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BERTALAN Laura¹

Citizens' Perception of Urban Problems and Possibilities for Smart City Solutions. Case Study from Sopron, Hungary

The question of urban sustainability has come to the front of research in the past decade. It is resulting from the fact that the proportion of urban population continuously increase, according to the estimations 70% of the population will be urban citizen by 2050. On the other hand cities play a significant role in sustainability, climate protection and the reduction of harmful emissions. Several innovative initiatives were performed on the area of the establishment of carbon-neutral cities of zero energy consumption and sustainable municipalities.

The purpose of Smart City concepts is to maximize urban life quality and to increase energy efficiency, to reduce harmful emissions and to enhance the quality of urban services utilizing the possibilities provided by the available ICT-devices (Info Communication Technology). Nowadays the condition of the urban environment, the urban problems can be constantly measured and monitored by means of instruments and with the help of data analysis and process forecasts we can offer up-to-date solutions for them. Intelligent devices have come to the focus when researching city organizations.

In Hungary it can be seen that some cities already apply smart solutions and these have ideas about future development directions, but most of the cities have the term only from hearsay. Because in the subsequent years significant sources from the European Union will be available for the development of urban services and the enhancement of energy efficiency, it is important that the management of cities informs itself and opens toward smart application as possible.

Within the frame of a public survey in 2015 we have investigated the sensibility of the inhabitants of Sopron for urban problems and analysed, which urban processes are considered expressly harmful and which measures – even of smart character – would be kept important. In our article the results of the survey are presented.

Keywords: smart city, urban problems, environmental issues, sustainability, liveability, Sopron

Jel Codes: R000

Városi problémák lakossági érzékelése és smart városfejlesztés lehetőségei Sopronban

A városi fenntarthatóság kérdése az utóbbi évtizedben a kutatások előterébe került. Köszönhető ez annak, hogy a városi népesség aránya folyamatosan nő, a becslések szerint 2050-re a népesség 70%-a városlakó lesz. Másrészt a fenntarthatóság, a klímavédelem és a károsanyag-kibocsátás csökkentésében a városok meghatározó szerepet játszanak. Számos innovatív kezdeményezés történt a karbon-semleges, zéró energiateljesítményű városok kialakítása, illetve a fenntartható városüzemeltetés terén.

A Smart City koncepciók célja a városi életminőség maximalizálása és az energiahatékonyság növelése, a károsanyag-kibocsátás csökkentése és mindeközben a városi szolgáltatások minőségének növelése a rendelkezésre álló IKT-eszközök nyújtotta lehetőségek kihasználásával. Napjainkban a műszerek segítségével folyamatosan mérhetjük, monitorozhatjuk a városi környezet állapotát, a városi problémákat, és az adatok elemzésével, folyamatok előrejelzésével naprakész megoldásokat kínálhatunk azokra. A kutatásokban előterébe került az intelligens eszközökön alapuló városüzemeltetés.

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Hazai viszonylatban azt látjuk, hogy egyes városok már alkalmaznak smart jellegű megoldásokat és elképzeléseik vannak jövőbeli fejlesztési irányokról, de a legtöbb város csak hallomásból ismeri a kifejezést. Mivel az elkövetkező években jelentős európai uniós forrás áll a városi szolgáltatások fejlesztésére és az energiahatékonyság növelésére, fontos, hogy a városok vezetése tájékozódjon, és lehetőségeihez mérten nyisson az okos alkalmazások irányába.

2015-ben lakossági felmérés keretében vizsgáltuk a soproni lakosság városi problémák iránti érzékenységét, elemeztük, hogy mely városi folyamatokat látják kifejezetten károsnak, és milyen – akár smart-jellegű – intézkedéseket tartanának fontosnak. Cikkünkben bemutatásra kerülnek a felmérés eredményei.

Kulcsszavak: smart city, városi problémák, környezeti problémák, fenntarthatóság, élhetőség, Sopron
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Introduction

The city, the most ancient forms of life in human being is one of the most important products and carriers of its culture. Today, when a significant part of scientific sphere or the man of media and public discourses about future framed by environment change and energy crisis, as a matter of fact the future of the city is weighed up as well. Although the cities are the main centers for concentrating the population, value creation and consumption, their impact reaches far beyond their borders and their close environment; huge amount of people, goods, information etc. are kept moving day by day by them. Cities as admired works of artificial culture and architecture have become the symbols of non-sustainable human way of living and unsustainable development by today.

The literature covering sustainable development and the different documents dealing with development policy consider the question of the sustainable urban development, climate protection and the provision of economic sustainability as serious challenge (*Lukovich et al., 2013*). After realization that regarding the entirety of mankind significant steps shall be made forward for sustainability, the European Union and its individual member states and several countries of the world have set brave goals to reduce harmful emission, increase energy efficiency and enhance renewable energy utilization. Reaching the goals not only depends on the creation of national political frameworks and appropriate city-level measures, but also on local society. For this reason it is an important question, what does the local society perceive from environment problems at all, what is considered an acute or relevant problem and which are the questions, to which it is insensitive, or which cannot be perceived by the average urban citizen at all. After perception there is always some action, the logic seems to be simple, namely if there is no perception, then there is not any frustration related to the problem and the reaction also fails.

For this reason the importance of investigations researching problem perception does not only aim to show the urban politics, how the local population considers some urban questions, but political reactions can be also promoted and the public engagement can be also deepened related to an affair respectively. In my research I have focused on the topic of perception first of all, in order to place the weight and judgement of environmental and social affairs among urban problems. Additionally, because in the European Union and in the big cities of the world according to the spirit the citymanagement applying smart infocommunication technology-based solutions uniting sustainability and life quality purposes come more and more to the front, I attempted to survey the opinion of the population about this too.

The location of my survey is Sopron, which is a border city of 60 thousand inhabitants adjacent to Austria and Vienna. Variegation is characteristic for the current image of the city, which is owing to the historic city part remaining as unique unit in Hungarian relation. The historic inner city and the surrounding historic suburbs continuously employ urban designer experts since the evolution of the urban development and national monument protection in the 20th century, these city areas are historic scenes, due to the characteristics of the artificial environment these imply the problems of both the social devolution – social rented flats, senescent inhabitancy of lower status – and functional under-utilization. It is not by accident that the development attempts of the city mainly concentrate on the renewal of these areas – in the built environment at least. The historic city parts of medieval origin are surrounded by suburbs also considered historic today, which constitute the transition towards new city parts. Socialist housing estates, rust zones or old-new family house zones can also be found. According to the local urbanization of our times most of the “actions” take place at the city edges of Sopron; since 1990 due to urban expansion previous garden-plot zones and plowlands have become family house or multy-storey dwelling zones or new industrial areas and shopping zones.

Resulting from this Sopron is not exempt from environmental problems, which are the consequences of wasting area usage or increasing vehicle traffic. The phenomenon resulting from the border city character; however it is of unique character in the whole country, because Sopron has become the springboard of Austrian work opportunities. According to the telling data in the register of KSH (Central Statistical Office) almost 70% of commuters commute abroad day by day, namely assumedly to Austria and these data are not approached by the data of any other Hungarian city (*KSH Census Data, 2011*). The population of the city increases: a part of the people moving in arrives here due to the Austrian work possibilities and another part arrives here due to the excessive lack of qualified workforce experienced in this context. Apart from the shopping tourism of long range dependence and the currently prosperous dental and health tourism, there is always something happening along the border. Considering all the above Sopron has proven an ideal investigation subject.

Smart City concept for sustainable cities

The term Smart City and the related urban development solutions are getting very popular in the profession. Although the term has already gathered ground in strategic documents, city media or marketing surfaces, its meaning is uniform neither in literature, nor in public use, a common acceptable definition is still not created (*Angelidou, 2015*). Literature investigations prove that the *human being, living quality and sustainability* are in the centre of smart city approaches and concepts, for this the reasonable utilization of urban resources, the management of urban problems and actually the organization of urban life are performed with the assistance of ICT devices and the data available through them. In order to eliminate the wasting utilization of resources the European growth strategy and via this the national development politics of individual member states also attempt to establish smart and sustainable economy. The increase of energy efficiency is a primary objective of *Europe 2020 Strategy*.

Similar to everyday life, smart cities and development solutions are already unimaginable without info-communication devices. The amount of the producible data increases exponentially day by day, this phenomenon is called by the international literature *BIG DATA*, or it can be read as age of data overflow (*Ders, 2015*). This huge data amount brings changes from qualitative and approach point of view owing to different analysis methods in urban planning and development. The so called open access databases (*Open Data*) already reflect a new kind of information and data collection demand: against the previous central data collection methods the purpose of data collection and service here shall be the final user, namely the urban community, the urban citizen and the city management. This change of accent can be observed not only among final users, but also on the level of the investigated processes, the measurement of micro-level events comes to the front against processes of macro-character. The time of data cognition minimizes and one-direction data flow is exchanged by interactivity (*Ders, 2015*). The availability of data allows the so called “smart” urban planning, when complex geoinformational databases and the complex analyses thereof support city planning (*Szczuka, 2015*).

The real-time data – or smart data – become available owing to the instrumentation (Internet of Things), however these data are currently not readily available or not comparably available in the majority of cities. Nowadays the measurement of real-time data is essential, because through them in addition to the available static and past data municipalities can receive information, which provide a more exact picture about the operation and liveability of the city and the efficiency of utilization of resources respectively (*Marsal-Llacuna et al., 2015*).

The international literature emphasizes the measurement and ranking of the “smartness” of cities. The analysts attempt to rank cities by analysing several indicators and using

different mathematical-statistical methods regarding the development, competitiveness and last but not least smart-characters, with the purpose, that the urban designer can relate the progress of their own cities compared to others (*Lazaroiu et al. 2012; Lados et al. 2011; Giffinger et al., 2007*). Due to the fact that the cities appear at different places in the individual rankings depending on the methodology and databases the single cities appear at different places, a need to prepare a generally accepted, objective „smart city index” has come up. Currently the indexes are being standardized with the assistance of a board established by ISO (International Standards Organization) for this purpose (*Marsal-Llacuna et al., 2015*). However the standardization of the indicators is not simple, mainly the availability of data causes the difficulties. There is a fear that the application of the standardized index will be extremely complicated and the required data make the calculations fairly cost-intensive.

Local urban practices

Upon examination of the success of Smart City concepts it can be stated that a critical urban mass of extent is required (*Belanche et al., 2015*), which uses the infrastructure of the city, participates in the data provision and lay down the directions of urban processes and developments. The instrumentation, the establishment of ICT-conditions are fairly expensive, the return period is generally long, so smaller cities can be hardly integrated into the row of big cities applying real smart solutions. In addition cost facts and sustainability questions the level of informedness and openness of urban citizens are also dominant factors in the utilization of smart solutions, because the more urban citizen uses the opportunities provided by the Internet today or uses different mobile phone applications, the bigger space has the city for the wide application of e-services, Internet-based communication channels or even GIS-based mobile phone measurements. So it can be stated that “smart” urban citizenship is a critical factor in such developments. It also means that the municipalities shall make significant steps to encourage the population to regularly use public e-services and e-communication channels.

Although during the traditional operation of cities several databases are created, most often these are not handled by one person in one hand most often, are not updated simultaneously and do not form the basis of urban development decisions, because the required analytical capability is missing (*Ders, 2015*).

In addition to the capital – which is in the front-line on this area in Hungary – some regional centres, the most dominantly Debrecen (Smart City Debrecen²) take actions in the area of the establishment and realization of smart concepts, organizes events, involves civil and local communities and supports start-ups, which can be fitted into the concept. More and more cities have created an online complaint management system on their websites, where the local citizens can immediately upload the failure of any urban infrastructure or service with a picture and a short description. Through this the local citizens can support the city management with up-to-date information among others in Budapest, Tatabánya and Veszprém.

Several cities have introduced the so called city cards among local citizens and tourists, which encourage the card owners to use public transport and other local services, and on the other hand small and medium enterprises, restaurants and service providers (e.g. Budapest, Szolnok, Tatabánya) receive an efficient marketing surface as well. The city cards mean a smart solution in the event, if beyond the support of local trade and urban cultural institutes these serve also as public transport and parking organization tool (such as in Tatabánya or Szolnok, where the intelligent citypass³ can function as entry card as well).

² <https://www.facebook.com/smartdebrecen/>

³ https://www.telekom.hu/rolunk/t-city/intelligens_kozossegi_kartyarendszer

However real smart solutions can be found only in a few Hungarian cities apart from the capital such as Pécs, where the movement and actual space utilization of bicyclists were measured with the help of a mobile phone application (Urban Cycle) in order to establish future bicycle network development decisions (Ders, 2015).

The players of the local ICT-sector, infocommunication companies contact municipalities with complex city management, operation, communication and service offers with always bigger intensity (*technology push*, s. Angelidou, 2015). Due to lack of appropriate strategy (and databases) the municipalities can hardly make long-term good decisions. For this reason the demand for governmental support seems to be outlined, through which the municipalities can see more clearly and get to know good practices, which are worth to implement and they become more capable to formulate their long-term concept.

On the whole it can be stated that the Hungarian cities are in a significantly behind in the area of real smart solutions applied in the international practice. They are far from the level experienced in developed big cities, which is mainly attributable to the costliness of developments, the relative small size of cities and approach deficiencies. There is lot to do in the area of informative creation of city websites or even of the appearance in social media, but there is already some progress. The role of social media is not negligible regarding urban development and residential problem perception. Nowadays surveys and content analyses are performed among the posts of the social media characters, based on which one tries to map the problems characteristics of the individual cities. In case there is a problem in a city interested by the the man of public, the discourse is typically running also on social media surfaces, so the most important problems become measurable in this manner.

Sopron – similar to most Hungarian cities – has recently performed several urban development actions to rationalize energy efficiency, for sustainability and to eliminate environmental problems. However the municipality in Sopron still does not have a “Smart City” concept of integrated perspective, applying “smart” urban planning tools, namely the developments are not made according to this approach⁴. Several objectives of the Integrated Urban Development Strategy⁵ could be fitted into a future Smart City concept. In Hungarian urban development documents (Integrated Urban Development Strategy), the concept of a smart city was not formulated neither on the area of sustainability and traffic development, nor of infrastructure, even the term itself is not spread in these documents.

Among the recent developments in Sopron the results obtained on the area of public transport shall be highlighted, one can meet smart solutions in the organization of local bus service (passenger counting, green-way demand by the driver, passenger-information, and ticket sales). The modernization of the public lighting of the city is a significant step forward in the promotion of energy efficiency, within the frame of which approx. 5000 lights were replaced by LED-lights. This project shall be the basis for the establishment of further devices, which can lead to the introduction of real smart solutions.

Perception of residential problems – survey results

During autumn 2015 we wanted to map the relation of local citizens of Sopron to urban problems and the opinion thereof by means of an online and paper-based survey consisting of 25 questions. One part of the questions related to the person and household of the respondent, the other part asked questions about the heating system and energy efficiency of the residential property and their willingness for developments and investments on this area. The

⁴ Based on the discourse of Barbara Papné with the title „Sopron – Road to SMART CITY” in the conference with the title „Smart City, as urban development model in the big cities of upper Transanubia” (Győr, November 10, 2015)

⁵ Integrated Urban Development Strategy of the City of Sopron with County Rights 2014 -2020

third question group has focused on urban problems and their management. The scope of respondents was local citizens older than 20 years and living in Sopron.

The number of the urban citizens is 60.548 based on the census in 2011, which is approx. 1-2 thousand higher in 2015 considering the Hungarian economic migration trends. The number of the population older than 20 years was 48.374 (*KSH, data of the census in 2011*). The number of evaluable questionnaires was 573 pcs.

The results of the survey *shall not be considered representative*, because the proportion of age composition, highest qualification, economic activity, household structure and the inhabitants of the individual city parts did not match the proportion of the composition of urban population. Female respondents have significantly (65%) prevailed, which is in our opinion the result of the fact, that women are generally more ready to answer questionnaires and they spend more time on social surfaces. The sample is not proportional regarding qualification: the university degree is over-represented, which results from the fact, that among the acquaintances of professors participating in the surveying there are people with university degree to a typically bigger proportion. Regarding economic activity unemployed and pensioners are under-represented.

From the questionnaire it can be stated that the relative *liveability* of the city, which mainly results from the city size and favourable environmental conditions, is more and more endangered due to the quick increase of urban population. In the first question related to urban problem perception we have marked the city with 10 typical labels and we asked the respondents to choose the most typical 3 (*Table 1*). Among the labels there were “*Historic city*” and “*Border city*”, from which we have already assumed in advance, that they would be ranked among the first places, so we considered the answer indicated as 3rd and 4th the most interesting. However based on this it can be seen, that a significant part of the respondents considers Sopron “*Liveable city*”, while the category “*Crowded city*” has received fairly large number of votes, which is on the one hand the result of the crowdedness of the institute system, and on the other hand the crowdedness of streets and the continuous traffic jams. The concept „*Green city*” which is a kind of strategic objective of the city obviously does not appear in public thinking.

Table 1: In your opinion which label suit Sopron the most? Please choose three from below!

Answer	Occurrence	Ranking
Safe city (A1)	76	
Liveable city (A2)	242	3
Festival city (A3)	123	
Border city (A4)	392	2
Intelligent city (A5)	18	
City of culture (A6)	113	
Historic city (A7)	423	1
Holiday city (A8)	54	
Green city (A9)	63	
Crowded city (A10)	149	4

Source: own edition

We have investigated, whether the feeling of crowdedness is in context with car usage, but the investigation of the correlation has shown, that there is not a real relationship between the feeling of crowdedness and car usage, so crowdedness is perceived by everyone. For the

correlation between place of residence and crowdedness we have received similar result, maybe mainly the inhabitants of the inner city can feel crowdedness the most. It is worth mentioning however, which label has received the fewest votes: intelligent city was marked 18-times in total by mainly respondents younger than 35 years. It is concluded that the municipality shall make significant steps forward on the area of e-services and e-administration and the information of the population respectively, in case if they would like to implement smart measures.

The category „*Safe city*” has appeared among the answers with relative low frequency. The always declining public safety is in the background, which correlates with the increase of population. It was investigated in the following question, where the question has concerned the three most typical problems of the city (*Table 2*). From the answers it can be seen that the respondents consider the *increasing urban population* as the most vital problem, which results in traffic problems and the crowdedness of roads. A significant part of the respondents sees negative tendency in the *change of the ethnical structure*. It is worth to mention that the respondents *make a grievance of the decline of inner city residential environment*, namely they would keep the renovation of empty properties of the inner city and the stopping of the further delapidation of historic values important. The decline of the inner city is a central question in the thinking of the city management and as it can be seen also in public feeling.

Table 2: In your opinion which problems characterize Sopron the most? Please, choose three from below!

Answer	Occurrence	Ranking
<i>Increase in the population of the city and the number of inmovers</i>	366	1
<i>Traffic problems and congestions</i>	330	2
<i>Intensifying ethnical problems, declining public safety</i>	302	3
<i>Social conflict due to the extent of work opportunities in Austria</i>	188	4
<i>Decline of the inner city residential environment and historic values</i>	174	5
<i>Crowdedness of educational, medical and social institutes</i>	157	6
<i>Scarcity of work opportunities</i>	135	7

Source: own edition

The 3rd question has investigated the opinion of the respondents related to environmental problems. The answer options were established paralleled with the environment protection program of the city (Environment Protection Program of the City of Sopron with County Rights 2010-2015), among which we also asked for the marking of the three most important ones (*Table 3*). The *low level of environmental consciousness* is an existing phenomenon in the population, which shall be remedied. Considering that the city has good environmental capabilities in Hungarian context and that the income conditions of the population is higher than the domestic average, we assumed, that the sensibility of the inhabitants towards environment and their environment consciousness will be higher than the average. However, the answers do not prove this assumption, because it was one of the top markings among the environmental problems. It is the task of the municipality to change this, which is possible mainly by means of information and marketing tools, but it can be assumed that the level of environmental consciousness will also be improved by the implementation of separate household waste collection. Public sanitation und illegal waste disposal typically

appears both in political and public discourses. Based on results it can be assumed that the population is satisfied with the green areas of the city, because this problem occurs relatively few times in the answers.

Table 3: Please characterize the possibilities below do you consider as most important environmental problems in Sopron? Please, indicate the most important three answers!

Answer	Occurrence	Ranking
<i>High air pollution</i>	150	7
<i>Bad environmental conditions and water quality of brooks</i>	75	9
<i>Vulnerable ground water and drinking water bases resp.</i>	24	11
<i>Impairing city image, landscape problems</i>	171	4
<i>Bad condition of green areas and parks</i>	95	8
<i>Public sanitation problems on public places</i>	225	2
<i>Low level of environment consciousness</i>	303	1
<i>Waste production</i>	169	5
<i>Impairing city weather resulting from local climate change</i>	44	10
<i>Illegal waste disposal</i>	221	3
<i>Soil destruction, contamination of soils, reduction of fertility</i>	13	12
<i>Noise, vibration and light pollution</i>	161	6

Source: own edition

The category *Impairing city image and landscape problems* are marked however with relative high frequency. It results again from the decay of the inner city. The answer option *Noise, vibration and light pollution and high air pollution* were marked relatively often; these problems occur due to the crowdedness of roads and the high level of urban traffic.

In the next question the respondents were allowed to indicate measures for the municipality, which can improve the environmental condition of the city (*Table 4*). We also asked here for choosing of the three most important measures. The demand for more effective *traffic regulation* was indicated the most frequently, which is typical on the area of smart solutions. The *separate household waste collection* on the second place will be probably fulfilled in the near future in Sopron, in the city which indicates itself as green city. The impairing city image occurs with surprisingly high frequency in this question: almost 40% of the respondents have marked *the renovation of empty properties in the inner city* as an important issue. The latter is a serious sign for the municipality: the decline of the inner city should be prevented.

Table 4: In your opinion what are the three most important measures, which could be kept in view by the urban management, in order to improve the environment condition of the city?

Answer	Occurrence	Ranking
<i>Slow-down the increase of the city</i>	106	9
<i>Efficient traffic organization, traffic regulation</i>	261	1
<i>Improvement of bicycle road network</i>	177	4
<i>Development of community traffic, enhancement of headways</i>	97	10
<i>Encouragement of citizen-lead energy efficient measures</i>	116	7
<i>Enhancement of renewable energy sources in the energy supply of the city</i>	161	5
<i>Increase of the green areas and public parks of the city</i>	114	8
<i>Development of separate household waste collection</i>	236	2
<i>Renovation of vacant inner city properties</i>	224	3
<i>Enhancement of the number of parking places</i>	160	6

Source: own edition

It is worth investigating the most frequent answer-group, namely the answers in the 4-6th rank, namely the demand for *bicycle road network*, *utilization of renewable energy sources in the energy supply of the city* and the *enhancement of the number of parkplaces*. The latter causes serious difficulties among the car owners. Several smart solutions and good practices can be found on this area in global context, which can be used during the planning of its future developments. The same can be told about the expansion of the bicycle road network and energy rationalization; it would be fruitful to implement similar smart solutions in these fields.

In order to improve „*livability*” we asked the respondents to indicate the three most important measures, as very important developments to be made by the municipality (*Table 5*). Actually, we have indicated typical smart solutions in this question. The respondents have marked the *improvement of public safety* as a most important measure. The *placement of outdoor security cameras* is a common “smart” tool, thanks to them the incidents committed in public places become immediately visible and the information gets directly and quickly to the police, which assumedly helps the rapid intervention and discovery of the perpetrators. At the same time the existence of cameras increases the feeling of safety of the population, mainly in neglected or sparsely populated city areas concerned by less pedestrian traffic. So it is not accidental that the major part of respondents living in suburbs or external urban areas welcome security cameras. The installation of cameras was typically marked by the inhabitants living in the inner city and its surroundings, in the suburbs, Bánfalva and Lővérek. Looking at the ratios within a particular residential zone, the ranking is different, because 77,8% of the inhabitants of industrial areas, 66,1% of the inhabitants of Kurucdomb and 60% of the inhabitants of Brennbergbánya, Görbehalom, Ó-Hermes and in the district of Új-Hermes have marked the improvement of liveability with security cameras, but the number of respondents here is relatively low.

Table 5. Please choose the most important three measures from below, with which the municipality can contribute to the improvement of the “liveability” of Sopron!

Answer	Occurrence	Ranking
<i>Infocommunication information tools for tourists/population</i>	54	8
<i>Online complaint management system (e.g. illegal waste disposal, problems with separate waste islands, failure of public lighting, proposal for the placement of waste collector)</i>	189	5
<i>Improvement of public safety by means of security cameras</i>	325	1
<i>Improvement of educational, medical and social institutional structures</i>	299	2
<i>Intelligent traffic organization in order to avoid traffic jams</i>	298	3
<i>More vehicle-free zones in order to advance the interests of pedestrians</i>	134	6
<i>Improvement of environmental conditions, development of green areas</i>	244	4
<i>Establishment of flexible school-bus system</i>	110	7

Source: own edition

Analyzing the liveability, the demand for the *improvement of educational, medical and social institutional structures* and the *development of environment conditions and green areas* were emphasized, which is the 4th most frequent answer. The persons expediting the *introduction of intelligent traffic systems* live first of all in the inner city and its surroundings, in the suburbs, Bánfalva and Lőverek. The younger generations (born after 1971) would rather support an *online complaint management system* than the middle-aged or older population. It is interesting that the *infocommunication tools* serving the information of population and tourists are tailenders. It should be considered of course, that women and younger age-groups are over-represented in the sample. Respectively, it is a serious question, why do the respondents devote such small role for the introduction of infocommunication tools.

In the last questions we have investigated, whether the respondents meet the term “Smart City” at all. 75,1% of the 551 respondents still do not know the term, which is not surprising, because the related developments receive only a few appearance in the media, probably because the country is generally in a starting phase. We have also asked, whether the respondents would be pleased if the municipality would take smart measures in order to reduce the emission of greenhouse gases and to rationalize energy efficiency: 91,7% of the respondents have answered ‘yes’.

Summary

The criterion of sustainable city is to ensure the well-being of the inhabitants in a manner, which does not degrade the natural resources of the present and future. For sustainability the cities attempt to rationally utilize their resources and to reduce harmful emissions. For sustainability and to improve liveability of cities and the life quality of urban citizens nowadays urban planning and management can promptly react to urban problems thank to the available ICT-devices and utilize their resources in a more efficient way. Owing to instrumentation and with the help of real-time data obtained they can effectuate solutions of smart character on every area of urban life.

Looking at Hungarian cities the underdevelopment is significant compared to developed Western cities, not only in terms of implemented “smart developments”, but also the spread of “smart city concept”. The critical mass is missing, which ensures the sustainable operation of expensive investments. The cities have a lot to do also on the area of introduction of different smart communication channels and the information of the citizens. It would be important that the planning practice of this approach is established among more and more local Hungarian cities, because this is the precondition of the obtaining financial sources from the European Union for the purpose of sustainable urban development.

In case of the city of Sopron it can be seen that in several urban environmental and social problems the application of smart solutions will be possible. In order to improve liveability based on a survey among citizens the biggest demand would be for the improvement of safety feeling, reduction of crowdedness, more effective traffic organization, strengthening of environment consciousness and the stopping of the dilapidation of the inner city.

Literature

- Angelidou M. (2015). A conjuncture of four forces. In: *Cities* Vol. 47. pp. 95-106, DOI: [10.1016/j.cities.2015.05.004](https://doi.org/10.1016/j.cities.2015.05.004)
- Belanche, D., Casaló, L. V., Orús C. (2015). City attachment and use of urban services: Benefits for smart cities. In: *Cities* Vol. 50. pp. 75-81, DOI: [10.1016/j.cities.2015.08.016](https://doi.org/10.1016/j.cities.2015.08.016)
- Ben Letaifa, S. (2015). How to strategize smart cities: Revealing the SMART model. *Journal of Business Research* Vol. 68. pp. 1414-1419, DOI: [10.1016/j.jbusres.2015.01.024](https://doi.org/10.1016/j.jbusres.2015.01.024)
- Central Statistic Office, Census Data 2011 *KSH 2011-es népszámlálási adatok*
- Debrecen Smart City <https://www.facebook.com/smartdebrecen/>
- Ders Cs. (2015). [Urban Planning in the age of data fullness – a new empirium] Településtervezés az adatbőség korában. In: Salamin G. (szerk.): *Városi válaszok a globális gazdasági kihívásokra és technológiai trendekre különös tekintettel az intelligens városok modelljére*. Magyar Urbanisztikai Társaság, Budapest 84-94
- Environment Protection Program of the City of Sopron with County Rights 2010-2015
- Giffinger, R., Fertner, C., Kramar H., Kalasek, R., Pichler-Milanvic, N., Meijers, E. (2007). *Smart Cities – Ranking of European medium-sized cities* (Report). Vienna University of Technology (http://www.smart-cities.eu/download/smart_cities_final_report.pdf)
- Integrated Urban Development Strategy of the City of Sopron with County Rights 2014 -2020
- Lados M., Barsi B. (2011). [“Smart Cities”] „*Smart cities*” tanulmány, MTA RKK NYUTI (http://www-05.ibm.com/hu/download/IBM_SmarterCity_20110721.pdf)
- Lazaroiu G. C.; Roscia, M (2012). Definition methodology for the smart cities model. In: *Energy* Vol. 47. Issue 1. pp. 326-332, DOI: [10.1016/j.energy.2012.09.028](https://doi.org/10.1016/j.energy.2012.09.028)
- Lukovich T., Mogyorósi K. (2013). [Sustainable development. Urban Planning Guide] *Fenntartható fejlesztés. Várostervezési útmutató*. Terc. Budapest.
- Marsal-Llacuna, M., Colomer-Llinàs, J., Meléndez-Frigola, J. (2015). Lessons in urban monitoring taken from sustainable and livable cities to better address the Smart Cities initiative. In: *Technological Forecasting & Social Change* Vol. 90. pp. 611-622., DOI: [10.1016/j.techfore.2014.01.012](https://doi.org/10.1016/j.techfore.2014.01.012)
- Smarter Cities: *Creating opportunities through Leadership and Innovation*. Innovativ Operations. IBM Corporation, 2013. (www.ibm.com/smarterplanet/global/files/Budapest_MarchMF_12.pdf)
- Szczuka L. (2015). [SMART City – SMART Urban Planning] Okos város, okos várostervezés. In: Salamin G. (szerk.): *Városi válaszok a globális gazdasági kihívásokra és technológiai trendekre különös tekintettel az intelligens városok modelljére*. Magyar Urbanisztikai Társaság, Budapest 105-115
- Telekom https://www.telekom.hu/rolunk/t-city/intelligens_kozossegi_kartyarendszer/