The European Proceedings of
Social and Behavioural Sciences
EpSBS

www.europeanproceedings.com
e-ISSN: 2357-1330

DOI: 10.15405/epsbs.2021.07.41

LEASECON 2020
International Conference «Land Economy and Rural Studies Essentials»

ECONOMIC SECURITY PROVISION IN SMART TOWNS

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Abstract

The following paper presents the experience of "Smartcity" implementation in various countries of the world. The digital technologies development problems of smart cities are analyzed. It also shows the problem of Smartcity implementation in countries with different cultural and religious traditions. It is proved that the "Smartcity" system for towns is not studied enough and there are also no methods for its implementation. The article analyzes new developments in Smartcity systems that allow synchronization of humans and the environment. During the study, some proves supporting the hypotheses of the study have been found. A set of technical solutions necessary to give a town the Smart status has been formed. It is concluded that there is no sufficient scientific and legislative basis for smart towns' development. The results of this study are expected to provide valuable information for urban planners, developers and legislators to develop more practical strategies and for researchers to better understand the concept of a smart city.

Keywords: Economic security, integration processes, smartcity, smart town

https://doi.org/10.15405/epsbs.2021.07.41
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Selection and peer-review under responsibility of the Organizing Committee of the conference
eISSN: 2357-1330

1. Introduction

The relevance of the research topic is built up by the following circumstances. First of all, economy digitalization generates new risks. Second, introduction of intelligent systems for territories life-support is associated with economic security. Third, having done some conceptual groundworks to implement the "Smartcity" system, the problems of smart cities have not touched towns and urban-type settlements, though it should unite all social and economic processes and improve a comfortable living environment for their residents.

"Smartcity" is not adapted for towns and does not have specially developed standards and methods.

The subject of urban management in large smart cities has been studied quite well; that is why the authors in their work decided to study towns in the "Smartcity" system and their economic security.

2. Problem Statement

Existing "Smartcity" criteria do not rank cities by their size; accordingly, there are no methods to assess economic security depending on the city level. The economic security element in smart cities is primarily associated with the access to the city management systems. Any malicious intervention can lead to enormous problems and, consequently, to expenses spent for the caused damage elimination. Another problem is the risk of databases theft containing secret and confidential information.

An example of the system interventions in the is a hacker attack on Estonia in 2007. As a result all websites of government agencies in the country had been disconnected, and the work of institutions had been paralyzed for two weeks (Cyber-attacks on government agencies and media websites in the world, 2010)..

3. Research Questions

The following hypotheses have been put forward in the framework of this study:

Hypothesis 1. In what direction should cities develop if they have already reached the "Smartcity 3" indicators or will have reached them in the near future?

Further cities' development will most likely proceed according to the new "Smartcity 4" innovative standards, their parameters will be set by cities with a faster pace of development. Currently, there are some cities in the world that have taken the lead in their development according to some indicators; their list is given in table 1.

Table 1. New directions for the smart cities development

Country	Smart city innovation
China (Beijing)	City parking lots management and parking lots design during construction.
Georgia (Batumi)	Climate risk forecasting system to support the agricultural sector, the highway sector and the architectural development of the city.
England (London)	Fire prediction program for city districts and for each house separately.
USA (New York)	Sensor detection system that pinpoints the location of gunfire by vibration and sends the information to law enforcement.

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USA (Boston)	Data collecting system using in-vehicle sensors to provide details concerning road and traffic conditions
Spain (Madrid)	"Service ecosystem" i.e. a system to monitor the quality of services performed by providers and the corresponding payment for services rendered.
Spain (Barcelona)	A program collecting data from all meters and cameras to diagnose the situation in the city. "Smart garbage" is a system that collects data from all the city's garbage bins and, when filled, sends specialists to take them out
Brazil (Rio de Janeiro)	Climate data collection program is to analyze it and notify the authorities and residents in case of emergency (the system is relevant for cities located in the seismic and dangerous climatic zones)
Russia (Moscow)	The program of a unified smart transport system allows one to track passenger traffic, to control the journey of each individual person and determine the cost of a ticket if a person changes for another municipal transport in a certain period of time
Russia (Sarov)	Implementation of a system of urban problems mapping (town residents can map urban problems being able to track all stages of the problem solution)
Republic of Singapore (Singapore)	The first computer-based electricity management system. It enables to constantly monitor the electricity producing factories and to monitor the operation of all systems there.
Japan (Fujiasawa)	It is a fully automated smart city built in 2010.

Source: Intelligent Cities Smart Cities Smartcities. 2020. [Electronic resource] Access mode: http://www.tadviser.ru/index.php/Article:intelligent_cities_(Smart_cities,_Smart_cities). Tishchenko A., "Smart" Singapore: how technology makes life easier for residents of the country. 2019 [Electronic resource] Access mode: https://www.qled.com.ua/story/smart-singapore/

Hypothesis 2. Will the turn to the "Smartcity" system lead to economic growth?

Taking into account that the "Smartcity" system is aimed at improving quality of life of people (accessible roads, safety and developed infrastructure), we should not expect rapid economic growth. Ultimately, it is possible to have economic growth associated with an increase in life quality and population growth (an influx of people in search of a better life) and consequently with the creation and expansion of new industries and housing sector.

Hypothesis 3. Do socio-cultural values and religion affect the implementation of all aspects of smart territories; for example, face recognition for security purposes or identifying target groups in sales?

Definitely, the process of smart cities development is not fully feasible in some countries due to religious and other values. For example, face recognition cameras introduced in Yinchuan, China make it possible to pay in shops and supermarkets with the help of face biometry without using credit cards (The history and future of smart cities, 2019). But in Arab countries with a predominantly Muslim population, this action will not be possible because some part of the population wears a burqa for religious reasons, so it is impossible to identity women and recognize their face biometrics.

Hypothesis 4. What is the "smartness" integration degree of the related areas: smart city, smart block, smart house, smart apartment, smart office, etc.?

Studies have shown that simultaneous, parallel implementation of smart territories, smart homes and smart offices is not always possible. However, it should be borne in mind that the lack of individual components in some of the areas considered can lead to significant restrictions in related smart projects. For example, if there is no fiber-optic cable for broadband Internet in a neighbourhood or a house, since this urban village has not got into the technical program for Internet cables updating, then the designers will encounter technical limitations launching a smart house. If there is practically no centralized street

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lighting in a small town, then it will not be possible to turn the street lighting off automatically. If there is no centralized water supply and sewerage in the built-up area infrastructure, then the introduction of an automated cost calculation system for supplied resources becomes impossible (Kalachinsk, Omsk region). If the traffic intervals of public-passenger transport in towns are quite long, for example, every hour (Tatarsk, Omsk region), then a smart system optimizing the passenger traffic flows loses all meaning. The possibility of the "Smartcity" evolutionary implementation into fragmentary projects, for example, the introduction of individual elements of e-government, the construction of individual smart apartments ordered by the owners, certain work of water intakes modernization, etc., will obviously be associated with the slow introduction of "Smartcity" components. Thus, the implementation of "Smartcity" complex projects is possible with the authorities support (Sarov, Nizhny Novgorod Region) and it is also possible to perform a gradual fragmented implementation of smart town elements in traditional villages.

4. Purpose of the Study

A large number of companies have been developing "Smartcity" in Russia and all over the world; they retain access to the implemented system through an encryption system, keys, etc. Introduction of control measures into "Smartcity" security system would enable specialists to take into account all possible consequences of attacks and interventions on the system even at the planning stages.

5. Research Methods

Over the past few years, the scientific literature dedicated to the "Smartcity" issue has been enriched significantly. The study of the scientific material by foreign and national authors allows comparing the level of "Smartcity" development in different parts of the world using the method of comparative analysis. The "Smartcity" study is focused on direct comprehension of the model of city interaction with all areas of activity and its citizens.

The main part of the study was devoted to the basic provisions of the standardization theory concept.

Russian state standards regulating requirements for smart cities and methodological recommendations make it possible to build a "Smartcity" prospective development analysis. And a retrospective analysis will allow us to identify the weaknesses of the system that we need to rely upon (Order of Rosstandart, 2019; Order of the Ministry of Construction of Russia, 2018).

In the process of "Smartcity" model studying, some foreign authors transferred the smart cities model to enterprises, thereby creating a system keeping under control all the processes caused by new implementations (Bastidas et al., 2017).

The study was based on general scientific, socio-economic and statistical methods: integrated approach, synthesis, analogy generalization, structural and logical analysis, abstraction, as well as on research methods: economic and statistical method, integration of socio-economic estimates, perspective design. We used the method of results graphical presentation, the method of expert estimates and the statistical-factual method to display the obtained results.

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6. Findings

At the present stage of the "Smartcity" system development and its introduction into the city life, it is necessary to understand the when a city is considered as a smart and safe one (Staudemeyer et al., 2019). When considering the problems of towns, it should be understood that small towns have their own specifics. And the process of their integration will differ significantly from the processes occurring in large cities, and in some respects it is not feasible (Smartcities: digital solutions for a more livable future, 2018).

The economic security system in "Smartcity" towns is a rather difficult challenge, since it is required to have qualified IT specialists but small towns are usually lack of such experts. None of a modern "Smartcity" development program takes into account the problems of small towns, but focuses mainly on large megalopolises.

To implement "Smartcity" in small towns, it is necessary to understand the obstacles the system can face in the process of integration. We have developed a list of specific features necessary to be considered when creating "Smartcity" in small towns.

The specifics of small towns development is as follows:

- limited amount of financial support;
- relatively low living standards;
- the environmental problem does not have an average level (either the problem is not relevant or has a dangerous level);
- lack of federal roads / poor roads quality;
- lack of a railway connection;
- lack commute and regional aviation;
- lack of universities (or presence of University branches, mainly in the field of agriculture or pedagogical education);
- subsistence farming;
- far distance from large cities, except satellite cities;
- lack of modern utilities.

In order to create a "Smartcity" standard for small towns, it is necessary to determine the feasibility of all new developments for small towns using the expert method.

An example of a smart solution relevant for a small town but being useless for a mega polis is motion sensors mounting onto the lighting posts. Due to a heavy people and traffic flow in large cities, the cost of sensors installation will be uneconomic, since the constant flow makes the lighting system work continually. In small towns the situation is absolutely different: the human and traffic flow is rather weak there and without sensors the lighting system will function all night long and it will increase budget and electricity expenditures.

"Smartcity" means combination of all intellectual processes taking place in the city into one single management complex. From the point of view of economic security, it is advisable to make a closed system and it should not be connected to the worldwide network. Thus, it will be possible to avoid system hacking by external intervention. An example of a closed system is the Internet in China.

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Nowadays, we can distinguish three levels of "Smartcity" development, each level has its own list of necessary parameters to be achieved (Technologies for smart cities, 2017).

"Smartcity 1" is characterized by the initial stage of development. Typically, this market is represented by large technology companies, the system is being developed through semi-automated production and the ability to control processes in real time.

"Smartcity 2" is a more complex information system. It starts to participate in cities' life on the base of digital models. In this period of development, startup companies are starting to appear. This standard includes most of the large cities in the world.

"Smartcity 3" is the closing stage of development at the moment. It characterizes itself as a single urban management system, starting from the private sector of the suburbs and ending with the city authorities. An ordinary citizen is getting a possibility to influence the city appearance.

At the present stage of the "Smartcity" formation as an independent intellectual process, the issue of energy efficiency optimization and renewable energy sources development in cities becomes critical. German scientists pay considerable attention to this issue considering the achievement of rational energy consumption as one of the essential tasks (Bruckner et al., 2012).

In our opinion, the issue of renewable energy sources is more relevant for small smart towns, since their consumption is several times smaller than that in megacities.

Currently, the only fully automated smart town in the world is Fujisawa, Japan with a population of 3,000. The city is able to receive up to 30% of its electricity using renewable sources. In emergency situations, Fujisawa is able to provide itself with everything necessary for 3 days (electricity, communications, hot and cold water). The example of Fujisawa development is advisable for the national smart towns' development.

One of the branches creating a smart city is the rational use of renewable energy sources i.e. "green energy". Latin America countries have all the prospects for this direction development. The Latin American pavilion presented the whole line of green technologies at the EXPO-2017 in Astana. Thus, Chile, having tremendous potential in solar energy, pursues the policy of building solar power plants, and it makes Chile a country with cheap electricity. In Bolivia, the Ministry of Energy was established for the systematic implementation of the green energy project. This will allow the country to control energy sources (it is of political importance) and to regulate the introduction of advanced technologies in this field. To implement "Smartcity" in small towns, it is necessary to make public investment in infrastructure projects. The set of smart town technical requirements, we have identified, will allow determining the channels for budget funds direction (Figure 1).

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Figure 1. The set of technical solutions necessary for smart towns (Source: own development)

The technical solutions described are universal and may correspond to the classification features of most smart towns in the world. In order to take into account the classification of individual cities, their specificity is presented below (Table 2).

Table 2. The specific features of individual cities

Specificity	Example	Solution
Cities located close to military operations, border lines	Jerusalem, Gaza (Israel-Palestine), border cities of the southern part of the Republic of Turkey (border with Syria),	Installation of public warning systems, border monitoring systems, emergency call systems for emergency services
	Oimyakon (Russia) - temperature - 71 2 ° C,	Installation of warm bus stops, sites where people can get warm, public warning systems in case of weather deterioration
Cities located in unfavorable climatic zones or in zones of natural disasters and unforeseen incidents	Los Angeles (USA) located in a seismically dangerous area Catania (Italy) - located near the volcano Etna Pasto (Colombia) - located near the volcano Galeras	Installation of emergency public warning systems, installation of avalanches and earthquakes analyzing and forecasting systems, installation of climate monitoring systems and emergency deployment sites for special services
Cities located close to solid waste landfills or nuclear waste disposal or toxic waste landfills	Lagos (Nigeria) Las Vegas (USA) New Delhi (India) Varanasi (India)	Installation of modern systems and sensors to monitor the communal situation in the city, as well as the construction of waste processing enterprises and water treatment systems.
Cities located close to hazardous facilities, including army depots	Bruce (Canada) - located near a nuclear power plant Gyeongsangbuk-do (South Korea) - located near a nuclear power plant	Installation of universal duplicate operational emission warning systems, the establishment of emergency sites for obtaining the

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	Dunkirk (France) - located near a nuclear power plant Seversk (Russia) – there is a chemical plant in the city Achinsk (Russia) - located near military artillery depots	necessary equipment (gas masks, first-aid kits, etc.)
Satellite cities	Smart City - Kazan (Russia) Academic - Yekaterinburg (Russia) Queenstown - Singapore (Singapore) Tres Cantos - Madrid (Spain) Evry - Paris (France)	Introduction of mechanisms and programs supporting rapid integration with the city

Source: own development

The special characteristics of individual cities imply the creation of a separate "exclusive" "Smartcity" system; it will lead to its cost and service increase. The security of such a system will also be of expensive and special character.

To understand the relevance of economic security in "Smartcity", it is necessary to analyze attacks in the context of activity areas, as it is shown in figure 2 (Central Bank of the Russian Federation, 2018).

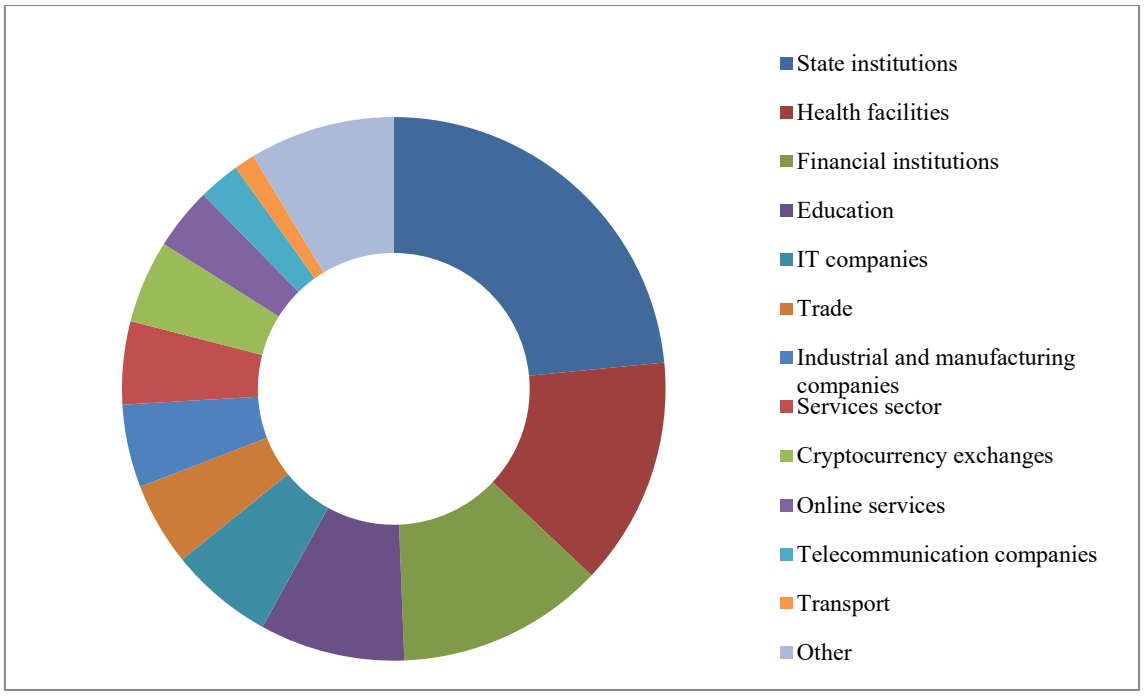

Figure 2. Attack statistics in 2017-2018

It is clear that the sector of public institutions, medical institutions and financial industry are more subjected to interventions. Arranging real-time information flows, intelligent environments make decisions that benefit their users, but if an intervention occurred they may lead to incalculable losses.

It is necessary to determine what will be considered as a smart solution for a small town. In small towns, there are a lot of urgent problems that are not noticeable in large cities.

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7. Conclusion

Basing on results of the studies it was found that “Smartcity” is an urgent issue all over the world, though the problem of smart small towns is not well explored and there are no legally established concepts, criteria, types and levels of small smart towns. Analyzing scientific sources and practices it was proved that “Smartcity” is a system contributing to the overall well-being of the city, improving the quality of people’s life through combination of all intellectual processes into a single management complex. It is necessary to create a single development plan and establish implementation phases for smart processes implementation in a smart small town.

It is necessary to take into account the features and specifics of each town implementing the “Smartcity” system. In most cases, legislative acts and procedures for the “Smartcity” implementation are based on the problems of large cities and they do not provide a structured plan for the development of small towns. The large quantity of the modifier leads to its coagulation and reduction of its influence on the structure.

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