.

Smart city and suburban forests

There are extensive research and documents on the importance of the urban forestry and greening area and its benefits to human wellbeing, and contribution to the economic value of the city (Anguluri and Narayanan 2017). The role of the urban forestry and urban green areas becomes crucial due to rapid population growth in the cities and slowly integrated into the smart city concept. There are several successful cities in the Czech Republic that can proudly consider themselves Smart Cities. Most of them are cities at the regional level, which can be characterised by a higher population, well-developed services, good transport infrastructure and, of course, easier access to financial resources. According to Pělucha (2012), the Czech Republic is characterised by a relatively specific settlement structure. Compared to other European countries, it is characterised by a relatively high number of smaller rural municipalities, which make up about 90%. At the same time, we also have a small number of large cities - after Prague, Brno and Ostrava, there are only a few cities with a population of around 100 thousand. Smaller towns have, of course, more difficult conditions for the implementation of Smart Cities activities. According to the research of the Czech-German Chamber of Commerce (2017), hereinafter referred to as CNOPK, which was devoted to the evaluation of the Smart Cities concept in municipalities and cities in the Czech Republic, cities and municipalities are most limited by budgets and finances in general, excessive bureaucracy, lack of professional or personnel capacities,

lack of concept, lack of information and know-how. Low citizen participation is also a problem. However, it is surprising that 64% of cities and municipalities have no Smart Cities agenda or strategy at all. The majority of cities over 10,000 inhabitants have their own coordinator dedicated to Smart City issues (CNOPK, 2017). Therefore, the starting point may be rather the promotion of Smart Regions, which are created at the level of regions. Regions, as higher self-government units, obviously have a greater opportunity to implement Smart Cities projects due to their larger budget. They are also able to concentrate more experts in key areas. In addition, it is very important to promote meetings with representatives of other cities where activities related to Smart Cities issues have already been implemented. The use of new technologies optimises public and social services and makes them more efficient and accessible. It helps to create a more open and skilled society and, above all, to improve quality of life. Local politicians and officials should aim to facilitate the interaction of the general public with the government and to improve and simplify administrative procedures. Promote and develop e-government services so that people can communicate and handle their affairs quickly, flexibly and efficiently. Digitalisation at the municipal and city level cannot make full progress without digitalisation at the state level, yet there are many opportunities for improvement in this area as well. As the mobility of the population increases, transport is also becoming a discussed aspect of smart cities. Ideally, transport should be simple, fast, and put as little strain as possible on visitors and residents, as well as on the environment. Smart cities are thus about building cycle paths, designing the safest possible transport systems, connecting even better with ICT and open data infrastructure, as well as promoting and improving public transport travel options and other alternatives. However, efforts to build urban smart elements are not always met with a favourable outcome. Growing consumption and urbanization put broader environmental pressure on ecosystems (on water, air, natural resources, land and biodiversity), while ecological stability requires that economic consumption of the products and services of nature be compatible with the rates of production and the assimilative capacity of the ecosphere (Rees, 1995). Furthermore, the environmental impacts of human activities come back to society in the form of negative health impacts and deteriorated living environments. Demand in urban areas tends to be more sophisticated and environmentally aware. Urban residents are more likely to download apps to avoid food waste or to think about their carbon footprint. This allows cities to experiment to find out what works, and then to scale up good ideas to rural areas and other cities and beyond. In 2017, the #brno2050 Strategy and its long-term vision for the development of the city were approved. The vision is based on 23 values important for the long-term development of the city. Each value has its own expert guarantor. These guarantors are independent, respected experts in a number of fields important for the comprehensive development of the city. The vision is further developed into more specific plans, which contain priorities for the next 10 years, and action plans with individual projects and activities for the coming years.

The City's development focuses on three areas:
1) resource efficiency
2) quality of life (environment, prosperity, services)
3) effective governance

Results

Environment and blue-green infrastructure

A healthy environment is the foundation of a sustainable and smart city. Reducing environmental burdens is at the forefront of environmental care. Without a sophisticated environmental policy, the rapid economic growth characterised by a linear buy-use-dispose economy would have much greater impacts on ecosystems and human health. Basic sustainability must be ensured by using as sparingly and efficiently as possible all the materials and energy resources we need to live our lives. The solution lies in innovation to provide the same or better services while reducing environmental burdens and improving quality of life. To monitor whether this has actually happened, innovative indicators are used to compare environmental performance for better decision making in city management (e.g. automated monitoring). It should be remembered that well-designed environmental policies also create economic opportunities. An important aspect is to regularly inform the public about the state of the environment in the city where they live. Environmental thinking should be a natural part of people's thinking.

Overview of the objectives of the area
- Strengthen the services provided by the landscape
- Ensure the protection of all components of the environment
- Implement and integrate climate and environmental policy
- Create and protect a coherent system of green and blue infrastructure in the city

PROCESS AND ORGANISATIONAL RECOMMENDATIONS FOR EVALUATING THE SMART CITY CONCEPT		
Environmental policy The City has an environmental policy or strategy and regularly updates its approaches so that they lead to: - Mitigating impacts on human health and ecosystems; - Adapting to anticipated climate change and increasing resilience; - Avoiding major risks (precautionary and preventive measures); - Restoring the resilience of societies and ecosystems by strengthening the care of natural resources; - Taking the carbon footprint into account when developing strategies and policies in other areas local government. The policy itself takes into account the national objectives of the Strategic Framework Czech Republic 2030, the State Environmental Policy 2012-2020, and possibly related strategies (biodiversity, air quality, etc.). Recommended frequency of updating the document: 3-5 years	YES	NO
Climate Change Adaptation - Strategy and Crisis Plan The city applies the main recommendations and measures for adaptation to climate change according to the Climate Change Adaptation Strategy for the Czech Republic (2015) and has developed its own locally specific adaptation strategy (especially with regard to maintaining water in the landscape and reducing the risk of all types of erosion, especially water and wind erosion). The city has developed a crisis management plan for critical situations ("disasters") in water supply, waste management, floods, drought. Methodological support can be found at www.adaptacesidel.cz. Recommended frequency of updating the document: 3-5 years	YES	NO
State of the environment report The City collects data, analyzes it, and regularly informs the residents of the City about the state of all components of the environment, preferably through the City's Environmental Yearbook. It informs not only about the current state, but also about the development over time, or compares the results of environmental indicators with monitoring in previous years. Recommended frequency of updating the document: 1 year	YES	NO
Information systems The city contributes to nature conservation by using the information systems of the Ministry of the Environment, such as the IS of the Convention on Biological Diversity, IS of Nature Conservation, IS of Flood, IS of Air Quality, Integrated Pollution System, IS of Waste Management, IS of Hydroecology, Register of CITES, etc. Recommended frequency of updating the document.	YES	NO
Department or expert responsible for collecting data on the state of the environment The City has an expert or group of staff tasked with collecting environmental data, updating strategies, and monitoring changes in the state of the environment. The same or a separate staff member may be assigned the task of climate protection and adaptation of the city to climate change. The regular evaluation of this data is used by the staff to plan environmental protection. They use the means of new technologies and ICT to carry out their work.	YES	NO

Stable and diverse ecosystems are central to maintaining a healthy environment. The development and management of the City is careful to maintain and enhance the ecosystem services provided by the landscape. Agriculture, forestry and water management take account of natural limits by improving soil conditions, slowing water run-off from the landscape and helping to maintain biodiversity. The development of settlements and technical infrastructure shall be carried out with the utmost regard to maintaining and enhancing the services.

Conclusion

What it all means for suburban forests. Increasing demands for digitalisation may place greater demands on suburban forest owners. There is also the likelihood of increased demand for bike paths and bike lanes, which if built would again lead to further constraints on forest owners' management. For a useful and successful solution to the SMART Czech Republic issue, it is necessary to meet some basic assumptions, or good cooperation in solving the challenges facing society in the Czech Republic. In the context of the Czech Republic, SMART solutions are those that meet the objectives and commitments of the Czech Republic in a timely manner, so that as the date of the required fulfilment approaches, there is no pressure for ineffective solutions due to lack of time. The critical ones include both those objectives and commitments that the Czech Republic has made within the European Union, and those that are beyond the commitments made by significant problems in the national context and require urgent solutions. At the same time, as stated throughout the document, SMART is a solution that brings significant positive effects in several areas.

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Souhrn

Digitální služby mohou městům pomoci oživit a zlepšit služby pro jejich obyvatele, a také řešit některé problémy, se kterými se dlouhodobě potýkají. Tyto problémy souvisejí s probíhajícími demografickými změnami, škrty ve veřejných financích a omezováním veřejných služeb nebo s velmi aktuálním přechodem na oběhové a nízkouhlíkové hospodářství. Digitální služby zde však nevystupují jako samospasitelné řešení, ale spíše jako nástroj pro efektivnější uplatnění tradičních způsobů řešení

problémů. Existuje již mnoho příkladů úspěšné praxe. Například se podařilo vyřešit problémy se zásobováním venkova I měst pomocí online tržišť, do kterých se zapojili místní výrobci a obchodníci. Efektivní komunikaci mezi obyvateli o otázkách obecního významu mohou významně podpořit integrované aplikace sociálních médií. Takové řešení umožňuje obcím velmi efektivně a transparentně komunikovat a diskutovat s obyvateli, stejně tak jako mohou pomoci k lepší realizaci a aplikaci konceptu smart city.

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