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Sustainable development of territories in the framework of smart initiatives

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***Abstract*— The research based on analysis smart city-initiatives in framework of sustainable development. The main hypothesis is a lack of a comprehensive vision of a smart city slows down the development of the city as a whole. The results of research are developed methodology of community analysis and designed template for competitive passport of the city (community). The competitive passport of the city that developing on bases of proposed methodology will allow to reveal explicit and implicit competitive advantages of the territory, to choose the most needed at this stage of smart-technology, to develop an up-to-date strategy with specific (measurable and achievable) goals. Thereby using the concept of smart cities allows cities, regardless of their size, to achieve economic development, attract investors, and mobilize local people and create new jobs. The smart platform allows share data between all participants and stakeholders, this improves efficiency and stimulate changes.**

Index Terms— sustainable development, smart city, local community, planning, spatial development.

I. INTRODUCTION

Sustainable development in the most general way can be defined as long-lasting (hundreds of years) economic growth based on social welfare and access to quality resources for all members of the society. Naturally, sustainable development is being studied and implemented at different territorial levels, and each of them has peculiarities and need personalised approaches but nevertheless some common approaches are existed. The aim of the represented research is formulating some common uniformed approach for developing territorial units (preliminary local communities, small cities) in sustainable way.

The focus on communities was chosen under the circumstances that in the last two decades, the concept of "smart city" has become increasingly popular in the scientific literature and in international politics. In order to understand this concept, it is important to determine why cities are considered key elements for the future. We believe that the study of urban sustainable development is becoming increasingly relevant to contemporary tendencies, e.g. according to research today, only 600 urban agglomerations generate about 60% of world GDP. Moreover, by 2025, 136 new cities are expected to be in the top 600, all from developing countries and the vast majority - 100 new cities - from China (Urban world, 2011). Simultaneously the world's urban population is expected to increase by 63% between 2014 and 2050, compared to 32% of the total population growth over the same period. Urbanization and population decline in rural areas is currently one of the hallmarks of the country's economic development. In fact, according to the World Bank (World Bank, 2019), India, where 66% of the population lives in rural areas, is considered to have more potential for rapid economic growth than China, where the figure is 42% (for comparison, in the USA - 19%, Japan - 8%, Germany - 23%, Ukraine - 31%).

One of the reasons why people move to cities is a dream of better life and possibilities to earn money. It is clear that cities cannot cope with the constant population growth, and this results that 828 million people living in the wilds in 2015 without basic services such as drinking water and sanitation; this figure is increased annually by 6 million people. Social instability is also increasing as a result of rising inequality and unemployment, air and water pollution, road congestion, urban violence and crime. In terms of the environmental footprint, according to the United Nations (UN Environment, 2019), although cities occupy only 3% of the earth's surface, they account for between 60% and 80% of energy consumption and account for 75% of carbon emissions. Rapid urbanization puts pressure on fresh water supplies, sewage, habitat and public health. Illustrating that - in 2016, 90% of urban residents were breathing dangerous air, leading to 4.2 million deaths. More than half of the urban population worldwide has been exposed to air pollution levels that are at least 2.5 times the safety level.

The metabolism of cities mainly consists of the consumption of goods and the production of waste with persistent negative externalities that exacerbate social and economic problems. Cities traditionally require a lot of external resources and, in fact, they are (and probably always will be) resource consumers. Initial interpretation of sustainability through a focus on natural resources is now transforming and becoming

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more anthropocentric, suggesting that cities must respond to people's needs through sustainable solutions to social and economic challenges (Turcu C., 2013; Berardi U., 2013; Albino V., Berardi U., Dangelico R.M., 2015). The Sustainable Development of Cities problematic focus on 11th Sustainable Developments Goals (SDG), which is formulated as to ensure openness, security, sustainability and environmental sustainability of cities and towns. In particular, one of the indicators for Ukraine is the development and implementation of local development strategies aimed at economic growth, job creation, tourism development, recreation, local culture and local production. In this framework, the concept of Smart cities (or smart communities) as a platform for uniting residents, businesses, activists and city authorities for the development of smart infrastructure is fully integrated with the Sustainable Development Goal. It should also be mentioned that the development of such territorial unites is based on the principles of open data, smart use of digital services and transparent governance, which is important for good governance under the Sustainable Urbanization Strategy developed by the UN by 2030 (UNDP, 2016). The Strategy - incorporates the principle of open data, smart use of digital services and transparent governance, which is important for good governance.

II. MATERIALS AND METHODS

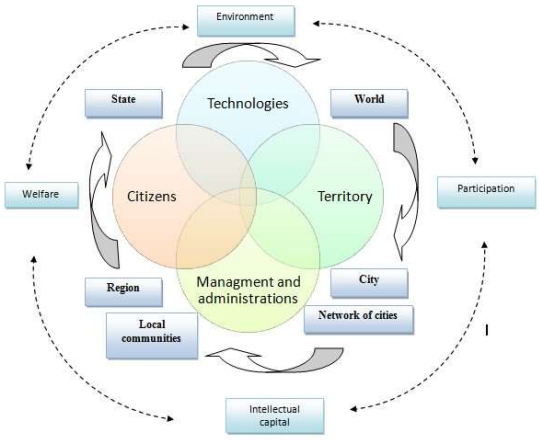
The term smart-city was first used in the 1990s. At that time, the emphasis was placed on the importance of new information technologies for the development of modern urban infrastructure. The California Institute for Smart Communities was one of the first to focus on how communities can become smart and how a city can take advantage of IT implementation (Alawadhi S. and others, 2012). There are many definitions of smart cities (literally more than 50), as well as numerous concepts about the correctness of the use of the term "smart", and the need to replace it with alternative adjectives, such as " intelligent" or "digital". The situation is caused also by the fact that smart cities are dedicated to the work of IT and artificial intelligence professionals, mathematicians, architects and urbanists, environmentalists, economists and lawyers, leading to different definitions that place emphasis and priority on the subject research. Moreover there is exist the concept of treating the city as a computer when the variations of urban life are perceived as programmable and rational (Mattern S., 2017). This discussion of terminology is reminiscent of what has been around the concept of sustainable development for many years. Such discussion is appropriate at both the theoretical and practical levels: it is important to have a generally recognized definition (better enshrined in regulatory documents) in order to have a detailed justified discussion (because in this case, the parties will be certain that they are talking about the same thing). After all, there is no one template for interpreting a smart city or unifying it. For example, there is a line of research that states that a "smart city" is a process, not a state (Mc Fedries P., 2014; Hannah Knox, 2010; Center for cities, 2014). There is a view that the concept of "smart city" refers to a local organization - district, city, region or small country - implies a holistic approach to the use of information technology with real-time analysis that encourages sustainable economic development (IDA, 2015). Researchers also discuss the risks of overuse, abuse and total control (exemplified by coastal Chinese cities) in managing the city, its flows and life within this concept, as well as the fact that a reasonable urban discourse can be a powerful tool for producing submissive subjects and political mechanisms legitimization (Vanolo A., 2014).

In general, the concept of smart cities is viewed through the lens of successful smart city initiatives in at least three dimensions (technology, people and institutions): integration of infrastructure and technology services, social learning to raise awareness and community engagement and governance to improve institutions and community involvement (Nam T., Pardo T.A., 2011, Sapiński, 2019). Social science representatives say that the modern city has deficit of trust, people, time and money (the means are secondary).

We can say that a generalized smart city (Fig. 1):

- created by a combination of citizens, technology and governance in a specific territory;
- may have larger or wider borders, from local urban dimension to region or network of cities, national and global scale;
- must have a strategy with clearly defined and measurable goals in the context of sustainable development: environmental security, the generation of smart intellectual capital, citizen participation and well-being, etc ;
- those that we generally expecting – developed, digital, networked (with full Wi-Fi coverage), sustainable, inclusive, democratic and more.

FIG. 1 GENERALIZATION OF THE THEORETICAL AND PRACTICAL DEFINITIONS OF A SMART CITY



Source: generalized on the base of Dameri R.P., 2013 and Zharova L.,2019

In the article, we consider a smart city (smart communities) as one that unites residents, business, activists and city government to develop smart-infrastructure.

The best, or most intelligent, cities in the world by several rankings are London, and the top five are New York, Seoul, Singapore, Helsinki. Typically, such indicators are estimated as urban transport mobility (including public, private and non-

motorized); quality of health care, level of access of citizens to medical services, integration of "smart city" in the system of interaction between doctor and patient; public safety, crime rate, law enforcement responsibilities; urban policies and technologies aimed at enhancing the productivity and ability of all citizens access to digital services.

A study by the Navarra University Business School (IESE Cities in Motion Index or SIMI), in particular on the city's prosperity conditions, shows that Kyiv ranks 113 out of 165 places between Tbilisi and Istanbul in this ranking, and its position is rated as M - good (A is the best, RA is relatively the best, M is good, B is bad) (IESE, 2018). There are four main categories with subcategories:

Social cohension includes diversity, the spirit of the citizens, health and safety, democratic values.

Sustainability includes reasonable density, compact growth, energy efficiency, public space.

Connection which covered by effective mobility, friendship for pedestrians, communications and infrastructure, international relations.

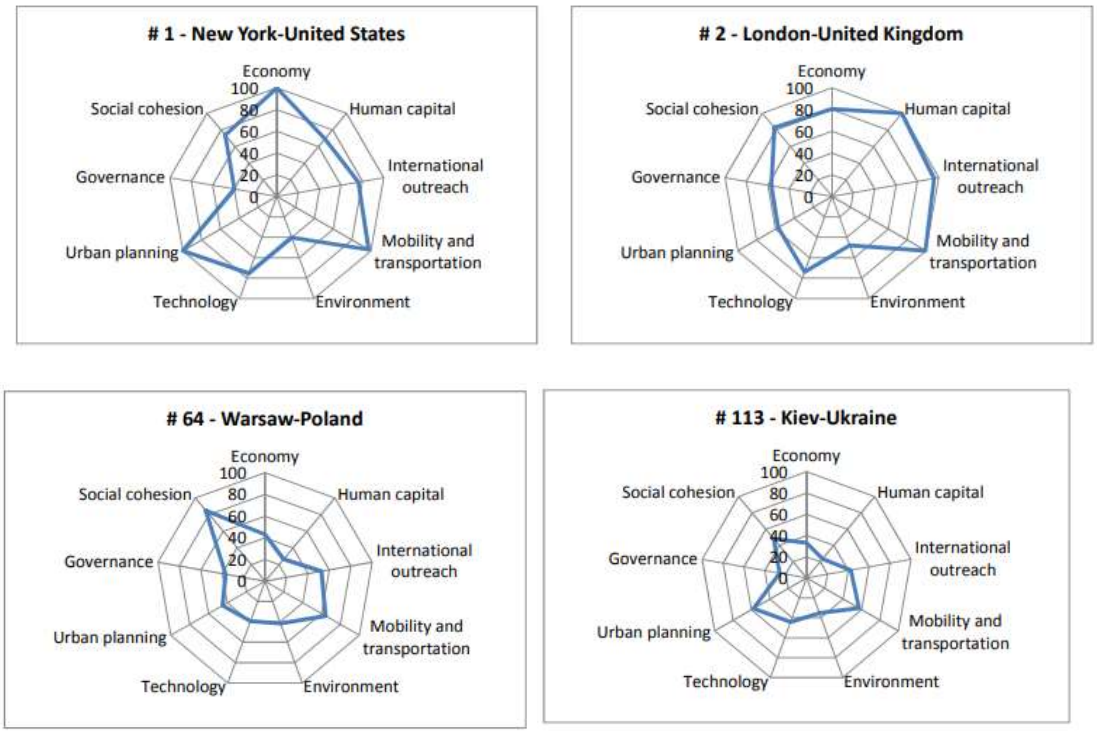
Innovation - creative activity, private sector, talents, technologies.

What matters is not the average achievement, but the fact that the city has risen by 6 points in the last year. Unfortunately, the city has been rated for only 2 years.

Ratings, and more precisely their interpretation and methodology, are most effectively used to analyze the current situation and compare it with one's own vision of the problems. In addition, the analysis of the top cities (Fig. 2) gives us an understanding that each city has its priorities, strengths and weaknesses. Undoubted, New York has high rates in economics, urban planning and mobility, while Reykjavik has high environmental, social cohesion and mobility.

Warsaw is on the level with London by the level of social cohesion but has was urban planning then Kyiv (in general it has 64th place in ranking from 165) With regard to Kyiv, when designing a development strategy, it is necessary to determine what is more important - promotion in the ranking (then mobility and social cohesion are the priorities, because we have the best indicators here) or the balance of development (then the priorities are management and human capital).

FIG 2. CITIES RATING



Source: IESE, 2018

We can argue that building smart cities is more effective than the traditional approach and allows us to implement the SDG – not only the 11 goals mentioned above, but also others: 6 - clean water and proper sanitation; 7 - accessible and clean energy; 12 - responsible consumption and production; 13 - climate change mitigation; 15 - protection and restoration of land ecosystems.

The Smart Cities Development Initiative provides an opportunity for effective development, not only of the big places traditionally associated with comfort, well-being and prospects (such as Kiev or Kharkiv), but also of small ones, allowing them to quickly change the quality of life in a settlement. The list of the top smart cities in Ukraine according to the Smart City Forum 2019:

– Innovative open city – Ternopil

- Smart transport – Lviv
- Smart Comfortable for living city – Uman
- City of startups – Slavutich
- Smart Environmental city – Myrgorod.

Besides that there are number of best practices, e.g. in Vinnytsa – the first service center was established, which allows fast register vehicle, sign a contract of sale, pass driving tests and obtain a driver's license. Vinnytsa call center "24 Hour Sentinel", unlike other cities, accepts applications not only on housing and communal services, but also on health, education, transport. There is an online chat on the City Council website where you can send a photo fixation of the problem. For the Vinnytsa condominiums, an online utility control service is available with their evaluation, selection of contractors, online payments through the site and the VinDim24 application. Through the "Children's Ombudsman" service on the city hall's website you can report violations of children's rights online.

It should be noted that rising public awareness is an integral part of smart cities. It also helps to spread information about environmental issues and find effective ways to address them (e.g. the SaveDnipro initiative which specialized on an air quality monitoring and reporting application is currently being developed and launched; the initiative also monitors the lagerst polluter DTEK compliance with commitments modernization of filters and is actively involved in consulting the former Ministry of Environment and Natural Resources of Ukraine now the Ministry of Energy and Environment of Ukraine).

The development of smart cities initiatives in Ukraine is one of the effective tools for maintaining sustainable development of territories and communities with the use of the latest technologies and attracting all resources. However, there are a number of challenges to implementing.

III. Results and Discussion

The main hypothesis is a lack of a comprehensive vision of a smart city slows down the development of the city as a whole. Companies and research institutions are pursuing their own goals, targeting specific technology areas of interest. Even if they associate their own project with the broader idea of a smart city, these goals are general and not well defined, and therefore not measurable and valuable. Moreover, overall goals, such as reducing pollution and traffic, or improving the energy efficiency of construction, do not add to the strategic vision of the city, taking into account the cultural, geographical and economic characteristics of each urban region and its specific goals.

The overriding goal is to address a more specific issue: communities do not always clear about how they can develop, where to spend money, and what the problems are.

We developed methodology for community analysis. It is not a development strategy; it is the basis for it - an analysis of what it is, the formulation of what the city (local community) wants, an offer of what can be achieved and the final stage of specifying the goals and steps to achieve with a description of the resources that will be needed and their sources.

The aim is to realize the scope of work, describe as precise as possible the current situation and to evaluate in which directions (areas) the development will be maximum effective and efficient and forming precise recommendations.

The product is a competitive community passport, action plan, list of potential stakeholders.

Main steps of work:

- Step 1. Preliminary - initial analysis based on available data (geography, finances, including what taxes are left in the community, economic indicators, businesses, online feedback etc);
- Step 2. Communication on the spot - the first stage of communication – what information is and what (in their opinion) is missing, what are the expectations, what are the problems, how they see the opportunities and what they would like to have (money is not the answer, here we should try to understand their vision - agro, services, tourism etc);
- Stages 1 and 2 analyze the community and identify the most promising areas of development and possible points of growth, while assessing opportunities for implementation - infrastructure, finance, specialists (availability and who can be involved). It will also be clear what kind of smart technologies can be applied now that need development. If necessary, a few more meetings and consultations can be held to clarify and form a common opinion.
- Step 3. Competition passport with 3 main parts: the descriptive part is what we have now and the perspective part is what can be changed in the short term; advertising part - what can be offered to investors and a list of potential initiatives that the region may be interested in (production, international community's);
- Step 4. Action plan (to further develop the strategy) - a list of specific steps and their sequence to determine where to get money, who to contact, etc.

Creating a competitive passport of the city (local community) will allow to reveal the explicit and implicit competitive advantages of the territory, to select the most needed at this stage of smart technology, to develop an actual strategy with specific (measurable and achievable) goals.

IV. Conclusions:

In conclusion, we emphasize that the use of the concept of smart cities allows cities, regardless of their size, to achieve economic development, attract investors, as well as mobilize local residents and create new jobs. The main points for urban development based on the principles of sustainable development using smart concepts are set out below.

Using shared platforms allows data to be shared between systems and made available across the city and for everyone. This increases efficiency and maximizes impact.

Being open to new technologies and technological solutions, even though cities are inert and use systems and infrastructure for much longer than humans or businesses, they can and should

break these stereotypes by introducing new technologies where they are most effective.

Security should be a priority - network and data security, social and environmental security, and guarantee transparency and legality for all - residents, entrepreneurs, investors, etc. At the same time, this thesis brings to the forefront the need for confidentiality and responsible treatment of data.

Involvement of citizens and active communication will make the city's development manageable, efficient and sustainable, since all sustainable development goals are aimed at people and people. In addition, education and multilateral communications will help expedite the identification and resolution of city issues and ensure well-being for all segments of the population.

An effective tool for this is the development of a competitive map of the city, which will become the basis for the development of strategies, programs, plans for communications, development, investment and more.

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