

## MAKING RURAL CITIES SMART – BY UPGRADING EXISTING CITIES OR CREATING NEW ONES?

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### Abstract

The importance of SMART initiatives is undeniable nowadays. Due to technological, economic and social processes, our world faces many global challenges, such as food and water shortage, global economic imbalance, demographic problems and – based on the authors' opinion – vastly underrated global inequality. These problems need to be addressed in the next few decades in order to ensure that we can leave a safe and sustainable planet to our descendants. Since great decisions require long-term planning and analysis, this paper is about taking a look into the possible future of cities by discussing SMART Cities generally, with a special focus on SMART cities built from scratch, to see how they can be the solution of current and future problems. The authors' reviewed relevant literature to prepare this paper.

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**JEL classification:** *L11*

**LCC:** *H1-99*

### Introduction

Our world is a rapidly changing one. Due to technological advancement, we can see new groundbreaking scientific results now almost weekly. Improving technology also brings higher automatization and therefore, less need for human resource on the long run, especially in rural areas. Besides that, the urban areas continue to be attractive places to live and work for people, especially for the young and skilled workforce. Both global and EU territorial processes indicate that the role of urban areas is getting more prevailing, as urban areas serve as engines of economic growth (Káposzta et al., 2016; Kollár et al, 2017). The proportion of urban dwellers exceeds half of the current global population, which is likely to rise in the future (based on estimations). This situation poses as a great challenge for not only rural areas, but for urban ones as well. While rural areas struggle to keep their population, and therefore, their human capital and local demand for products, cities and towns need to act quick, if they are to mitigate challenges, such as overpopulation, environmental degradation and infrastructural shortage.

Enter the SMART initiatives, which may be the cure decision makers are looking for. Based on the literature on territorial and rural development, the notion of smart growth and the associated SMART cities ("livable" cities) is gaining ground in both the European Union and in Hungary. Defining factors determining smart growth and their cardinal areas is also a key factor in the European Union's growth strategy for Europe. The competitiveness of the settlements is determined primarily by the quality of living life and the social, economic and environmental infrastructure involved in it, complemented by the quantity and quality of services available (Nagyné Molnár, 2013; Kassai-Molnár, 2016).

### ***Cities in the globalised world***

The proportion of urban population is over 50% globally. The dominant role of cities is further emphasised by the facts, that 80% of GDP is produced there and 70% of energy is consumed by cities. According to preliminary estimates, the number of city inhabitants is expected to rise to 5 billion by 2030. However, considering the territorial differences that characterize the world, there are significant disparities between continents, countries and regions in the case of urban populations as well. While approximately 66.4% of the population in the United States is currently living in cities, in Europe this proportion is approximately 73%. Figure 1 shows the most up-to-date situation (May 3, 2019) about the population- and city density of Hungary.



**Figure 1: City- and population density in Hungary**

Source: [https://www.ksh.hu/teruleti\\_atlasz](https://www.ksh.hu/teruleti_atlasz), 2019.

At present, the number of cities and towns in Hungary is 328. Of all the population, 17.4% lives in Budapest, while another 52.1% lives in other cities and towns (TeIR, 2018). As mentioned above, cities are the basic engines of growth; therefore, they require continuous improvement of the technical, institutional, social, economic and environmental infrastructure. This fact makes smart and sustainable growth strategies for cities and other settlements cardinal.

### **Material and Method**

In this manuscript, we primarily use document analysis to compile the changes in the definition of the SMART Cities of Hungary over the past decade. We conducted secondary research activities about the cities in the globalised world and then we present the foreign and domestic literature, which is the basis for the concept of smart cities initiatives, including the description of the domestic legal background. The study is based on a research launched in September 2018, with the involvement of students from the Agricultural Economics and Rural Development (BSc) training of Szent István University. Based on the research plan, SMART Cities initiatives will be investigated using empirical research methods based on the SMART criteria, of which we later aim at creating models. This study was made in the initial phase of

the research, thus presenting a slice of expected results, paying particular attention to the cities of the future (NEOM and Belmont).

## **Results**

SMART cities are based on smart growth, the importance of which is underlined by the fact that it has become an important priority in the Europe 2020 Growth Strategy. Smart growth means a process that aims to improve the performance of the European Union in education, research & innovation and the digital society. In the case of education, the promotion of learning and skills development is a sub-objective. In the case of research and innovation, the most important goal is to promote the production of new products and services, which ensures growth and employment and solves societal problems. Strategies also emphasise the use of information and communication technologies, when talking about digital society.

Based on the above, the key three objectives of the European Union in the area of smart growth are:

1. Investment in research, development and innovation from public and private sources should reach 3% of the Union's GDP and also create better conditions for these three activities.
2. By 2020, the employment rate should be raised to 75% among workers aged 20-64 by attracting more people (especially women, young people, older people, low skilled and legal immigrants).
3. The level of education must be improved, especially in the following areas: the drop-out rate should be reduced to below 10% and at least 40% of EU residents aged 30 to 34 must have a tertiary (or equivalent) qualification.

Urban areas are a key factor in achieving smart growth since the metropolis regions account for more than half of the EU's population and nearly two-thirds of the GDP produced. In general, in each European Union metropolitan region, per capita GDP is higher than in other regions, but we must point out that this does not always mean that growth rates will be higher. In a number of European countries, per capita GDP grew slower in metropolitan regions than in other regions. Of course, this is justified by the growth rate of regions with lower economic levels.

Among the metropolitan regions in the European Union, the growth rate of the capital cities is particularly high, which in our opinion is due to productivity and employment growth. Secondary metropolis regions produced the same growth as the national level, but they fell behind the capital regions, while the smaller regions grew even slower. An important test result is that in all OECD countries, productivity and incomes grow in parallel with the size of cities and make a significant contribution to national GDP. One of the reasons for this is that larger cities usually have a high quality and quantities of human resources, though with increasing the size of cities, this is not always straightforward. Another reason is that in large cities there are more sectors with high productivity potential (e.g. financial services). Thirdly, these cities are nodes and service centers that require high added value services as channels of trade and financial processes (Eurostat, DG Regio, 2016).

Smart growth is the foundation for SMART cities' concept. The SMART city, is a collective term and there is no general and uniform definition for it in professional discussions. In our opinion, the smart city is a collection concept that is essentially a development that is tailored to local needs. They are "up-to-date", "people-centered" and "liveable cities". We call a city smart when its sustainable economic development is achieved through a balanced investment

in traditional and digital infrastructure, human and social capital, involving the stakeholders of the community concerned, with its participation in an environmentally conscious manner. "Smart city dwellers are indispensable parts of smart cities, because they are the fundamental condition for the long-term development of a city (Dobos et al., 2015; Virág, 2017). Those cities are successful where they have given room to innovation, but it requires service provider approach from the local authorities. Based on the Smart City Handbook, Smart Cities are mediums where technology and intelligent service solutions are complex tools for achieving quality of life, efficiency, ecological and economic sustainability goals. They can work successfully together with other tools to improve the quality and efficiency of services, to make energy and other resources more economical, and to involve citizens and improve their quality of life (Dobos et al, 2015).

### ***Defining SMART Cities***

Once the SMART City concept was developed in the European Union, the preparations for the domestic spatial development policy have also taken place. The first such government decision on the SMART City concept for Hungary was published in 2014, the decision of the Government of 1631/2014 (XI.6.) On the implementation of the Digital Nation Development Program, which outlines the development directions and goals of the info communication sector and four pillars of implementation of the National Infocommunication Strategy:

1. digital competence
2. digital economy
3. digital infrastructure
4. digital government.

Then, in 2015, government regulation 1486/2015. (VII. 21.) was published in the Hungarian Official Gazette, which was about the current tasks related to the implementation of the Digital Nation Development Program and about the amendment of certain related government declarations. Point 3 of this regulation refers to the Lechner Knowledge Center as a contributing party in the coordinated introduction of smart urban services and the creation of an organizational and knowledge platform supporting operation. Accordingly, the Lechner Knowledge Center is established as the Smart City Center in 2015, which handles the various activities of the Knowledge Center (City Planning, Geoinformatics, Informatics) as a central coordinating body. The task of the Smart City Center is to support domestic cities in building their smart strategy, liaising with international organizations of similar profile, and mediating between cities, state and market actors - documenting the process of creating smart settlements in Hungary.

Since 2014, a number of studies have been carried out in the European Union Member States and in Hungary as well in the field of city evaluations, and are currently addressing the components and methodology of evaluation of smart cities. There have been several variants for the development of the monitoring system, but in Hungary the following six main groups have been developed in relation to the situation assessment of cities (Nagy et al.; 2015):

1. smart mobility
2. smart environment
3. smart people
4. smart life circumstances and life quality
5. smart governance
6. smart and sustainable economy

These elements are basically the same as the ones found in the 'Smart City Wheel' of Cohen (2012). In the authors' opinion, it is easy to define which city is SMART, but it is much more difficult to define which city is actually 'smart'. There is a difference between the two, which we are going to discuss later. About the SMART elements of cities, there is a short explanation in the next section.

In the Smart Mobility Subsystem, the urban assessment model presents the most important elements and integrations of freight and passenger transport, as well as their technical infrastructure. Furthermore, it is also important to know the distribution of transit traffic and modes of transport related to the assessment of environmentally friendly freight transport, assessment of environmentally friendly transport. It is worth considering the "SMARTNESS" of the technical infrastructure conditions, which can be measured by introducing smart card systems, running real-time information systems and spreading electric filling stations. The smart environment subsystem primarily includes smart buildings, which are currently categorized according to 10 energy quality classifications. According to the assessment method of the Lechner Knowledge Center, the proportion of buildings certified by the city is mainly determined by the urban assessment, and the energy classification of the city's building stock. The most decisive conceptual background of this subsystem is the climate-friendly nature of the city, which can be measured by the existence of a climate strategy, closely related to the rational use of land, the presence of heat islands and green space management, also affecting the inner and outer areas of the settlement.

We agree with the fact that no digital application or technical solution can be disseminated by the adequate adsorption and flexible adaptation ability of the local population without smart people. The quality of inclusion and integration is best achieved by having individuals with smart devices (telephones) and the penetration of internet subscriptions. In assessing the Community's ability to cooperate and evaluate the capacity and activity of NGOs, their influence, the community's participatory activities, the electoral activity of the local community and, finally, other forms of community actions and activities (e.g. urban facebook profile, design, users, forums). In the field of settlement assessment, the smart living conditions and quality of life subsystem include the welfare and safety conditions outlining the quality of life, the health status and the health consciousness of the population. In our opinion, it is important to look at other descriptive data of quality of life, such as local unemployment, migration, social assistance, car supply and others, including features describing real estate market indicators. The assessment of settlements should take into account the health status of people living there and assess their lifestyles and levels of health awareness (eg. the presence of bio-markets).

On the basis of the current division as defined in the legal background, the smart governance subgroup is the most widespread group of public administrations and public services. One of the most important elements is the measurement of the spread of online processes, the scope of the types of cases involved in e-administration and their use by the customers through the client interface (Ügyfélkapu; Káposzta-Kollár, 2017). Based on the current measurement system, the first category to be evaluated in the category of public services is education, culture and cultural institutions (Péli-Neszmélyi, 2015). It is important to teach e-learning and digital knowledge in the community (e.g. e-journal).

In the smart, sustainable economy subgroup, in our opinion, when comparing settlements, the emergence of new and innovative start-ups and the weight of information and R & D are very important. Assessing the entrepreneurial activity of the local population and examining modernity and flexibility in employment could also provide cardinal data. This sub-group manifests best in the market of tourism that is closely related and easily measurable for

settlements. Tourism is a local-based industry, which in many ways can provide digital help to visitors in the city, including tourism planning, city marketing and tourism digital reservations. The local and global connections and embeddedness of the settlement can be measured most by the export orientation of the enterprises established there and the importance of international traffic through the frequency of conferences, fairs or the rate of foreign guest nights in various accommodation facilities (Nagy et al., 2015; Nagy Molnár - Lendvay, 2017; Aboelnaga et al., 2019).

### ***NEOM and Belmont – the cities of the future***

This paper focuses on creating SMART cities. Generally speaking, there are two ways to do that: we can improve existing ones, or we can create entirely new ones. The following sections of the paper deal with the second option. In October 24, 2017 Mohammad bin Salman, Crown Prince of Saudi Arabia announced the establishment of a SMART city called 'NEOM' in his country. The project is very ambitious with its initial budget of \$500 billion. To compare: the Hungarian annual GDP on current prices was \$125,297 billion (IMF, 2017). As we can see, this is a considerable sum, but what is the project actually about?

Taken from the project website: "NEOM is positioned to become an aspirational society that heralds the future of human civilization by offering its inhabitants an idyllic lifestyle set against a backdrop of a community founded on modern architecture, lush green spaces, quality of life, safety and technology in service of humanity paired with excellent economic opportunities." (Discoverneom.com, 2017)



**Figure 2: The future geographical position of Neom**

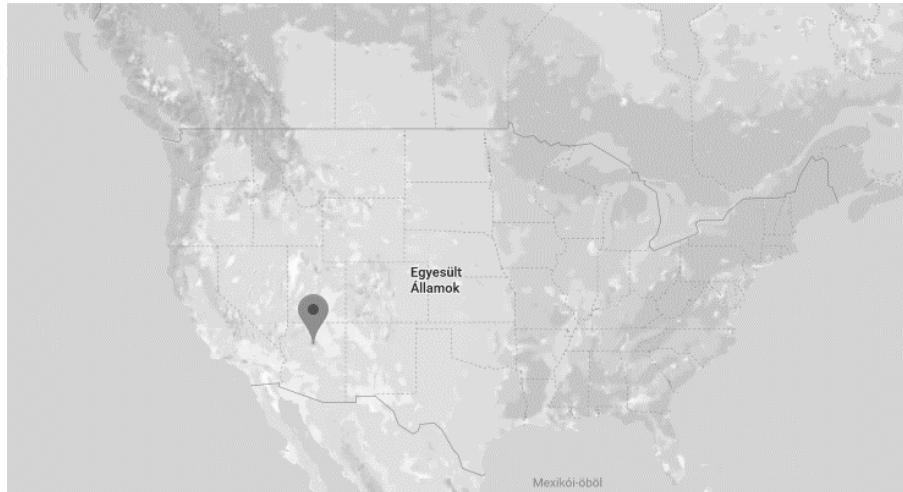
*Source: Bloomberg, 2020*

The aim of the project is to create a city, operating independently from the existing governmental framework, and which place could truly be a city of the future. According to the plans, the city is going to be a prospering settlement with unmatched liability, with clean energy sources, well-designed multimodal means of transportation, cutting-edge healthcare services, advanced manufacturing and entertainment opportunities (Discoverneom.com, 2017). The city is planned to be quite large. According to preliminary designs, it would be as large as 26,500 km<sup>2</sup>.

The main focus of NEOM will be technology. The city aims to utilise the latest technological improvements to ensure sound operation, welfare and economic prosperity, while it also aims

to improve technology by inviting experts and investors alike to change the world as we know it. A very similar project will be Belmont, which was announced by non-other than Bill Gates, former CEO of Microsoft. Although the billionaire spent a much lower sum (\$80 million) on the project so far, this city shares a similar vision with NEOM.

According to the plan, there is going to be 80,000 homes built, along with a roughly 15 km<sup>2</sup> of area for industrial, retail and office space, 2 km<sup>2</sup> for public schools and 13.7 km<sup>2</sup> for open spaces. From the \$80 million, Cascade Investment, Gates' investment firm bought altogether approximately 100 km<sup>2</sup> of land in Arizona (which is a relatively small area, barely bigger than an average Hungarian town).



**Figure 3: The future geographical position of Belmont**

*Source: Google maps, 2020*

But size is not everything, and this city surely places quality before quantity. Similarly to Neom, Belmont “will transform a raw, blank slate into a purpose-built edge city built around a flexible infrastructure model” (12news.com, 2017). Also, „Belmont will create a forward-thinking community with a communication and infrastructure spine that embraces cutting-edge technology, designed around high-speed digital networks, data centers, new manufacturing technologies and distribution models, autonomous vehicles and autonomous logistics hubs” (Weiner, 2017; Káposzta-Honvári, 2019).

After presenting shortly both projects, we can see the key differences and similarities. Although much different in scale (Neom dwarfs Belmont in both in physical size and budget so far), they both share the same vision: focusing on cutting-edge technology and high level city design to create places for people to live and for businesses to thrive, serving as flagship projects inspiring innovation by their competitive activities. There is a question, however: why spending so much creating something new from practically nothing, and why not focusing on upgrading cities and communities already in need of investment and SMART design?

Well, this is mostly a matter of green versus brown field investments. In the case of cities, the difference between these two types is similar to any of the brown field – green field investments. Table 1 compiles some of the main differences.

**Table 1: Main differences between green field and brown field investments**

<b>Green field investments</b>	<b>Brown field investments</b>
Takes away land from other potential uses	Utilises already used areas (mostly industrial)
The need to establish infrastructure from scratch	There is existing infrastructure (but it can be costly to modernise)
Higher start-up costs	Lower start-up costs
New capital equipment = less costly operation	Old equipment = more costly operation
Maximum design flexibility	Less design flexibility

*Source: The authors' own editing 2020*

Building new cities can naturally be considered as green field investments. Based on the factors summarised in the table above, we can establish that both types can be favourable or unfavourable, based on the concrete project at hand. Of course, any city could use the investment these new locations receive, and with the right planning methods, the utilisation of these billions could have a spillover effects, affecting millions of people positively. But the goal of these projects is not nearly that simple. Creating new cities is a very unique project. It is much more than constructing homes, places for businesses or building shopping malls. On the one hand, they are experiment sites, which can help future planners to see which techniques, technologies and innovations work, and which do not. New cities represent great opportunities to learn and improve, and these results can not always be replicated in other, much older cities.

On the other hand, they carry a message: they can show the world what happens when there is a concentrated effort to do something what was only in books about urban design, and that is why constructing a city from scratch can be a very significant step. It is going to allow designers and decision makers to create something with maximum design flexibility, not bound by, for example, local tradition (since there is none, yet). The concentrated nature of these cities is very important to emphasise. The Silicon Valley is the prime example of how places with concentrated governmental regulation and effort, investments and expertise can thrive and become the home of some of the modern technological giants in the world (no wonder that other countries try to reproduce its success – the best example is maybe Shenzhen, China).

There is another important topic to discuss: the issue of SMART initiatives versus 'smart' initiatives. As we mentioned it above, there is a significant difference between the two. Whereas SMART criteria can easily (and have already been) defined, being 'smart' is much more difficult. But why is it an important issue? First of all, talking about the SMART criteria above, and than about the high budget investments of creating entire cities with cutting edge technologies suggests that settlements without considerable budget cannot hope to become successful and competitive. But it is not entirely true. We can safely assume that if a settlements aims to become a global IT giant, it does need to have access to advanced technologies and it has to be able to compete for investors of this field. But what about smaller, less potent settlements (towns and villages)?

Although the urban population surpasses the rural population on a global scale, and perhaps it is possible that in the far future all people will live in highly advanced SMART cities, in the next few decades we can theorise that there will still be villages and towns. These settlements, however small and less significant they are compared to cities, are the homes of citizens and communities; therefore, decision makers do have a responsibility to take care of them. But we have still yet to answer the question: how can we make them successful, if we cannot make



them as SMART as cities? For that, we may find guidelines at large, international organisations, such as the United Nations. Specifically, the UN established the Sustainable Development Goals (SDGs), as principles for development. These goals are displayed on Figure 4. These goals are of course not specific, but they represent very clear messages on how to make any communities more sustainable, while not emphasising costly technology. The best examples for that could be: Quality Education; Gender Equality; Good Health and Well-Being; Decent Work; Reduced Inequalities; Responsible Consumption and Production; Peace, Justice and Strong Institutions; and Partnerships for the Goals.

These elements do not necessarily require advanced technology, or even high budget. For instance, good health conditions do not necessarily mean expensive hospital equipment. In 2016, the Hungarian Government published the Strategy for a Healthy Hungary 2014-2020 (Egészséges Magyarország 2014-2020), in which prevention received a well-earned place, since Hungary usually lags behind other OECD countries in regard to preventing sicknesses. More focus on prevention, however, brings long-term effects on well-being and prevention activities can be carried out with relatively low costs, and on local levels as well (meaning that they can be universal development tools).



**Figure 4: The Sustainable Development Goals of the United Nations**

*Source: The United Nations, 2015*

Some of the SDGs do not seem to be able to bring quick results, and while long-term results are much appreciated, small villages usually need help fast, to encourage locals to continue their work and motivate new actors to settle down in the village or town. But many of the goals can bring economic profit even on short term. For instance, the Climate Action and Clean Energy goals can be interconnected by creating new power plants fuelled by clean energy (biomass, solar- or hydro energy). These investments need considerable planning and the initial costs can be high, but they can create jobs locally and potentially cut the local energy costs, leaving more money at the local government (thus, allowing it to spend on well-being improvements). Besides economic benefits, we need to consider social ones as well, since they can also improve how people perceive living in their respective settlements (and they might not be too costly for less advantageous regions and settlements). Smaller villages should be transformed into more diverse, more multifunctional areas, for example, by establishing community development facilities (Kassai et al, 2016; Gerencsér et al, 2017; Farkas et al., 2020). People should be supported in satisfying their social and other needs as close to them as possible (Oláh et al,

2012; Tóth – Jóna, 2019). This way, they would be more encouraged to stay in their homes and not to move to larger cities.

## Summary

This paper discussed urbanisation trends and the roles of SMART cities globally, showcased two planned SMART cities (Neom and Belmont), and discussed their role in ushering a new area of innovation. SMART cities are relatively new phenomena in our world, but they potentially hold the key to change urban planning and development as we know it now. The authors argued that it is important to create new cities, serving as flagship projects for development, since they themselves can stimulate innovation, growth, prosperity and well-being within and even outside their territories. The paper discussed the two new cities only briefly, because there is relatively few information on these projects. The paper also discussed differences between SMART cities and ‘smart’ settlements, because while converting ‘regular’ cities into SMART cities is very important, we need to look into how to improve the situation of those communities lacking the resources to have up-to-date technologies integrated to their transportation, health care or other infrastructural systems. These settlements should not be abandoned and when discussing what really can be done to make them ‘smart’, we must take into consideration other options other than advanced technologies. As a continuation of this paper, the authors aim to conduct more concrete research in the future on newly established cities.

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