# Private initiative and public management - factors in the development of smart cities in Romania

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**Abstract**

*The article aims to establish the factors of influence on the development of smart cities from the perspective of their economic sector. Established concepts related to the functioning of the smart city are used, such as urbanization, smart citizens, smart infrastructure, mobility, technology, communication, open data, innovation, the knowledge economy, but also development-specific ones such as efficiency. In view of the current situation, the trends already shown and the aspirations for the smart cities in Romania, the article analyses possible combinations of factors grouped by sector capable of ensuring the dynamics of social innovation in this field. The study uses the observation method of the phenomenon under study (smart city), the analysis and summary of available data on the combinations of factors that have generated the success of smart city projects, the impact analysis of legislation, public policies and the attitude of administration to processes supporting and converging toward smart communities, mapping attitudes to modernization, technology and sustainability, identifying some success factors of local public administrations along the lines of smart community development, selection of results from scientific research that can guide the likely development of smart cities. The connection between scientific research in the various fields (exact sciences, social sciences, technology), technological development, social innovation and mobility of the population is presented. The method of interviewing or collecting previously expressed views on different media channels, including during various events relevant to the evolution of smart cities, the taking up of available information collected through statistical methods, other specific methods for obtaining the data*

*needed for a comprehensive analysis of smart cities in Romania, shall be used.*
*The results of the research are to determine possible combinations at the current stage between economic sectors with potential for smart city development. In order to validate the results of the research, there will be presented the combination of factors that generated some successful projects in the field of smart cities in Romania.*
*The article will help clarify options for all those who wish to engage in the creation of smart communities and will facilitate the development of strategies.*

***Keywords:*** *strategy, scientific research, technological development, social innovation, mobility of the population*.

## 1. Introduction

### *1.1. Current state of knowledge of the problem*

We may assume that the world is experienced a fourth industrial revolution due to the rapid development of technologies and digital abundance [5]. The problem of smart cities already passed from the stage <a dream for the future>. We have in Romania many smart city projects already completed and tested by their users, citizens. We are in the process of developing smart city components or expanding the number of smart communities. The theory, in turn, has made significant progress. The phase of needs for the synthesis of research related to smart city projects has been reached [28]. Civil society, in turn, has become better organized. Smart city projects are promoted in Romania on the basis of a civic initiative.

The issue of smart cities has long gone beyond the dream stage for the future. We have in Romania many smart city projects already completed and tested by their users, the citizens. We are in the phase of developing smart city components or expanding the number of smart communities. The theory has made important progress in explaining the context in which smart cities are emerging and developing. The phase of the assessment of the state of research available on smart city projects has been reached (28). Civil society has also been better organized. Smart city projects are promoted in Romania on the basis of a civic initiative (1). It is thus possible to summarize good practices in this area. The expansion of the number of smart city projects and communities that are in progress or already benefit from smart technology has led to the emergence of the < smart city industry > concept.

The opinions of practitioners or decision-makers in the < smart city industry> are centralized in Romania in a specialized publication, Smart City Magazine [1]. All those who have had performance or concerns in the smart city industry meet regularly in a regular gala, this being a good time to exchange ideas and improve solutions to follow. The magazine and gala are private initiative events; the public sector is present through writing articles for the magazine by the heads of public

institutions or by the award of the results achieved in the smart city industry by some local authorities.

The operations involved by the smart cities projects are considered as a field of the science. There are available Proceedings of international workshops on science of smart city operations and platforms engineering [22]. We may sure that the smart cities are a future: the field of technological development is already organized [20]. Thus, at the moment, there is the whole flow capable of generating the development of smart city projects: Bottom-line research, technological development and innovative applications.

### *1.2. Methodology*

The dynamics of smart cities can be seen as the algebraic or vector sum of several types of forces acting concurrently but not in the same direction. The aims and aspirations accumulated over time, some of which are kept in the unconscious area transmissible over the generations, are the main engine of change. People don't want anything else, they want to live their dreams. In the face of those dreams, however, there is the fear of change and the fear of adaptation to the new one, even if the new one represents real progress.

### *1.3. Context*

The development of the smart city is considering a warning of the economists about the fundamental problem of the economy, the need to allocate limited resources to virtually unlimited needs. Resources are limited not because they do not exist, but because there are restrictions on accessibility: Ownership, administrative and territorial barriers, insufficient development of technologies capable of discovering and exploiting them [7]. This is precisely what the smart city projects focus on: generate new resources capable of meeting people's needs, remove administrative barriers to allocating resources, find new legal forms of cooperation between people, reducing the waste of scarce resources and sharing the use of resources that are likely to be used efficiently in the shared system. It is clear that in this direction action, the intervention of the State or local authorities is needed to issue appropriate rules.

## 2. Strategy - a key factor in the development of the smart city

Every big project requires an appropriate strategy. Today we are facing the project of generalizing the life model of a smart city. In addition to the social (population mobility) and technological components, the strategy is a binding link. Depending on the content of the changes needed for the emergence or development of smart cities, it can simulate the public and private sector participation share according to the key factors considered. Neither new forms of urbanization specific to smart cities nor building smart infrastructure can be achieved without a forward-looking vision and a strategy to achieve such complex objectives. When we talk about the strategy, we understand that consistency is needed on the medium or long

term. Briefly, we can consider a certain stability in both the private and public sectors (within the electoral cycle). When projects exceed 4-5 years, the risk of not being ready in their original design is inherent.

A success factor for most of the local public administrations in Romania was precisely the consistency in implementing strategies to set up smart city services. Unfortunately, with current technologies and with due respect for the legal rules currently in force, the time to complete a complex and integrated project of the smart city type is longer than the duration of the electoral cycle. Only the communities that "had patience" with the local public administration and entrusted them at least two mandates benefited from integrated projects of the smart city type.

An important conclusion of experts in strategic management is that the business model needs to be reinvented. The recent spectacular success of major projects at international level or in developed countries has been attributed to innovation in the business model. For success it is necessary to put together innovative products or services through themselves, design or aesthetic elements, as well as new business models [16].

Thus, in order to be able to work toward generalizing or improving the parameters of the smart city, it is necessary to design new business models. But in order to have new business models it is necessary to support the state authorities with changes to existing laws and authorizations, where appropriate. In addition, the behaviour of public administration needs to be changed. The private sector, in turn, will need to respond positively to the challenges posed by the new business model. In order to be applicable, the new business models of the smart city must be called into question through the education system, the instruments of economic and social scientific research, and civil society debates. The smart city will very likely look different also in terms of social or business relations that will take place for it to function properly.

First theory, then legislation must address challenges specific to the intelligent city such as the legal regime of goods placed in the public domain or on a common space (e.g., flowers and trees, communication and transport infrastructure, etc.), of common goods, public-private, public-public or private-private partnership, behaviour in public or common space, including the legal regime for information of various kinds.

The objectives pursued in the development of smart cities are broadly in line with what economic theory calls quality of life: all the economic, social, environmental, spiritual conditions which ensure the integrity and balance of biological life, and the continuous and sustainable development of human personality [9]. Economic theory also shows that the stage achieved by quality of life is the result of both individual and collective effort. Quality of life includes the standard of living, the quality of the living environment, the quality of the working environment, the quality of the social and political environment, the quality of the environment. In addition, the concept of collective well-being is already formulated, which is particularly useful in the philosophy of smart cities. The strategic design of smart cities requires progress on all parts of quality of life. It is acceptable to appreciate that responsibility for each of the components of quality of life has a different structure in terms of the economic sector. For the quality of environment,

for example, the public sector is responsible for the content of the rules and the rigor in their application. The media reported that the same legal rules can have much different effects between local communities depending on the firmness of local public administration and the involvement of civil society in reporting irregularities.

Much information is needed both for the development of the smart city's strategy and for its implementation. In collecting and selecting this information, the advances made by contemporary management are useful. Whenever a decision about acquisition of additional information is to be done, like for decision about development smart cities, the following questions should be considered: what information is needed? is it available? is the time to acquire the information? what is the quality of the information? what is the value of the information? what is the cost of the information? should the information be acquired [25].

The local economy in the smart city may be predominantly private. We really recommend that the maximisation of the private sector be sought in the new stage of urban development of human society. The location and position of the private sector will be designed, at least for the early or pilot phases of the smart city, through the strategy initiated by the local public administration. From experience to date, we know that no matter what proportion of the public and private sectors are in the actual functioning of the smart integrated city, it is usually the public sector that takes up the development and implementation of the strategy to achieve it.

A question is asked about what I have put forward above: Can the hypothesis of the Austrian School of liberal thought be taken into account for a smart city entirely realized by private initiative? The answer is sure to be YES, but it can only be a smart city formed on the basis of a set of smart infrastructure components. These components are designed and delivered to consumers by the private sector. The process of organizing the other parts of the smart city is then taking place. We do not know any such case in Romania, even though the liberal-supported local public administrations were the engine of the smart cities in Romania (Cluj-Napoca, Timisoara, Alba-Iulia, Oradea, Sibiu). In any case, such a development must be based very much on the civic spirit of all concerned, as it remains a difficult to replace public sector area: legislation appropriate to new realities.

## 3. Scientific research, technological development and social innovation – factors in the development of the smart city

### *3.1. Science research*

In setting the parameters of the smart city, all advances in science (exact, social and technical), technological development and social innovation contribute, in proportions and intensities that are difficult to assess. Here are some contributions from science, technological development and social innovation with a major impact in the development of the smart city in the next phase.

The progress of economic science has provided social practice with a number of useful conclusions, including the design of the smart city. We know today that if

we want to think about a new community, it is not enough to establish only those rules with the potential to generate conflicts. The theoretical generalization of institutional practices leads us to the conclusion that "*the advantages of the new structures do not concern isolated issues, but the entire institutional arrangement. It is about that pattern of rules of behaviour, guidelines, laws, rights, habits that establish interpersonal relationships'* [18]. These theoretical assessments valid for the modern institutional system are in line with the integrated system project in which the smart city is designed.

From the experience of the already existing smart communities, it is shown that interpersonal relationships have a significantly changed content. Trust among members of the smart Community is important. Many leaders of local public administrations believe that we cannot have a smart city without "smart citizens".

From the perspective of psychology studies, the distinction made by D. Kahnman (the 2002 Nobel Prize in Economics), according to which there are two plans for the behaviour of business people and consumer groups: The one based on instincts and intuition, representing level 1, and the one based on logic, without emotional involvement, representing level 2 [4]. Through practical education, through public policies and civil society action, it is possible to increase the weight of the logical component of the behaviour of the private sector (people acting individually or in groups, civil society, business people, etc.). When the logical component is dominant in private sector behaviour, there will always be favourable reactions to incentives and decisions will largely be based on realistic cost-benefit analyses, which give a better chance to smart city projects. We will thus see greater flexibility in social and economic activity toward personal or collective benefits. Public policies and regulations, mainly those in the tax or sanctioning field, will have much more predictable effects according to the intensity of intent or resources committed.

Since the mid-20th century technological revolution, research to predict the future has introduced a number of instruments to measure or assess the likelihood of change. For example, the concept of the total length of movement of social work was proposed. Also then, indicators such as the duration of a given profession or human occupation, the time needed from a discovery to its realization in mass quantities, the speed of substitution or radical change of certain consumer goods (goods or services), the rate of change of certain habits have begun to be used [17]. The use of these indicators over a relatively long period has improved the capacity to forecast the future and establish dynamic correlations to change. Statistics and forecasting have studied developments in a series of data long enough to allow for methodological changes. The new methodologies thus obtained are useful today when we can actually estimate, on the basis of existing trends, the city of the future in terms of nomenclature and content of the professions.

Studies on the evaluation of organizations can contribute to the development of smart cities. The Smart City is essentially a complex organization with an innovative profile. According to current standards, the assessment of organizations takes into account legal factors, research-development, commercial, technical equipment, human potential, economic and financial situation and structural

organization [14]. The inclusion of structural organization in the assessment of organizations is highly applicable in the design efforts of the smart city. The Smart City future relationship scheme must be accepted by both the local authority (public component of the project) and the citizens or associations representing citizens (private component of the project). Obtaining information on citizens' preferences in structural redesign of cities is a difficult task for local public authorities.

The fundamental structure of the smart city has been based and is likely to also be based in the future on the advances made by system theory. Science has shown that the value of a system is greater than the sum of the values of each element of the system. Developments in cyber research based on the concept of the system have greatly supported theoretical studies and practical projects on the smart city. The recent system definition provides attention to some aspects to be studied in new smart city projects. The system is defined as a set of elements in a non-random, more or less logical and stable relationship [11]. From the same study we understand that the relationship of the system with the external environment is important. The smart city will be an open system, closely connected with its region, but also with the national economy or the global economy. Commercial, social and environmental relations of the smart city with its external environment can be treated as external connections in the terminology of systems theory. These connections will be in line with the rules developed by the public authorities, but also with the will of individuals acting in an organized or individual manner.

Recent philosophical studies have called into question the correlation between the progress of society and the general aspiration called human achievement [26]. Because it is the essence of the human being, self-achievement will be an important mobile of human action, including the fulfilment of certain necessities considered legitimate. In explaining human action, it had been established since the 20th century that the principle of causality [27] was applicable. We will thus easily understand the determinism and motivation that explains the human need for better or, more precisely, comfort, which it is defined according to his established subjective needs.

### *3.2. Technological development*

Smart technology, smart infrastructure, and high-performance communications are the minimum conditions for the smart city to run. Smart infrastructure and high-performance communications are the conditions for the emergence of the smart city. These realities are the physical support without which a city cannot be called "smart". In addition, in order to meet real progress requirements, smart infrastructure needs to respond to real needs of the users, mainly "smart citizens".

The development stage called the "knowledge economy" has as its main characteristic the decisive role of technology. It is actually the role of knowledge and experience incorporated in technology. The more valuable ideas and more advanced knowledge are included in the technology, the more its capacity to generate added value and efficiency increases. As a general rule, advanced technology belongs to the private sector. The public sector can facilitate the speed of technological renewal by

funding basic and partially applied scientific research. This will in turn be able to generate high-performance technology.

Through the new phase of smart city technology development, we are aiming for the efficient functioning of smart infrastructure already in operation, being designed or put into service. The functional objective is to close all smart circuits so that resources are no longer wasted in a way incompatible with the knowledge society.

A new trend on the technology is Array of Things. Array of Things is an intelligent urban measurement project that's changing our understanding of cities and urban life. The Array of Things (AoT) is an experimental urban measurement system comprising programmable, modular "nodes" with sensors and computing capability so that they can analyse data internally, for instance counting the number of vehicles at an intersection (and then deleting the image data rather than sending it to a data centre). AoT nodes are installed in Chicago and a growing number of partner cities to collect real-time data on the city's environment, infrastructure, and activity for research and public use. The concept of AoT is analogous to a "fitness tracker" for the city, measuring factors that impact livability in the urban environment, such as climate, air quality, and noise [3].

### *3.3. Social innovation*

An already tested method is motivation communities in the online space. The new studies [23] propose a new stage of this method: crowdsourcing. So, is possible a new starting point for more comprehensive development strategy. Will be created platform dedicated to residents, local authorities and private companies. In this method the state and the private initiative have the same position. We may speak about a new model of city based on connectivity and mobility.

Fast Forward is the first start-up accelerator to focus solely on non-profit-based technology enterprises, it was founded by Shannon Farley and Kevin Barenblat in 2014. The accelerator provides support, mentorship, and access to financial capital for emerging companies that aim to improve the world, by focusing on poverty, education access, improving health, and environmental degradation.

One Greece's project of civil is SynAthina, aimed at finding solutions to urban problems, mainly for support of local municipalities. SynAthina is a social innovation platform set up by Athens in order to engage citizens in such reforms and to bring civil society in contact and dialogue with the city's administration and political leaders. This project maps the local initiatives, increases their visibility, and helps them connect with the private sector, various experts, and local administrations. By evaluating citizens' activities and acknowledging the best practices of civil society, SynAthina constantly informs the municipal administration about the citizens' priorities and pushes for updated regulations, simplified procedures, and creative synergies with citizens in order to enhance the administration's efficiency in responding to citizens' needs. The result is a better collection of information for the future development of the city. In fact is a private action to help the decision of public authorities [21].

Community groups submit ideas with a social impact via the synAthina online platform, which is essentially a map of groups and activities in the city of Athens. SynAthina's website also offers an online tool, which connects citizens' activities with all those stakeholders (city services, sponsors, volunteers, businesses, and knowledge centres) who can offer them support.

**4. Mobility of the population– a factor and a result of the development of the smart city**

Developments so far have shown that, based on technical progress and the technological revolution, the dynamics of professions are complex: professions are lost, professions are emerging, some professions remain unchanged and others are changing their content greatly. Detailed studies are useful to warn of the actual changes in the digital age to the content of certain professions [30].

A parameter of smart city is urban mobility. In many reference documents when referring to smart city, urban mobility is assumed to be implicit. In principle, a smart city aims to generate better living conditions for its citizens. Access to improved housing conditions requires mobility. Limited improvements can occur on rigid structures, but no revolutionary developments are possible.

The problems of labour and population mobility have started to be very intense since the 20th century. Since then, there have been studies that analyse the factors involved in the mobility-stability binomial. During the period of rapid evolution of industrialization, a distinction was made between the subjective movement of the population called fluctuation and the objective movement called mobility [19]. The conceptual differences between mobility and fluctuation are less significant in the smart city era and in the knowledge society. Knowledge of the main motivation of the mobility of individuals remains important for public authorities and civil society in order to establish causal relationships. Both types of movement must be taken into account when designing urban and rural areas. The views on the relationships between social and territorial mobility remain valid. This must be taken into account in a context of intense social dynamics, which are uncontrollable by the instruments of government or local public institutions.

A problem that has long limited the mobility of people, both social and territorial, has been the emergence of conflicts. It covered all types of conflict: between individuals, between non-organized groups, between organizations, between groups within the same organization, between state structures. The evolution of science has been able to advance knowledge of the coordinates, internal structure and source of conflict. After the conflict classification and the identification phase of the potential concept of conflicts, there have naturally been developments in conflict management capacity, including the scientific basis for conflict prevention and resolution [12]. This has reduced the obstacles previously faced with mobility. Sociology and political science explanations of the concept of tolerance, together with the media pressures related to this concept, will further limit the negative influence of conflicts. Thus, by harnessing tolerance as a basic social principle, it is likely that a barrier to social progress in humanity is removed, including forming smart communities of smart citizens.

Sociological studies on the mobility of the population, with a sufficiently large database, have drawn attention to some of the risks posed by certain types of migration. A sensitive aspect is the risk of gender, age and profession-based structures being unbalanced in both the source and destination communities [13]. Starting from such considerations, the comfortable living solutions of the smart city where the focus of attention is given to the family or household have been generalized. New urban spaces will provide good living conditions for all professions needed for a community. This will allow for competition in smart communities, but the partnership principle will be extended.

Under the pressure of population mobility, the regional economy has developed a great deal, including through a nuance of concepts. We have a difference today in the concepts of local development, urban development, metropolitan development or regional development [8]. If we talk about smart city, then we will take into account urban development and metropolitan development in the narrow sense; if we are talking about smart communities, we will consider local development. Projects that are more forward-looking and wider, with the necessary funds available, will also refer to regional development. However, the development of the smart city must be the core for the creation of smart communities at national level. There are already countries that can be classified under this type of community.

## 5. Conclusions

A success factor for most of the local public administrations in Romania was the consistency in implementing strategies to set up smart city services. In order to be able to work toward generalizing or improving the parameters of the smart city, it is necessary to design new business models.

The objectives pursued in the development of smart cities are broadly in line with what economic theory calls quality of life. In setting the parameters of the smart city, all advances in science (exact, social and technical), technological development and social innovation contribute, in proportions and intensities that are difficult to assess.

Trust among members of the smart Community is important. Many leaders of local public administrations believe that we cannot have a smart city without "smart citizens".

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