

## **IMPACT OF SUSTAINABLE DEVELOPMENT ON SMART CITIES**

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### **Abstract**

Sustainability is an important topic addressed and promoted by the European Union among its member states. Thus, environmental policies in the European Union are correlated with global problems and solutions are constantly sought to reduce the negative effects in society. Sustainable development has two important crises in the foreground, climate and biodiversity, but the measures to reduce their effects are for various fields and the development of a green economy is supported.

The study aims to highlight that projects are being developed at the level of the city of Iași, either by accessing non-reimbursable funds or through private partnerships, which aim to develop the city of Iași as a Smart City. In the same development as Smart City determines a sustainable development, because projects are implemented in the field of public transport, by introducing new means of transport (trams, buses) whose main purpose is to reduce pollution. The opportunity to access European funds helps urban administrations develop sustainably and, in this way, aspire to become a Smart City. At the European level, there are instruments that promote the development of smart cities (non-reimbursable European funds, the European Ecological Pact, Agenda 2030), which facilitates an integrated sustainable development. This paper will use centralized information from the websites <http://iasismartcity.ro/>, <https://iasi.digital/>, [www.mdlap.ro](http://www.mdlap.ro) and [www.mfe.gov.ro](http://www.mfe.gov.ro), which will analyze and highlight the projects, which have been implemented or are being implemented by the local public authority of Iasi for the development of Smart City.

### **Keywords**

sustainable development, smart cities, projects, European Union

### **JEL Classification**

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### **Introduction**

Smart City is a complex approach of local authorities, institutions, and partners from the private sector. The development of a Smart City type city represents a simultaneous

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involvement of all factors (local authorities, private environment, civil society) and a collaboration between them. The results of smart cities are the equal efforts of everyone, and projects can be involved through direct partnership between public authorities and the private sector or through projects developed by the private sector through which the citizens are the direct beneficiaries. In 2017, the municipality of Iași won the Digital Cities Challenge competition, organized by the European Commission, which led to the conception and implementation of the "Digital Transformation Strategy", carried out by European Commission experts in collaboration with local experts. Also, in 2020, the Municipality of Iași qualified in the Intelligent Cities Challenge competition with the aim of obtaining a strategy for the transformation of the city from a Smart one to an Intelligent one. The realization of Smart City represents the collaboration between local public authorities, the private environment, NGOs, the academic environment, which currently shows a collaboration between these factors, in various projects whose purpose is the development of a smart city.

The analysis of the projects that have been completed or are being implemented for the development of the Smart City in the city of Iași will have the role of highlighting the importance of sustainable development in this endeavour. Smart City development and sustainable development are closely related for urban spaces. These projects are the result of the direct involvement of local public authorities and companies, which aim to transform the urban area into a smart city.

### **1. Review of the scientific literature**

The smart city highlights the importance of information and communication technologies (ICT) in their development (Schaffers, 2012). In the specialized literature, the term smart city is used to specify the ability of a city to respond as promptly as possible to the needs of citizens and adapt to sustainable development. Smart cities consider the quality of life and development of the city, which are influenced by transportation, government services and education, public safety, and health (Choenni, 2001). So, when analyzing the "Smart City" several aspects must be considered, from main areas of activity to quality of life and sustainable development. Research in this field can be found in the following fields: education, health, transport, public administration. These areas contribute to improving the quality of life in a city and ensure sustainable development.

In the specialized literature, the authors Choenni (2001), Dirks (2010) and Giffinger (2007) consider transport to be the most important area for starting the transformation of a city into a smart one. This area envisages the use of modern transport technologies. Intelligent transport systems are the best example of harmony between city development and modern technologies. Smart City is also used by various authors in the literature and an opportunity for citizen education Caragliu (2009) and Schaffers (2012). Smart cities are an important part of the future educational process. The educational goal of smart cities is for them to develop harmoniously, through the least possible consumption of resources.

The development of cities must be carried out according to models of urban regeneration, these being described by management, finance, mobility, energy, and ICT (Garcia-Fuentes, 2017). Today's cities face new economic, political, and technological

responsibilities that they must meet to deliver sustainable prosperity to citizens. Through technology, smarter systems can be created to optimize the use of limited resources.

The relationship between the urban sustainability of new smart cities and infrastructure projects has become integrated and reflects the progress and prosperity of administrative units, smart infrastructure projects classified into two main categories, in which the first is to upgrade the built infrastructure and provide it with smart solutions, and the second is creating new infrastructure for new urban sprawl or replacing built infrastructure with new to cope with global population growth. The concept of smart infrastructure is derived from the idea of a smart city, which is described as a comprehensive system with various elements such as stakeholders, environment, economy, mobility and living conditions of a given geographical space, with effective communication technology of information (ICT).

Infrastructure is the basis for the development of sustainable smart cities (SSC), which has six distinct conceptual characteristics:

- Smart economy.
- Smart governance.
- Smart environment.
- Smart people.
- Smart mobility.
- Smart life (Cruz, Sarmiento, 2017).

A smart city is an innovative city that uses information and communication technologies (ICT) and other means to improve the quality of life, efficiency of urban services and competitiveness, while ensuring that it meets the needs of present and future generations in terms of economic, social and environmental. Smart infrastructure can be divided into two real parts which are "smart physical infrastructure" and "smart digital infrastructure" (Cruz, Sarmiento, 2017).

## **2. Research methodology**

The work was carried out by analyzing information from the websites <http://iasismartcity.ro/>, <https://iasi.digital/>, [www.mdlap.ro](http://www.mdlap.ro) and [www.mfe.gov.ro](http://www.mfe.gov.ro). The goal was to identify the projects that have been implemented or are being implemented by the local public authority of the city of Iași for the development of the Smart City. By analyzing the projects, the priority areas for accessing the funds are also identified. The analyzed financial year is 2014-2020, regarding the implementation of projects with non-reimbursable European funds. During this period, the infrastructure, either through the rehabilitation and modernization of some streets, or through the purchase of new means of transport and the provision of digital services in the means of transport, represented a priority at the level of the authorities in the municipality of Iași, which indicates that mobility is a field key to the sustainable development of the city. The data and information analysed were centralised over the period 2021-2022.

The study will highlight the importance of accessing European funds for the creation of a Smart City urban area. The implementation of projects with non-reimbursable

financing helps to achieve sustainable development, which primarily contributes to protecting the environment and reducing pollution.

### **3. Results and discussions**

#### **3.1. Projects with non-refundable funds**

At the level of the Iași City Hall, several non-reimbursable European funds were accessed for the 2014-2020 financial year, which aim to create better conditions in the city of Iași, rehabilitate various areas, which ultimately lead to the creation of the smart city. Iași City Hall had and is implementing a number of 19 projects, in the total value of 619,314,676, of which 488,608,670 lei is non-refundable European funding. These were on several operational programs, but most of them are through the Regional Operational Program, which represented the main source of development, from which the City Hall benefited (58.3 million euros). Most of the projects aimed either at the rehabilitation of cultural objects (Braunstein Palace), or at the digitization of public services of the institution or the rehabilitation of the road infrastructure in the city of Iași, the construction of kindergartens, etc. The results of the projects lead to an increase in the quality of life of the inhabitants, transform the appearance of the city and transform towards a smart city.

The municipality also pays attention to the rehabilitation and modernization of public transport by purchasing new means of transport. In this sense, Iași benefited from three projects, which aimed to purchase 16 new trams and 44 electric buses, in which the purchase was made by the Ministry of Development, Public Works and Administration. The local administration of the municipality of Iași was based in the 2014-2020 financial year on the Regional Operational Program on the specific objective 4.1, "Reducing carbon emissions in the county seat municipalities through investments based on sustainable urban mobility plans". It submitted projects for: the rehabilitation of the tram infrastructure in the Municipality of Iași (rehabilitation of the Cinci Drumuri tram infrastructure - Pădurii street - Nicoriță street, Piața Podu Roș - the intersection with Primăverii boulevard and Virgil Săhleanu boulevard (between the intersection with Metalurgiei boulevard and the Industrial Zone roundabout , plus the purchase of three trams), rehabilitation of the tram infrastructure in the Municipality of Iași by reorganizing traffic on Tudor Vladimirescu Boulevard (execution of construction and installation works of the Bucșinescu tram infrastructure – Tudor Vladimirescu Street – Calea Chișinăului, rehabilitation of the Tudor Vladimirescu Bridge, plus the purchase of seven trams) and the rehabilitation of the Iași - Dancu tram infrastructure (Doi Băieți - A. Vlaicu street - borders the Iași Municipality) (rehabilitation of the Iași - Dancu tram infrastructure, the rehabilitation of the Ciurchi II bridge, plus the purchase of two trams). Thus, in addition to the project through the MDLPA, the municipality also acquired 16 new trams, through other projects, but which aim at urban mobility. Through these projects, the Țuțora intermodal point was built, inaugurated in July 2022 and which aims to take over public transport to the interior of the city.

Considering that urban mobility has an important role for the development of smart cities, one can see a concern of the Iași administration for the continuous development of shared public transport through the acquisition of new means of transport and the gradual replacement of the old ones. This year the municipality submitted a project for the purchase of trams, buses and trolleybuses through the National Recovery and

Resilience Program, and the intentions are that every financial year the municipality will access non-reimbursable European funds, which lead to the modernization of public transport. According to the authorities, 100 new trams are needed to change the entire tram fleet, but through the two projects with non-reimbursable financing, at the end of 2022 there will be 32 new trams in circulation. The modernization of public transport in the city of Iași and through the purchase of electric vehicles, including electric buses, will lead to the development of metropolitan transport, because those with thermal engines will be put into circulation in the metropolitan area.

Through Operational Programme "Administrative Capacity", the first intervention category 119 offered the opportunity to the municipality of Iași to access a project worth a total of 3,539,179 lei, which will improve the decision-making process at the level of the Municipality of Iași by introducing coherent methods and systems to substantiate the decisions, their correlation with the available resources and the training of the staff of the specialized apparatus to use these tools. Also, the Integrated Urban Development Strategy of the Municipality of Iasi and the Sustainable Urban Mobility Plan for the Iasi Growth Pole for the period after 2020 will be updated, the archives will be digitized, and the staff trained within the General Directorate of Economic and Public Finance for the use of related IT systems digital document archiving system.

The involvement of the public administration to access non-reimbursable European funds to develop various fields creates the prerequisites for shaping the framework for the development of the smart city. As observed in the analysis of the conceptual framework and examples of Smart City worldwide, it is necessary to have a modern transport infrastructure and an environment conducive to the collaboration of authorities and partners from academia, private and civil society for the development of all areas that transform an urban area in a smart city. The municipality of Iași has the opportunity by accessing European funds to remedy various problems, including those related to mobility, digitalization, energy efficiency, the creation of cultural centers, etc.

### **3.2. Projects developed by private partners**

The municipality of Iași, in addition to the projects developed through non-refundable European funds, could benefit from projects developed by private companies and in which the City Hall is co-opted as a partner, or the projects are addressed directly to the community. At the level of the city of Iași, there are several examples of projects based on the use of new technologies, and they are public-private partnership models in which the main beneficiaries are the citizens (Nedap Sensit, for parking lots or HereItIs, for public transport mobility).

The LoRaWAN® network is an essential network for Smart City infrastructure. This is essential in IoT-type projects (remote control and monitoring of utilities, air quality measurement, etc.), which are the basis for the development of smart cities. In 2020, LoRaWAN® had full coverage in Bucharest and Iași, and the network is already present in 6 other localities in the country, being made available by Orange Business Services, which came to the aid of local authorities. LoRaWAN® type communications have greater coverage and ensure the delivery of small amounts of data between hard-to-reach devices that have increased energy autonomy. The smart city must have an infrastructure based on networks that allow the connection of many devices and sensors,

for efficient management of city resources. At the national level, Orange offered Smart City solutions for cities such as Iași, Alba Iulia, Timișoara, Cluj-Napoca, Suceava and Caransebeș. For smart cities, connectivity is paramount, in addition to other areas, and telecommunications infrastructure is vital for any smart city project where data converges and is translated into solutions that serve citizens, businesses and local public authorities. The Orange company has realized the importance of the Smart City for cities and has defined in its strategy that it has an important role and collaborates with local authorities to support them in their efforts to become smart areas.

Among the most important projects are those based on new technologies. The acceptance of open data technologies in public services is also observable at the level of Romania. Large urban centres have made open data information available to those interested. And the Government of Romania has published a web portal that serves as a "central access point for open data sets" that are provided by the public administration and its institutions. In this way, they can be easily found, downloaded, and used, thus facilitating access to "information generated and held by administrative structures". To facilitate the access and use of this data, the portal presents examples of API (Application Programming Interface) calls and ways to call this data in JSON format (JavaScript Object Notation – a way of representing data for computer applications), calling by through the Python language, accompanied by a code example, etc. The Romanian Government Portal allows the extraction of open data in a broken-down way, by domains, such as: economy, justice, agriculture, population, cities, environment, health, energy, etc. In a centralized way, city operations can also be accessed, selected, and funded through the various funding lines.

Urban communities face problems in terms of mobility, but also in terms of parking spaces. The integration of technology and digitization can help solve a problem faced by large urban agglomerations, traffic in central and public interest areas. The use of smart parking services is the solution for cities because access also contributes to reducing pollution. In this sense, the use of Nedap Sensit parking sensors is an increasingly popular solution. In Romania, the fastPark company is Nedap's partner. The proprietary SENSIT technology consists in creating a network of parking sensors that detect in real time the state of the parking space (occupied/free) and the duration of parking. The SENSIT IR Flush Mount sensor is an intelligent parking sensor that offers a dual detection technology: magnetic and infrared, through which it provides real-time information on the status of the parking space (occupied/vacant). As part of the SENSIT platform, the SENSIT IR Flush Mount optimizes parking utilization, reduces emissions, and guarantees a quick return on investment.

Fastpark arrived in Iasi in December 2020, when it delivered and put into operation an integrated system for detecting the status of parking spaces for the municipality of Iasi. Following the implementation of these parking sensors, the aim is to streamline urban traffic and improve the quality of life of the citizens of Iași. The sensors are integrated into the UPPARK Parking App mobile application, through which occupancy can be seen in real time, and drivers can easily find free parking spaces and be guided to the nearest available parking spaces. Also, UPPARK Parking App has some benefits that help users like:

- Secure registration, data is protected by the latest payment technologies;

- Correct parking, depending on the position, it is easy to find a permitted parking space;
- Exact pricing, all fees and payment commissions are known;
- Pay by phone until you reach the parking spot;
- The driver is notified before the parking time expires.

It can be extended remotely, so you can extend the parking time as many times as you want, from anywhere. This parking system is an example that the administration through partnership benefits from a smart project, which helps to modernize the parking lots and where the main beneficiaries are the citizens, the community.

### **3.3. Partnerships of the authorities for the development of Smart City**

The main partnerships of the Iași City Hall for the realization of the smart city are identified on the website <http://iasismartcity.ro/>. Thus, the Smart City project for the municipality of Iași is a complex project, which requires major investments, multiple partners and openness to collaboration between the municipality and companies or the private sector and civil society. The main Smart City partnerships in Iasi are listed below.

DIGITAL CITIES CHALLENGE, a program of the European Commission for the development of the Digital Transformation Strategy. Through this opportunity, the Digital Transformation Strategy of the Municipality of Iași was realized. INTELLIGENT CITIES CHALLENGE is an initiative of the European Commission that supports 100 cities in using leading technologies for smart, ecological, and socially responsible development. OPEN & AGILE SMART CITIES (OASC) - OASC is a network that connects cities and communities around the world to learn from each other and exchange data-driven digital solutions based on minimal interoperability mechanisms (Iasi Municipality is a member)

ROMANIAN ASSOCIATION FOR SMART CITY - ARSC is the main authority of the Smart City Industry in Romania (Iași Municipality is a member of the association). ROMANIA 2030 CHARTER is a national program for the creation and modernization of creative-intelligent communities in Romania (the Municipality of Iași signed the Romania 2030 Charter). THE OPEN GOVERNMENT PARTNERSHIP (OGP). The municipality of Iași is the only city in Romania that joined the open government project. The Open Government Partnership is a multilateral initiative that aims to secure concrete commitments from national and sub-national governments to promote open government, empower citizens, fight corruption and harness new technologies to strengthen governance.

ICONIC CLUSTER is the first IT and New Media cluster in Iasi (the municipality of Iasi is a member). It aims to encourage the development of Iași companies active in the fields of IT and New Media and to increase their visibility and competitiveness internationally, by attracting investors and technology transfers. The cluster contributed to the formation of a global collaborative relationship called the Business Roaming Agreement (BRA). THE DIGITAL COUNCIL FOR THE DIGITAL TRANSFORMATION OF THE MUNICIPALITY OF IAȘI. The municipality of Iași is a member and coordinates this council, made up of representatives of academia,

business, civil society and public administration. CDTD governs the implementation of the Digital Transformation Strategy of the Municipality of Iași and can meet in its entirety, or on working groups specific to a certain specific field: education, mobility, environment, sanitation, governance, etc.

At the local administration level there are diversified partnerships that have as their final goal the development of the city of Iași as a smart city, especially since this is the future trend for urban administrations.

### **Conclusions**

Following the completion of this study, it was observed that at the level of the city of Iași, a number of 19 projects (implemented or in the process of implementation) were won, in a total amount of 619,314,676 (approximately 124,851,761.15 euro), of which 488,608,670 lei (approximately 98,501,868.80 euro) in non-refundable European funding. The projects were from various fields, but the ones that had a major impact on the community are the digitization of the public services of the institution, the rehabilitation of the road infrastructure in the city of Iași and the acquisition of new means of transport or the modernization of public transport. The results of the projects lead to an increase in the quality of life of the inhabitants, transform the appearance of the city and transform towards a smart city.

From the analysis carried out, the field of mobility is the biggest beneficiary of funds, either from non-reimbursable funds or from private partnerships. However, the field of mobility has become a priority at the city level and enjoys special attention from the local authorities, currently being the "Iași Mobility" project, which aims to develop a MaaS (Mobility-as-a-Service) platform, which to allow the intermodal transition of passengers. The first stage is represented by the Tranzzy platform, it is also the "Iași Mobility" application, in which the entire metropolitan area will be introduced. At the level of the city of Iași, several projects are launched, about which not much information is known, such as "Iași Smart District", "Iași Digital Mall" or "Iași Maps". Private partners will certainly be involved in the development of these projects.

The study has perspectives to be deepened by analyzing the other areas for Smart City at the level of the city of Iași. Mobility is a primary component for sustainable development and the Smart City, but other areas also have an important role in this endeavor.

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