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Building of smart cities in specific conditions of transitional economies

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Title: Building of smart cities in specific conditions of transitional economies

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General Theme: G_U. Transitional economies

Abstract:

The word smart belongs to the most used and for sure the trendiest words of the present. Currently the main aim of everything is to be smart. The same story appears with cities. Smart city is super trendy term and dream of development planners, urbanists, mayors, entrepreneurs, NGO's and local communities. How to turn that dream into reality is a real challenge.

Strategies of smart development are usually oriented on metropolitan areas and huge cities as these cities have great potential of any kind. CEE countries have different urban structure as western countries. In CEE countries there are only few metropolitan areas but they grow very fast, especially metropolitan areas including capital cities. Massive population growth and influx of population, despite many advantages, bring also a lot of problems to these metropolitan areas (environmental, transport, etc.) and increase disparities among capital city regions and rest of the regions in CEE countries. These metropolitan areas necessarily need to be smart, to be able to survive and service all their inhabitants. These metropolitan areas also have naturally good preconditions to become smart as they concentrate the best human capital of the countries. They concentrate creative class, are well equipped by culture and infrastructure, needed public infrastructure is already there. These areas also naturally concentrate the best entrepreneurs; all needed administrative institutions are available. Through the synergy effect, strong representation has also non-profit sector with several kinds of NGO's involved in public life. However, not the whole Europe can, and also luckily don't want to, live in metropolitan areas. A lot of smart people prefer small and medium-sized cities for life and work because of different reasons (for example quality of environment, family issues, high price of living in metropolitan area, overall quality of life etc...). This trend offers unique opportunity to small and medium-sized cities to attract smart people, keep smart youngsters in their territory, start up new entrepreneurs and to expand number of smart cities. CEE countries have very specific but generally common features. They have common part of history as were a part of Soviet Union, after reaching their independency in 1989 they have had to fight with common problems and issues. Although several countries are a part of the European Union and are trying to get closer to western European countries, there is still a big gap among western part of EU and CEE countries. The same story appears also in building smart cities. In comparison with Western countries there is still big gap in building real smart cities in the conditions of transitional economies. In the paper we pay attention to this issue. In the first part of the paper we process theoretical knowledge related with the topic of smart cities with focus on its possible exploitation in the conditions of transitional economies. Analytical part of the paper is aimed on mapping potential for creating smart cities in conditions of transitional economies. In the third part of the paper we process good practices related with building and functioning of smart cities that serve as a good example for policy and decision makers in condition of transitional economies.

Key words: smart city, transitional economies, small-medium sized cities

JEL code:

Introduction

Sustainable development of cities belong to the most crucial issues of researchers and urban planners. By 2050, 83% of EU's citizens are expected to live in cities. It is a real challenge that requires new approaches and methods to ensure sustainable living conditions. The Wealth Report (2012)¹, analysing the global economy and the tendencies till 2050, connects the urban smartness to the economic wealth, saying that cities that are now hardly known will be able to participate in the global economy by 2050 because are now implementing strategies to become 'intelligent communities.

Cities and their development have become an important part of regional policies of the European Union in the last decade. It is a consequence of the fact that global urban population has for the first time in history become higher than rural population and it is still growing. Changes in the society are caused by the global economic crisis, integration and interdependence between regions, demographic changes, changes in values and threats to the competitiveness of the territories. The Territorial Agenda of the European Union in 2020, which follows the Europe 2020 strategy, aims at the integration of urban development into the strategy. In a changing world, EU wants to become a smart, sustainable and inclusive economy. These three mutually reinforcing priorities should help the EU and the Member States deliver high levels of employment, productivity and social cohesion (Europe 2020 strategy)².

The paper presents the results of the project VEGA V-14-101-04 Creative industries delivering the crucial intangibles to public sector in context of innovation and smart growth and the project KEGA 007UMB – 4/2015 Marketing in regional and local development.

Smart city – the dream of urban planners (theoretical overview)

The role of cities in the EU programme documents is crucial in achieving the smart growth. Smart cities are characterized by a high degree of innovation activities; achieving the green growth oriented on building green, compact and energy-efficient cities; as well as achieving the inclusive growth with an emphasis on addressing the consequences of

¹ Frank, K. 2012. The Wealth Report 2012. Available at: <http://www.knightfrank.com/resources/pdf-documents/thewealthreport2012.pdf>

² Europe 2020: A strategy for smart, sustainable and inclusive growth. Available at: <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2010:2020:FIN:EN:PDF>

population aging, social exclusion and segregation (Cities of Tomorrow, 2011)³. European Union cities are considered engines of economic growth whose base lies in creation, dissemination and sharing creativity, knowledge and innovation. The uniqueness of new ideas is stimulated by proactive innovation policy and education, targeted application of sophisticated information and communication technologies in education, employment, social services, health and safety. Cities are also the centres of development of the regions in which they are located (European Commission, 2014)⁴.

The smart specialization concept originated in the literature that was analysing the productivity gap between the US and Europe, a gap which had become evident since 1995 (Ark, et. al.2008)⁵ as a direct response to this issue the European Research Area (ERA) was established as a mechanism for engendering EU-wide integration and scale advantages in activities generating and disseminating knowledge. The policy was aimed at promoting European R&D and EU-wide knowledge spillovers via the development of knowledge-intensive agglomerations and cross-border network systems of researchers, universities, entrepreneurs and innovators. As such, the ERA was aimed both at promoting knowledge-integration and also maximizing dissemination in many of the very sectors that currently lack EU-wide integration (Thissen, et. al. 2013)⁶.

During the latest five years, the label smart city has been spreading all over the world, impacting on urban strategies in both large and small towns (Caragliu, Del Bo, Nijkamp 2011)⁷. To face the increasing problems of urban areas, local public government, companies, not for profit organizations and the citizens themselves embraced the idea of a smarter city, using more technologies, creating better life conditions and safeguarding the environment. However, today the smart city panorama appears very confused. No acknowledged smart city definition exists till now and several cities defining themselves smart completely lack of a strategic vision about their smart future (Dameri, Rosenthal-Sabroux, 2014, p. 1)⁸. Over and misused expression, it implies a really silent revolution in our cities, often sat back in wrong

³ Cities of Tomorrow. Challenges, visions, ways forward. 2011. Available at: http://ec.europa.eu/regional_policy/sources/docgener/studies/pdf/citiesoftomorrow/citiesoftomorrow_final.pdf

⁴ European Commission 2014

⁵ Ark, B. et al.(2008), "The Productivity Gap between Europe and the U.S.: Trends and Causes", *Journal of Economic Perspectives*. Vol. 22 (1), Winter, pp. 25-44.

⁶ Thissen, M. et al.(2013). *Integrated regional Europe: European regional trade flows in 2000*. PBL Netherlands Environmental Assessment Agency, The Hague

⁷ Caragliu, A., Del Bo C., Nijkamp P. (2011). Smart cities in Europe, *Journal of Urban Technology*, 18 (2): 65-82.

⁸ Dameri, R.P., Rosenthal-Sabroux, C. 2014. *Smart City: How to Create Public and Economic Value with High Technology in Urban Space*. Springer. 238 p.

habits and not attentive to the cautious management of resources and consumptions (Sansaverino, 2014, p.2)⁹.

But what is really a “smart city”? It is a city that bets a lot on the quality of living and where the citizens are involved as main actors in decision processes (Dominici 2012)¹⁰. At the basis of creating a smart city there is certainly a new and integrated design process, aiming at a new modulation of the urban functions (both the traditional and the new ones appearing in everyday life) also thanks to the digital technology innovation. The word “smart” includes various features as technological and inter-connected, but also sustainable, comfortable, attractive, safe. It is a model of city on which, governments are betting to provide a balanced urban development keeping up with the demand of welfare, coming from the middle class. Aiming at technological innovation to improve management of urban processes and quality of life of citizens, this is the direction followed by some local administrations in Europe that are starting projects, and setting agreements to re-draw cities. In relation to the objectives fixed by the EU, supported by ‘pacts’ and formal ‘commitments’, all cities are involved in this transformation process that should turn them in different ways in smart cities (Sansaverino, 2014, p. 1)¹¹.

Rising from the practice, the smart city is especially a collection of several projects, initiatives and actions, carried out both by public and by private organizations. Therefore, as these initiatives are the result of spontaneous choices by different actors, depending on their own interests but also on the specificity of a city, the collections are very heterogeneous. To design a definition observing one or several case studies means to write a definition describing a specific smart city, and not a standard (Hollands, 2008)¹².

There is a large disagreement between the academic view and the empirical view about smart cities. This disagreement regards the main component of a smart city in the academic debate - it is an intellectual capital; in the empirical vision expressed by large companies the main component is the technology (Sansaverino, 2014)¹³. This different vision impacts on all further aspects regarding the smart city: strategy definition, implementation, and evaluation and performance measurement. The academic vision considers the intellectual capital the most important resource to increase the smartness of a city. The intellectual capital includes the culture of citizens, their educational level, their intellectual capability; but also the culture

⁹ Sansaverino, E.R., et al. 2014. Smart rules for smart cities. Springer. 138 p.

¹⁰ Dominici, G. (2012) Smart cities nuova moda o vera opportunità? In *Urbanistica Informazioni* n.243

¹¹ Sansaverino, E.R., et al. 2014. Smart rules for smart cities. Springer. 138 p.

¹² Hollands, R. G. (2008). Will the real smart city please stand up? *Intelligent, progressive or entrepreneurial? City*, 12(3), 303–320.

¹³ Sansaverino, E.R., et al. 2014. Smart rules for smart cities. Springer. 138 p.

of companies, that is, trademarks, patents, know how, reputation on the market; and finally the city culture, represented by museums, theatres, cinemas, cultural events and everything could animate the cultural life in the city (Leydesdorff, Deakin, 2011)¹⁴.

Depending on this vision, the smarter city has the larger cultural capital and is able to use its knowledge to choose the better solutions for the further development of the city quality. Investments in cultural initiatives are therefore welcomed, but especially the city should use its awareness to promote sustainable development, equal economic growth and environmental quality in the urban areas. Also the evaluation system is consequently designed depending on this intangible vision. Indicators regarding the cultural aspect of the city, the citizens and the public and private bodies' resident in the city are the main proxy of the city smartness. To increase the cultural level—and by this way the smartness—of the city is the main instrument to further attract the best people and companies: more educated, more innovative, more profitable (Paskaleva, 2009)¹⁵.

The business vision of a smart city is strongly based on the pivotal role of technology, especially the ICT. It derives from both the previous idea of digital city, and from the strong need to solve several specific problems strongly affecting the life in large metropolis, such as traffic, pollution, energy consumption, waste treatment, water quality. These aspects are also close to the idea of green city. In this smart city vision, initiatives to improve the city smartness are especially focused on energy production from renewable sources, reduction of energy cost, CO₂ emissions and satisfaction the increasing energy demand in urban areas; building efficiency, reduction of energy demand and consumption; local transport quality and greenness etc. The evaluation system to be applied to this different smart city vision is more tangible and based on physic indicators such as CO₂ emissions, greenhouse gases, waste tons, megawatts produced by renewable sources, etc. (Al-Hader, Rodzi, 2009)¹⁶. It is important to stress that, even if the ultimate goal is to improve the citizens' quality of life, they are scarcely considered in this smart city vision and smart initiatives are often planned without their involvement. They are seen like the final addresser in the smart city value chain, but this

¹⁴ Leydesdorff, L., Deakin, M. (2011). The triple-helix model of smart cities: a neo-evolutionary perspective. *Journal of Urban Technology*, 18(2), 53–63.

¹⁵ Paskaleva, K. A. (2009). Enabling the smart city: the progress of city e-governance in Europe. *International Journal of Innovation and Regional Development*, 1(4), 405–422.

¹⁶ Al-Hader, M., & Rodzi, A. (2009). The smart city infrastructure development and monitoring. *Theoretical & Empirical Researches in Urban Management*.

value is not compared with their own expectations about the quality of life in city (Dameri, Rosenthal-Sabroux, 2014)¹⁷.

The smart city from our point of view, presents the consensus of both approaches, academic and practical. The city is smart if it invests in human and social capital and traditional (transport) and modern (ICT) communication infrastructure that fuel sustainable economic growth and a high quality of life, with a wise management of natural resources, through participatory governance'' (Caragliu et.al. 2011).

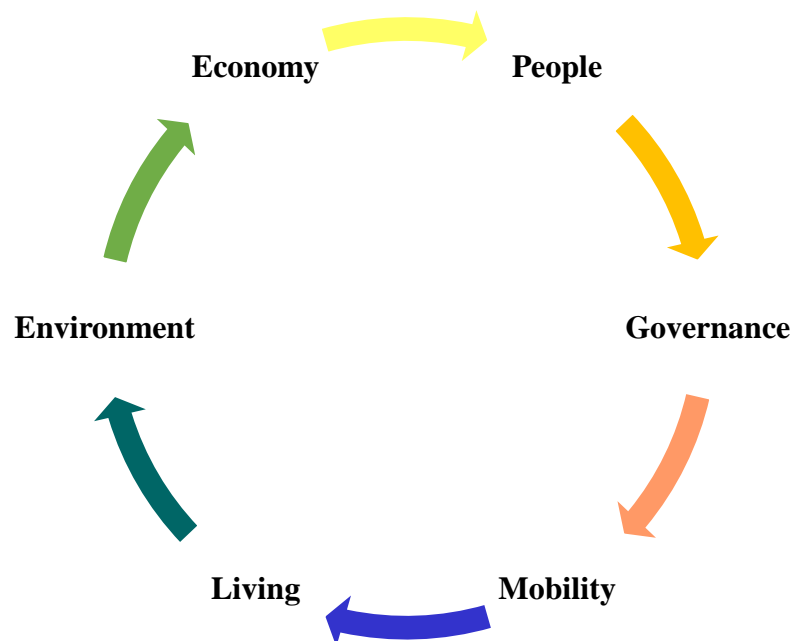
The question of many urban academics and practitioners is how can a city become a smart city? Caragliu believes the city is smart if it invests in human and social capital and traditional (transport) and modern (ICT) communication infrastructure that fuel sustainable economic growth and a high quality of life, with a wise management of natural resources, through participatory governance'' (Caragliu et.al. 2011)¹⁸. This definition is based on an operational notion, which, relatively to medium-sized European smart cities, has been proposed using six characteristics: Smart Economy, Smart People, Smart Governance, Smart Mobility, Smart Environment and Smart Living (Giffinger et al. 2007). According to Giffinger a Smart City is a city well performing built on the 'smart' combination of endowments and activities of self-decisive, independent and aware citizens''(Giffinger et. al. 2007)¹⁹. Following picture (figure 1) shows the most important components of smart city.

¹⁷ Dameri, R.P., Rosenthal-Sabroux, C. 2014. Smart City: How to Create Public and Economic Value with High Technology in Urban Space. Springer. 238 p.

¹⁸Caragliu, A., Del Bo C., Nijkamp P. (2011). Smart cities in Europe, Journal of Urban Technology, 18 (2): 65-82

¹⁹ Giffinger, R. et al. (2007). Smart cities: ranking of European medium-sized cities. Centre of Regional Science (SRF), Vienna University of Technology, Vienna, Austria, from http://www.smartcities.eu/download/smart_cities_final_report.pdf.

Figure 1: Characteristics of smart city



Source: Giffinger et al. 2007

Smart economy is closely connected with competitiveness created through innovative spirit; entrepreneurship; economic image and trademarks; productivity; flexibility of labour market; international embeddedness. Smart people means high quality of social and human capital formed by level of qualification; affinity to lifelong learning; social and ethnic plurality; flexibility; creativity; cosmopolitan/open-mindedness and participation in public life. Smart governance means high level of participation. It consists of participation in decision-making; public and social services; transparent governance and political strategies and perspectives. Smart mobility is connected with transport system and usage of ICT. Smart mobility is influenced by local accessibility; (inter)-national accessibility; availability of ICT infrastructure; sustainable innovative and safe transport system. Smart environment is created esp. by natural resources and affected by attractivity of natural conditions; pollution; environmental protection; sustainable resource management. Smart living is determined by quality of life, for example cultural facilities; health conditions; individual safety; housing quality; education facilities; tourism attractivity; social cohesion (Giffinger et al. 2007)²⁰. In the following part of the paper we will analyze potential for building smart cities in specific

²⁰ Giffinger, R. et al. (2007). Smart cities: ranking of European medium-sized cities. Centre of Regional Science (SRF), Vienna University of Technology, Vienna, Austria, from http://www.smartcities.eu/download/smart_cities_final_report.pdf.

conditions of transitional economies based on the approach of Giffinger's six smart characteristics.

Potential for building smart cities in transitional economies – methodology of its evaluation and empirical analysis

Transition economies in European Union are countries that were a part of Soviet Union and changed from central planned economies to market economies. Our analysis is focused only on countries that are members of European Union so we are speaking about 3 groups of countries – central European countries (Czech Republic, Hungary, Poland, Slovakia and Slovenia), Baltic countries (Estonia, Latvia and Lithuania) and Southeastern countries (Bulgaria and Romania). These countries have common part of history, economy and culture and they have also common part of problems. During the time of transition they had to face and they are still facing a lot of obstacles and problematic issues. After the change of the system from central planned economy with almost no unemployment to market economy, all countries have to face high rate of unemployment, corruption and rising inflation in some stage of their development. At the beginning of transition in all countries, there was a lack of infrastructure, sophisticated legal system and entrepreneurship that made transition more difficult. There was a huge skill's gap and inequality among western countries and countries in transition. On the other hand, these countries have great potential in form of human resources (99 338 421 inhabitants create almost 20% of overall EU population), attractive cultural, natural and historic sites hidden for tourists while years of isolation, huge external support from the EU and foreign investors. All these countries in last 25 years went through initial stabilization and reforms (1990-1993), market reforms (1994-1996), turmoil and recovery (1997-2001), boom (2000-2007) and crisis (2008-2013).

The past 25 years have seen a dramatic transformation in Europe's former communist countries, resulting in their reintegration into the global economy, and, in most cases, major improvements in living standards. But the task of building full market economies has been difficult and protracted. Liberalization of trade and prices came quickly, but institutional reforms in areas such as governance, competition policy, labor markets, privatization and enterprise restructuring, often faced opposition from vested interests²¹. The key focus of the European integration process has been to significantly reduce the relevance of national

²¹ Roaf, J. et al. 2014. 25 Years of Transition. Post-Communist Europe and the IMF. International Monetary Fund. 72 p.

borders for European economic players, in order to create a large market in which national borders no longer stand in the way of the free movement of workers, goods, services and capital²². After 25 years of transition the question is whether transition of these countries is over? There are different opinions on this matter. Kornai (1999) views the end of transition as a situation in which the communist parties have lost monopoly political power, the private sector accounts for the majority of GDP, and the market is the dominant coordinator of economic activities. Gelb (1999) sees the end of transition as a state when the problems and the policy issues confronted by today's "transition countries" resemble those faced by other countries at similar levels of development. Although according to these opinions transition seems to be over, citizens in the most of CEE countries do not feel they already accomplished the mission of transition, neither in economic and social way, nor in political.

Socio-economic inequalities are still considerable on a regional level, although the efforts of Cohesion Policy have largely succeeded in reducing disparities between the richer and the poorer countries. Nevertheless new member states face a growing economic gap between central urban areas and remote rural regions (Kramar 2006)²³. This trend enhances the importance of specific local characteristics, which provide comparative advantages competing for increasingly footloose and mobile global enterprises, investors, tourists and capital (Parkinson et al. 2003, Giffinger et al. 2003)²⁴. The gap exists also in the area of catching or setting new modern trends of urban development, where transition countries pulling the shorter end. Since the current situation is unsatisfactory, we think it is very important to pay attention to this topic.

Cities in transition countries, the same as in western European countries and countries all over the world, have to face to challenge how to achieve sustainable urban development and high level of competitiveness in the same time. Following part of paper is aimed on mapping the current situation and potential of transition countries to build smart cities, as one of the “hottest” trend in urban development. In the paper we used the “European Smart Cities” approach, which was elaborated by Vienna University of Technology (Centre of Regional Science) in 2007 and revised for the specific requirements of the PLEEC project in 2013, concentrates on medium-sized cities and their perspectives for competitive and

²² Committee of the Regions. 2007. The European Grouping of territorial cooperation. 227 p.

²³ Kramar, H., 2006. Economic convergence on different spatial levels: the conflict between cohesion and growth. *Raumforschung und Raumordnung*, p. 18–27

²⁴ Parkinson, M., et al. 2003. *Competitive European cities: where do the core cities stand?* London:ODPM.
Giffinger R., et al., 2003. *Städteettbewerb und sozialverträgliche Stadtentwicklung: Stadtentwicklungspolitik am Beispiel von Wien und Budapest*. Wiener Beiträge zur Regionalwissenschaft, Band 17, Wien: Institut für Stadt- und Regionalforschung.

sustainable development. Even though the vast majority of the urban population lives in such cities, the main focus of urban research tends to be on ‘global’ metropolises. As a result, the challenges of medium-sized cities, which can be rather different, remain unexplored to a certain degree. Medium-sized cities, which have to compete with larger metropolises on corresponding issues, appear to be less equipped in terms of resources and organizing capacities. In order to enforce endogenous development and to achieve a good position, these cities have to identify their strengths and opportunities even more carefully and to ensure comparative advantages in various key resources against other cities of the same level (Giffinger et al. 2014)²⁵.

Following table (figure 2) shows the results of PLEEC project financed by 7th Framework Programme of EU aimed on evaluation smart, or potentially smart city profiles. City sample was defined according to two criteria: cities should be of medium size and they should be covered by accessible and relevant databases. From 1600 cities in EU 27, Switzerland and Norway, based on 3 knock-out criteria - urban population among 100 000 and 500 000, at least one university and catchment area less than 1 500 000 inhabitants – 77 cities were chosen as a sample²⁶, presented in the figure 2.

Figure 2 Small and medium sized smart city profiles

Country	City	Eco.	Peo.	Gov.	Mob.	Env.	Liv.	Total
LU	LUXEMBOURG	1	18	56	4	16	4	1
DK	AARHUS	2	3	6	3	19	27	2
SE	UMEA	24	5	2	34	1	13	3
SE	ESKILSTUNA	21	1	7	24	3	41	4
DK	AALBORG	10	11	5	14	14	10	5
SE	JOENKÖPING	32	13	3	11	2	26	6
DK	ODENSE	13	9	4	20	9	40	7
FI	JYVÄSKYLÄ	23	8	1	47	5	25	8
FI	TAMPERE	16	2	15	31	12	14	9
AT	SALZBURG	27	24	29	2	27	1	10
FI	TURKU	20	6	12	15	18	29	11
FI	OULU	14	4	9	39	13	35	12
AT	INNSBRUCK	35	27	26	12	6	3	13
AT	LINZ	11	23	31	8	25	7	14
SI	LJUBLJANA	6	7	34	33	21	21	15
AT	GRAZ	26	21	33	9	28	2	16
NL	EINDHOVEN	5	12	24	1	49	49	17
DE	REGENSBURG	4	17	37	10	37	11	18
FR	MONTPELLIER	29	20	16	46	4	30	19
BE	GENT	15	29	27	6	41	9	20
NL	GRONINGEN	18	14	11	30	54	12	21
NL	NIJMEGEN	28	10	8	18	57	43	22
FR	NANCY	44	37	13	23	11	20	23

²⁵ Giffinger et al. (2014). Smart city profiles. Available at: http://www.pleecproject.eu/downloads/Reports/Work%20Package%202/Smart%20City%20Profiles/pleec_d2_1_smart_city_profiles_introduction.pdf

²⁶ <http://www.smart-cities.eu/>

DE	GOETTINGEN	19	15	25	40	42	18	24
FR	POITIERS	47	38	10	44	8	15	25
FR	CLERMONT-FERRAND	38	40	18	36	10	17	26
DE	TRIER	30	33	19	16	48	19	27
DE	KIEL	17	26	28	22	34	52	28
NL	ENSCHDEDE	36	19	23	17	61	33	29
DE	ERFURT	22	28	30	7	51	38	30
UK	CARDIFF	12	32	44	19	58	16	31
IE	CORK	3	39	57	28	39	24	32
DE	ROSTOCK	46	31	20	29	20	44	33
UK	ABERDEEN	8	25	52	42	43	32	34
FR	DIJON	52	41	21	41	7	22	35
UK	PORTSMOUTH	9	30	42	13	65	53	36
BE	BRUGGE	39	52	22	27	52	5	37
ES	PAMPLONA	41	34	14	54	36	34	38
UK	LEICESTER	7	35	46	5	67	63	39
SI	MARIBOR	42	22	43	49	15	51	40
EE	TARTU	55	16	35	52	26	55	41
DE	MAGDEBURG	49	36	36	35	44	31	42
ES	SANTIAGO DE COMPOSTELA	48	56	38	59	32	6	43
ES	VALLADOLID	50	47	32	53	24	37	44
UK	STOKE-ON-TRENT	31	42	47	26	55	60	45
IT	VENEZIA	33	63	68	32	59	8	46
ES	OVIEDO	40	45	41	64	45	46	47
PT	COIMBRA	72	50	17	71	17	36	48
IT	VERONA	25	57	61	45	66	28	49
CZ	PLZEN	51	43	73	38	63	23	50
CZ	USTI NAD LABEM	53	53	69	25	50	54	51
IT	TRENTO	43	48	74	62	30	39	52
IT	TRIESTE	37	58	66	66	31	47	53
SK	BANSKA BYSTRICA	73	51	48	58	33	48	54
PL	RZESZOW	63	64	49	56	56	50	55
PL	SZCZECIN	64	62	50	55	47	65	56
IT	PERUGIA	57	54	65	68	53	42	57
LV	LIEPAJA	56	49	71	21	40	75	58
SK	NITRA	77	60	60	51	23	57	59
SK	KOSICE	76	59	58	37	38	66	60
IT	PADOVA	34	44	75	60	73	45	61
PL	BYDGOSZCZ	60	68	54	50	64	64	62
HU	GYOR	66	72	53	48	46	69	63
HU	PECS	65	69	40	70	60	59	64
IT	ANCONA	54	66	72	67	29	62	65
PL	BIALYSTOK	68	67	45	61	72	61	66
LT	KAUNAS	45	46	67	43	76	67	67
PL	KIELCE	71	65	51	65	68	58	68
HU	MISKOLC	69	71	39	63	69	70	69
PL	SUWALKI	67	70	55	57	71	68	70
EL	LARISA	58	61	76	74	22	74	71
BG	RUSE	61	74	70	69	62	72	72
RO	SIBIU	74	76	62	73	74	56	73
EL	PATRAI	59	55	77	77	35	77	74
BG	PLEVEN	62	73	64	76	70	73	75
RO	TIMISOARA	70	75	63	72	75	71	76
RO	CRAIOVA	75	77	59	75	77	76	77

Source: <http://www.smart-cities.eu/>

Small cities, even though they show a big potential as 40 % of the entire European population live in small cities, often stay in the shade as compared to the larger European cities. The competitive advantage small cities have and that is often not considered by investors is their limited size, both in terms of population and in terms of territorial extension, which allows to easily test new solutions (Sansaverino, 2014, p.3).²⁷ Evaluation of city profiles is based on six main characteristics of smart city: economy, people, governance, mobility, environment and living. They are broken down into 28 relevant factors together with the selection of 81 components/indicators from publicly available databases (EUROSTAT, URBAN AUDIT, EUROBAROMETAR, ESPON) which reflect the most important aspects of every (smart) key characteristic (Giffinger, et al. 2014)²⁸.

The gap among western countries and transition countries is visible in city profiles. The best ranking obtained 2 Slovenian cities – Ljubljana on the 15th place, Maribor on the 40th place and Estonian city Tartu on 41st place. The rest of the cities in transition economies reached the places at the end of this ranking. The situation is not sufficient and just confirms unpreparedness of transition economies in following modern urban trends of development and its adoption.

Following table (figure 3) shows smart cities in transition countries, including small and medium sized cities (from 100 000 to 500 000 inhabitants) as well as larger cities (from 300 000 to 1 000 000 of inhabitants). Criteria for choosing cities is its enlisting in the “Urban Audit database”, what case that the availability of indicators is more than 80%.

Figure 3 Smart, or potentially smart cities in transition countries

Country	Big cities	Small-medium sized cities
Bulgaria	Plovdiv, Varna	Pleven, Ruse
Czech Republic	Brno, Ostrava	Plzen, Usti nad Labem
Estonia	Tallin	Tartu
Hungary		Gyor, Miskolc, Pecs
Latvia	Riga	Liepaja
Lithuania	Vilnius	Kaunas
Poland	Katowice, Krakow, Gdansk Lodz, Lublin, Wroclaw, Poznan	Bialystok, Bydgoszcz, Kielce Rzesow, Suwlaki, Szczecin
Romania	Cluj-Napoca	Craiova, Sibiu, Timisoara
Slovakia	Bratislava	Banská Bystrica, Nitra, Košice
Slovenia		Ljubljana, Maribor

Source: <http://www.smart-cities.eu/>

²⁷ Sansaverino, E.R., et al. 2014. Smart rules for smart cities. Springer. 138 p.

²⁸ Giffinger et al. (2014). Smart city profiles. Available at: http://www.pleecproject.eu/downloads/Reports/Work%20Package%202/Smart%20City%20Profiles/pleec_d2_1_smart_city_profiles_introduction.pdf

Our assumption is that cities identified and analysed within the project PLEEC in Slovakia are more potentially smart cities than real smart cities but by proposal and implementation of proper strategies and approaches these cities have potential to become real smart cities. Their advantage is that they already know their strengths and weaknesses so they can use correct tools for achieving the goal to become smart city.

Analysis and evaluation of smart cities in Slovakia

Our deeper analysis will be devoted to the smart cities in Slovakia. We focus on small and medium-sized cities only, Bratislava is excluded from our analysis because it belongs to the group of bigger cities (another indicator and methodology was used for bigger cities). Bratislava that has natural advantages in comparison with other Slovak cities in almost all areas, including size, number of inhabitants, very good location and international accessibility, economic potential, concentration of the high quality human resources, the biggest concentration of cultural, education and research facilities. As a capital city is Bratislava also attractive for tourists, entrepreneurs, foreign investors. Because of these aspects we decided to focus our analysis on small and medium-sized cities only. The basic statistical indicators of three analysed cities are illustrated in figure 4.

Figure 4 Smart cities in Slovakia

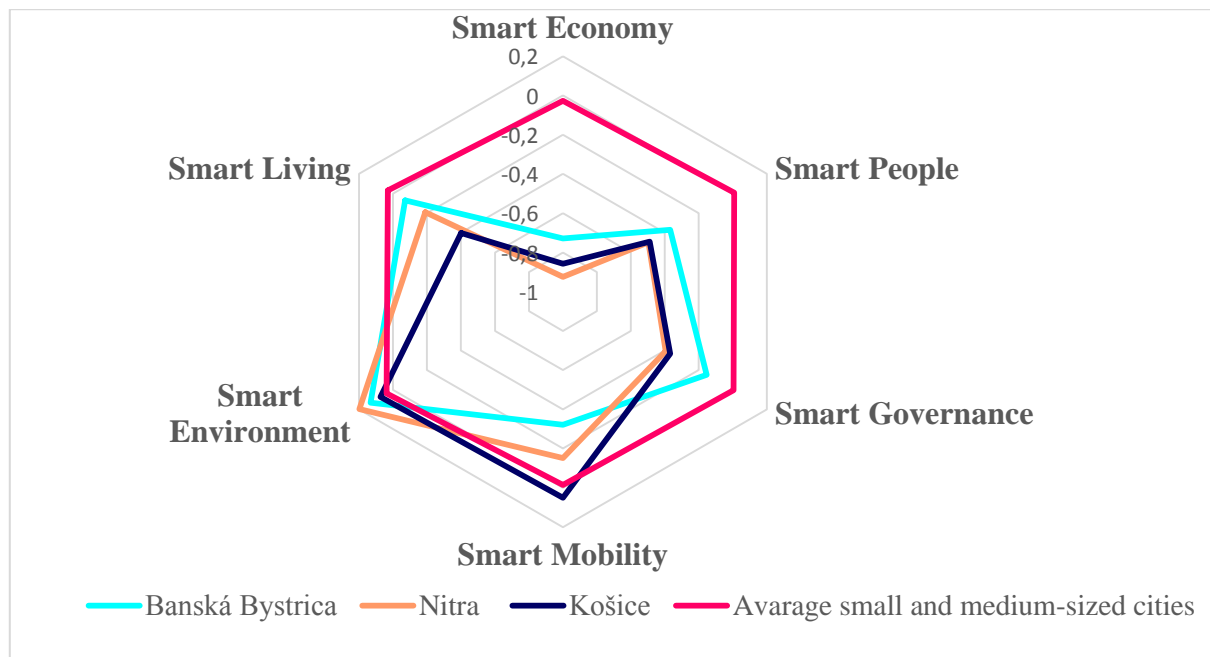
City	Area	Number of inhabitants	Number of universities	Unemployment rate of the district
Banská Bystrica	103,4 km ²	79 027	4 (2 faculties without the seat of university)	8,9 %
Nitra	108 km ²	78 033	3 (1 faculty without the seat of university)	8,64 %
Košice	242,8 km ²	239 464	7 (3 faculties without the seat of university)	9,28 %

Source: own workmanship by www.statistics.sk; www.portalvs.sk.

The second biggest city in Slovakia is Košice, in 2013 the European Capital of Culture, currently with the progressive development of creative and cultural industries. Nitra is a city of exhibitions and a centre of Agricultural University (only the one in Slovakia). It is localised in one of the most productive agricultural area of Slovakia. Banská Bystrica is situated in the middle of Slovakia. Last years, its development has stagnated. Because of its unique localisation in the valley Hron close to the Low Tatras and Fatra and historical monuments, there is a great potential for tourism development.

Described Slovak cities were included also in the evolution of smart cities with the mentioned PLEEC project. Following figure 5 shows the ranking of 3 Slovak cities evaluated as a smart, or potentially smart cities.

Figure 5 Ranking of small and medium-sized smart cities in Slovakia and their benchmarking

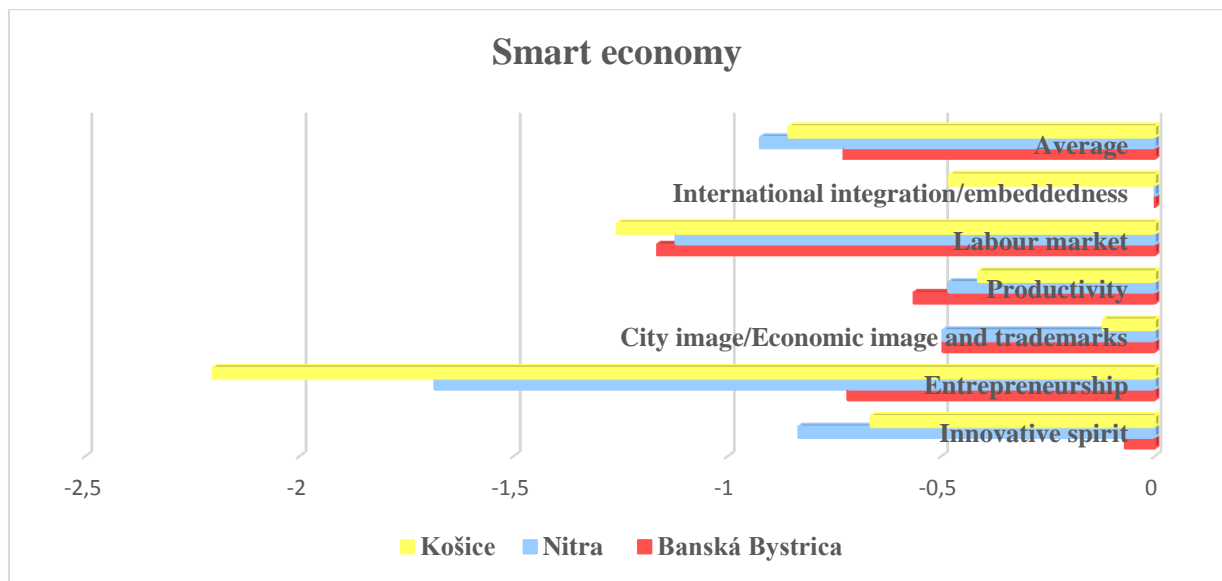


Source: <http://www.smart-cities.eu/>

Figure 5 shows the ranking of three small and medium-sized cities – Banská Bystrica, Nitra and Košice and average ranking of small and medium-sized cities in the whole EU. We can see that all small and medium-sized cities in Slovakia are below average evaluation of European smart small and medium-sized cities on all characteristics except smart environment. In this characteristic are Slovak small and medium-sized cities above the European average. Košice reached better score than average also in characteristic smart mobility. This confirms our previous assumption that Slovak small and medium-sized cities are more potentially smart cities than real smart cities. As a negative aspect we consider the fact that in most of indicators Slovak cities reached negative score. On the other side thanks to this analysis urban planners, policy and decision makers can see the gaps and choose proper approach, strategy and tools for elimination of weaknesses.

The first characteristic of smart cities – smart economy - consists from 6 indicators – international integration and embeddedness, labour market, productivity, city image, entrepreneurship and innovative spirit. The results of evaluation in the Slovak cities presents figure 6. Each presented figure (6-11) compares the results of score for Slovak cities with the average of evaluation for all cities (0). Positive values of score means the value of indicator is over the average, negative values of score means the value is under the average.

Figure 6 Smart economy in four Slovak smart cities

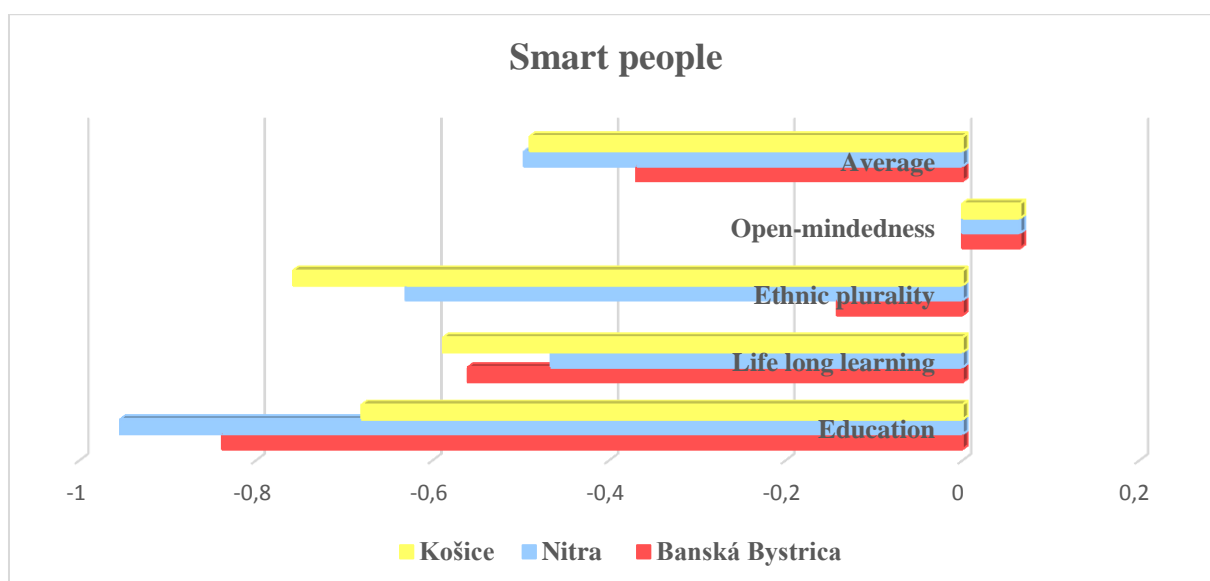


Source: <http://www.smart-cities.eu/>

In case of first indicator only Košice were evaluated. The best ranking from small and medium-sized cities achieved Banská Bystrica despite the fact that one indicator is missing in its evaluation. Anyway, we cannot evaluate this characteristic and results of evaluation as positive, because all indicators in all cities reached the negative score.

Following figure 7 shows the results of evaluation characteristic - smart people. It consists of four partial indicators – open-mindedness, ethnic plurality, life-long learning and education. The same situation as in the evaluation of the first characteristics appears also by this one. The best ranking from small and medium-sized cities achieved Banská Bystrica in average and also in indicator ethnic plurality. All small and medium-sized cities achieved the same ranking in indicator - open-mindedness.

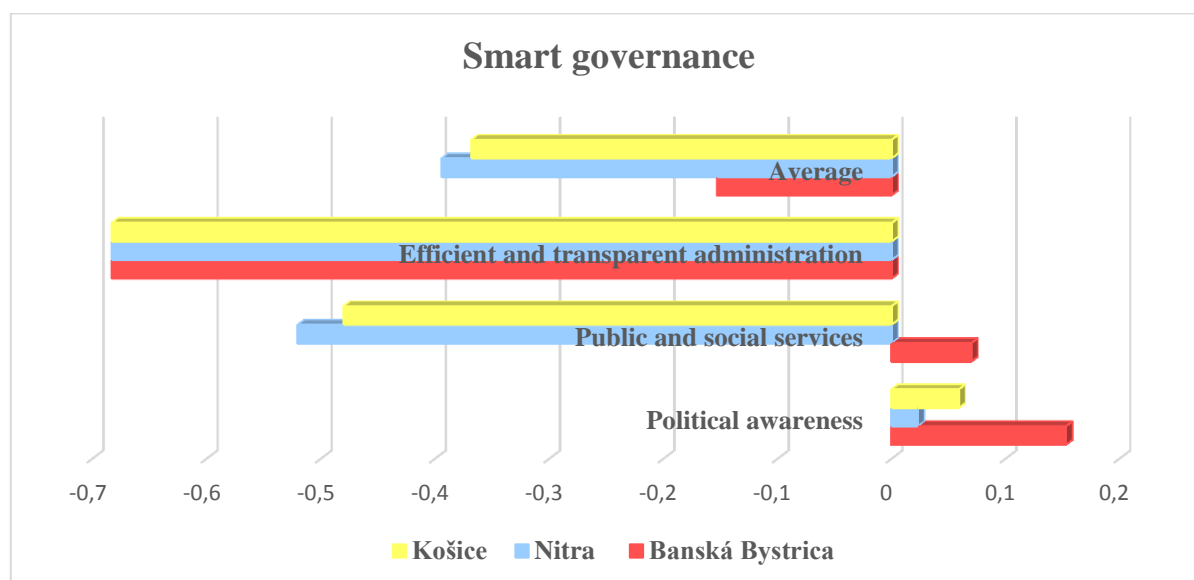
Figure 7 Ranking of four Slovak smart cities in characteristic smart people



Source: <http://www.smart-cities.eu/>

The evaluation of characteristic - smart governance is presented in figure 8. Banska Bystrica reached the highest ranking in average in the category small and medium-sized cities and overall the highest ranking in indicators public and social services and political awareness. The situation is not satisfactory because by this characteristic all cities reached negative score in average.

Figure 8 Ranking of four Slovak smart cities in characteristic smart governance

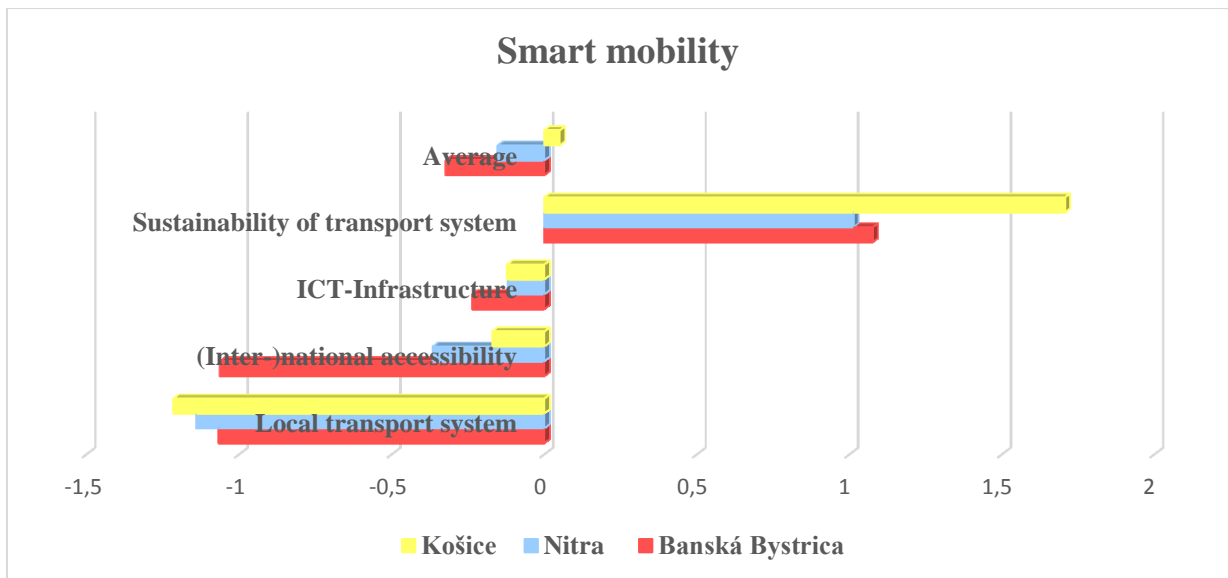


Source: <http://www.smart-cities.eu/>

The characteristic smart mobility in the Slovak evaluated cities evaluated by the indicators – sustainability of transport system, ICT-infrastructure, (inter-)national accessibility and local transport system, is illustrated in figure 9. The best ranking in category small and medium-

sized cities reached Košice in average and also in all partial indicators. As a result we see the fact that Košice are the second biggest city in Slovakia with good location and international accessibility, well-developed transport infrastructure including international all year operating airport.

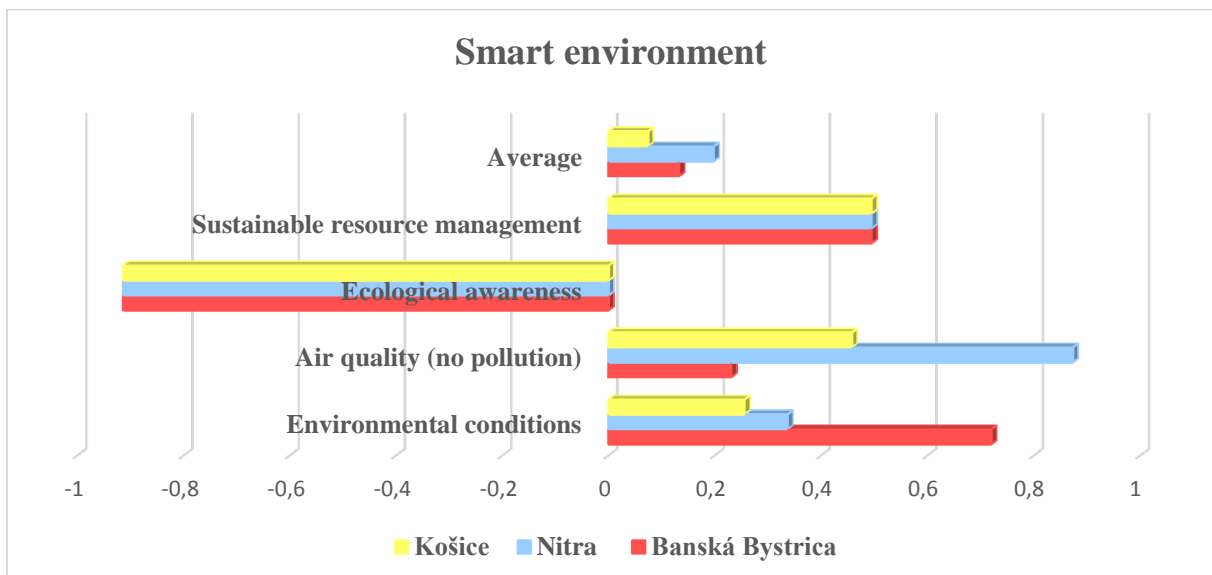
Figure 9 Ranking of four Slovak smart cities in characteristic smart mobility



Source: <http://www.smart-cities.eu/>

The level of smart environment in four Slovak cities we can see in figure 10.

Figure 10 Ranking of four Slovak smart cities in characteristic smart environment



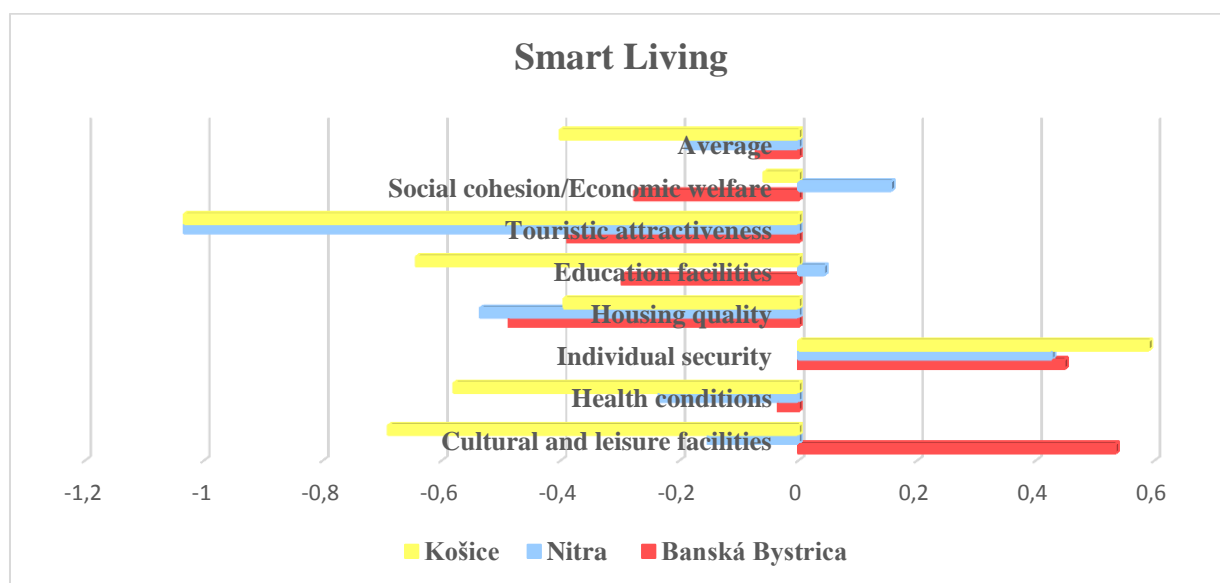
Source: <http://www.smart-cities.eu/>

The highest ranking in average reached Nitra and then Banská Bystrica. All three small and medium-sized cities reached positive score. Banská Bystrica reached the highest ranking in environmental conditions and equal ranking in sustainable resource management as cities

within its category. Negative ranking reached all small and medium-sized cities in indicator ecological awareness. We recommend to urban planners, policy and decision makers to raise awareness of citizens in this matter.

Last partial characteristic is smart living (figure 11). The best ranking from all Slovak cities reached Banská Bystrica in average, as well as in indicators - health conditions, culture and leisure facilities, second highest ranking in indicators individual security and touristic attractiveness.

Figure 11 Ranking of four Slovak smart cities in characteristic smart living



Source: <http://www.smart-cities.eu/>

In the category of small and medium-sized cities the best ranking achieved Banská Bystrica in overall average and also in four partial characteristics – economy, people, governance and living. For now we have to say, that all Slovak evaluated small and medium-sized cities are still only potential smart cities, not real one. On the other hand, this analysis shows where the weaknesses are and which characteristics need to be improved.

Banská Bystrica has potential to become real smart cities if city urban planners, policy and decision makers as well as all relevant stakeholders will work on reinforcement of strengths, elimination of weaknesses and exploitation of opportunities. On the example of Banská Bystrica city we will demonstrate the set of continually implemented activities as first steps to build the real smart city.

The way of Banská Bystrica to become smart city

As a good practice we use the city Banská Bystrica and its natural initiatives that lead to building of real smart city in six areas – people (university city), economy (industrial park),

governance (participatory budget, electronic services), mobility (plan for new cycle paths, new path for roller-skaters), environment (the system of separated waste including the special dust bins for clothes for the socially disadvantaged groups) and living (Záhřada/Garden – the independent centre of culture, community center – Fončorda, Sásová).

The way how Banská Bystrica is becoming real smart city is very natural and during last years the “smart” activities were developed by the communities and citizens without conceptual support of municipality or other institutions with aim to build smart city here. Despite this fact, we can find several good examples and practices how this city is becoming real smart city in time.

It is good to start by history and to say, that Banská Bystrica is very old city. The place where Banská Bystrica is located has been settled continuously since ancient times. Thanks to rich natural resources, esp. copper, the city was very attractive also for foreign scholars and engineers. Importance of the city was growing and resulted in royal recognition by Hungarian king Bela IV who awarded the city by kings’ privileges. Banská Bystrica was already in the 15th century an important center of education and innovation as Thurzo-Fugger company (the first or one of the first capitalist companies in Europe) started to operate in Banská Bystrica in 1495. Banská Bystrica played very important role also during the Second World War when became the centre of Slovak National Uprising.

In Banská Bystrica are located several higher education institutions – Matej Bel University, Academy of Arts and branch of Slovak Medical University. Thanks to these institutions Banská Bystrica is a real city of students (number of students is more than 10 000 what represents approx. 10 % of overall inhabitants) with all needed facilities and equipment for valuable life of students, including sport, culture and leisure time facilities.

In the field of economic development, during last 10 years Banská Bystrica has prepared for new investors the area of 69 ha full equipped by the technical infrastructure in the form of industrial park Banská Bystrica – Šalková. However, there is still low interested to invest in Banská Bystrica. Nowadays, there are established only 3 industrial companies. With aim to support the promotion of industrial park to the potential investors, the new website was created <http://www.industrialpark.sk> in Slovak, English, German and Russia.

Banská Bystrica is the third Slovak city which introduced participatory budget. From 2014 citizens are allowed to make decision how part of public money from the city budget will be used. Participatory budget is redistributed on the basis of public evaluation of project proposals.

Banská Bystrica is one of the first cities in Slovakia, which implemented and now fully operates the system of electronic services in the form of application – imesto (icity) from 2013. The citizens and legal entities can order or claim more than 36 different public services (e. g. social services, various kinds of confirmations, tax payments etc.).

Banská Bystrica was during the Soviet time one of two main centres of sport in Czecho-Slovakia (second one was Prague) and still citizens of the city are very active and ready to use environmental friendly ways of transport, despite the fact the city is hilly. The city hall prepared the plan of building six new cycle paths in the city centre and all big housing developments of the city. In surrounding of the city already exist 13 cycle paths with overall lengths 294 km.

During 2015, the representatives of city based on the claim of citizen and young sportsmen start to prepare the project of new path for roller-skaters. It should be situated in the city park under the Monument of SNP. The path will be in the form of circle, long 460 m, wide 3-3,5 m. It is first construction of this kind of path in the city. (<http://bbonline.sk/korcularska-draha-v-parku-pod-muzeom-snp-nabera-realne-kontury/>, cit. 24. 7. 2015).

To the issue of environment belong in each city the disposal of municipal waste. The system of separated waste in Banská Bystrica is quite well developed from 2010 with the support of European Union. The waste is separated to the usual kinds of waste, but moreover the separation includes also the dust bins for the biological waste, the special dust bins for used clothes for the socially disadvantage groups of citizens, and special collection of waste containing the dangerous substances (e. g. batteries, colours, alcohol, etc.) and oversized waste in regular time period. To educate the citizens in this field the city printed also some promotion materials as brochures, leaflets and posters (e. g. the brochures with title Where to give the waste from household?, How to separate the waste? How to increase the waste separation rate in Banská Bystrica?).

In the city live active citizens and artists that create unique culture and community point – The Garden – Centre of an independent culture. It is a non-profit organization, which firstly existed as an informal community of artists, cultural managers and volunteers. The building where the Garden is located went through several phases of reconstruction, mostly managed by volunteers. Common grounds in the historical town centre serves as multifunctional theatre studio with an open dramaturgy as well as a relax zone in form of the town park of which the volunteers take care. The garden park offers the possibility of organizing various events and leisure outdoor activities. The main organizational objective of The Garden is to provide the space for recent local art in form of theatre and dance performances, concerts, festivals and

exhibitions as well as own artistic production (The Theatre in the Garden) and education. The Garden is also the home scene for the Town theatre – The Theatre from the passage established in 1995 as the only professional local theatre working with mentally disabled people (and recently also with minorities, Roma minority, immigrants and people coming from socially disadvantageous environment, etc.). The Garden is the seat of the association named “SKOK!” information and residential centre for modern dance and physical theatre (<http://www.zahradacnk.sk/o-zahrade>).

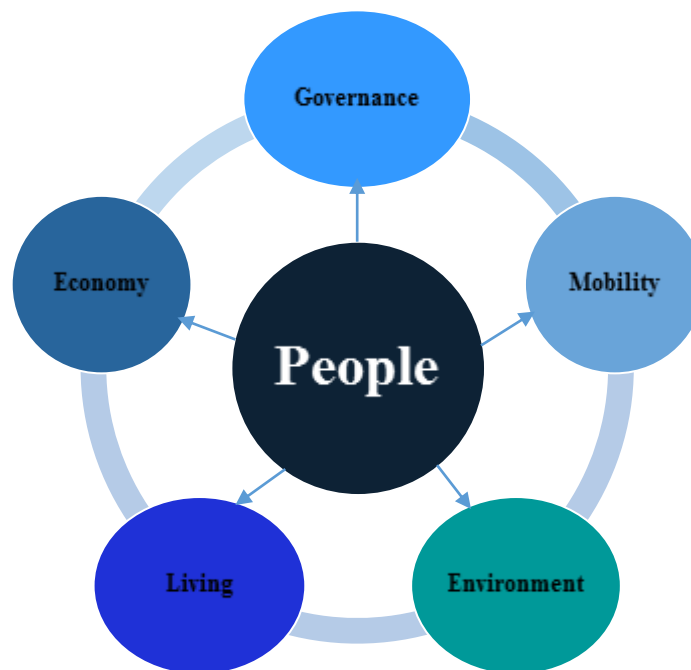
The proactive approach of the citizens was recognized by the municipality, which help to the local communities to establish the official community center – the first one in Sásová, in 2014 and now is coming the date of official opening the second community center – Fončorda. Both centres present the place for community meetings, discussion, leisure time activities, but also the place for offering the public services and building closer relationship with the municipal representatives. The centres contribute to initiate and strength the citizen participation in the local life, to educate them and develop their awareness. To the popular activities of centers among citizen belong community gardens (revitalisation of abounded public spaces); local library; courses of hand-made crafts or discussion of municipal strategic documents and problem issues of local life.

Conclusion

Paper was aimed on analysis and evaluation of potential for building smart cities in specific conditions of transition economies with focus on Slovakia, especially one potentially smart city Banská Bystrica, that is home of all authors.

As we can see in the research and also in the example of Banská Bystrica, in the smart city it is not possible to develop just one partial component of “smartness”. They all are interconnected and complement each other. However, the practical examples show that the role of human resources is inevitable. Without the active participation of the human resources it should be not possible to develop the other components of smart cities. The interrelations and the key position of people present the figure 12.

Figure 12 The interrelations of smart city components



Source: own workmanship

We consider people as the most important characteristics of smart city that also create and actively influence all other five characteristics. People act in smart cities in different roles and they are part of each characteristic as citizens, tourists, students, labour forces, entrepreneurs, municipal representatives, users of transport, members of communities etc. People govern the city, create conditions and ensure mobility, contribute to the quality of environment, create conditions for better living in form of sport, culture, social, etc. activities and act in economy on both sides – as a producers as well as consumers. On the example of Banská Bystrica we can also see that people are the most important factor that influence building or creating real smart cities so we would recommend policy and decision makers to pay more attention to people living in the city and to make all possible steps from their position to maintain creative class in the city and to attract new smart citizens, tourists and entrepreneurs.

References

- Al-Hader, M., & Rodzi, A. (2009). The smart city infrastructure development and monitoring. *Theoretical & Empirical Researches in Urban Management*.
- Ark, B. et al.(2008), "The Productivity Gap between Europe and the U.S.: Trends and Causes", *Journal of Economic Perspectives*. Vol. 22 (1), Winter, pp. 25-44.
- Caragliu, A., Del Bo C., Nijkamp P. (2011). Smart cities in Europe, *Journal of Urban Technology*, 18 (2): 65-82.

Cities of Tomorrow. Challenges, visions, ways forward. 2011. Available at: http://ec.europa.eu/regional_policy/sources/docgener/studies/pdf/citiesoftomorrow/citiesoftomorrow_final.pdf

Committee of the Regions. 2007. The European Grouping of territorial cooperation. 227 p.

Dameri, R.P., Rosenthal-Sabroux, C. 2014. Smart City: How to Create Public and Economic Value with High Technology in Urban Space. Springer. 238 p.

Dominici, G. (2012) Smart cities nuova moda o vera opportunità? In *Urbanistica Informazioni* n.243

Europe 2020: A strategy for smart, sustainable and inclusive growth. Available at: <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2010:2020:FIN:EN:PDF>

Frank, K. 2012. The Wealth Report 2012. Available at: <http://www.knightfrank.com/resources/pdf-documents/thewealthreport2012.pdf>

Gelb, Alan, "The End of Transition?" Chapter 2 in Annette Brown (ed.) *When is Transition Over?* Kalamazoo, MI: W.E. Upjohn Institute for Employment Research, 1999.

Giffinger R., et al., 2003. Städtewettbewerb und sozialverträgliche Stadtentwicklung: Stadtentwicklungspolitik am Beispiel von Wien und Budapest. Wiener Beiträge zur Regionalwissenschaft, Band 17, Wien: Institut für Stadt- und Regionalforschung.

Giffinger, R. et al. (2007). Smart cities: ranking of European medium-sized cities. Centre of Regional Science (SRF), Vienna University of Technology, Vienna, Austria, from http://www.smartcities.eu/download/smart_cities_final_report.pdf

Giffinger et al. (2014). Smart city profiles. Available at: http://www.pleecproject.eu/downloads/Reports/Work%20Package%202/Smart%20City%20Profiles/pleec_d2_1_smart_city_profiles_introduction.pdf

Hollands, R. G. (2008). Will the real smart city please stand up? Intelligent, progressive or entrepreneurial? *City*, 12(3), 303–320.
<http://www.smart-cities.eu/>

Kornai, Janos, "Reforming the Welfare State in Postsocialist Economies," Chapter 6 in Annette Brown (ed.) *When is Transition Over?* Kalamazoo, MI: W.E. Upjohn Institute for Employment Research, 1999.

Kramar, H., 2006. Economic convergence on different spatial levels: the conflict between cohesion and growth. *Raumforschung und Raumordnung*, p. 18–27

Leydesdorff, L., Deakin, M. (2011). The triple-helix model of smart cities: a neo-evolutionary perspective. *Journal of Urban Technology*, 18(2), 53–63.

Parkinson, M., et al. 2003. Competitive European cities: where do the core cities stand? London:ODPM.

Paskaleva, K. A. (2009). Enabling the smart city: the progress of city e-governance in Europe. *International Journal of Innovation and Regional Development*, 1(4), 405–422.

Roaf, J. et al. 2014. 25 Years of Transition. Post-Communist Europe and the IMF. International Monetary Fund. 72 p.

Sansaverino, E.R., et al. 2014. Smart rules for smart cities. Springer. 138 p.

Thissen, M. et al.(2013). Integrated regional Europe: European regional trade flows in 2000. PBL Netherlands Environmental Assessment Agency, The Hague