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Facultatea de Administrație Publică
Grupul de cercetare „Dezvoltare și planificare urbană”

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Shaping the Cities of Tomorrow

PROCEEDINGS
OF THE SMART CITIES
CONFERENCE
7th Edition, 2019



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Smart environment management through the public solutions contest. The case of Cluj-Napoca

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Abstract

The new tendency to have a competition of ideas and projects in the field of space management has captured the attention of the decision makers, especially at the level of Cluj-Napoca. The context of collaborative governance is put under pressure from investors who want to put their mark on the community and look for an administration with which to work together to benefit from both sides. The theoretical model, that of the framework for collaborative governance can provide a cross-cutting perspective on the projects analyzed in the case study. The model was based on a qualitative analysis of official documents (reports and studies) and interviews to highlight the elements that make up the framework of collaborative governance for finding solutions for public spaces in Cluj-Napoca. The main solutions and findings have encouraged creativity while supporting urban landscape, architectural, hydrological and impact research in the sense of an integrated concept of urban remodeling for the Cluj-Napoca relationship with the novelty, attractiveness and functionality, awareness and respect for the environment surrounding, not ignoring certain historical and spatial aspects. Most of the analyzed participants (public, private, NGOs) are important to align the community-public relation with contemporary urban thinking, demonstrating that they can bring them back to the active life of the city, redefining their contact with them. In the context of collaborative governance, the model can be considered a good practice at the level of Cluj-Napoca through this approach.

Keywords: collaborative governance, smart city, public spaces.

1. Introduction

Community development processes are some of the most complex, starting from their nature and reaching a community goal: development which, in operational terms, concerns many particular aspects. This new tendency to have a competition of ideas and projects in the field of space planning has captured the

attention of the decision makers, especially at the level of Cluj-Napoca, if we think about the number of projects and spaces that have been proposed. The trend would maximize the results if there was a change in the trust-based behavior of individuals, where it would be quite difficult.

At the same time, we agree with the reality that affects any collaboration, practically the reality is too complex, development and technology go in an ascending direction, therefore the key to collaboration is trust. Every new generation has the wisdom of the previous generation. In the context of collaborative governance, core values make society function and design and act in practice. The context of collaborative governance is put under pressure from investors who want to put their mark on the community and look for an administration with which to work together to benefit from both sides. In analyzing these processes, I think it is appropriate to focus on concrete projects and measurable objectives. The theoretical model, that of the framework for collaborative governance that I will be considering, will give me a cross-cutting perspective on the projects analyzed in the case study.

2. Theoretical model chosen for the analysis

Operationally, the model of collaborative governance is a general one, with potential to be used in many areas. Practically, the theoretical model presents operationally the Collaborative Governance Regime (CGR) as a particular, systemic way for making public decisions where cross-sectional cooperation is a preferred model of behavior and activity. At the same time, the model analyzes a perspective on the political, tangible, socio-economic and environmental context and functions as a preliminary analysis of opportunities and constraints taken into account when talking about collaboration.

Also, the theoretical model is based on interdependence between regimes, so different variables, resources, legislative framework, the failure of past attempts and the level of trust are linked. The authors propose 10 guiding propositions, which are put in place for collaborative governance. The choice of model developed by Emerson, Nabatchi, Balogh (2011, pp. 1-29) is justified by a number of elements that make up the field of community development based on an integrative framework. Thus, they find practical elements and practical aspects of the cooperative governance regime and its internal dynamics that can have an impact on the whole system.

Firstly, the framework itself offers a multiple perspective on the case study. It analyzes broadly collaborative governance and treats it as an emerging system, a new type of regime for collaborative governance. In this respect, it treats a wider range of collaborative initiatives identified than other models and extends beyond the typical public sector orientation to include the many collaborations initiated in the public, private and civic sectors and that I will be analyzing.

Secondly, the system components integrate a number of factors identified in research into an operational system and suggest some general and very specific causal links. This framework seems to be building more explicitly and highlighting dynamism.

Thirdly, the framework establishes the wider context with which it interacts. How can we analyze internal elements without having an impact from the external environment or system perspective? The regime is influenced by the surrounding conditions and initiated by the specific drivers, and the regime produces effects that affect the surrounding conditions as well as the regime itself and the collaborative dynamics.

Finally, in addition to the positive and easy to put into practice, as the authors have identified, this theoretical model has some limitations, but it will help me centralize some recommendations.

2.1. Analyzing past / similar efforts

Collaborative governance approaches have been instrumental to local economic policy, crisis management, collaboration between environmental agencies and state and local public health departments (e.g., Daley 2009), and on environmental issues such as the protection of open-spaces (e.g., Smith 2009), natural resources management (e.g., Durant et al. 2004; Koontz and Thomas 2006), and forest management in both the United States (e.g., Manring 2005) and India (e.g. Kumar, Kant, and Amburgey, 2007). For example, in the absence of federal action on climate change issues, state and local governments began developing their own climate change policies. In 2003, then New York Governor G. Pataki invited fellow governors in the Northeast to explore the possibility of a regional climate change strategy. The result was the development of the Regional Greenhouse Gas Initiative (RGGI). In this case, the system context in which collaboration unfolded was shaped by local, state, national, and international politics, the lack of federal law and action, environmental concerns, and other issues. In turn, RGGI changed the landscape of the system context by altering political, legal, regulatory, socioeconomic, environmental, and other forces in multiple northeastern states. (Rabe, 2010).

Another collaborative effort at the same level comes from China (Yang et al, 2012), known as a country entering a critical and accelerated phase of urbanization. Being one of the most urban regions in China, the Danube Delta in Changjiang (Yangtze) has experienced dramatic urbanization and urban transformation. In recent years, there have been many changes in this region and there is limited attention to the evolution of the regional urbanization route, its problems and the way to solve these problems. But once their collaborative model has gradually converged, the results have been visible. Studying the phenomenon together with other actors with expertise, they have realized, such as the existing institutional arrangements, including the hukou system (registration of households) and others that can not meet the current needs of socio-economic development and urbanization. Therefore, it was imperative to promote institutional innovation and adopt a new, collaborative strategy for the orderly and sustainable development of urbanization in the Changjiang River Delta.

The Bilbao example can be viewed with similarities when it comes to collaborative governance in Cluj-Napoca. Bilbao is a city whose growth has relied heavily on the economy and heavy industry in the past, with various major economic

problems. In the survival formula found, the Nervion River would become the center of the new metropolis: the famous Guggenheim rose almost to the river, and areas of the center were recovered for urban regeneration along the river. The river has, in fact, become the basis of the new economic model. For that, several essential steps were needed, ranging from the greening of the area to the solutions taken by the administration. A new transport system was put into operation and the main pillar was the new metro, a project started in 1988 with the participation of the famous British architect Norman Foster. It was the first time the city used foreign, innovative expertise. Even if the population was reluctant, today's innovative ideas are part of their lives. Quality in public works is essential, as well as expertise. Urban regeneration has been built on several levels: massive public investment in infrastructure, followed by private projects and partnerships between public and private entities.

At the same time, what has been identified in terms of collaboration has been the fact that art has played an important role in Bilbao: the city has not only the Guggenheim Museum but also other projects for artists, related projects that have spurred the project. The shift to art and creative industries in a high industrial city was not an easy one, and it has not ended, but new projects and strategies have turned the city into an attractive one for the people.

What can be identified as a model of good practice in similar efforts on collaborative governance is the perspective on the involvement and promotion of values. At least four types of values govern the innovative public sector, namely: results (citizens evaluate the extent to which the results are visible), innovative services, productivity (the efficiency of public administration as a key factor) and democracy.

Innovative public administration involves creativity, development and the implementation of practical ideas that deliver a public benefit, and these ideas must at least be based on consultation and collaboration.

3. Rethinking Someș River from Cluj-Napoca

Rethinking Someș is an integrative and innovative program that challenges and tests community ideas for the integration of Someș river in the life of Cluj-Napoca. The meaning of this case study derives from the need to reconsider the presence of the Someșul Mic River in the future development of the city, as a result of recognizing the insufficient use of the river's potential for the city, its inhabitants and its visitors. The specific complexity of the city's relationship with "Some of the Future" in a long-term perspective has prompted the promoter (Cluj-Napoca City Hall) to organize contests aimed at capitalizing on the advantages of the river through technical projects on the water course, highlighting its landscape and ecological value and, at the same time, identifying the vocation of this river. Also, structures with specific expertise and leadership are involved: the Order of Architects, Cluj Cultural Center, Someș Delivery and other institutional actors (University of Art and Design, etc.).

The project, initiated by the municipality of Cluj-Napoca, involves the revitalization and redevelopment of the Someș river banks, to bring it back to where

it is, in the heart of the Cluj community. The investment aims to improve the quality of life of citizens in interacting with Somes by using the concept of shared space: increasing the quality of pedestrian space (16 km pedestrian areas), expanding the bicycle path infrastructure with more than 10 km, expanding green spaces (112,000 sqm, planted trees). Also, the project provides increased attention to the environment by introducing load points for electric vehicles - 68 charging points for trotters and electric bicycles, intelligent lighting and tele-management. (Draft Decision no. 16, 2019, online).

The choice of this case study is not accidental, but it is justified by the fact that it also tests and illustrates a way of connection to Somes. How is this done? Knowledge is a good start. Knowing the transformation plans for this public space involves experimentation, collaboration and trust, all on another type of relationship with Somes. It's a way of meeting urban planning and Somesh in the smallest detail. Practically, ideas are created and then interventions are made to make the water banks more accessible and friendly.

The river issue has been extensively studied and sometimes even challenged to develop concrete solutions. Basically, the project focuses on the restoration of ecosystem functions of the river and increases the awareness of the importance of the river, its responsibility for common goods and a general culture of sustainability in the city. The role of key actors will be that it will involve involving the local community in socio-cultural river activation projects by exploring social memory and organizing thematic initiatives. The role of the local public administration analyzed will be to formulate public policies and institutional mechanisms and experiment with innovative models related to the governance of public spaces adjacent to the Somes River.

Table 1. Some strategic perspectives identified in documents

Strategy/Plan	Related institution/institutions	Integration of the Somes River
Sustainable Urban Mobility Plan Cluj-Napoca	Cluj-Napoca City Hall	• The Someșul Mic axis has been reconfigured as a green axis across the entire area of the metropolitan area.
The Cultural Capital Project in 2021	Cluj-Napoca City Hall/ CCC (NGO)	• [...] river as a major cultural development sphere.
Development Strategy for Cluj-Napoca 2014-2020	Cluj-Napoca City Hall/Universities/NGOs	• "Strategy for the Historical Identity of the City" to include objectives for revitalization.
Somes Delivery (2015-2017)	<i>Foundation Cărturești. Order of Architects from Romania, The miniMass association.</i>	• the project addresses another segment of the river on a yearly basis which involves temporary arrangements, animation events, sanitation, community consultation and involvement.
GLAC (Ground Level Active Citizenship)	<i>Urbannect Association</i>	• Vamos a la Playa creates the context of an active participation of locals in the (re) vitalization of urban areas of Someș.

Source: Personal adaptation following the Order of the Architects

We can say that the whole perspective on the river is quite current on the public agenda, proof being some mentionings in operational strategies or plans. Practically, these references are related because there are landscape, historical, hydrological studies that reveal not only the importance of this river, but also its necessity in community life.

Analyzing the historical perspective, the life of the river in the community was present in 1564, when the Italian mercenary Giovan Andrea Gromo reported that in Cluj "is a large and well-built commercial city with strong walls, according to the usual way, with numerous towers , situated on the spot in a charming valley between two hills, including a crystalline river. " Gromo's description suggests a poetic ambience, where water of good quality is without problems. In fact, the inhabitants of Cluj could not get it so easily, although they were connected with it. The Someșul Mic River crosses the city of Cluj-Napoca on its west-east axis, having a slightly regularized course for the most part.

The town's relationship with the Someșul Mic River has been problematic since its foundation, as the river has been both a significant barrier and a valuable ally. An interaction with the river started with the construction of the Canalul Morii, tangent to the walls of Cluj's city on the northern half, for the town's water supply. The demolition of the fortifications in the 19th century allowed partial opening of a town to the Someșul Mic River, but the difficult relationship with the river over a millennium led to a non-belligerent cohabitation and a major utilitarian treatment of the course and the banks, perhaps quite present today. (Mitre, 2017)

Someșul River was perceived mainly by the community due to frequent overflows. That is why the river's successive arrangements and refurbishment were focused on improving the risk of floods, rather than on the conservation of riparian vegetation and fauna. They ignored the natural ecosystem, but in the last years they have prevented large floods from Cluj, such as those that were before the construction of dams, reservoirs (Fântânele, Tarnița), and the banks, especially from the point of view hydro-technical by concreting.

4. Theory-practice comparison

4.1. Methodology

As far as the methodology is concerned, I will approach a cross-cutting perspective on the framework model of collaborative governance, following the ten sentences proposed by the authors of the model, justifying the elements that are present in the case study. I will follow that transformative change (analyzing the Collaborative Governance Regime and the Collaboration Dynamics (with emphasis on the three elements), the impact, the adaptation and the relationship with the system context.

I also found data and analyzes by state and civic actors on the program, preliminary analyzes of data (available on the City Hall's website and Architects Order), but also various qualitative approaches in the form of five interviews and conferences organized by NGO actors. (there are debates organized by the Cluj

Cultural Center and I will take over from the Activity Report 2017, 2018). Impact and output I will attempt to systematize them in the descriptive and exploratory way by connecting the elements according to the model to see how the sentences proposed by the collaborative governance model are tested in practice. Depending on the results and nature of the data, I will focus on the dimensions of the project (space, events, environment, community, as promoted by NGOs as strategic points) because there are limitations on access to information and impact studies.

4.2. Results analysis

- Proposition One: One or more of the drivers of leadership, consequential incentives, interdependence, or uncertainty are necessary for a CGR to begin. The more drivers present and recognized by participants, the more likely a Collaborative Governance Regime will be initiated. This assumption basically identifies the tracked elements that facilitate collaboration, taking into account a context and certain variables. I will seek to link them and justify the presence of the elements in the general context.

The promoter of the contest is the City Hall of Cluj-Napoca, the administrator of the objective and the owner of the areas to be the subject of the investment (according to the hydrographic study), to become the beneficiary of the project contracted following the competition of ideas. The organizer of the contest is the Order of the Architects of Romania through the Territorial Branch Transylvania, in partnership with the Order of Architects in Romania. Any contest is based on expertise and score assignment. Thus, in the analysis of the project, 9 persons, most architects and two representatives in the field of culture / NGOs were put together. The jury president, Dietmar Steiner (Austria), said at the end of the trial that "I was rarely given to meet situations like the one I found in this Idea Contest, which was thoroughly prepared, structured on objective criteria and clearly attended by jury members highly motivated and determined by the desire to find the best solution for Somes, the river of Cluj." (Results of the SOMEȘ Rethinking Solution, October 2, 2017, Press release)

Practically, a key actor in collaborative governance has chosen the solution contest just in order to benefit from the best expertise and to have a modern European solution, in accordance with the existing urban and mobility exigencies at European level. We identify a leadership element (related to the confidence and trust to launch such a contest), incentives that shaped the process (Somes river problem and finding a modern solution, but also the opportunity of such an initiative). Interdependence as a conductor can be deduced from the fact that the jury considered sharing and comparing experiences and viewpoints, starting from different types of training and different nationalities, enriched the vision that Cluj prepares its urban future. Both the diversity and the quality of the various proposals demonstrated the real need for the implementation of the competition as a public procurement procedure, dedicated to the new initiatives in the urban and architectural field.

Practically, the Cluj-Napoca Local Council approved at the Ordinary Meeting on 8 May 7 projects financed by European funds worth a total of 66.5 million euros,

of which the highest value was Rethinking Somes. Drivers shape the initial stages, as we have identified through the project contest, but the collaborative dynamics and collaborative actions form the regime of collaborative governance and its efficiency.

- Proposition two: Principled engagement is generated and sustained by the interactive processes of discovery, definition, deliberation, and determination. The effectiveness of principled engagement is determined, in part, by the quality of these interactive processes.

This second assumption emphasizes the main commitment and the process that implies this. Here the emphasis is more prominent on the part of people with expertise, practically the best people at the table, with the project ahead, discovering and making deliberations.

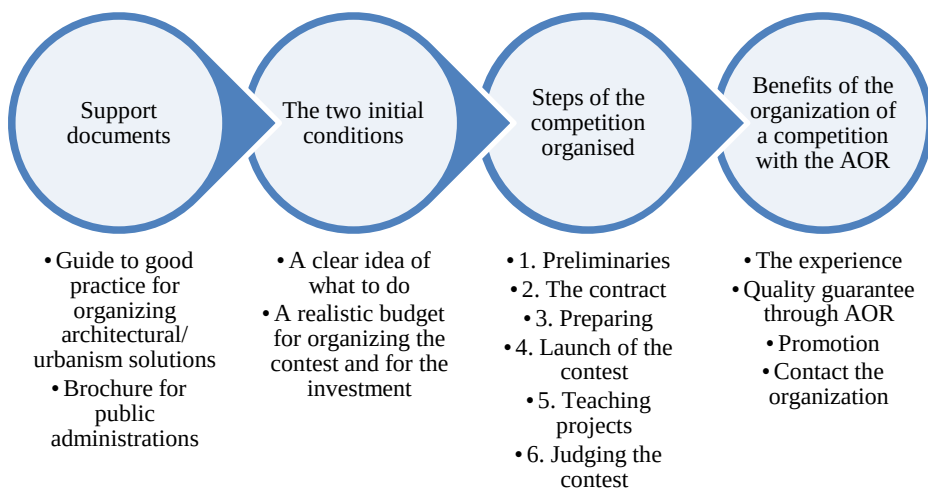


Figure 1. Presentation of how to organize competitions.

Source: Order of Architects, personal processing.

As it is highlighted, the main designers have outlined some of the solutions for the contest: they are part of a studio (*PRACTICA*), have collaborators on architecture: Raul Brito, Sofia Valdivia, Gonzalo Cortes with a vast experience that I will explain in other dimensions. "The proposal uses the transformative force of the natural landscape and is based on community involvement in project development and manages to highlight the complexity of the landscape, surpassing the limits of conventional urban solutions. Here we identify the element called "discovery". The definition has been articulated by the fact that, as certified by previous experiences, they have built a shared meaning, shared from general to specific by the fact that have proposed a new way to manage the relationship between the built environment and the natural environment, inviting all urban actors to relate to the natural environment with respect through sustainable practices. Ask how communication was justified, given the complex process, the representatives of the Practica said that the deliberation was based on "a sensitive approach to the competition theme."

The project uses multidisciplinary to work "on a team" with the natural ecosystem, not against it. This is the clear vision that the project has proposed, and

which has a logical succession, in the sense that a final product has been created: an innovative project for Some that could be taken over by other public administrations. The main commitment is also justified by the legislation, budget, expertise and conditions that they have imposed and which are presented in the scheme.

- Proposition Three: Repeated, quality interactions through principled engagement will help foster trust, mutual understanding, internal legitimacy, and shared commitment, thereby generating and sustaining shared motivation.
- Proposition Four: Once generated, shared motivation will enhance and help sustain principled engagement and vice versa in a “virtuous cycle”.

These two dimensions are studied together, illustrating, as the theoretical model describes the dynamics of collaboration, alongside the capacity of joint actions.

Mutual trust that builds over time generates a common understanding, basically the project was justified, as legitimate by the chairman of the jury, even though such initiatives were not recorded on the Romanian Architect Order platform. Dietman Steiner (Austria) said that in his nearly 35 years of experience as a jury member in competitions all over Europe, he rarely encountered situations where he met projects such as the one he found in this contest of ideas. In Europe, the procurement procedure has a long history, proving its effectiveness in selecting the best solutions over time. Thus, for example, between 2000 and 2011 in the UK, 57% of the winning projects following a RIBA competition, built, won an architectural award. (AOR Report, 2018).

The mutual understanding also comes on the backdrop of institutional interactions, being a complex project, it also included government bodies or agencies, which had positions and interests not always for the same purpose. Taking into account this reasoning, as well as the constant refusal of the Ministry of Waters, and the allocation of funds for the continuation of the hydro-technical works on the Someșul Mic banks have made the process difficult. (Address no. 17637/29.12.2016 from the Romanian Water Administration regarding PIDU)

If the internal legitimacy was automatically accepted and understood, the process of collaboration was impetus to the results. I consider that the City Hall had a new character, an openness to place the problem in the task of the experts, justifying the choice due to the lack of the necessary expertise, but also the way in which the optimal solution is selected, from a multitude of solutions and answers received on the given topic. I also understood that the City Hall was interested in the contest, it is the way to carry out public projects without suspicion of participation. “It is also a proof of the trust that public authority confers on the professionals with whom it has to work and the experience to which it has to rely.” (ABC News Transylvania, June 28, 2019)

- Proposition Five: Principled engagement and shared motivation will stimulate the development of institutional arrangements, leadership, knowledge, and resources, thereby generating and sustaining capacity for joint action.

The capacity for joint action generates the desired results and which can not be achieved separately. The common action capacity, as defined (Emerson, Nabatchi, Balogh, 2011, pp. 16), takes into account a collection of cross-functional elements that come together to create the potential for effective action, to connect the strategy and performance.

Procedures and institutional elements have established between the City Hall of Cluj-Napoca and the Order of Architects practically the limits, the rules of interaction, formal or informal, which were also explained in figure 1. The contract must be properly negotiated from the beginning between the promoter (City Hall) and the organizer. It established, on the basis of negotiation / understanding between promoter and organizer, the following:

- the responsibilities of each party for the proper organization of the contest;
- the deadlines for their achievement;
- the types of expenditure to be paid by the promoter through the organizer (budgeted);
- staging payments to the organizer, etc.

The internal leadership, together with the NGOs acting on the cultural side and Cluj-Napoca City Hall, established the Center for Innovation and Civic Imagination (CIIC) in October 2017. It was a response to the need to highlight different roles in the process, facilitators or which would have a greater power of representation. In the form of debates, this Center was the promoter of the advocated public action. Because everyone shared knowledge, at the same time working on the Master-plan of Urban Development, which mobilized social capital, weighed, processed and integrated the values and judgment of all participants.

If we think about the resources, how they were managed, the project represented, as a prize, the estimated value of the design contract, which amounts to 1,577,345 lei. (Cluj-Napoca City Hall, March 05, 2016). As stated by the Architects Order, the design team based its proposals on this budget, in the sense that it may be a criterion in choosing certain technical solutions or certain formal and functional concepts.

- Proposition Six: The necessary levels for the four elements of capacity for joint action are determined by the CGR's purpose, shared theory of action, and targeted outcomes.

The contest took place, the ideas are new, the team won the prize, as the results are presented, we find out precisely the purpose of the project (PRACTICA Studio): "The Somes is envisioned as an urban connector of public spaces and green areas as well as the primary circulation path for pedestrians and bicycles." Thus, this proposal aims to bridge that gap between the river and the city.

Firstly, a system of terraces expands the river's edge and allows it to permeate into the urban fabric. As the river section is widened, the existing hard edge is transformed into a softer and more natural environment with the inclusion of local vegetation, rocks and sand. This system of terraces allows the river to become more accessible and incorporates areas for recreation where a diverse range of activities can take place. Secondly, a system of longitudinal bicycle and pedestrian paths give continuity to the circulation routes along the river, currently fragmented, and allows

the Somes to become the primary spine of movement throughout the city. Thirdly, a system of diagonal paths aims to stitch the river and its immediate context. These paths redefine the existing urban connections by extending them to the water's edge, creating a visual, and physical, connection between the city fabric and the river." It is quite obvious the idea of connection, extension and accessibility as objectives to be achieved through this project.

- Proposition Seven: The quality and extent of collaborative dynamics depends on the productive and self-reinforcing interactions among principled engagement, shared motivation, and the capacity for joint action.

Under this quality initiative, it was automatically the need to create advertising, so actions centered on citizens' understanding of the actions began to be considered. Someș Delivery (individual project) is organized by the Foundation Cărturești, the Romanian Architects Order and the miniMass Association. The project team consists of over 15 professionals from Cluj-Napoca, Târgu Mureș and Bucharest, specialists in project management, architecture, public relations, events, IT, sociology and fundraising. Building on the quality of the project, they wanted to promote collaborative actions on 4 dimensions: space, community, events, environment.

- Proposition Eight: Collaborative actions are more likely to be implemented if 1) a shared theory of action is identified explicitly among the collaboration partners and 2) the collaborative dynamics function to generate the needed capacity for joint action.

In connection with this, with the common desire to promote Somes and to redefine the goal, the Cluj Cultural Center, Someș Delivery (2015-present), Street Delivery, foundations and the university environment (University of Arts and Design), businesses (Betfair, Banca Transilvania, Impress, etc.) have begun concrete actions.

Although it was a public project competition, not only has the winner of the competition benefited from a certain image capital. Other young people, perhaps with a different vision but equally motivated by a common goal, were involved in this task, and by their action adapted the whole process, providing a predictor to act. Architect collaborators Nistor Alexandru, Susan Roxana, Pop Vlad, Knall Arnold, Fülöp Csenge, Apahidean Dragoș and Horhat Ana specialists - landscaping, Marius Marius - structures have developed a model of how they see the development of this river in four steps, and some of the ideas are highly likely to be considered. What was their motivation? Participatory approach: "Our vision is developed around a co-productive way of working. In that sense we propose to work with government organizations (e.g. city and regional government), private partners (e.g. companies), cultural partners (e.g. architectural offices), NGO's and of course citizen group (e.g. community gardens, bottom-up initiatives). What does our proposed matrix look like?

They also explained that involvement should not be completed where legislative limits or institutional bottlenecks begin, perhaps the administration is reluctant, but it can compensate for an action oriented towards citizens' awareness.

- Proposition Nine: The impacts resulting from collaborative action are likely to be closer to the targeted outcomes with fewer unintended negative consequences when they are specified and derived from a shared theory of action during collaborative dynamics.

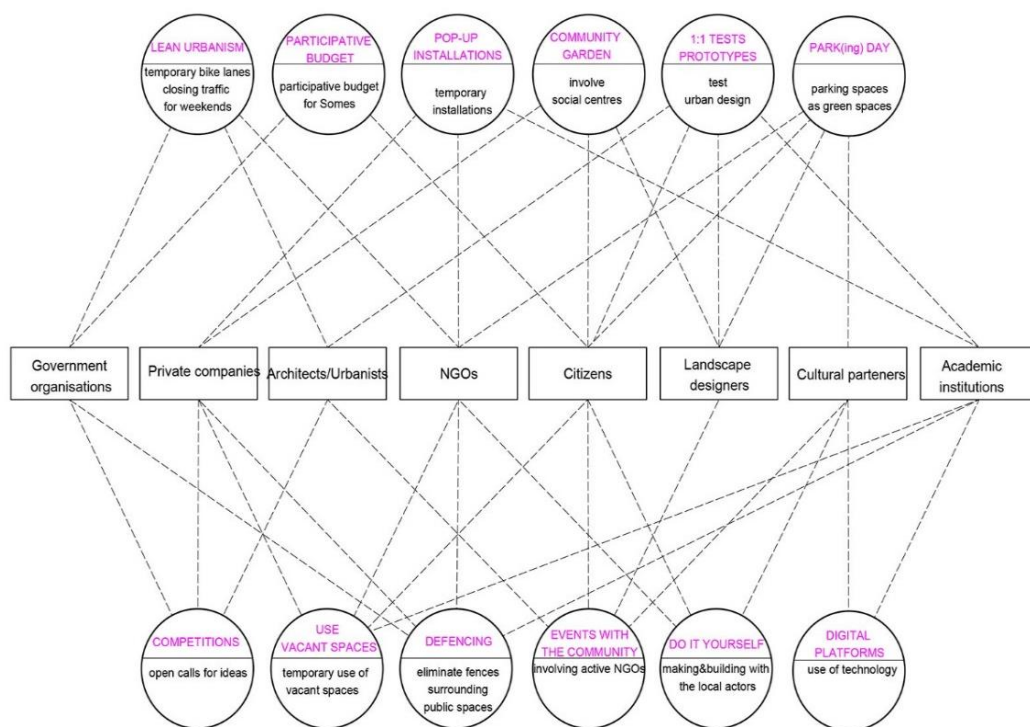


Figure 2. Matrix of collaborative governance system.
Source: AtelierMass.

According to the Report published by Someș Delivery, 8 interventions in space, 12 events with 2000 participants, were organized in the 2015 pilot edition. The first edition had a research role, focusing on what citizens want, creating a common meeting framework. In 2016 another part of the river was taken into account (Pod Napoca-Garibaldi) with 14 space interventions, 19 events and 2500 participants. Someș Delivery 2017 focused on the segment in the closeness of the Polyvalent Hall and unfolding in stages throughout the year, having the idea of connecting people through images, art.

The Cluj Cultural Center organized two public conference editions *SUNT RIVERAN*, where it invited the winners of the Rethinking Someș project (those who are part of the collaborative governance regime like those drivers), guided tour to Someș together with the representatives of the local administration. Workgroups with experts and consultations with citizens will be organized this year to determine the opportunity to set up an initiative (Water Council) to facilitate the activation of Someș river banks.

There will be cultural interventions to support the coagulation of riparian communities and the sustainable use of spaces along the river (community arts projects). Asked what the internal motivation was, the people from the Cluj Cultural Center justified it by "What can be more beautiful than to understand the importance of a river in our town?"

Also, the 2018 conference on good practices in public administration was organized. The conference aims to pave the way for improving communication between performing local administrations and helping them to provide inspiration, models and support for the replication, from one city to another, of local stories success in cultural and creative fields. The May 2018 edition of the conference was attended by Mayor of Timișoara, Nicolae Robu, Mayor of Sibiu, together with 150 people from the administrative, academic, cultural and creative fields, representatives of the press and others interested in local development and culture, in Romania and 10 other countries. Here was the idea of rethinking the Bega River in Timisoara, a real success for the municipal collaboration.

- Proposition Ten: CGRs will be more sustainable over time when they adapt to the nature and level of impacts resulting from their joint actions.

The results are rather difficult to analyze and evaluate, and the measure of practical impact only changes certain parameters and processes within the collaborative governance. Practical adaptation has implied a change on evolution, from uncertainty to a clear direction of action, thus changing the perception of actors. This shows transformative change.

The local councilors were in the position to approve, according to the Decision, the expenses for starting the works. Both projects amounting to 168 million lei (35 million euros), for which the City Hall wants to attract European funds, namely:

- Revitalizing the non-motorized mobility corridor of Someș, modernizing and expanding the pedestrian infrastructure and riverside cycling, area I - Someșul Mic Meadow.
- Revitalization of the Somes' mobility corridor, modernization and extension of the pedestrian and cyclic infrastructure along the banks of the river, zone II - Armatura Park and area III - Sports Hall Plateau.

Also, from an interview with the City Hall of Cluj-Napoca (Ovidiu Campean), we find out about a paradox of project management. "You have an idea and you do not know much about the project, but your ability to act within the project is great. You can use your imagination, but if you have an approved level, your ability to change later is very low."

The Center for Innovation and Civic Imagination (CIIC) coordinates NGO networks. A project with the Cluj Cultural Center (CCC), called the Innovation Division, hosted an event on the street where they blocked the street for two days and borrowed 300 questionnaires to find out whether people really want a pedestrian street with more events hosted there. "There are more than 800 civil servants in the town hall. There are also pressures for other departments to accelerate the level of approach to citizens' problems, but competition is good for the municipality." Collaboration with the international team of architects is difficult due to cultural differences and their previous experience. The ability to adapt the collaborative governance process (CGR) is evident from the point of view of the fact that the whole collaboration was horizontal, more specific in the NGO environment and private. I also understand that the power of words that make up the vision makes it possible for the goals to be fulfilled. Oana Buzatu, in charge of project

monitoring and media relations, said that "people, relying on certain values promoted, make things change throughout the community. People have expectations of each other and the expectations and the power of words can change things." The year 2012 marked another methodological effort, elaborated the City Development Strategy and marked the innovative idea of looking around. How can you develop solutions based on what your people have, whether they are people, institutions? The Rethinking project involves some people who in turn are involved in other projects.

Adaptation also includes interventions that should not be strictly limited to the river and banks. Civic-political negotiations are taking place. "What kind of community do we want to live in? One that suffocates from car traffic? [...] One in which public spaces turn into feudal niches, with fence and barbed wire fences? Public and private to have open spaces instead of enclosed spaces".

The Architects Students' Association responded about the relationship with the other actors involved, saying that "From our experience with the design of the river we found that there are contradictory opinions of the institutions and of the various actors involved. The role I felt was taken over by the administrations was to establish effective communication and change of perception over the river."

Having an impressive capacity and a very clear vision of what needs to be done under concrete action, the transformation capacity was very evident throughout the process. Longitudinal, the project is at the beginning, the scale of such spatial redevelopment, cultural and community integration is sustainable, in a city of generations who will clearly find the benefits of using public space adapted to modern requirements.

5. Final thoughts, conclusions and recommendations

Rethinking Someş has encouraged creativity while supporting urban and landscape, architectural, hydrological and sociological research in the sense of an integrated concept of urban remodeling to bring the city's relationship with the novelty, attractive attractiveness and functionality, sensitivity and respect to existing elements, both landscape and historical.

Most of the participants (the public, private, NGO) are thus proposed to align the river-city relationship with contemporary urban thinking, demonstrating that they can bring the river back to the active life of the city, redefining the contact with water. In this way, we have identified a logic in the whole process of collaborative governance:

- Scrutinizing levels of detail, conceptual and representation scales (from general to detail) tailored to the implementation objectives (the idea of the solution contest)
- The proposed solutions / processes go deep into the urban area
- The participants, regardless of contribution, were invited to consider the following principles of approaching the subject:
 1. To seek balance / harmony between the tissue and the life of the city and the particular nature of the river, between the construction and the free spaces, between the mineral and vegetal and aquatic spaces, etc. and to seek

the integration of public space created along the banks into the city's public and / or landscape network, or to propose such networks using the still untapped urban areas to their true potential.

In this respect, links should be found with other objectives (landscape and / or other) as well as solutions for opening physical, visual or symbolic colors between the river and these or between them through the river as a mediator.

2. To favor the diversity and mix of facilities and uses, respecting the river ecosystem

All these were the drivers for the citizens to see the river as a friend who can offer them various satisfactions: aesthetic contemplation, promenade, playing, practicing sports, cultural loisirs, etc.). These functions are called to anime river fronts, urban areas of inestimable value and, for the time being, untapped with sufficient success.

3. Promote openness to private investment and create the conditions for a harmonious public-private partnership.
4. Encourage the presence in the public space in the vicinity of the functions that serve the specific needs of the community to ensure its use throughout the day and in all four seasons (organization of art or food fairs - markets manufacturer, handmade, etc., meeting places, picnic, etc.).

Most of the analyzed functionalities, using the collaborative governance model that were present in the analysis of this case study, have been identified with varying intensity but present as links.

I recognize that this integrated framework covers a lot of ground. It incorporates concepts from a wide range of literature and broadens the scope of collaborative governance beyond the examples used. The framework identifies several general sets of variables (e.g. dimensions, components and elements) as well as the relationships between those variables that will be of interest to collaborative researchers and practitioners. In addition, we have identified some actors within the framework of collaborative governance, interacting to form events and outcomes, especially NGO's and business sector.

Although the width of the frame is rather difficult to analyze, it is difficult to describe it properly within the limits of this article. By developing a framework that encompasses the context, drivers, engagement processes, motivational attributes and joint decision-making capabilities, management, implementation and other joint activities within organizations, jurisdictions and sectors, from each component and develop a full range of proposed causal pathways, and are not limited here.

Behind the interaction with formal data, work plans, different views of the actors, the model puts forward a soft approach to the concept, the limitations being quite obvious in this project:

- Legislation on public procurement, European funds and organizational structure (approval of Council Decisions) of the City Hall of Cluj-Napoca is rather incomplete.
- A normative approach to the project by public actors, not necessarily analytical, due to the lack of experience, has enabled NGOs to develop related evequities.

- The publicity of collaborative governance quite exploited.
- Many of the solutions have not been tested for feasibility, only the actors were consulted in public debates.

Additionally, although the framework includes several components and interactive elements, we have noticed by sequentially studying that all are necessary at all times or at the same level of quality or to the same extent. We have also noticed that further studies are warranted to find out which relationships, in what contexts, ie the task was to identify where, when and why the components are necessary and to what extent for collaborative success.

For example, in the study of the four drivers specified in the model, I had to test only the most important aspects. The premise in this sense is that driving is an essential engine without which collaborative regimes would not be initiated. However, at least one or a combination of other drivers (consistent incentives, interdependence and / or uncertainty) and CGR may have much weaker causal relationships. Similarly to the model, I examined which element or elements of each of the components of the dynamics of collaboration (the commitment of principle, common motivation and joint action capacity are essential to collaborative success) as more present in this case. In a similar direction of research one could analyze more complex projects already carried out at the level of Cluj-Napoca.

Also, future research can explore the critical factors that influence the sustainability of CGRs. For example, one might take into account what many have suggested in the literature, that small initial successes are essential to maintaining a CGR at the beginning, or that such successes are not sufficient in the long run). This would require a much clearer definition of the different levels of success (eg initial development of joint action capacity, different types of actions, actions plus impact, etc.), as well as tracking CGR longevity, constantly maintaining other components and elements, on a qualitative and quantitative approach.

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The missing coordinates of the sharing economy: Intellectual capital and intergenerational learning

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Abstract

Objectives: This research aims to analyze the role of intellectual capital and intergenerational learning in the contemporary sharing economy. **Prior work:** The concept of “intellectual capital” has its roots in the work of Machlup (1962) and was coined by J.K. Galbraith (1969) who used it in order to describe the behavior of using brain and not just knowledge and mere intelligence. Although remarkable signs of progress have been made, this field is still in an embryonic stage of development. Despite the fact that the perspective switched from the organizational to the regional and national intellectual capital, there is no generally accepted framework regarding its components; these become highly important in the context of the sharing economy which manages to connect people, communities and organizations from various continents. Besides, in light of the faster technological progress and the development of smart communities and cities, the knowledge loss generated by the aging population seems to be neglected. **Approach:** An etic approach is employed which encompasses an external view on meaning associations and real-world events. **Results:** The results emphasize the link between intergenerational learning and intellectual capital, and highlight their contribution to the development of the sharing economy. **Implications:** These findings have both theoretical and practical implications; on the one hand, they extend the literature from the knowledge management field by emphasizing the nexus between age diversity and competitiveness in the sharing economy. On the other hand, it may serve as a handbook of policy-decision guidelines; it brings forward how the intergenerational learning programs and practices can be used for increasing the organizational and national intellectual capital. **Value:** It generates insightful knowledge on how to develop organizational and national intellectual capital through intergenerational learning.

Keywords: human capital; age diversity; technology; knowledge.

1. Introduction

The emergence of the sharing economy has been so far approached from a socio-technological perspective; thus, it involves the use of technology [1], [2] and it aims to improve the quality of life at individual, group, organizational and national level [3], [4]. Nevertheless, it seems to neglect the fact that 5 generations are currently present in every society, namely: the Traditional / Veterans (born in 1922–1945), Baby-Boomers (1946–1964), Generation X (1965–1980), Generation Y (1981–1996), and Generation Z (1997–2012), and they have different sets of values and attitudes towards using technological platforms and networks. Within this framework, it is impetuous for the policy-makers to develop proper strategies and policies that can enhance intergenerational learning.

Intergenerational learning can be seen not only as a tool for knowledge sharing among different generations but also as a way of avoiding national and corporate amnesia. Through intergenerational learning, people exchange not only rational/cognitive knowledge related to their experiences and how things should be done but also values, feelings, traditions and emotions (spiritual and emotional knowledge). From the knowledge management perspective, these variables are usually labeled as intellectual capital. Nevertheless, none of the studies developed so far analyzes the relationship between intellectual capital and intergenerational learning.

Taking these into account, this article aims to emphasize the role of intellectual capital and intergenerational learning in the current sharing economy. As it is presented further, both variables are interlinked and influence the development of smart economies and communities. Thus, the following section brings forward the concept of “intellectual capital” from an organizational and national perspective while section three emphasize the link between intellectual capital and intergenerational learning; the latter fosters not only knowledge sharing among the members of various generation but it also supports knowledge creation and recombination. Last but not least, the article closes by drawing several conclusions and emphasizing further research directions.

2. Intellectual capital

The concept of “intellectual capital” (IC) has its roots in the work of [5] and was coined by [6] who used it in order to describe the behavior of using the brain and not just knowledge and mere intelligence. According to [7], its development so far has two phases. The first one started in the 1990s and concentrated on defining the concept [8], [9] while the second one began in the 2000 and focuses on measuring, modeling and extending the levels of analysis from the organizational [8], [10], [11], [12] to national approaches [13], [14], [15].

2.1. Intellectual capital – An organizational perspective

At the organizational level, IC is seen as a critical factor for achieving competitive advantage and ensuring the company’s sustainable development. Although the researchers seem to agree when it comes to IC’s utility, they are unable to establish a generally accepted structure. Thus, [12] states that IC’s structure should

include three components, namely: employee competencies, external structure, and internal structure. [8] maintain the three components perspective but they argue that these should be represented by human capital, structural capital, and financial capital. [16] adopts a more general approach and argue that 6 components should be taken into account when defining IC's structure, namely: human capital, organizational capital, technological capital, business capital, social capital, and entrepreneurial and innovative capital.

Despite this variety, most researchers [17], [18], [19] use the three components approach and make the distinction among:

- human capital – which is labeled as the most significant component of IC [18] due to the fact that it is the only one capable of generating innovation and transforming all the other organizational resources;
- structural capital – which emphasizes the role of organizational structure, culture, and information and management system in storing and distributing knowledge within and behind the company's boundaries [17];
- relational capital – which brings forward the value of an organization's relationship with the internal and external stakeholders [19].

Within this framework, measuring IC becomes a challenge. As can be noticed from Table 1, some researchers focus on financial statements and try to bring to the forefront what lies behind the numbers while others develop complex instruments, capable of offering a holistic perspective on the company's IC.

Table 1. Models measuring the organizational intellectual capital

Model	Characteristics	Limits
Market to net book value	It defines IC as the difference between market value and book value. It offers information regarding the IC value for a firm at a given moment. It is easy to use. It is the most widely known and used indicator.	It depends on the accounting rules. It highlights a lack of vision; market value's increase may be generated by external factors and not necessarily a consequence of using IC The firm is perceived as an independent entity and not as part of a system
Calculated intangible value [9]	It reflects the IC value based on the average performance. It focuses on a three-years period. It facilitates comparison within and between industries. It allows trend analysis.	It is based on financial information. It does not emphasize the elements that define the IC. It presents the results but not what lies behind them.
Value added intellectual capital – VAIC [20]	It defines IC performance as the sum of value added by human and physical capital. It brings forward the importance of human capital. It facilitates comparison between companies.	It evaluates human capital based on its cost and not on its abilities, skills, and competences (its real value). It is based on financial information.
Intellectus Model [16]	It measures IC performance using 342 indicators that are organized based on a 'relevance tree' approach (more indicators are defining a variable; more variables are defining an element; more elements are defining a specific type of capital). It uses a 'multiplying factor' in order to determine the IC's future value.	Some indicators are redundant. Indicators distribution among variables and capitals is unequal (for Business Capital 71 indicators are used while Social Capital is measured through 41 indicators); it increases their influence on the general result/ It is difficult to use.

Model	Characteristics	Limits
AMIC [21]	It takes into account the current and potential future influence of 8 value drivers. It evaluates the impact, cross-impact, and performance of each value driver, using the analytic network process. It supports corrective actions that may improve the firm's performance in the short, medium and long term.	It provides a subjective perspective on the firm's IC since it is based on structured interviews. It presents only the managers' perspective on the firm's IC It highlights IC evolution by relating its value to other organizational variables

Source: [7]

2.2. National intellectual capital

Against the backdrop of globalization, knowledge creation and utilization became vital for national economic wealth, human development and quality of life [22]. Since these are interconnected and reflect the way in which individuals, firms and countries will evolve, the academics started to measure the nation's invisible wealth. They focused on the IC theory and extrapolated the initial conceptual level to nations. Thus, the national IC has its roots in the work of [5] and highlights the current and potential sources for wealth creation [23]. It represents the knowledge, capability, and expertise that provide the competitive advantage of a country and determine its potential for future growth [24]. It is a key driver of performance and makes the difference between the rich and the poor societies. The first ones develop their intangible assets while the second ones focus on land, capital, and labor [22].

Since the early 90s, a large number of studies analyzing various aspects of national IC were undertaken [22], [24], [25], [26], [27] but the field is still embryonic. If some of the most relevant models (Table 1) are analyzed, it can be noticed that there is a lack of comprehensive reference framework and none of the previous methodologies is widely accepted.

Table 2. Models measuring the national intellectual capital

Source	Methodology	Results	Limits
[23]	The model is based on a weighted mean of 4 dimensions: human capital, process capital, renewal capital, market capital. The weights are the results of academic debate.	National intellectual capital explains 20% of the financial wealth. Human capital is the cornerstone of the intellectual wealth of the Arab countries.	The number of variables included in a dimension is unequal. Variables weights are distributed subjectively.
[25]	The model has 3 dimensions: human capital, structural capital, relational capital. In each dimension, variables are grouped in assets, investments, and effects. It analyzes the dynamics of the intellectual capital of the EU for 3	The European countries are grouped in leaders, challengers, and laggards. The Nordic countries are the leaders.	The number of variables included in a dimension is unequal. Relational capital has no variables in the investment group.

	years.		
[24]	The model has 4 dimensions: human capital, market capital, process capital, renewal capital. Each dimension includes 7 variables; their validity is assured using the LISREL technique.	The Nordic countries have the highest results. It emphasizes the importance of individuals, institutions, and communities as sources for national wealth creation.	It overlooked the impact of cultural issues although it mentioned its influence on a nation's wealth.
[28]	The model is based on a weighted mean of 6 dimensions: human capital, process capital, relational capital, marketing capital, RDI capital, social and environmental capital. The weights are determined using the principal component analysis.	The highest scores are obtained by Switzerland, Norway, Sweden, United States, Denmark, the United Kingdom, and Ireland. It emphasizes the environmental responsibility of a nation.	Some variables are redundant. The number of variables included in a dimension is unequal.

So, the previous models: (i) focused on the international comparison without taking into account that different countries develop in different economic, social and cultural realities; (ii) offered questionable results since they used different content and quality criteria of various statistical systems; (iii) concentrated on determining the amount of national IC rather than its quality and dynamics; and (iv) overlooked the importance of social and environmental issues on the sustainable development of a country.

3. From intergenerational learning to intellectual capital

The concept of “intergenerational learning” is defined as “an interactive process that takes place among different generations and results in the acquisition and development of new knowledge, skills, and values, and as such benefits both the organization and the employee” [29]. Although this definition seems to have its roots in the organizational studies, most researchers approach the issue of intergenerational learning from an educational [30], [31], [32] or social perspective [33], [34]. In other words, they argue that a mutual sharing of skills, attitudes, competences, and experiences occurs among the members of various generations within and behind the organizational boundaries; children learn from their parents what is right and what is wrong (labeled by [35] as “spiritual knowledge”), adolescence learn from their friends, colleagues, and teachers how to feel and how to act in certain circumstances (aspects described by [35] as “emotional knowledge”), and they also teach their families and friends how to use specific tools, like information technologies (issues defined by [36] as “rational knowledge”). Within this framework, it can be stated that intergenerational learning is a continuous social process that bridges the gap between generations by fostering not only knowledge dissemination and acquisition but also knowledge creation; not only does it challenge the existing mental models but it also stimulates knowledge codification and re-combination.

In order to support this process, various activities can be used inside and outside organizations' boundaries. Among these, the scholars from the management [37], [38], [39], [40], [41] and educational area [42], [43], [44] tend to focus on:

- *mixed-aged teams* – it starts from the presumption that people from a different generation can cooperate whenever they have to achieve a common goal. According to [37], it fosters mutual learning since knowledge increases in both categories of participants: senders and receivers; the less experienced members acquire new knowledge while the more experienced ones develop their skills and abilities.
- *mentoring* – it is a one-on-one process that puts the less experienced member in the center of the learning process and it involves sharing spiritual, emotional and rational knowledge. It can either occur in a formal context (like an organizational policy) or as a spontaneous reaction, a sign of fellowship [41].
- *storytelling* – it is a one-to-many process that is “based on personal and organizational values (spiritual knowledge), stimulates participants' emotions (emotional knowledge) and presents the context and how skills and competencies have been used (rational knowledge)” [37].

Nevertheless, a few researchers [45], [46], [47] take into account the faster pace of technological progress and the development of “smart” economies and cities and recommend the use of serious games in order to foster intergenerational learning. According to [48], these use an environment with which the members of Generations Y and Z are familiar with, transcend the dimensions of time, space, and personal relationships, and enhance the development of skills and abilities. Furthermore, in order for the experience to pass the entertainment level, [49] argues that the challenges have to be “pleasantly frustrating in the sense of being felt by learners to be at the outer of, but within, their regime of competence”.

Last but not least, given the increased interest in social responsibility and sustainable development of the members from Generation Y and Generation Z [50], [51], [52], several scholars state that volunteering activities could enhance intergenerational learning [47], [53]. This type of activity provides a common ground of communication for those persons who share the same set of values (spiritual knowledge) and supports the dissemination of emotions and feelings (emotional knowledge), and experiences (rational knowledge). Besides, it facilitates cooperation among generations and it removes the stereotypes; it does no longer depend whether the knowledge provider is young or old as long as he/she can increase the group's efficiency, and the team manages to create a better world for future generations.

4. Discussion and further research directions

The aforementioned issues emphasize two major coordinates that are somehow neglected in the current sharing economy. On the one hand, there is a lack of vision when it comes to managing intellectual capital at the organizational, national and regional levels. Although this is considered to be a critical source of

competitive advantage due to its unique and dynamic character, the researches developed so far tend to be treated as a “problem”. As a consequence, the focus is on how to measure and not on how it can be increased or used efficiently. Thus, intellectual capital becomes a tool that can be used in order to achieve organization’s, country’s or region’s objectives, and not a resource that has to be managed.

On the other hand, the sustainable development of intellectual capital becomes more and more difficult to achieve due to the pressure felt at the human capital level. Thus, against the backdrop of an aging population, companies, and governments start to develop intergenerational learning strategies and programs; these aim to ensure knowledge sharing between those who belong to Baby-Boomers and Generation X, and those from Generation Y and Z. At the national level, mixed-aged teams and storytelling seem to be performed by policy-makers [44], [54], [55] while at the organizational level, managers combine the traditional on the job education practices (formal training, mentoring, apprenticeship, etc.) with several modern HR practices, like gamification and volunteering [46], [47], [53]. Nevertheless, as it was previously stated, these activities are linked with intellectual capital development; they foster: (i) skills development (which are usually included in the human capital area), (ii) company’s / country’s image (mentioned frequently as a component of the relational capital), and (iii) process efficiency (included in the structural capital).

Last but not least, although the relationships established among HR practices, intergenerational learning, and intellectual capital are more or less emphasized in the specialized literature [38], [39], [46], none of the previously developed studies analyzed the impact of HR policies and practices on intergenerational learning. In other words, the relationships are emphasized based on an inductive approach but they are not quantitatively tested. Taking these into account, further research could concentrate on evaluating the impact of HR practices on intergenerational learning in order to foster the strategic development of intellectual capital and sharing economy.

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Dynamics of technological readiness competitiveness of the Moldovan economy

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Abstract

Telecommunications infrastructure can effectively reduce trade costs due to the interaction of innovations caused by human and technological resources, thereby contributing to the development of international trade. In the economic literature is mentioned that trade and IT dissemination provide the way to development for the economy of the country when it can use existing opportunities. Our research provides the measurement of the ability of the economy of Moldova adopts existing technologies. The purpose of research is to study the most problematic factors that affecting the technological readiness competitiveness of the Moldovan economy. In our study, we analyzed the Republic of Moldova's score and position in international indicators and rankings in correlation with the methodology of the World Economic Forum. We examined the rank of Moldova relative to other Southeast Europe countries, so our research may be interesting for the countries from the whole region. Our research found that technological readiness competitiveness of Moldova is higher than the global competitiveness and the gap between them has a tendency to increase in the last years. The research showed also that Technological readiness pillar has a significant contribution to the competitiveness of Efficiency enhancers subindex and through him on the global competitiveness of the Moldovan economy. Our research found that the Republic of Moldova has a competitive advantage in the Internet bandwidth kb/s/user, but in other six factors of the Technological readiness pillar, the country has critical values, in comparison with Southeast Europe countries. In plus, Moldova is a country with the most problematic factors between countries.

The research identified that the Republic of Moldova has critically low-level indicators of the innovation and sophistication pillars, associated with Technological readiness pillar.

The results of our study can be used in the elaboration of appropriate education, R&D, labour market, industrial and service sectors policies by decision-makers and the private sector of country.

Keywords: *regional economic integration, Global Value Chains, Republic of Moldova, competitiveness, factors of Technological readiness Pillar.*

1. Introduction

The important links between application of existing technologies, competitiveness and external trade have been the subject of an ongoing debate that has attracted considerable attention from both researchers and decision makers. The globalization has intensified the competition between countries. It is widely accepted that using technologies is a key to competitiveness in the modern economy. Withal the factors and conditions that influence innovation behavior and productivity are basically the same as those that determine the ability of firms to compete.

Since 2010, for emerging economies and commodity-exporting economies in particular, GDP per capita has become more closely correlated with the Global Competitiveness Index's technological readiness, business sophistication, and innovation pillars than it is with the infrastructure, health and primary education, and market-related pillars (goods markets efficiency, financial market development, and labor market efficiency) [1].

The growing interest of Moldovan government to the country's score and position in international indicators and rankings was manifested recently by the introduction of their mandatory monitoring in all key ministers as well as the elaboration of amelioration proposals [2] and it is explained by the importance of country's score and position for the decisions of foreign investors.

The main purpose of the paper is determining causes affecting the technological readiness of the Moldovan economy based on the multilateral analysis. On the one hand, we will study in detail all factors the technological readiness pillar of Moldova. On the other hand, we will compare the technological readiness of the Moldovan economy with the technological readiness of other Southeast Europe countries. Taking into attention Moldova's situation in Southeast Europe, along with the eastern border of the European Union the research covers Moldova and six countries of Southeast Europe region: Romania, Bulgaria, Croatia, Albania, Montenegro, and Serbia. Both analyses are based on the calculation of countries score and position in international indicators and rankings in correlation with the methodology of the World Economic Forum.

Besides its introductory part, the paper has four parts, including the theoretical and methodological background of research as well as all outlining aspects of technological readiness competitiveness of the Moldovan economy and concluding remarks.

2. Interaction between global trade and technology dissemination

Last decades in the economic literature dedicated of trade topics have discussed the importance of trade liberalization for organizing the production of goods and adding value across different countries that consistently led to the appearance of global value chains (GVC).

Under value chains according to M. Porter who primarily described this concept is understanding the division a firm into the discrete activities it performs in designing, producing, marketing, and distributing its product[3]. This concept

was used by him as the main tool for diagnosing competitive advantages by disaggregating the firm in the activities underlying the competitive advantage and identifying links between activities that are central to the competitive advantage and also explaining how coalitions with other firms can replace performance inside the chain.

Value chains have started in framework mainly of one country, then expanded to neighboring countries, have developed at the global level in the early 2000s. In global trade landscape where partners' exports depend on imports and where their connection to the world market is as effective as their link to any other link in the value chain, countries have a greater motivation to work together in order to reduce trade barriers, disseminate technologies, harmonize standards, costume procedure etc.

Many studies pay attention that IT dissemination alongside the trade and transport tariff reduction allowed further international division of labor and specialization by countries, transferring competition from the firms to their departments and individual jobs through participation in GVC. In the era of increasingly developing GVCs, innovation, and technology transfer are also seen as important sources of more sustained competitive advantage based on intangible assets rather than labor costs[4].

In economic literature is accentuated that technologies are combined with the openness of the economy and economic integration. An open, trading economy generates incentives to innovate and invest in new technologies because firms are exposed to competition and new ideas and can benefit from the technology transfer that comes from imports and foreign investment. At the same time, firms can benefit from larger markets abroad [5; 6].

In this regard it should be noted, that the liberal trade policy of the Republic of Moldova is based on the multilateral and bilateral agreements within neighbor countries between which the Foreign Trade Agreement between RM and EU, Central European Free Trade Agreement (CEFTA) embracing the Southeast Europe countries not members of EU.

In this context, economic integration of the Republic of Moldova by using the potential of trade agreements will contribute to the growth of competitiveness of the economy based on the knowledge and integrated into regional value chains. Valorification of this potential of FTA alongside absorbing the innovations and technology transfer will conduce to overcome such disadvantages of domestic production as low competitiveness of Moldovan exports in foreign markets, as well as the inability to offer them a fairly wide range of end-use goods.

To be mentioned that for the rethinking of upgrading in global value chains is using the concept of "smile curve". It was first introduced by Shih (1996) on the example of the personal computer industry who noticed that at each end of the curve obtain higher value added to the product than in the middle [7]. Therefore at one end are concentrated preproduction activities such as R&D, while on the other postproduction such as marketing. Both tend to obtain a higher share of final product and are situating in developed countries. In contrast, manufacturing or assembly activities in developing countries tend to be located in the middle of the curve that corresponds to lower value-added share.

Despite the consensus that the introduction of new technologies in the manufacturing of developing countries and countries with transitional economies often takes place through GVCs, in the economic literature is mentioned that it encounters certain difficulties [8].

Trade and technology provide the path to development for the economy of the country when it can use existing opportunities.

At present, the significance of GVCs for the CEFTA economies of Southeast Europe region is limited, because “they are only weakly to moderately integrated into international trade”[9].

The following sections will be addressed to measurement the ability of the economy of Moldova adopts existing technologies.

3. Methodological background and objectives of the research

The study is based on the analysis of the Republic of Moldova's score and position in international indicators and rankings in correlation with the methodology of the World Economic Forum. Understanding the factors of competitiveness in framework of this methodology is arising from theories of specialization and the division of labor to neoclassical theories emphasis on investment in physical capital and infrastructure, and, later, to interest in other mechanisms such as education and training, technological progress, macroeconomic stability, good governance, firm sophistication, and market efficiency [10]. It is compatible with the approach that explaining the appearance of the value chains.

The Technology Readiness Pillar is the ninth pillar of the *Global Competitiveness Report (GCR)*, embodied in the “Efficiency Enhancers Subindex”, through which the WEF makes possible the comparison between countries of the main technological aspects of national competitiveness over a certain period. It consists of the following 7 indicators:

- Availability of latest technologies;
- Firm-level technology absorption;
- Foreign direct investment (FDI) and technology transfer;
- Internet users (% pop.);
- Fixed-broadband Internet subscriptions (/100 pop.);
- Internet bandwidth (kb/s/user);
- Mobile-broadband subscriptions (/100 pop.).

All indicators have been estimated from 1 (lowest score) to 7 (highest score) by the experts included in the World Economic Forum survey.

Although research pays special attention to the analysis of indicators included in the Technological readiness pillar, first of all, will be specified records of the 3 Subindexes of Moldova in the Global Competitiveness Index, taking in consideration interconnection between 12 pillars of competitiveness as well as their configuration according the actual level of economic development of the country's economy.

In GCR (2011-2012) is mentioned: “While all of these factors are likely to be important for competitiveness and growth, they are not mutually exclusive—two or more of them can be significant at the same time”[11].

GCRs (from 2011-2012 to 2017-2018) classify all countries observed according to the following stages of development: factor-driven, transition from stage 1 to stage 2; efficiency-driven; transition from stage 2 to stage 3; and innovation-driven.

According to the stage of development, the economy of Moldova balanced between factor-driven and transition to the efficiency-driven stage in the analyzed period 2011-2017 (see Figure 1). For the exception of the transition to efficiency-driven period of 2013-2015, it was classified as the factor-driven economy.

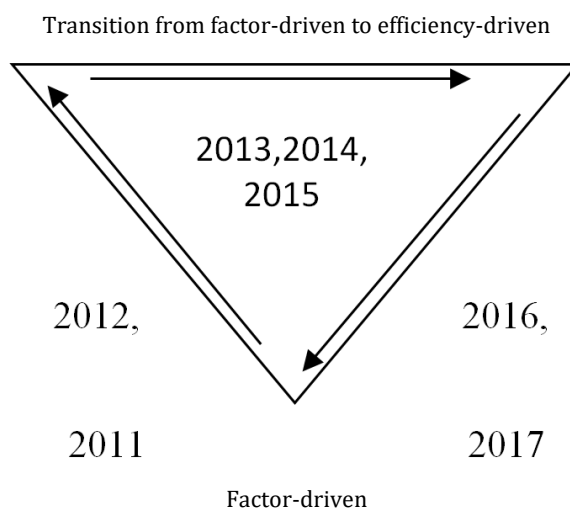


Figure 1. Classification of stages of development of Moldova
Source: Elaborated by the author at the WEF, the Global Competitiveness Report, 2011-2012 to 2017-2018

Figure 1. also reveals the regress in the stages of development of Moldova in the last years. As at the factor-driven stage countries compete based on their factor endowments, the efficiency-driven stage of development, competitiveness has determined by the ability to use the benefits of existing technologies alongside the other indicators of the efficiency enhancers pillars.

Analysis below embraces indicators included in the GCRs for 2011 to 2017 of the World Economic Forum[11;12;13;10;14;1]; their changes and the average scores as well as growth rates of technological readiness pillar calculated by the author for the mentioned period.

The all above-mentioned are taking into attention the necessity of adopting the urgent economic policy measures.

It should be noted that in accordance with the methodology applied, for the economies which are measured in the overall GCI below 50, any individual performance measured above 51, are considered advantages [11, p.90].

4. Dynamics of technological readiness competitiveness of the Moldovan economy

4.1. Impact of technological readiness on the global competitiveness

The analysis below will be directed first of all on establishing the key domains for the improvement of the country's competitiveness. It testifies to the low progress in the competitiveness of the Moldovan economy in the period 2011-2017. None subindexes records are ranking higher than the Moldovan economy in the list of the Global Competitiveness Index (Table 1). It can be also observed that the country was placed above the hundredth position in some years in the Basic requirements subindex (5 years in total) and the Efficiency enhancers subindex (4 years) of the Global Competitiveness Index.

Table 1. Subindexes records of Moldova in the Global Competitiveness Index

Year	Global Competitiveness Index				Basic requirements				Efficiency enhancers				Innovation and sophistication factors			
	score	rank	Changes		score	rank	Changes		score	rank	Changes		score	rank	Changes	
			score	rank			score	rank			score	rank			score	rank
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
2011	3,9	93	-	-	4,1	102	-	-	3,6	103	-	-	2,9	127	-	-
2012	3,9	87	0	+6	4,2	93	+0,1	+9	3,7	99	+0,1	+4	2,9	131	0	-4
2013	3,9	89	0	-2	4,2	97	0	-4	3,7	102	0	-3	2,9	133	0	-2
2014	4	82	+0,1	+7	4,3	90	+0,1	+7	3,8	88	+0,1	+14	2,9	129	0	+4
2015	4	84	0	-2	4,3	89	0	+1	3,8	94	0	-6	2,9	128	0	+1
2016	3,9	100	-0,1	-16	4,1	101	-0,2	-12	3,7	102	-0,1	-8	2,9	131	0	-3
2017	4	89	+0,1	+11	4,2	95	+0,1	+6	3,7	94	0	+8	3	124	+0,1	+7
Total	3,9*	-	+0,1	+4	4,2*	-	+0,1	+7	3,7*	-	+0,1	+9	2,9*	-	+0,1	+3

Source: Elaborated by the author at the WEF, the Global Competitiveness Report, 2011-2012 to 2017-2018

* Note: The average score for the 2011-2017 years is embraced in row

Innovation and sophistication factors have demonstrated the catastrophic low values with the rank among the last fifteen countries included in the Global Competitiveness Index between 2011 to 2017.

It should be mentioned that the average score of the Basic requirements subindex (4.2) is ranking higher, but the Efficiency enhancers subindex (3.7) and the Innovation and sophistication factors (2.9) are lower than the average score of the Global Competitiveness Index (3.9).

It is unlike the analysis of changes in the scores and ranks during the 2011-2017 period in the following analysis. The Republic of Moldova has improved its score by 0.1 in each of subindexes. It is in line with the change of the score reached by the Global Competitiveness Index in the mentioned period. The sign of annual deviations in the rank of GCI is practically the same as in the Basic requirements subindex and in strong correlation with Efficiency enhancers subindex. It emphasizes the importance of the last mentioned one for the global competitiveness of Moldova.

Table 1 reveals also that the factors of Innovation and sophistication factors of competitiveness practically have no changes in its score. They were estimated with the annual low score of 2.9 in all years with the exception 2017 year (3.0). It shows at absent of the progress in innovation and business sophistication sphere.

It can be also observed that the Republic of Moldova has increased its ranks in each of subindexes. But the highest rank increase, which exceeds the Global competitiveness index at 5 points, was in the Efficiency enhancers subindex - by the 9 positions. It is in comparison with rising by 7 positions in the Basic requirements subindex and by 3 positions in the Innovation and sophistication factors.

The above-mentioned records are in contrast with higher ones obtained in the framework of the Technological readiness pillar (an increase in the score by 1.1 and an increase in rank by 25 positions) (Table 2).

Table 2. Trends in the Technological readiness pillar of Moldova

Year	Technological readiness		Changes in Technological readiness		Number of countries surveyed
	score	rank	score	rank	
2011	3,5	78	-		142
2012	3,9	65	+0,4	+13	139
2013	3,9	64	0	+1	148
2014	4,4	51	+0,5	+13	144
2015	4,4	53	0	-2	140
2016	4,4	58	0	-5	138
2017	4,6	53	+0,2	+5	137
Total	-	-	+1,1	+25	-

Source: Elaborated by the author at the WEF, the Global Competitiveness Report, 2011-2012 to 2017-2018

On technological readiness, Moldova was placed in the first part of the list of countries, embraced by the Global Competitiveness Index, with the exception of 2011.

It should be mentioned that the technological readiness competitiveness of Moldova is higher than the global competitiveness and the gap between them has a tendency to increase in the last years.

To be mentioned further that from the comparison changes in Technological readiness pillar (Table 2) and there in the Efficiency enhancers subindex (Table 1) can be observed the correlation between them. So, the changes in the scores and ranks have almost the same signs for both. In this context, the most revealing is the growth in the score by 0.5 and in rank by 13 positions in the Technological readiness pillar in 2014, that is followed by the growth in the score by 0.1 and in the rank by 14 positions in the Efficiency enhancers subindex for this period. Similarly, both have no change in the score in 2015. But the decrease of the Technological readiness pillar for 2 positions was accompanied by the decrease in the Efficiency enhancers subindex for 8 positions in this year. In the end, the growth of rank by 25 positions in the Pillar of Technological Readiness made a significant contribution to the growth of rank by 9 positions in the Efficiency enhancement subindex. From the

analysis reveals that Technological readiness pillar has an important influence on the competitiveness in the framework of Efficiency enhancers subindex and by this on the global competitiveness of the Moldovan economy.

Therefore, improving the competitiveness of the technological readiness of the Moldovan economy should have a strong impact on the upgrading of the Moldovan stage of development and precisely speaking on the transition from a factor-driven stage to efficiency-driven stage.

Taking into account the above considerations, in the following analysis, all factors of technological readiness competitiveness of the Moldovan economy are studied in detail with the scope of determining the most problematic from there.

It can be observed that indicators within the technological readiness pillar are developed unevenly (Table 3).

Table 3. Factors of technological readiness competitiveness of the Moldovan economy for the period 2011-2017

Factors	2011		2012		2013		2014		2015		2016		2017		2017-2001	
	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Changes	
															Score	Rank
Availability of latest technologies	4,3	112	4,1	118	4,1	116	4,3	96	4,4	92	4,3	95	4,4	88	+0,1	+24
Firm-level technology absorption	3,9	126	4	128	4	124	4,1	109	4,1	109	4	112	4	106	+0,1	+20
FDI and technology transfer	4,1	103	4,1	103	4,1	109	4,2	97	4	99	3,9	100	4	98	-0,1	+5
Internet users % pop.	40	62	38	74	43,1	77	48,8	70	46,6	74	49,8	79	49	71	+9	-9
Fixed-broadband Internet subscriptions /100 pop.	7,5	61	9,9	58	11,9	52	13,4	52	14,7	52	15,5	56	16,3	54	+8,8	+7
Internet bandwidth kb/s/user	14	38	91,1	15	94	23	115,8	23	152,4	18	194,9	16	144,1	34	+130,1	+4
Mobile-broadband subscriptions /100 pop.	-	-	3,5	92	5,1	97	47,2	42	49,4	59	51,9	70	55,5	75	+55,5	+75

Source: WEF, the Global Competitiveness Report, 2011-2012 to 2017-2018

At the highest end are the Internet bandwidth, Mobile-broadband subscriptions and Fixed-broadband Internet subscriptions as the most dynamic and important factors of competitiveness within the technological readiness pillar.

Moldova has the competitive advantage in the Internet bandwidth, ranking higher than the fiftieth place during the analyzed period (the best – the fifteenth in 2012), whereas country was ranked lower than the fiftieth position in the overall GCI. Fixed-broadband internet subscriptions should be considered as the upgrading factor with the best rank fifty-second in 2013-2015 years. Although, it has room for improvement.

At the lowest end the FDI and technology transfer, Firm-level technology absorption and Availability of latest technologies factors are placed. Although, all factors have ranked higher in 2017 in comparison to 2011: the Availability of latest technologies rose by 24 places, the Firm-level technology absorption by 20 places and FDI and technology transfer by 5 places, they have had very insignificant changes in scores - around 0,1. But in the case of FDI and technology transfer was decreased in the score by 0,1. This situation can be explained by an initial very low base of comparison. In 2011 the Republic of Moldova was placed in all factors analyzed below the hundredth position in their competitiveness. They still remain the critical factors affecting the technological readiness of the Moldovan economy. So, the highest rank of the firm-level technology absorption was one hundred sixth place and the availability of latest technologies – eighty-eighth place, both obtained in 2017, but FDI and technology transfer – ninety-seventh (2014).

To be mentioned on the special role of FDI as main sources of foreign technology, especially for countries at a less advanced stage of development. But in the case of Moldova, there is not only a general shortage of export-oriented FDI in higher-technology industries but the weak correlation between them [15].

4.2. The place of Moldova in the technological readiness of the some Southeast Europe countries

The evolution of technological readiness of the Southeast Europe countries shows the persistent competitiveness gaps between countries. By the average score, the countries ranked from Bulgaria(4,66) and Croatia (4.6) at the upper end to Serbia (4.11) and Albania (3.61) at the lower end (Table 4).

Table 4. Dynamics of the technological readiness scores of the some Southeast Europe countries for the period 2011-2017

Countries	2011	2012	2013	2014	2015	2016	2017	Average score	Growth rate,%
Moldova	3,5	3,9	3,9	4,4	4,4	4,4	4,6	4,16	4,66
Romania	3,8	4,1	4,1	4,5	4,6	4,7	4,8	4,37	3,97
Bulgaria	4,1	4,3	4,4	4,7	4,9	5,1	5,1	4,66	3,70
Albania	3,8	3,7	3,3	3,3	3,4	3,7	4,1	3,61	1,27
Croatia	4,5	4,4	4,4	4,6	4,6	4,7	5	4,6	1,77
Serbia	3,6	4,1	3,9	4,4	4,5	4,1	4,2	4,11	2,6
Montenegro	4	4,1	4,2	4,3	4,3	4,6	4,9	4,34	3,44

Source: Elaborated by the author at the WEF, the Global Competitiveness Report, 2011-2012 to 2017-2018

It is important to emphasize that Bulgaria has had the competitive advantage in technological readiness (2013-2015) and Croatia (2013-2017). Both were ranking higher than the fiftieth place in technological readiness in the mentioned periods while their economies were ranked lower than fiftieth positions in the overall GCI.

According to average score - 4,16 the economy of Moldova is placed in the middle of the list of countries on the technological readiness, following the economy of Montenegro (4,34) and Romania(4,37).

It should be noted that Moldova has demonstrated the highest growth rate (4,66%) on the technological readiness competitiveness among countries. At the lowest end on the growth rate are placed Albania, that has had poorest score technological readiness competitiveness, and Croatia with one of the biggest score. Simultaneously, it can be observed that the initial base of comparison of Moldova in 2011 was the lowest (3,5).

In the following analysis, the most critical factors of technological readiness of Moldova will be found by comparing the values of technological readiness factors of competitiveness between South-Eastern Europe countries. For this goal, the average score of each factor is calculated as well as countries with the best score are determined. In our analysis factors with the score below average are considered as critical. We analyze the data for 2017, one of the best years with the point of view the score and position of Moldova in the Technological readiness pillar competitiveness.

The factor analysis placed the countries unlike the analysis above. From the analysis reveals that Moldova is a country with the most critical factors (6), followed by Serbia (5), Albania(4) and Montenegro(3) (Table 5).

Table 5. The score of factors of technological readiness of some Southeast Europe countries in 2017

Factors	Moldova	Romania	Bulgaria	Albania	Croatia	Serbia	Montenegro	Average Score	Country with the best score	N countr. with critical factors
Availability of latest technologies	4,4	4.7	4.7	4.4	4.8	4.4	4.5	4,6	Croatia 4.8	4
Firm-level techn. absorption	4	4.2	4.5	4.4	4.2	3.9	4.3	4,2	Bulgaria 4.5	2
FDI and technology transfer	4	4.1	4.7	4.9	3.7	3.9	4.4	4,2	Albania 4.9	4
Internet users % population	49	59.5	59.8	66.4	72.7	67.1	69.9	63,5	Croatia 72.7	3
Fixed-broadband Internet subscrip./100 pop.	16,3	20.7	23.3	8.2	24.6	18.9	18.5	18,6	Croatia 24.6	3

Internet bandwidth kb/s/user	144,1	155.5	175.9	57.0	119.0	26.3	202.9	125,8	Montenegro 202.9	3
Mobile-broadband subscriptions/100 pop.	55,5	73.7	88.4	52.6	79.7	67.4	60.7	68,3	Bulgaria 88.4	4
Total number of critical factors of country	6	2	1	4	2	5	3	-	-	

Source: WEF, the Global Competitiveness Report, 2011-2012 to 2017-2018

Note:  factors with the score below average

 factors with the score above average

Croatia and Romania, both have 2 factors with the score below average, but Bulgaria only 1 critical factor. It can be observed that most countries (4 from them) this score is below average in the following factors: availability of latest technologies, FDI and technology transfer and mobile-broadband subscriptions/100 pop. But three from Southeast Europe countries have found the most problematic factors affecting the technological readiness of their economy: internet users % population; fixed-broadband Internet subscrip./100 pop. and Internet bandwidth kb/s/user.

The analysis also shows that Croatia has the best score at the 3 factors, Bulgaria 2 factors, Albania and Montenegro at the 1 factor. Romania and Moldova haven't the factors with the best score.

5. Conclusions

This study showed that Technological readiness pillar has a strong impact on the competitiveness in the framework of Efficiency enhancers subindex and by this on the global competitiveness of the Moldovan economy. Accordingly, improving the competitiveness of the technological readiness of the Moldovan economy should have an important contribution to the upgrading of the Moldovan stage of development by the transition from a factor-driven stage to efficiency-driven stage.

The factor analysis of technological readiness competitiveness found that the Republic of Moldova has a competitive advantage in the Internet bandwidth kb/s/user. At the same times, the analysis showed that FDI and technology transfer, Firm-level technology absorption and Availability of latest technologies are the critical factors affecting the technological readiness of the Moldovan economy. These factors play a central role in the Technological readiness pillar, taking into attention that the firms operating in the country need to have access to advanced technologies and products and the ability to absorb and use them. Hence it should be adopted urgent measures of state economic politics to improve the situation in these domains.

In the regional aspect, study displayed the comparable level development of Technological readiness pillar of Moldova with other Southeast Europe countries

and the highest growth rate (4,66%) on the technological readiness competitiveness among countries.

But the factor analysis of technological readiness competitiveness between Southeast Europe countries has demonstrated that these records were obtained mainly thanking the competitive advantage factor - the Internet bandwidth kb/s/user. Since the study showed that other 6 factors of the Technological readiness pillar of Moldova have critical values, in comparison with Southeast Europe countries, and Moldova is a country with the score below average: Internet users % population, Fixed-broadband Internet subscrip./100 pop., and Mobile-broadband subscriptions/100 pop. Although about 50% of the population of Moldova is the Internet users other countries had reached more advanced results. It can speak regarding the characteristic of other results of the country in the field of technological readiness. In spite of Moldova has improved its indicators of technological readiness in the last years, the progress reached wasn't sufficient and is preponderantly explained by the low initial base of comparison.

In the study was paid attention to the interconnection between pillars of competitiveness also. From this point of view, the innovation and business sophistication pillars are cause for concern. Since the country is lagging quite far behind in terms of innovation factors as well as business sophistication. To change this situation for the better is also required the urgent state intervention.

The study found that at present the ability of the economy of Moldova to adopt existing technologies is reduced the most problematic factors among them. Besides above mentioned there were the following factors

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Can we use waste generation as a smart indicator?

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Abstract

*Improving environmental quality is one of the prominent purposes of the governments in developing countries where additional international pressures with an increasing level of environmental awareness exist. Environmental quality models are predicted by using generally its components such as air pollution, emissions, demand and awareness to protect it, but by somehow lack of municipal solid waste generation and municipal solid waste management expenditures. **Objectives** This study aims at exploring the effects of municipal solid waste generation per capita, municipal solid waste expenditures per capita, and waste expenditures rate on environmental quality. **Prior work** A range of assessment tools have been designed to provide holistic picture of smart cities and many common prospects of the system. Focusing on the specific domains of the smart city concept, some scholars propose four smart environment indicators, including attractiveness of natural conditions, pollution, environmental protection and sustainable resource management. **Approach** The current study constructed a national dataset from Turkish provinces, including environmental indicators, running a causal relationship model. Hierarchical regression analysis was conducted to explore the relationship between environmental quality and municipal solid waste management. **Results** The mean of environmental quality index level in 81 cities. The mean of annual municipal solid waste generation in 81 cities was 429 (± 100.25) kg per capita in Turkey in 2016. Municipal solid waste expenditures per capita was a predictor of environmental quality level. **Implications** The findings of this study signal that we can estimate the*

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level of environmental quality by using municipal solid waste management in the next years. Our results showed that municipalities' solid waste management expenditures clearly had an impact on environmental quality level in Turkey. This type of convergence of interests might get municipalities to adopt municipal solid waste management programs adopting IT towards better environmental quality level. Value Environmental quality level turned out to be reflecting environmental inequality in the provinces of Turkey.

Keywords: *Municipal solid waste management, multivariate statistical analysis, environmental quality.*

1. Introduction

Improving environmental quality is one of the prominent purposes of the governments in developing countries where additional international pressures with an increasing level of environmental awareness exist. Environmental quality refers to a source of well-being (Streimikiene 2015), and previous research has explored the influences of macro factors on environmental quality, including economic, social and demographic factors (Cropper and Griffiths 1994; Arbulu et al. 2015). In the last two decades, those factors have inspired much attention due to their policy implications over time, such as urbanization, economic growth, and sustainable development. Particularly, municipal solid wastes are still among the prominent problems in urban society, and many studies have emphasized that wastes if managed not properly, may be harmful to human, plants, animals and environment, steadily deteriorate the health status of individuals, and gradually reduce the environmental quality (Pierzynski et al. 2005; Keleş et al. 2012). For example, landfilling, as a conventional waste disposal technique, may increase health expenditures due to increased congenital abnormality, cancer incidence, and mortality rate, especially under-five (Jerrett et al. 2003; Ruston 2003). The possible way to cope with this emerging problem is to assess the level of waste generation, its management performance, to identify the mismanagement conduct, and to follow up the expenditures to protect environmental quality (Adeoye et al. 2016).

Recently, studies examining many aspects of smart cities have emerged, but there have been also research gaps. Overall those studies have been much related to defining assessment methods on multiple smart city dimensions to provide holistic picture of smart cities and many common prospects of the system, specifically embedding information technologies in each dimension. In this scope, a variety of system/subsystem assessment indicators have been proposed to follow-up the relevant characteristics of the smart cities. Consequently, using the relevant indicators, many studies have focused on ranking of the smart cities and its components, common prospects, and its determinants, economically, politically, and culturally. For example, Shafik (1994) have examined the effects of economic growth on smart environment while Adeoye et al (2016) have revealed that rural deveopment are related with integrating many technological tools. Many other studies have argued that income is associated with environmental quality, implying

that as income grows environmental quality increases because of income elasticity of demand for environmental quality (OECD 2008; Giovanis 2015). Nevertheless, few studies discuss the effects of municipal solid waste generation quantity and municipal solid waste management expenditures on environmental quality. Environmental quality models are predicted by using generally its components such as air pollution, emissions, demand and awareness to protect it, but by somehow lack of municipal solid waste generation and municipal solid waste management expenditures.

Against this background, the current study constructed a national dataset from Turkish provinces, including the environmental indicators, running a causal relationship model. It aims at exploring the effects of municipal solid waste generation per capita, municipal solid waste expenditures per capita, and waste expenditures rate on environmental quality levels in 81 provinces of Turkey. It provides new evidence about the inductive environmental impact of waste management. This study contributes to the public administration and environmental economics literature by uncovering the effects of annual municipal waste generation and expenditures on environmental quality.

2. Literature review

One of the major problems encountered in city life is the environmental problems emerging from inappropriate municipal solid waste management. Approximately 32 million tons of municipal waste generated in Turkish provinces in 2016, according to Official Statistics Bureau. Examining the effects of municipal solid waste on smart environment is a vital research topic in environmental economics and public administration.

Smartness is specially denoted as exploring innovative solutions to the needs of people in a society, and defined with six domains: (i) economy, (ii) people, (iii) governance, (iv) mobility, (v) environment, and (vi) living (Centre of Regional Science Vienna University of Technology 2019; Giffinger and Gudrun 2010). Those domains are related to the characteristics of the cities where they should aspire to achieve better in terms of competitiveness, social and human capital, active participation, transport and ICT, natural resources, and quality of life [13].

In Turkey many local governments utilize IT applications regarding smart environment, such as infrastructure automation, water and sewage systems monitoring (e.g. using smart meters, detection of leakage, water quality monitoring, vigilance systems), municipal solid waste collection/sorting systems (e.g. pay as you throw, recycling systems), environmental quality measurement (e.g. air quality measurement and monitoring with sensors, noise pollution measurement), energy consumption reduction (e.g. using smart meters and networks, distribution and intermediate station automation, building energy management, street lighting) applications (Varol 2017).

A range of assessment tools have been designed to provide holistic picture of smart cities and many common prospects of the system. Most of the assessment methods focus on multiple smart city dimensions with an overall system

perspective, specifically embedding information technologies in each dimension and process. For example, European smart cities ranking system have been put forward to provide a more comprehensive understanding of the concept, sustainable urban model (Lazaroiu and Roscia 2012; European Commission 2012). It includes a set of metrics, standards, or indicators regarding smart city objectives that are related to all actors affected by proper implementation of effective and innovative solutions.

The same methodological approach may particularly tackle the subsystems, where the task is much more effective and producing new indicators to provide new insights. Therefore, due to the difficulty in accurately measuring environmental quality, many researchers have developed a novel approach to quantify the environmental quality level by aggregating a range of indicators. Focusing on the specific domains of the smart city concept, some scholars propose four smart environment indicators, including attractiveness of natural conditions, pollution, environmental protection and sustainable resource management (Lazaroiu and Roscia 2012; European Commission 2012; Batty et al. 2012). This approach considers environmental quality to be a function of air pollution, green space area, waste management, individuals' awareness and demand for protecting nature, and energy efficiency.

In general, it assumes that income per capita positively related to environmental quality while illiteracy and infant mortality rate, as meaningful social standard and economic inequality indicators, are negatively related to it due to decreasing environmental awareness and demand (Beigl et al. 2014). Many studies report that economy, urban development, and human attitude are prominent factors influencing municipal solid waste generation (Liu and Wu 2010). For example, high economic level and adopting advanced technology in developed countries increase costs but reduce the risks, because of the trade-off between economic growth, technological infrastructure, costs and risk of diseases, and environmental degradation (Ikhlayel 2018). That is relevant for the early stage of economic development, but when the economic growth reaches a sustainable level, municipal solid waste generation begin to decline substantially (Arbulu et al. 2015). Thus, reducing the amount of waste is the main objective of developed countries' waste policies.

Municipal solid waste management in most countries differ due to national regulations, including source reduction, material recovery transfer, incineration, sterilization, anaerobic digestion, composting, and landfilling (Özeler et al. 2006; Ezechi et al. 2017). There have been many attempts to pursue the municipal solid waste management practices and expenditures. For example, The World Bank (2001) proposed a software tool for urban cleaning services municipality solid waste management (COSEPRE) to assist Lima Municipal Cleaning Services Company to follow up the costs, excessive expenditures, relevant corrective actions, and waste prediction (The World Bank 2001).

Despite the extensive literature, Turkish scholars have paid little attention to the subject. So, this study attends to fill the gap suggesting an evidence to explore the linkage between the variables. Moreover, the findings gathered from this study will provide further insights for public policy makers and researchers. We also

expect that local governments will follow up their process and activities on environmental quality, and municipal solid waste management by using the indicators suggested in this study.

3. Methodology

3.1. Materials/ Data

Environmental quality for 81 provinces in Turkey were recorded based on a dataset of Turkish Statistical Institute (TurkStat). Linearities between environmental quality and selected municipal waste management indices of each urban society were examined using correlation analysis. Specifically, in this study we used twelve indices which are explained below. Air pollution, forest area, population provided controlled municipal solid waste services, noise level and satisfaction level were included in the environmental quality index by TurkStat (Türkiye İstatistik Kurumu 2016). Also, income per capita, literacy rate, under-five mortality rate, population, amount of municipal solid wastes, municipal solid waste expenditures, and municipal solid waste expenditure rate was obtained from TurkStat province-level database (Türkiye İstatistik Kurumu 2017).

Income (TL/capita): This indicator is the gross domestic product. Data was based on 2016 calendar year.

Literacy (%): This indicator refers to the rate of people who are graduated from a formal school and able to read and write in national formal language. Data was based on 2016 calendar year.

Under-five mortality rate: This indicator refers to the number of deaths of infants and children under five years old per one thousand live birth. Data was based on 2016 calendar year.

Population: This indicator refers to the urban residents in a province. Data was based on 2016 calendar year.

Air pollution (mg/m³): This indicator refers to the average of PM₁₀ values of the stations in a city. Data was based on 2015 calendar year.

Forest area per km²: This indicator refers to the forest area per km² in a city. Data was based on 2015 calendar year.

Population provided controlled municipal solid waste services: This indicator refers to the percentage of urban population receiving regulated waste management services provided by local governments in a city. Data was based on 2015 calendar year.

Noise level: This indicator refers to the percentage of households having noise problems from the streets. Data was based on 2015 calendar year.

Satisfaction level: This indicator refers to the satisfaction rate of urban residents from sanitation services provided by local governments in a city. Data was based on 2015 calendar year.

Annual municipal solid waste generation (thousand tonne/capita): Generated amount of municipal solid waste in a city. Data was based on 2016 calendar year.

Annual municipal solid waste expenditure (TL/capita): Total expenses for municipal solid waste management, including collection, transportation, storage, treatment, and disposal. Data was based on 2016 calendar year.

Waste expenditure rate: This indicator refers to the percentage of the expenditures for municipal solid waste management by local governments in total environmental protection expenditures in a city. Data was based on 2016 calendar year.

3.2. Method

The dependent variable in this study was environmental quality, while annual municipal solid waste generation per capita, annual municipal solid waste expenditure per capita, and proportion of municipal solid waste management expenditures in total environmental protection expenditures in a city were treated as independent variables. Hierarchical regression analysis was conducted to explore the relationship between environmental quality and municipal solid waste management. We controlled income per capita, illiteracy rate, population, and under-five mortality rate. We used the SPSS 21.0 (SPSS Inc) and the R programming language (R-Studio) for all data modeling.

4. Results

In this section, descriptive findings of environmental quality, annual municipal solid waste generation per capita, annual municipal solid waste expenditures per capita, and the percentage of the expenditures for municipal solid waste management by local governments in total environmental protection expenditures are provided. Also, the regression models are presented.

4.1. Descriptive findings

The mean and standard deviation values are presented in Table 1.

Table 1. Descriptive statistics

Abbreviation	Variables	Mean	SD
EQ	Environmental quality	0.5906222	0.1203727
GDP	Income per capita	24854.5101546	8432.04505
LITR	Literacy	95.5275309	2.1563265
MORT	Under five mortality rate	11.7975	3.77353
POP	Population	985368.7778	1786221.06536
MWG	Municipal solid waste generation	429.0987654	100.2536290
MWE	Municipal solid waste expenditure	71.8868	31.19251
MWER	Municipal solid waste expenditure rate	44.6960494	14.3658487

The mean of environmental quality index level in 81 cities was 0.59 (± 0.12). First five cities which had greater environmental quality were Kastamonu (0.81), Karabük (0.80), Bilecik (0.76), Kırklareli (0.74), and Yalova (0.74). Last five cities

which had smaller environmental quality were Iğdır (0.20), Muş (0.25), Hakkari (0.31), Kars (0.37), and Ağrı (0.37).

The mean of income per capita in 81 cities was 24854 ($\pm$ 8432) TL in Turkey. While, the first five wealthy cities were İstanbul (54,933), Kocaeli (53,267), Ankara (45,247), Tekirdağ (40,083), and Bilecik (38,274), having approximately 12% of the total annual national income, the most poverty-stricken cities were Ağrı (11,125), Şanlıurfa (12,161), Van (12,378), Batman (14,015), and Bitlis (14,145), having approximately 3% of the total annual national income. Data on annual income per capita reveals that there apparently exists an economic inequality among Turkish provinces in 2016.

The mean of literacy level in 81 cities was 95.53% ($\pm$ 2.16) in Turkey. While, the most literate five cities were Antalya (98.68%), Çanakkale (98.35%), Tekirdağ (98.34%), İzmir (98.34%), and Denizli (98.34%) in 2016, the least literate five cities were Mardin (90.64%), Şanlıurfa (90.7%), Şırnak (91.24%), Siirt (91.33%), and Muş (91.53%).

According to the Table 1, the average level of under-five mortality rate was approximately 12‰ in 81 provinces in Turkey in 2016. While, the city which was most suffering from the mortality rate under five years old was Şırnak (22‰), the least one was Tunceli (4‰). Data on the average level of under-five mortality rate reveals that there apparently exists social inequality among Turkish cities in 2016. While the most crowded city was İstanbul (14.8 million), the least one was Tunceli (83 thousand). The mean of annual municipal solid waste generation in 81 cities was 429 ($\pm$ 100.25) kg per capita in Turkey in 2016. While, the most municipal solid waste producer cities were Muğla (719 kg/per capita), Bartın (657 kg/per capita), Kars (639 kg/per capita), Ardahan (620 kg/per capita), and Kilis (620 kg/per capita), having approximately 10% of the total municipal solid waste generated, the least one was Kahramanmaraş (259 kg/per capita).

The mean of municipal solid waste expenditure per capita in 81 cities was 72 ($\pm$ 31) TL in Turkey. First five cities which had greater municipal solid waste expenditure per capita were İstanbul (148), Muğla (145), Antalya (135), Ordu (131), and Van (129). Last five cities which had smaller municipal solid waste expenditure per capita were Osmaniye (12), Niğde (14), Gümüşhane (18), Kars (28), and Muş (30). The mean of municipal solid waste expenditure rate in 81 cities was 45% ($\pm$ 14) in Turkey. First five cities which had greater municipal solid waste expenditure rate in total expenditures for environmental protection were Konya (84%), Denizli (84%), Niğde (83%), Bursa (82%), and Kocaeli (81%). Last five cities which had smaller municipal solid waste expenditure rate in total expenditures for environmental protection were Bingöl (21%), Adıyaman (24%), Bolu (25%), Bilecik (28%), and Düzce (35%).

4.2. Multiple regression results

To explore the causality between independent and dependent variables, regression analysis was adopted. The proposed regression equity was as follows:

$$\begin{aligned} \text{Ln(EQ)} = & \alpha_i + \beta_1 \text{Ln(GDP)} + \beta_2 \text{Ln(LITR)} + \beta_3 \text{Ln(MORT)} + \beta_4 \text{Ln(POP)} + \beta_5 \text{Ln(MWG)} \\ & + \beta_6 \text{Ln(MWE)} + \beta_7 \text{Ln(MWER)} + \varepsilon \end{aligned} \quad (1)$$

Where:

EQ – environmental quality;

GDP – gross domestic product per capita;

LITR – literacy rate;

MORT – under-five mortality rate;

POP – population;

MWG – municipal solid waste generation quantity;

MWE – municipal solid waste expenditure;

MWER – municipal solid waste expenditure rate.

We checked the variables in terms of being highly correlated with environmental quality. Correlation values between the independent and dependent variables are presented in Table 2.

Table 2. Correlation between exploratory variables

	EQ	GDP	LITR	MORT	POP	MWG	MWE
GDP	0.526 (0.000)						
LITR	0.629 (0.000)	0.733 (0.000)					
MORT	-0.597 (0.000)	-0.615 (0.000)	-0.636 (0.000)				
POP	0.74 (0.257)	0.533 (0.000)	0.242 (0.015)	-0.085 (0.225)			
MWG	0.061 (0.053)	0.187 (0.036)	0.196 (0.040)	-0.139 (0.108)	-0.007 (0.474)		
MWE	0.418 (0.294)	0.448 (0.001)	0.407 (0.059)	-0.228 (0.020)	0.421 (0.000)	0.172 (0.114)	
MWER	-0.075 (0.254)	-0.267 (0.003)	-0.371 (0.000)	0.252 (0.012)	-0.182 (0.052)	0.051 (0.326)	0.095 (0.131)

p-Values in brackets.

Two step hierarchical regression analysis was adopted to determine the predictors of environmental quality controlling for the effects of income per capita, literacy rate, under-five mortality rate, and population. In regression analysis further assumptions, such as linearity between dependent and independent variables, normal distribution of residuals, absence of auto-correlation, homoscedasticity (constant variance of error terms), and absence of multicollinearity problem between residuals are required to meet. Hence, we used correlation analysis, histogram visualization and Shapiro-wilk test, Durbin-Watson coefficient, Breusch-Pagan modified studentised test, and variance inflation factor accompanied with tolerance value to validate the assumptions of interest. The hierarchical multiple regression statistics are reported in Table 3.

Table 3. Hierarchical Multiple Regression Statistics

Model	Variable	Std. coefficient	Std. error	t-statistic	Significancy	Variance inflation factor
1	Constant	-	0.694	-1.937	0.056	-
	GDP	0.140	0.000	0.882	0.380	3.613
	LIT	0.375	0.007	2.831	0.006	2.510
	MORT	-0.282	0.004	-2.378	0.020	2.012
	POP	-0.116	0.000	-1.080	0.284	1.649
2	Constant	-	0.722	-1.857	0.067	-
	GDP	0.123	0.000	0.807	0.423	3.691
	LIT	0.368	0.008	2.692	0.009	2.977
	MORT	-0.297	0.004	-2.629	0.010	2.023
	POP	-0.183	0.000	-1.672	0.099	1.909
	MWG	-0.123	0.000	-1.486	0.142	1.083
	MWE	0.232	0.000	2.318	0.023	1.595
	MWER	0.120	0.001	1.301	0.197	1.358

According to the Table 3, the regression coefficient for the GDP was 0.123 ($t=0.807$, $p=0.423$), for the literacy rate was 0.368 ($t=2.692$, $p=0.009$), for the infant mortality rate was -0.297 ($t=-2.629$, $p=0.010$), for the population was -0.183 ($t=-1.672$, $p=0.099$), municipality solid waste generation per capita was -0.123 ($t=-1.486$, $p=0.142$), for the municipality solid waste expenditures per capita was 0.232 ($t=2.318$, $p=0.023$), for the percentage of municipality solid waste expenditures in total environmental protection expenditures was 0.120 ($t=1.301$, $p=0.197$). Municipal solid waste expenditures per capita was a predictor of environmental quality level in 81 cities ($p<0.05$). Also, literacy rate and infant mortality rate were other predictors of environmental quality level.

In regression models, independent variables should not have strong relationship with one another. Otherwise highly related variables may manipulate the regression equation which symbolizes the apparent causal relationship between the independent variables and dependent variable. To diagnose the availability of multi-collinearity between the independent variables variance inflation factor (VIF) and tolerance have been used. VIF value exceeding 4.0, or tolerance value less than 0.2 indicate the multi-collinearity problem (Hair et al. 2010). With this background, VIF values in the second regression model ranged from 1.358 to 3.691, indicating that there was no multi-collinearity between the independent variables, as they were below the cut-off values.

Moreover, the assumption of homoscedasticity requires the constant variance of error terms, which can be measured by many specific tests such as plot and histogram visualization techniques, Breusch-Pagan test, Breusch-Pagan modified studentised test, Goldfeld and Quandt test, Szroeter test, and White's asymptotic test (Evans 1989).

We applied Breusch-Pagan modified studentised test to validate the assumption of homoscedasticity, and found that p value was greater than 0.05 ($BP=0.023$), indicating that there was no heteroscedasticity. To diagnose the autocorrelation which is one of the assumptions of linear regression, we checked Durbin-Watson coefficient, and found that it (1.8) was less than the reference level (1.5-2.5)

(Norusis 1999). Moreover, we diagnosed the normal distribution of residuals with histogram visualization and Shapiro-wilk test ($p > 0.05$), which indicated that the residuals were normally distributed. The regression models are presented in Table 4. While model 1 included controlled variables, the independent variables were subsequently added to the following model (model 2).

Table 4. Regression models

Model	R	R square	Adjusted R square	Std. error of the estimate	Change statistics					Durbin-Watson
					R square change	F change	df1	df2	Sig. F change	
1	.685	.469	.441	.0899796	.469	16.793	4	76	.000	
2	.735	.541	.496	.0854140	.071	3.781	3	73	.014	1.8

In model 1 with controlled variables predicted environmental quality, R-square value was 0.47. In model 2 the R-square value was 0.54. This finding implies that the second model has more predictive power, explaining 54% of the total variance. ANOVA test was applied to compare the regression models. ANOVA test has extensively been used to detect mean differences among groups on a single dependent variable are likely to have occurred by chance (Tabachnick and Fidell 2014). In ANOVA test p and F values are the critical factors for determining the significant difference between the models. The ANOVA test results validated the existence of significant group difference between hierarchical regression models for the dependent variables.

Table 5. ANOVA test results of the regression models

Model		Sum of squares	df	Mean square	F	Sig.
1	Regression	0.544	4	0.136	16.793	0.000
	Residual	0.615	76	0.008		
	Total	1.159	80			
2	Regression	0.627	7	0.090	12.270	0.000
	Residual	0.533	73	0.007		
	Total	1.159	80			

According to the Table 5, hierarchical regression models for environmental quality level were significantly different from each other ($p=0.000$). The assessments for the model performance indicate that the fitting accuracy of the model.

5. Discussion

This study focuses on the environmental aspect of the smart city concept by uncovering the effect of municipal solid waste generation quantity and municipal solid waste expenditures on environmental quality in Turkish cities. Furthermore, in addition to income level per capita, many other factors were analyzed in this study, with the aid of multivariate statistical methods. Overall results indicated that social development factors and waste management development play a great deal of important roles in environmental quality level. Moreover, the findings of this study signal that we can estimate the level of environmental quality by using municipal solid waste management in the next years.

The results imply that municipal solid waste expenditure per capita is a predictive factor for smart environment. This can be explained by adopting expensive disposal methods which adopt new technology rather than conventional and cheap municipal solid waste treatment methods such as dumping into landfill sites and burning in incinerations. According to Turkish Statistical Institute, 28.80% of what urban residents thought that was garbage is dumped in municipality's landfill site, 61.23% is dumped in controlled landfill site, 9.79% is send to recovery facilities, and 0.19% is disposed with unregulated methods (Türkiye İstatistik Kurumu 2017). This is in line with previous studies indicating the trade-off between smartness and costs of risks and quality assuring measures (Ikhlayel 2018). Although Nicolli et al (2010) found out that municipal solid waste production quantity has negative impacts over environmental quality in Italy, our result was not in line with this finding. Annual municipal solid waste generation quantity per capita and municipal solid waste expenditures rate in total environmental protection expenditures were not found to be predictor variables of environmental quality.

Municipalities are one of the local governments, and their number has reached 1397 in 81 provinces in 2016 (TC İçişleri Bakanlığı Mahalli İdareler Genel Müdürlüğü 2018). Our results showed that municipalities' solid waste management expenditures clearly had an impact on environmental quality level in Turkey. Municipalities have high level of responsibility to effectively manage municipal solid wastes, which are by-product of daily life. An integrated solid waste management requires a significant financial resource, approximately 2-3 billion TL depending on the choice of technology (TC Çevre ve Şehircilik Bakanlığı 2017). Those forecasting mean that municipalities need a larger investment resource than they can handle alone. This type of convergence of interests might get municipalities to adopt municipal solid waste management programs adopting IT towards better environmental quality level. Furthermore, the concept of partnerships should be a more inclusive option with a range of policy actors, and policy makers should enable public-private initiatives for municipal solid waste management to compensate the physical infrastructural gaps of municipalities.

In addition, environmental quality level turned out to be reflecting environmental inequality in the provinces. Existing environmental inequality in Turkish provinces is a major threat to public health and health status. Hence, the results imply that some further policy measures should be adopted and

implemented to decrease the environmental inequality, controlling the effects of efficient municipal solid waste management.

The results show that municipal solid waste generation quantity (429 kg/per capita) in Turkish provinces is relatively higher than that in European countries. Beigl et al found that annual municipal solid waste amount of production in major EU cities with higher prosperity level is 415 kg/per capita (Beigl et al. 2014). This result can be explained by environmental awareness level and demand for environmental quality in European countries. According to a national project report, annual municipal solid waste generation quantity is 420 kg/per capita in 2008 (TC Çevre ve Orman Bakanlığı 2010). Our results implied that annual municipal solid waste generation quantity had increased by 2% from 420 to 429 kg/per capita in last eight years.

6. Conclusion

This study analyzes the impact factors on environmental quality. The empirical results show that the major influencing factor of environmental quality is municipal solid waste expenditures of municipalities in provinces of Turkey. Municipal solid waste expenditures and the literacy rate appear to increase environmental quality, while the under-five mortality rate influences negatively on environmental quality.

The results have some policy and administrative implications. First, local governments should efficiently operate their primer task of municipal solid waste management. Hence, some further financial and economic analyses are required. Second, performance of municipal solid waste management is undoubtedly prominent concern which should be focused on.

This study can provide insightful references for planning and the future environmental protection policy measures. Ascertaining the effect of municipal solid waste generation on environmental quality provides useful evidence and understanding for the policy making process regarding the urban environmental quality and its determinants. Municipal solid waste management policies should be seriously taken into consideration with the active involvement of actors for the sake of smart environment which is a key factor for critical health issues in a community, especially developing countries.

However, this study has some limitations. First, it is based on a cross-sectional data which is published by TUIK for just one year. Second, data extracted from indirect data source. Third, the explanatory power of the regression coefficient is not so high as it stems from one-year data. Some further research using a panel data on the relevant topic would provide clear and strong evidence. Although those limitations we expect that the results will induce many of the local governments to follow some efficiency guidelines to enhance the performance of municipal solid waste management.

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Educație prin gamificare

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Abstract

Luând în considerare avântul pe care tehnologia l-a luat în ultimii 50 de ani, putem afirma cu siguranță, că paradigma pregătirii individuale sau colective va fi reprogramată în jurul unei colaborări participative digitale. Mai exact, ceea ce va trebui să învățăm precum și modul în care vom învăța vor fi restructurate ontologic de către tehnologie. De aceea a amenda dezvoltarea educației prin gamificare nu face parte dintr-o modă care o să treacă, ci are rolul de a descoperi și a crea un instrument strategic în zona resurselor umane. În acest sens, prin cercetarea de față, voi structura principiile de funcționare ale gamificării și voi preciza punctele pro și contra ale acestui tip de educație precum și dacă este posibilă și necesară o aplicare viitoare a ei. Sensul acestui studiu a germinat din cercetările pe care le-am făcut pentru teza de doctorat, care se vrea un dialog realist și sincer între religie și știință. Ca mijloc de abordare m-am folosit în special de metoda de observare întrucât lucrez într-un domeniu în care sunt implicat în mod direct în modelarea unor caractere, dar și pe cea a studiului de caz. În cercetarea mea am fost uimit de rezultatul pe care l-a avut proiectul Gamify Your Teaching. Un proiect Erasmus+ coordonat de o echipă din România, în colaborare cu alte șase state care a primit distincțiile de „poveste de succes”(pentru impact și contribuția la crearea de politici în domeniu, pentru rezultate inovative și abordare creativă) și „exemplu de bună practică”(pentru modul exemplar în care a fost dezvoltat și coordonat, fiind o sursă de inspirație și pentru alții). Un aspect deosebit de important al acestui subiect este faptul că sub incidența lui pot fi implicați cercetători, profesori, dar și studenți sau elevi. Concret, educația prin ludificare își propune să susțină lecțiile profesorilor în două moduri: în primul rând, prin realizarea unui joc digital inovator, iar în al doilea rând, creând și testând materiale didactice pentru predarea. Un exemplu concludent este jocul de puzzle “Foldit” care, a facilitat o descoperire revoluționară în domeniul SIDA, rezolvând o problemă pe care cercetătorii nu o deslușeau de 15 ani. Cu peste 240,000 de jucători, soluția a fost identificată în 10 zile. Deci gamificarea este o metodă de educație utilă și ușoară care îi încurajează pe elevi și studenți să practice studiul precum și să facă schimb de idei.

Cuvinte cheie: jocuri video, tehnologie, mecanisme de joc, dinamică, ludificare.

1. Introducere

Odată ce jocurile video și-au gravat un loc stabil în cultura secolului XXI, s-a mărit și potențialul lor de a transforma experiența educației școlare. Nu e de mirare acest lucru, întrucât, studiile de cercetare arată că până la vârsta de 21 de ani, majoritatea tinerilor consumă în lumea virtuală a jocurilor același volum de timp pe care îl petrec la școală. De aceea generațiile actuale au devenit mult mai sensibile la stimulii educaționali bazați pe principiile de funcționare ale jocurile video. În acest sens, gamificarea pare să fie cheia succesului educațional, în special, datorită faptului că înșiși elevii și studenții doresc implicarea lor activă în implementarea acestui tip.

Termenul de gamificare a fost împrumutat din industria digitală, fiind folosit ca expresie de sine stătătoare în anul 2008, dar popularizare sa a început abia în a doua parte a anului 2010, după ce s-a renunțat treptat la termeni paraleli ca: „productivity games”, „surveillance entertainment”, „funware”, „playful design”, „behavioral games”, „game layer” sau „applied gaming” [13].

Conform raportului „Global Education Gamification Market 2016 – 2020”, se preconizează o creștere de până la 66,22% a pieței educației prin gamificare în doar patru ani [7]. Astfel, am putea spune că rata de dezvoltarea a acestui tip de învățământ, va transforma ontologic toate metodele educaționale tradiționale.

2. Istoric și evoluție

O scurtă incursiune în istoria omenirii, ne arată că educația prin jocuri a existat chiar și la vechile civilizații. Astfel în localitatea Ain Ghazal, Iordania, a fost descoperit un joc de societate (board game) asemănător cu macala, care a fost datat la 5870±240 de ani î.Hr. [19]. În India, jocul *Gyan Chauper* a fost creat pentru a împărți lecții morale și religioase, în Roma, tinerii aristocrați jucau *Ludus latrunculorum* pentru a învăța tehnicile militare, jocul *Go* era considerat în China unul dintre fundamentele necesare pe care trebuie să-l cunoască un învățat, în Persia o formă primitivă a *Șahului* făcea parte din educația de la curtea regală.

Revenind la perioada noastră, în expoziția din 2012 „The Century of the Child: 1900–2000”, a Museum of Modern Art din New York, doi cercetători Kinchin și O'Connor notau că „Jocul este pentru secolul XXI ceea ce a reprezentat munca pentru industrializare. El demonstrează o cale de a cunoaște, a face și de a crea o valoare” [24]. Iar pentru a pune laolaltă o periodizare [16] a evoluției și dezvoltării ideii de gamificare actuală trebuie să ne întoarcem în timp și să începem cu anul 1958, anul apariției primului joc video *Tennis for two*, care simula jocul de pin-pong pe un ecran, cu ajutorul unui osciloscop. Următoarea treaptă a fost apariția a două lumi virtuale: MUD1 (Multi-User Dungeon) creată de Roy Prubshaw la Universitatea din Essex pe un calculator DEC PDP-10 și World Peace Game, un simulator educațional, creat de John Hunter, care folosea instrumente geopolitice fictive. În anul 1980 Thomas Malone publică „What makes things fun to learn? Heuristic for designing instructional computer games” fiind prima lucrare științifică, care aduce în discuție ideea de educație prin jocurile video. Microsoft lansează în anul 1982 prima versiune a unui simulatorului de zbor. Anul 1984 este încununat de apariția jocului *Tetris*,

creat de inginerul Alexey Pajitnov. Cinci ani mai târziu, în anul 1989, Howard Adelman et al' comentează despre beneficiile aplicării jocurilor video și a tehnicilor utilizate în conținutul lor, în arealuri diferite de cel digital, în lucrarea: „Toward a procedure of minimizing and detecting falsa positive diagnoses of learning disability”. Anul 1993 aduce în fața publicului jocul *Doom*, un FPS (first person shooter), care deschide apetitul utilizatorilor de calculatoare pentru jocuri. În 1999 apare primul joc MMORPG (multiplayer online role-playing game), *Everquest*, care face cunoștință publicului cu ideea de joc social online. În anul 2002 programatorul și antreprenorul britanic Nick Pelling aduce în mainstream termenul de „gamification” definindu-l ca o interfață asemănătoare jocurilor video create pentru a face tranzacțiile electronice plăcute și rapide. În anul 2005 apare Scratch, un limbaj de programare menit să-i învețe pe programatori să înțeleagă conceptele de programare. În anul 2007 se înființează la New York The Institute of Play care se axează pe un program educațional pentru vârstele 11 – 18 ani, gamificat în întregime. Tot în 2007 James Paul Geo publică lucrarea „What video games have to teach us about learning and literacy”. În anul 2009 The Institute of Play, începe primul său proiect Quest to learn (Q2L) în cadrul căruia toate cursurile și clasele sunt gamificate. Din anul 2010 mediul academic începe să-și îndrepte atenția către gamificare popularizându-l. În 2011 la San Francisco are loc prima conferință despre gamificare, iar The Oxford English Dictionary indexează în conținutul său termenul de gamificare, definindu-l ca: aplicarea conceptelor și tehnicilor din jocuri în alte arealuri de activitate. În 2012 The Deloitte Leadership Academy este prima instituție de nivel superior care își restructurează curricula spre gamificare. În anul 2015 prin Kickstarter este lansat site-ul gamificat Fantasy Geopolitics menit să-i încurajeze pe student să învețe despre știrile din lume. Anul 2016 aduce în prim plan Oculus Rift prima cască de realitate virtuală. Anii dintre 2016 și 2019 pot fi considerați ani de experimentare datorită apariției numeroaselor aplicații gen Memrise, Duolingo, SoloLearn și altele, care au ca rol suplinirea elementului uman în educație dar și promovarea învățământului autodidact.

3. Gamificarea – conceptualizare și funcționare

Deși sunt multe definiții atribuite gamificării, nu există una, cu care, literatura de specialitate să fie întru totul de acord întrucât, fiecare dintre ele aparțin unui alt domeniu de activitate. În acest sens, unele definiții scot în evidență implicarea precum și aspectul problemă-rezolvare [39], altele se concentrează pe forma de instruire care poate fi desprinsă [15] sau cum e în cazul Huotari și Hamari [22] gamificarea reprezintă o îmbunătățire a serviciilor și crearea unei valori în cadrul marketingului. În contextul educației, gamificarea înseamnă introducerea elementelor funcționale din jocuri în cadrul orei tradiționale de curs, în cuprinsul materialului didactic și în sistemul de management al educației [10]. Implicarea jocului în educație ar însemna valorificarea divertismentului rezultat din activitatea ludică, însă gamificarea nu se rezumă doar la aceasta. Ea reunește în firea sa jocurile de divertisment și jocurile serioase. Jocurile de divertisment nu au scopul de a educa întrucât, primordial, ele se axează pe distracție, pe de cealaltă parte jocurile serioase

au la bază un itinerariu educativ și nu conțin elemente de amuzament [36]. Am putea spune că gamificarea este de fapt, un mod de a rezolva probleme ale realității într-un mediu de divertisment. De aceea, este foarte important de sesizat diferența dintre educația bazată pe jocuri și gamificare. Dacă a doua folosește elemente din jocuri într-un mediu non-ludic, pentru prima jocul este scopul, dar și finalitatea.

Pentru a crea o experiență captivantă într-un mediu non-ludic este necesar să se acorde atenție maximă elementelor din jocuri. Deși clasificările lor sunt foarte puțin diferite, terminologia este similară. Astfel, pentru unii cercetători principiile fundamentale sunt mecanismele, dinamica și estetica [21], pentru alții doar mecanismele și dinamica [4].

Mecanismele sunt componenta de bază ale gamificării întrucât, ele determină legile, procedurile și algoritmi jocului. Cele mai uzitate mecanisme sunt: puncte, niveluri, provocări, insigne, obiecte virtuale și tabele de clasificare [5]. Punctele pot fi folosite în mai multe moduri. Pe de o parte, când au rolul de a stimula competiția, acestea pot fi folosite în locul calificativelor, pe de altă parte, când scopul lor este de a furniza un feedback aceste devin personale [37]. Nivelurile indică pragul care a fost atins în itinerariul propus. Cu cât mai mare cu atât mai mult crește respectul și statutul. Provocările sunt echivalentul misiunilor, care trebuie îndeplinite pentru a primi o recompensă. Insignele și alte trofee sunt mărturia că au fost atinse anumite niveluri și că misiunile date au fost realizate. Foarte important în acest sens este ca aceste insigne să fie la vedere pentru a stimula dorința de a le înmulți. Obiectele virtuale sunt non-fizice, dar pot fi achiziționate cu ajutorul punctelor strânse. Astfel, acestea sunt un mod de a încuraja strângerea de puncte și totodată ajută la crearea unei identități specifice prin personalizarea unei posesii virtuale. Tabelele de clasificare arată poziția în comparație cu ceilalți. Acest ultim mecanism nu trebuie folosit în mod izolat, întrucât, conduce la reducerea performanței, deraind de la scopul lui de a avea un efect motivațional prin necontextualizarea informației despre progress [37].

Când vorbim despre dinamică, ne referim în special la interacțiunea umană cu mecanismele de joc. Concret, aceasta determină ceea ce va face jucătorul, individual sau colectiv, ca răspuns la acțiunea sistemului de mecanisme [39]. Dinamica nu poate fi programată într-o soluție gamificată, dar folosită cu mecanismele corecte, se poate crea o experiență care stimulează comportamentul prin satisfacerea uneia sau mai multor nevoi [4]. Astfel, oamenii sunt motivați de mecanismele jocului datorită dinamicii acestora. Principalele tipuri de dinamică sunt răsplata, statutul, realizările, individualitatea și competiția.

4. Principiile de bază pentru o gamificare semnificativă

Ideea unei gamificări semnificative provine din credința că sunt activități în care oamenii se antrenează dintr-o motivație intrinsecă. Așadar, creatorul unui sistem de gamificare trebuie să asigure o varietate de experiențe și de căi de angrenare, pentru a crește șansa fiecărui participant, de a găsi ceva reprezentativ pentru el. În acest sens, Nicholson a dezvoltat o teorie a gamificării semnificative pornind de la ideea autodeterminării [28]. Cu alte cuvinte, sistemul de gamificarea nu trebuie

construit linear ci, în maniera tridimensională a lumii reale, așa încât, utilizatorul, în activitatea lui de a crea și a învăța, să nu fie supus unor șabloane. Pentru ca acest sistem să fie operațional Nicholson propune șase principii: joaca, expozițiunea, predilecția, informația, angajamentul și meditația [29].

Când vorbim despre joacă, trebuie neapărat să facem distincția dintre ea și joc. Dacă jocul este o formă de joacă cu o structură și un scop [27], joaca este un joc fără scop și fără structură. De aceea, un element important în joacă este ca aceasta să fie opțională [6]. În acest sens, designerii trebuie să creeze un sistem de gamificare, în care, utilizatorul nu este forțat să participe ci alege de bunăvoie să se angreneze. Astfel se micșorează riscul apariției conflictelor dintre gamificare și sistemul educațional.

Expozițiunea sau narațiunea este baza cunoașterii, înțelegerii și a explicării, fiind cel mai important element pentru construirea identităților și a istoriei [34]. Într-un studiu asupra narațiunii prezente în optzeci de jocuri Brand și Knight [1] au descoperit patru dimensiuni ale acesteia: narațiunea evocatoare care introduce jocul într-o lume pre-existentă dintr-o carte, film sau alt joc; narațiunea de montaj, care folosind tehnici de film, prezintă povestea; narațiunea de încorporare în care jucătorul descoperă elemente care spun o poveste întâmplată în trecut și narațiunea emergentă când jucătorul iese din planul narativ pentru a crea altul printr-o alegere proprie. În gamificare, cele patru dimensiuni prezente în jocuri sunt greu de integrat. Aici expozițiunea are scopul de a-l conecta pe utilizator cu mediul lumii reale așa încât, acesta, să nu rămână afundat într-o lume imaginară atunci când schimbă sistemul de la gamificare la realitatea vieții. Aceasta se poate face prin două moduri: prin narațiunea de tip oglindă și prin analogie [29].

Predilecția este strâns legată de joacă. Pentru a avea o experiență de joc, utilizatorul trebuie să-și aleagă modul de angrenare în sistemul de gamificare. Dezvoltând un sistem în care participanții pot să-și aleagă modul propriu de implicare, se înlătură barierele dintre student și materie, mărinând rata de success a învățatului. Totuși există și o problemă în acest model: studentul slab. Dându-i-se libertatea de a-și alege sarcina, dar și modul de a o rezolva, studentul slab nu va ști de unde să înceapă dacă nu va avea îndrumare [30].

Conceptul de informare în gamificare pornește de la răspunsul pentru întrebările „de ce” și „cum” în loc de „cât am făcut” și „câte puncte valorează x”. Informația are rol de a-i arăta utilizatorului că schimbările de comportament nu trebuie să fie bazate pe o recompensă ci pe înțelegerea efectelor acțiunii lui [26]. Punctul sensibil al acestui principiu este relevanța informației. Fiecare student are propriul bagaj de cunoștințe de aceea, este foarte greu de știut relevanța pe care o are informația în cazurile particulare [33]. În acest sens, designerii sistemelor de gamificare trebuie să copieze modul de organizare al bibliotecilor pentru a putea oferi informația potrivită fiecărui utilizator.

În contextual gamificării angajamentul are două definiții. Prima se referă la interacțiunea socială dintre utilizatori. Sociologia arată că oamenii s-au simțit întotdeauna bine atunci când erau conectați la lumea din jurul lor [13]. În gamificare angajamentul în relațiile interumane duce la formarea de prietenii între persoane

care împărtășesc aceleași pasiuni și încurajează munca în echipă. Aceasta se realizează prin crearea de grupuri care lucrează în același sistem de gamificare sau prin stabilirea de legături între utilizatorii începători și cei experimentați. A doua definiție are la bază ideea de „flow”. Raportat la sistemul de gamificare aceasta înseamnă o paralelă între ascensiunea aptitudinilor studentului și greutatea provocărilor viitoare, lucru care va duce la o înțelegere a acțiunilor necesare atingerii scopului final [8].

Meditația creează utilizatorului oportunitatea de a se reculege și de a reflecta asupra experienței sale din joc. Această stare este necesară utilizatorului așa cum spune și Dewey care argumentează că fără a cugeta după o acțiune înseamnă a nu înțelege scopul acesteia [32]. Pentru a arăta valoarea pe care o are reflectarea în gamificare, Thiagarajan [35] o prezintă în șase stagii. Ea începe cu explorarea emoțiilor în urma acumulării unor experiențe, urmată de materializarea verbală a acestora. În continuare utilizatorul analizează experiența dobândită spre a înțelege ce a învățat de fapt după care, încearcă să creeze o conexiune între elementele studiate și lumea reală. În final utilizatorii sunt întrebați cum ar putea aplica cele învățate într-un context nou ca apoi, să precizeze care va fi următorul pas în urma experienței acumulate. Așadar valoarea reflectării stă în faptul că studentul va fi capabil să vadă imaginea de ansamblu, depășind astfel parabola oamenilor orbi și ai elefantului în care fiecare individ învață doar din experiența sa unilaterală.

5. Gamify your teaching – un proiect Erasmus+

Scopul proiectului Gamify Your Teaching [17] a fost de a sprijini dezvoltarea profesională a formatorilor de antreprenoriat și a profesorilor din domeniul VET care folosesc gamificarea. Elevii, profesorii, formatorii și alte persoane s-au implicat activ în cadrul proiectului, acesta fiind implementat de un consorțiu format din șapte țări europene: România, Italia, Lituania, Polonia, Marea Britanie, Spania și Grecia. Timp de doi ani (septembrie 2015 - august 2017), partenerii au fost antrenați în toate activitățile legate de crearea și testarea unui joc antreprenorial și dezvoltarea unei metodologii inovatoare de învățare a spiritului antreprenorial prin folosirea jocului. Toate activitățile s-au bazat pe cercetarea specifică realizată de partenerii locali și partenerii externi în domeniul cercetării sociale. Motivul pentru efectuarea cercetării este acela de a determina nivelul ITC al profesorilor de antreprenoriat în țările consorțiului și de a stabili caracteristicile generale ale jocului. Concret, lecțiile au fost alcătuite în două moduri: în primul rând, s-a urmărit dezvoltarea unui joc digital inovator, iar în al doilea rând, crearea și testare de noi materiale didactice, după sistemul gamificării, pentru predarea educației antreprenoriale.

Proiectul include și un raport de analiză a nevoilor profesorilor din România în acest caz. Potrivit documentului [18], în România, jocurile pe calculator nu sunt asociate cu învățarea, din acest motiv ele nu sunt folosite în timpul orelor, având un procentaj de nefolosire a acestora de 63,33%, doar 23,23% de folosire a lor de două ori pe luna și 6,67% de utilizare a acestora o dată pe săptămână. La cercetare au participat profesori din 4 școli, 3 universități și colaboratori – 30 chestionare (16

femei – 53,33% și 14 bărbați – 46,67%). 56,33% dintre ei au fost profesorii de liceu, 36,67% au lucrat în universități și 3,33% sunt angajați în școli gimnaziale, din instruire informală sau alte locuri. Majoritatea au avut de la 6 la 15 ani de experiență în predarea antreprenoriatului; 53,33% dintre ei nu au început sau preluat o afacere vreodată.

Situația în privința folosirii gamificării în educație, a fost la fel de dezastruoasă și în țările partenere [18]. Marea Britanie: 75% nu folosesc jocurile. Doar 20% dintre respondenți au spus că le folosesc o dată sau de două ori pe semestru. Lituania: 40% dintre respondenți nu folosesc jocurile pentru predare și 7 persoane au răspuns că le folosesc o dată pe an. Doar două persoane le folosesc săptămânal, din cele 21 participante. Grecia: din 20 de chestionare completate, majoritatea participanților (70%) nu folosesc jocurile pe calculator în predarea antreprenoriatului. Restul de 30% (6 respondenți) nu le utilizează frecvent în predare, cu excepția a 2, care le folosesc săptămânal. Italia: Mai mult de jumătate dintre respondenți (13 din 21) nu includ jocurile pe calculator în metodele lor de predare. Restul folosesc jocurile în felul următor: Unul, cel puțin o dată pe săptămână; patru o dată sau de două ori pe lună iar trei doar o dată sau de două ori pe semestru. Spania: (50%) nu folosesc jocurile în predarea la clasă deloc, iar (14%) o dată pe semestru. Polonia: Peste jumătate dintre participanți nu folosesc jocurile ca metodă de predare a antreprenoriatului. Cei care le folosesc, o fac de două ori pe semestru (5 respondenți). Cealaltă jumătate de participanți nu știau ce este gamificarea.

6. Avantajele și riscurile sistemului de gamificare

Există un larg corp de literatură care explorează beneficiile sistemului de gamificare în contextul educațional. Rezultatele cercetărilor arată că gamificarea promovează: angajament [11], motivație [20], atitudine pozitivă [38], participare activă și colaborare [25], realizări [5] [38] și schimbări de comportament [12]. Concret, toate acestea se reunesc sub umbrela celor patru libertăți caracteristice jocului [16]. Prima libertate este cea de a greși. Omul este înzestrat de la natură să se ferească de greșeli. Gamificarea își asumă faptul că vor apărea erori din partea studenților, pentru care nu vor exista consecințe grave. Astfel se crează un mediu în care studentul e încrezător chiar dacă greșește și este motivat să meargă mai departe. A doua libertate este cea de a experimenta. Când studentul are libertatea să greșească, dorința lui de a experimenta noi căi în direcția învățatului crește exponențial. În acest sens, scopul experimentării devine congruent calității informației deoarece nu se mai lucrează cu liste finite de fapte. Să luăm drept exemplu istoria. În timp ce predatul tradițional îl învață pe student doar datele și numele importante, gamificarea îl împinge mai departe spre a crea o ermineutică proprie. A treia libertate este asumare unei identități diferite. Nu vorbim aici despre o depersonalizare ci, doar despre o schimbare temporară de rol. Prin asumarea acesteia în cadrul gamificării, studentul este încurajat să vadă lumea dintr-o perspectivă diferită de cea proprie, ceea ce va ajuta la construirea aptitudinilor de limbaj precum și la dezvoltarea empatiei. Un astfel de exemplu poate fi observat la cluburile din cadrul liceelor sau la frățiile din cadrul universităților. A patra libertate este lipsa efortului. Un element împrumutat de sistemul de gamificare din jocuri este cel de alternare a efortului cu relaxarea. De exemplu, în jocurile de tip turn-base jucătorii

trebuie să se concentreze doar când este rândul lor relaxându-se când ceilalți sunt activi. Această alternare reduce oboseala și lipsa de atenție. Mai mult, pauzele sunt un exercițiu care ajută la creșterea cantității de informație înțeleasă și reținută.

Cel mai mare avantaj pe care gamificarea îl aduce este automatizarea învățatului. De exemplu, în cazul unui examen, corectarea acestuia este mult mai ușoară, răspunsurile fiind predefinite și astfel se salvează unități de timp. Studenții pot profita de acest timp pentru a lucra cu profesori virtuali. Beneficiile sunt feedback-ul instant, iar timpul de studiu cu profesorul uman poate fi îndreptat spre rezolvarea unor probleme dificile pentru partea de software.

Un alt mod crucial în care gamificarea poate servi educația este reducerea costurilor pentru personalizarea proceselor de învățat. Este general acceptat între specialiști că o clasă formată dintr-un număr mic de studenți, dezvoltă realizări educaționale mult mai mari. Într-un mediu gamificat, studentul, alegând domeniul pe care-l dorește, își poate crea o agendă educațională în funcție de preferințele sale. Aceasta are efectul de a simula o clasă mică permițând școlii, să ofere studenților beneficiile acesteia, fără a angaja profesori suplimentari.

Ian Bogost este cel mai vocal critic dintre cercetătorii din domeniul jocurilor. Într-un articol [3] de pe blogul său, argumentează că gamificarea este de fapt un sistem de exploatare, o perversiune și simplificare a mediului de joc, creat de marii afaceriști cu scopul de a obține un profit ușor, iar în altă parte [2] critică termenul de gamificare ca fiind vag. Chang [9] susține că gamificarea este o fantezie tehnou-topică cu un trecut complicat, care acordă întâietate virtualului și nu în ultimul rând nu se ridică la standardele pe care le propune. Designerul de jocuri Margaret Robertson amendează fervent abordarea de tip stoc a gamificării [31]. În acest sens, ea spune că mecanismele cele mai puțin esențiale din jocuri, tind să devină prin gamificare, punctul central al educației. Dacă am rezuma criticile rezultate din cele spuse mai sus, acestea s-ar concretiza în următoarele: motivația extrinsecă, intersul studenților, fezabilitatea, distragerea atenției [16].

Din abordarea de tip stoc, rezultă cel mai mare risc al gamificării: motivația extrinsecă. Transformând învățatul într-o vânătoare de puncte, insigne sau niveluri, gamificarea nu reușește întotdeauna să alimenteze motivația intrinsecă. Ori scopul educației este de a crea pe termen lung o dorință interioară de a învăța. În încercarea de a mări timpul acordat învățatului pe o perioadă scurtă de timp, gamificarea sacrifică scopul educației tradiționale.

În urma unei expertize făcută de Pew Research Center în anul 2015, s-a descoperit că în SUA doar 40% dintre cetățeni joacă jocuri video iar din aceștia doar 10% se consideră „gameri”. Așadar lipsa de interes față de jocuri, existența unei mentalități anti-jocuri video și a unor stereotipuri negative pun într-o lumină întunecată gamificarea. Astfel studenții care dau randament în cadrul sistemului de educație tradițional, nu vor adopta gamificarea întrucât, aceasta ar duce la o scădere a performanțelor lor.

În general sistemul de gamificare se bazează pe tehnologie ca platformă de comunicare dintre profesor și studenți. De aceea instituțiile școlare care nu dispun de resursele hardware necesare se chină în încercarea de gamificare a cursurilor. Mai mult conexiunea la internet este vitală ori în momentul de față sunt destul de multe locații unde nu există nici măcar curent electric.

Libertatea de a explora și de a alege o cale în parcursul rezolvării unei probleme precum și abordarea de tip stoc mai scot la iveală o problemă. În acest sens, studenții vor alege cea mai ușoară cale care îi va duce la rezolvarea sarcinii primite. Astfel gamificarea poate redirecționa atenția de la subiectul materiei, la descoperirea a cât mai multe fisuri și puncte slabe existente în cursul gamificat.

7. Concluzii

Gamificarea este un concept nou. Succesul inițial raportat de unele companii, în cazul nostru proiectul *Gamify your teaching*, a fost de fapt, așa cum afirma și Ian Bogost, doar o încercare de a atrage clienți noi și de a-i păstra activi pe cei vechi. Mai mult gamificarea utilizată în educație este la un nivel infantil de aceea, cercetările viitoare trebuie să se focalizeze pe elementele specifice ale acesteia. În acest fel, înțelegând eficacitatea fiecăruia se poate ajunge la alimentarea motivației intrinsece în care mesajul primit să nu fie din mediul înconjurător ci din interioritatea utilizatorului.

Gamificarea ar avea o rată de succes mai mare în special la nivelul primar și cel universitar. Atenția copiilor mici se disipă imediat de aceea introducerea treaptată a mecanismelor de joc în clasă va mări interesul lor către subiectul materiei. La nivel universitar, pentru a-i antrena pe studenți într-un scop cu termen lung, gamificarea trebuie să fie creată sub forma unei călătorii. Majoritatea sistemele de gamificare însă se lamentează doar în oferirea unor recompense sau premii până când, utilizatorii se plictisesc și renunță. De aceea o opțiune ar fi integrarea unui sistem de tranziție care să-l conecteze pe student cu lumea reală ca apoi să-l lase acolo. În acest fel, utilizatorul va fi angrenat direct cu lumea reală, iar gamificarea va îndeplini doar rolul de îndrumător.

Dacă în UK sau în SUA se poate vorbi despre existența unor școli și chiar universități care au adoptat sistemul de gamificare, în România, implementarea acestuia este momentan greu de realizat. Acest lucru nu datorează lipsei de capacitate a profesorilor români ci datorită infrastructurii deficitare. În acest sens, o profesoară scria: „Jocurile oferă o valoare adăugată clasei noastre, dar punerea în practică este un lucru diferit. De exemplu, pentru aplicarea jocurilor digitale la clasă avem nevoie de o infrastructură digitală în școală, în lipsa acesteia punerea în practică este dificilă” [23].

Gamificarea are potențialul de a aduce schimbări pozitive în comportament și în atitudinea față de învățat. Trebuie însă avut grijă, ca în încercarea de a domestici spiritul de joacă în interiorul școlii, să nu se alunece spre ceea ce în anii 1920 era numit Taylorism.

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A comparative approach to smart features of higher education institutions: Uni Konstanz and UAIC Iași

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Abstract

Objectives: This paper is an analysis of higher education institutions in relation to the “smart city” concept. On a micro level, the features of a smart university coincide with those of a smart city. The paper aims to investigate the University of Konstanz, Germany and the “Alexandru Ioan Cuza” University of Iași, Romania from the perspective of their functioning, administration and network of resources in order to observe smart features and room for improvement. **Approach:** The investigation employs a comparative approach and uses observation and personal first-hand experience as a former student of both institutions as research methods.

Results: This comparative study provides an overview on smart features, ideas and solutions that are implemented in different aspects of university life: campus geography, student accommodation, public transportation, online administration of the institution, online platforms and portals for students and teachers, recreational activities and fruitful interaction between students. The analysis points out smart elements and characteristics, such as integrated student accommodation and other facilities inside the campus, the existence of public transportation means designated for students, smart stations, bicycle rental services, internet-based registration for classes and exams, online application for study programs and other events, interactive spare time activities and student associations.

Implications: This study may provide valuable material for researchers in the field of development and smart innovation and also ideas for practitioners that work in academic institutions or city administration.

Value: The originality and uniqueness of the paper reside in the comparison between two academic institutions from different countries and also in the contribution to the promoting and expansion of the “smart city” concept. By bringing the concept to a lower level, smart features can be implemented in companies, academic institutions and even in people’s homes. Studying similarities and contrast between smart features of different universities is essential in order to highlight possibilities for improvement.

Keywords: smart university; smart campus; transportation solutions; online administration; comparative analysis.

1. Introduction

A smart city is defined by digitalized or partially digitalized processes, efficient solutions and the use of information technology to insure an intelligent interaction between the city and its inhabitants. Innovative concepts and smart applications are engaged in running and operating a smart city, where aspects such as transportation, public services, tourism, healthcare, education, safety and security, sustainability, urban management and environmental responsibility are integrated and interconnected in a harmonious way [1].

The main dimensions of a smart city are technology, institutions and people, consequently relying on technology factors, institutional factors and human factors as the fundamental components of a smart city. The three directions subordinated to each factor are represented by learning, performed by the human factor, governance, which is the responsibility of the institutional factor and integration through the technology factor as the key to smart cities, since it ensures the collaboration and cooperation between all the main dimensions of society [2].

Higher education institutions are connected with the “smart city” concept on all levels: from the point of view of the human factor, the importance of such institutions resides in their role as places where specialists are formed, where people acquire and transfer knowledge and where their creativity is cultivated and their civic sense is boosted; from the technological point of view, higher education leads to the emergence and development of new infrastructure, smart technologies, digital networks and innovative ideas; and from the institutional point of view, higher education institutions stand as pillars of a smart community, through the implementation of smart regulations, policies and administration ideas.

2. Smart features of higher education institutions

The humanist dimension of the smart city is best illustrated by the tight relationship between learning and economic growth and social development [3]. From the perspective of teaching and learning, the role of education as a vital fundament in building a smart city is achieved by aligning the curricula with the “smart city” concept and by constantly modernizing the contents of lectures, in order to keep them up-to-date with the continuously changing realities and also in close connection with local or regional communities, as their particularities, the resources they dispose of and the challenges they have to face might differ from those of the global community. Study programs such as civil engineering, architecture, industrial engineering, information technology and telecommunications, robotics, renewable energy, transport and logistics, but also business administration and medicine are closely connected to the creation and development of smart cities and to improvements in the life quality of their citizens.

Apart from the processes of teaching and learning, it is interesting to analyze higher education institutions from the perspective of their functioning, management and network of resources, in order to observe smart features and potential room for improvement.

The features of a smart institution virtually coincide with those of a smart city. For instance, on a macro level, the smart administration of a city in terms of intelligent services, communication or security, is reflected in features such as the existence of systems and applications for online payments, registrations or appointments, web pages or social media pages that give citizens access to information and offer them an opportunity to get involved in the city life, and video surveillance systems that increase security in public spaces or in traffic and prevent criminality. On a micro level, the same features can characterize a smart higher education institution: the possibility for students to register for classes or exams online, platforms for them to access important information, opportunities for them to actively take part in the development and improvement of the institution, by getting involved in projects, making decisions or participating in debates and video surveillance for their protection.

Other smart features that apply both to cities and to institutions are intelligent energy and intelligent mobility. On both levels, intelligent energy implies the use of sensors, regenerative technologies and renewable resources, as well as methods to store energy, whereas intelligent mobility involves different measures and applications. In a smart city, intelligent mobility covers areas such as traffic management – based on adaptive traffic signals, video monitoring, speed control, parking place management, public transportation and integrated solutions such as car sharing or bike sharing, intelligent stations with electronic systems, smart displays and solutions for disabled persons, on-board Wi-Fi internet access and security in public transportation, eco-mobility, zero emissions goals and charging stations for electric vehicles. In a smart higher education institution, intelligent mobility measures include integrated solutions such as public transport exclusive for students, bicycle rental services or discounted public transportation passes.

Smart features also apply to buildings, in the form of the presence of automated systems, HVAC (Heating, Ventilation, Air Conditioning) solutions, advanced equipments, sensors, smart meters and thermostats, as well as video surveillance. In what concerns technology – the key factor in connecting the different dimensions of a smart community or a smart institution, the main elements are represented by Wi-Fi coverage and online access to all kinds of services. In a smart higher education institution, intelligent technology also includes smart boards, multimedia equipments and interactive systems.

Other smart features that apply on both the macro and the micro level are environmental management and monitoring, waste and pollution reduction, recycling and selective waste collection, as well as intelligent healthcare and medical services. Last but not least, smart citizens are the driving force of a smart city and subsequently, smart students are a vital part of a smart higher education institution.

3. A comparative analysis of Uni Konstanz and UAIC Iași

Iași is the second largest city in Romania and one of the leading centers of Romanian academic life. Apart from being a cultural and historic center, the city is on an upward trajectory towards modernization and digitalization, hosting debates

on the “smart city” concept and being a member of the OASC (Open and Agile Smart Cities) Organization since March 2019 [4]. Iași is also home to the oldest Romanian university, which was founded in 1860 – Universitatea “Alexandru Ioan Cuza” (UAIC).

Konstanz is a university city located in southern Germany and home to Universität Konstanz, an elite higher education institution founded in 1966. With a significant part of the population being represented by students, the city is continuously evolving and adapting to innovative concepts; the architectural features of the university itself mirror modernism and novelty through the interlinked buildings with untraditional designs.

In the context of smart cities and smart institutions, it is interesting and appealing to conduct a comparative analysis in order to study smart features of the University of Konstanz and the „Alexandru Ioan Cuza“ University of Iași.

3.1. Campus geography and student accommodation

The university campus (Latin *campus*, meaning *field*) is the land where all the buildings and infrastructure belonging to the institution are situated. The structure and expansion of the campus have evolved in accordance with modern tendencies, social progress and growing numbers of students and their various needs, which led to the inclusion of amenities and facilities such as dormitories, shops, restaurants or cafes, special transportation routes and stations, leisure activity centers. Campuses therefore come to represent places where students not only learn and study, but venues where they live, eat, interact with each other, relax and spend their free time as well. The university campus as a community where the students are the inhabitants is consequently comparable to a miniature city and respectively the smart features of a city are transferred onto the campus.

The university campus of Uni Konstanz is more concentrated than that of UAIC Iași. In Konstanz, the academic buildings are all in the same area, since the university is located outside the city on the Giessberg hill, surrounded by forest and overlooking Lake Constance. But because of the rather isolated location of the academic buildings, the student dormitories are far away from university. The student services network Seezeit Studierendenwerk Bodensee offers approximately two thousand and four hundred rooms in thirteen dormitories, which are situated in different areas of the city; the closest dormitory is Sonnenbühl West I (1.3 kilometers away from the university) and the farthest is Europahaus (4.6 kilometers away).

In Iași, on the other hand, most of the dormitories are close to the academic buildings, which are situated in the inner city, but rather detached from each other. Out of the fifteen dormitories belonging to UAIC Iași, eight (C5, C6, C7, C8, C11, C12, C13 and Gaudeamus) are located within walking distance from the university (250 – 550m), while the others are located at distances of one kilometer, 1.4 kilometers or two kilometers away from the academic buildings. The layout of student accommodation in Iași makes it easier for students to get to and from university, either by foot, or by using public transportation. However, the academic buildings

are not concentrated in an especially designated place and they are situated in a busy neighborhood of the city, which sometimes makes it difficult for the students to attend consecutive classes in different buildings. In comparison to UAIC Iași, Uni Konstanz has many more separate academic buildings, but on the other hand more condensed premises, though larger. The expansion of a university campus and the long distances between the academic buildings and the dormitories may increase the danger that students are exposed to when they are on their way to classes, returning home or during breaks.

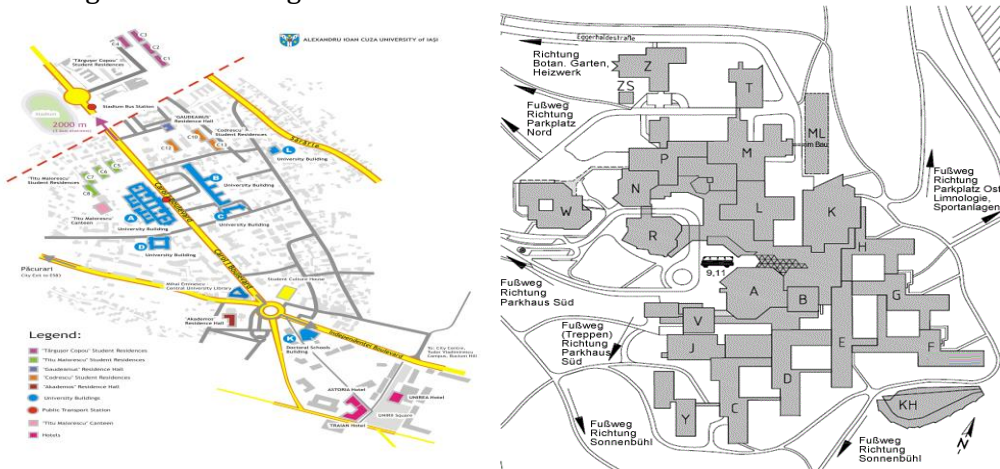


Figure 1. (a) UAIC Iași campus; (b) Uni Konstanz campus.

Sources: <https://www.mathematik.uni-konstanz.de/beratung-und-service/kontakt/anfahrt-und-lageplan/>
http://150.uaic.ro/wp-content/uploads/2010/01/harta_eng1.jpg

3.2. Transportation solutions

University students are generally at a stage in life where they are not yet prepared to fully support themselves financially. Apart from this fact as a lower-scale argument for public instead of private or individual transportation, environmental protection and reducing carbon emissions are the higher-scale reasons why a smart community – and subsequently, a smart university – put efforts into creating, developing and promoting public transportation and green transportation. Smart ideas and solutions for university students include:

- an extensive network of public transportation lines that provide wide coverage and connect the institution with all surrounding areas;
- buses or trams destined only to students;
- discounts for transportation tickets, passes and subscriptions;
- smart stations where useful information is displayed;
- and bike rental services, which can be free or subject to charge.

The cities of Konstanz and Iași both have broad networks of public transportation lines connecting the academic institutions directly or indirectly with all parts of the city, as it can be seen in Figure 2 marked with red circles and rectangles. The University of Konstanz is directly connected with the main areas

where the student dormitories are located, through four bus lines (9a, 9b, 9c and 11 – out of which 9c only runs during the lecture period, as additional assistance introduced especially for students) and the “Alexandru Ioan Cuza” University of Iași also has good connections with most parts of the city, through six bus lines (6b, 28, 28b, 41, 41b, 43b) and two tram lines (1 and 13).

A great way of stimulating the use of public transportation is the introduction of lines and vehicles destined only for students. This facility eases the commute by saving time and preventing crowding and it also increases the safety of students and makes them feel special. This smart measure has been implemented in Iași and has been successfully functioning for three years. Special buses and trams destined exclusively to school and university students run on the most crowded routes and during the rush hours of the morning, especially between 7 o'clock and 7:30; the vehicles display a message mentioning that they run especially for pupils and students, who are allowed inside based on their badges and student ids. In Konstanz there is no bus destined exclusively to students, but the need for adopting such a measure is not as great as it is in Iași, considering the much smaller number of inhabitants and also the fact that the university is isolated from the rest of the city and has its own private bus station which represents the end of the line, as opposed to UAIC Iași, which is situated inside the city and has an intermediary bus station.

Another successful way of promoting public transportation and helping students with their finances at the same time is represented by offering student discounts for the purchase of tickets, passes and subscriptions. This ensures that public transportation is used regularly and also that students are supported with the expenses that studying involves. Germany and Romania both offer student discounts for public transportation and in Romania the student benefits may depend on their academic performances or on their age; for instance, there are bigger public transportation discounts for students that are under twenty-six years old and registered in a program that is sponsored by the state, where all educational costs are covered – this benefit is based on good admission grades or good average grades after each university year; also, there is free railway transport for students that attend classes on a daily basis, as opposed to those who are enrolled in a low-frequency program. On the other hand, the city of Konstanz offers free transportation for students in the evening (after 7 P.M.), but excluding night buses where special rates apply [5].

Smart stations have not yet been implemented in Iași, but they have existed in Konstanz, as well as in many other German cities, for many years. They carry great importance, as they display useful information about the timetable and functioning of public transportation vehicles, as well as messages regarding potential problems; the facts are continuously updated from inside the vehicles, so that passengers can get real-time information. The existence of such smart stations contribute to better time management and more effective planning, while also training passengers to become more responsible at the same time; not being able to blame public transportation for being late means taking full responsibility for being on time. Considering that responsibility is best taught by example, we may argue that even a punctual public transportation timetable can have a positive impact on the development of young people as future responsible and smart citizens.

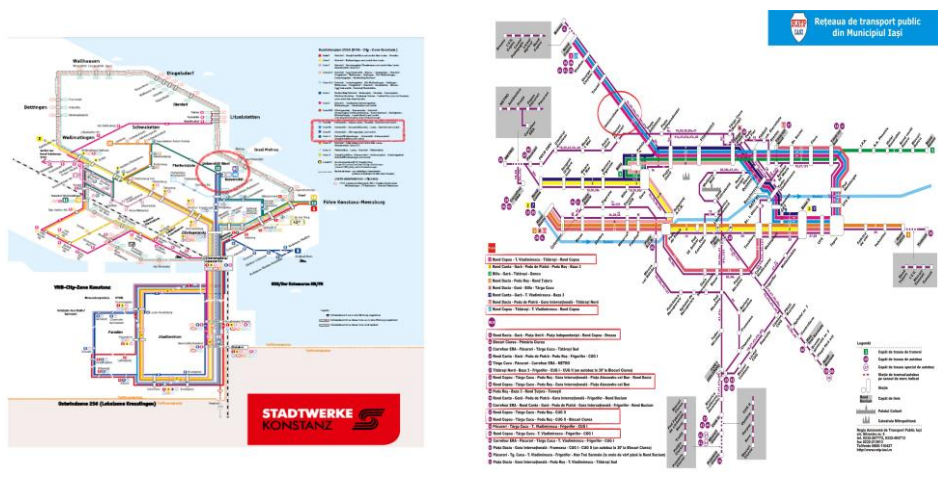


Figure 2. (a) Public transportation routes in Konstanz; (b) Public transportation routes in Iași.
Sources: <http://stadtwerke-konstanz.de>
<https://infos.ro>

Apart from public transportation, bike riding is a great alternative or first option that is old-fashioned and modern at the same time; it represents the past of individual transportation, but also its future. We notice that bike riding performed as a fun activity or adopted as a necessary habit is characteristic to the most developed countries, where people ride bikes not because they do not afford cars, but because they prefer a type of transportation that costs less or nothing, does not harm the environment and is healthy at the same time. Bike riding can be seen as a pillar of green communities, as it is environmentally friendly and recommended as fitness exercise, thus being healthy both for the environment and for its inhabitants. Infrastructure is crucial in the context of bus riding as a smart transportation solution and education also plays a vital role; instruction and discipline concerning the use of special equipment and knowledge about rules to follow in traffic are essential for the good functioning of a bike riding network that can replace other means of transport and also for the safety of bike riders.

The network of bicycle tracks and parking facilities is much more developed in Konstanz and throughout Germany than in Iași and other Romanian cities. However, the first steps have been made in Iași and the city now has a few bicycle tracks that are especially used by students; the problematic aspects are related to the exclusivity and continuity of bike tracks: they are built as part of the pavements, meaning that pedestrians often interfere with bike riders, and they are sometimes suddenly interrupted or come to an end without really reaching a destination, meaning that they do not always successfully connect two or more points of interest. On the other hand, there is one aspect where Iași gains extra points: bike rental services for students, which are free of charge as opposed to Konstanz, where bike rentals are fee-based services.

An overview on the mentioned transportation solutions can be observed in Table 1 below.

Table 1. Transportation solutions

	Uni Konstanz	UAIC Iași
Public transportation connections	yes (bus)	yes (bus and tram)
Designated student transport	no	yes
Discounted passes	yes	yes
Smart stations	yes	no
Bicycle rentals	yes (subject to charge)	yes (free)

3.3. Online resources and platforms

Online administration is an essential attribute of a smart university. This feature allows easy access to information and provides the possibility to solve different problems more smoothly. It creates an effective and friendly interface between the students, the teachers and the administrative staff, enabling facilities, tools and resources such as:

- online registration for classes (compulsory or optional);
- online registration for exams;
- online application for study programs;
- online application for curricular or extracurricular events, scientific conferences, student competitions;
- online subject choice and subject change;
- online platforms that provide information about grades, credits and other personal details;
- online platforms where students can request, obtain and print out certificates of enrollment or other verified attestations;
- online campus management portals for students, professors and researchers;
- online classes, resources in written format or interactive workshops;
- online job market available exclusively to students;
- Wi-Fi connection inside the academic buildings and throughout the campus, by means of a secure network.

The online registration for classes and exams is available at Uni Konstanz through the StudIS portal; the selection of mandatory and optional classes allows students to create and adapt their schedule in accordance with their area and course of study, but also considering their needs, talents, interests and spare time preferences. Online registration for study programs and online application for educational or extracurricular events, scientific conferences or competitions are also possible at Uni Konstanz through the ZEuS portal. The same online conveniences are not available at UAIC Iași, where administrative matters are still more paper-based than electronically handled; the students do, however, have access to online platforms which provide information and resources and to the eSims portal which allows them to check their information, grades and credits.

A smart feature of Uni Konstanz is the existence of the student identification card (UniCard) that uses chip technology in order to become usable for multiple

purposes, replacing different badges, passes and vouchers and acting as a many-in-one card. The UniCard is presented on the website of the university as “der Schlüssel für (fast) alles” – the key to (almost) everything [6]; for instance, it is also used as library pass and as a rechargeable payment card for scanning, copying and printing documents on campus. The student identification card at UAIC Iași is in paper format, but it can be used outside the university as well, in order to get discounts for transport, events, cultural activities or touristic attractions.

3.4. Leisure and wellbeing

The campuses of both Uni Konstanz and UAIC Iași include different amenities and facilities that are created for students' wellbeing and free time. Among such facilities, the most important are the ones that offer food and beverages, which are much needed during break times when students spend long periods of time on campus. The students of Uni Konstanz usually spend their entire day on the premises, so the campus has a large student canteen that overlooks Lake Constance and also various other cafés, bistros, pasta or Asian food restaurants and snack bars that offer assorted possibilities for all tastes and pockets. The UniCard can also be used as a MensaCard (payment card for the student canteen) and as a payment instrument in all the other facilities. At UAIC Iași there is also a canteen destined for students and teachers, with very affordable prices, as well as two restaurant-canteens which can also hold festive events. However, the other restaurants, cafes and bistros in the area do not have restricted access and are open to all inhabitants of the city.

3.5. Student interaction

A smart solution for real instead of virtual student interaction has been implemented by Uni Konstanz in the form of interactive boards and notice boards that are installed on the hallways and contain all kinds of adverts, announcements and tutoring requests and offers. Another example that is worth mentioning is represented by the invitations for students to participate in experiments and get paid for it; this is a smart way of using all available resources, in this case the human resources of the university and it is also a smart way of functioning like a community and being self-sufficient. This idea brings benefits for all those involved, as it is brilliant for research purposes and very helpful for students' finances, even if the payment of a couple of Euros only counts as pocket money.

Student interaction at UAIC Iași is achieved by means of creating student associations and organizations where students learn about leadership principles, acquire skills and become responsible, by getting involved in organizing almost anything from festivals to charity events, scientific manifestations and recycling patrols. The leaders of such organizations and also the representatives of students in the senate or council of the university get voted, elected and have to keep a close connection with their colleagues, to be very receptive to problems and to come up with solutions and innovative ideas for improvement. These responsibilities that

perfectly mimic real adult affairs prepare students for being the leaders of the real society of tomorrow; this is another example and piece of evidence in favor of comparing a smart higher education institution to a miniature smart city.

The existence of Erasmus programs also represents a smart feature of higher education institutions. Uni Konstanz and UAIC Iași are both active participants and also partners in the Erasmus exchange studies program, which has also made possible the writing of this paper from the perspective of a former student of both institutions. Erasmus programs involve sending and receiving students, exchanging information and transferring experience; the Erasmus experience is very beneficial for students, as it offers them the chance to observe, to learn and then to apply new concepts and bring innovation into their home country.

4. Conclusions

A smart university is defined by intelligent interaction between the institution, its students, its employees and the society, just like a smart city involves intelligent interaction between citizens and all divisions and dimensions of the society. Higher education institutions are closely connected to the “smart city” concept through the importance of education for economic growth and social development and also through the implementation of features such as smart architecture, smart mobility, smart administration and smart interaction. The comparative analysis of Uni Konstanz and UAIC Iași reveals the existence of many common smart features, such as integrated transportation solutions, online resources and platforms, but also differences in what concerns accommodation and amenities within campus and internet-based administration, showing that positive examples create room for development and progress.

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Smart (Re)Evolution: Dezvoltarea ecosistemelor de date și servicii din administrația publică

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Abstract

Adoptarea unor mecanisme bazate pe performanță și eficiență în domeniul digital necesită luarea în considerare a 3 provocări: actualizarea periodică a sistemelor informatice (hardware și software), monitorizarea deficitului de competențe profesionale în domeniu și asigurarea securității serviciilor/ datelor prin modularizarea sistemelor și identificarea eventualelor blocaje (analize de risc - reziliență) pentru creșterea încrederii. Instituțiile guvernamentale utilizează modele rigide și fragmentate de proprietate

organizațională a datelor și se confruntă cu probleme curente cum ar fi: date offline, infrastructură IT închisă și lipsa abilităților analitice, toate acestea fiind un impediment în dezvoltarea capacităților de a crea servicii bazate pe date. Instituțiile publice utilizează prea puțin abilitățile practice și experiența celor cărora le oferă servicii. Modelele de succes și experiența din mediul privat privind capacitatea de adaptare și transformare utilizând noile tehnologii reprezintă obiective ce trebuie adoptate la nivelul statului la nivel central și local. Obiectivul articolului constă în posibilitatea dezvoltării unui model de guvernare inteligentă ca fundament al conceptului de smart-state, prin analiza a patru piloni de interacțiune privind provocările societății digitale: transparență, implicarea cetățenilor, schimb de informații (interoperabilitate instituțională) și securitate cibernetică (reziliență). Modelul dezvoltat prezintă un ansamblu de direcții necesare a fi implicate în dezvoltarea unui ecosistem colaborativ: resursele umane, cadrul legislativ național/instituțional și tehnologia. Evoluția structurală a instituțiilor publice nu trebuie să se concentreze doar pe evoluția tehnologică. Asigurarea unui cadru legislativ, managerial și operațional coerent reprezintă, cu precădere pentru factorii decizionali, elemente indispensabile în asigurarea unei bune guvernări. Diversitatea și particularitățile fluxurilor administrative complexe de la nivelul unei administrații guvernamentale necesită o abordare managerială integrată ce trebuie să cuprindă, pe lângă măsurile tehnice care trebuie adoptate în dezvoltarea serviciilor electronice, o serie de măsuri juridico-administrative care să asigure un cadru managerial și operațional coerent și practic.

Cuvinte cheie: *e-government, guvernare participativă, smart-administration, smart-state, fluxuri administrative.*

1. Introducere

În 2050, la nivel european, se preconizează că două treimi din populație va locui în orașe și va consuma 70% din energia disponibilă [1]. Astfel, pornind de la această predicție, se observă necesitatea de a dezvolta conceptul de Smart Cities nu numai din punct de vedere urbanistic, cât și digital. Printre prioritățile necesare a fi luate în considerare se regăsesc infrastructura digitală și mai ales necesitatea de a se asigura interoperabilitatea încă din faza de design a sistemelor dedicate Smart Cities. Abordarea „*interoperability by design*” este necesară deoarece acest concept necesită o colaborare optimă (bazată pe schimb de date și informații în timp real) între administrația publică, mediul economic local, organizațiile non-guvernamentale sau grupurile de inițiativă cetățenești non-formale la nivel local. De asemenea, conceptul de interoperabilitate este parte a unui eco-sistem național / internațional prin necesitatea interconectării structurilor administrației publice naționale europene, dar și a altor factori implicați în conceptul de Smart Cities. În ceea ce privește interconectarea sistemelor care deservește orașe inteligente, la nivel european s-a conturat inițiativa CoP-CITIES [2], care își propune un schimb de expertiză între diversele forme de abordare a conceptului Smart Cities, dar și dezvoltarea unor metode eficiente de interconectare digitală.

O digitalizare de succes a unei administrații publice presupune evoluția tuturor factorilor implicați la nivelul unei comunități: instituții publice locale, mediul privat local, dar și administrațiile centrale. În acest sens, evoluția accelerată a domeniului smart cities, susținut de o dezvoltare a componentei digitale este necesară adoptarea unui cadru legal articulat, dar și pregătirea unor resurse umane, tehnice și tehnologice pentru a parcurge cu succes toate etapele unui produs digital de tip Smart City.

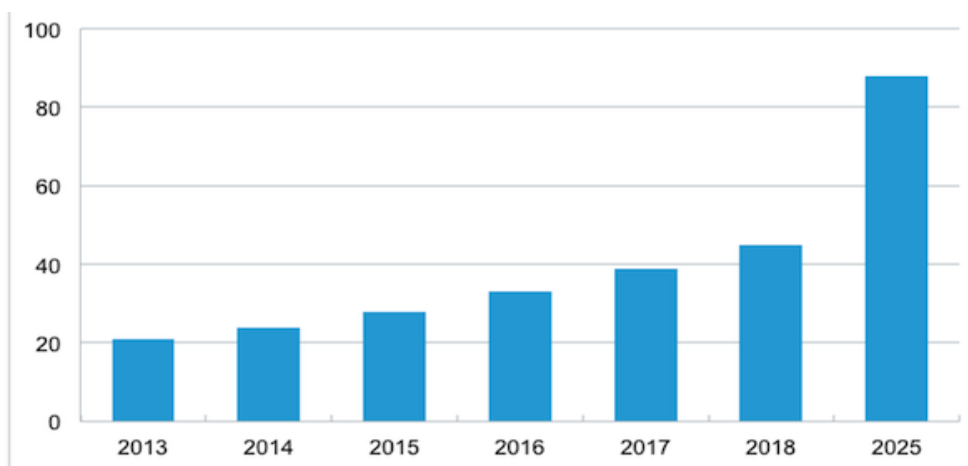


Figura 1. Evoluția numărului de Smart Cities la nivel internațional conform standardelor IHS Technology [3]

Deși conceptul de Smart Cities se concentrează în principal pe tehnologie și soluții tehnice, apare din ce în ce mai concretă ideea conform căreia implementarea unei agende a orașelor inteligente este mai probabil să aibă succes dacă este integrată într-o strategie mai largă de dezvoltare durabilă[4]. În acest context, analiza cadrului legislativ este imperioasă pentru a cunoaște care sunt, *de plano*, problemele pe care le ridică dezvoltarea de Smart Cities, în special în ceea ce privește mecanismele de colectare, utilizare și comunicare a datelor cu caracter personal și conformarea cu directivele europene privind e-privacy și securitatea cibernetică.

2. E-GOV - Analiza cadrului legislativ

Interoperabilitatea în cadrul unui Smart City trebuie să aibă ca punct de plecare un cadru legislativ coerent și flexibil, care să protejeze cetățenii de eventualele efecte negative prin atingeri aduse dreptului la viață privată, posibil a fi generate de potențiale dezvoltări eronate a interconectărilor și de publicarea accidentală a bazelor de date cu potențial vătămător.

În consecință, cadrul legislativ trebuie să fie conceput de asemenea natură încât să ofere mijloacele juridice necesare implementării unor mecanisme specifice de protecție a datelor cu caracter personal și, *in concreto*, să excludă posibilitatea

încălcării unor drepturi fundamentale. Este adevărat că infrastructura legislativă europeană permite asigurarea unei minime protecții a drepturilor și libertăților fundamentale, prin efectul infralegislativ al Regulamentelor și Directivelor, care au aplicabilitate directă în dreptul intern al statelor membre. Cu toate acestea, principiul *nemo censetur ignorare legem* (nimeni nu se poate prevala de necunoașterea legii) rămâne la nivel de deziderat, în contextul evoluției tehnologiilor și al accesibilității crescute a mediului Internet. Astfel, cel puțin în contextul în care se regăsește România, puterea legiuitoare ar trebui să manifeste mai mult interes în ceea ce privește transpunerea normelor europene în dreptul intern, pentru o mai bună adaptabilitate și personalizare a normelor proteguitoare la necesitățile concrete ale vieții sociale românești.

Începând cu data de 25 mai 2018 a intrat în vigoare Regulamentul (UE) 2016/679, cunoscut mai bine sub acronimul GDPR - General Data Protection Regulation, preluat și în legislația română prin Legea nr. 190/2018. Însă chiar din denumirea acestui Regulament se poate observa că reprezintă un set de reguli generale, instituind măsuri minime de ocrotire a datelor cu caracter personal. Regulamentul nu vizează doar actorii din domeniul privat care sunt operatori de date cu caracter personal, fiind aplicabil și domeniului public, autoritățile publice având la rândul lor obligații specifice GDPR, uneori chiar diferite de cele ale entităților private, în administrația publică responsabilitatea fiind mult mai accentuată.

Urmând principiile impuse de Regulamentul 2016/679, cadrul legislativ privind protecția datelor cu caracter personal trebuie să cunoască adaptări la specificul fiecărui domeniu de activitate, în speță în ceea ce privește modalitatea de interconectare a bazelor de date și fluxul de informații dintre operatorii privați și instituțiile publice, doar astfel putându-se ajunge la o veritabilă protecția a drepturilor fundamentale. Mai mult decât atât, este foarte important să reținem că aceste date esențiale pentru funcționarea unui oraș de tip Smart, date care pot fi cu caracter personal, nu sunt deținute doar de către autorități publice. Astfel, asemenea date se află în gestionarea unor operatori de furnizare a unor servicii publice locale, așa-numitele stabilimente de utilitate publică: furnizori de apă, gaz, curent, servicii de salubritate, transport public local sau chiar operatori *stricto sensu* privați - de exemplu, servicii de telecomunicații. În acest context a apărut noțiunea de „date de interes general” [5], reglementată deja în Franța în așa numita Lege a Republicii Digitale intrată în vigoare încă din data de 7 octombrie 2016, lege care în esență reglementează mecanisme de garantare a confidențialității și securității datelor pe care titularul trebuie să le pună la dispoziția autorităților ori la dispoziția operatorilor de servicii publice delegate.

Cu toate că problema datelor cu caracter personal este cea mai sensibilă, aceasta nu reprezintă singura problemă cu implicații legale în ceea ce privește modalitatea de reglementare a dezvoltării de Smart Cities. Având în vedere faptul că orașele de tip Smart se fundamentează pe o eficientă conlucrare a autorităților publice cu domeniul privat, se pot naște o serie de inconveniente în ceea ce privește relațiile contractuale, în legătură cu licitațiile publice, achizițiile directe, contracte de concesiune, contracte de parteneriat public-privat sau chiar contracte de drept

privat pur (unde și autoritățile publice acționează ca un operator privat). Problemele care pot apărea sunt derivate din natura interconectată a infrastructurii orașelor de tip Smart care, pentru a-și asigura o gestionare și o productivitate coerentă, va necesita o mai bună adaptare a relațiilor contractuale ce presupun implicare multipartită și o perioadă contractuală îndelungată.

De asemenea, o atenție deosebită va trebui acordată și modalității de planificare a orașelor de tip Smart, în special asupra regulilor de urbanism și a autorizațiilor de construire care vor trebui remodelate pentru a răspunde necesităților unui oraș de acest fel, care implică o multitudine de preocupări și de constrângeri ce necesită a fi antamate concomitent. În acest sens facem referire la necesitatea asigurării securității și confidențialității tehnologiilor în continuă schimbare, la tranziția energetică de la modalități tradiționale la cele inovative și performante, la supravegherea și îmbunătățirea traficului rutier prin gestionarea acestuia în vederea fluidizării zonelor urbane supraaglomerate.

În final, și legile de organizare și funcționare a administrațiilor publice locale trebuie adaptate pentru a găsi noi modalități de articulare a relației dintre instituțiile publice locale, cu resursele sale și cetățenii informați și conectați la viața de interes general, pe de o parte, și sectorul privat care va juca un rol primordial în construirea și dezvoltarea *de facto* a orașelor de tip Smart, pe de altă parte.

În acest sens, se observă că o colaborare dintre sectorul public și cel privat este absolut esențială pentru dezvoltarea armonioasă de Smart Cities, însă se impune a stabili dacă și în ce măsură se poate realiza o procesare în masă a unor date cu caracter personal și, mai mult, în ce măsură aceste date pot fi transferate pentru a deservi operațiunilor specifice ale Smart Cities. Astfel, din analiza reglementării europene în materie, dar și a legislației naționale, în principiu un asemenea transfer de date este permis, însă în anumite condiții [6].

Astfel, prelucrarea datelor cu caracter personal poate fi realizată, atât de către instituții publice, cât și de către operatori privați, însă, în primul rând, trebuie avut în vedere ce fel de date sunt exceptate de la prelucrare, spre exemplu cele care se referă la: origine rasială ori etnică, convingeri politice, orientare sexuală, apartenență sindicală ș.a. În al doilea rând, trebuie ca prelucrarea de date să aibă un scop bine determinat, serios și legitim, procedura de procesare a datelor trebuie să fie corectă și transparentă, iar procesarea trebuie să se limiteze doar la acele date care sunt indispensabile. În al treilea rând, trebuie respectate anumite proceduri și mecanisme de siguranță și trebuie oferite o serie de garanții care să protejeze integritatea și securitatea datelor cu caracter personal, astfel încât scopul operatorului de date cu caracter personal să fie atins, iar atingerea drepturilor persoanelor să fie minimă ori chiar inexistentă.

Nu în ultimul rând, trebuie respectate anumite condiții pentru prelucrarea datelor cu caracter personal, printre care se numără, într-adevăr necumulativ, interesul public, interesul legitim ori consimțământul persoanei. Din această perspectivă, este cert că la nivel legislativ pot fi implementate o serie de măsuri care să vizeze punerea în aplicare a unor servicii de tip Smart Cities pe considerentul acționării în interes public, ceea ce *de plano* presupune și un interes legitim. Astfel, prelucrarea de date cu caracter personal și transferarea ori comunicarea acestora

către alți operatori, pentru îndeplinirea unui scop comun și de interes general, este permisă în măsura în care se respectă cerințele legale și se oferă garanțiile necesare pentru protejarea acestor date.

3. Modelarea cadrului instituțional național

Cadrul instituțional pentru dezvoltarea Smart City trebuie să se bazeze pe 4 piloni principali: transparență, implicarea cetățenilor, schimb de informații (interoperabilitate instituțională) și securitate cibernetică (reziliență). Transparența presupune, într-un cadru general, cunoașterea de către societate a motivelor, faptelor, logicii și a bazei ce stau la baza deciziilor factorilor decidenți. Într-un Smart City, transparența trebuie să reprezinte o prioritate, atât pentru deciziile luate la nivelul comunității, cât și pentru modul de operare a datelor cetățenilor. Instrumentele ce oferă informațiile privind aspectele de transparență locală, națională și europeană trebuie să fie ușor accesibile cetățenilor.

Un oraș inteligent în primul rând este un oraș al cetățenilor, de aceea este necesară o implicare proactivă a acestora în viața comunității. Pentru a avea această implicare, în primul rând cetățenii au nevoie de instrumentele necesare pentru a fi parte activă în societate. Un astfel de instrument, ce îmbină implicarea cetățenilor cu transparența decizională, o reprezintă conceptul de bugetare participativă, ce se poate vedea implementat în Cluj-Napoca, Sibiu și Făgăraș, unde cetățenii pot propune și vota proiecte locale ce să fie bugetate și astfel realizate.

Schimbul de informații reprezintă o prioritate în primul rând pentru facilitarea unui acces ușor și rapid al cetățenilor la serviciile publice; acestea trebuie să aibă cursivitate și simplitate în utilizare astfel încât cetățenii să aibă cât mai puține fluxuri administrative de urmat pentru obținerea de documente sau informații din partea statului, dar și a mediului privat. Acest schimb de informații trebuie însă să respecte interesul cetățeanului privind stocarea și utilizarea datelor sale personale.

Securitatea cibernetică reprezintă un ansamblu complex de măsuri proactive și reactive care au drept scop asigurarea confidențialității, a integrității, autenticității, dar și evitarea răspândirii necontrolate a informațiilor în format electronic, care poate afecta în mod ireparabil resursele și serviciile publice ori private din spațiul cibernetic. Spațiul virtual a ajuns un element constant integrant al vieții personale. Noile tehnologii, infrastructurile cibernetice și conținuturile informaționale trebuie să beneficieze de un grad ridicat de protecție, deoarece acestea implică riscuri care pot afecta grav sau iremediabil fie la nivel de individ, fie întreaga entitatea ce gestionează aceste informații, în condițiile în care există numeroase acțiuni ostile desfășurate în spațiul cibernetic care vizează disponibilitatea, integritatea și funcționarea sistemelor informatice.

La nivelul legislației comunitare în materie de securitate cibernetică, în luna iulie 2016 a fost adoptată Directiva (UE) 1148/2016 [7] și care a fost transpusă și în legislația internă prin Legea nr. 362/2018. Acest cadru legislativ este deosebit de important deoarece aliniază reglementarea internă la cadrul european comun de

răspuns la incidente de securitate cibernetică. Această nouă reglementare legislativă vizează asigurarea securității rețelelor și sistemelor informatice ce servesc unor activități esențiale pentru societatea și economia statului, vizând în special domenii de interes național precum: infrastructuri digitale, transporturi, sănătate sau energie. *In concreto*, această reglementare stabilește mecanisme de prevenție, detecție, dar și de reacție împotriva unor incidente ciberneticе astfel încât impactul acestora să fie minim pentru societate și economia națională.

4. Aplicații inteligente. Digitalizarea administrației publice

La nivel internațional se observă o perspectivă de încurajare a inițiativelor Smart City ce provin mediul privat, mediul academic, organizații non-guvernamentale sau din partea unor grupuri civice. Un exemplu de bună practică îl constituie colaborarea între autoritățile publice din Toronto și Sidewalk Labs (parte a Alphabet Inc., grup cunoscut mai ales pentru asocierea cu compania Google), ce își propune dezvoltarea inteligentă urbană a unui district din orașul Toronto. Această inițiativă poate fi considerată una de succes, pentru că presupune deschiderea unui mediu colaborativ pentru dezvoltarea conceptului de Smart City în acel district, prin organizarea de workshop-uri, spații de discuții online, aplicații tip open-source, cadre de dezbateră complexe, atât tehnice, juridice și economice a propunerilor de dezvoltare a conceptului. Această procedură de lucru evidențiază și pune în centrul conceptului de Smart City colaborarea între toți factorii implicați în viața unei urbe. Această inițiativă reiterează constant ideea în spațiul public că un Smart City nu presupune doar dezvoltarea de aplicații inteligente pentru un oraș, ci ansamblul de elemente componente (sistemizare urbanistică și a construcțiilor, îmbunătățirea sistemelor de transport, mecanismelor de întreținere și igienizare a unui oraș), prin intermediul unor modalități de optimizare și eficientizare cu ajutorul datelor și informațiilor care provin din utilizarea tehnologiilor din IT&C.

Una dintre cele mai interesante propuneri este un sistem de colectare eficientă a deșeurilor printr-un mecanism subteran de transport al acestora, ce presupune suport uman, dar mai ales utilizarea unor roboți. Această inițiativă va duce la o sistem de colectare mult mai bun, dar și la descongestionarea traficului, asigurând un trafic rutier fluid în cadrul districtului. Autorii acestui proiect și-au definit din start 5 piloni: diversitate, accesibilitate, servicii financiare ușor de accesat, echitate în oportunități și incluziune [8]. Previziunile economice așteptate pentru anul 2040 pe baza acestui proiect sunt: 44.000 locuri de muncă full-time (93.000 de locuri de muncă în total), un produs intern brut anual de 14,2 miliarde de dolari, taxe încasate de 4,3 miliarde de dolari, un hub global pentru inovație urbană.

Un alt aspect important în dezvoltarea unui Smart City este conceptul Small Data, care constituie posibilitatea de a reprezenta datele colectate și modelate pentru obiective specifice. Necesitatea principală în cadrul unui Smart City pe modelul de Small Data este reprezentat de optimizarea fluxurilor administrative pentru a exista un echilibru între, pe de o parte, creșterea securității și combaterea criminalității și a terorismului și, pe de altă parte, protecția vieții private și a datelor cu caracter personal. Small Data reprezintă unul dintre pilonii principali în

dezvoltarea comunităților Smart City, mai ales pentru rolul său în analiza vieții publice a comunității. Unul dintre pionierii analizei acestui aspect este Jan Gehl; prin studiile sale din Danemarca, acesta a dovedit că nivelul de accesibilitate a cetățenilor către serviciile publice este direct proporțional cu succesul unui oraș inteligent. De asemenea, în cadrul Institutului Gehl sunt dezvoltate constant instrumente pentru analiza vieții publice a comunității, cât și pentru analiza spațiilor publice. Astfel de instrumente reprezintă elemente ce necesită a fi utilizate constant de către comunitățile locale și trebuie să reprezinte o prioritate în procesul de digitalizare a unui Smart City.

Un alt factor ce va duce la evoluția orașelor tradiționale către Smart Cities este tehnologia 5G, ce presupune viteze mult mai ridicate decât tehnologia 4G și care va avea ca efect eliminarea rețelele clasice de cabluri pentru conectarea la Internet. Tehnologia 5G „poate include frecvențe mai mici, de la 600 MHz la 6 GHz. Cu toate acestea, vitezele în aceste frecvențe joase sunt cu mult mai mici decât sistemele noi 4G, estimate de la 15% până la 50% mai rapid” [9].

La nivel european, Comisia Europeană susține o inițiativă publică-privată [10] pentru infrastructura 5G, ce își propune:

- furnizarea unei capacități de acoperire a rețelelor wireless și a unor servicii publice variate de 1.000 ori mai bune decât cele din 2010;
- eficientizarea cu 90% a consumului de energie necesar furnizării de servicii, cu un focus principal pe rețelele de comunicații mobile unde consumul de energie dominant vine de la accesul la rețele radio;
- reducerea timpului mediu de creație a unui serviciu de la 90 de ore la 90 de minute;
- crearea unui mediu Internet sigur, de încredere, cu un downtime minim (aproape de zero) pentru furnizarea de servicii;
- facilitarea unei implementări foarte dense de legături de comunicații wireless ce să conecteze numeroase dispozitive wireless (de ordinul trilioanelor), utilizate de peste 7 miliarde de oameni;
- asigurarea unui panou mai larg de servicii și aplicații la costuri mai mici pentru toți cetățenii.

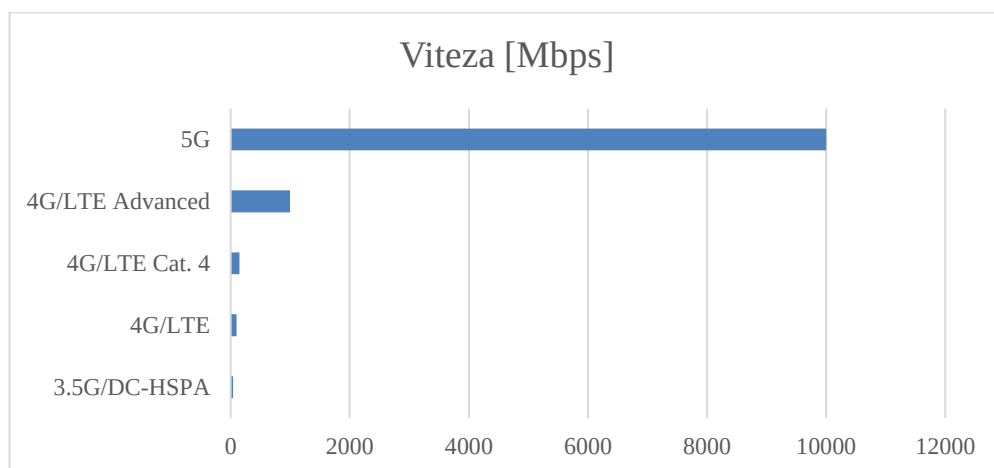


Figura 2. Evoluția vitezelor de operare în tehnologiile de telecomunicații

La nivel național, pornind de la datele deschise ale autorităților centrale, furnizate prin portalul data.gov.ro [11], au fost dezvoltate proiecte private și publice, ce reutilizează seturile de date ale instituțiilor publice. Printre acestea merită a fi amintite:

- meserii.ro - hartă interactivă a învățământului profesional și tehnic din România, care conectează meseriile pregătite în școală cu potențialul de cerere pe piața muncii și utilizează 6 seturi de date;
- termene.ro - vizualizări și selecții interactive ale contribuabililor cu datorii la cele 4 bugete, contracte, cumpărări directe SEAP etc.;
- VisitRo - oferă informații despre toate monumentele istorice din lista oficială publicată de Ministerul Culturii în 2015.

Una dintre problemele tehnice prezente în actualele sisteme informatice ale administrației publice locale și centrale este cea a interconectării bazelor de date. Această problemă provine de la faptul că sistemele informatice sunt construite pe diverse tipuri de baze de date, cât și cu tehnologii back-end diferite. Diversitatea tehnologiilor este o caracteristică necesar a fi eficient exploatată prin dezvoltarea de tehnologii tip magistrală de publicare a datelor (API-uri). Pentru a rezolva această problemă este necesară o soluție tehnică care să transpună datele din orice bază de date într-un format universal acceptat și care să le transmită într-un mod rapid și eficient. O soluție viabilă este STRAPI [12], proiect ce își propune transpunerea datelor în format JSON și livrarea acestora către orice aplicație prin API. Prin acest mecanism se pot interconecta noile aplicații ale mediului public sau privat la aplicații mai vechi, care funcționează în cadrul administrației publice.

Un aspect important al proiectelor actuale aflate în diverse stadii de implementare este reprezentat de aspecte care țin de securitate cibernetică. Manipularea datelor, intoxicarea factorilor decizionali și acțiunile de influențare a opiniei publice prin diverse metode persuasive reprezintă provocări care trebuie avute în vedere la dezvoltarea sistemelor complexe din cadrul Smart Cities. Particularitățile unei zone (unui oraș), obiceiurile specifice regiunii și

comportamentul locuitorilor sunt elemente necesar a fi luate în considerare în vederea asigurării unei abordări complexe și complete a fenomenului.

5. Testarea și validarea aplicațiilor software

Ultima decadă a reprezentat un salt uriaș atât în domeniul hardware, cât și software. Echipamentele coordonate de micro-controllere și microprocesoare sunt disponibile în orice industrie, fie că discutăm despre domeniul financiar-bancar, sănătate, transporturi, IT&C sau sisteme de mare răspundere funcțională. Funcționalitățile și managementul general al acestor echipamente sunt controlate prin software, local sau la distanță, iar operarea corectă a acestor echipamente, esențiale în cadrul conceptului Smart City, depinde în mare măsură de fiabilitatea sistemelor informaționale.

Calitatea a devenit unui din factorii determinanți în atingerea succesului în orice domeniu. Multe companii au recunoscut această dependență de produse software și depun eforturi pentru îmbunătățirea calității și a proceselor de dezvoltare a acestora. O modalitate de a realiza acest obiectiv este evaluarea sistematică și testarea software-ului. Testarea software reprezintă o investigație empirică realizată cu scopul de a oferi părților interesate informații referitoare la calitatea produsului sau serviciului supus testării, luând în considerare contextul operațional în care acesta din urmă va fi folosit. Testarea software mai poate fi definită ca un proces de validare și verificare a faptului că un program/aplicație/produs software corespunde cerințelor business-ului și cerințelor tehnice care au ghidat proiectarea și implementarea lui; rulează și se comportă corespunzător așteptărilor [13].

Funcțiile pe care trebuie să le îndeplinească un sistem, un subsistem sau o componentă pot fi descrise ca o specificație a cerințelor, cazuri de utilizare sau o specificație funcțională sau pot să fie nedocumentate. Testele funcționale se bazează pe funcții și caracteristici (descrise în documente sau înțelese de către testerii) și interoperabilitatea lor cu anumite sisteme și pot fi efectuate la toate nivelurile de testare (de exemplu, testele pentru componente pot fi bazate pe o specificație a componentelor). Un tip de testare funcțională, cum ar fi testarea securității, investighează funcțiile (de exemplu, un firewall) care au ca scop detectarea amenințărilor, cum ar fi aplicațiile malițioase. Un alt tip de testare funcțională, interoperabilitatea, evaluează capacitatea produsului software de a interacționa cu unul sau mai multe componente sau sisteme specificate.

Testarea non-funcțională include, dar nu se limitează la, testarea performanței, testarea sarcinii, testarea de stres, testarea utilizabilității, testarea mentenabilității, testarea fiabilității și testarea portabilității. Testarea non-funcțională poate fi efectuată la toate nivelurile de testare. Termenul de testare non-funcțională descrie testele necesare pentru măsurarea caracteristicilor sistemelor și a software-ului, care pot fi cuantificate pe o scară variabilă, cum ar fi timpii de răspuns pentru testarea performanțelor. Aceste teste pot fi raportate la un model de calitate, cum este cel definit în "Software Engineering - Product Quality" (ISO 9126) [14].

Principalul obiectiv al aplicațiilor dezvoltate pentru Smart Cities este de dezvolta produse și servicii inovatoare de înaltă calitate la un preț competitiv pentru clienții săi. Acest lucru necesită o viziune clară asupra domeniului de afaceri, a inovațiilor și a calității produselor. În aceste zile, clienții au așteptări foarte mari privind calitatea și fiabilitatea produselor software ceea ce dă o importanță deosebită etapei de testare. Testarea în conformitate cu standardele de calitate pot asigura dezvoltarea unor sisteme și aplicații informatice conforme cu necesitățile Smart Cities.

6. Concluzii

Pentru o bună dezvoltare a Smart Cities la nivel european este nevoie de o legislație piramidală care să aibă în vârf autoritățile locale și care să ofere un echilibru între privacy-ul cetățenilor și o interconectare eficientă pentru schimbul date între autorități și mediul privat care furnizează servicii digitale pentru cetățean. În România, dar și la nivel european, necesitatea operaționalizării mecanismelor de parteneriat public-privat la nivelul comunităților locale este prioritară deoarece cetățenii trebuie să beneficieze de servicii din ambele medii, iar acestea trebuie să ofere cel puțin aceleași standarde de calitate și eficiență.

Considerăm că o atitudine proactivă în vederea dezvoltării de Smart Cities se impune cu precădere, iar inițiativa va trebui preluată de la nivel central prin elaborarea de acte normative de tip descentralizat, care să conțină direcțiile și principiile normative în domeniu pentru a oferi și asigura o mai bună adaptare a fiecărei unități administrative în parte, astfel încât să răspundă exigențelor personalizate ale fiecăreia, iar în domeniile în care deja există o reglementare trebuie realizate amendamente care să fie în acord cu specificul orașelor de tip Smart. Un climat bazat pe încredere rămâne indispensabil pentru consolidarea rezilienței cibernetice generale, de aceea îmbunătățirea cooperării, a coordonării și a schimbului de informații între sectorul public și cel privat trebuie să fie scopul imediat al oricăror reglementări în materie de securitate cibernetică. Dezvoltarea competențelor și a gradului de conștientizare reprezintă elemente esențiale care trebuie să preocupe toate sectoarele societății, în condițiile în care, la nivel mondial există un deficit de competențe în acest domeniu [15]. Modelarea proceselor necesită luarea în considerare a elementelor sociale și juridice, nu numai componenta tehnologică. De altfel, abordarea trans-disciplinară a domeniului Smart Cities poate asigura o bază solidă pentru elaborarea și consolidarea unui concept integrat comun care să corespundă cu așteptările și condițiile unei comunități.

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Transformations of administration and administrative law in the national and European space after 1989

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Abstract

Symbolically, the year 1989 - named on the official website of the European Parliament as the Year of Miracles - brought the liberation of the nations of Eastern Europe under the communist regime. The release revealed a picture painted in dark colors of reality, which highlighted the contrast between the two parts of the continent. From the beginning, the states released in 1989 have taken a single path, namely that of real democratization, effective governance, in which citizens become partners and beneficiaries of the political-administrative institutions. This path, which the citizens of central and eastern Europe wanted to go from the beginning, led to accession to the European Union - all the states that regained their freedom in 1989 being today members of the European political and administrative space. But this path meant the complete transformation of the constitutional, legal, administrative, economic, social and moral framework, which led to the adoption of adequate public policies and new constitutions, new laws of public administration and in the field of property, business environment. and so on All these public policies and new normative acts created another reality, closer to the models of articulated societies in the west of the continent. However, citizens feel the need for a deeper transformation of the states and communities in which they live, which forces the political and administrative decision makers to a higher quality conduct, in relation to the highest European standards. In any country, science is obliged to understand the realities in which people act, to find the best models for

society and solutions to problems that daily life cannot solve. To achieve these goals, researchers and academics, along with practitioners, must meet constantly, have a deep, open dialogue, following which they formulate new ideas and proposals for improving the political, administrative, economic, social and social framework. moral of their countries, starting from a clear and complete analysis of reality.

Keywords: legal order, soft law, European Union, integration, sovereignty.

1. Introduction

We started our scientific research endeavor, trying to configure the context of those times. Symbolically, the year 1989 - named on the site of the European Parliament as the Year of Miracles - brought the liberation of the nations of Eastern Europe under the communist regime. The release revealed a picture painted in dark colors of reality, which highlighted the contrast between the two parts of the continent. From the beginning, the states released in 1989 have taken a single path, namely that of real democratization, effective governance, in which citizens become partners and beneficiaries of the political-administrative institutions. This path, which the citizens of central and eastern Europe wanted to go from the beginning, led to accession to the European Union - all the states that regained their freedom in 1989 being today members of the European political and administrative space. But this path meant the complete transformation of the constitutional, legal, administrative, economic, social and moral framework, which led to the adoption of adequate public policies and new constitutions, new laws of public administration and in the field of property, business environment. and so on All these public policies and new normative acts created another reality, closer to the models of articulated societies in the west of the continent. However, citizens feel the need for a deeper transformation of the states and communities in which they live, which forces the political and administrative decision makers to a higher quality conduct, in relation to the highest European standards. In any country, science is obliged to understand the realities in which people act, to find the best models for society and solutions to problems that daily life cannot solve. To achieve these goals, researchers and academics, along with practitioners, must constantly meet, have a deep, open dialogue, following which to formulate new ideas and proposals for improving the political, administrative, economic, social and social framework. moral of their countries, starting from a clear and complete analysis of reality.¹

The Smart Cities International Conference, the seventh edition, 2019, which aims to bring together scientists from academia, researchers, academics, doctoral students, students and, last but not least, law practitioners, to exchange and to share their experiences and research results on the various aspects related to reforming the legislation in the spirit of the new national, European and international trends, to discuss current issues affecting the legal community, to highlight new interpretations, but also to highlight proposes solutions, it was a good opportunity for the author of these lines to say what he thinks, perhaps other than others, more

concerned about their condition than the community they belong to. And this is because we live in a world where legal systems are increasingly interfering, and the legal tradition requires perpetual upgrading to respond to diversity. Our study is based on the idea that the law does not develop abstractly, but is shaped by society, by the economic-social reality, by intellectual, cultural and linguistic environments, but especially by immediate needs, by the printing of appropriate solutions.

After December 1989, Romania needed a change in the development paradigm to meet the challenges of the 21st century as it was forced to evolve in a period marked by the process of globalization, increasing inequalities and aggravating the problems of humanity. National administrative law could have been one of the solutions, proposing interstate administrative cooperation based on the principles of respecting national sovereignty and identity within a prosperous and invigorated European Union. The national sovereignty represents, in the Romanian context, the desire to achieve a balance, a synthesis between the aspirations of the free-born citizen, the society on which it depends and by which it is defined and the context that allows the self-realization. This balance starts from the human being, the central actor who seeks an individual balance and favorable conditions to be achieved. The favorable conditions are influenced by the society that must support and motivate it and by the environment in which it is found and can find its balance. The role of the state in the context of globalization and implicitly of Europeanization is to help achieve this balance, not only for the current citizens, but also for future generations. This is why my daughter wants to have the opportunity to build a secure future in Romania; to study, to get involved in his country and to establish a family. And for this, I think that we citizens, we have to take control over what is happening in our Romania. I want a safe Romania where administrative law - material and procedural - is part of everyday life. The protection of citizens must be the first priority. The administration must be strengthened and the judicial system improved. We are one of the last states of the European Union that does not have a code of administrative procedure under the conditions of an accentuated Europeanization of administrative law. But let's not forget that in the US the administrative procedure code was elaborated by teachers and then submitted to the Government for approval.

About the US, recently, on 24.09.2019, at the UN, Donald Trump surprised with a nationalist discourse in which he stated that "The future belongs to the patriots. The future belongs to the sovereign and independent nations, who protect their citizens, respect their neighbors and honor the differences that make each country special and unique. "In connection with the nationalism / patriotism vs. globalism dispute, the American president said" If you want democracy, keep yourselves. sovereignty! If you want freedom, be proud of your country! If you want democracy, keep your sovereignty! If you want peace, love your nation! The future does not belong to the globalists! The future belongs to the patriots. The future belongs to the sovereign and independent nations, which protect their citizens, respect their neighbors and honor the differences that make each country special and unique. When you open your heart for patriotism there is no room for prejudice. The future does not belong to the globalists. The Bible says, "how good and pleasing

it is when God's people live together in unity": they mistake politicians who support globalism to the detriment of national sovereignty; national structures must be protected, not replaced by some superstates! That's why we, in the United States, have embarked on an exciting program of national renewal. In everything we do, we focus on mobilizing the dreams and aspirations of our citizens. Globalism has exercised a religious attraction to the leaders of the past, then making them ignore their own national interests. But as far as America is concerned, those days are history."

Under the conditions in which, the European Union tends towards federalization - the step towards globalization, and the US towards an accentuated nationalism, Romania where? After 1989, the year that marked the end of the Cold War, people seem to have made the right decisions by which the conflict between superpowers was peacefully resolved. Now the world has become more and more complex, and people are not aware of how little they know about what's going on. And for this reason, the aim of this study is to arouse a debate involving specialists in the field of law and administrative sciences and is intended to be a forum for the analysis of new research directions regarding the adoption of the Code of administrative procedure in our homeland. where this need for proceduralization from several directions is felt acute: public administration, administrative litigation judges and administrative law practitioners. „There is a remedy that, in a few years, would make Europe free and happy. It involves the recreation of the European family, at least as far as possible, and its endowment with a structure that can allow them to live in peace, security and freedom. We have to build something like the United States of Europe, "said Winston Churchill in one of his famous speeches, namely the University of Zurich, in 1946. This“ remedy "that the Prime Minister of the United Kingdom was talking about, materialized. In 1951, when the French Minister of Foreign Affairs, Robert Schuman, proposed the creation of a supranational authority to control the coal and steel production of Germany and France. The obvious purpose of this initiative was to avoid a new global conflagration by stabilizing relations between the two states, "reducing France's fears about possible military threats from Germany and linking them with a limited framework of peaceful cooperation"2.

Regarding Romania, we believe that the main objectives that led to the decision to become a member of the EU and which continue to govern the policy regarding our relationship with the Union were, are and will be to increase the standard of living, standards economic, social and political and the development of the state under the influence of Europe. Romania, as mentioned above, belongs to the category of countries that adapt, without opposing. At the Quo Vadis question? we are trying for an answer, which, although short, is far from simple. The United Kingdom returns to the spirit that propelled its orientation in 1957, and Romania develops its potential for action and influence, following the steps imposed. Romania's accession to the European Union on January 1, 2007 was the turning point for another society, another economy and another life for Romanian citizens who became Europeans. Beyond the mirage of a life in well-being, peace, tranquility and harmony with all European citizens, the concrete life and the evolutions at

European and global level showed that Romania did not benefit from the same treatment as the rest of the European states. The "two-speed" Europe was at first only an image that was vehemently fought in some European chancellery, because as the years went by the reality of the differentiated treatment allocated to Romania became more and more outlined.

In this regard, the political opinions expressed both in the European forums, but especially in the color of the European institutions, show that, from now on, Europe must rethink many of its policies regarding especially the economic activity. The "two-speed" Europe has also worked with regard to the participation of the Member States in the Euro Zone. The area was created in 1999 by eleven countries, joined by Greece in 2001, Slovenia in 2007, Cyprus and Malta in 2008, Slovakia in 2009, Estonia in 2011, Latvia in 2014 and Lithuania in 2015.⁴ Mark Twain recommended „Stay away from people who diminish your ambition. „Romania has made every effort in its European way to perform under theoretically equal conditions, practically completely inequitable. And current US President Donald Trump said, "Be careful who you step on when you go up, that you will meet the same people down." they are part of: they meet the conditions, but they do not want in the euro area; they want, but do not meet the conditions; neither will they, nor can they; and the last category can, but will not! Why would the state, or the European Union as a whole, need it? I think that by a soft law that would allow them to adapt their legal order more quickly to the social realities at the request, the elites from Brussels or Bucharest were somewhat separated.

2. About soft law in the legal and institutional order of the European Union

2.1. Specific issues

Our attempt to address the need for interdisciplinary public administration research that we are tempted to pursue, given the fact that we are all interested in being best managed, is hampered by the inability of policy makers. So we will go directly to say that this concept - soft law - has been used in the specialized doctrine, but also in the political institutions, through a wide range of techniques and meanings, starting from very different bases even for the supporters of the idea. according to which there are few affinities of the soft law with the law, where the fictional character of the notion of representation has acquired other connotations completely foreign to the legal doctrine of traditional law. More clearly, the fictional character of the idea of representation did not attract attention as long as the struggle of democracy against autocracy lasted. But as soon as the parliamentary principle was fully imposed, it became practically impossible not to highlight the fiction that represented the thesis of representation, namely that Parliament is in itself nothing but an organ representing the people and whose actions it must reflect. strictly only the will of the people. What we need to understand is that the people do not exhaust their power with the election of representatives and it is not just a creative organ. The elections establish a legal relationship between constitutional representatives and the people, which involves mutual rights and

obligations and which also includes a political dependency link through which the representatives are under the effective and permanent control of the voters. The term democracy is frequently used outside the strictly legal area. Therefore, it acquires an essentially teleological or ideological function. Thus, the more or less democratic character of the EU is politically invoked to support or criticize the European structure, without a genuine reflection on the role that this concept can play from the perspective of the foundations of the Union legal order or its functioning. At present, it is important to reach a consensus on the legal definition of the concept of democracy before comparing it with the use given to the term in other areas.

Before moving on to a more theoretical analysis, we believe that it is necessary to start from the function of representation on which democracy is founded, as it is recognized and formulated in constitutional texts, namely representative democracy. The concept of „representation" is extremely comprehensive in the legal field. Even without discussing its applications in private law, this concept could be used, within political institutions, through a wide range of techniques and meanings, starting from very different bases. The origins of representation are old: long before the US revolution and the French revolution, the old European monarchies and urban republics had created the theoretical and functional basis of representative regimes that were not born of the democratic principle. The French monarchy in the so-called Old Regime knew a system of organic representation in which the king's person incarnated the State, as it results from the famous expression of King Louis XIV. However, Carl Schmitt warned us that we should not confuse this transcendent notion of "representation" (Repräsentation) applicable to the monarchies of the Old Regime with its functional concept (Stellvertretung) valid in modern democracy and which has a technical and materialistic connotation.⁵ Only that these assertions were made some time ago. Now things, the general context, international and European, are somehow changed! How? We'll try to draw it.

2.2. About the democratic character of the institutions of the European Union

As it is accepted, it is claimed that democracy is currently acquainted with new forms, one example being participatory democracy. In fact, the reference to this notion now tends to encompass the issue of fundamental rights protection, although these two notions are not necessarily of the same type. One of the questions that arise is, however, related to the extent to which these so-called new forms of democracy, participatory democracy, qualified to be substantial, are indeed values-based and do not, in fact, constitute competing systems of representative democracy, whose legitimacy and legitimate function will be reduced in the future as in the case of the European Parliament. Carl Schmitt's antagonism between the transcendent and the functional concept does not exhaust the legal-political concept of representation. They would rather be two extremes between which we could identify old and modern forms of representation that have their own logic and their own foundations. This applies to the old "states" or "orders" that we find in quite similar forms in most European countries, which have long been perpetuated in the

19th century. One of the common features of this form of representation was the exercise of the imperative mandate that bound the representatives to their constituents and deprived them consequently of the reality of a true deliberative power.

In general, this manifestation of the independence of the assemblies from the electoral body is what marks the beginning of the modern representative institutions in the sense that they allow their differentiation from the old forms dressed by the state assemblies. The modern notion of representation has as its corollary and foundation at the same time a theory of the sovereignty of the Parliament that had been imposed in England with the revolution of 1688 - or a theory of national sovereignty - that sustained by the French Revolution and especially by the Constituent - whose consequences, despite the diversity of events and institutions, they are similar: they establish "a democracy without a people"⁶. This consequence is not inevitable per se. In the United Kingdom, the "mandate" theory has reappeared in relation to a democratic conception of the right to dissolve, and the extension of the vote and finally the birth of the universal vote, in a context of bipartisanship, tend gradually to give the people the right to elect their governors. Could this be a landmark or reason for Brexit? We leave our readers and distinguished readers to develop the idea. In France, the 1958 Constitution was totally detached from the dogmas of the sovereignty and intangibility of the assemblies that characterized the "republic of deputies". It remains true, however, that this conception, typical of classical liberal democracy, of the "filter type" representation, this elitist or at least oligarchic notion of representation, as in the case of the European Union, is not a simple product of history. Even the very structure of the representation carries with it the oligarchy, even when the aristocratic connotations have disappeared under the pressure of modern bill government conditioned by the mass media. Hence the question: is this tendency contrary to the nature of the democratic principle? The most famous criticism of the concept of representation belongs to J.J. Rousseau: „The will cannot be represented; the will is the will or it is something else. There is no middle ground ”⁷.

The same idea is repeated by Kelsen: „As few affinities have the idea of representation with the democratic principle, this is why we realize that autocracy uses the same fiction." This notion of "fiction" is frequently found since it denounces not only the contradictions between democracy and representation, but also the utopian character of democracy itself. Kelsen noted that „The theory of representation has the role of legitimizing the Parliament from the perspective of the sovereignty of the people. But this "obvious fiction", meant to conceal the real and considerable prejudice brought to the idea of freedom caused by parliamentarism, has not been able to fulfill its function in time; instead, it provided the opponents of democracy with the argument that democracy is based on an assertion of blatant falsehood. The fictional character of the idea of representation did not attract attention as long as the struggle of democracy against autocracy lasted. But as soon as the parliamentary principle was fully imposed, it became practically impossible not to highlight the fiction that the thesis of representation implies, namely that Parliament is in itself nothing but an organ representing the people and whose

actions must strictly reflect only the will of the people. It is not surprising, therefore, that among the arguments nowadays against parliamentarism, a first argument is the revelation that the will of the state released by the parliament does not absolutely represent the will of the people and that the parliament cannot express the will of the people for the simple reason that, so as the constitutions of the parliamentary states stipulate, the people cannot even express their will - apart from the one regarding the election of the parliament”.

The democratic critique of the representative regime, assimilated by Kelsen to the parliamentary regime, was developed in France by Carré de Marlberg, who in turn makes the distinction between the representative regime and the parliamentary regime. He opposes the representative regime, characterized by the absolute power and immunity of the elected assembly, the parliamentary regime which implies, especially through the dissolution game, the need for a union and a permanent agreement between the elected and the voters and admits a combination with the direct democracy procedures. In addition to this positive critique that tends towards institutional reformism, we must mention the radical criticisms that are frequently raised on the issue of „fiction”, namely those that insist on the utopian character of the power exercised by the so-called "sovereign" people in the system of political representation: its basic mechanism, the universal vote, would thus be oriented "against democracy".⁹ It is understandable that direct democracy, with the exception of small communities, cannot be adapted to the size and diversity of the powers of the modern state, as in the special case of the EU which cannot be claimed to be a state in the traditional sense of the notion. For this reason, representation appears as an objective necessity. Sieyès, who made the most interesting and profound observations on representation theory, argued for the necessity and usefulness of representation through a compelling comparison when he stated that denying the system of representative government is as if you would like to convince citizens who wish to send a letter somewhere, that their absolute freedom would have been better protected if they had taken their letters to their destination alone. But this obviously real finding cannot eliminate the aforementioned criticisms: representation is inevitable, but not democratic, it is also fiction and utopia at the same time. However, this thesis of representation that can be socially based is not legally justified. In this sense we can see that J.J. Rousseau's thesis is based on a reasoning that departs from the legal one, confusing the legal point of view with the psychological one. His ideas on representation contain a contradiction because they are incompatible with his theory of the general will, which does not constitute a cumulation of individual wills, which means that each deputy does not represent the will of those who chose him, but that of the whole people.

In direct democracy, the people constitute the supreme collegiate political body of the state, and the identity between the governors and the governed is total. It follows from the above that the right to choose, so the right of voters would be reduced to participate in the process of setting up another body that is mandated with powers that previously came to the community of citizens directly. The assembly thus becomes the organ of the will of the people. In direct democracy, as in representative democracy, the people is the organ of the state, but in the first case

the will of this body belongs to the people as such, and in the second case the will belongs to an organ created by the people. Therefore each deputy represents the people as a whole in the sense that he competes in forming the will of the people and the representative bodies thus become, according to the terminology used by the German jurist Jellinek, secondary organs, ie organs of a primary organ of the state that is the people; strictly legal, that real part of the people whose constitution guarantees the right to vote. It is true that starting from this basis, the principle of representativeness may lack the democratic foundation from the moment we admit that representation entails, the transfer of the rights of the people to representatives. What we need to understand, however, is that the people do not exhaust their power with the election of the representatives and it is not just a creative body and the elections establish a legal relationship between constitutional representatives and the people, which implies mutual rights and obligations and which implies including a link of political dependency through which the representatives are under the effective and permanent control of the voters. From the moment the electoral body is recognized the power to elect its representatives, and especially since this election is only valid for a certain time and is periodically questioned again, means that we necessarily confer on this electoral body a decision-making power that goes beyond the strict framework of people's choice. This power can be reinforced in Carré de Marlberg's view by purely political factors, but also by legal institutions designed to guarantee a democratic character of the representative regime: the dissolution of certain procedures of direct democracy, such as the abrogative referendum that allows the compliance between the will to be verified.¹⁰ Kelsen envisioned the rehabilitation of the imperative mandate in a modern form through measures that are mainly related to the constitutional myth such as the abolition of parliamentary immunity or the radical control of the parties over the deputies. These measures aimed at reforming the representative regime, but they aimed less at democratization and more at limiting the power of parties whose functioning was considered by Kelsen to be undemocratic. Equally true is that if contemporary democracies are merely representative, they are representative without respecting the true theory of representation.

The old aristocratic concept, which banned the imperative mandate, survives through some of its legal attributes that still exist, which means that in fact, a new conception has not been imposed. „What has been, will be, and what has happened will happen again, because there is nothing new under the sun, as the Ecclesiastes reminds us every time! It could be argued at most that the notion of representation tends to disappear in favor of the one of representativeness - a notion of a non-legal nature but beneficial from the perspective of the direct democracy criteria far from the principles of natural law reflected in the new Union legal order constituted following a normative process of The union that has evolved a great deal, from the regulations of a predominantly economic nature, to the new European legal regulations with specific features, which enrich their meanings and meanings. An institutional law of the Union has been created, with all that this implies: sources of law, defining principles and regulations that outline a specific legal order. Union law regulates the legal relations within the European Union, but also between the Union and the Member States, underlines the status of the institutions of the Union, while defining

its powers and competences. Various legislative instruments and the creative jurisprudence of the Court of Justice of the European Union have gradually created:

- *Institutional Union law* that includes all the legal norms governing the structure and functioning of the bodies of the European Union;
- *As a material union law* that includes all the legal norms that set the objectives of the Union and the measures by which they are fulfilled;
- *Union procedural law* that includes all the legal norms governing the procedures of European Union law.

Thus, the institutional, material and procedural law of the European Union has outlined a specific legal order in which the rules of institutional law mainly regulate aspects such as: the scope of the treaties, their revision and accession of new states, the legal personality of the EU, the organization of institutions European functions, their functions and attributions, as well as their relations. The rules of material law mainly refer to the exercise of the powers of the national and administrative policy-making bodies through the European institutions for the purpose of applying Union law, either by action or inaction. They also concern the establishment of rules of conduct for persons falling within the sphere of influence of Union law. The diversity of legal relationships covered by Union law also leads to the diversity of the nature of the litigation or actions with which the CJEU can be brought. Thus, we can distinguish several types of procedures, which gradually outline a procedural right of the European Union, and which send us with a thought to a procedural right in the field of administrative law concerning the procedure of direct actions before the Court of Justice; of preliminary actions before the Court of Justice; the special procedures before the Court of Justice; in appeals before the Court of Justice; of the Tribunal; and the Civil Service Tribunal. And all this under the conditions of an unsuccessful transplant of natural law in the Union legal order, as we will see, below.

2.3. About an unfortunate transplant of natural law in the Union legal order

As is well known, in modern times, the term natural law has multiple occurrences, often being an accessible and useful substitute for the concept of human rights. Just like the category of natural law, human rights are inalienable, becoming central concepts of the modern world. In the modern paradigm, the natural rights of the subjects are neither conditioned by the social context, nor by the belonging of the individuals to a constituted society. By modernizing the legal subject with autonomy, modernity establishes the human subject as a central point of law, understood both as a system and as a prerogative of the person. Bjarne Melkevik offers a description of the legal meaning of modernity: „legal modernity refers exclusively to the possibility of a subject of law to recognize itself, in relation to other subjects of law, as an instance of explanation and fulfillment of the law. In other words, the subjects of law must be able, totally autonomously, to recognize each other both as authors and as recipients of their laws, their norms and their political and judicial institutions”¹¹.

The contemporary philosophy of law refers to two fundamental conceptions of natural law: a premodern conception and a modern one. In the social and political

sense, the pre-modern conception of the legal system establishes the law by reproducing the natural order, while the modern one establishes the laws to guarantee natural rights not only as obligations, but also as freedoms.¹² Completion of previous conceptions of natural law comes along with the contemporary proclamation of human rights. The conception that by virtue of the fact that individuals are human beings, they naturally hold certain rights considered as fundamental, underlies the idea of human rights. So, regardless of the idea of citizenship, belonging to a state or the contingent laws or regulations of various societies, human rights have as a basis the obligation to respect the dignity of any individual by virtue of being born as a human being. What characterizes the idea of human rights lies in the interweaving of several different elements of the classical and modern paradigm of natural law. In other words, the idea of human rights takes from the ancient legal paradigm the notion that any law must essentially embody a natural law. From the modern legal paradigm, the idea of human rights takes on the logic of the civil establishment of laws, always starting from the principle of rationality. Therefore, the fact that all individuals are born as human beings is, in itself, a virtue by which equality between people can be instituted, just as positive rights are instituted, somewhat artificially, as natural¹³.

The difficulty of using the model of natural rights to explain the fundamentals of human rights, and the purpose or manner in which they can become a guide to concrete human actions, generates multiple debates that animate the field of philosophy of law today. The origin of human rights in the two variants of natural law, respectively in the classical and modern ones, has been criticized or even challenged, making a distinction between human rights and natural rights. Even with the task of verifying whether there are, however, common characteristics between the two, despite the apparent differences. Certainly, the fact that the universal application and respect of human rights is still deficient may be an indication of the fragility of their foundations. That is why the issue of human rights founding in the EU legal order is still incompletely elucidated. Therefore, the text below explains the essential springs of the mechanism that sets in motion one of the most important legal activities: the law transplant in general, and the union law transplant in particular. The dispute over the transplantation of EU law in Romania has divided the legal world in two: on the one hand, those who support the development of a domestic transplant program - the steps have been started since the beginning of the pre-accession of our homeland to the European Union, the Ministry of Justice working hard in this regard, but financially blocked by the specific situation of Romania, and on the other side, those who claim that Romania is not yet ready for the transplant of the law, campaigning for the referral to the ancestral origins of Romanian law. Beyond the obvious usefulness of such an approach, which would eliminate the reliance on Western multinationals, while preserving the precious legal odors for Romanian citizens, but also beyond the well-meaning warning of the undersigned, who is convinced that the transplantation of the Union law has caught us unprepared.

Everything I say now is based on my experiences, lived for years, near the Romanians in the country and abroad, on the dialogues with many specialists in our

faulty judicial system. The world must know that Romanian law goes through a great deal of suffering, caused by an unhappy law transplant made for a certain political elite, broken by reality. They, the decision makers know the steps, the hibiscus and how the gaps can be filled and they have woven a net of facts, difficult to challenge, because everything they do seems necessary. I think the clean leaders were not elected, they also wove through the law, a spider who devoured and will devour any intruder. And I also think that something is missing from the Romanian legal system to become closer to the German one: the organization and administration as in Germany. There are solutions to problems also in Romania, without the claim that in the end a perfect system will be obtained, only a functional one, that will respond to the needs of most citizens. Some of the conditions would be that at the decision level to act on the basis of correct principles, unanimously accepted, to promote a real competition in the Romanian system, the performance must be rewarded and the errors sanctioned.

Last but not least, each person must be made aware that this is not the way to go. The lack of money in the system is a problem that all states face. Financial resources are important, but they cannot be unlimited and in any case they cannot replace managerial performance deficits. For the current state of the system, you should not just accuse politicians or decision makers. Change can only be made if all the partners really want it. And there is something very important: to consult people with experience in the profession, people who have done something tangible and whose results speak for themselves, who have proven that they are clean, true leaders who can break the spider from Romania! The difference between refusing to cultivate your own thinking and infesting with the aberration microbe the thinking of others is exactly like the difference between our Romanian law and EU law, especially from the perspective of that soft law of the European Union.

2.4. The meaning, objectives and functions of soft law in European Union law

Jurgen Schwarze published in the Romanian Journal of European Law no. 1 of March 31, 2014, the article entitled Soft Law in European Union law. Starting from a simple analysis, the antithesis inherent to the notion of soft law is evident, which seems to contradict the imperative character of the law itself. However, soft law is very common internationally, and the EU is no exception. However, in order to analyze the weight of such rules in the Union space, a preliminary examination of the concept is required. Thus, from the perspective of F. Snyder, soft law designates rules of conduct which, in principle, have no binding power, but which can have practical effects. They were positioned by other authors in a gray area, at the border between law and politics. Although these provisions are indicative, from the point of view of the issuers, they must be given legal relevance. With regard to the EU, a distinction must be made between soft law of an administrative nature and soft law with institutional or constitutional impact, relevant in the relations between the bodies of the Union and the Member States. This differentiation is relevant from the perspective of the purpose of soft law acts. In this respect, those of an administrative nature seek to provide legal certainty to legal subjects, and the second category is

intended for areas where the Union has no regulatory competence. Also, depending on the intentions of the issuing bodies, soft law acts may have either a concrete or an explanatory function, or a preparatory or intermediate function.

The most common manifestations of the soft law type in the Union are recommendations and guidelines. The non-binding nature of the recommendations is enshrined in the law by the TFEU (art. 288), while the guidelines give rise to an effect which, although not imperative, allows derogations only on grounds compatible with the principle of equal treatment. Moreover, once it issues an orientation, the Commission undertakes to respect the conduct it imposes, which is why any derogation from this may constitute a punishable violation of the general principles of law. The guidelines of the Commission are met mainly with regard to the application of sanctions for non-compliance with the rules of competition law. In the field of soft law with institutional impact, the open method of coordination is relevant, which essentially implies the manifestation of a Council position by virtue of common objectives, in areas reserved to the competence of the Member States. On another occasion, the European Commission has guaranteed, in the light of the existing doubts as to the validity of such actions, that the Commission will consult the European Parliament in advance, when they are of a preparatory nature for future legislative acts. Soft law rules replacing authentic rules are not tolerated by the legal order, as the Union legislative bodies cannot assign such powers to an executive body.

Soft law appears in the EU institutions in various forms and in an increasing proportion and the rules established by the Lisbon Treaty do not exclude the use of these instruments of action as before. This does not mean, however, that soft law has evolved at Union level into a unitary legal category, sufficiently defined, with admissibility criteria and legal effects. The legal evaluation must start from its various forms of manifestation, in which soft law appears today in the gray area, located between law and politics. In a hierarchy, given the admissibility of their use and the effects they produce, the following forms of soft law can be distinguished: We consider here soft law in the form of recommendations and opinions, whose non-mandatory character is expressly provided in the TFEU (art. 288) and through which the EU bodies can communicate their position and intentions. Soft law of an explanatory or concrete nature of the formal norms can be considered in principle admissible, as long as it does not go beyond the semantic framework of the "authentic" legal norms. Law having a preparatory character for mandatory legal acts It is worth noting the intention of the institutions of the Union to inform those to whom the norm will be addressed regarding its essential elements. Such a soft law is acceptable, but only under the conditions of no intervention. of automaticity regarding the subsequent regulations, which he prepares, and to him no other form of irreversible constraint is characteristic of him, in any case, the margin of legislative appreciation must be ensured when the subsequent legal norms are issued. Since soft law of a preparatory nature is immanent to a certain modeling force regarding the subsequent rules, the rights of hearing and participation are of particular importance in this type of legislation. Consequently, the information rights of the national parliaments and on this form of expression of the will of the

organs of the Union have been extended to the Member States. Soft law that replaces or substitutes for authentic legal rules cannot be tolerated. The legislator is called to regulate himself the essential elements of a legislative act. Unless the delegation is expressly provided for, it may not assign these powers to an executive body that is not empowered to legislate, nor can it accept the issuance of such rules in a form that, as in the case of soft law, does not have the force mandatory of an authentic legal norm. Such an approach would flagrantly contravene the provision of primary law according to which the essential elements of a legislative act must be established by the legislator (Article 290 paragraph (1) TFEU). For the considerations set out here, soft law will have an indispensable character in the future, at Union level. However, it will have to be within the limits imposed by treaties and other legislative acts. This is because, according to its purpose, the law does not give expression to "soft" rules of conduct, but imposes imperative normative provisions. Soft law differs obviously in this sense. By the adjective "soft" are not only limited the normative content and / or the effects of these norms, but the force of their validity and their obligation is fully relativized. Thus, the limited scope of the scope does not characterize soft law, but its validity entirely reduced. It is not surprising, under these circumstances, that the status of legal category of soft law, which has its roots in international law, is still strongly contested. For the law of the European Union the problem of internal contradiction, inherent in soft law, between law (law) and validated attenuated, flexible (soft) has a special significance, being used here, in the most varied forms, to a great extent by norms under the threshold of imperative normative validity.

2.5. Common features of the existence of soft law in EU law

Starting from the various forms of existence, certain features can be extracted that define soft law at EU level. The prevailing situation, in this context, is a soft law issued by the European Commission or the Council, alone or in cooperation with the European Parliament. In any case, as a rule, an EU body will act. The regulations issued by these bodies do not in themselves directly produce legal effects, yet they are not completely legally irrelevant. In the specialty literature, this is why "soft forms of guidance" are also spoken. They cannot be directly imposed, as they do not contain any provision that can be implemented. Further, another feature common to the different EU soft law variants can be found, that is, they not only describe certain circumstances or a status quo, but more than that, they contain rules of conduct, in certain cases obligations of conduct or expectations of conduct, respectively guidelines of orientation. They are characterized by a certain relation to the respective law by a certain approximation to the law, which have been defined, in different formulations, but overlapping with regard to the fundamental elements of the fund: In this soft law there would be "rules of conduct, which in principle do not they have binding power, but they can have practical effects." Similarly, D. Thurer understands by soft law "rules of conduct that are in a gray area, located between the law and politics, used by state authorities and international organizations to express

commitments that represent more than political statements, but less than the law in its strict sense".¹⁴

In the same sense go C. Borchardt and K. Wellens: "Soft union law concerns the rules of conduct which are on a non-binding legal level, but which, from the point of view of their issuers, must be given legal relevance. The above corresponds also to the opinion of L. Senden, according to which soft law refers to the rules "which are provided by instruments to which the obligatory legal force has not been assigned, which can nevertheless produce indirect legal effects and which seek to reach of practical effects, being able to produce such effects ". It does not matter if this concept is really "consciously held inaccurate" or if it has thus developed as a consequence of the lack of an accurate description possibility. Moreover, it can be used with difficulty and as an antonym of it „hard law". Because antonym of "hard law" can only be considered "no law". If it were to be localized, the concept of soft law should be assigned an intermediate position between the two extremes, "hard law" and "no law".¹⁵

The objectives pursued by soft law in EU law vary depending on the issuer and their content. Thus, the administrative law soft law is complementary in nature and often seeks to enhance the legal certainty of legal matters. In many situations, it is about preparing the future authentic legal norms and preparing the circles of persons to whom these norms are addressed. Finally, EU bodies rarely make use of soft law in EU law because, in the absence of regulatory competence or due to lack of political consensus, it is not possible to adopt genuine law."¹⁶ There are multiple functions performed by soft law. In this context, it depends on which actors emanate soft law. It is conceivable that soft law with executive motivations, as well as soft law of an institutional or constitutional character, emanating from legislative bodies. valid as a primary or secondary law, it can have a concrete or explanatory function. In this way, what is the intention of the EU bodies in the medium or long term, in the framework of interinstitutional cooperation At EU level, soft law can finally lead to better communication between institutions. In order to increase legal clarity and security, soft law has been subject to new rules in the Lisbon Treaty. In this context, the question arises whether by this clarification of the obligatory legal acts it was desired to limit or place in a plan as far as possible the soft law instruments. The Treaty of Lisbon sought to define more precisely the existing legal acts, and not a general renunciation of unregulated legal acts. Starting from the subsistence of these legal acts, art. 296 the third paragraph of the TFEU provides for a limitation on atypical legal acts - which differs from authentic legal rules - only insofar as the European Parliament and the Council are already examining a draft legislative act with an appropriate content. In this situation, they refrain from adopting acts that were not provided for by the legislative procedure applicable to the respective field. In light of these provisions of the Lisbon Treaty, the right of the European Parliament to be consulted in the field of soft law, as well as the right to inform national parliaments in the process of adopting European norms, from the perspective of the ethical and religious dilemma of EU law, is upheld. ¹⁷

3. Conclusions

The dream of a perfectly synchronized society, similar to a clockwork mechanism, has tormented many of the "modernizers" who influenced the industrial age. Thus, what Taylorism meant for the factories was Leninism for the Soviet Union. The objective was to create a state and a society that would work with the efficiency of a machine. Each bureaucracy should act as a single man, each individual moving in unison with the others. In reality, human beings and human societies are open, disordered and imperfect systems. In our lives and societies, the regions of chaos and chance alternate with the regions of temporary stability and give rise to the latter. We need both. Stability and synchronization provide the degree of predictability we need to function as individuals in social groups and especially in the economy. Without a certain stability and temporal coordination, life is reduced to submission to anarchy and chance. But what happens when I take power instability and desynchronization? In a world where the rules of the game are changing and the importance of resources is changing, Romania wants to be the diligent student of the EU. But accelerating social and technological changes increases the difficulty of individuals and organizations to cope. We must not adapt, in one way or another, only to change, but also to the actual acceleration. Even the pace of change itself has effects quite distinct from its direction and content. The future has arrived prematurely, the industrial society of the world is going through a general crisis in which the anachronistic character of the contemporary social institutions is noted.

It is necessary to revolutionize the way we think, to make politics and to organize our economic and family life, as well as the trajectories of social development that create the high probability of such revolutions. Without placing us neither to the right nor to the left of the contemporary political spectrum, and to grant us the accession of any existing political party or movement, as the left / right political axis is increasingly obsolete in high-tech nations and the main schisms that fracture society are produced by - along completely different faults, we appreciate that the current system of political parties and government institutions is outdated and requires huge economic transformations. Are contemporary political movements anachronistic? Are the traditional racial, religious, sexual, class and age conflicts in our society somehow subordinated to another system of conflicts, with deeper roots and a much greater causal impact? Or, on the contrary, are the waves of change themselves subordinate, unfolding in the context of more familiar political relationships and contradictions? To what extent can his innovative analyzes help us to humanize the future? The answer to all these questions starts from the premise that our existing social institutions are dangerously inadequate to the needs of the time and to the citizens of today, even if the law is the way in which the decision maker disposes of the norms imposed on people, and e-governance (concept also known behind Englishism) e-gov) is one of the most - if not the most - interesting challenge of Public Administration in the world.¹⁸ The EU is no exception! It must be transformed if we are to survive the turbulent times that await us. But what kind of changes are necessary, or possible? Can our society survive on the basis of inequality and exploitation? Or can survival itself entail a new level of equity,

participation and social diversity that will enrich all our lives? Again, the answers to all these questions may show what are the main determinants of contemporary change and ultimately aim at them or how we, as citizens, can understand and then intervene in these social processes. Regarding the EU and its legal order, in this material I did not want to give a rattling speech through the dramatism of ideas, about the danger of dissolving our cultural identity in a Europe preoccupied until the despair of dissolving its lifestyle as a result of the apparent occupation peace of European space by millions of emigrants. Satanization of the notion of nation, nationality, nationalism by proletarian internationalism or political correctness even if it has different purposes, manifests itself with the same violence and has the same victims: tradition, pride of inheritance from old people and solidarity with those of your nation, the nation meaning in at the same time people, but also family. Metaphorically,

I would compare the situation with the following picture: We are in a small flotilla - we as humanity -, in which also our Romanian boat, which from the point of view of the human condition, enters a period of great storm, of viscous big. And when I say that, I'm not just thinking of alternative puritanism, depravity, to say, because many people think about it immediately, but, on a very broad plane, the forecasts for the immediate future of humanity are very pessimistic. In this «meteorological - spiritual» perspective, so in the face of these storms, we, the lawyers, are some kind of meteorologists, and not any meteorologists, from those who stand in offices or on television, but among those in Omu Peak. That is, we have the opportunity, along with others, to observe, to intuit, to understand, to predict this entry into the valleys and the intensity of the storm. Why? Because being at the interface with the judicial phenomenon, which is an important sensor of social behavior, we as professionals feel, if we are people of reflection, the evolutions as thinkers, but at the same time, we can commensurate them daily by what happens in the phenomenon judicial.

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Transformări ale administrației și ale dreptului administrativ în spațiul național și european după anul 1989

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Abstract

Simbolic, anul 1989 – denumit pe site-ul oficial al Parlamentului European drept Anul miracolelor – a adus eliberarea națiunilor din Estul Europei aflate sub regimul comunist. Eliberarea a relevat o imagine zugrăvită în culori sumbre a realității, care evidențiază contrastul dintre cele două părți ale continentului. De la început, statele eliberate în anul 1989 și-au asumat un singur drum, anume acela al democratizării reale, al guvernării eficiente, în care cetățenii devin parteneri și beneficiari ai instituțiilor politico-administrative. Această cale, pe care au dorit să meargă de la început cetățenii Europei centrale și de est, a condus spre aderarea la Uniunea Europeană - toate statele care și-au redobândit libertatea în anul 1989 fiind astăzi membre ale spațiului politic și administrativ european. Dar această cale a însemnat transformarea completă a cadrului constituțional, juridic, administrativ, economic, social și moral, ceea ce a condus la adoptarea de politici publice adecvate și de noi constituții, de noi legi ale administrației publice și în domeniul proprietății, mediului de afaceri etc. Toate aceste politici publice și acte normative noi au creat o altă realitate, mai aproape de modelele societăților articulate din vestul continentului. Totuși, cetățenii resimt nevoia unei transformări mai profunde a statelor și comunităților în care trăiesc, ceea ce obligă decidenții politici și administrativi la o conduită calitativ superioară, în raport cu cele mai ridicate standarde europene. În orice țară, știința este obligată să înțeleagă realitățile în care oamenii acționează, să găsească

modelele cele mai bune pentru societate și soluții la problemele pe care viața cotidiană nu le poate rezolva. Pentru a îndeplini aceste scopuri, cercetătorii și universitarii, alături de practicieni, trebuie să se întâlnească în mod constant, să aibă un dialog profund, deschis, în urma căruia să formuleze idei noi și propuneri pentru îmbunătățirea cadrului politic, administrativ, economic, social și moral al țărilor lor, plecând de la o analiză clară și completă a realității.

Cuvinte cheie: *ordinea juridică, soft law, Uniunea Europeană, integrare, suveranitate.*

1. Introducere

Am pornit demersul nostru de cercetare științifică încercând să configurăm contextul acelor vremuri. Simbolic, anul 1989 – denumit pe site-ul Parlamentului European drept *Anul miracolelor* – a adus eliberarea națiunilor din Estul Europei aflate sub regimul comunist. Eliberarea a relevat o imagine zugrăvită în culori sumbre a realității, care evidenția contrastul dintre cele două părți ale continentului. De la început, statele eliberate în anul 1989 și-au asumat un singur drum, anume acela al democratizării reale, al guvernării eficiente, în care cetățenii devin parteneri și beneficiari ai instituțiilor politico-administrative. Această cale, pe care au dorit să meargă de la început cetățenii Europei centrale și de est, a condus spre aderarea la Uniunea Europeană - toate statele care și-au redobândit libertatea în anul 1989 fiind astăzi membre ale spațiului politic și administrativ european. Dar această cale a însemnat transformarea completă a cadrului constitutional, juridic, administrativ, economic, social și moral, ceea ce a condus la adoptarea de politici publice adecvate și de noi constituții, de noi legi ale administrației publice și în domeniul proprietății, mediului de afaceri etc. Toate aceste politici publice și acte normative noi au creat o altă realitate, mai aproape de modelele societăților articulate din vestul continentului. Totuși, cetățenii resimt nevoia unei transformări mai profunde a statelor și comunităților în care trăiesc, ceea ce obligă decidenții politici și administrativi la o conduită calitativ superioară, în raport cu cele mai ridicate standarde europene. În orice țară, știința este obligată să înțeleagă realitățile în care oamenii acționează, să găsească modelele cele mai bune pentru societate și soluții la problemele pe care viața cotidiană nu le poate rezolva. Pentru a îndeplini aceste scopuri, cercetătorii și universitarii, alături de practicieni, trebuie să se întâlnească în mod constant, să aibă un dialog profund, deschis, în urma căruia să formuleze idei noi și propuneri pentru îmbunătățirea cadrului politic, administrativ, economic, social și moral al țărilor lor, plecând de la o analiză clară și completă a realității.¹

Conferința Internațională Smart Cities, ediția a șaptea, 2019, care și-a propus să reunească laolaltă oameni de știință din structura academică, cercetători, cadre didactice universitare, doctoranzi, studenți și nu în ultimul rând, practicieni ai dreptului, pentru a face schimb și a împărtăși experiențele și rezultatele lor de cercetare cu privire la cele mai diverse aspecte legate de reformarea legislației în spiritul noilor curente naționale, europene și internaționale, pentru discutarea problemelor de actualitate, care afectează comunitatea juridică, urmărind să evidențieze noi interpretări, dar și pentru a propune soluții, a fost un bun prilej

pentru autorul acestor rânduri de a spune ceea ce gândește, poate altfel decât alții, preocupați mai mult de starea lor decât a comunității din care fac parte. Și asta întrucât trăim într-o lume în care sistemele juridice interferează tot mai mult, iar tradiția juridică necesită o upgradare perpetuă pentru a răspunde diversității. Studiul nostru pleacă de la ideea că legea nu se dezvoltă abstract, ci este modelată de societate, de realitatea economic-socială, de medii intelectuale, culturale și lingvistice, dar mai ales de necesități imediate, de imprimarea unor soluții adecvate.

După decembrie 1989, România a avut nevoie de o schimbare a paradigmei de dezvoltare pentru a face față provocărilor secolului XXI întrucât era obligată să evolueze într-o perioadă marcată de procesul de globalizare, de accentuare a inegalităților și de agravare a problemelor umanității. Dreptul administrativ național ar fi putut fi una dintre soluții, propunând o cooperare administrativă interstatală bazată pe principiile respectării suveranității și identității naționale în cadrul unei Uniuni Europene prospere și revigorate. Suveranitatea națională reprezintă, în contextul românesc, dorința realizării unui echilibru, o sinteză între aspirațiile cetățeanului născut liber, societatea de care depinde și prin care se definește și contextul care permite realizarea de sine. Acest echilibru pornește de la om, actor central care caută un echilibru individual și condiții favorabile pentru a se realiza. Condițiile favorabile sunt influențate de societatea care trebuie să îl susțină și să îl motiveze și de mediul prin care se regăsește și își poate găsi echilibrul. Rolul statului în contextul globalizării și implicit al europenizării este să ajute la realizarea acestui echilibru, nu doar pentru cetățenii de acum, dar și pentru generațiile viitoare. Iată de ce fiica mea vreau să aibă ocazia să construiască un viitor sigur în România; să studieze, să se implice în țara sa și să-și întemeieze o familie. Și pentru aceasta, cred că noi cetățenii, trebuie să preluăm controlul asupra ceea ce se întâmplă în România noastră. Vreau o Românie sigură unde dreptul administrativ - material și procedural - să facă parte din viața de zi cu zi. Protecția cetățenilor trebuie să reprezinte prima prioritate. Trebuie consolidată administrația și îmbunătățit sistemul judiciar. Suntem unul din ultimele state ale Uniunii Europene care nu are un cod de procedură administrativă în condițiile unei europenizări accentuate a dreptului administrativ. Dar să nu uităm că în SUA Codul de procedură administrativă a fost elaborat de profesori apoi prezentat Guvernului spre aprobare.

Apropo de SUA, recent, pe 24.09.2019, la ONU, Donald Trump a surprins cu un discurs naționalist în care afirma că „Viitorul aparține patrioților. Viitorul le aparține națiunilor suverane și independente, care-și protejează cetățenii, își respectă vecinii și onorează diferențele care fac fiecare țară specială și unică.” În legătură cu disputa naționalism/patriotism vs globalism, președintele american spunea „Dacă vreți democrație, păstrați-vă suveranitatea! Dacă vreți libertate, fii mândru de țara ta! Dacă vreți democrație, păstrează-ți suveranitatea! Dacă vreți pace, iubește-ți națiunea! Viitorul nu aparține globaliștilor! Viitorul le aparține patrioților. Viitorul le aparține națiunilor suverane și independente, care-și protejează cetățenii, își respectă vecinii și onorează diferențele care fac fiecare țară specială și unică Când îți deschizi inima pentru patriotism nu este loc pentru prejudecată. Viitorul nu aparține globaliștilor. Biblia spune: „ce bine și plăcut este când oamenii lui Dumnezeu trăiesc împreună în unitate”: greșesc politicienii care susțin globalismul în detrimentul suveranității naționale; structurile naționale trebuie protejate, nu înlocuite de unele suprastatale!

De aceea noi, în Statele Unite, ne-am angrenat într-un program captivant de înnoire națională. În tot ceea ce facem, ne concentram să le mobilizăm visurile și aspirațiile cetățenilor noștri. Globalismul a exercitat o atracție religioasă asupra liderilor din trecut, atunci făcându-i să-și ignore propriul interes național. Dar în ceea ce privește America, duse în istorie sunt acele zile”.

În condițiile în care, Uniunea Europeană tinde spre federalizare – pasul spre globalizare, iar SUA spre un naționalism accentuat, România încotro? După 1989, an care a marcat sfârșitul Războiului Rece, oamenii se pare că au luat decizii corecte prin care a fost soluționat pașnic conflictul dintre superputeri. Acum lumea a devenit tot mai complexă, iar oamenii nu conștientizează cât de puține lucruri știu despre ceea ce se petrece. Și din această pricină, obiectivul acestui studiu este de a stârni o dezbatere care să coopteze specialiști în domeniul dreptului și al științelor administrative și se dorește a fi un for de analiză a noilor direcții de cercetare cu privire la adoptarea Codului de procedură administrativă în patria noastră unde se resimte acut această nevoie a proceduralizării din mai multe direcții: administrația publică, judecătoria de contencios administrativ și practicienii dreptului administrativ. „Există un remediu care, în câțiva ani, ar face Europa liberă și fericită. Acesta presupune recrearea familiei europene, cel puțin în măsura în care acest lucru este posibil, și dotarea ei cu o structură care să-i poată permite să trăiască în pace, siguranță și libertate. Trebuie să construim ceva de tipul Statelor Unite ale Europei”, spunea Winston Churchill într-unul dintre faimoasele sale discursuri, și anume cel de la Universitatea din Zurich, în 1946. Acest „remediu” despre care vorbea prim-ministrul Marii Britanii, s-a materializat în 1951, când ministrul de externe francez, Robert Schuman, a propus crearea unui autorități supranaționale, care să controleze producția de cărbune și oțel a Germaniei și Franței. Scopul evident al acestei inițiative era evitarea unei noi conflagrații mondiale prin stabilizarea relațiilor dintre cele două state, „reducând temerile Franței față de posibilele amenințări militare din partea Germaniei și legându-le printr-un cadru limitat de cooperare pașnică”².

În ceea ce privește România, suntem de părere că obiectivele principale care au condus la decizia de a deveni membru al UE și care guvernează, în continuare, politica privind relația noastră cu Uniunea au fost, sunt și vor rămâne creșterea nivelului de trai, a standardelor economice, sociale și politice și dezvoltarea statului sub aspectul influenței în Europa. România, astfel cum am menționat și mai sus, face parte din categoria țărilor care se adaptează, fără a se opune. La întrebarea Quo Vadis? încercăm un răspuns, care, deși este scurt, este departe de a fi unul simplu. Marea Britanie se întoarce la spiritul ce i-a impulsionat orientarea în 1957, iar România își dezvoltă potențialul de acțiune și influență, respectând pașii impuși.³ Aderarea României la Uniunea Europeană la 1 ianuarie 2007 a constituit momentul de cotitură către o altă societate, altă economie și altă viață pentru cetățenii români care au devenit europeni. Dincolo de mirajul unei vieți în bunăstare, pace, liniște și armonie cu toți cetățenii europeni, viața concretă și evoluțiile în plan european și global au demonstrat că România nu a beneficiat de același tratament față de restul statelor europene. Europa „cu două viteze” a fost la început doar o imagine care era combătută vehement în unele cancelarii europene, pentru ca pe măsură ce anii au

trecut să se contureze tot mai mult realitatea tratamentului diferențiat alocat României.

În acest sens, opiniile politice exprimate atât în forurile europene, dar mai ales pe culoarele instituțiilor europene demonstrează că, începând chiar de acum, Europa trebuie să-și regândească multe dintre politicile sale privind mai ales activitatea economică. Europa „cu două viteze” a funcționat inclusiv în privința participării statelor membre la Zona Euro. Zona a fost creată în 1999 de unsprezece țări, la care s-a alăturat Grecia în 2001, Slovenia în 2007, Cipru și Malta în 2008, Slovacia în 2009, Estonia în 2011, Letonia în 2014 și Lituania în 2015.⁴ Mark Twain recomanda „Stai departe de oamenii care îți micșorează ambiția.” România e depus toate eforturile în drumul ei european să performeze în condiții teoretic egale, practic complet inechitabile. Iar actualul președinte american Donald Trump spunea: „Fii atent pe cine calci când urci, că vei întâlni aceiași oameni la coborâre.” Și adoptarea euro este o provocare permanentă pentru statele din zona euro, dar și pentru restul statelor europene, indiferent din categoria din care fac parte: îndeplinesc condițiile, dar nu vor în zona euro; vor, dar nu îndeplinesc condițiile; nici nu vor, nici nu pot; și ultima categorie pot, dar nu vor! De ce ar avea nevoie stat, sau Uniunea Europeană, în ansamblul său? Cred că de un *soft law* care să le permită adaptarea mai rapidă a ordinii lor juridice la realitățile sociale de la care s-au cam depărtat elitele de la Bruxelles ori București.

2. Despre *soft law* în ordinea juridică și instituțională a Uniunii Europene

2.1. Chestiuni precizatoare

Încercarea noastră de abordare a necesității cercetării interdisciplinare a administrației publice la care suntem tentați să purcedem, dat fiind faptul că toți suntem interesați să fim cât mai bine administrați, se lovește de neputința decidenților politici. Așa că vom trece direct la a spune că acest concept - *soft law* - a fost folosit în doctrina de specialitate, dar și în cadrul instituțiilor politice, printr-o gamă largă de tehnici și sensuri, plecând de la baze foarte diferite chiar pentru susținătorii ideii conform căreia există puține afinități ale *soft law* cu dreptul, unde caracterul fictiv al noțiunii de reprezentare a căpătat alte conotații cu totul străine doctrinei juridice a dreptului tradițional. Mai clar, caracterul fictiv al ideii de reprezentare nu a atras atenția atâta timp cât a durat lupta democrației împotriva autocrației. Dar imediat ce principiul parlamentar s-a impus din plin, a devenit practic imposibil să nu iasă în evidență ficțiunea pe care o comporta teza reprezentării și anume aceea că Parlamentul nu reprezintă în sine nimic altceva decât un organ care reprezintă poporul și ale cărui acțiuni trebuie să reflecte strict doar voința poporului. Ceea ce trebuie să înțelegem este că poporul nu-și epuizează puterea odată cu alegerea reprezentanților și nu este doar un organ de creație. Alegerile stabilesc între reprezentanți și popor un raport juridic de drept constituțional care presupune drepturi și obligații reciproce și care implică inclusiv o legătură de dependență politică prin care reprezentanții, se găsesc sub controlul efectiv și permanent al alegătorilor. Termenul democrație este frecvent utilizat în

afara ariei strict juridice. Prin urmare, dobândește o funcție esențialmente teleologică sau ideologică. Astfel, caracterul mai mult sau mai puțin democratic, al UE este invocat politic pentru a susține sau a critica structura europeană, fără o reflexie veritabilă asupra rolului pe care îl poate juca acest concept din perspectiva fundamentelor ordinii juridice unionale sau a funcționării sale. În prezent, este important să se ajungă la un consens asupra definiției juridice a conceptului de democrație înainte de a-l compara cu utilizarea dată termenului în alte domenii.

Înainte de a trece la o analiză mai teoretică, suntem de părere că este necesar să pornim de la funcția de reprezentare pe care se fondează democrația, așa cum este aceasta recunoscută și formulată în textele constituționale, mai exact democrația reprezentativă. Conceptul de „reprezentare” este extrem de cuprinzător în domeniul juridic. Chiar fără a discuta despre aplicațiile sale în dreptul privat, acest concept a putut fi folosit, în cadrul instituțiilor politice, printr-o gamă largă de tehnici și sensuri, plecând de la baze foarte diferite. Originile reprezentării sunt vechi: cu mult înainte de revoluția din SUA și revoluția franceză, vechile monarhii europene și republicile urbane creaseră baza teoretică și funcțională a regimurilor reprezentative care nu se nășteau din principiul democratic. Monarhia franceză în așa zisul Vechiul Regim cunoștea un sistem de reprezentare organică în care persoana regelui întruchipa Statul, așa cum rezulta din faimoasa expresie a regelui Ludovic al XIV-lea. Cu toate acestea, Carl Schmitt ne avertiza că trebuie să nu confundăm această noțiune transcendentă de „reprezentare” (*Repräsentation*) aplicabilă monarhiilor din Vechiul Regim cu conceptul său funcțional (*Stellvertretung*) valabil în democrația modernă și care îmbracă o conotație tehnică și materialistă.⁵ Numai că aceste aserțiuni se produceau cu ceva timp în urmă. Acum lucrurile, contextul general, internațional și european, este cumva schimbat! Cum? Vom încerca să-l creionăm.

2.2. Despre caracterul democratic al instituțiilor Uniunii Europene

După cum este acceptat, se susține că democrația ar cunoaște actualmente noi forme, un exemplu în acest sens fiind democrația participativă. În fapt, referirea la această noțiune tinde în prezent să înglobeze problematica protecției drepturilor fundamentale, deși aceste două noțiuni nu sunt neapărat de același tip. Una dintre întrebările ce se ridică este, totuși, legată de măsura în care aceste așa zisele noi forme de democrație, democrația participativă, calificată a fi substanțială este într-adevar fondată pe valori și nu constituie, în fapt, sisteme concurente ale democrației reprezentative, a cărei legitimitate și funcție legitimantă vor fi reduse în viitor precum în cazul Parlamentului European. Antagonismul sesizat de Carl Schmitt între conceptul transcendent și cel funcțional, nu epuizează conceptul juridico-politic al reprezentării. Ele ar constitui mai degrabă două extreme între care am mai putea identifica forme vechi și forme moderne ale reprezentării care au propria lor logică și propriile fundamente. Acest lucru se aplică pentru vechile „state” sau „ordini” pe care le găsim în forme destul de asemănătoare în majoritatea țărilor europene și care s-au perpetuat mult timp în secolul XIX. Una din trăsăturile comune ale acestei forme de reprezentare era exercitarea mandatului imperativ care lega

reprezentanții de electorii lor și care îi priva în consecință de realitatea unei puteri deliberative veritabile.

În general, această manifestare a independenței adunărilor față de corpul electoral este cea care marchează debutul instituțiilor reprezentative moderne în sensul că acestea permit diferențierea lor de formele vechi îmbrăcate de adunările de stat. Noțiunea modernă de reprezentare, are drept corolar și fundament în același timp o teorie a suveranității Parlamentului care se impusese în Anglia odată cu revoluția din 1688 – sau o teorie a suveranității naționale – cea susținută de Revoluția Franceză și mai ales de Constituantă – ale căror consecințe, în ciuda diversității evenimentelor și instituțiilor, sunt similare: ele stabilesc „o democrație fără popor”⁶. Această consecință nu este inevitabilă în sine. În Marea Britanie a reapărut teoria „mandatului” în legătură cu o concepție democratică a dreptului de dizolvare, iar extinderea sufragiului și în final nașterea votului universal, într-un context de bipartism, tind gradual să dea poporului dreptul de a-si alege guvernării. Ar putea fi acesta un reper sau un motiv al Brexitului? Lăsăm avizaților și distinșilor noștri cititori să dezvolte ideea. În Franța, Constituția din 1958 s-a detașat total de dogmele suveranității și intangibilității adunărilor care caracterizau „republica deputaților”. Rămâne adevărat însă că această concepție, proprie democrației liberale clasice, a reprezentării „de tip filtru”, această noțiune elitistă sau cel puțin oligarhică a reprezentării, precum în cazul Uniunii Europene, nu este un simplu produs al istoriei. Chiar structura însăși a reprezentării comportă cu sine oligarhia, chiar și atunci când conotațiile aristocratice au dispărut sub presiunea guvernării de factură modernă condiționată de mijloacele de comunicare în masă. De aici întrebarea: este această tendință contrară prin natura sa principiului democratic?¹ Cea mai celebră critică adusă conceptului de reprezentare aparține lui J.J.Rousseau: „Voința nu poate fi reprezentată; voința este voința sau e altceva. Nu există cale de mijloc”⁷.

Aceeași idee este repetată de Kelsen: „Cât de puține afinități are ideea de reprezentare cu principiul democratic, de acest lucru ne dăm seama din faptul că autocrația se servește de aceeași ficțiune”. Această noțiune de „ficțiune” se regăsește frecvent din moment ce denunță nu numai contradicțiile dintre democrație și reprezentare, dar și caracterul utopic al democrației în sine. Kelsen constata că „Teoria reprezentării are rolul de a legitima Parlamentul din perspectiva suveranității poporului. Însă această „ficțiune evidentă”, menită să ascundă prejudiciul real și considerabil adus ideii de libertate cauzat de parlamentarism, nu a mai reușit în timp să-și îndeplinească funcția; în schimb, a furnizat adversarilor democrației argumentul conform căruia democrația se bazează pe o afirmație de o falsitate flagrantă. Caracterul fictiv al ideii de reprezentare nu a atras atenția atâta timp cât a durat lupta democrației împotriva autocrației. Dar imediat ce principiul parlamentar s-a impus din plin a devenit practic imposibil să nu iasă în evidență ficțiunea pe care o comportă teza reprezentării și anume aceea că Parlamentul nu este în sine nimic altceva decât un organ care reprezintă poporul și ale cărui acțiuni trebuie să reflecte strict doar voința poporului. Nu e de mirare astfel că printre argumentele aduse în zilele noastre împotriva parlamentarismului, un argument de prim rang este revelația faptului că voința de stat degajată de parlament nu reprezintă absolut deloc voința poporului și că parlamentul nu poate exprima voința

poporului din simplul motiv că, așa cum prevăd constituțiile statelor parlamentare, poporul nici nu poate să-și exprime o voință – în afără de cea referitoare la alegerea parlamentului”.⁸

Critica democratică a regimului reprezentativ, asimilată de Kelsen regimului parlamentar, a fost dezvoltată în Franța de Carré de Marlberg, care la rândul lui face distincția între regimul reprezentativ și regimul parlamentar. El opune regimului reprezentativ, caracterizat de puterea absolută și imunitatea adunării alese, regimul parlamentar care implică, mai ales prin jocul dizolvării, necesitatea unei uniuni și a unui acord permanent între aleși și alegători și admite o combinație cu procedurile democrației directe. Pe lângă această critică pozitivă care tinde spre reformismul instituțional, trebuie să menționăm criticile radicale care se nasc frecvent la adresa problemei „fiecțiunii” și anume cele care insistă asupra caracterului utopic al puterii exercitate de așa-zisul popor „suveran” în sistemul reprezentării politice: mecanismul său de bază, votul universal, ar fi astfel orientat „împotriva democrației”.⁹ Este lesne de înțeles că democrația directă, cu excepția colectivităților de mici dimensiuni, nu poate fi adaptată la dimensiunea și diversitatea atribuțiilor statului modern precum în cazul special al UE despre care nu se poate susține că este un stat în sensul tradițional al noțiunii. Din acest motiv reprezentarea apare ca o necesitate obiectivă. Sieyès, care a făcut cele mai interesante și profunde observații la adresa teoriei reprezentării, a argumentat necesitatea și utilitatea reprezentării printr-o comparație convingătoare atunci când a afirmat că a nega sistemul guvernării reprezentative e ca și cum ai vrea să convingi cetățenii care doresc să trimită o scrisoare undeva, că libertatea lor absolută ar fi mai bine aparată dacă și-ar duce singuri scrisorile la destinație. Însă această constatare evident reală nu poate elimina criticile menționate mai devreme: reprezentarea este inevitabilă, dar nu și democratică, ea este și ficțiune și utopie în același timp. Această teză a reprezentării care poate fi fundamentată din punct de vedere social, nu este însă justificată și din punct de vedere juridic. În acest sens putem observa că teza lui J.J.Rousseau, se bazează pe un raționament care se îndepartează de cel juridic, confundând-se punctul de vedere juridic cu cel psihologic. Ideile sale cu privire la reprezentare conțin o contradicție deoarece ele sunt incompatibile cu teoria sa privind voința generală care nu constituie un cumul al voințelor individuale, ceea ce înseamnă că fiecare deputat nu reprezintă voința celor care l-au ales, ci cea a întregului popor.

În democrația directă, poporul constituie organul politic colegial suprem al statului, iar identitatea între guvernanți și guvernați este totală. Rezultă din cele de mai sus că dreptul de a alege, deci dreptul electorilor s-ar reduce la a participa în procesul de înființare al unui alt organism care este mandatat cu puteri care înainte reveneau colectivității de cetățeni în mod direct. Adunarea devine astfel organul voinței poporului. În democrația directă, la fel ca în democrația reprezentativă, poporul este organul statului, însă în primul caz voința acestui organ aparține poporului ca atare, iar în al doilea caz voința aparține unui organ creat de popor. Prin urmare fiecare deputat reprezintă poporul în ansamblu în sensul că acesta concurează la formarea voinței poporului iar organele reprezentative devin astfel, conform terminologiei folosite de juristul german Jellinek, organe secundare, adică organe ale unui organ primar al statului care este poporul; în sens strict juridic acea parte reală a poporului căruia constituția îi garantează dreptul la vot.

Este adevărat că plecând de la această bază, principiului reprezentativității i-ar putea lipsi fundamentul democratic din momentul în care admitem că reprezentarea antrenează, cedarea drepturilor poporului către reprezentanți. Ceea ce trebuie să înțelegem este, însă, că poporul nu-și epuizează puterea odată cu alegerea reprezentanților și nu este doar un organ de creație iar alegerile stabilesc între reprezentanți și popor un raport juridic de drept constituțional care presupune drepturi și obligații reciproce și care implică inclusiv o legătură de dependență politică prin care reprezentanții, se găsesc sub controlul efectiv și permanent al alegătorilor. Din momentul în care se recunoaște corpului electoral puterea de a-și alege reprezentanții, și mai ales din momentul în care această alegere nu are valoare decât pentru un timp determinat și este din nou pusă în discuție periodic, înseamnă că acestui corp electoral îi conferim neaparat o putere de decizie care depășește cadrul strict al alegerii persoanelor. Această putere poate fi întărită în viziunea lui Carré de Marlberg de către factori pur politici, dar și de către instituțiile juridice destinate a garanta un caracter democratic regimului reprezentativ: dizolvarea anumitor proceduri ale democrației directe, cum ar fi referendumul abrogativ care permite verificarea conformității dintre voința reprezentanților și cea a reprezentaților.¹⁰ Kelsen a imaginat reabilitarea mandatului imperativ sub o formă modernă prin măsuri care țin mai ales de mitul constituțional cum ar fi desființarea imunității parlamentare sau controlul radical al partidelor asupra deputaților. Acest tip de măsuri vizau reformarea regimului reprezentativ, însă tindeau mai puțin către democratizare și mai mult către limitarea puterii partidelor a căror funcționare era considerată de Kelsen ca fiind una nedemocratică. La fel de adevărat este că dacă democrațiile contemporane nu sunt decât reprezentative, ele sunt reprezentative fără a respecta adevărata teorie a reprezentării.

Vechea concepție zisă de tip aristocratic, care interzicea mandatul imperativ, supraviețuiește prin unele din atributele sale juridice care mai există încă, ceea ce înseamnă că de fapt, practic, o nouă concepție nu s-a impus. „Ceea ce a mai fost, aceea va mai fi, și ceea ce s-a mai întâmplat se va mai petrece, căci nu este nimic nou sub soare, așa cum ne amintește de fiecare dată Ecclesiastul! S-ar putea susține cel mult că noțiunea de reprezentare tinde să dispară în favoarea celei de reprezentativitate – o noțiune de natură nejuridică dar benefică din perspectiva criteriilor democrației directe departe de principiile dreptului natural reflectate în noua ordine juridică unională constituită urmare a unui proces normativ al Uniunii care a evoluat foarte mult, de la reglementările de natură preponderent economică, până la noile reglementări juridice europene având trăsături specifice, care îmbogățesc sensurile și semnificațiile lor. Un drept instituțional al Uniunii a fost creat, cu tot ceea ce implică acest lucru: izvoare de drept, principii definitorii și reglementări care conturează o ordine juridică specifică. Dreptul unional reglementează raporturile juridice din cadrul Uniunii Europene, dar și dintre Uniune și Statele Membre, subliniază statutul instituțiilor Uniunii, definind totodată atribuțiile și competențele sale. Prin instrumente legislative variate și prin jurisprudența creatoare a Curții de Justiție a Uniunii Europene, treptat, au fost create un:

- *Drept unional instituțional* care cuprinde totalitatea normelor juridice care reglementează structura și funcționarea organelor Uniunii Europene;

- *Drept unional material* care cuprinde totalitatea normelor juridice care fixează obiectivele Uniunii și măsurile prin care acestea sunt aduse la îndeplinire;
- *Drept unional procesual* care cuprinde totalitatea normelor juridice care reglementează procedurile dreptului Uniunii Europene.

Astfel, dreptul instituțional, material și procesual al Uniunii Europene au conturat o ordine juridică specifică în care regulile de drept instituțional reglementează în principal aspecte ca: domeniul de aplicare a tratatelor, revizuirea lor și aderarea de noi state, personalitatea juridică a UE, organizarea instituțiilor europene, funcțiunile și atribuțiile lor, precum și relațiile dintre ele. Regulile de drept material se referă în principal la exercitarea atribuțiilor organelor de elaborare a politicilor naționale și administrative prin intermediul instituțiilor europene în scopul aplicării dreptului Uniunii, fie printr-o acțiune, fie printr-o inacțiune. Ele privesc totodată stabilirea unor norme de conduită pentru persoanele care intră în sfera de influență a dreptului Uniunii. Diversitatea raporturilor juridice acoperite de dreptul unional conduce și la diversitatea naturii litigiilor sau acțiunilor cu care CJUE poate fi sesizată. Se pot distinge, astfel, mai multe tipuri de proceduri, care conturează încetul cu încetul un drept procesual al Uniunii Europene, și care ne trimit cu gândul la un drept procesual în materia dreptului administrativ vizând procedura acțiunilor directe în fața Curții de Justiție; a acțiunilor preliminare în fața Curții de Justiție; procedurile speciale în fața Curții de Justiție; în căile de atac în fața Curții de Justiție; a Tribunalului; și a Tribunalului Funcției Publice. Și toate acestea în condițiile unui transplant nereușit al dreptului natural în ordinea juridică unională, așa cum vom vedea, mai departe.

2.3. Despre un transplant nefericit al dreptului natural în ordinea juridică unională

După cum este îndeobște cunoscut, în modernitate, termenul de drept natural are multiple ocurențe, constituind adesea un substitut accesibil și util pentru conceptul de drepturi ale omului. Întocmai categoriei de drept natural, drepturile omului sunt inalienabile, devenind concepte centrale ale lumii moderne. În paradigma modernă, drepturile naturale ale subiecților nu sunt condiționate nici de contextul social, nici de apartenența indivizilor la o societate constituită. Statornicindu-i subiectului juridic autonomia, modernitatea stabilește subiectul uman ca punct central al dreptului, înțeles atât ca sistem, cât și ca prerogativă a persoanei. Bjarne Melkevik oferă o descriere a sensului juridic al modernității: „modernitatea juridică face referire, în mod exclusiv, la posibilitatea pe care o are un subiect de drept de a se recunoaște pe sine, în raport cu alte subiecte de drept, ca o instanță de explicare și împlinire a dreptului. Cu alte cuvinte, subiecții de drept trebuie să fie capabili, în mod total autonom, să se recunoască reciproc atât ca autori cât și ca destinatari ai legilor lor, ai normelor lor și ai instituțiilor lor politice și judiciare”¹¹.

Filosofia contemporană a dreptului se raportează la două concepții fundamentale despre dreptul natural: o concepție premodernă și una modernă. În sens social și politic, concepția premodernă a sistemului juridic instituie legea prin reproducerea ordinii naturale, pe câtă vreme cea modernă instituie legile pentru a

garanta drepturile naturale nu doar ca obligații, ci și ca libertăți.¹² Desăvârșirea concepțiilor anterioare despre dreptul natural survine odată cu proclamarea contemporană a drepturilor omului. Concepția potrivit căreia în virtutea faptului că indivizii sunt ființe umane, ei dețin, în mod natural, anumite drepturi considerate ca fundamentale, stă la baza ideii de drepturi ale omului. Deci, fără a ține seama de ideea de cetățenie, de apartenența la un stat sau de legile sau reglementările contingente ale diverselor societăți, drepturile omului au ca fundament obligația de a respecta demnitatea oricărui individ în virtutea faptului că se naște ca ființă umană. Ceea ce particularizează ideea drepturilor omului rezidă în împletirea câtorva elemente diferite din paradigma clasică și din cea modernă a dreptului natural. Cu alte cuvinte, ideea drepturilor omului preia din paradigma juridică antică concepția că orice lege trebuie să își întipărească în esență o legitate naturală. Din paradigma juridică modernă ideea drepturilor omului preia logica instituirii civile a legilor, pornindu-se întotdeauna de la principiul raționalității. Prin urmare, faptul că toți indivizii se nasc ca ființe umane reprezintă, în sine, o virtute în baza căreia egalitatea între oameni poate fi instituită, exact așa cum se instituie drepturile pozitive, în mod oarecum artificial, ca naturală¹³.

Dificultatea de a utiliza modelul drepturilor naturale pentru a explica fundamentele drepturilor omului, precum și scopul sau modul în care acestea se pot constitui drept ghid pentru acțiunile umane concrete generează multiple dezbateri ce animă astăzi domeniul filosofiei dreptului. Originarea drepturilor omului în cele două variante ale dreptul natural, respectiv în cea clasică și în cea modernă a fost criticată sau chiar contestată, făcându-se o distincție între drepturile omului și drepturile naturale. Chiar cu miza de a verifica dacă între cele două există, totuși, caracteristici comune în ciuda aparentelor diferențe. În mod cert, faptul că aplicarea și respectarea universală a drepturilor omului este încă deficitară poate fi un indiciu al fragilității fundamentelor lor. Iată de ce, problema fondării drepturilor omului în ordinea juridică a UE rămâne, încă, incomplet elucidată. De ceea, în textul de mai jos sunt explicate resorturile esențiale ale mecanismului ce pune în mișcare una din cele mai importante activități juridice: transplantul de drept în general, și transplantul de drept unional în particular. Disputa privind situația transplantului dreptului UE în România a scindat lumea juridică în două: într-o parte cei care susțin dezvoltarea unui program de transplantare autohton - demersurile fiind demarate încă de la începuturile preaderării patriei noastre la Uniunea Europeană, Ministerul Justiției lucrând mult în acest sens, dar blocate financiar de situația specifică a României, iar în cealaltă parte, cei care afirmă că România nu este încă pregătită pentru transplantul dreptului, militând pentru trimiterea la originile ancestrale ale dreptului român. Dincolo de utilitatea evidentă a unui astfel de demers, care ar elimina dependența de multinaționalele occidentale, păstrând și prețioasele odoare juridice pentru cetățenii români, dar și dincolo de avertismentul bine-intenționat al subsemnatului, care este convins că transplantul dreptului unional ne-a prins nepregătiți.

Tot ceea ce afirm acum se bazează pe experiențele mele, trăite în ani, lângă românii din țară și din străinătate, pe dialogurile cu mulți specialiști din sistemul nostru judiciar defectuos. Lumea trebuie să știe că dreptul român trece peste o mare

suferință, provocată de un transplant de drept nefericit făcut pentru o anumită elită politică ruptă de realitate. Ei, decidenții știu pașii, hibeles și cum se pot umple golurile și au țesut în juru-i o plasă de fapte, greu de contestat, fiindcă tot ce fac li se pare că e necesar. Cred că nu au fost aleși liderii curați, ei au țesut și prin intermediul dreptului, un păienjenis care a devorat și va devora orice intrus. Și mai cred că lipsește ceva sistemului juridic românesc ca să devină apropiat de cel german: organizarea și administrarea precum în Germania. Sunt soluții pentru probleme și în România, fără a avea pretenția că în final se va obține un sistem perfect, doar unul funcțional, care să răspundă necesităților majorității cetățenilor. Unele dintre condiții ar fi ca la nivel decizional să se acționeze pe bază de principii corecte, unanim acceptate, să se promoveze o competiție reală în sistemul românesc, performanța trebuie recompensată iar erorile sancționate.

Nu în ultimul rând, trebuie să se conștientizeze de către fiecare persoană că așa nu se mai poate merge înainte. Lipsa banilor în sistem este o problemă cu care se confruntă toate statele. Resursele financiare sunt importante, dar ele nu pot fi nelimitate și în orice caz nu pot suplini deficitele de performanță managerială. Pentru starea actuală a sistemului nu trebuie acuzați exclusiv politicienii sau factorii de decizie. Schimbarea se poate face doar dacă toți partenerii doresc cu adevărat acest lucru. Și mai este ceva foarte important: să consultăm oamenii cu experiență în profesie, oameni care au făcut ceva palpabil și ale căror rezultate vorbesc de la sine, care au demonstrat că rămân curați, lideri adevărați ce pot rupe păienjenisul de pe România! Diferența dintre a refuza să-ți cultivi propria gândire și a infesta cu microbul aberației gândirea altora este exact ca diferența dintre dreptul nostru român și dreptul UE, mai ales din perspectiva celui soft law al Uniunii Europene.

2.4. Semnificația, obiectivele și funcțiile soft law în dreptul Uniunii Europene

Jurgen Schwarze a publicat în Revista Română de Drept European nr. 1 din data de 31 martie 2014 articolul intitulat *Soft Law în dreptul Uniunii Europene*. Pornind de la o analiză simplă, este evidentă antiteza inerentă noțiunii de *soft law* (eng. *lege moale*), care pare să contrazică însuși caracterul imperativ al legii. Cu toate acestea, soft law-ul este foarte des întâlnit în cadru internațional, iar UE nu face excepție. Pentru a analiza, însă, ponderea unor astfel de norme în spațiul unional, se cere o examinare preliminară a conceptului. Astfel, din perspectiva lui F. Snyder, *soft law*-ul desemnează reguli de conduită care, în principiu nu au putere obligatorie, dar care pot avea efecte practice. Ele au fost poziționate de alți autori într-o zonă *gri*, la limita dintre lege și politică. Desi aceste dispoziții sunt orientative, din perspectiva emitenților, trebuie să li se acorde o relevanță juridică. În ceea ce privește UE, trebuie să opereze o distincție între soft law de natură administrativă, și soft law cu impact instituțional sau constituțional, relevant în relațiile dintre organele Uniunii și statele membre. Această diferențiere este relevantă din perspectiva scopului actelor de soft law. În acest sens, cele de natură administrativă urmăresc oferirea unui plus de siguranță juridică subiecților de drept, iar cea de a doua categorie este destinată domeniilor în care Uniunea nu are competență de reglementare. De asemenea, în funcție de intențiile organelor emitente, actele

de *soft law* pot avea fie o funcție de concretizare sau explicativă, fie una pregătitoare sau intermediară.

Cele mai comune manifestări de tip *soft law* la nivelul Uniunii sunt recomandările și orientările. Caracterul neobligatoriu al recomandărilor este consacrat legislativ de TFUE (art. 288), în timp ce orientările dau naștere unui efect care, deși nu este imperativ, permite derogări doar în baza unor motive compatibile cu principiul egalității de tratament. Mai mult, odată ce emite o orientare, Comisia se auto-obligă să respecte conduita pe care o impune, motiv pentru care orice derogare de la aceasta poate constitui o încălcare sancționabilă a principiilor generale de drept. Orientările Comisiei sunt întâlnite cu precăderere în materia aplicării sancțiunilor pentru nerespectarea normelor de dreptul concurenței. În domeniul *soft law*-ului cu impact instituțional, este relevantă metoda deschisă de coordonare, care esențialmente presupune manifestarea unei poziții a Consiliului în virtutea unor obiective comune, în domenii rezervate competenței statelor membre. Cu altă ocazie, Comisia Europeană a garantat, în considerarea îndoielilor existente cu privire la validitatea unor asemenea acțiuni, că în materia actelor de *soft law* Comisia va consulta în prealabil Parlamentul European, atunci când acestea au un caracter pregătitor pentru actele legislative ulterioare. Normele de *soft law* care înlocuiesc norme autentice nu sunt tolerate de ordinea juridică, întrucât organele legislative ale Uniunii nu pot ceda asemenea competențe unui organ executiv.

Soft law apare la nivelul instituțiilor UE în forme diverse și într-o proporție tot mai mare iar normele instituite prin Tratatul de la Lisabona nu exclud utilizarea ca și până acum a acestor instrumente de acțiune. Aceasta nu înseamnă totuși că *soft law* a evoluat la nivelul Uniunii spre o categorie juridică unitară, suficient definită, cu criterii de admisibilitate și cu efecte juridice. Evaluarea juridică trebuie să pornească de la diversele sale forme de manifestare, în care *soft law* apare astăzi în zona gri, situat între drept și politică. Într-o ierarhizare, având în vedere admisibilitatea utilizării lor și efectele pe care ele le produc, se pot distinge următoarele forme de *soft law*: Avem aici în vedere *soft law* sub formă de recomandări și avize, al căror caracter neobligatoriu este prevăzut în mod expres în TFUE (art. 288) și prin care organele UE pot comunica poziția și intențiile lor. *Soft law* de natură explicativă sau concretizatoare a normelor formale poate fi considerat în principiu admisibil, atât timp cât nu depășește cadrul semantic al normelor juridice „autentice”. Îndoilei din punct de vedere juridic apar în momentul în care cadrul recomandărilor și avizelor este depășit, *soft law* având caracter pregătitor pentru acte juridice obligatorii. Merită remarcată intenția instituțiilor Uniunii de a informa pe cei cărora norma li se va adresa cu privire la elementele esențiale ale acesteia. Un astfel de *soft law* este acceptabil însă numai în condițiile în care nu intervine niciun fel de automatism cu privire la reglementările ulterioare, pe care el le pregătește, iar lui nu îi este caracteristică nicio altă formă de constrângere ireversibilă. În orice caz, trebuie asigurată marja de apreciere legislativă la emiterea normelor juridice ulterioare.

Întrucât *soft law* de natură pregătitoare îi este immanentă o anumită forță modelatoare în ceea ce privește normele ulterioare, drepturile de audiere și de participare au o importanță deosebită în cazul acestui tip de legiferare. În consecință, la nivelul statelor membre au fost extinse drepturile de informare ale

parlamentelor naționale și asupra acestei forme de expresie a voinței organelor Uniunii. Nu poate fi tolerat soft law care înlocuiește sau se substituie normelor juridice autentice. Legiuitorul este chemat să reglementeze el însuși elementele esențiale ale unui act legislativ. În afara situațiilor în care delegarea este expres prevăzută, el nu poate ceda aceste competențe unui organ executiv care nu este abilitat să legisla și nici nu poate accepta emiterea unor astfel de norme într-o formă care, precum în cazul soft law, nu are forța obligatorie a unei norme juridice autentice. Unei astfel de abordări i-ar contraveni flagrant dispoziția din dreptul primar potrivit căreia elementele esențiale ale unui act legislativ trebuie stabilite de legiuitor (art. 290 alin. (1) TFUE). Pentru considerentele expuse aici, soft law va avea și în viitor, la nivelul Uniunii, un caracter indispensabil. El va trebui să se situeze, însă, în interiorul limitelor impuse de tratate și de alte acte legislative. Aceasta, pentru că după scopul său dreptul nu dă expresie unor reguli de conduită „moi”, ci impune dispoziții normative imperative. Soft law diferă evident în acest sens. Prin adjectivul „soft” nu sunt doar limitate conținutul normativ și/sau efectele respectivelor norme, ci este relativizată în totalitate forța validității și obligativității acestora. Nu întinderea limitată a domeniului de aplicare caracterizează așadar soft law, ci validitatea sa în întregime redusă. Nu este de mirare, în aceste condiții, că statutul de categorie juridică al soft law, care își are rădăcinile în dreptul internațional, este în continuare puternic contestat. Pentru dreptul Uniunii Europene problema contradicției interne, inerente soft law, dintre drept (law) și validitate atenuată, flexibilă (soft) are o însemnătate deosebită, aici făcându-se uz, în cele mai variate forme, în foarte mare măsură de norme aflate sub pragul valabilității normative imperative.

2.5. Caracteristici comune ale formelor de existență ale soft law în dreptul UE

Pornind de la diversele forme de existență, se pot extrage anumite caracteristici care definesc soft law la nivelul UE. Situația predominantă, în acest context, o constituie soft law emis de către Comisia Europeană sau de către Consiliu, singur sau în cooperare cu Parlamentul European. În orice caz, ca regulă, va acționa un organ al UE. Reglementările emise de către aceste organe nu produc în sine în mod direct efecte juridice, ele nefiind totuși pe deplin irelevante din punct de vedere juridic. În literatura de specialitate se vorbește de aceea și despre „forme moi de îndrumare”. Ele nu pot fi impuse direct, neconținând nicio dispoziție susceptibilă de punere în executare. Mai departe, se poate constata o altă trăsătură comună diferitelor variante de soft law al UE, anume aceea că ele nu descriu doar anumite împrejurări sau un status quo, ci, mai mult decât atât, ele conțin reguli de conduită, în anumite cazuri obligații de conduită sau așteptări de conduită respectiv repere de orientare. Ele se caracterizează printr-un anumit raport cu dreptul respectiv printr-o anumită apropiere față de drept, care au fost definite, în diverse formulări, dar suprapunându-se în ceea ce privește elementele fundamentale ale fondului: În acest soft law ar fi „reguli de conduită, care în principiu nu au putere obligatorie, care însă pot avea efecte practice”. În mod asemănător, D. Thurer înțelege prin soft law „reguli de conduită aflate într-o zonă gri, situate între lege și politică, utilizate de către

autoritățile de stat și organizațiile internaționale pentru a exprima angajamente care reprezintă mai mult decât declarațiile politice, însă mai puțin decât legea în sensul ei strict”.¹⁴

În același sens merg C. Borchardt și K. Wellens: „Soft law unional privește regulile de conduită aflate pe nivelul juridic neobligatoriu, dar cărora, din perspectiva emitenților lor, trebuie să li se acorde o relevanță juridică. Celor de mai sus le corespunde și opinia lui L. Senden, potrivit căreia soft law se referă la reguli „care sunt prevăzute de instrumente cărora nu le-a fost atribuită forța juridică obligatorie, care pot însă produce totuși efecte juridice indirecte și care urmăresc atingerea de efecte practice, putând să producă asemenea efecte”. Nu are importanță dacă acest concept este într-adevăr „în mod conștient ținut imprecis” sau dacă el s-a dezvoltat astfel drept consecință a lipsei unei posibilități de descriere exacte. De altfel, el poate fi utilizat cu dificultate și în calitate de antonim al lui „hard law”. Pentru că antonim al lui „hard law” nu poate fi luat în considerare decât „no law”. Dacă ar trebui localizat, conceptului de soft law ar trebui să i se atribuie o poziție intermediară între cele două extreme, „hard law” și „no law”.¹⁵

Obiectivele urmărite prin soft law în dreptul UE variază în funcție de emitentul și de conținutul lor. Astfel, soft law de natură administrativă are caracter complementar și urmărește adeseori să sporească siguranța juridică a subiecților de drept. În multe situații este vorba de pregătirea viitoarelor norme juridice autentice și de pregătirea cercurilor de persoane cărora aceste norme li se adresează. În sfârșit, organele UE fac nu rareori uz de soft law în dreptul UE pentru că, în absența competenței de reglementare sau din cauza lipsei consensului politic, nu este posibilă adoptarea de drept autentic”.¹⁶ Sunt multiple și funcțiile pe care le îndeplinește soft law. În acest context, depinde de la ce actori emană soft law. Este imaginabil soft law cu motivații executive, precum și soft law cu caracter instituțional sau constituțional, emanând de la organe legislative. Dacă este vorba despre soft law, care se raportează la norme valabile de drept primar sau de drept secundar, acesta poate avea o funcție de concretizare sau explicativă. Dacă este vorba despre reguli de conduită comună neobligatorii, care urmăresc pe termen lung adoptarea unei norme obligatorii, soft law are o funcție pregătitoare sau intermediară. Devine oricum limpede, în acest fel, ce intenții urmăresc organele UE pe termen mediu sau lung. În cadrul cooperării interinstituționale la nivelul UE soft law poate să conducă în sfârșit la o mai bună comunicare între instituții. În intenția de a spori claritatea și securitatea juridică, soft law a cunoscut o nouă reglementare în Tratatul de la Lisabona. În acest context se ridică întrebarea dacă prin această clarificare a actelor juridice obligatorii s-a dorit limitarea sau plasarea într-un plan cât mai îndepărtat a instrumentelor de soft law. Prin Tratatul de la Lisabona s-a dorit conturarea mai precisă a actelor juridice existente, iar nu o renunțare generală la actele juridice nereglementate. Plecând de la subzistenta acestor acte juridice, art. 296 paragraful al treilea TFUE prevede o limitare pentru actele juridice atipice - care diferă de normele de drept autentice - numai în măsura în care Parlamentul European și Consiliul examinează deja un proiect de act legislativ cu un conținut corespunzător. În această situație ele se abțin de la adoptarea de acte care nu au fost prevăzute de procedura legislativă aplicabilă domeniului respectiv. În lumina

acestor prevederi ale Tratatului de la Lisabona se statornicește și dreptul Parlamentului European de a fi consultat și în domeniul soft law, precum și dreptul de informare al parlamentelor naționale în procesul de adoptare a normelor europene, din perspectiva dilemei etice și religioase a dreptului UE.¹⁷

3. Concluzii

Visul unei societăți perfect sincronizate, asemănătoare cu un mecanism de ceasornic, i-a chinuit pe mulți dintre „modernizatorii” care au influențat epoca industrială. Astfel, ceea ce a însemnat taylorismul pentru fabrici a fost leninismul pentru Uniunea Sovietică. Obiectivul era crearea unui stat și a unei societăți care să funcționeze cu eficiența unei mașinării. Fiecare birocratie să acționeze ca un singur om, fiecare individ să se miște la unison cu ceilalți. În realitate, ființele umane și societățile umane sunt sisteme deschise, dezordonate și imperfecte. În viețile și societățile noastre, regiunile de haos și șansă alternează cu regiunile de stabilitate temporară și le dau naștere acestora din urmă. Avem nevoie de ambele. Stabilitatea și sincronizarea oferă gradul de predictibilitate de care avem nevoie pentru a funcționa ca indivizi în grupurile sociale și, mai ales, în cadrul economiei. Fără o anumită stabilitate și o coordonare temporală, viața se reduce la supunerea față de anarhie și șansă. Dar ce se întâmplă când iau puterea instabilitatea și desincronizarea? Într-o lume în care regulile jocului se schimbă și iată că și importanța resurselor se modifică, România vrea să fie elevul sânguinos al UE. Numai că accelerarea schimbărilor sociale și tehnologice sporește dificultatea indivizilor și a organizațiilor de a le face față. Nu trebuie să ne adaptăm, într-un mod sau altul, numai față de schimbare, ci și față de accelerarea propriu-zisă. Chiar însuși ritmul schimbării are efecte cu totul distincte de direcția și conținutul acesteia. A sosit prematur viitorul, societatea industrială a lumii trece printr-o criză generală în care se constată caracterul anacronic al instituțiilor sociale contemporane.

Este necesară o revoluție a modului de gândire, de a face politică și de a ne organiza viața economică și familială, precum și a traiectoriilor de dezvoltare socială care creează înalta probabilitate a unor asemenea revoluții. Fără a ne plasa nici la dreapta, nici la stânga spectrului politic contemporan, și a ne acorda adeziunea niciunui partid sau mișcări politice existente întrucât axa politică stânga/dreapta e tot mai desuetă în națiunile de înaltă tehnicitate iar principalele schisme care fracturează societatea se produc de-a lungul unor falii complet diferite, apreciem că actualul sistem de partide politice și instituții guvernamentale este depășit și solicită imense transformări economice. Sunt oare mișcările politice contemporane anacronice? Tradiționalele conflicte rasiale, religioase, sexuale, de clasă și de vârstă, din societatea noastră, se subordonează cumva unui alt sistem de conflicte, cu rădăcini mai adânci și un impact causal mult mai mare? Sau, dimpotrivă, valurile schimbării sunt ele însele subordonate, desfășurându-se în contextul unor relații și contradicții politice mai familiare? În ce măsură ne pot ajuta analizele lui novatoare să umanizăm viitorul?

Răspunsul la toate aceste întrebări pornește de la premisa că instituțiile noastre sociale existente sunt periculos de inadecvate necesităților epocii și cetățenilor de azi chiar dacă dreptul este maniera în care decidentul dispune

normele care se impun oamenilor, iar e-guvernarea (concept cunoscut și în spatele englezismului e-gov) este una dintre cele mai – dacă nu cea mai – interesantă provocare a Administrației Publice din întreaga lume.¹⁸ UE nu face excepție! Trebuie să fie transformate dacă vrem să supraviețuim vremurilor turbulente care ne așteaptă. Dar ce fel de transformări sunt necesare, sau posibile? Poate societatea noastră să supraviețuiască pe baza inegalității și a exploatării? Sau poate însăși supraviețuirea va presupune un nou nivel de echitate, de participare și de diversitate socială, care să ne îmbogățească tuturor viețile? Din nou, răspunsurile la toate aceste întrebări pot arăta care sunt principalele determinante ale schimbărilor contemporane și încotro ținesc ele în ultimă instanță ori cum putem, în calitate de cetățeni, să înțelegem și apoi să intervenim în aceste procese sociale. Referitor la UE și la ordinea sa juridică, în acest material nu am dorit să rostesc un discurs zguduitor prin dramatismul ideilor, referitor la pericolul dizolvării identității noastre culturale într-o Europă preocupată până la deznădejde de dizolvarea stilului ei de viață ca urmare a ocupării aparent pașnice a spațiului european de către milioane de emigranți. Satanizarea noțiunii de națiune, naționalitate, naționalism de către internaționalismul proletar sau de către political correctness chiar dacă are scopuri diferite, se manifestă cu aceeași violență și are aceleași victime: tradiția, mândria moștenirii din bătrâni și solidaritatea cu cei din neamul tău, neamul însemnând în același timp popor, dar și familie. Metaforic, aș compara situația cu următorul tablou: Suntem într-o mică flotilă - noi ca omenire -, în care se înscrie și bărcuța noastră românească, care din punct de vedere al condiției umane, intră într-o perioadă de mare furtună, de viscole mari. Și când spun asta nu mă gândesc numai la alternativa puritanism, depravare, să zicem, pentru că multă lume se gândește imediat la asta, ci, pe un plan foarte larg, prognozele pentru viitorul imediat al omenirii sunt foarte pesimiste. În această perspectivă «meteorologică - spirituală», deci în fața acestor furtuni, noi, juriștii, suntem un fel de meteorologi, și nu orice meteorologi, din aceia care stau prin birouri sau pe la televiziuni, ci dintre aceia din Vârful Omu. Adică avem ocazia, alături de alții, să observăm, să intuim, să înțelegem, să pronosticăm această intrare în vârtoare și intensitatea furtunii. De ce? Pentru că fiind în interfață cu fenomenul judiciar, care este un senzor important al comportamentului social, noi ca profesioniști simțim, dacă suntem oameni de reflecție, evoluțiile ca gânditori, dar, în același timp, le putem comensura zilnic prin ceea ce se întâmplă în fenomenul judiciar.

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Smart grids: levers towards reducing disparities between cities or targets on the European energy innovation map?

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Abstract

The energy market liberalization in Europe strives to be more than an aggregation of functional energy national systems, but a smart and unified approach to a market subjected to various disparities amongst states. Given that states are characterized by distinctive levels of investments in the innovation sector, as well as the technological one, a swift and harmonized market liberalization seems to be more a desiderate, rather than an actual objective.

The objective of this research is to deliberate and analyse to which extend a smart grid, in its whole mechanics, may reduce the number of disparities between European cities. Moreover, the research will try to depict a smart approach towards implementing successful models of smart grids on markets not yet matured. In this paper I will refine and further deliberate concepts that I have advanced during my Doctoral research in the field of energy market liberalization, but now on a more evolved and in-detail approach; trying to answer to questions such as: is the actual liberalized energy market capable to successfully sustain a smart grid/ smart network approach? And if yes, are the smart consumers enabled to use the advantages, such as smart metering, to full potential?

The main result of this research will be to create a matrix, based on comparative research and case study approach, of existing capabilities on the Romanian energy market versus the European ones, thus advancing further recommendations to future approaches; for example, what would enable consumers to become fully operational as smart consumers and which are the state policies that can transform the energy market in a smart grid enabled one.

Through this paper, I will advance the existing debates concerning the energy market in Romania, but from a more scientific approach, one under the umbrella of the political science approach.

Keywords: energy market, liberalization, smart consumer, smart meter, platforms.

1. Introduction

In a field so vast and so complex such as the energy market, the mere possibility of not adapting to on-going technological advancements would enable on the long run, a greater gap in between consumers' households, areas and, subsequently nations/ Member States of the European Union. The energy policy has always been one of the strong indicators of the development that characterizes a country, and paired with other variables, could depict an useful overview when one wants to understand the disparities amongst states. Still, in an area like the energy policy, implementation *per se* would not be sufficient to ensure stability and competitiveness on the market for any of the actors. All efforts that are deployed in this field, must be accompanied by strong harmonized cross-policy initiatives.

2. Smart Grids: premises for smart development?

Even though the grounds for a more homogenous energy policy can be pinpointed in the overall roll-out of this initiative, 2009 was the year when more activities started to be implemented striving towards achieving an efficient and competitive energy system.

The first one of them was the Third Energy Package that aimed to address the existing disparities which directly influenced the internal energy market, and, on the long run, to improve its overall functionality [1]. Four documents in this initiative can be considered as a starting point for the discussion about the Smart Grids initiative, even though throughout these communication the Smart Grid is not treated as a singular point of discussion, whereas a step (a lever) towards a mean: attaining a coherent and harmonized internal market.

Directive 72/2009 in the field of electricity stressed the importance of Member States as promoters towards modernizing the existing distribution networks with the usage of Smart Grids [2]. Still, the course of this initiative would have been directly impacted by the capacity and the degree of technological development which characterized each state. Moreover, having in mind the impact on the long run, Smart Grids were presented as an alternative solution alongside smart metering, in ensuring energy efficiency and the modernization of the electric system [3]. Again, this approach would have been offset by the attributes of each state, more exactly how mature the national energy market was and to what extent the consumers were able to understand and use, to the best of their advantages, the innovative solutions.

A similar direction was followed when developing Directive 2009/73 in the gas sector. In this document, Smart Grids were presented as a predicament for sustainable development as long as they are part of a complex and comprehensive measures system. Hence, Smart Grids became a solution alongside pricing formulas and intelligent metering systems towards amending the way in which gas was used [4]. Similar to the electricity Directive, Smart Grids were not a singular objective, but a phase in a strategical approach.

As a next phase in a comprehensible roll-out, the Smart Grid Task Force was put in place in order to address and advise in matters concerning the implementation and advancement of smart grids [5]. Closely related to how the European Energy Policy has evolved throughout time (from an economic lever, to a cohesion and reducing regional disparities enabler), a structure was needed in this regard in order to harmonize what seemed to be a puzzle piece-by-piece European Energy Market. The drivers which paved the way for such an initiative were presented during the 2009 Steering committee meeting [6], as being the following ones:

- The necessity of deploying the internal market for energy by using more active systems of transmission and distribution
- The existing EU policies which aimed to embrace new solutions
- And last, but not least, a need of defining a coordinated approach in dealing with various variables, such as actors and existing issues

Analyzing the afore mentioned pillars, we can see that the approach characterizes both the macro level (of the European policy framework), as well as the micro layer (the national, and, in subsidiary, the way in which each national actor implements the energy policy. In addition, having as a driver the need to establish coordinated approaches, would imply the fact that all participating parties would be able to address the situation from similar power/ knowledge levels.

2010 was the year when The Organisation for Economic Co-operation and Development (OECD) released a paper concerning Smart Grids in the field of electricity. In this document, Smart Grids, alongside smart metering, were defined as being part of a cluster of innovations which enabled more effective decisions in consumption [7] Similar to the gas and energy Directives, Smart Grids were paired with smart metering activities, both acting as levers in empowering the consumer towards advancing in a more educated usage of resources. As aims and objectives of these technology, the paper outlines the following [8]:

- Decreasing consumer demand when supply is not optimal
- Increasing receptivity of consumers to the overall electricity market workflow

When evaluating prior mentioned targets, one can notice that the overall aims is slightly enhanced versus the gas and electricity Directives; apart from the immediate direct effect (balancing consumption within the overall market framework), there appears a more integrative dimension, namely educating consumers towards a smarter usage. Still, without national policies that seek to tackle the same issues, a Smart Grid would not be able to fulfill all the European desiderates. The document creates a more in-depth perspective into the Smart Grid approach to the market, by emphasizing on which are the exact innovations that support this endeavor [9]:

- A more refined metering technology which enables two-way metering
- A direct communication line between consumers, electricity producers and operators
- Enhancing appliances capabilities by making them autonomously responsive to the network's signals

Similar to the gas and electricity Directives, a Smart Grid is characterized both by a macro-level lense, as well via a micro-level one. Thus, the advance network

surpasses the target of development, and aims to interconnect all actors in real time (both providers and users). Moreover, as a long-term approach, the capabilities of the enhanced network reach an economical development stage, namely producing more developed technical appliances which are used by the end consumer. Contrarily, not all Member States could have been able to use to the fullest this advantages, given their development stage and the national capabilities.

In 2011, the European Commission released a communication concerning Smart Grids and means towards their implementation. Linking directly the Smart Grid approach to the EU2020 agenda, the document underlines the importance of Smart Grids as the next level of electricity networks which allow both ways communication between suppliers and consumers [9]. Building on the long term approach already observed as well in the previous documents, in this communication Smart Grids are presented as [10]:

"[...]the backbone of the future decarbonized power systems. They will enable the integration of vast amounts of both on-shore and off-shore renewable energy and electric vehicles while maintaining availability for conventional power generation and power system adequacy".

In this regard, Smart Grids are described to be both a lever towards system development, as well as a gate-keeper of a more sustainable type of energy consumption. Plus, by tailoring the grid to have the capacity of encompassing different sources of energy, it implies that its availability would be an aggregated and balanced one – not more resources from the unconventional sources instead of newly discovered and sourced ones. Again, the question would arise if all Member States would be able to maintain an equilibrium between energy sources in the final consumption for the end consumer; having in mind that some Member States have more renewable energy sources than the others, but not all have the economic capacity to harness these advantages to the fullest of their potential.

In 2013 the Regulation number 347 concerning trans-European energy infrastructure brought a more in-depth overview concerning the further deployment of Smart Grids and how Member States could adopt this type of workflow. In terms of their importance, the approach seems now to incline more to the cause-effect pattern, Smart Grids being described as [11]:

"[...] Union-wide integrated networks and deployment of smart grids are vital for ensuring a competitive and properly functioning integrated market, for achieving an optimal utilization of energy infrastructure, for increased energy efficiency and integration of distributed renewable sources [...]"

In the above mentioned paragraph, Smart Grids act as levers and enables for a sustainable and competitive market (which would imply that the market is already well established enough so that Member States would function under optimal parameters within the framework, the grid). In addition, a Smart Grid would be a working mechanism in ensuring market equilibrium between energy sources and efficient means of transportation.

The same document pin-points Smart Grids as being part of the 12 strategic priorities from a trans-European energy infrastructure point of view, alongside electricity highways, oil infrastructure, gas transmission, storage a.o.[12].

The more mature perspective coming for the feasibility reasoning behind Smart Grids, aligned priorities in terms of action fields (gas, oil and electricity) and means of implementation (transportation and storage), ensuring this way a holistic approach to the energy network and market.

3. Innovation and capabilities: do all countries have a similar development pace?

As observed from the before mentioned Smart Grid descriptions, this type of approach on the energy market implies having a long-term strategy, as well as the actual capabilities of implementing it. From smart metering, to smart consumption decisions, such a direction (alongside the market liberalization) would harmonize and shape the economical equilibrium at European market level. This is why, when addressing the capacity of each state to successfully deploy such an initiative, an innovation benchmark ought to be taken into consideration.

In order to assess each state's capability in terms of innovation acumen, data from the European Innovation Scoreboard will be used in the following paragraphs. Apart from a general overview of how innovation is rolled-out throughout European countries, a more relevant indicator could be the degree of investment in research and development at country level.

From a broad perspective, innovation seems to be at a slow pace in Eastern European countries versus the Western or the Nordic ones. The last six ranking countries in this regard are as follows [13]:

- Romania with a score of 34.13
- Bulgaria with a score of 48.72
- Croatia with a score of 59.58
- Poland with a score of 61.10
- Latvia with a score of 65.66
- Hungary with a score of 69.03
- Sweden, the top state in the innovation index with a score of 147.74

Of course, the first explanation that comes with ease is that the less innovative states are former communist one. On the other hand, taking into consideration that this states have had powerful industries and operational technological sectors (be they fully competitive or not when compared to the Western states), more factors must be taken analyzed before explaining the differences.

This is why, when reducing the data cluster to the "innovators" in the field of innovational activities, the situation changes in terms of top innovators, whereas it remains more or less the same for the least performing actors, as follows [14]:

- Romania: no score available
- Poland with a score of 14.95
- Bulgaria with a score of 24.52

- Hungary with a score of 30.88
- Latvia with a score of 36.09
- Slovakia with a score of 37.85
- Portugal, the top innovator with a score of 155.64

Whilst Sweden is on the upper side of the ranking with a score of 104.78 [15], we can observe that Croatia has increased its ranking whereas Romania and Bulgaria remain at the bottom of the cluster.

Still, as European policies are translated at state level through national policies, an even more efficient overview would be to analyze the level of investment in research and development. Thus, when considering public research and development expenditure, we can detect a substantial change in the bottom part of the ranking [16].

- Bulgaria - a modest innovator with a score of 4.76
- Malta - a modest innovator with a score of 4.76
- Romania - a modest innovator with a score of 4.76
- Cyprus having a score of 19.70
- Ireland having a score of 23.43
- Hungary having a score of 30.09
- Denmark the top innovator with a score of 161.63

Versus the previous two clusters of data, we can observe that in terms of research and development level of investment the difference between the top innovator and the last ranking ones is greater than 150 points, whereas in the field of innovation as an activity, the difference was of approximately 140 points; from the general perspective (the innovation index), the difference between the top innovator and the last innovator was of approximately 113 points. Consequently, the differences between the capabilities of implementing an approach such as Smart Grids, resides far beyond the past of each country, and it can be interpreted through the optics of the present: how much they are willing to invest now for the future advantages.

4. Conclusions. Smart Grids: what is next?

This paper did not intend to draft a full overview in the field of Smart Grids, but to draw some analysis lines and pin a starting point on the map of the European energy market. As we have seen from the previous data, even though Smart Grids are designed to harmonize the existing energy network, and, on the long run to reduce disparities in between member states, having an action plan may not be sufficient. Given the existing situation and levels of development (such as investment in research and development), some member states may be prone to be followers, rather to adapt the framework to their own needs.

In addition, the Smart Grid initiative stretches far beyond from a technological approach to making energy networks more effective. When assuming that consumers will be able to directly interact with operators and producers, or they will be able to make smart decision regarding their consumption pattern, this implies a certain level of development in this regard. This level could be attained, of

course on the long run, via comprehensive policies and activities of informing consumers about existing advantages, as well as how the system works as a whole.

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Sustenabilitate și reziliență în localitățile afectate de seism - Exemplu de caz Norcia, Italia

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Abstract

Dezvoltarea orașelor de-a lungul secolelor folosind aceeași tramă stradală, utilizând aceleași clădiri timp de mai multe generații au caracteristicile dezvoltării durabile. Astfel clădirile sunt păstrate, îmbunătățite și adaptate noilor generații, iar Norcia din Italia este un bun exemplu de locuire având o istorie minunată și realizări economice folosind tehnologia alimentară locală. După cutremurele din 2016, localitatea Norcia a trebuit să răspundă unei noi provocări, să fie funcțională și să restabilească parametrii afectați. Studiul pentru prezentare include restructurarea funcțiilor vitale ale orașului, păstrând în același timp comunitatea locală. Orașul compact deteriorat în urma seismelor, a necesitat relocarea unei părți a populației în apropierea zonei industriale existente, zonă situată în afara zidurilor de apărare. Metodele de investigare ale studiului, implică diagramele și concluziile după observarea directă, a documentelor întocmite pentru autoritățile din Norcia, precum și a articolelor din presa locală și națională din Italia. Dezvoltarea durabilă implică, de asemenea, rezolvarea

problemelor de locuire în spații sigure, iar comunitatea locală continuă să se dezvolte prin echilibrarea conservării și consolidării clădirilor vechi deteriorate, cu funcționarea optimă în zone separate, nou create după 2016, până la reabilitarea clădirilor deteriorate. Conform Acordului de la Paris din 2015 privind schimbările climatice și obiectivele de dezvoltare durabilă, sectorul alimentar, turismul și construcțiile pot fi un bun sprijin pentru dezvoltare, iar Norcia are toate premisele pentru o reconstrucție și dezvoltare a zonelor deteriorate, astfel încât să ajungă la un mod de locuire adecvat care să corespundă cerințelor de sustenabilitate contemporane. Exemplul de caz poate constitui un reper pentru localitățile afectate de seisme precum și anticiparea măsurilor necesare, și a planurilor de management privind gestionarea riscurilor în localitățile expuse acestui tip de hazard.

Cuvinte cheie: avarii, clădiri, conservare, consolidare, zone.

1. Introducere

Acest articol prezintă caracteristicile durabile ale orașelor vechi, valori care se regăsesc și în Norcia, Italia. După această analiză privind caracteristicile orașului sustenabil, sunt prezentate elementele privind reconstrucția și adaptarea la noile condiții după evenimentele seismice. În 2016, în centrul Italiei, în special în zona localităților Norcia, Amatrice, Cascia din regiunea Umbria, au avut loc o succesiune de cutremure care au avut un impact economic, social și cultural nefavorabil.

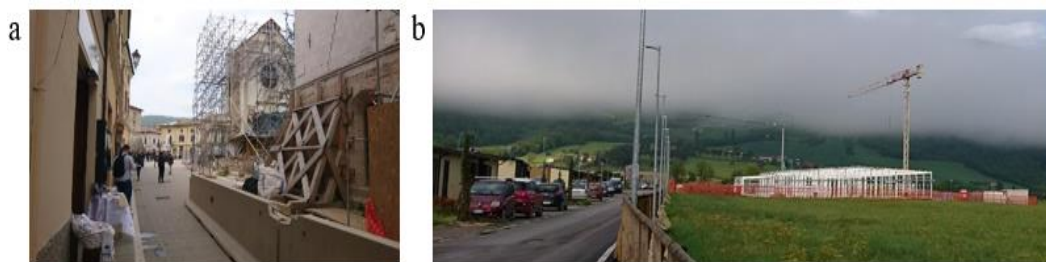


Figura 1. (a) Oraș istoric afectat de cutremur; (b) Noua dezvoltare industrială și o nouă zonă rezidențială constuita pentru sinistrați

Sursă: © Stefania Trifan, 2018

Studiul realizează o analiză socio-economică, culturală, de patrimoniu și a tipologiei constructive. Cutremurele înregistrate în datele de 24 august 2016 și 30 octombrie 2016 au avut un impact diferit pentru localitățile vecine în ceea ce privește pierderile. În Norcia, nu au fost înregistrate pierderi de vieți omenești ca urmare a acestor cutremure, dar au fost pierderi materiale. Astfel pentru o parte a orașului vechi accesul a fost restricționat, iar bisericile din localitate au fost avariate, printre care biserica Sf. Benedict, construită în amintirea Sfântului născut în Norcia. Recuperarea fondului construit este o prioritate pentru orașul istoric, iar studiul își propune să le identifice, și să arate cum se pot păstra aceste valori în concordanță cu caracterul și spiritul locului.

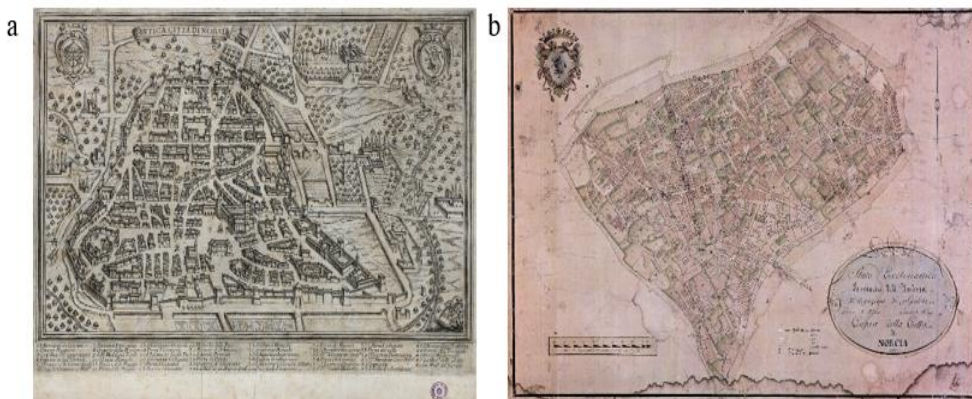


Figura 2. (a) Hartă veche cu ștampila de la Arhiva de Stat din Roma; (b) Harta Norcia din 1820
Surse: (a) <http://www.istitutodatin.it/biblio/images/en/riccard/10928/dida/151.htm> (b) Documente Workshop
 „Cutremure și centre istorice - Zidurile urbane din Norcia”

2. Caracteristici de sustenabilitate ale orașului Norcia

Norcia, a fost fondat în antichitate, și are caracteristicile specifice orașelor vechi: incintă închisă cu ziduri de apărare, uneori acest zid fiind încorporat în construcții aflate la limitele exterioare ale cetății și tramă stradală înscrisă în acest perimetru [1]. În concordanță cu acest aspect, s-au întocmit Obiectivele de Dezvoltare Durabilă pentru Norcia, dar toate informațiile au un caracter general [2].

2.1. Caracteristici constructive

Localitățile de acest tip reprezintă mai multe caracteristici ale orașelor durabile, iar unele dintre aceste aspecte sunt prezentate mai jos.



Figura 3. (a) Materiale locale: piatră, cărămidă, gresie, pavaj;
 (b) Detaliu din zidărie confecționat din materialele reutilizate
Sursă: © Stefania Trifan, 2018

Piatra, materialul local pentru construcție, poate fi reutilizată și este întrebuințată pentru rezistență, durabilitate, și stabilitate. Folosirea pietrei pentru clădiri conferă, de asemenea, o rezistență bună în caz de incendiu. Clădirile sunt păstrate mai multe generații, de aceea se realizează îmbunătățiri care nu generează atâtea deșeuri câte ar rezulta din demolarea construcțiilor vechi și din construcția unora noi. Pereții cu o grosime mai mare ai clădirilor mai vechi sunt apreciați datorită transferului de căldură mai mic, consumând astfel mai puțină energie.

2.2. Transport față de calea pietonală

Zidurile perimetrice ale orașului vechi Norcia, precum și amenajarea străzilor încurajează accesul pietonal, cu biciclete sau mașini mai mici, care au un consum de combustibil mai redus. În oraș se desfășoară competiții sportive cross, ceea ce înseamnă că populația are un stil de viață sănătos.

2.3 Identitate culturală

Norcia are o identitate puternică, de origine etruscă și romană, este orașul unde s-a născut Sfântul Benedict din Norcia în anul 480. Norcia a fost afectată de mai multe ori de cutremure (în special în 1763, 1859, 1979 și 2016), dar cu toate aceste pierderi, Norcia a rămas funcțională în același perimetru. Mai multe biserici și mănăstiri au fost puternic afectate de cutremurele din 2016: bazilica Sf. Benedict, construită în secolul al XIII-lea, pe locul unei clădiri bisericești mai vechi în care s-a născut Sf. Benedict, biserica Sant'Agostino, biserica Santa Maria Argentea, Bazilica San Lorenzo și una din cele mai vechi construcții din Norcia, Muzeul din cetatea papală, Castellina. Identitatea culturală a încurajat continuitatea în aceeași locație, folosind aceleași materiale specifice, în special piatra.



Figura 4. (a) Comerț stradal pentru promovarea produselor locale și punct de vânzare cu suveniruri reamplasat în zona veche a orașului / (b) Clopotele recuperate dintre dărâmături puse în funcțiune de oficialități [3]

Sursă: © Stefania Trifan, 2018; (b) [3]

Vechimea comunității locale și a personalităților străvechi venite din aceste locuri, cum ar fi mama împăratului Vespasian, în altă perioadă a Sfântului Benedict și a surorii gemene Scolastica, au încurajat păstrarea identității și continuității în aceste locuri. „Dialecto Norcino” este un limbaj particular al zonei și face parte din specificul local. Prin datele enumerate, se poate spune că orașul vechi Norcia are o imagine omogenă care reprezintă un atu pentru conservarea în continuare a propriilor sale caracteristici. Deoarece sunt foarte legați de locurile în care trăiesc, unii dintre locuitorii din afara Norciei au preferat să locuiască în containere situate pe proprietatea din apropierea casei, după cutremurul din 2016.

Identitatea este corelată și cu percepția, astfel că din punct de vedere vizual locuitorii Norciei solicită restaurarea cetății așa cum a fost înainte de cutremur.

2.4 Produse locale și producția responsabilă

Pe lângă produsele de construcție locale enumerate mai sus, Norcia este cunoscută mai ales datorită produselor alimentare: cârnați specifici, trufe negre și mai puțin pentru producția de brânză și ciocolată. „Norcineria”, măcelăria, a intrat în limba italiană în special prin produsele locale de calitate care folosesc produse făcute din mistreți. Utilizarea produselor locale, prin comercializare, încurajează dezvoltarea zonei, iar la nivel local, reduce consumul altor produse importate care ar necesita transport, depozite, transpuse ulterior în poluare.

2.5 Agroturism

Parcul Național Monti Sibillini se află în apropierea orașului, cu natura nealterată în care se găsesc păduri seculare. Aceste zone sunt foarte apreciate pentru produsele care se regăsesc în natură precum: ciuperci, afine, mure și zmeură. Activitățile în aer liber sunt încurajate și există facilități pentru călărie, ciclism, pescuit, rafting și alpinism. Aceste activități încurajează un stil de viață sănătos, iar agroturismul folosește specificul regiunii și menține o dezvoltare durabilă. În apropiere de Norcia se află Castelluccio, care oferă o panoramă foarte frumoasă și care atrage mulți turiști, mai ales atunci când câmpurile sunt pline de flori sălbatice înflorite.

Conform situației descrise, mai multe cerințe ale Obiectivelor de Dezvoltare Durabilă a ONU sunt îndeplinite. Particularitățile orașului, în afară de caracteristicile durabile, pot concluziona că Norcia deține „*genius loci*” [4] care reflectă un caracter unic care trebuie păstrat.

3. Daune după seismele din 2016

Cutremurele care au afectat cel mai mult localitatea în ultima perioadă, au fost cele înregistrate pe 24 August 2016 și 30 Octombrie 2016.



Figura 5. Seismele din centrul Italiei

Sursă: U.S. Geological Survey of 1500GMT, Oct. 27/ C.Iton 27/10/2016

Cutremurul din 24 august a deteriorat mai multe clădiri din Norcia și a provocat moartea a 297 de persoane: 234 în Amatrice, 11 în Accumoli și 49 în Arquata del Tronto [5].



Figura 6. (a) După cutremurul din 24 august 2016, oamenii s-au adăpostit pe Piazza San Benedetto /
(b) Ruinele Bisericii Sf Benedict după cutremurul din 30 octombrie 2016

Sursă:[6]

3.1 Măsurile anterioare cutremurelor din 2016

În 1859, după un puternic cutremur în Norcia, statul papal a impus un regulament prin care clădirile să nu fie mai înalte de 3 etaje. Recent, după cutremurul din 1979, au fost luate măsuri de consolidare, iar în 2005 [7], din cauza deplasărilor de terenuri din zonă, s-au efectuat studii asupra naturii terenurilor, subliniind faptul că Norcia este situată într-o zonă cu risc seismic.

3.2 Consecințele după cutremurele din 2016

Imediat după cutremurul din 24 august 2016, populația s-a adăpostit în spațiile libere din centrul Norciei, iar după cutremurul din 30 octombrie 2016 au existat daune majore ale bisericilor, dar din fericire nu s-au pierdut vieți omenești.

Datorită faptului că mai multe clădiri riscă să se prăbușească la un posibil nou cutremur, au fost stabilite zone cu restricții de acces.



Figura 7. (a) Indicator zonă cu acces restricționat

Sursă: / (b) Plan în care sunt indicate zonele cu acces restricționat

Surse (a) © Stefania Trifan, 2018/ (b) <https://www.comune.norcia.pg.it/2018/05/31/esclusione-zona-rossa/>

Măsurile de conservare pentru construcțiile actuale sunt necesare, deoarece există riscul unei degradări ulterioare, deoarece acestea nu sunt utilizate.

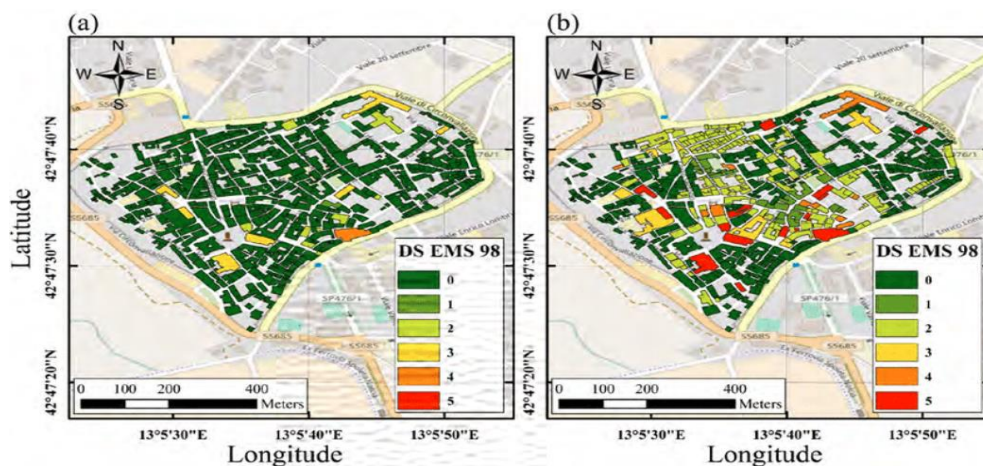


Figura 8. (a) Daune după cutremurul din 24 August 2016/(b) Daune după cutremurul din 30 octombrie 2016

Sursă: https://www.researchgate.net/figure/Damage-distribution-in-the-historical-center-of-Norcia-a-after-the-24-August-event-and_fig11_323687016

4. Reziliență

Primarul și oficialitățile din regiune s-au concentrat pe redeschiderea unor activități între zidurile orașului, cu speranța de a reveni la activitățile actuale din Norcia înainte de cutremurele din 2016. Pentru continuitatea activităților, în Norcia există următoarele tipologii: continuarea pe același amplasament, prin dispunerea unor containere, dacă acest lucru a fost posibil, și relocarea locuitorilor prin construirea locuințelor de urgență SAE pe terenul viran situat în limita localității dar situate în afara zidurilor de incintă. Pentru locuitori a fost necesar să se adapteze la noile situații, la noile condiții de trai, la un alt traseu către locurile de muncă din zona industrială, și pentru a găsi alte zone mai sigure pentru petrecerea timpului liber. Magazinele, cafenelele, restaurantele, teatrul, muzeul au fost închise, astfel încât locuitorii au fost afectați și din punct de vedere al locațiilor de agrement. Una dintre cele mai mari pierderi și provocări a fost pierderea bisericilor care s-au prăbușit după cutremurul din 30 noiembrie 2016, mănăstirile din interiorul localității au fost nevoite să se mute, iar locuitorii să se adapteze pierderii bisericilor prin care s-au identificat spiritual. Cetățenii din Norcia organizează periodic festivaluri, diverse expoziții și concursuri pentru strângerea de fonduri. Din păcate, procesul de recuperare și adaptare este lung și anevoios și necesită implicarea autorităților și a cetățenilor.



Figura 8. (a) (b) Proprietăți în afara orașului vechi în care au montat containere în curte deoarece a existat spațiu disponibil

Sursă: © Stefania Trifan, 2018

4.1. Reconstrucție și strategii de dezvoltare

După cutremurele din 2016, au fost luate măsuri de construcție de urgență pentru a evita prăbușirea clădirilor deteriorate.

4.2. Măsurile de punere în siguranță a construcțiilor după seism

Imediat după cutremur, au fost luate măsuri pentru monitorizarea construcțiilor existente, pentru a evita o prăbușire imediată în cazul apariției unui nou cutremur.

[8] Armarea și fixarea structurilor au fost puse în aplicare la clădire cuavarii prin instalarea șprîjînirii structurilor metalice.[9]. Aceste măsuri au fost luate pentru a evita prăbușirea clădirilor și pentru siguranța cetățenilor.

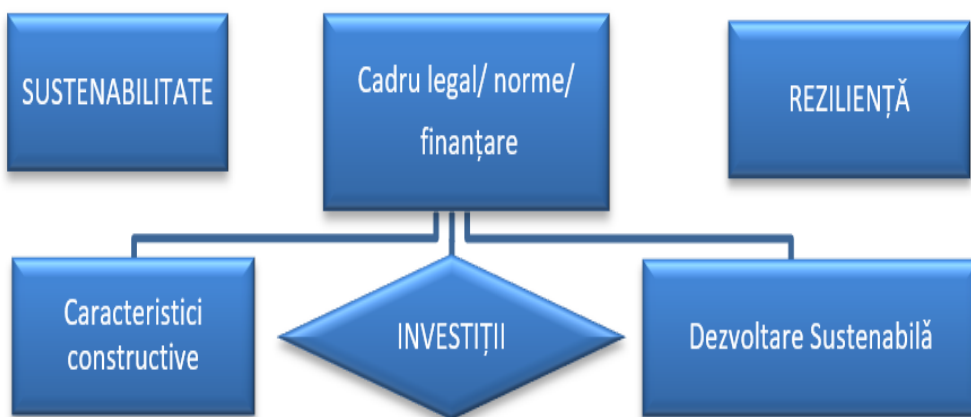


Figura 9. Diagramă Sustenabilitate/Reziliență



Figura 9. (a) Punerea în siguranță a zidului de incintă precum și a arcadelor de la construcția adiacentă/ (b) Punere în siguranță și contravântuiri la o școală existentă în Norcia

Sursă: © Stefania Trifan, 2018

4.3. Măsuri privind populația afectată și relocarea în siguranță a administrațiilor locale din clădirile deteriorate

După cutremurele din 2016, au fost luate măsuri urgente pentru asigurarea populației și a instituțiilor, astfel încât în 2018, când au fost colectate datele pentru această lucrare, școala, carabinierii, primăria și secția de pompieri au fost relocați în containerele dispuse pe un teren viran situat în afara zidului de incintă. Spitalul și-a păstrat vechea locație deoarece a existat spațiu disponibil lângă acesta, iar unele secții

cu risc din construcția din spitalului au fost mutate în containerele dispuse în curtea spitalului. În ceea ce privește măsurile luate pentru asigurarea condițiilor minime de siguranță, trebuie luate cel puțin măsurile minime pentru reducerea riscurilor de incendii.

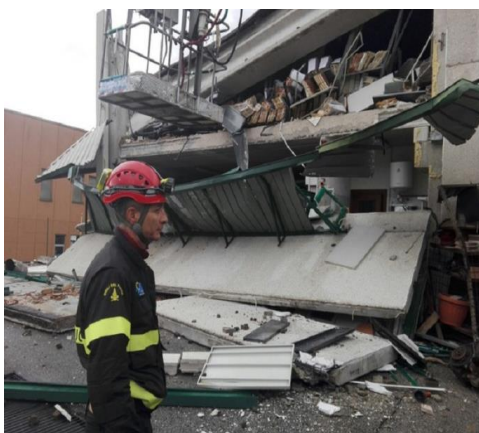


Figura 10. (a) Misiune de salvare a arhivei din Norcia / (b) Martie 2017 Incendiu la containerele în care s-a mutat administrația localității
Surse: [10]; [11]

În regiunea Norcia, au fost realizate 606 de locuințe de urgență (SAE) pentru aproximativ 1500 de persoane [12].

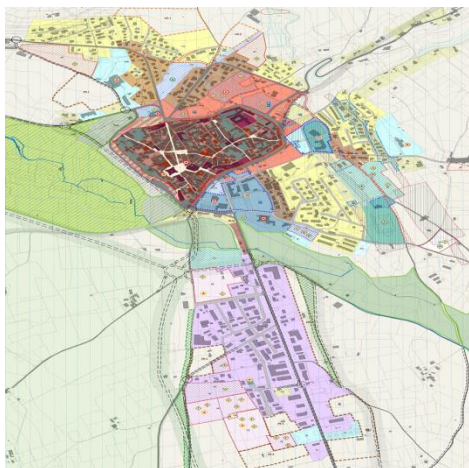


Figura 11.(a) General Regulator Plan de Reglementari Generale Norcia / (b) Localizari cu noile amplasamente ale autoritații locale (1) SAE (locuire în sistem de urgență) (2) Comunitate Montana Valnerina care cuprinde containere care adăpostesc primăria și separat carabinieri (3) Spitalul din Norcia (4) Detașamentul de pompieri Norcia;
Surse: [13]; Google map 2019

4.4. Măsuri privind strângerea de fonduri pentru reconstrucție

O contribuție importantă la restaurarea zonelor afectate de cutremur și în special la finanțarea restaurării Bazilicii San Benedetto din Norcia a avut-o Comisia Europeană, care a alocat fonduri pentru reconstrucție. [14] Prin urmare, păstrarea și continuarea activităților din zonele afectate vizează păstrarea vechiului oraș Norcia. Cu toate acestea, în 2019 populația este nemulțumită de ritmul în care se desfășoară toate procesele de reconstrucție.



Figura 12. Zonă construcții noi puse la dispoziție cetățenilor a căror locuințe au fost afectate de seism
Sursă: © Stefania Trifan, 2018

5. Concluzii

Identitatea culturală din orașele vechi este una dintre caracteristicile relevante, de aceea este important să luăm în considerare acest fapt, deoarece există o determinare clară de a continua în aceeași zonă a activităților anterioare înainte de produce a unor seisme semnificative. Măsurile luate privind diminuarea consumului de energie și realizarea investițiilor durabile trebuie să țină seama de avertismențele făcute de specialiști, deoarece pot fi raportate date de pericol care anticipează alte riscuri viitoare.

Conservarea și restaurarea sunt esențiale pentru a recupera din efectele cutremurelor, iar măsurile eficiente sunt semnificative pentru recuperarea și adaptabilitatea comunității reziliente [15].

Studiile care se dezvoltă trebuie să fie obiective, în caz contrar, există riscul de pierderi materiale și vieți omenești, precum și pierderea drepturilor și plata unor despăgubiri, așa cum au fost solicitările despăgubirilor solicitate de către rudele victimelor cutremurului de la L'Aquila 2017 imputate specialiștilor care au susținut înainte de cutremur că zona nu prezintă un pericol iminent [16] - [19]. Cu toate acestea, locuitorii se identifică cu orașul vechi și solicită ca lucrările de reconstrucție să fie efectuate într-un ritm mai alert.

Respectarea Obiectivelor de Dezvoltare Durabilă a ONU fac parte din viitorul localității, iar în documentele administrației locale, aceste obiective sunt descrise în detaliu asupra modului cum pot fi îndeplinite. [20] Dintre cele 17 obiective de dezvoltare durabilă stabilite în 2015 la Paris în cadrul summitului Națiunilor Unite, pentru orasul Norcia s-a pus accentul în principal pentru următoarele obiective: “6 Apă curată și igienă” “8 Muncă decentă și creștere economică” “9 Industrie, inovație și infrastructură” “11 Orașe și comunități durabile” “12 Consum și producție responsabilă” “13 Acțiune asupra climei” “15 Viața pe pământ” [21] Astfel strategia de dezvoltarea a localității Norcia se realizează prin respectarea cerințelor de conservare și refacere a construcțiilor afectate de seismele din 2016 precum și prin integrarea cerințelor obiectivelor dezvoltării durabile.

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Memorie și monument în context urban contemporan

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Abstract

Deși manifestarea modernismului în arhitectură și intenția lui de a șterge tot ceea ce aparținea trecutului părea până de curând să conducă la o ștergere completă a memoriei din cadrul urban, totuși ultimele decenii au făcut loc unui nou tip de reconsiderare a acesteia. Astfel, mai ales orașele care până atunci fuseseră orientate exclusiv către progresismul modernist își direcționează astăzi atenția spre comemorare. Acest fapt se traduce în prezent prin interesul crescând al arhitecților pentru proiectele ce au în vedere monumente, memoriale și alte forme de evocare a traumei, de cristalizarea din ce în ce mai vizibilă a unor forme de recompensare a victimelor trecutului și de creșterea numărului de muzee, pentru ca orașele de mâine să nu mai repete erorile trecutului.

Astfel, prin rolul său, monumentul/ memorialul/ situl comemorativ este reprezentarea fizică a relației dintre discursul istoric și memoria individuală și colectivă. El își propune, prin mijloacele sale specifice (concepție, formă, textură, amplasament, inscripții etc.) să reamintească, să facă apel la memorie, pentru a evoca evenimente, persoane sau valori ce au o semnificație profundă pentru o comunitate. În același timp, el poate deveni o foarte interesantă metodă de a observa și înțelege relația interactivă dintre memorie, istorie și a ne explica prezentul în forma în care el ne apare astăzi, ajutând la construirea unui viitor coerent.

Cuvinte cheie: memorial, comemorare, cadru urban, istorie urbană.

1. Introducere

În ultima perioadă remarcăm o schimbare în ceea ce privește relația marilor orașe cu propriul trecut. Se observă un interes în continuă creștere în ceea ce privește atenția către trecut, care se concretizează prin organizarea unor societăți de conservare a patrimoniului, de implicare a specialiștilor din diverse domenii conexe, precum genealogi, istorici, arhitecți, care colaborează pentru păstrarea și aducerea în actualitate a diferitelor ipostaze ale trecutului. În fața amenințărilor naturii, care

pot produce pierderi iremediabile, indiferent că ne referim la clădiri, arhive, bunuri de preț, amenințări informatice, care șterg baze de date și informații, propria memorie este cea care poate supraviețui, rămânând vie și nealterată, fiind de datoria noastră să o transmitem, să facem apel la ea și să o punem în folosul viitorului pe care îl construim.

Mai ales după 1980, societățile occidentale au dezvoltat o fascinație a memoriei. Sub numeroase forme, memoria a devenit un reprezentant global al culturii dezvoltate: în istoriografie, psihanaliză, arte vizuale și media, dar mai ales în studii de urbanism și arhitectură, artă urbană sau peisagistică. Exercițarea memoriei este evidentă în modul în care realități sau mituri ale trecutului sunt reprezentate, rememorate sau uitate, marcând politicile contemporane și cultura globală.

2. Ce este un monument?

Când descoperim o movilă în pădure, de 2 metri pe 3 metri, de formă piramidală ce parcă tinde către cer, devenim sobri și ceva înăuntrul nostru ne spune că acolo a fost înmormântat cineva... Aceasta este arhitectura. (Loos, 1993)

Arhitectul austriac Adolf Loos susținea, la începutul secolului XX, că doar o mică parte a arhitecturii poate fi considerată artă, și anume mormântul, afirmând că arta ia naștere din ideea de mormânt, un spațiu excepțional la conformarea căruia a condus viața, dar care transcede acest spațiu. Și mai importantă pentru Loos devine funcția etică: anume confruntarea cu moartea, care ne previne în abordarea superficială a vieții cotidiene și ajută la un anumit tip de cufundare în sine. Ceea ce contează nu este neapărat cine este înmormântat acolo, ci faptul însuși că o ființă umană se află în acel loc (Bonder, 2009). Astfel, devenim conștienți că nu individualitatea noastră este importantă – ea se va pierde în timp, după dispariția noastră - ci însuși faptul că suntem ființe, care la un moment dat își pun amprenta asupra unui spațiu și că au existat într-un anumit punct în acel loc. Se face, astfel, trecerea de la semnificația în sine a locului, la mesajul transmis posterității, iar acesta ar trebui să fie elementul primordial al monumentului.

Un monument aduce aminte. Amplasamentul său, amenajarea spațiului sau inscripțiile sunt elemente care amintesc persoane, lucruri, evenimente sau valori. În limba română, "monumental" înseamnă mare, important și impozant. Monumentele, în general, onorează, iar durabilitatea lor este potrivită cu subiectele de mare interes, care dăinuie în timp. Însă, derivarea noțiunii de monument, de la verbul latin *moneo*, *monere* sugerează mai degrabă calitatea sa de rememorare care servește la "muștrarea" sau avertizarea omenirii în prezent, pentru ca greșelile trecutului să nu mai fie repetate în viitor. În vocabularul german, această distincție se face în mod foarte clar, termenul de "Mahnmal" (monumentul care înglobează caracteristica enunțată anterior), este diferit de cel de "Denkmal" (monument care amintește), dar și de "Ehrenmal" (monument ridicat în onoarea unor persoane). (Stevens, Franck, Fazakerley, 2012). O astfel de demarcație este necesară pentru rafinarea scopului și

configurarea unui monument, iar aceasta trebuie să se stabilească încă de la începutul proiectării sale.

Semnificație

În prezent nu mai este acceptabilă ideea unei singure semnificații a monumentului; în situația în care evoluția societății și schimbările acesteia au loc cu o mare rapiditate, semnificația artistică și culturală, contextul social și politic sunt într-o mișcare accelerată, toți acești factori fiind esențiali pentru interpretarea și conferirea de sens monumentului.

Chiar dacă premisa monumentului este aceea de permanență, longevitate și de responsabilitate de transmitere a mesajului independent de timp, totuși, așa cum multe generații de artiști, moderni și post-moderni au remarcat (Young, 2003), nici monumentul în sine, așa cum nici semnificația sa nu sunt cu adevărat nepieritoare și nu își păstrează forma intactă în timp. El se supune, la fel ca orice creație umană, circumstanțelor în care a fost realizat, este influențat de contextul politic, istoric, estetic, de realități de moment ce îi imprimă un caracter ce nu poate fi perpetuu.

Un foarte bun exemplu în acest sens este oferit de Monumentul împotriva Fascismului, ridicat la Hamburg, opera artistului Jochen Gerz. Acesta este reprezentat de o coloană de 12 metri înălțime, care îndeamnă vizitatorii să își scrie numele pe suprafața sa de plumb, ca un simbol al vigilenței împotriva fascismului, războiului și violenței.



Figura 1. Jochen Gerz, Monument împotriva fascismului, Hamburg, Germania (1996)

Sursa: <https://www.zf.ro/ziarul-de-duminica/anti-monumente-de-tudor-calin-zarojanu-9850146>

Totuși, acest monument a reușit chiar să depășească așteptările artistului de a realiza o confruntare între tradiție și sacru, inițial el sperând ca oamenii să își scrie pur și simplu numele într-o oarecare ordine, amintind de imaginea clasică a unui

memorial de război, în cadrul căruia numele dispăruților apar menționate sub forma unui pomelnic. Însă oamenii au ales să schițeze și graffiti-uri banale, să adauge figuri zâmbitoare, stele ale lui David sau svastici, ori să înlăture inscripțiile anterioare. Criticii afirmă că în acest mod, monumentul capătă semnificații noi pe parcursul existenței sale, ajungând să funcționeze ca o oglindă a societății (Young, 2003), care marchează diferite puncte de vedere ale oamenilor în ceea ce privește anumite problematici ale trecutului și modul în care ei aleg să le comemoreze în prezent.

3. Anti-monumentul

În timp ce monumentele tradiționale au drept componentă de bază o afirmație (glorifică un eveniment sau o persoană, ori o ideologie), operele anti-monumentale, în general, sunt adresate unor evenimente întunecate, precum Holocaustul, ori evenimente complexe, care într-un anumit moment în timp au fost subiectul unei glorificări, cum ar fi războaiele. Dacă primele fac referire la personalități marcante, sau valori înalte (eroismul soldaților necunoscuți), anti-monumentele avertizează și demonstrează tarele unei ideologii, precum fascismul sau rasismul, acuzând în aceste cazuri vinovații și îndreptându-și atenția către suferința victimelor conflictelor sau persecuțiilor. (Young, 2003)

Începând cu anul 1945, în Europa apar numeroase monumente dedicate victimelor nazismului și comunismului, depășind deja sfera evreilor și ale disidenților, se ajunge la marcarea altor categorii, precum sinti (elemente etnice nomade înrudite cu țiganii) la Roma, homosexualii și persoanele cu dizabilități. Început ca un proiect artistic personal în 1996, „Pietrele răvășite” (Stolpersteine) ale lui Gunter Demnig sunt niște inserții de mici plăci în pavaj, fiecare amintind de locuitorii clădirilor adiacente, care au devenit victime ale Holocaustului, pe aceste pietre fiind inscripționate numele lor, datele de naștere, de deportare și de moarte. Comunitatea din Germania a fost foarte receptivă la această inițiativă, iar acum se află peste 30.000 de astfel de pietre în această zonă.



Figura 2. Gunter Demnig, Stolpersteine - 1996-prezent, Berlin

Sursa: <http://www.yelp.com/biz/stolpersteine-k%C3%B6ln>

Probabil că cea mai notabilă însușire a anti-monumentalității este constituită de opoziția acesteia față de formele convenționale monumentale și instaurarea unor alternative ce constau în tehnici de design, materiale și durabilitate. Dată fiind adresarea acestora către evenimente și sentimente ce implică trauma, nu este surprinzător că forma anti-monumentului rezidă în negarea/inversarea celei a monumentului clasic, astfel că în acest caz regăsim forme abstracte mai degrabă decât figurative. Inversiunile fundamentale constau și în goluri în loc de plinuri sau suprafețe solide, absența în locul prezenței, tonuri întunecate în loc de nuanțe luminoase și mai ales un accent pe orizontală și nu pe verticală. Formele sunt mai degrabă aplatizate decât elansate, nu urmăresc o axă, sunt fragmentate sau dispersate și nu fac parte dintr-o compoziție unitară, controlată, ele fiind mai degrabă multiple decât unitare (Memorialul Holocaustului din Berlin al lui Eisenman, unde fragmentarea evidentă și configurarea abstractă elimină orice repere și posibilitate de orientare), iar în ceea ce privește materialele, opera anti-monumentală contrastează cu soliditatea convențională și pare a fi realizată din materiale fragile, diafane, reflectante sau transparente.

4. Scară umană sau scară urbană

În mod tradițional, noțiunea de “monument”, de “monumental” ne trimite cu gândul la un obiect la scară mare, care durează și are o importanță aparte, de aceea el este creat pentru a onora și a veni în recunoașterea meritelor cuiva, ori pentru a face trimitere la evenimente solemne.

Însă, trebuie să fim conștienți că odată cu schimbările înregistrate în toate domeniile artelor, în modul de abordare a arhitecturii, se schimbă atât conformarea monumentelor, precum și felul în care ne raportăm la ele. Astfel, rigiditatea, grandoarea și pretențiile de permanență ale unui astfel de obiect nu mai sunt de actualitate, ele fiind mai degrabă specifice societăților arhaice, premoderne, care utilizau un anumit limbaj legat de scară și conformație mai degrabă decât unul ce operează cu simboluri, sugestie și subtilitate.

Memorialul Pantofi pe Dunăre urmează acest principiu, el reprezintă un tribut îndreptat către victimele acestui moment de teroare din istorie, ce s-a născut în urma unei colaborări între regizorul de film Can Togay și sculptorul Gyula Pauer. Memorialul amplasat de-a lungul malurilor Dunării, în Budapesta este compus din 60 de perechi de pantofi specifici anilor 1940, ce redau fidel scara și detaliile încălțăminte din epocă, realizate din fier. Memorialul se bazează pe simplitate, dar este cu atât mai sugestiv și evocator, descriind pantofii lăsați în urmă de mii de evrei ce au fost uciși de Partidul Crucilor cu Săgeți. Stilul pantofilor – cizme de muncitor, mocasini de om de afaceri, pantofi cu toc eleganți de femeie, chiar și pantofi minuscule de copil – a fost ales tocmai pentru a demonstra că nimeni, indiferent de vârstă, sex sau ocupație nu a putut fi cruțat de această soartă.



Figura 3. Memorialul Pantofi pe Dunăre, Budapesta

Sursa: <http://exchange.adelinawong.ca/2012/04/photo-of-the-week-shoes-on-the-danube-promenade/>

Pantofii nu sunt aliniați într-o ordine, pentru că victimele i-au abandonat sub amenințarea armelor; unii pantofi sunt împrăștiați, alții zac deasupra unei alte perechi, unii nu și-au mai găsit perechea, iar altora le lipsesc șireturile, astfel căpătând individualitate și fiecare vorbin despre o persoană diferită. Pentru că pantofii fac parte din identitatea noastră și ei vorbesc despre cine suntem și cine sperăm să devenim.

Așadar, scara monumentului nu trebuie să fie neapărat una supradimensionată pentru a evoca și a transmite mesajul. Un memorial care își atinge scopul de a aduce aminte și de a folosi expresivitatea pentru a transmite o emoție, poate fi de la o clădire, o amenajare a unui spațiu public sau unul interior, până la un obiect sculptural, sau chiar un peisaj nealterat de intervenția umană. Acesta trebuie să iasă din solemnitatea statică și impunătoare, să evite didacticismul excesiv și manipularea prin omisiunea sau devierea subiectului. Abordarea simbolică și modestă trebuie să faciliteze legătura dintre oameni și să opereze cu sensibilități sufletești mai mult decât cu cele fizice sau senzoriale.

5. Concluzii

În perioada recentă, practica rememorării a devenit foarte complexă și s-a dezvoltat datorită influenței globalizării. În timp ce lumea în expansiune devine neîncăpătoare, oportunitățile pe care le descoperim de a ne integra într-un peisaj memorial internațional sunt ample și de anvergură. Peisajele memoriale (memoryscapes) sunt astăzi combinația tensionată între cerințele locale și așteptările globale. Aceste numeroase puncte de presiune (atat interne cât și globale) – cerințe legate de timp, religie, politică și economie, dictează forma, precum și expresivitatea narativă a memorialelor în societățile contemporane.

Problematica privind abordarea subiectului memoriei și conformarea monumentului este de actualitate, mai ales că înregistrăm o schimbare de paradigmă în ceea ce privește modul de transmitere a mesajului și conformarea volumetrică a

obiectului. Cum posibilitățile sunt practic infinite, misiunea arhitectului devine cu atât mai dificilă și răspunsul vine mai ales din propria sensibilitate și dintr-un anumit tip de abordare subiectivă a cauzei pe care o ilustrează. Monumentul nu mai este astăzi un obiect perpetuu și neprescriptibil, ci mai degrabă un mesaj în sine, dispus a evolua odată cu societatea și a evoca o realitate ce nu trebuie pierdută.

Ca orice domeniu uman, și arta construirii are nevoie de noi forme și mijloace și de inovație, iar monumentele spațiului public sunt unele dintre primele forme vizibile și este necesar să li se acorde o atenție deosebită, cu atât mai mult cu cât ele însele sunt forme de reprezentare a comunității.

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Corporate governance of the future

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Abstract

Objectives Main research objective: Digitalized recruitment in accordance with the requirements of Corporate Governance, DM Software. At the international level, there is a tendency of intense digitization, affecting the area of recruitment beyond the initial stage, reaching the development of specialized recruitment software through algorithms to determine the best solutions and eliminate the human factor from the process. Secondary research objective: In Romania, climate change has remained only at the theoretical stage, the practical applicability of the measures proposed by the government is cumbersome, requiring the adoption of concrete measures and easy to apply. The idea of sustainability should not be limited only to climate change, it represents the continuity strategy assumed by the present management, taken into account in the management selection process, and has as a consequence a much more efficient composite, aware of the effects of their present decisions. The idea of sustainable governance by digitalize the recruitment and selection process is achievable by simulating the implementation of the process in Romanian Public Enterprises. **Prior work** An adequate governance framework is fundamental for enhancing economic performance, especially in developing and transitional states, which want to join the European Union and to help deter fraud and mismanagement. Studying the performance indicators and adapting them to a software for recruiting and selecting future members in the Boards of Directors of Public Enterprises, in terms of Corporate Governance, in order to make the process itself transparent and decentralized. Researches in the field of Corporate Governance motivate the continuous transformation of the Public Administration, meeting the need to digitalize it in the context of sustainability, **Approach** The efforts made to collect the information needed to complete the research resources are based on variables whose standards will be defined according to the criteria of good governance and economic performance, some criteria mandated by the European Union, target the listed companies and the secure markets, such as blockholdings, the digitalization process-a new aproch in Corporate Governance. Study case: Romania's Public Enterprises, **Results** (Obtaining official data from

*Public Undertakings is a proof of transparency itself, with the expected results automatically achieving the objectives and providing answers to research questions. At the same time, the importance of digitalizing the processes of recruitment of the top management of public enterprises is highlighted. Researching new ways of digitized recruitment and selection of the future members of the Board of Directors of Public Enterprises under the tutelage of the Public Authority it emerge several models of software programs secured and adapted to the needs of the Public Administration, such as be DM Software (decision making software), oriented towards Corporate Governance enhance transparency and has as a consequence the decentralization of the selection process, **Implications** Due to the fact that I am studying in the second year, I did not have the honor of involving other people with expertise, for the time being, and **Value** In the Romanian public administration, the recent progress has contributed to the improvement of the legal and regulatory framework against abuse, which is why I proposed to bring to the fore the importance of studying this area, adding value, by studying the possibility of adopting new tools for the public sector in Romania, support mechanisms, simple, uncompromising, completing the digitalization process in public sector.*

Keywords: e-transformation, recruitment, border, software, e-governance.

1. Corporate governance at European level

An adequate governance framework is fundamental for enhancing economic performance, especially in developing and transitional states, which want to join the European Union and to help deter fraud and mismanagement.

The European Institute of Corporate Governance "ECGI" intends to make a major contribution to the debate on policy formulation and development of best corporate governance practice, based on impartial and objective research and on the collective expertise of its individual and institutional members.

The efforts made to collect the information needed to complete the research resources are based on variables whose standards will be defined according to the criteria of good governance and economic performance, some criteria mandated by the European Union, target the listed companies and the secure markets, such as blockholdings.

To be successful, businesses need to be aware that different strategic contexts require different value indicators. This means that it is important to establish the value measures. This implies the existence of a balanced data table, which should cover these measures and be developed with the introduction and approval of the management of the company. It should also be noted that the public sector has different value factors / indicators compared to the private sector. In the public sector, measures such as compliance with legal provisions and due diligence take priority over financial measures, such as profitability.

There have been more changes in governance in the last five years than in a generation, the failures of 2001-2002 being very different from the financial crisis of 2008-2009.

There is a conflict between accessible and effective short-term solutions that will make it difficult to answer long-term challenges. Social trends, such as aging and environmental trends, such as climate change, may require actions that are not commercially viable, but which will potentially reduce monetary costs and the long-term social and social impact (Stern et al., 2006). In such cases, the state must intervene to allow or stimulate such activities.

Planning is a future-oriented reflection activity, which usually operates on a fixed periodic cycle. In the United States, for example, a state economic operator is required to prepare a long-distance transport plan every 5 years if it is in compliance with national ambient air quality standards (NAAQS - Reviewing National Ambient Air Quality Standards) or 3 years if not. Also, the state economic operator must create a financially limited 3-year transport improvement program for the implementation of the long-distance transport plan. In England, local governments produce a 15-year strategy with an implementation plan of 3-5 years shorter. The planning area is a series of projects or policies ready for implementation.

Innes and Gruber (2005) identify four different forms of decision-making that they suggest coexist: political / bureaucratic influence, politics, social movement and collaboration. They noted that «each style tended to be associated with different types of results, although this was not explicitly discussed. Political planners shared resources among actors, while collaborative and social movement planners were associated with strategies intended to benefit the entire region » (Innes and Gruber 2005, p. 177). Emberger et al. (2008) identify three different approaches:

- Driven vision - care must be the result of a political leader or an influential policy entrepreneur who cares about the loan or vision for the city (for example, Curitiba or Bogota);
- Planned - care tends to take a form of more rational or system-based analysis to technocrats in care until an objective can be processed, problems evaluated, potential interventions implemented, evaluated an intervention in relation to the objectives, implementation and monitoring (Emberger et al. May 2003);
- Consequently, care is needed on the various actions of a pulmonary process in order to be the subject of a potential and priority solution to problems, solutions and solutions. Regarding the creation of public vehicles for investigations / intermediation financing in actions / participation in projects / profitable enterprises, segment not currently covered on the Romanian financing market, care, part of a party, may have a multiplier role in the economy for a Sustainable support ".

Source: Sustainable transport: indicators, frameworks and performance management, Henrik Gudmundsson, Ralph P. Hall, Greg Marsden, Josias Zietsman, pg. 122.

1.1. Motivation of the research

The motivation of the research consists in outlining performance indicators at the level of public enterprises and their management, in order to improve their efficiency. Thus, the targets and the degree of achievement of the Performance Indicators are being pursued. These indicators fall into two categories: financial and non-financial, which reflect the nature of the activity of the respective enterprise. The criteria for choosing the operational and governance indicators consist of the importance of meeting the policy objectives of the Government and of the Public Authority, in accordance with the legislation in force and to have favorable results in the economic sector, aiming to achieve them for each Public Enterprise, corresponding to the field of activity in which the respective Company operates.

The solution most commonly used in these contexts is to prioritize the strategy of the Supervisory Public Authority in terms of improving the coordination and strategic planning on the reorganization of the companies under its subordination, through the institutional reform and consolidation of the Corporate Governance system.

The study of the experiences in the field of Corporate Governance in other European countries, helps to outline internal processes that are currently taking place in Romania, making present essential research, both for understanding the process and for developing theoretical analyzes on this field.

The problem that has been posed to most Public Enterprises has been in terms of a negative impact, the consequences on the activities that generate losses and the follow-up of the costs evolution lead to a reorganization plan of the performance management, due to the budget losses. A proposal of an electronic governance maybe the answer to this gaps.

E-transformation

In order for an electronic strategy to be formulated and applied consistently in the areas of government interest, a comprehensive analysis of all the methods that must be "borrowed" from the private sector and implemented in the public one should be provided. There are, for example, more dimensions than the basis of a scoring strategy (Norton and Kaplan, 1996):

1. The financial dimension - it represents even the end of the "Strategy Charter" and may seem to some extent insufficiently adapted to the needs of the public public society.
2. Client size - which helps to provide services to the public.
3. Internal dimension of the process - which focuses on identifying ways to improve the administrative capacity to manage the demand for public services.
4. The organizational dimension - becomes relevant when trying to establish the strategic changes that the government deals with, Filip and Stoica, The Transition to e-Government. The Romanian Case.

Source:

<http://unpan1.un.org/intradoc/groups/public/documents/untc/unpan003858.pdf> COURSE - SA, Contract RO.004.02.01 / C1.

In October 2001, the Romanian Parliament adopted the "Government Strategy on accelerating the reform of the public administration" (GD 1006/2001), where it outlined the main directions for the proposed restructuring:

Bulleted lists may be included and should look like this:

- the principle of separation of political and administrative functions;
- the principle of creating and consolidating professional and politically neutral civil servants;
- the principle of clearly defining the role, responsibilities and relationship between institutions;
- the principle of subsidiarity, so that decisions are taken by and in the interests of the citizen;
- the principle of decision-making autonomy;
- the principle of simplifying the procedures and normative acts;
- transparency of administrative and governance actions;
- respect for the principle of citizenship;
- the principle of channeling the interest for results in terms of efficiency, effectiveness and quality of services.

All these principles require both modern methods of public administration and new forms of institutional organizations - provided by e-administration. Reinventing the public sector would therefore entail a profound restructuring of the central and local public structures, a substantial change in the relationship between the administration and the citizen and also a decentralization process, both in terms of financial and political aspects.

1.2. The need for scientific study

The need for complete data and the efficient and rapid regulation and management of a substantial part of the public administration are inevitable steps to obtain transparency from public authorities and institutions, thus reducing the lack of honesty of public authorities, poverty, corruption, violations of the law, unemployment and communication dysfunctions. This transparency is needed in improving the dialogue with the citizen and becomes as a way of improving the general performance of the government. If the measures that have been adopted so far, in order to eliminate corruption, are not sufficiently effective to obtain the best results, as stipulated by the policy of "good practices" in the administration, the need for decentralization at central level, for to face the current challenges, of a company that wants to be revolutionized in order to resonate with the trends of the competitive markets and the alignment with the requirements of the European Union, with the development of information and communication technology, the adoption of the e-government vision and the application of the conditions on which this concept depends. , outlines a new version of public administration oriented to services with intense exchange of information between all stakeholders, decentralization process and citizen orientation, the first example in this regard being the United States of America and Canada, and on the European continent, France, The Kingdom of Great

Britain and Ireland, which have supported the process of administrative transformation, laying the foundations of e-government, to meet the needs of citizens and the private environment, becoming a developing stage of active collaboration through e-government applications that allow the implementation of e-government processes. decision making in a transparent and horizontal way, simplifying the exchange of data between administrations and the integration of electronic public services, develops social governance structures and encourages both investments and public procurement in the IT field. Finding the lack of a scientific study or an implementation in the field of digitized recruitment, the entire process of recruitment and selection regarding corporate governance, especially in the public system, makes the present research necessary to improve the dialogue between the authorities involved, to facilitate the working mode of the the personnel participating in the process and the citizens who apply.

In Romania, the governance appeared, from a conceptual and regulatory point of view, only at the beginning of the 2000s. The delay is due to the difficult steps taken along the lines of political, legal, economic and social reforms. In recent years, however, the context of corporate governance in Romania has changed. Accountability and transparency have become key factors not only for shareholders, but also for investors, creditors, suppliers and other participating parties. Felga et al. Theoretical and applied economics Volume XVIII (2011).

In 2011 there were published 3038 papers on the topic "Corporate Governance in state-owned companies", the year 2011 being taken as a reference year for this research, while the implementation of the Corporate Governance at national level, (Romania), was adopted to the Government emergency ordinance no. 109/2011 of November 30, 2011 on the corporate governance of public enterprises, in force starting with October 12, 2016, Ordinance which is based for the first time in Romania, the Codes of good practice in the field of corporate governance recommended by the Organization for Cooperation and Economic Development (OECD).

The dynamism of the current economic context, as well as the need to correct the dysfunctions faced by certain small and medium-sized enterprises, companies, organizations, economic operators and autonomous governments, emphasized the importance of creating and implementing a relevant legislative framework, which would boost their performance, leading to their performance. generating added value for the national economy.

In addition, increasing the efficiency of state-owned enterprises could be achieved by creating, developing and implementing corporate governance mechanisms, as an adjunct to existing legislation, in order to ensure the professionalism of the decision-makers, to protect the rights of minority shareholders and to increase transparency. vis-à-vis the public environment regarding the activity and the shareholding policy of these state entities.

A decisive attribute in defining the concept of Corporate Governance is the adoption of the `apply or explain` principle, the principle developed by the OECD and adopted by the legislation in the field of corporate governance in Romania, where it is reflected in the recruitment process and the selection of the future

members of the Board of Directors from Public enterprises, the Long List and the Short List being realized by an independent expert, outsourcing this service, which can also be performed by the public tutelary authority under certain conditions of transparency and decentralization, the main research direction in this paper, where we will show how this can be done, under cyber security conditions, helping us exclusively by the own resources of the tutelary public authority regarding e-government tools, through which this service is completely digitized, eliminating the hiring of an independent expert and maintaining the degree of transparency of the selection process to the end. This innovation brought to light, is not only limited to the digitization of the recruitment of future members of the Boards of Public Enterprises, instead we want to bring profound changes in the recruitment application of top management personnel.

1.3. HR between digital transformation and the new world of work

The world of work is in a state of upheaval. Flexible working models and job sharing are on the rise, international and cross-company networking are dramatically increasing the complexity of work, and proven management and organizational models are being put to the test. Companies are increasingly acting as networks and are placing the management of complex teams at the center of organizational structuring. The “organization of the future” has become HR Topic Number 1. Digital tools and artificial intelligence are natural components of recruiting, Electronic personnel files, self services and cloud solutions can reduce the Corporate Governance department’s workload, from Tuthelar Public Authorities, in the public sector. Digital HR is a strategic competitive advantage that can be used in Public Enterprises, Cloud technology is also a competitive factor for the Public Enterprises, not yet applied, Algorithms and user-centric software make employees more productive in the new world of work, Innovation and agility in human resources are decisive for the success of the company. Globalization, networking and digitization call for new forms of cooperation- In late 2018, globalise analyzed the way in which digital transformation as well as new work and organizational requirements will change HR work, White Paper, Globalization 4.0 Shaping a New Global Architecture in the Age of the Fourth Industrial Revolution A Call for Engagement, April 2019, conducted by World Economic Forum.

1.4. The recruiting in private sector

The study was based on three core questions: How is the world of work and thus HR management changing? Which HR technologies already exist today and in what way are they successful? In which areas are the biggest challenges to be found? We asked more than 80 decision-makers, HR professionals, interim managers and directors for their responses to these questions. The experts were drawn primarily from the focus sectors Automotive, Healthcare & Life Sciences, Consumer Goods & Retail, Mechanical and Plant Engineering, and Telecommunications, IT & Media. This white paper provides an overview of the status quo and the most pressing

challenges in the HR field, as well as providing concrete recommendations for HR professionals. In view of the radical changes occurring within the working world, new technologies are called for. On the one hand, they should help individual employees to be more productive. On the other they need to support the successful management of complex teams. Team-oriented platforms, tools for coaching and HR analytics, monitoring and assessment therefore urgently need to come much more into the spotlight. To take just one example: in the years to come, many companies will replace their email systems with new tools that facilitate collaboration and communication – e.g. Microsoft Teams, Workplace from Facebook, Slack, Trello or Skype. In this environment, HR work needs to be understood more than ever as a strategic competitive factor. But the reality in many companies is still very different. Up to now, the relevance of HR to strategic development has barely been noticed – to say nothing of the efficiency potential of digital technologies. In a global expert survey on digitization in the HR sector, 82 % of respondents stated that their HR department still works primarily with paper or Excel. Digital tools and artificial intelligence are a natural part of recruiting. Storytelling, employee advocacy and Artificial Intelligence (AI) are new instruments in recruiting. Jobs are filled quickly and precisely using Robotic Process Automation (RPA). HR departments are poorly equipped technologically. Many HR teams are administrative departments that still work with paper and Excel. Digital personnel files are as much a dream of the future as using the cloud. The faster the available knowledge grows, the less sufficient it is to send employees for further training once a year according to the waterfall can principle. But this is still the case today. Companies therefore need to invest significantly more in their workforce to keep pace with digital development.

Furthermore, cloud-based platforms are gaining ground, gradually replacing companies' own on-site systems. The cloud is a simple and inexpensive alternative to inhouse software, that was often expensive, cumbersome and not updatable. Cloud technology is also a competitive factor for HR. The prerequisite for the sustainable operation of HR software is an upgrade of the core technology: legacy systems need to be replaced by an integrated cloud platform and a solid digital infrastructure. Compared to legacy systems, the cloud enables simple scaling as the company grows or evolves. In addition, new functions can be tested and activated in the shortest possible time. Cloud applications also mostly offer defined interfaces for connecting further applications, allowing the company to easily assemble the right application portfolio. The best way to select the right software is to set up a digital HR team that tests new solutions based technologies in order to implement innovative services for recruiting or further professional development within the company. Digitization and digital transformation in human resources must be aligned with the goals of the organization. This calls for long-term measures that require intensive discourse with all participants and should be implemented iteratively. There will be no final state in which HR becomes merely an IT service that can be handled on a smartphone. Rather, constant adaptation to our way of life, the talent market and competition will enable a more productive, efficient and healthy working environment.

McKinsey Quarterly, Managing talent in a digital age, March 2016: " Online labor platforms make it easier to find and harder to retain talented people. They give companies a real opportunity to transform the way they recruit, develop, and engage their employees.

"Software leaders contend with a growing array of challenges as the shift to subscription business models and to the cloud prompt changes across the organization. New commercial models, AI and digital technologies raise the competitive bar, even as companies need to deal with rising talent gaps and cyber security threats.,"

Paul Roche Senior Partner, Silicon Valley office McKinsey & Company.

1.5. The proposal in recruiting in public sector

Starting from an simple Applicant Tracking System (ATS) software, and evolving to an entire employment digital system, all the way up to the final candidate from the Short List, will ensure the recruitment and selection process to be transparent and decentralized, since it eliminates the human factor fully. This will transform the way we know to hire governing bodies, evolving to a Corporate Governance that is sustainable.

In order to elaborate an optimal composition of the governing bodies, a well-known method of selection is the RACI matrix method, offering diversity elements and strategic requirements of supervision of the Public Enterprise, for the members of the Board of Directors and the General Directors, introducing the selection indicators and applying as the criteria for an algorithm which will obtain the best score.

**User centric design* may be defined as an iterative design process, wherein the focus lies upon the end users' usability. Rather than asking the users to adapt their attitudes and behaviours to learn and use a system, a system can be designed to support its intended users' beliefs and knowledge as they relate to the tasks that the system is designed to support. The developers have the task of understanding the intention of the software and the background of the user. This step helps to bridge the gap between the goals of the business and the customer expectations. Expectations are to be met to satisfy customers in turn. A system that is easy to get familiar and learn with minimal requirements is what the user desires. For this, the interface has to behave consistently. The designing phase has to inculcate consistency to integrate with the existing components in a computer system. Users have to be given chance to provide feedback after every phase of progress. This makes the developer team understand where they can improve in the upcoming projects. Involvement of the users can be enhanced by keeping them occupied with the system. For this, the navigation of the application needs to be simple. A step-by-step procedure will be easy to understand and the progress will not be disrupted.

**What is chatbot technology?* A chatbot is an AI software that is capable of simulating a conversation with a user via websites, messaging applications, mobile apps, and the likes. So advanced is this tool, in fact, that it can mimic human

language perfectly and respond to users' questions in an accurate manner. The goal is to give users the illusion that they are interacting with another human at the other end of that conversation.

The current trend in industries attaches great importance to Sustainable Development

"Sustainable development follows and tries to find a stable theoretical framework for decision making in any situation where there is a human-environment type report, each one concerning the environment, the economic environment or the social environment" (Lester Brown, *Eco-Economy: Building an Economy for the Earth*, 2001).

or

Sustainability (<engl. Sustainable) s. F. Quality of an anthropic activity to be carried out without exhausting the available resources and without destroying the environment, thus without compromising the possibilities of satisfying the needs of the next generations. The 1992 Rio de Janeiro World Environment Conference has paid particular attention to this concept, which involves establishing a balance between growth and environmental protection and finding alternative resources. When it comes to the overall economic development of a country or region, the term synonymous sustainable development is usually preferred. Source: DEX (1993-2009).

Thus, we remain at the term of sustainability process for Corporate Governance, because at present it is not adopted, and the current tendencies of orienting the company towards the effects that can <compromise the possibilities of satisfying the needs of the next generations>, have a special importance in the decisions we make in present, this proposal coming as a measure of accountability of the members in their actions, presenting an integral profile.

So far, the specialized works in the field of e-government methodologies adopted by the state and analyzed in these researches, have a general format, addressing topics from the category of public administration relation with the citizen, announcing a new form of public administration, a more transparent one , encouraging the relationship between citizen and state, by eliminating bureaucracy, but in terms of online recruitment, in the digital environment, all publications are limited to simple recruitment by accessing candidates, online recruitment platforms, by submitting CV - either in the private or the public sector, so far the idea of digitizing the entire recruitment chain does not exist, a process that no longer presents digital elements in the initial phase.

Thus, we get to ask ourselves: What major research has raised questions that have caused scientists to be concerned about public administration and its digitization? Is this transposition in the digital environment of a service outsourced by the state in order to fight corruption? , is this methodology ultimately effective?

We note that in the works "Information systems of e-government type or electronic governance: between the present and the future" and "mGovernment - an image for the future of the Public Administration", the author D. Litan does not address the problem of digitalized recruitment from the Public Administration, limiting -is only for services for citizens.

The research methodology addressed in this paper is based on the fragmentation of the principles of good governance and consolidation of the economic performances imposed by a critical analysis of matrix type, where the importance of digitizing the processes of recruitment of the top management of public enterprises is highlighted.

In the future, I propose to model a process of digitized recruitment and selection of the future members of the Board of Directors of Public Enterprises under the tutelage of the Public Authority, where I will study several models of software programs secured and adapted to the needs of the Public Administration, such as be DM Software (decision making software), oriented towards Corporate Governance with a view to transparent and decentralize the recruitment and selection process.

1.6. Conclusion

The research direction presented first involves the mathematical dimensioning of the digitization process, my proposal being the analysis of the satisfaction factor taken as the criterion of conclusion, because the satisfaction of the actors involved in the process and the satiation of the degree of accomplishment of the initially proposed goal, that of transparency of the process selection, comes to the package with the decentralization of the decision-makers involved, thus it is possible to observe the evolution, the transition from the classical methods to the digitalization of the internal processes of the public institution and the actual transformation of the entire system of recruitment of the future members of the Boards of the public system. Such a revolution of the tutelary public authorities, which are currently in charge of this endeavor, has as a consequence the shaping of the future of public administration, a model that is almost completely different from the one we know today. Are we ready for such a change?

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Smart healthcare for smart cities

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Abstract

The proposed goals of smart cities are to improve the quality the life of citizens by improving urban infrastructure, foster innovation and enhance the healthcare system offered to their citizens. This paper presents a literature review about the use of Big Data Analytics and BDA-related technologies in order to provide highly efficient medical and health services to patients living in smart cities. A lot of tools in Big Data Analytics involve data mining; thus, we are proposing a simple way of collecting medical and health-related data from patients using a series of sensors and a cloud-based method of mining, transmitting, and analysing data using a (hypothetical) machine learning system. As a conclusion, we may say that health services in smart cities and the use of big data mining for improving medical decision support, among other aspects of health and medical care services are (almost) purely theoretical concepts at this point. These services definitely look good on paper, but there is yet to be a truly successful model that has been tried in real-life clinical practice that has, at the same time, been unanimously considered as successful.

Keywords: *Big Data Analytics, Healthcare services, Smart Data.*

1. Introduction

The impacts of information technology innovations such as Big Data Analytics (BDA) are now starting to reach industries that have long been considered as slow adopters, a perfect example of which is the health care industry [1, 2]. It can be recalled that it took at least a few decades before the health care industry started to break free from the traditional pen and paper-based methods of record keeping in

favour of higher-tech and digital-based means of conducting record-keeping operations. While organizations in the health care industry were still thinking about whether digitalizing their patient and medical and health personnel's records would be the right call or not, a consistently growing number of technologies and innovations were already being introduced in the background. One of such is Big Data Analytics; thus, the objective of this paper was to conduct a literature review about the use of Big Data Analytics and BDA-related technologies to provide highly efficient medical and health services to patients living in smart cities.

2. Literature review

Big Data Analytics can be used in the health care industry in numerous ways. There are, in fact, some studies that have been published in the past about the different use cases for BDA in the aforementioned industry. In general, Big Data Analytic methodologies such as data mining and knowledge discovery, can be used to collect, analyse, and leverage consumer, patient, clinical, and other types of data that may be considered too vast or complicated for individuals using traditional means of data processing (even with the help of computers) to understand [3, 4].

More specific types of BDA such as data mining and knowledge discovery, harnesses the power of computers not just to assist the person conducting the analysis perform his duty. In a typical BDA scenario, there are the computers that are actually doing the complex computations already; they also involve little to no human intervention and or interaction [5]. This is often done via a combination of machine learning, artificial intelligence and data science.

From a broad perspective, BDA can be a highly efficient means to enable public and private entities that are operating in this industry to make better decisions. Such decisions may be better than the ones that the leaders of the public and private entities may be able to make without the guidance provided by the Big Data Analytic tools (e.g. data mining and knowledge discovery programs) in various ways.

Some decisions, for example, may have a positive impact on the overall patient experience, while some may be more focused on bringing the level of accessibility of the available health care services up to, especially to those who really need them [6, 7]. In the majority of the cases, however, the improved outcomes of the decisions that medical and health care institutions that would end up using BDA tools such as data mining and knowledge discovery would most likely be attributed to their newfound ability to be more aware of their situation and surroundings [8]. This increased level of awareness is what enables them to make more precise adjustments in the areas that require improvements [9].

2.1. Personalized medical and health care services in smart cities using big data analytics infrastructures

There is a high degree of variation when it comes to the type of medical and health care services that a person is going to need [10]. Medical and health care

professionals always point out that every patient's case is different [11]. This is still true even in cases where two or more patients have been diagnosed with a similar disease or disorder. This is where the importance of a medical and health care institution's ability to provide highly personalized services to their patients come in. The problem, however, is that highly standardized (and at some point, mass-produced) medical and health care services are already expensive as they are to the point that even the people who really need access can barely afford them.

Affordability will undoubtedly be an even bigger issue if medical and health care institutions are to start offering personalized care to their patients [12]. The good news is that this problem can be solved through the adoption of smart technologies, mainly big data analytics, in medical and health care practice. In a study that was featured in the IEEE International Symposium on Medical Measurements and Applications, for example, Patsakis et al. (2014) suggested that the wide deployment of various types of diagnostic sensors in various parts of the city would be an effective way to collect data about the overall health and medical conditions of the patients or people who live or work inside the designated smart city grid. The purpose of the sensors is to collect data about their medical and health condition. These data would then be stored and analysed through data mining and knowledge discovery applications – which is precisely where the Big Data Analytics aspect of the process comes in. This, according to Patsakis et al. (2014), is a good way to improve the specificity and quality of the medical and health care services that the patients living in highly urban areas (that have a huge potential for being converted into a smart city) can receive, without having too much of an impact on affordability.

2.2. Data acquisition from sensors

One of the requirements of a data mining and knowledge discovery-based processes of delivering health services in a smart city is an efficient and not to mention an ethical way of collecting data from a target population – i.e. patients living in a smart city [13]. It is important to note that Big Data Analytics only works if one actually has access to a large stream or pool of data that can be analysed. A typical characteristic among many conceptualized smart cities (because there is not really any full-pledged smart city on the planet at the moment) is a high degree of automation. A truly BDA-inspired way of delivering health services to a large number of people living in an urban area (i.e. smart city) is the remote collection of the patients' medical and other health-related data [14].

This can be done through a wide range of sensors. The important thing is for these sensors to accurately mimic the different methods that physicians use to conduct a physical and medical (non-laboratory) examination of their patient [15]. The overall physical and medical patient examination process can be broken down into four parts. Each of these four parts can be represented by a unique type of sensor that would collect data remotely for the physicians to gather the data that they need to be able also to make a diagnosis or even do a simple check of the patient's status.

These four parts are 1) Inspection, 2) Palpation, 3) Percussion, and 4) Auscultation. During the inspection, the physician basically checks the patient's condition using his eyes, to determine if there are any visible signs of trauma, infection, among other potentially abnormal findings. The type of data that has to be accessed through inspection-based examinations can be collected by cameras [16]. In the case of a big data analytics-based system that can perform thorough visual checks on patients, the cameras would act as the physicians' eyes, doing most of the data mining processes for them, and remotely at that. Percussion is another type of examination that can be mimicked by another type of sensor. This type of sensor must be able to record and deliver auditory data from the patient to the receiver. For most applications, a sensor-equipped with a high definition microphone would fit the description. However, it is essential to note that in order to generate recordable sounds, the patient has to be taught how to percuss the potentially problematic areas of his body properly.

2.3. Data pre-processing and transformation

In a clinical setting, it is usually the physician who performs the percussion (tapping). The two remaining parts of physical and medical examination, auscultation and palpation, would most likely be prohibitively invasive (on the patient's part) if it were to be implemented based on a BDA-method. Auscultation requires the use of a stethoscope to listen to the sound generated by the patients' organs (e.g. lungs); palpation requires physical contact between the physician and the patient. There are currently no reliable technological means to mimic these two remaining processes. The ethical issues involved in using a sensor that would have to be directly implanted into a patient's body in order for the said sensor to fulfil its role are also going to be a problem [17].

Sensors that are equipped with specialized hardware that would enable them to perform urine stool seamlessly and even blood analyses may also be incorporated in the smart city health services provision system. This would enable the medical and health care institutions to remotely monitor their patients' medical and health conditions, with a high level of precision, as if they are only staying in the hospital [18]. From a realist's standpoint, however, it is essential to recognize that a high level of patient education would be needed in order for this kind of smart health care service provision system to work. A patient, for example, would have to know how to use and or interact with the sensors in order for them (the sensors) to do their job correctly – to relay the data collected from the patient to the data mining computers – for knowledge discovery purposes.

2.4. Data transmission for central servers

The data obtained from the sensors would have to be transmitted to a central database located within the vicinity of a hospital or any designated medical facility. In a study that was published in the International Journal of Healthcare Management ([21]) we have used a rather complicated XML-based process of collecting, processing,

transforming, and transmitting data. While the idea was indeed noble and highly detailed, it creates some unnecessary steps that only complicate the system. Data transmission of sensor-collected patient medical and health data can be freely transmitted over the cloud [19, 21]. This would, of course, entail a certain fee, depending on the overall space that the data that would have to be transmitted would occupy. This space in the cloud would then act as the central server from which the hospitals and medical institutions can access the patients' medical and health data that they have to use as the input in their data mining and knowledge discovery systems. This eliminates the need for them to acquire and set up central server hardware on their own.

2.5. Data reduction

Data reduction processes can be added as a layer to simplify the process of data mining and knowledge discovery. The good news, however, is that the sensors can already be programmed in such a way that they would already be able to transmit the right data so that the need for the addition of another layer (for data reduction) in the system would be minimized, if not completely eliminated.

2.6. Feature and knowledge extraction and visualization

Feature and Knowledge Extraction and Visualization can be performed through the use of machine learning. The machine learning system will have to be fed with the data that have been collected from the patients in order for patterns and trends to start emerging. These can then be used to make better decisions for a group of patients, or even a single patient-enabling the practitioners to provide a highly specific and specialized type of care.

2.7. Decision tree and random forest

The decision tree acts as a layer that enables the users of the BDA tool to determine what the best possible options for a patient or a group of patients are, considering the type of data that have been collected and analysed starting from the sensors up to the part where machine learning systems were used to spot any problems or issues with their health or medical condition.

3. Methodologies used

In this paper, we have used a short literature review that consider the opportunities involved in the development of a health service provision system that is based on the concept of smart cities, particularly Big Data Analytic tools, such as data mining. Here, we have proposed a simple way of collecting medical and health-related data from patients using a series of sensors and a cloud-based method of mining, transmitting, and analysing data using a (hypothetical) machine learning system.

4. Conclusions

The implications of using BDA in the context of smart health services and smart cities boil down to whether the system that the first few organizations would come up with can really do their job or not. The only thing that would convince the patients to try something this revolutionary out for real is if it works.

Big Data Analytics, while a relatively new technology, is already being used in a growing number of industries. Some of the ones that are in the forefront are those operating in the technology and business intelligence industries (e.g. those whose core operations include marketing, advertising, and market research). Big Data Analytics refers to the group of technologies that cover the complex process of analysing large chunks of data, in an attempt, to better make sense of what they mean. Depending on the purpose of the entity that sanctioned the use of Big Data Analytics to analyse data, it often involves the recognition of specific patterns, and trends, that can (presumably) help said to fulfil its role. Assuming that that entity is a business, for example, the pattern and trend recognition-mechanisms of BDA can be used to develop and gain a better understanding of the consumers. This is a strategy that can also be used to deliver more efficient and cost-effective health services, especially within the context of developing smart cities. In conclusion, the authors found that health services in smart cities and the use of big data mining for improving medical decision support, among other aspects of health and medical care services are purely theoretical concepts at this point. They definitely look good on paper, but there is yet to be a truly successful model that has been tried in real-life clinical practice that has, at the same time, been unanimously considered as successful.

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RECICLETA – cel mai ecologic colector de materiale reciclabile

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Abstract

RECICLETA este o întreprindere socială înființată în 2009 de ViitorPlus asociația pentru dezvoltare durabilă.

Obiective: România este pe ultimul loc în Europa în ceea ce privește reciclarea. Până în 2020 ar fi trebuit să atingem tinta de 50%. RECICLETA a fost lansată cu scopul de a oferi o alternativă la serviciul de colectare de materiale reciclabile printr-un model de transport bazat pe folosirea de mijloace nepoluate: cargo-triciclete asistate electric și cargo electrică. Astfel creem locuri de muncă verzi, o parte din angajați fiind persoane aparținând grupurilor vulnerabile. **Studii prealabile:** Ultimul raport emis de EUROSTAT, poziționează România pe ultimul loc în Europa cu o rată de reciclare a deșeurilor municipale de doar 14%.

Abordare: RECICLETA a pornit inițial la drum pentru a acoperi o nevoie foarte clară: de colectare a cantităților mici și mijlocii de hârtie de la birourile din sectorul 1. Cantitățile preluate de RECICLETA între 25-150 de kg nu sunt atractive pentru colectorii mari și de aceea nu sunt ridicate de aceștia. În plus, hârtia necesită mai multă atenție pentru a nu fi contaminată, caz în care își pierde calitatea de a fi reciclată. Cu timpul, cererea pentru serviciul de colectare RECICLETA a crescut, făcând posibilă extinderea atât la mai multe tipuri de materiale reciclabile preluate (carton, sticle plastic PET01, folie plastic bax și doze de aluminiu), cât și extinderea în celelalte sectoare - centrul și semicentrul Bucureștiului.

Rezultate: În cei 10 ani de funcționare, RECICLETA a salvat de la groapa de gunoi peste 630.000 de kilograme de materiale reciclabile, în special hârtie și carton, cu peste 8000 de arbori maturi salvați de la tăiere prin reciclare. O tonă de hârtie reciclată salvează de la tăiere 15 arbori maturi. În acest moment RECICLETA oferă 6 locuri de muncă verzi și deservește peste 70.000 de beneficiari – angajați ale firmelor clienți, locatari ai scârilor de bloc și elevi din școlile incluse în program.

Implicații: RECICLETA este una din întreprinderile sociale din România care a fost premiată la nivel European în 2013 pentru inovație la secțiunea de mediu de către EIB Institute. Problemele pe care le adresează RECICLETA sunt atât de domeniul protecției mediului – prin reciclare și

folosirea unui mijloc de transport alternative nepoluant – cât și la nivel social prin oferirea unor locuri de muncă verzi unor persoane din grupuri vulnerabile. **Valoare:** RECICLETA funcționează pe un model logistic eficient de last mile pick-up, se află în faza de validare și are ca obiectiv diseminarea acestui model în cât mai multe orașe din țara, așa cum s-a întâmplat în 2015 în Alba Iulia și 2019 în Iași.

Cuvinte cheie: întreprindere socială, reciclare, cargo-triciclete asistate electric.

Peste 70.000 de bucureșteni reciclează acasă, la școală și la birou cu RECICLETA

RECICLETA, programul de transport materiale reciclabile colectate separat, s-a extindis în 2019 în 20 de licee și școli generale din sectorul 2 al capitalei. Copiii se alătură inițiativei în care sunt deja incluse 600 de scări de bloc din sectorul 2 și 200 companii din centrul Bucureștiului, deserving astfel peste 70.000 de beneficiari direcți. Programul RECICLETA, care a împlinit în acest an 10 ani de activitate este o inițiativă ViitorPlus – asociația pentru dezvoltare durabilă, susținută de Kaufland România. În ultimii trei ani.



Figura 1. Cargo-tricicletele asistate electric și autoturism electric utilitar

Sursa: kerucov.ro și 2dogood

În unitățile școlare se montează recipiente de colectare separată a materialelor reciclabile – hârtie, carton, doze de plastic și aluminiu. Materialele sunt preluate și transportate periodic, către punctele de colectare intermediară RECICLETA, cu ajutorul cargo-tricicletelor asistate electric și a unui autoturism utilitar electric, de unde partenerul în reciclare vine să le preia pentru a le introduce pe fluxul de valorificare. Întregul program asigură 6 locuri de muncă verzi, cu normă întreagă și pe termen lung.



Figura 2. Sesiuni educaționale interactive pe teme de reciclare
Sursa: voluntar

Pentru a motiva elevii să recicleze, RECICLETA și Kaufland România au lansat un concurs cu premii totale în valoare 20.000 lei, premii care vor merge către instituțiile de învățământ care colectează cele mai mari cantități, în primele 3 luni de la intrarea în proiect. Premiile sunt destinate reparării sau reamenajării a 6 unități școlare câștigătoare. Detalii pe <https://www.recicleta.ro/scoli/>.



Figura 3. Recipiente de colectare în cele 20 de unități de învățământ și afișul concursului
Sursa: voluntar și grafică 2dogood

Mulțumim partenerilor: Kaufland România, Primăria Sectorului 2, EIB Institute, Supercom, Shillex, SOS Satele Copiilor, Nexus Electronics, Nomenius, Professional, Autonom, Klaussenburg Recycling.

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Reconfiguration of the road and the pedestrian traffic in the central area of the Municipality of Alexandria - Road passageway

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Abstract

Road Passageway / Passage

Any locality , especially a county seat municipality, needs a representative area, the so-called „ Centre ” that the tourists and the foreigners would want to visit, the locals to enjoy it and take pride of.

Amongst the most important landmarks of the residents of the Municipality of Alexandria are the green areas, which is why the project conceived by the Municipality supports the importance of developing the network of urban spaces in the city. The city has a regular street formation and a system of distribution that appears most often in colonies cities. Therefore, the Danube street with its green area for recreation which cuts the monotony situated exactly in the centre of the city, is “ the green heart of the city”.

General objectives of the project: *Improving the accessibility of both locals and tourists in the city centre of Municipality of Alexandria with the help of the underground road passages. Reconfiguring the subterranean spaces related to the central area of the municipality, thus improving the quality of the public space. Reducing traffic congestion to the surface in the central area and supporting both locals and visitors by providing parking in this area. This is achievable, by using an underground parking for the underground passage, proposed by the project, thus clearing up a significant number of square meters of the above- ground space, usually occupied by vehicles.*

The project ‘Reconfiguration of the road and the pedestrian traffic in the central area of the Municipality of Alexandria– Road Passageway’ is part

of the general context of sustainable development, economic and social, in the regional, county and local policies and programs. It is relevant from the point of view of community strategies aimed at optimizing local development factors- environmental actors on the one hand and tourism infrastructure on the other.

Keywords: *community strategy, sustainable development, tourism infrastructure, green area, development of urban space networks.*

1. Introduction

1.1. Defining the territory and the accessibility

The Municipality of Alexandria is the residence of Teleorman county and the main economic-social centre of the county with complex industrial, tertiary, administrative, political, educational and cultural functions.

Due to its location, the city of Alexandria has been and continues to be a hub for communication. It makes the connection between the capital of the country, Bucharest and many of the provincial cities.

The National Road DN 6 connects Bucharest through Alexandria to Roşiorii de Vede, Caracal, Craiova, Timișoara;

The National Road DN 52 connects Alexandria to Turnu Măgurele, Corabia, Calafat etc.;

The National Road DN 51 connects Alexandria to Zimnicea;

The County Road DJ 504 connects Alexandria to Pitești and Câmpulung;

The County Road DJ 601 connects Alexandria, through Găești, to Târgoviște;

The County Road DJ 506 make the connection through Alexandria and Giurgiu.

Located in the south of the Romanian Plain, on the right side of the Vedea river, the Municipality of Alexandria is 89 km away from the country's capital, Bucharest.

The Municipality of Alexandria has an area of 98,46 km² and a population, based on the place of residence on 1st January, 2016 of 52.101 residents, according to the statistical data presented by the National Institute of Statistics in the Tempo-Online Database.

In terms of land use, 74,92% represents arable land, 3,27% grassland, 2,98% forest, 0,9% water and ponds, 2,60% degraded land, 10,88% construction, 2,45% communication lines.

Most of the public institutions of general interest and points of attraction are concentrated on the street Danube, the main thoroughfare crossing the municipality, and the residential areas, consisting of block neighbourhoods and house neighbourhoods, are located on a rectangular **street plot**.

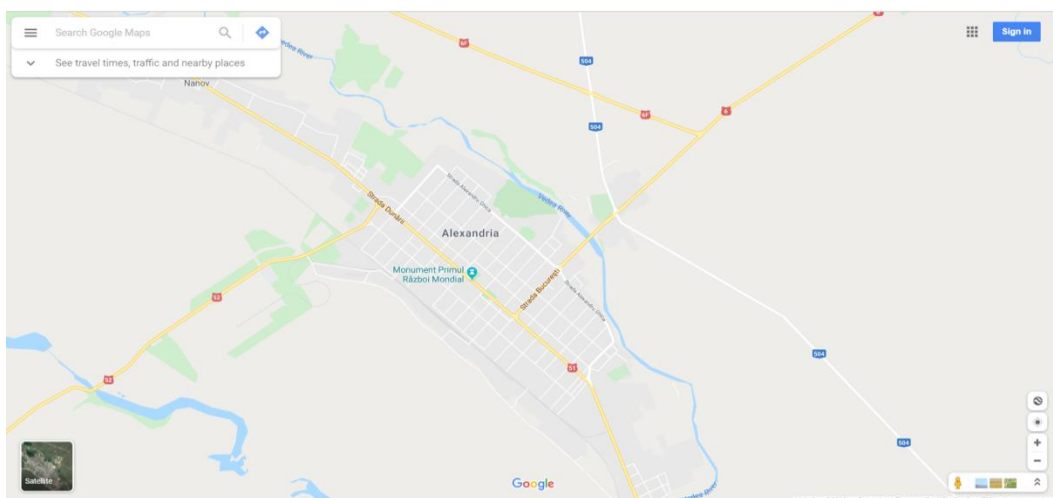


Figure 1. Alexandria municipality - accessibility
Source: <https://www.google.com/maps>

1.2. General information about the project

The perimeter in which the location of the investment is located concentrates the headquarters of the most important public, financial, cultural and commercial institutions and presents a good service with public spaces through the existence of a network consisting of parks, squares and markets connected, partly, through pedestrian areas.

Focusing on the idea that green spaces play an important role, contributing to the quality improvement of the residents' life, **the Municipality of Alexandria's Mayor, Mr. Victor Drăgușin**, requested the current project. Its general objective is to improve the accessibility of cars and pedestrians, local and transit traffic through an underground roadway. That will result in an increase of the city centre's attractiveness.

Tourism increasingly involves modifying the natural and artificial environment and demands a special territory equipment, and the development of specific spaces and functions.

Achieving the objective of the present project is important for promoting the tourism in the Municipality of Alexandria. Any investment that increases the attractiveness of the public spaces and improves the urban image, will have a positive impact on the development of tourism.

The area involved in this project is delimited by the following landmarks: the Danube Street, the section delimited by the intersection with Bucharest Street and Ion Creangă Street and the pedestrian area related to the section described above and up to Liberty Street. The limits of the project are the following: Danube Street between the intersection with Ion Creangă Street and Bucharest street, Liberty Street between Ion Creangă Street and Bucharest Street, Ion Creanga Street and Bucharest Street.



Figure 2. Decongestion of road traffic and the creation of a green, pedestrian area, suitable for relaxation

Source: Feasibility study for "Reconfiguration of the road and the pedestrian traffic in the central area of Alexandria-Pasaj Rutier", elaborated by S.C. SPECIALISTCONSULTING S.R.L., August 2014

The land related to the works provided for in the project is located in Alexandria municipality, Teleorman County and is delimited by the following landmarks: Dunarii Street, the section delimited by the intersection with Bucharest Street and Ion Creangă Street and the pedestrian area related to the section described above and up to Libertății Street. The limits of the project are the following: Dunarii street between the intersection with Ion Creangă street and Bucharest street, Libertății street between Ion Creangă street and București street, Ion Creangă street and Bucharest street.

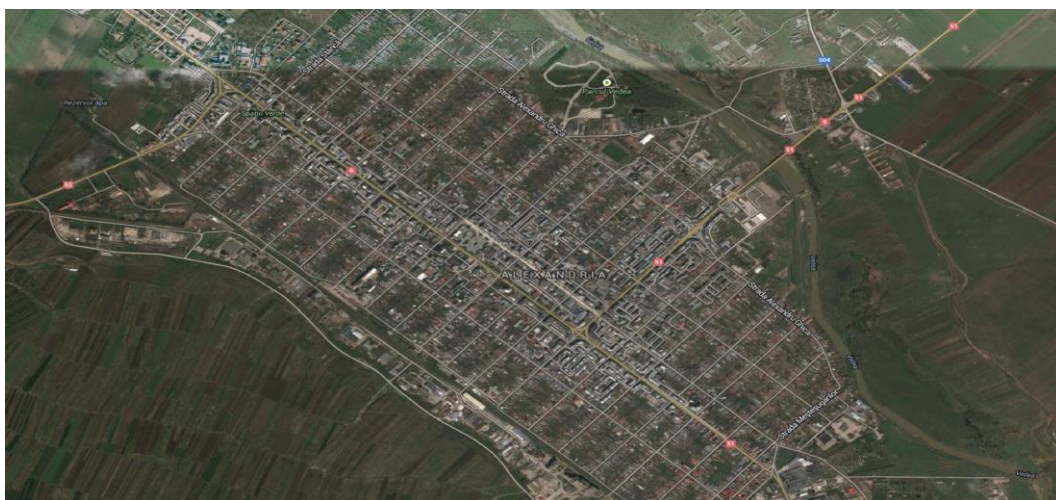


Figure 2. Plan for framing the area studied by the project

Source: <https://www.google.com/maps>

The project aims to implement solutions regarding:

- parking arrangements in the proposed location, modern share-space and pedestrian solutions;
- the creation of an infrastructure necessary for the transit of pedestrians and cyclists between the areas of interest in the central area and the connection between the traffic lines of the urban public transport;
- providing the necessary facilities for pedestrian traffic as well as those involved in traffic with special needs, evaluating the environmental impact factors and adopting technically and economically feasible solutions to avoid the negative impact;
- adopting solutions that allow inspection and maintenance as well as fixing the objective with minimal expenses;
- framing the landscape objective in the studied area;
- diversification of activities in the social sphere of the locals by organizing different functions; **"greening"** the central area of the municipality in the idea of replacing every square meter of space built with green spaces as much as possible.

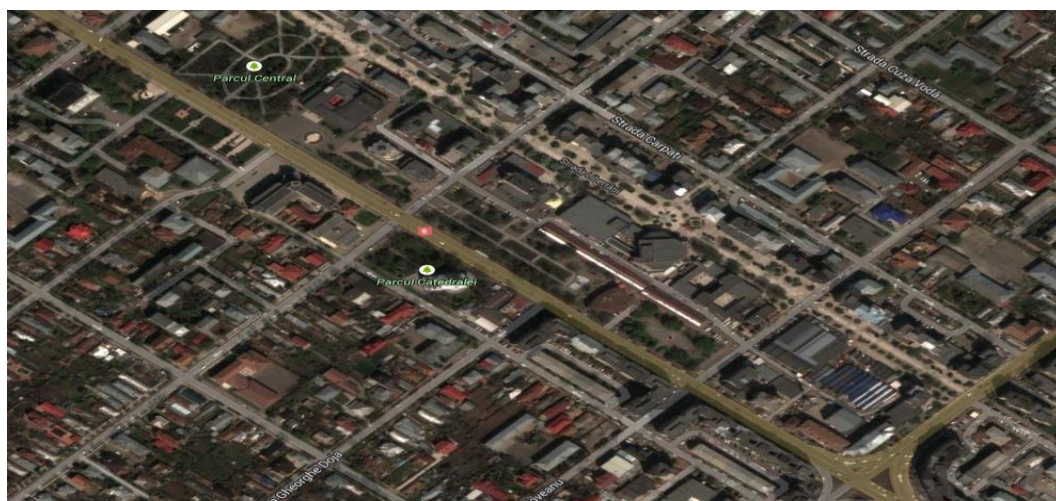


Figure 3. Situation plan of the objective studied through the project

Source: <https://www.google.ro/maps>

In the context of the **"greening"** of the central area, we aimed to redevelop the central park, an investment that is intended to have a recreational, educational and aesthetic impact.

It will bring a contribution to the quality of the environment and implicitly the quality of life of the residents. At the same time our aim is to create an attractive place for residents and people in transit.

The constructions proposed within the park are generally places intended for spending leisure time but also for carrying out socio-cultural activities.

The proposed intervention works will consist of: infrastructure works, building fountains, enlarging and diversifying the areas of green space through the placement of flower boxes and support gardens (local species will be planted and very well adapted to the climatic environment in the plains area), steps and ramps for the access of people with disabilities, pergolas, various urban furniture, ornamental lighting, underground sewers for new installations as well as for telephone networks, existing cable, arrangement of living areas through the placement of smart banks (equipped with USB sockets, intelligent systems and autonomous), etc.

The project is part of the general context of sustainable development, economic-social, regional policies and programs. While being relevant in terms of community strategies, it aims to optimise the local development.

To increase the image of the Municipality of Alexandria as a tourism attraction, it is important to achieve the objectives of this project. Until now, it did not reach its fully potential. Any investments that increases the attractiveness of public spaces will have a positive impact on tourism.

The proposed project preserves the urbanistic old configuration of the city centre, while essentially improving the functional character of the area.

1.3. The current situation and information about the entity responsible for this project implementation

The development of the transport infrastructure represents a necessary condition for the successful implementation of the other development priorities of Teleorman county, contributing to the increase of the mobility of people and goods, to the integration of the area with the trans-European transport network, to combating the isolation of the underdeveloped areas and, last but not least, the development of regional and local transport infrastructure. An efficient transport infrastructure, connected to the European transport network contributes to increasing economic competitiveness, facilitates integration into the European economy and allows the development of new activities on the internal market.

The project proposes a modern and sustainable road and bridge infrastructure development due to the increase of vehicles purchased, the increase of the mobility index of the existing fleet, the increase of the traffic passing through Teleorman county, the increase of the pollution, lack of signalisations for protected areas, tourist areas and cultural heritage, natural and historical areas.

All three dimensions of the concept of sustainable development, the ecological, economic and social dimension are addressed in the elaboration of the study. The ecological dimension concerns consumption and sustainable production, conservation and management of natural resources, climate change and clean energy.

The economic dimension refers to socio-economic development (economic prosperity) and sustainable transport. The social dimension concerns social inclusion, demographic changes and public health.

In this regard, the study aims to developing the road infrastructure in Teleorman County while meeting the economic, social and environmental needs of the population. The desired outcome is to minimize its impact and identify opportunities and possibilities for development, while taking into account the sustainable component.

The existing situation of the analyzed park resulted from the cadastral documentation and the surveys drawn up at the time of elaboration of the present technical-economic documentation. The land on which the park is located is placed in the inner city, in the centre of the Municipality of Alexandria. This area has polarized and continues to polarize the entire leisure activities and cultural events.

2. Description of the investment

2.1. The need for investment

The need for this study arose from the decision of the City Hall of the Municipality of Alexandria to continue the program of modernizing the urban infrastructure.

The project proposed for the study envisages the construction of an underground road passage along the Danube Street. In order to substitute the parking space, two independent for each other underground parking lots were provided, on one side and on the other of the passage.

The explosive development of the Municipality of Alexandria fleet (car park) obliges the local authorities to find viable solutions for the development of the number of parking places. The problem with the number of parking places does not belong only to the central area but also to other neighborhoods with agglomerations of housing units or commercial areas. The largest agglomeration is in the central area, the target of all the residents of the municipality and not only. The development of a pedestrian area in the area targeted by the project constitutes not only a need arising from the application of the other objectives but also an opportunity to raise the quality standard of the public space.

2.2. Development directions - framing the project in the Local Development Strategy 2014-2023, Part I

The urban development, the modernization of the infrastructure and the protection of the environment in the city of Alexandria follows the updating of the General Urban Plan of the Municipality of Alexandria:

- outlining, organizing and developing the peri-urban area;
- the reevaluation of urban areas, of the urban and extra-urban space (general and area urbanization plans) in the perspective of the development of the habitat and of the areas of economic activity and in other areas;
- the reassessment of the general architectural profile of the municipality: central area, neighbourhoods, green spaces, spaces for public utilities (water, waste water, transport, waste, etc.), spaces for various activities;

- the reassessment of spaces bordering administrative boundaries in view of creating new areas with economic, residential and leisure functionality;
- the adequate protection of the natural and ecological capital of the area;
- improving the selected collection and ecological storage of household waste;
- the rehabilitation of the water and sewerage networks in Alexandria municipality and its extension so as to ensure water supply and access to the sewerage network of all inhabitants;
- modernizing the road network, pedestrian areas, bypass routes;
- increasing traffic safety by expanding video monitoring of road traffic and decongesting the central area by constructing underground car parks;
- ensuring the mobility of the population in the municipality and to the localities in the periurban area;
- ensuring efficient management of transport and mobility;
- promoting public transport and alternative means of transport;
- providing sufficient parking spaces and arranging bicycle lanes;
- increasing the degree of safety and security on public roads;
- improving the quality of life of the population by reducing pollutant emissions generated by road traffic;
- reducing fuel consumption and using alternative energy sources;
- ensuring the civilized living conditions by extending the natural gas supply networks in all the districts of the municipality and extending the network to the Alexandria Industrial Park - Vitănești Commune - Măgura Commune;
- urban regeneration of central and peripheral areas through the modernization of sidewalks, pedestrian traffic spaces, by making parking lots and offering a modern traffic solution;
- landscaping and dendrological rehabilitation of Vedea Forest;
- setting up of protective curtains;
- rehabilitation and consolidation of the protection dam of the Vedea River and the arrangement of the Vedea park and lake;
- improving the conditions of leisure and increasing the degree of safety by creating and modernizing children's playgrounds and their video surveillance;
- improving recreational and environmental conditions by redesigning parks and green spaces;
- providing living spaces for both young people, specialists and people with social problems;
- improving the educational infrastructure in kindergartens, schools and high schools in order to increase the performance and development of the educational act;
- the initiate programs to support gifted children;
- building a school campus with all the facilities;
- the improvement of the sports infrastructure in order to increase the performances and competitiveness at municipal and national level;

- the improvement of health services in Municipality of Alexandria (maternity, ambulance service, morgue and stem cell and transfusion collection center);
- offering alternatives for the care of elderly people in difficulty by setting up a specialized center and setting up a palliative care center;
- the establishment of a new cemetery;
- improving the conditions of civilization by equipping the city with urban furniture;
- the setting up of special places for recreation within the premises of the blocks;
- the modernization of the Municipality of Alexandria Culture House and the Patria Cinematographer;
- the establishment of a municipal cultural center.

2.3. Development Policies of the Municipality of Alexandria - framing the project in the Policy for the development of local infrastructure (public services)

2.3.1. Strategic priority: The development of public services

2.3.1.1. Development measures of the Municipality of Alexandria

The development measures consist in:

- the rehabilitation and modernization of the road network and the pedestrian alleys;
- the rehabilitation of degraded urban infrastructure and improvement of urban services;
- the development of infrastructure and utilities for new individual and collective housing neighbourhoods;
- renovating unused spaces and preparing them for new activities;
- the thermal rehabilitation of public buildings;
- the development and rehabilitation of public infrastructure and utilities;
- modernizing and extending the local public transport service and ensuring efficient mobility management;
- promoting public transport and alternative means of transport;
- creating sufficient parking spaces and arranging bicycle lanes;
- improving the quality of life of the population by reducing pollutant emissions generated by road traffic;
- increasing the degree of safety and security for public roads;
- the development of appropriate waste management systems - selective collection, recycling;
- the rehabilitation and consolidation of the protection dam for the Vede River and the arrangement of the settlement area;
- environmental protection;
- the implementation of renewable energy use projects;
- vocational training in the field of sustainable energy of the personnel of the local administration, identification and development of alternative solutions regarding the production of energy in order to reduce the expenses with the public lighting network;

- the rehabilitation, extension and modernization of the rainwater network;
- the replacement of the drinking water transport and distribution network;
- the introduction of the cable network underground;
- the concession of the care service of dogs without an owner;
- the establishment of sanitary groups in the municipality;
- the rehabilitation of existing cemeteries and establishment of a new one;
- the construction of mortuary chapels within the churches;
- the construction of utility airport (emergency, SMURD, agriculture, etc.);
- the arrangement of the central area of the city in such a way as to combine the commercial functions with the civic, cultural, leisure and tourist functions.

2.3.2. Policies to improve local transport infrastructure

*2.3.2.1. **Strategic priority:** Development of transport infrastructure*

2.3.2.2. Development measures

Development measures consist in promoting sustainable economic development and mobility of the population and labor force of the area and in increasing the degree of accessibility and attractiveness by:

- improving the transport infrastructure;
- the rehabilitation and modernization of the road network;
- the video reconfiguration and monitoring of road traffic - extension;
- improving the road traffic system;
- the extension of parking spaces;
- making the bypass variant and building a bridge over the river Vedeia between DJ 504 and DJ 51;
- setting up of indicators at the entrances of the municipality to the main public institutions and objectives;
- improving the public transport system by introducing electric transport;
- reconfiguring the traffic in the central area by introducing it into the underground – underpass road.

2.4. Proposed scenarios - the criteria taken into account when drawing up the decision matrix

2.4.1. Scenario 1 - Execution of the infrastructure of the lower passage, from slurry walls / molded walls;

2.4.2. Scenario 2 - Execution of the infrastructure of the lower passage, pile cages;

When establishing the optimal solution, a decision matrix was developed that would highlight the main advantages and disadvantages of each scenario.

The criteria that were taken into account when drawing up the decision matrix are the following: solving the problems of strength and stability of the

structure, the execution time, the risk and complexity of the technology, maintenance costs and the cost of the basic investment.

In both scenarios, the problems of strength and stability of the structure - the main elements that contribute to the choice of the optimal technical solution for the realization of the lower passage, are in the long term fully solved.

The execution time takes into account the type of infrastructure executed. Since the studied scenarios for the execution of the passage are technologically different, there will be different execution times.

In the case of scenario 1, the passage being executed from slurry walls/molded walls, the execution rate is approx. 14 m / day of work, while for the passage executed in the solution with pile/cages/ ridged pilots, the execution rate is approx. 88 * pilots / day = 4,80 m / working day.

From the calculations made above, it is obvious that in scenario 1 the execution time is much shorter than in scenario 2. In view of the presented scenarios, it was appreciated that 35 days are needed for the execution of the infrastructures in scenario 1, while for the scenario 2, 103 days. The criterion regarding the risk and the complexity of the technology was chosen because it reflects best the risk assumed by the Constructor and the Designer during the achievement of the objective according to the execution details. In the case of scenario 1, the passage being executed in solution slurry walls, the complexity and the risk are obviously lower than in scenario 2, because the safety measures (guide beam) and the used equipment can be taken, reducing the risk of deviation from the project. In the case of scenario 2, the passage being executed in the solution of pile cages / forged pilots, the complexity is higher than in scenario 1, because the probability of missing a pilot's execution is much higher than the probability of missing a slurry wall/molded wall panel. Another very important risk is obtaining a poorer quality in terms of the strength of the structure.

The maintenance costs will vary depending on the scenario chosen. For this criterion, the only cost category different from one scenario to another is the maintenance of the waterproofing of the passage. Due to the fact that in scenario 2 through the adopted technology additional waterproofing measures must be taken, the maintenance cost for this category will be higher than in scenario 1. The cost of the basic investment best reflects the investment effort, while giving the technical difficulty of each scenario studied.

Table 1. Weight of the criteria in the decision-making matrix - analysis of the importance of each criterion in relation to the others

Criterion	Degree of importance	Weight criterion
Strength and stability	3	30%
Execution time	0,5	5%
Risk and complexity	4	40%
Maintenance costs	0,5	5%
The cost of the basic investment	2	20
Total	10	100%

Table 2. The decision matrix

Criterion	Weight criterion	Scenario 1		Scenario 2	
		Execution of the infrastructure of the lower passage of slurry walls		Execution of the infrastructure of the lower passage of pile cages	
Strength and stability	20%	100	20	100	20
Execution time	5%	100	5	34	1,7
Risk and complexity	40%	80	32	60	24
Maintenance costs	5%	80	4	60	3
The cost of the basic investment	30%	100	30	70	21
Total	100%		91		69,7

Source: Feasibility study for "Reconfiguration of road and pedestrian traffic in the central area of Alexandria- Road Passage"

2.5. The scenario recommended by the developer

According to the decision matrix, the best score is assigned to *scenario 1 - the execution of the lower passage infrastructure, from slurry walls / mule walls*.

2.6. *The advantages of the recommended scenario* consist of the costs of the basic investment, much lower than in scenario 2; the execution time of the investment, much shorter; works quality - superior;

2.7. *The disadvantages of the recommended scenario:* providing a larger work front; precise synchronization between the excavating machine and the supply with the material resources (reinforcement and concrete).

2.8. *The main characteristics of the constructions within the investment objective, specific to the field of activity and the constructive variants for the realization of the investment, with the recommendation of the optimum variant for approval - recommended scenario;*

2.8.1. The underground road crossing

The topographic, geotechnical and environmental studies were based on the design of the resistance structure, which, together with the technical standards and regulations in force, led to an optimal solution.

All the geometrical elements of the objective have been established to comply with the standards and legislation in force, as well as according to the legal situation of the land.

2.8.1.1. The route in plan

The lower passage is between T. Vladimirescu street and C-tin Brancoveanu street, and has a total length of 660.0 m, of which 288.28 m represents the length of the actual passage (the covered area), 183.45 m represents the length of the ramp T. Vladimirescu, and 188.27 m represents the length of the C-tin Brâncoveanu ramp.

The path of the passage is presented in the form of alignments connected with fragments.

2.8.1.2. The passage itself

In the transverse direction, the passage will have a rectangular section, with two lanes on sense of 3.50 m each and two technological sidewalks of 55 cm each. The road side is provided with 2.0% transverse slopes to the sidewalk.

The layout of the vertical passage will be 5.00 m, which allows the circulation of all categories of vehicles.

In the middle area of the passage, decelerating / accelerating lanes will be arranged to ensure the entry / exit of the underground car parking. Because the underground parking is located on both the left and right sides of the passage, the decelerator / accelerator bands are also made on both sides, with a width of 3.00 m each.

The delimitation of the decelerating / accelerating lanes on the current part of the road will be done by the execution of a separating island with a width of 1.60 m and road markings. Along the separating island will be realized intermediate supports of the upper plate. The intermediate supports will be made of piles with a diameter of 600 mm and will be finished by applying an aluminum plate facade. Throughout the length of the decelerator / accelerator bands, the sidewalk will be 50 cm wide. The sidewalks will be provided with two PVC pipes, embedded inside.

The strength structure of the covered area will be composed of two rows of slurry walls / molded walls arranged parallel, grooved and the top plate.

The slurry walls / molded walls will be made of reinforced concrete with a thickness of 60 cm. At the bottom, the walls will be solidified by means of a monolithic reinforced concrete slab, and at the top of a plate made of both prefabricated beams with adherent strings solidified by means of the overlayer plate and reinforced concrete monolith.

The waterproofing of the covered area will be carried out by the execution of a modern waterproofing on the outside of the overlay plate and by the construction of a reinforced concrete screen with a thickness of 20 cm, in front of the slurry walls / molded walls. The screen has the role of waterproofing the structure, especially by using a special concrete and treating each joint with special strips.

The width of the underground passage is variable, between 17,20 m ($0,50 \times 2 + 3,50 \times 2 + 1,60 \times 2 + 3,00 \times 2$) ... 8,10 m ($0,55 \times 2 + 3,50$). Through the passage will be able to circulate all the vehicles with a height of up to 5,00 m.

2.8.1.3. Access ramps

The structure of the access ramps, will be composed of slurry walls / molded walls made of reinforced concrete with a thickness of 60 cm, Ø400 mm pile cages / cut piles and support walls. The solidification at the bottom of the support structure will be done by means of a monolithic reinforced concrete slab, and at the top it will be achieved by means of the crown beam.

In the cross-section, the ramp will provide the gauge for two lanes having a width of 3,50 m each and two technological sidewalks of 0,50 ... 0,55 m on one side and the other of the carriageway part. The sidewalks will be provided with two PVC pipes, embedded inside. The side road is provided with 2,0% transverse slopes to

the sidewalk. The sidewalks shall be offset from the level of the road, by means of a curb of type A1.

The waterproofing of the supports will be done by the execution of a screen of reinforced concrete with a thickness of 20 cm, in front of the slurry walls/ molded walls and of the pile cages/ piled piles. The screen has the role of waterproofing the structure, especially by using a special concrete and treating each joint with special strips. Due to the high height of the parapet, it is no longer necessary to install a safety parapet, but in order to achieve a more special architectural aspect, an ornamental parapet with a height of up to 250 mm will be made.

2.8.1.4. *The underground parking*

At the conception of the optimal solution for positioning the future investment within the limits of the land proposed by the project, the topo and the on-site studies were counted. The relief of the land as well as the existing accesses concluded the solution presented in the project. Compared to the passage, the parking position also takes into account the conditions imposed by the above-ground environment in the immediate vicinity of the parking position. The new parking lot will serve both the newly designed recreation area and the public buildings. The construction will be carried out in compliance with the quality and safety requirements in operation imposed by the specific legislation in force. The structure of the building will comply with the law 10/1995 regarding the quality in constructions according to the details specified in the technical report of resistance.

The project solves the operational safety of the objective by the following provisions in accordance with NP 24-97: the safety of the building is solved by the constructive solutions chosen; people’s safety is ensured by the use of non-slip materials.

3. Conclusion

It can be concluded that the new passage will decrease by almost a third the duration of the crossing of the central area (from the intersection of Danube Street - Bucharest Street to Danube Street - Tudor Vladimirescu Street, about 0.96 km) and the crossing speed will increase from 22.45 km / h (2015) to 31.15 km / h (2025).

**Table 3. Duration of crossing the central area,
the values refer to the base year 2015, the variant „without passage ”**

Year	Average time of crossing the central area		Average speed of crossing the central area		Travel time reduction [%]	Increased speed [%]
	“ Without passage” variant [s]		Version “ with passage” [km/h]			
2015	160.2	-	22.45	-		
2025	195.1	109.9	16.5	31.15	31.4%	38.8%

Source: Feasibility study for “Reconfiguration of road and pedestrian traffic in the central area of Alexandria- Road Passage”

By 2023, the City Hall of Alexandria intends to transform the Municipality into the regional pole that will impress by building the largest central urban area without traffic and reduced pollution, dominated by the Arts Center and in which a special role will be played by modern green spaces.

It also follows, offering citizens a developed public service infrastructure, benefiting from an accessible and fluent circulation system, interspersed with green spaces that will give a pleasant environment and protect against pollution.

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Reconfigurare trafic rutier și pietonal în zona centrală a Municipiului Alexandria - Pasaj Rutier

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Abstract

Pasaj Rutier

Orice localitate, cu atât mai mult un municipiu reședință de județ, are nevoie de o zonă reprezentativă, așa-zisul „Centru” pe care turiștii și cei din afara localității vor să îl viziteze, pe care localnicii îl îndrăgesc și cu care ar trebui să se mândrească.

*Printre cele mai importante repere ale locuitorilor din municipiul Alexandria sunt și spațiile verzi, motiv pentru care proiectul gândit de municipalitate susține importanța dezvoltării rețelei de spații urbane din oraș. Având o tramă stradală regulată, cu sistem de împărțire în loturi egale, sistem de împărțire ce apare cel mai des la orașele colonie unde este nevoie de o împărțire rapidă și economică a terenului, orașul prezintă ca element ce taie monotonia, o zonă verde destinată recreerii ce se dezvoltă pe axa principală a municipiului, identificată prin strada Dunării, zona amplasată în centrul de greutate al orașului, constituind metaforic “**inima verde a orașului**”.*

Obiective generale ale proiectului: Îmbunătățirea accesibilității, atât a localnicilor cât și a vizitatorilor municipiului Alexandria, în zona centrală a municipiului cu ajutorul pasajului rutier subteran prevăzut prin proiect. De asemenea, drept obiectiv general, constituie intenția de reconfigurare a spațiilor supraterrane aferente zonei centrale a municipiului îmbunătățind astfel calitatea spațiului public.

*Unul din **scopurile proiectului** este de a realiza fluidizarea traficului auto la suprafață în zona centrală și de a veni în sprijinul atât a localnicilor, cât și a vizitatorilor, care au nevoie de parcare în această zonă, lucru posibil*

prin realizarea unei parcuri subterane aferente pasajului subteran propus prin proiect, eliberându-se astfel un număr semnificativ de metri pătrați din spațiul suprateran care în mod normal este ocupat de autovehicule. Proiectul "Reconfigurare trafic rutier și pietonal în zona centrală a Municipiului Alexandria – Pasaj Rutier" se înscrie în contextul general de dezvoltare durabilă, economico-socială, în politicile și programele regionale, județene și locale, fiind în același timp relevant din punct de vedere al strategiilor comunitare care vizează optimizarea factorilor de dezvoltare locali-actorii de mediu pe de o parte și infrastructura turistică pe e altă parte.

Cuvinte cheie: strategie comunitară, dezvoltare durabilă, infrastructură turistică, zonă verde, dezvoltare rețele de spații urbane

1. Introducere

1.1. Definirea teritoriului și accesibilitatea

Municipiul Alexandria este reședința județului Teleorman și principalul centru economic-social al județului cu funcțiuni complexe industriale, terțiare, administrative, politice, educaționale și culturale.

Datorită așezării sale, municipiul Alexandria a fost și continuă să fie un nod de căi de comunicație. Face legătura între capitala țării, București și multe dintre orașele de provincie sau leagă aceste orașe între ele:

DN 6 leagă București prin Alexandria de Roșiorii de Vede, Caracal, Craiova, Timișoara; DN 52 leagă Alexandria de Turnu Măgurele, Corabia, Calafat etc.;

DN 51 leagă Alexandria de Zimnicea; DJ 504 leagă Alexandria de Pitești și Câmpulung; DJ 601 leagă Alexandria, prin Găești, de Târgoviște;

DJ 506 face legătura între Alexandria și Giurgiu.

Poziționat în sudul Câmpiei Române, pe partea dreaptă a râului Vedea, municipiul Alexandria se află la o distanță de 89 km față de capitala țării, București. Municipiul Alexandria are o suprafață de 98,46 km² și o populație după domiciliu la 1 ianuarie 2016 de 52.101 locuitori, conform datelor statistice prezentate de Institutul Național de Statistică în Baza de date Tempo-Online. În ceea ce privește modul de utilizare a terenurilor, 74,92 % reprezintă teren arabil, 3,27 % pășuni, 2,98 % păduri, 0,9 % ape și bălți, 2,60 % terenuri degradate, 10,88% construcții, 2,45 % căi de comunicații.

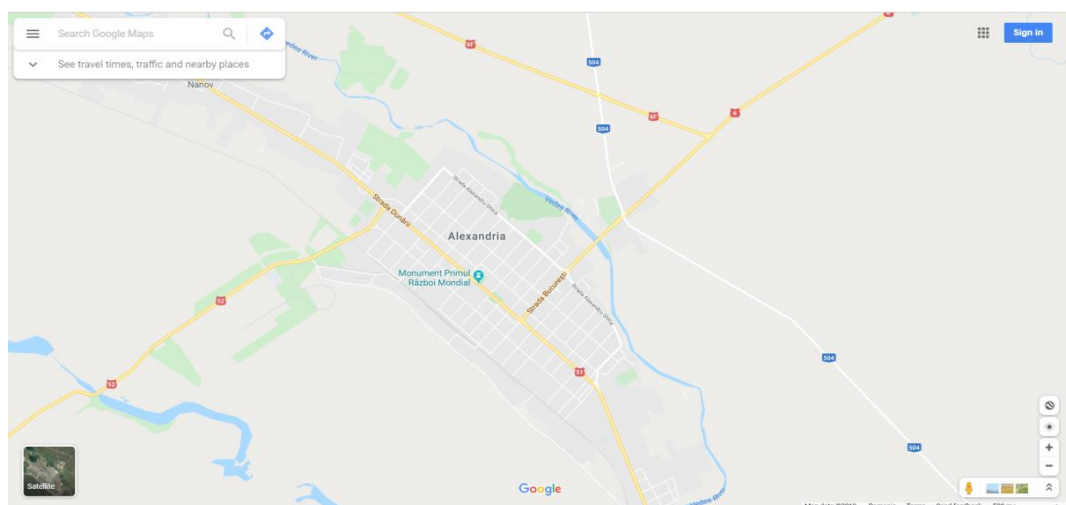


Figura 1. Municipiul Alexandria- accesibilitate

Sursa: <https://www.google.ro/maps>

Pe str. Dunării, artera principală care traversează municipiul, sunt concentrate majoritatea instituțiilor publice de interes general și punctele de atracție, iar zonele rezidențiale, formate din cartiere de blocuri și cartiere de case, sunt amplasate pe o tramă stradală rectangulară.

1.2. Informații generale privind proiectul

Perimetrul în care este situat amplasamentul investiției concentrează sediile celor mai importante instituții publice, financiare, culturale și comerciale și prezintă o bună deservire cu spații publice prin existența unei rețele formată din parcuri, squaruri și piețe conectate, parțial, prin zone pietonale.

Axându-se pe ideea că spațiile verzi joacă un rol important, contribuind la îmbunătățirea calității vieții locuitorilor, **Primarul Municipiului Alexandria, domnul Victor Drăgușin**, a solicitat realizarea unui proiect privind "*Reconfigurarea traficului rutier și pietonal în zona centrală a municipiului Alexandria- Pasaj Rutier*" ce are ca obiectiv general îmbunătățirea accesibilității auto și pietonale, a traficului local și cel de tranzit prin intermediul unui pasaj rutier subteran, cu rol nu numai în fluidizarea circulației, facilitând tranzitul rapid prin zona centrală, dar și sporind atractivitatea zonei centrale prin eliberarea unei suprafețe semnificative din spațiul supateran, care în prezent este ocupat de autovehiculele parcate în zonă.



Figura 2. Decongestionarea traficului rutier și crearea unui spațiu verde, pietonal, propice relaxării
Sursa: Studiu de fezabilitate pentru "Reconfigurare trafic rutier și pietonal în zona centrală a municipiului Alexandria-Pasaj Rutier", elaborator S.C. SPECIALISTCONSULTING S.R.L., august 2014

Consumându-se ca o activitate de destindere, în afara ocupațiilor obișnuite și obligatorii, turismul intervine din ce în ce mai mult în modificarea cadrului natural și artificial și pretinde echiparea specială a teritoriului, dezvoltarea unor spații și funcțiuni specifice.

Îmbunătățirea imaginii Municipiului Alexandria prin realizarea obiectivului prezentului proiect este importantă pentru promovarea turismului în regiune și pentru creșterea atracției turistice a municipiului. În această localitate, orice investiție care sporește atractivitatea spațiilor publice și îmbunătățește imaginea urbană, va avea un impact pozitiv și asupra dezvoltării turismului.

Terenul aferent lucrărilor prevăzute în proiect se află în Municipiul Alexandria, Județul Teleorman și este delimitat de următoarele repere: strada Dunării, tronsonul delimitat de intersecția cu strada București și strada Ion Creangă și zona pietonală aferentă tronsonului descris mai sus și cuprinsă până la strada Libertății. Limitele proiectului sunt următoarele: strada Dunării între intersecția cu strada Ion Creangă și strada București, strada Libertății cuprinsă între strada Ion Creangă și strada București, strada Ion Creangă și strada București.

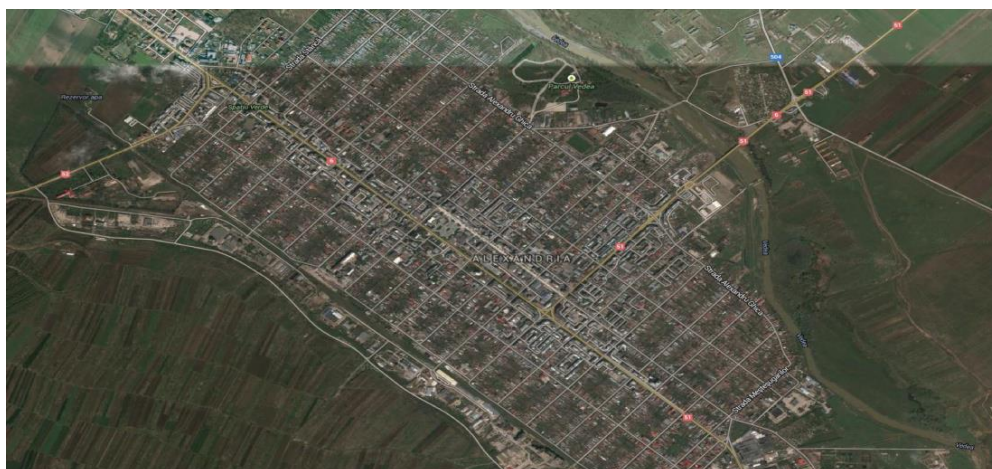


Figura 2. Plan de încadrare în zonă a obiectivului studiat prin proiect
Sursa: <https://www.google.ro/maps>

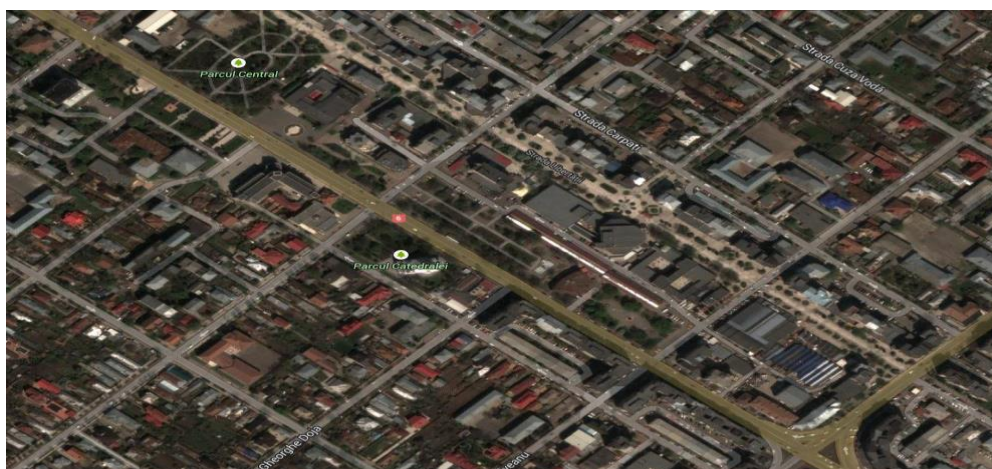


Figura 3. Plan de situație a obiectivului studiat prin proiect
Sursa: <https://www.google.ro/maps>

Prin proiect se dorește implementarea de soluții privind amenajarea parcajului în locația propusă, de soluții moderne de share-space și pietonal; realizarea unei infrastructuri necesare derulării tranzitului pietonilor și bicicliștilor între zonele de interes din zona centrală și a legăturii între liniile de circulație ale transportului public urban; asigurarea facilităților necesare circulației pietonale cât și a acelor participanți la trafic cu nevoi speciale, evaluarea factorilor de impact asupra mediului înconjurător și adoptarea soluțiilor fezabile din punct de vedere tehnic și economic pentru evitarea impactului negativ; adoptarea de soluții care să permită inspecția și întreținerea precum și reparațiile obiectivului cu cheltuieli minime; încadrarea obiectivului peisagistic în zona studiată; diversificarea activităților din sfera socială a localnicilor prin organizarea de diferite funcțiuni;

“învverzirea” zonei centrale a municipiului în ideea de a înlocui fiecare metru pătrat de spațiu construit cu spațiu verde pe cât posibil.

În contextul **“învverzirii”** zonei centrale, s-a urmărit reamenajarea parcului central, investiție ce se intenționează a avea un impact recreativ, educativ și estetic, contribuind la îmbunătățirea calității mediului și implicit a calității vieții locuitorilor și în același timp, urmărind să devină un loc atractiv pentru locuitori și persoanele aflate în tranzit.

Construcțiile propuse în cadrul parcului sunt în general construcții destinate petrecerii timpului liber dar și pentru desfășurarea activităților socio-culturale.

Lucrările de intervenție propuse vor consta în: lucrări de infrastructură, construirea de fântâni, mărirea și diversificarea zonelor de spațiu verde prin amplasarea de grădiniere și gradene de sprijin (se vor planta specii autohtone și foarte bine adaptate la mediul climatic din zona câmpiei), trepte și rampe pentru accesul persoanelor cu dizabilități, pergole, divers mobilier urban, iluminat ornamental, canalizații subterane pentru instalațiile noi cât și pentru rețelele de telefonie, cablu existente, amenajarea zonelor de ședere prin amplasarea de bănci inteligente (dotate cu prize USB, sisteme inteligente și autonome), etc.

Proiectul se înscrie în contextul general de dezvoltare durabilă, economico-socială, în politicile și programele regionale, fiind în același timp relevant din punct de vedere al strategiilor comunitare care vizează optimizarea factorilor de dezvoltare locali.

Consumându-se ca o activitate de destindere, în afara ocupațiilor obișnuite și obligatorii, turismul intervine din ce în ce mai mult în modificarea cadrului natural și artificial și pretinde echiparea specială a teritoriului, dezvoltarea unor spații și funcțiuni specifice.

Îmbunătățirea imaginii municipiului Alexandria prin realizarea obiectivului prezentului proiect este importantă pentru promovarea turismului în regiune și pentru creșterea atracției turistice a municipiului, oraș care în prezent nu are dezvoltat acest capitol. În această localitate, orice investiție care sporește atractivitatea spațiilor publice și îmbunătățește imaginea, va avea un impact pozitiv și asupra turismului. Imaginea propusă, prin implementarea proiectului, pentru zona centrală a municipiului Alexandria păstrează indicii urbanistici din vechea configurație, dar îmbunătățește esențial caracterul funcțional al zonei, definindu-l ca Centru social-cultural al municipiului Alexandria.

1.2. Situația actuală și informații despre entitatea responsabilă cu implementarea proiectului

Dezvoltarea infrastructurii de transport reprezintă o condiție necesară pentru implementarea cu succes și a celorlalte priorități de dezvoltare ale județului Teleorman, contribuind la creșterea mobilității persoanelor și a mărfurilor, la integrarea zonei cu rețeaua trans-europeană de transport, la combaterea izolării zonelor subdezvoltate și, nu în ultimul rând, la dezvoltarea infrastructurii de transport regionale și locale. O infrastructură de transport eficientă, conectată la rețeaua europeană de transport contribuie la creșterea competitivității economice,

facilitează integrarea în economia europeană și permite dezvoltarea de noi activități pe piața internă.

Schimbările în datele economice, drept consecință au influențat numărul autovehiculelor și al participanților la trafic, lucru care se resimte într-o localitate precum municipiul Alexandria unde aglomerația traficului s-a concentrat în zona centrală.

În contextul creșterii continue a numărului de autovehicule achiziționate de persoane fizice și juridice, creșterii indicelui de mobilitate a parcului auto existent, creșterii numărului de autovehicule ce tranzitează județul Teleorman, creșterii nivelului de poluare prin aglomerări în nodurile de trafic județean, lipsei semnalizării specifice zonelor protejate, lipsei semnalizării zonelor turistice și a patrimoniului cultural, natural și istoric, studiul prezent propune o dezvoltare a infrastructurii de drumuri și poduri, modernă și durabilă.

În elaborarea studiului se abordează toate cele trei dimensiuni ale conceptului dezvoltării durabile, dimensiunea ecologică, economică și socială. Dimensiunea ecologică privește consumul și producția durabilă, conservarea și managementul resurselor naturale, schimbările climatice și energia curată.

Dimensiunea economică se referă la dezvoltarea socio-economică (prosperitate economică) și transportul durabil iar dimensiunea socială vizează incluziunea socială, schimbările demografice și sănătatea publică.

În acest sens, studiul urmărește o dezvoltare a infrastructurii rutiere din județul Teleorman care să poată satisface nevoile economice, sociale și de mediu ale populației, minimizând impactul asupra acestora și identifică oportunitățile și posibilitățile de dezvoltare, luând în considerare componenta durabilă.

Situația existentă a parcului analizat a rezultat din documentația cadastrală și releveele întocmite la data elaborării prezentei documentații tehnico-economice. Terenul pe care este amplasat parcul este situat în întravilanul localității, în centrul municipiului Alexandria, zona care a polarizat și continuă să polarizeze cel mai mult întreaga activitate de agrement și manifestări culturale.

2. Descrierea investiției

2.1. Necesitatea investiției

Necesitatea acestui studiu a apărut în urma hotărârii Primăriei municipiului Alexandria de a continua programul de modernizare a infrastructurii urbane.

Proiectul propus studiului are în vedere construirea unui pasaj rutier subteran de-a lungul străzii Dunării. De asemenea, în vederea compensării locurilor de parcare pierdute o dată cu amenajarea pietonală, s-au prevăzut două parcuri subterane independente una față de alta, pe o parte și pe alta a pasajului. Dezvoltarea explozivă a parcului auto al municipiului Alexandria obligă autoritățile locale la găsirea unor soluții viabile pentru dezvoltarea numărului de locuri de parcare. Problema numărului de locuri de parcare nu aparține doar zonei centrale ci și altor cartiere cu aglomerații de unități locative sau zone comerciale, însă aglomerarea cea mai mare este în zona centrală, ținta tuturor locuitorilor

municipiului și nu numai. Amenajarea unui spațiu pietonal în zona afectată de proiect constituie nu doar o nevoie aparută în urma aplicării celorlalte obiective ci și o oportunitate de a ridica standardul calității spațiului public.

2.2. Direcții de dezvoltare - încadrarea proiectului în Strategia de dezvoltare locală 2014- 2023, Partea I

Dezvoltarea urbanistică, modernizarea infrastructurii și protejarea mediului în municipiul Alexandria urmărește reactualizarea Planului Urbanistic General al Municipiului Alexandria; conturarea, organizarea și dezvoltarea zonei periurbane; reevaluarea zonelor urbanistice, a spațiului intravilan și extravilan (planuri de urbanism general și zonal) în perspectiva dezvoltării habitatului și a zonelor de activitate economică și în alte zone; reevaluarea profilului arhitectural general al municipiului: zona centrală, cartiere, spații verzi, spații pentru utilitățile publice (apă, apă uzată, transport, deșeuri etc), spații pentru diverse activități; reevaluarea spațiilor limitrofe hotarelor administrative în perspectiva creării de noi zone cu funcționalitate economică, rezidențială și de agrement; protejarea adecvată a capitalului natural și ecologic al zonei; îmbunătățirea colectării selecționate și depozitării ecologice a deșeurilor menajere; reabilitarea rețelelor de apă și canalizare din municipiul Alexandria și extinderea acestora astfel încât să fie asigurată alimentarea cu apă și accesul la rețeaua de canalizare a tuturor locuitorilor; modernizarea rețelei stradale, a zonelor pietonale, a rutelor ocolitoare; creșterea siguranței circulației prin extinderea monitorizării video a traficului rutier și decongestionarea zonei centrale prin construirea de parcuri subterane; asigurarea mobilității populației în municipiu și către localitățile din zona periurbană; asigurarea unui management eficient al transportului și mobilității; promovarea transportului în comun și a mijloacelor de transport alternative; asigurarea unor spații de parcare suficiente și amenajarea pistelor pentru bicicliști; creșterea gradului de securitate și siguranță pe drumurile publice; îmbunătățirea calității vieții populației prin reducerea de emisii poluante generate de traficul rutier; reducerea consumului de combustibil și utilizarea surselor alternative de energie; asigurarea condițiilor civilizate de trai prin extinderea rețelelor de alimentare cu gaze naturale în toate cartierele municipiului și extinderea rețelei către Parcul Industrial Alexandria – Comuna Vitănești – Comuna Măgura; regenerarea urbană a zonelor centrale și periferice prin modernizarea trotuarelor, a spațiilor de circulație pietonală, prin realizarea de parcuri și oferirea unei soluții de trafic moderne; amenajarea peisagistică și reabilitarea dendrologică a Pădurii Vedea; înființarea de perdele de protecție; reabilitarea și consolidarea digului de protecție al râului Vedea și amenajarea parcului și lacului de agrement Vedea; îmbunătățirea condițiilor de petrecere a timpului liber și creșterea gradului de siguranță prin realizarea și modernizarea spațiilor de joacă pentru copii și supravegherea video a acestora; îmbunătățirea condițiilor de recreere și de mediu prin reamenajarea parcurilor și spațiilor verzi; asigurarea unor spații de locuit atât pentru tineri, specialiști, cât și pentru persoanele cu probleme sociale; îmbunătățirea infrastructurii educaționale în grădinițe, școli și licee în scopul creșterii performanței și dezvoltării actului

educațional; inițierea unor programe de susținere a copiilor supradotați; construirea unui campus școlar cu toate facilitățile; îmbunătățirea infrastructurii sportive în scopul creșterii performanțelor și competitivității la nivel municipal și național; îmbunătățirea serviciilor de sănătate în municipiul Alexandria (maternitate, serviciu ambulanță, morgă și centrul de recoltare celule stem și transfuzii); oferirea unor alternative pentru îngrijirea persoanelor vârstnice aflate în dificultate prin realizarea unui centru specializat și înființarea unui centru de îngrijiri paleative; înființarea unui nou cimitir; îmbunătățirea condițiilor de civilizație prin dotarea cu mobilier urban a municipiului; amenajarea unor locuri speciale pentru recreere în cadrul incintelor blocurilor; modernizarea Casei de Cultură a Municipiului Alexandria și a Cinematografului Patria; înființarea unui centru cultural municipal; punerea în valoare a monumentelor istorice existente; amenajarea de noi zone de agrement.

2.3. Politici de dezvoltare ale Municipiului Alexandria - încadrarea proiectului în Politica de dezvoltare a infrastructurii locale (servicii publice)

2.3.1. Prioritate strategică: Dezvoltarea serviciilor publice

2.3.1.1. Măsurile de dezvoltare ale Municipiului Alexandria

Măsurile de dezvoltare constau în reabilitarea și modernizarea rețelei stradale și aleilor pietonale; reabilitarea infrastructurii urbane degradate și îmbunătățirea serviciilor urbane; dezvoltarea infrastructurii și utilităților pentru noi cartiere de locuințe individuale și colective; renovarea spațiilor nefolosite și pregătirea lor pentru noi activități; reabilitarea termică a clădirilor publice; dezvoltarea și reabilitarea infrastructurii și utilităților publice; modernizarea și extinderea serviciului de transport public local și asigurarea unui management al mobilității eficient; promovarea transportului în comun și a mijloacelor de transport alternative; crearea unor spații de parcare suficiente și amenajarea pistelor pentru bicicliști; îmbunătățirea calității vieții populației prin reducerea de emisii poluante generate de traficul rutier; creșterea gradului de securitate și siguranță pe drumurile publice; dezvoltarea sistemelor adecvate de management al deșeurilor - colectare selectivă, reciclare; reabilitarea și consolidarea digului de protecție pe râul Vedea și amenajarea unei zone de agrement; protejarea mediului; implementarea unor proiecte de utilizare a energiei regenerabile; formarea profesională în domeniul energiei durabile a personalului din administrația locală, identificarea și dezvoltarea unor soluții alternative privind producerea energiei în scopul diminuării cheltuielilor cu rețeaua de iluminat public; reabilitarea, extinderea și modernizarea rețelei pluviale; înlocuirea rețelei de transport și distribuție a apei potabile; introducerea în subteran a rețelei de cabluri; concesionarea serviciului de îngrijire a câinilor fără stăpân; înființarea de grupuri sanitare în municipiu; reabilitarea cimitirelor existente și înființarea unui nou; construirea de capele mortuare în incinta bisericilor; construire aeroport utilitar (situații de urgență, SMURD, agricultură etc.); amenajarea zonei centrale a orașului astfel încât să combine funcțiunile comerciale cu cele civice, culturale, de agrement și turistice.

2.3.2. Politici de îmbunătățire a infrastructurii de transport local

2.3.2.1. Prioritate strategică: Dezvoltarea infrastructurii de transport

2.3.2.2. Măsurile de dezvoltare

Măsurile de dezvoltare constau în impulsionearea dezvoltării economice durabile și a mobilității populației și forței de muncă a zonei și creșterea gradului de accesibilitate și atractivitate prin îmbunătățirea infrastructurii de transport; reabilitarea și modernizarea rețelei stradale; reconfigurarea și monitorizarea video a traficului rutier - extindere; îmbunătățirea sistemului de trafic rutier; extinderea spațiilor de parcare; realizarea variantei ocolitoare și construirea unui pod peste râul Vedea între DJ 504 și DJ 51; montarea de indicatoare la intrările în municipiu către principalele instituții publice și obiective; îmbunătățirea sistemului de transport în comun prin introducerea transportului electric; reconfigurarea traficului în zona centrală prin introducerea acestuia în subteran - pasaj rutier.

2.4. Scenarii propuse- criteriile luate în calcul la întocmirea matricei decizionale

2.4.1. Scenariul 1 – Execuția infrastructurii pasajului inferior, din pereți mulați ;

2.4.2. Scenariul 2 – Execuția infrastructurii pasajului inferior, piloți forți;

La stabilirea soluției optime a fost concepută o matrice decizională care să pună în evidență principalele avantaje și dezavantaje ale fiecărui scenariu.

Criteriile care au fost luate în calcul la întocmirea matricei decizionale sunt următoarele: rezolvarea problemelor de rezistență și stabilitate ale structurii, durata de execuție, riscul și complexitatea tehnologiei, costuri de întreținere și costul investiției de bază. În ambele scenarii, problemele de rezistență și stabilitate ale structurii - elementele principale care contribuie la alegerea soluției tehnice optime de realizare a pasajului inferior, sunt rezolvate în totalitate, pe termen lung.

Durata de execuție ține cont de tipul infrastructurii executate. Având în vedere că scenariile studiate de execuție a pasajului sunt diferite din punct de vedere tehnologic, vor fi durate de execuție diferite. În cazul scenariului 1, pasajul fiind executat din pereți mulați, se estimează un ritm de execuție de cca. 14 m/zi de lucru, în timp ce pentru pasajul executat în soluția cu piloți forți, se estimează un ritm de execuție de cca. $88^* \text{ piloți/zi} = 4,80 \text{ m/zi}$ de lucru.

Din calculele efectuate mai sus, este evident că în scenariul 1 durata de execuție este cu mult mai redusă decât în scenariul 2. Având în vedere cele prezentate, s-a apreciat că pentru execuția infrastructurilor în scenariu 1 sunt necesare 35 zile, în timp ce pentru scenariul 2 sunt necesare 103 zile. Criteriul privind riscul și complexitatea tehnologiei a fost ales deoarece reflectă cel mai bine riscul pe care și-l asumă Constructorul și Proiectantul pe parcursul realizării obiectivului conform detaliilor de execuție. În cazul scenariului 1, pasajul fiind executat în soluție pereți mulați, complexitatea și riscul sunt evident mai reduse față de scenariul 2, deoarece se pot lua măsurile de siguranță (grinda de ghidaj) și utilajele folosite, micșorează riscul de abatere de la proiect. În cazul scenariului 2, pasajul fiind executat în soluție piloți forți, complexitatea este mai mare față de

scenariul 1, datorită faptului că probabilitatea de a rata execuția unui pilot este mult mai mare decât probabilitatea de a rata un panou de perete mulat. Un alt risc, foarte important, este acela de a obține o calitate mai slabă în ceea ce privește rezistența structurii.

Costurile de întreținere vor fi diferite în funcție de scenariu ales. Pentru acest criteriu, singura categorie de costuri diferită de la un scenariu la altul este întreținerea hidroizolației pasajului. Datorită faptului că în scenariu 2 prin tehnologia adoptată trebuie luate măsuri suplimentare de impermeabilizare, costul de întreținere aferent acestei categorii, va fi mai mare decât la scenariul 1. Costul investiției de bază reflectă cel mai bine efortul investiționar, dând în același timp și măsură dificultății tehnice a fiecărui scenariu studiat.

Tabel 1. Ponderea criteriilor în matricea decizională - analiza importanței fiecărui criteriu în raport cu celelalte

Criteriu	Grad de importanță	Pondere criteriu
Rezistență și stabilitate	3	30%
Durata de execuție	0,5	5%
Risc și complexitate	4	40%
Costuri de întreținere	0,5	5%
Costul investiției de bază	2	20
Total	10	100%

Tabel 2. Matricea decizională

Criteriu	Pondere criteriu	Scenariul 1		Scenariul 2	
		Execuția infrastructurii pasajului inferior din pereți mulați		Execuția infrastructurii pasajului inferior din piloți forți	
Rezistență și stabilitate	20%	100	20	100	20
Durata de execuție	5%	100	5	34	1,7
Risc și complexitate	40%	80	32	60	24
Costuri de întreținere	5%	80	4	60	3
Costul investiției de bază	30%	100	30	70	21
Total	100%		91		69,7

Sursa: Studiu de fezabilitate pentru "Reconfigurare trafic rutier și pietonal în zona centrală a municipiului Alexandria- Pasaj Rutier"

2.5. Scenariul recomandat de către elaborator

Conform matricei decizionale, punctajul cel mai bun este atribuit *scenariului 1* – execuția infrastructurii pasajului inferior, din pereți mulați.

2.6. Avantajele scenariului recomandat constau în costuri ale investiției de bază, mult mai reduse decât în scenariul 2; durata de execuție a investiției, mult mai mică; calitate lucrări – superioară;

2.7. Dezavantajele scenariului recomandat: asigurarea unui front mai mare de lucru; sincronizare precisă între utilajul de excavare și asigurarea cu resursele materiale (armătură și beton).

2.8. Caracteristicile principale ale construcțiilor din cadrul obiectivului de investiții, specifice domeniului de activitate și variantele constructive de realizare a investiției, cu recomandarea variantei optime pentru aprobare – scenariu recomandat;

2.8.1. Pasaj rutier subteran

La baza proiectării structurii de rezistență au stat studiile topografice, geotehnice și de mediu care, împreună cu standardele și normativele tehnice în vigoare, au condus la obținerea unei soluții optime.

Toate elementele geometrice ale obiectivului, au fost stabilite pentru a corespunde cu standardele și legislația în vigoare, precum și în funcție de situația juridică a terenului.

2.8.1.1. Traseul în plan

Pasajul inferior se desfasoară între strada T. Vladimirescu și strada C-tin Brâncoveanu, și are o lungime totală de 660,0 m din care 288,28 m reprezintă lungimea pasajului propriu-zis (zona acoperită), 183,45 m reprezintă lungimea rampei T. Vladimirescu, iar 188,27 m reprezintă lungimea rampei C-tin Brâncoveanu.

Traseul pasajului se prezintă sub forma de aliniamente racordate cu frânturi.

2.8.1.2. Pasajul propriu-zis

În sens transversal pasajul va prezenta o secțiune dreptunghiulară, cu două benzi de circulație pe sens având lățimea de 3,50 m fiecare și două trotuare tehnologice de 55 cm fiecare. Partea carosabilă este prevăzută cu pante transversale de 2,0% spre trotuar.

Gabaritul pasajului pe verticală va fi de 5,00 m, ceea ce permite circulația tuturor categoriilor de autovehicule.

În zona mediană a pasajului se vor amenaja benzi deceleratoare/acceleratoare, pentru asigurarea intrării/ieșirii din parcare auto subterană. Deoarece parcare subterană este amplasată atât pe partea stângă cât și pe partea dreaptă a pasajului, benzile deceleratoare/acceleratoare sunt și ele realizate pe ambele părți, având lățimea de 3,00 m fiecare.

Delimitarea benzilor deceleratoare/acceleratoare de partea carosabilă curentă, se va realiza prin execuția unei insule separatoare cu lățimea de 1,60 m și marcaje rutiere. În lungul insulei separatoare se vor realiza sprijiniri intermediare a plăcii superioare. Sprijinirile intermediare vor fi realizate din piloți cu diametrul de 600 mm și vor fi finisați prin aplicarea unei fațade din plăci de aluminiu. Pe toată lungimea benzilor deceleratoare/acceleratoare, trotuarul va avea lățimea de 50 cm. Trotuarele vor fi prevăzute cu două țevi din PVC, înglobate în interior.

Structura de rezistentă a zonei acoperite va fi compusă din două șiruri de pereți mulați dispuse paralel, radier și placa superioară.

Pereții mulați vor fi realizați din beton armat cu grosimea de 60 cm. La partea inferioară pereții vor fi solidarizați prin intermediul unui radier din beton armat monolit, iar la partea superioară de o placă relizată atât din grinzi prefabricate cu corzi aderente solidarizate prin intermediul plăcii de suprabetonare cât și monolit din beton armat.

Impermeabilizarea zonei acoperite se va realiza prin execuția unei hidroizolații moderne la exteriorul plăcii de suprabetonare și prin realizarea unui ecran din beton armat cu grosimea de 20 cm, în fața pereților mulați. Ecranul are rolul de a impermeabiliza structura, mai ales prin folosirea unui beton special și tratarea fiecărui rost cu benzi speciale de rost.

Lățimea pasajului subteran este variabilă, între 17,20 m ($0,50 \times 2 + 3,50 \times 2 + 1,60 \times 2 + 3,00 \times 2$) ... 8,10 m ($0,55 \times 2 + 3,50$). Prin pasaj vor putea circula toate autovehiculele cu o înălțime de până la 5,00 m.

2.8.1.3. Rampe de acces

Structura de rezistență a rampelor de acces, va fi compusă din pereți mulați din beton armat cu grosimea de 60 cm, piloți forți $\varnothing 400$ mm și ziduri de sprijin. Solidarizarea la partea inferioară a structurii de sprijin se va realiza prin intermediul unui radier din beton armat monolit, iar la partea superioară aceasta se va realiza prin intermediul grinzii de coronament.

În secțiune transversală rampa va asigura gabaritul pentru două benzi de circulație având lățimea de 3,50 m fiecare și două trotuare tehnologice de 0,50 ... 0,55 m de o parte și de alta a părții carosabile. Trotuarele vor fi prevăzute cu două tevi din PVC, înglobate în interior. Partea carosabilă este prevăzută cu pante transversale de 2,0% spre trotuar. Trotuarele se vor executa decalat față de nivelul carosabilului, prin intermediul unei borduri de tip A1.

Impermeabilizarea sprijinirilor se va realiza prin execuția unui ecran din beton armat cu grosimea de 20 cm, în fața pereților mulați și a piloților forți. Ecranul are rolul de a impermeabiliza structura, mai ales prin folosirea unui beton special și tratarea fiecărui rost cu benzi speciale de rost. Datorită înălțimii mari a parapetului, nu mai este necesară montarea unui parapet de siguranță, însă pentru realizarea unui aspect arhitectural mai deosebit, se va realiza un parapet ornamental cu înălțimea de maxim 250 mm.

2.8.1.4. Parcare subterană

La concepția celei mai optime soluții în vederea poziționării viitoarei investiții în limitele terenului propus prin proiect, au contat studiile topo și cele de la fața locului. Relieful terenului precum și accesele existente au concluzionat soluția prezentată în proiect. Față de pasaj, poziția parării are în vedere și condițiile impuse de mediu suprateran aflat în imediata vecinătate cu poziția parării. Noua parcare va deservi atât zona de agrement nou amenajată cât și clădirile publice. Construcția va fi realizată cu respectarea cerințelor de calitate și siguranță în

exploatare impuse de legislația specifică în vigoare. Structura clădirii va respecta legea 10/1995 privind calitatea în construcții conform precizărilor detaliate în Memoriul tehnic de rezistență.

Prin proiect se rezolvă siguranța în exploatare a obiectivului prin următoarele prevederi în acord cu NP 24-97: siguranța clădirii este rezolvată prin soluțiile constructive alese; siguranța persoanelor este asigurată prin folosirea materialelor antiderapante.

3. Concluzie

Se poate concluziona că noul pasaj va diminua cu aproape o treime durata de traversare a zonei centrale (de la intersecția Str. Dunării - Str. București până la Str. Dunării - Str. Tudor Vladimirescu, circa 0.96 km) iar viteza de traversare va crește de la 22.45 km/h (2015) la 31.15 km/h (2025).

Până în anul 2023, Primăria Municipiului Alexandria intenționează să transforme Municipiul în polul regional care va impresiona prin construirea celei mai ample zone urbane centrale fără trafic și cu poluare redusă, dominat de Centrul Artelor și în care un rol deosebit îl vor avea spațiile verzi moderne. Se urmărește de asemenea, oferirea cetățenilor a unei infrastructuri de servicii publice dezvoltată, beneficiind de un sistem de circulație accesibil și fluent, întrepătruns de spații verzi care vor da o ambianță plăcută și vor proteja împotriva poluării.

Tabel 3. Durata de traversare a zonei centrale, valorile se raportează la anul de baza 2015, varianta "fără pasaj"

An	Durata medie de traversare a zonei centrale		Viteza medie de traversare a zonei centrale		Reducere durată călătorie [%]	Creștere viteză parcursă [%]
	Varianta "fără pasaj" [s]		Varianta "cu pasaj" [km/h]			
2015	160.2	-	22.45	-		
2025	195.1	109.9	16.5	31.15	31.4%	38.8%

Sursa: Studiu de fezabilitate pentru "Reconfigurare trafic rutier și pietonal în zona centrală a municipiului Alexandria- Pasaj Rutier"

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Project management of road infrastructure in Iraq

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Abstract

Road infrastructure is one of the main factors affecting the development of the country's economy and has directly contributed to supporting all economic sectors through the provision of logistical support in the establishment of projects. The main objective of this paper is to show the importance of road infrastructure and its impact on the Iraqi economy. There are many previous studies that emphasized the importance of road infrastructure and its contribution to achieving economic stability in the case of low oil imports where transport imports for 2015 amounted to 34.3 billion dinars. This study was conducted by Iraq because it is one of the countries that have a privileged position in the Middle East and are relying mainly in Iraq on road infrastructure rather than river or air transport infrastructure. So the approach for this paper is the case study which was done.

The results of this study are that the road infrastructure contributed to raising the economic level of the country as well as the face of Iraq not to rely primarily on oil resources only and therefore this study also concluded that it must rely on several criteria that will affect the development and development of this country.

Keywords: business administration, service, transportation, development.

JEL: M1, L80, L91, O20

1. Introduction

Raising the level of infrastructure is a vital factor for the socioeconomic transformation in Iraq. Infrastructure, the results must be parallel to improve the service situation and thus the livelihood of the population and continue to focus on these objectives, which is the output of the infrastructure, maintenance and development of the development process. It is in the country, and many governments are looking forward to this development, whether economic, social or political, especially developing countries, including Iraq, which began to think about the establishment of infrastructure since the beginning of the twenties of the last century during the monarchy, It developed after the founding of the reconstruction council in 1959, and achieved a qualitative leap after 1972 after the nationalization of oil, where it established many infrastructure projects such as roads, bridges, housing projects, etc. In 2003, there were signs of interest in building a modern infrastructure. The draft of the Infrastructure Law was issued in 2012, which did not see the light of this moment, which increased the infrastructure, whether it was the last war, which was in 2014-2017. Projects on the ground as a service reality The infrastructure can not be sustained more and does not meet the population and other investment projects without reliance on a sustainable infrastructure and developed to serve the new Iraq, and therefore the main objective of this paper is to demonstrate the management of these projects necessary to promote the reality of Iraq to the neighbors reached.

2. Literature review

Project management is a management that exists and is inherent to any project, whether that project is small, medium or large, so any management of any project is a set of skills needed by the manager to help him to manage the project effectively and reach the objectives for which this project was found. Any project classified as a method adopted by individuals, institutions or countries to make a change in order to provide us with something that we do not have at the moment, whether it is a service or a commodity, and there are many concepts that clarify the concept of project management, including "a dynamic process that takes advantage of the appropriate resources of the institution in an orderly manner. Each successful project has a successful manager who is able to manage that project and proceed to achieve its objectives on the ground where it is working" [1] Manage the technology, people, and change in order to achieve goals, reach targets, and deliver the project on time and within budget " [2]

The role and importance of infrastructure should be noted as a concept and importance for each country as it has become a criterion to measure the development of that country or a standard of the economy adopted by the country where many researchers referred to it as "Tinbergen (1962) introduces the distinction between infrastructure (for example, roads and education) and superstructure (manufacturing, agricultural and mining activities) " [3]

3. Methodology

3.1. Infrastructure importance

The methodology used in this paper is to rely on previous studies in the same field for the difficulty of accessing organizations to conduct questionnaire or interviews. Many studies point to the importance of Iraq's infrastructure for many things:

- The role of infrastructure in economic stability
- Creating opportunities for jobs and prosperity
- Help improve the work of hospitals, schools, businesses and industry.

The roles of the public and private sectors in infrastructure development have made significant progress over time. While the provision and financing of infrastructure services by the private sector dates back to the nineteenth century, a trend towards the private sector Private infrastructure companies have often been nationalized or forced to obtain concession from the government and even enshrined in the constitution.

However, the reverse trend towards private sector participation and competition in the infrastructure sectors began in the early 1980s. Technological development and the expansion of domestic and international capital markets in conjunction with the level of indebtedness and budget constraint limiting the capacity of the public sector. To meet infrastructure needs.

Infrastructure can be achieved through three methods, namely the public sector or the private sector, or partnership between them, and each of these methods have advantages and disadvantages that cannot be addressed, and the best of these methods, the last, the partnership between the two sectors in the completion of infrastructure according to several arrangements can be chosen What is suitable for each infrastructure

3.2. Road infrastructure analyses

"Total roads network in Iraq, including primary or secondary paved and unpaved roads, and all other paved roads in the country was reported at 58 592 Km in 2018, according to the Iraq Ministry of Planning, and there are New road network is under construction in Kurdistan region with an investment project from 2013 to 2020, and will cost \$5.2 billion. New tunnel has been opened for public use between Zakho (Ibrahim Khalil) and Duhok Governorate which decreased the time by approx. 30 mins, in 2018, there were some 4,535,280 vehicles on the road, and in 2013, Ministry of Planning reported 9,725 traffic accidents causing 2,601 death casualties." [4]

Calculation methods according to : (Central Statistical Organization) [5]

1 - Number of kilometers traveled:

"The number of passengers transported by trains".

Number of passengers transported x number of kilometers traveled by trains and unit of measurement (passenger. Km) .

2 - Number of kilometers covered:

"Means the amount of goods transported for the distances covered by trains.

Quantity of goods transported × number of kilometers traveled by trains and unit of measurement (tons. Km)".

Average Distance and drive time matrix between KR-I major cities and Baghdad					
From	To	KM	Drive Time at		
			30km/h	50km/h	90km/h
Baghdad	Dohuk	465	15h30	9h20	5h10
	Erbil	350	11h40	7h00	3h50
	Sulaimaniya	331	11h00	6h40	3h40
	Mosul	369	12h20	7h20	4h10
	Kirkuk	255	8h30	5h10	2h50
	Syria Border	430	16h00	9h40	5h20
Erbil	Mosul	84	2h50	1h40	1h00
	Dohuk Through Bardarash	160	5h20	3h10	1h50
	Dohuk through Akre	224	7h30	4h20	2h30
	Kirkuk	93	3h10	1h50	1h00
	Sulaimaniya	202	6h40	4h00	2h10
	Said Sadiq	35	1h10	0h40	0h20

Figure 1. Road Distance information

Source: Total Iraq road network – Logistics Capacity Assessment, 2019

3.3. Project management success

"Definitions of successful projects can be surprisingly elusive.

How do we know when a project is successful? When it is profitable?

If it comes in on budget? On time? When the technology we are

Developing works? When we achieve our long-term payback goals?

It is ironic that project managers continue to have great difficulty

in identifying a mutually acceptable and encompassing definition

Of success. Perhaps our difficulties in defining success are similar to

Justice Potter Stewart's ("I know it when I see it") "[6]

The success of the project depends mainly on a set of elements as shown in the following figure (2)

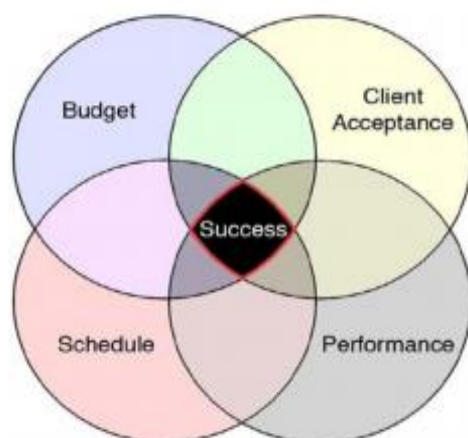


Figure 2. present the elements which any project need them to reach the success.

Source: Basic concepts of Project Management,2017.

Time: Any project is limited by a certain period of time until it has achieved the objectives assigned to it, and the time in this period has become one of the most basic resources of companies when applied to any project, especially when the implementation of the project

Cost: The second component of the project is the cost and is the basic food supplied by that project, which in turn indicates that the budget of any project is determined by the quality and time of completion of that project with the objectives set for it

Client: The client is classified at this point from the point of view of the state and from the point of view of the company, where the company considers that the country that offered it the opportunity to invest within its borders as a client and the companies in this moment to satisfy that customer by showing all what you can provide to him regardless of whether A service or commodity in line with the objectives of the company mainly in terms of profitability and reputation that the company is engaged in and other things that serve the interest of the company.

From the point of view of the state, companies that want to invest within their borders are considered a client (due to the circumstances of Iraq in the current period) and provide all laws, procedures and investment offers in order to win that client and thus will benefit the state of mutual benefit between them, especially in Iraq, where it works to give Good reputation for Iraq as it opens up investment opportunities for foreign companies and thus openness to the world.

Performance: Is the fourth element of the success of the project where the performance of the stages before, during and after the stage of completion of the implementation of the project.

Performance before the start of the project is the process of research and study and gathering the necessary information about the project to be implemented. Work from halal feedback and provide conditions in the provision of services required by the implementation of the project, whether a service or development to keep up with the world

4.Conclusions

In view of the contents of this paper to clarify the concepts of both projects and infrastructure and the elements required by the project to achieve the objectives for which it was established, as well as clarification and presentation of some statistics for the road network for Iraq was reached the following:

- The Iraqi environment in terms of economic and social side need to initiate such projects at the level of Iraq as a whole.
- The infrastructure of Iraq is old and dilapidated by wars
- Iraq to undertake such projects, whether by bringing foreign investors or contribute with the private sector will open prospects for Iraq and allows him to deal with the rest of the countries
- Managing, implementing and developing such projects helps to support Iraq's economic stability and create jobs for many people.

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Production of surface agents for limiting the growth of bacteria and fung based on silver nano and microparticles made by electrochemical methods on an industrial scale

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Abstract

The article presents the basics of a new technology for the production of surface agents for limiting the growth of bacteria and fungi based on silver nano and microparticles made by electrochemical methods on an industrial scale, developed on the basis of the results of industrial research and development works. There is a growing interest in the use of nano and micromaterials in various fields of the economy, including cosmetology, arable and livestock agriculture, and medicine. Silver is a biologically active element that strongly limits the growth of bacteria, fungi and even viruses. In the case of water colloids produced by electrochemical methods on an industrial scale, the processes accompanying the reactions are not controlled with an appropriate level of accuracy. The authors developed methods to automatically control these processes for the first time based on the optical properties of water colloids. As a result of the project, theoretical foundations for control systems as well as functional diagrams along with appropriate program codes were developed. The technology was tested in the production line of water molecular silver colloids used in cosmetics such as creams, mists, cosmetic waters and serums. Thanks to it, the stability of the reaction and the quality of the manufactured intermediates were increased. The technology will also be applicable to silver colloids intended for agriculture and other industries.

Keywords: *silver, nanomolecules, micromolecules, bacteria, fungi.*

1. Introduction

The interest in using silver in the processes of limiting the growth of fungi and bacteria dates back to antiquity. A long sailing tradition has dictated that a silver coin be placed in a potable water tank to keep it fresh for a long time. The aristocracy and nobility used silver utensils and cutlery when the techniques of freezing and preserving food were not yet known. The first observations of nanoparticles also took place in ancient Rome, around 1,600 years ago. Roman craftsmen then created the chalice of King Lycurgus, which changed its color under different lighting conditions. They did this by embedding tiny silver and gold particles in the glass. The unique properties of this object were observed in the 1950s, but only microscopic research in 1990 allowed to discover their essence. Nano and microparticles are produced naturally during many cosmological, geological, meteorological and biological processes. In the 19th century, Michael Faraday [1] provided the first description, in scientific terms, of the optical properties of nanometer-scale metals. In turn, in Turner's work from 1908 we find: "It is well known that when thin leaves of gold or silver are mounted upon glass and heated to a temperature that is well below a red heat ($\sim 500^{\circ}\text{C}$), a remarkable change of properties takes place, whereby the continuity of the metallic film is destroyed. The result is that white light is now freely transmitted, reflection is correspondingly diminished, while the electrical resistivity is enormously increased." [2] In the 1970s and 80s Granqvist and Buhrman led first fundamental studies with nanoparticles in the United States while in Japan nanoparticle materials were studied within an ERATO project. These times researchers used term "ultrafine particles" but till the National Nanotechnology Initiative was launched in the United States in 1990, the term nanoparticles had become more common.

Currently, we know many materials in the form of nanoparticles. They take various shapes such as nanospheres [3], nanorods, nanochains [4], nanostars, nanoflowers, nanoreefs [5], nanowhiskers, nanofibers, and nanoboxes. The shape of nanoparticles very strongly determines the properties of nanomaterials in many areas, such as interaction with light, solvents, behavior in external force fields, participation in chemical reactions, etc. Often, single nanoparticles form larger clusters, creating groups of several dozen to hundreds of thousands of nanoparticles. It also depends on the shapes whether the nanoparticles will form crystal structures (e.g. rods, boxes) or stay amorphous (e.g. spheres). Since the smaller a given structure, the better its surface area to volume ratio is, smaller clusters or individual nanoparticles are usually more reactive than larger clusters. Ex. 1 kg of particles of 1 mm^3 has the same surface area as 1 mg of particles of 1 nm^3 . Nevertheless, it should be remembered that the penetration of single nanoparticles or small clusters in the external material is also significantly greater than in the case of large groups.

Drugs, medications and cosmetics with silver nano or microparticles have a strong biocidal or biosuppressive effect against a wide range of harmful microorganisms, including pathogenic bacteria, fungi and even viruses (e.g. HIV). The multidirectional interaction of silver nano and microparticles impairs the defense mechanisms of microorganisms and inhibits the growth of bacterial resistance. Silver particles interfere with the energy metabolism of cells, damage

their structures and nucleic acids. The activity and effectiveness of silver nano and microparticles depends on their shape, size of clusters, solvents and the method of their production. Silver, in the form of nano and microparticles, is currently used in wound dressings and preparations because research has shown that it reduces the burden of microorganisms on wounds, heals or prevents local infections [6]. Silver has also been used in the food industry, air mist decontamination, inhalation systems, and food preservation and storage. Studies have also shown that silver nano and microparticles show relatively low toxicity to humans and a low degree of deposition.

During the research presented in this article, a number of research tasks were carried out within the established research agenda. The main issues concerned the following areas:

- Registration and processing of large-volume (nephelometric and turbidimetric) data along with the processes of their transmission.
- Statistical analysis of large-volume measurement data with extraction processes for key data sets.
- Machine learning mechanisms in the classification processes of nano fractions and microparticles.
- Process feedback loop modifying the parameters of the electrochemical reaction.
- Creation of a new surface technology for limiting the growth of bacteria and fungi with the use of silver nano and microparticles produced by electrochemical methods.

As a result of the research agenda, new knowledge was created in the form of a new technology for the production of surface agents for limiting the growth of bacteria and fungi based on silver nano and microparticles made by electrochemical methods on an industrial scale. Our own research equipment was also used for research. A utility model application was also filed and a new technology was implemented in test production line.

2. Measuring system

The principle of operation of the apparatus is based on nephelometric and turbidimetric methods, where not only the total luminous flux, i.e. turbidity, is measured, but also the distribution of luminous fluxes resulting from the absorption and scattering of the incident light wave. For this purpose, classic galvanometers were replaced with photosensitive matrices with a specific resolution (e.g. 3648x2736 px, i.e. 10Mpx). One of the matrices registers the light transmitted through the colloidal sample, while the other registers the light scattered by the colloid particles. An alternative may be the use of one matrix with a variable position (such a system was used in the apparatus described). The light sources are semiconductor (light-emitting) diodes and laser diodes (ie semiconductor lasers). Light emitting diodes give a relatively wide spectrum distribution with a maximum of a given wavelength. An example may be the Epistar power LEDs with spectra shown in the figures: Fig. 1 (maximum at 660nm), Fig. 2 (maximum at 515nm) and

Fig. 3 (maximum at 445nm). Appropriate collimators were used to narrow the beam to a cone with an angle of 5°. The spectra of semiconductor diodes should be as well separated as possible. The small size and very low price (including collimators) allow for the construction of an efficient lighting matrix. In turn, laser diodes give light similar to monochrome, with relatively high efficiency. An example can be LambdaWave point modules. They have a good quality of workmanship, which is important due to the independence from the influence of ambient temperature and good power control. Laser diodes allow the use of practically monochrome waves with complete spectral separation. Hence, practically all available options can be used, such as: 405nm, 450nm, 520nm, 638nm. Laser diodes are characterized by a much higher price (modules that meet certain quality parameters and with permanent characteristics are not cheap), but they ensure high stability of the light parameters. One of the advantages of using laser modules is that no additional collimators are needed.

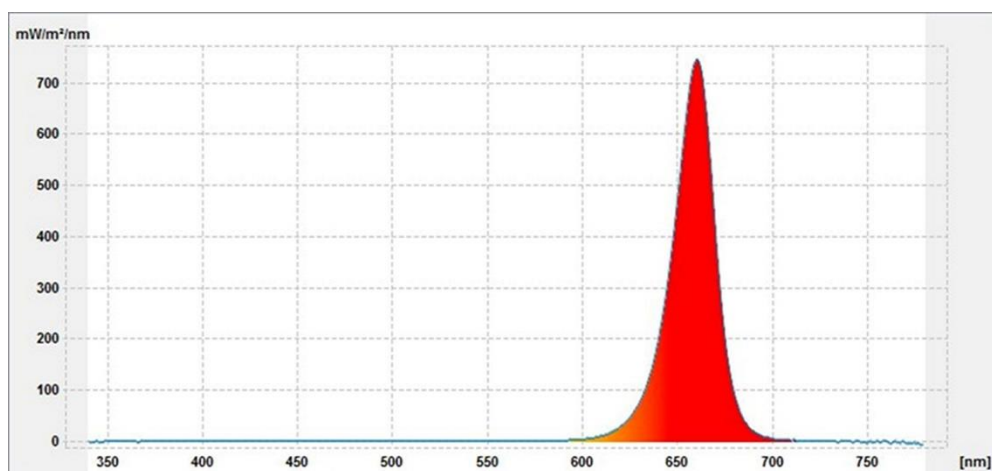


Figure 1. The Epistar 660nm diode spectrum

Source: The Epistar Power LED 1W 45 mil DEEP RED 660nm datasheet

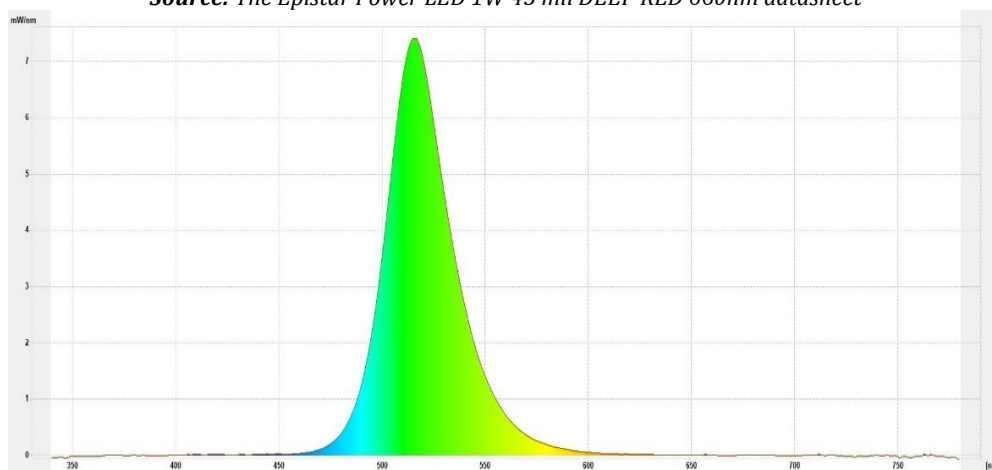


Figure 2. The Epistar 515nm diode spectrum

Source: The Epistar Power LED 1W 45 mil GREEN 515nm datasheet

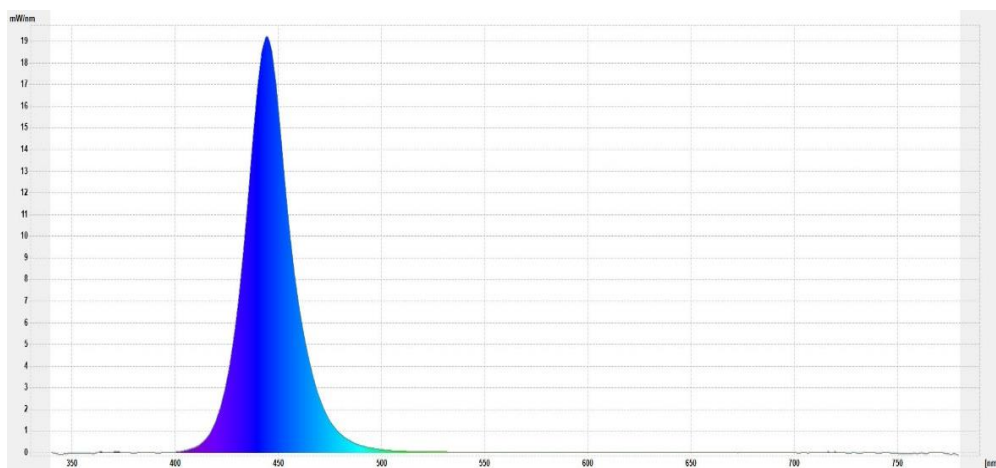


Figure 3. The Epistar 445nm diode spectrum

Source: The Epistar Power LED 1W 45 mil ROYAL BLUE 445nm datasheet

Only water colloids were used in the research due to biological safety and a wide range of applications. Ultimately, the tested colloids are used for the production of cosmetics with dermatological properties, such as creams, mists, cosmetic waters and serums.

A 23.5 x 15.6 mm sensor with a pixel number of 24.72 million (effective pixels number is 24.2 million) was used as the CMOS recording matrix with a variable position. The NEF (RAW) 14 bit uncompressed format was used to record the nephelometric and turbidimetric spectra with 35mm DX-type optics. A 23.5 x 15.6 mm sensor with a pixel number of 24.72 million (effective pixels number is 24.2 million) was used as the CMOS recording matrix with a variable position. The NEF (RAW) 14 bit uncompressed format was used to record the nephelometric and turbidimetric spectra with 35mm DX-type optics. Figure 4 shows a functional diagram of the basic version of the measurement system. The principle of operation is presented in the section below.

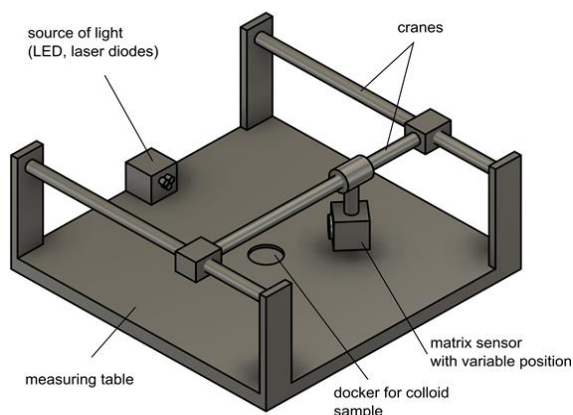


Figure 4. The functional scheme of the measuring apparatus used during research

Source: own materials

2.1. The principle of operation of the measuring system

The concept of measurement has two main aspects. The first is based on a rough measurement of the luminous flux. The efficiency of the light source is known, besides, the device can be calibrated each time by directing the beam to the first matrix (without a colloid in the light path) and then to the second (the result should be similar, because the matrices will be identical, and the calibration beam would be directed e.g. at using a mirror inserted in the place of the later colloid container). By controlling the supply current, the intensity of the light beam can be changed, besides, the calibration can take place in several wavelengths (both polychromatic and monochromatic), which will increase the accuracy of the measurement. Then, after placing the colloid in the device, it is possible to estimate the reduction of the source beam intensity (the sum of the measurements from both matrices together with the analysis of the light distribution reaching the matrices). The measuring container should be symmetrical, preferably in the form of a cylinder or orb-like. One matrix is mounted perpendicular to the axis of the container, opposite the light source, the other one parallel to the horizontal axis of the container, on its side (similar to galvanometers in a classic device). By summing up the estimated intensities of the secondary beams recorded by both matrices, it is possible to determine how much light was scattered on the particles of the suspension. From the nephelometric and turbidimetric measurements, the mean size of the scattering particles can be estimated.

2.2. Control of particle size changes regardless of the concentration of the solution.

Based on the Wells formula, the amount of turbidance can be determined:

$$T = k \cdot \frac{d^3}{d^4 + a\lambda^4} \cdot l \cdot c \quad (1)$$

Where:

k - proportionality factor depending on the type of suspension and the measurement method

a - constant characteristic for a given measurement method

c - weight concentration of the analyzed substance, expressed in units of ppm

d - the average diameter of the colloid particles

λ - length of the source light wave

l - sample layer thickness

If we assume that:

$$\alpha = k \cdot \frac{d^3}{d^4 + a\lambda^4} \quad (2)$$

then for the monochromatic wave the formula above takes the form of Lambert-Beer law:

$$T = \alpha \cdot l \cdot c \quad (3)$$

Where:

α is a constant

From the definition of turbidance we get:

$$T = \log \frac{I_0}{I_t} \quad (4)$$

Where:

I_0 - intensity of the source of light falling on the sample

I_t - the intensity of light passing through the sample (since we have a turbidimetric measurement also)

We can introduce following markings:

$$I_i = I_t^{(i)} \text{ for } \lambda_i \quad (5)$$

is the measured light intensity of wavelength λ_i passing through the sample.

$$T_i = \log \frac{I_0}{I_i} \quad (6)$$

i.e.

$$T_i = k \cdot \frac{d^3}{d^4 + a\lambda_i^4} \cdot l \cdot c \quad (7)$$

For a single measurement of a sample for which the process of precipitation of new nanoparticles is not currently taking place, virtually all quantities can be treated as constant. By using two different monochromatic waves in the measurement, i.e. $\lambda_1 \neq \lambda_2$, we can eliminate the concentration c from the equations:

$$c = T_i \cdot \frac{d^4 + a\lambda_i^4}{k \cdot l \cdot d^3} \quad (8)$$

$$T_1 \cdot \frac{d^4 + a\lambda_1^4}{k \cdot l \cdot d^3} = T_2 \cdot \frac{d^4 + a\lambda_2^4}{k \cdot l \cdot d^3} \quad (9)$$

Ordering by d we get:

$$d^4 = a \cdot \frac{T_2\lambda_2^4 - T_1\lambda_1^4}{T_1 - T_2} \quad (10)$$

If we mark subsequent measurements with index j , we can write:

$$d_j^4 = a \cdot \frac{T_2^{(j)}\lambda_2^4 - T_1^{(j)}\lambda_1^4}{T_1^{(j)} - T_2^{(j)}} \quad (11)$$

Finally we get:

$$D_j = \frac{T_2^{(j)}\lambda_2^4 - T_1^{(j)}\lambda_1^4}{T_1^{(j)} - T_2^{(j)}} \quad (12)$$

where

$$D_j = \frac{d_j^4}{a} \quad (13)$$

The stability of the process in terms of generating nanoparticles means that $D_j = \text{const}$ over time. An increase in the average particle diameter d means a proportional increase in the size of D . Therefore, it is enough to measure the turbidances at successive moments of the nanoparticle generation process using two different monochromatic waves and calculate the ratio:

$$\frac{T_2^{(j)}\lambda_2^4 - T_1^{(j)}\lambda_1^4}{T_1^{(j)} - T_2^{(j)}} \quad (14)$$

It can be seen that the greater the difference between wavelengths λ_1 and λ_2 , the role of nominator increases and the whole fraction should take values from a wider range, especially if T_1 and T_2 are not close to each other.

3. Application of new technology in test production line of silver water colloids

The new technology developed during the project was tested on the production line of water colloids containing silver nano and microparticles. The production system consists of:

- a reverse osmosis demineralizer connected to the local water network,
- jacket reactor with a stirrer, maintaining the reaction temperature,
- equalizing mixer,
- buffer tank with a mixer,
- mechanical filtration system,
- the peristaltic pump anti-air system,
- peristaltic pump with a system for pouring the solution into bottles,
- electronic system for pouring the solution into bottles,
- computer system for controlling electrochemical reaction processes, reactor parameters and the flow of liquid reaction environments,
- reactor reaction feed system,
- power supply system of the jacket heating system of the reactor,
- a system for regulating reaction parameters based on nephelometric and turbidimetric measurements,
- device communication system using the TCP/IP secure network protocol.

The functional scheme of the system for regulating reaction parameters based on nephelometric and turbidimetric measurements implemented to test production line has been presented on Fig. 5.

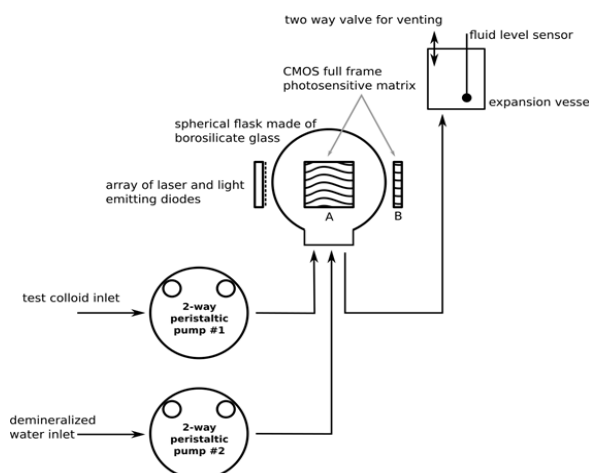


Figure 5. Functional scheme of the system for regulating reaction parameters based on nephelometric and turbidimetric measurements implemented to test production line

Source: own materials

4. Summary

Thanks to the application of a system controlling and regulating the parameters of the electrochemical reaction, in which the new technology was used, the quality and repeatability of the produced water colloids of silver nano and microparticles were stabilized. Colloids are the basis for the production of cosmetic products with dermatological properties, such as creams, cosmetic waters, mists or serums. They help fight and limit the growth of harmful bacteria and fungi that infect skin cells. Initial attempts were also made to limit the growth of harmful fungi on the surface of useful flowers. The obtained results encourage further tests and research in other agricultural sectors, such as the cultivation of cereals, vegetables and fruit. Livestock farming, including pig farming, may also be promising.

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Technology for accurate positioning of agricultural machinery in precision agriculture based on the GPS satellite signal using the Internet of Things, big data and cloud solutions

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Abstract

The implementation of the project allowed for the development and prototype implementation of the technology of accurate positioning of agricultural machinery in precision agriculture based on the GPS satellite signal using the Internet of Things, big data and cloud solutions. Thanks to the research and development work carried out, algorithmics were developed in such research areas as low quality antenna signal processing in the PPP-RTK CDGNSS approach with minimized TAR, position stabilization by means of expanded space in terms of Kalman's theory, cloud processing of high-volume positional data in the processes of inference and running of agricultural machinery in precision agriculture, data transmission, error reduction procedures, area optimization and inference in precision farming processes. Earlier scientific studies allowed the use of the theory of increasing the accuracy of geostationary measurements with the use of relatively cheap GNSS antennas, where measurement errors can be reduced to several centimeters. Thanks to the use of sensory fusion and Kalmanian approaches, it was possible to construct the foundations of devices for positioning agricultural machines with high accuracy, sufficient for effective precision agriculture. In principle, the device is to be cheap, also available to farmers with small farms and thus not having large funds for investments. This approach will allow to reduce the costs of agricultural production, which, paradoxically, is the most expensive in small farms.

Keywords: *precise agriculture, positioning, GPS, Internet of Things, cloud computing.*

1. Introduction

Precision farming is understood as all manifestations of computer-aided or electronic-aided agricultural activity, which allow for a number of positive effects, such as reducing the amount of fertilizers used or the use of intelligent fertilizers, reducing the emission of biogenic elements to the environment, increasing crops or population, enriching products. agriculture for nutrients or trace elements during growth, immunization of crops or livestock against diseases, etc. To a large extent, precision agriculture uses satellite reference systems to accurately position the agricultural machine relative to the field. Precise positioning allows for more accurate field work and thus provides a number of benefits. For example, sprayers supported by a satellite signal allow for precise spray coverage of crops in a band pattern. The sprayer moves across the field, spraying in a sufficiently wide strip. When turning, the machine stands next to the already sprayed area and moves back. Depending on the precision of the sprayer guidance, two adjacent lanes may overlap or there may be a gap between them. Both phenomena are undesirable. The first can lead to over-fertilization, unnecessary losses in fertilizers and excessive emission of biogenic elements to the soil, as well as overdrying of plants. In the latter case, an area left untreated may be a focus of disease development and spreading to other parts of the field, and causing crop losses. Another example is a device connected with the precision steering system of an agricultural machine, which tests remotely (non-contact) and in real time the level of selected biogenic elements in plants (most often nitrogen). Based on the read results, a precisely guided sprayer doses the amount of fertilizer appropriate to the amount of biogenic elements detected in plants in specific parts of the field. Therefore, the precision of operating and operating agricultural machinery determines the quality and size of the crop, as well as the quality of healthy food (the less and more precisely dosed fertilizers and protective measures, the healthier the food is) and the degree of protection of the natural environment by reducing the unnecessary emission of nutrients to soil and groundwater. (and then - to catchments, rivers, lakes and finally seas and oceans). Hence, the concept of precision farming aims to obtain higher yields of higher quality, lower production costs and reduce environmental contamination.

Currently, there are many devices on the market for precise guidance of agricultural machinery. Nevertheless, practically all of them offering satisfactory positioning precision, functionality and durability are associated with expenses of over 5,000 PLN. The Trimble CFX750 system with an accuracy of approx. 30 cm costs approx. 16,000 PLN gross, while increasing the accuracy to 15-20cm requires the use of an additional expensive antenna (cost about PLN 4,000 gross) and the requirement to pay an additional subscription (cost about PLN 1600 gross per year). Other devices for precision farming, but not offering accuracy below several dozen cm or 1m, are: Nomad 900L (approx. PLN 7,000 gross), Juno T41C (approx. PLN 6,000 gross), Juno 3B (approx. PLN 3,500 gross), Teejet CL 230 (approx. PLN 7,000 gross), Muller Track Guide (approx. PLN 8,000 gross), Topcon system 110 (approx. PLN 11,000 gross). Most of them (the cheaper ones, e.g. EZ-Guide 250, Juno T41C, Nomad 900L) are closed systems and do not allow for expansion with more precise antennas or other devices or communication with them (e.g. with cameras, on-board

computer, automatic control systems). The high prices of devices, especially without appropriate software and the ability to communicate with other computerized agricultural equipment, mean that many farmers with smaller farms are not interested in making investments (farms with a sown area of up to 50 ha occupy a total of over 80% of the agricultural area, i.e. approx. 13 million ha. and there are nearly 1,200,000 of them [1]). The average income per 1 conversion ha is PLN 1975 (according to the Announcement of the President of the Central Statistical Office of 23 September 2016 on the average income from work in individual farms per 1 conversion ha in 2015), and the profit after deducting hired labor, depreciation of machinery, fertilizers, pesticides, fuel, storage, harvest and sale costs, it constitutes a small, often several percent share, hence a small farmer (up to 50 ha) simply cannot afford a set of equipment for nearly PLN 10,000. The results of the implemented project meet these needs by providing processor devices that do not require expensive GPS receivers, but ensure the accuracy of positioning of agricultural machinery with an error margin of less than 30cm. The cost of the device was estimated at 2,000. PLN net. In addition, there is a possibility of subscription sale, which will further facilitate access to this type of equipment for farmers with small farms.

Moreover, as shown by scientific studies, there is a great demand on the market for low-cost GPS positioning technologies [2]. The problem is usually not the computing power of mobile processors, but significant interference in the path of the radio signal reaching the receiver from the satellite. These interferences are generic and cannot be prevented. Expensive solutions use significantly better radio systems, including antennas. In order to ensure the affordability of the technology, the applicant intends to apply an innovative GPS signal recording system with correction systems based on inertial, magnetic field strength, directional and optical sensors. The application of an approach using methodologies such as Kalman's theory will allow to introduce further corrections to the disturbed signal and thus achieve precise point positioning (PPP).

2. Theory

2.1. Determining the state

In determining the filter state, we take into account a component with real values. It models the relative position of the antenna and its velocity. We also take into account a component with integer values. This component models the phase ambiguities that are inherent in carrier phase differential positioning techniques. Earlier studies [3] [4] have investigated this resolution. It is therefore required to correctly define the solution for the CDGNSS positioning processes.

The real-valued filter state has a component defined for the moment t_k and it is denoted by the symbol $\mathbf{x}_k$, where $t_k = kT$. T is the time interval between successive updates of the filter state. This component takes the form:

$$\mathbf{x}_k = [\mathbf{r}_o, \mathbf{r}_k, \dot{\mathbf{r}}_k]^T \quad (1)$$

where we used the following markings:

$\mathbf{r}_o$ is a 3×1 size vector taken as a constant vector; it describes the relative position between the reference antenna and the center point of the movement of the moving antenna.

$\mathbf{r}_k$ is a 3×1 size vector that describes the relative position of the antenna moving relative to the center point of its movement, at time t_k .

$\dot{\mathbf{r}}_k$ is the size of the hand change at the time t_k .

The filter component that takes integer values $\mathbf{n}_k$ at time t_k can be written as follows:

$$\mathbf{n}_k = [N_1, N_2, \dots, N_{SV-1}]^T \quad (2)$$

where

$\mathbf{n}_k$ is a vector of size $(N_{SV} - 1) \times 1$ describing phase ambiguities with integer values, one for each pair of satellites.

N_{SV} is the number of all satellites observed.

We assume one reference satellite for all pairs of satellites.

2.2. Modeling dynamics

In the model, we assume that the real-valued $\mathbf{x}_k$ component of the filter evolves in accordance with the second-order Gauss-Markov process with mean-reverting. This process reflects movement that is correlated with time and inverts the value of the mean. This movement is experienced by the sensor when it moves together with the deployed mounting arm of the locating device. The integer-valued $\mathbf{n}_k$ state component is mapped by a constant. This is because the phase ambiguities remain constant as long as the sensor keeps the phase synchronized for each received signal.

The real-valued filter state component evolves over time as follows:

$$\mathbf{x}_{k+1} = \Phi \mathbf{x}_k + \Gamma \mathbf{w}_k \quad (3)$$

where:

Φ is a transition matrix for individual states,

Γ is the process noise effect matrix,

$\mathbf{w}_k$ is the process noise at time t_k , represented by a random Gaussian sequence with a discrete time mean of zero and a covariance matrix $\mathbf{Q}$, which takes the form:

$$\mathbf{w}_k \sim N(\mathbf{0}, \mathbf{Q}), E[\mathbf{w}_k \mathbf{w}_j^T] = \mathbf{Q} \delta_{kj} \quad (4)$$

The state transition matrix for real-valued states is the moment transition matrix from t_k to t_{k+1} for a second-order Gauss-Markov process of discrete-time and mean-reverting.

$$\Phi = \begin{bmatrix} \mathbf{I}_{3 \times 3} & \mathbf{0}_{3 \times 3} & \mathbf{0}_{3 \times 3} \\ \mathbf{0}_{3 \times 3} & f \cdot \mathbf{I}_{3 \times 3} & \frac{1-f^2}{\sqrt{1+f^2}} \cdot \mathbf{I}_{3 \times 3} \\ \mathbf{0}_{3 \times 3} & \mathbf{0}_{3 \times 3} & f \cdot \mathbf{I}_{3 \times 3} \end{bmatrix} \quad (5)$$

where

$$f = e^{-T/\tau_0} \quad (6)$$

is the correlation coefficient between the state components $\mathbf{r}_k$ and $\dot{\mathbf{r}}_k$, where τ_0 is the average time of decorrelation during antenna movement.

The noise effect matrix can be defined as:

$$\mathbf{\Gamma} = [\mathbf{0}_{3 \times 3} \quad \mathbf{0}_{3 \times 3} \quad \sqrt{1-f^2} \cdot \mathbf{I}_{3 \times 3}] \quad (7)$$

And the noise covariance matrix in the process can be written as:

$$\mathbf{Q} = \sigma^2 [\mathbf{I}_{3 \times 3}] \quad (8)$$

where σ is the calculated standard deviation of the time-dependent antenna variation mapped by the state components with real values $\mathbf{r}_k$ introduced in formula (1), calculated for each of the dimensions.

In order to apply the dynamic model in the case of a stationary antenna, the antenna motion decorrelation time should be assumed to be equal to infinity, i.e. $\tau_0 = \infty$, and the process noise should be set to zero, i.e. $\mathbf{Q} = \mathbf{0}_{3 \times 3}$.

2.3. Measurement model

The filter takes the measurement vectors $\mathbf{y}_k$ for $k = 1, \dots, K$, each of which is populated according to a single time epoch of the doubly differenced carrier phase measurements. The measurement model links $\mathbf{y}_k$ with the components of the filter state with real and total values, i.e. $\mathbf{x}_k$ and $\mathbf{n}_k$, thanks to the following adaptation of the linearized GNSS carrier phase measurement model, in accordance with [5]:

$$\mathbf{y}_k \triangleq \begin{bmatrix} \Phi_{AB,k}^{21} \\ \Phi_{AB,k}^{31} \\ \vdots \\ \Phi_{AB,k}^{N_{SV}-1} \end{bmatrix} = \mathbf{r}_{xk} + \mathbf{H}_{xk}(\mathbf{x}_k - \bar{\mathbf{x}}_k) + \mathbf{H}_{nk}\mathbf{n}_k + \mathbf{v}_k \quad (9)$$

where:

$\Phi_{AB,k}^{i1}$ is a double differential phase measurement between reference receiver A and mobile receiver B, satellite indexed i , satellite indexed 1, and reference satellite at time t_k .

$\mathbf{r}_{xk}$ is a vector of doubly differenced model ranges based on the filter state real values defined before $\bar{\mathbf{x}}_k$.

$\mathbf{H}_x$ is the measurement sensitivity matrix for the real-valued filter state components.

$\mathbf{H}_n$ is the sensitivity matrix of the measurement of the filter state components with integer values at time t_k .

$\mathbf{v}_k$ is a vector of doubly differenced noise measurements with discrete time.

Each of the components $\mathbf{v}_k$ is modeled as Gaussian white noise with a zero mean discrete time. From here we can write down:

$$\mathbf{v}_k \sim N(\mathbf{0}, \mathbf{R}), E[\mathbf{v}_k \mathbf{v}_j^T] = \mathbf{R} \delta_{kj} \quad (10)$$

where $\mathbf{R}$ is the covariance matrix for a noise measurement with dimensions $N_{SV-1} \times N_{SV-1}$.

Hence, we can write the noise measurement covariance matrix as:

$$\mathbf{R} = \sigma_{\phi}^2 \begin{bmatrix} 4 & 2 & \dots & 2 \\ 2 & 4 & & \vdots \\ \vdots & & \ddots & \\ 2 & \dots & & 4 \end{bmatrix} \quad (11)$$

where σ_{ϕ}^2 is the standard deviation for the undifferenced measurement of the noise phase. To simplify the model, it is adopted for all antenna-satellite pairs. The measurement sensitivity matrices can be written as:

$$\mathbf{H}_{xk} = \begin{bmatrix} \rho_{B,k}^{21} & \rho_{B,k}^{21} & \mathbf{0}_{1 \times 3} \\ \rho_{B,k}^{31} & \rho_{B,k}^{31} & \mathbf{0}_{1 \times 3} \\ \vdots & \vdots & \vdots \\ \rho_{B,k}^{N_{SV}1} & \rho_{B,k}^{N_{SV}1} & \mathbf{0}_{1 \times 3} \end{bmatrix} \quad (12)$$

$$\mathbf{H}_n = \begin{bmatrix} \lambda & 0 & \dots & 0 \\ 0 & \lambda & \dots & 0 \\ \vdots & \vdots & \ddots & \vdots \\ 0 & 0 & 0 & \lambda \end{bmatrix} \quad (13)$$

where $\rho_{B,k}^{i1}$ is the 1×3 single positioning vector difference between the estimated position of the moving antenna of the receiver, satellite indexed i , satellite indexed 1, and the reference satellite at time t_k , and λ is the wavelength for the GNSS signal.

2.4. Residuals of phase

After processing the data by the CDGNSS filter, its output, apart from the history of position estimates with the accuracy of the order of a centimeter, also shows the history of phase residuals $\tilde{\mathbf{y}}_k$. They can be viewed as deviations from any double differential phase measurement from its alignment at the antenna phase center point. The rest can be written as:

$$\tilde{\mathbf{y}}_k = \mathbf{y}_k - \mathbf{r}_{xk} - \mathbf{H}_n \hat{\mathbf{n}}_K \quad (14)$$

where $\mathbf{r}_{xk}$ is now determined from the state of the true-valued filter at time t_k and represents an estimate of the ambiguity of the integer-valued filter from all measurements taken up to time t_K .

3. Research domain

The following areas of new knowledge were investigated during the project implementation:

- Low quality antenna signal processing in the PPP-RTK CDGNSS approach with minimized TAR.
- Position stabilization by means of expanded space in terms of Kalman's theory.
- Cloud processing of high-volume positional data in the processes of inference and running of agricultural machinery in precision agriculture.
- Data transmission, error reduction procedures, area optimization and inference in precision farming processes.

The above activities concerned the following research issues, on the basis of which new knowledge in the form of a new technology was created:

- Methodology of minimizing multipath suppression in obtaining high resolutions.
- A methodology for reducing errors by analyzing data from a moving antenna or antenna array.
- Methodology for the implementation of artificial aperture processes in the DD GNSS approach.
- The methodology of supporting the positioning in the PPP approach using inertial sensors.
- Positioning support methodology in the PPP approach using directional sensors.
- Methodology for determining the superposition of radio and non-radio measurements in precise and fast positioning based on the Kalman theory.
- The methodology for collecting positioning data with a hierarchical and contextual structure.
- A methodology for processing high-volume positioning data using distributed cloud mechanisms.
- Methodology for the implementation of spatial inference processes and running agricultural machines on the basis of processed positioning data of a large volume.
- Functional and computational design methodology for IoT devices for positioning agricultural machinery.
- A methodology for secure data exchange and reduction of errors during data processing in the cloud from devices.
- Methodology of area optimization and inference in precision farming processes on the basis of data from devices.
- Creation of a new technology and its verification in real conditions and obtaining readiness for its implementation in the target system.

4. Results

The implementation of the above-mentioned research issues and the implementation of development works in the above-mentioned areas of new knowledge allowed for the creation of a new technology for accurate positioning of agricultural machines in precision agriculture based on the GPS satellite signal using the Internet of Things, big data and cloud solutions. As part of the implementation tests, a device for precise positioning of agricultural machines was designed, mounted e.g. on the roof of a farm tractor.

One of the major problems in precision farming is the precise reading of the agricultural machine's position in two aspects. The first one covers the geoposition's position without taking into account the arrangement of the machine in space as a solid. This position is read by means of GPS sensors (GPS wave receivers). The use of five independent receivers located at a known mutual distance, called the artificial aperture approach, allows the results to be averaged and thus correct the correct

geoposition reading. Hence, in the first aspect of positioning, the machine is treated as a geometric point. The second aspect involves the position of the agricultural machine in three-dimensional space (tilts are detected by accelerometers, alignment with the Earth's magnetic field by magnetometers) relative to the center of the geometric rotation. Measurements are then taken with MEMS sensors and averaged using Kalman approaches. Thanks to the use of MEMS sensors on unfolded arms, their linear displacement increases (compared to the situation with folded arms) for the same angular displacement. In addition, in the case of the movement of the agricultural machine during operation, dynamic overload readings are made by means of MEMS sensors on unfolded arms, which also in the Kalman approach are used to improve GPS positioning (interpolation with the use of sensors of different physical nature). To sum up, the unfolding of the arms increases the displacement of the sensors for the same rotation of the agricultural machine body, which in turn results in a more accurate determination of its position in three-dimensional space, and additionally enables better correction of GPS reading errors. At the same time, when the agricultural machine ceases to be positioned, e.g. it leaves the field, drives into the garage, the arms are retracted and thus their damage is avoided (the machine outline is reduced).

The device in question allows to increase the accuracy of geo-positional measurements as well as in the three-dimensional space of the agricultural machine by the simultaneous use of GPS sensors that are distant from each other and the distance of MEMS sensors from the geometric center of rotation of the machine as a solid. In the case of precision farming, it is not enough to know the exact position of the agricultural machine as a geometric point. It is also necessary to know about its inclination to the ground and its orientation in relation to the directions of the world. Failure to take into account the inclinations leads to incorrect readings of the machine's position in relation to the plowing, which in turn may lead to missed spraying or sowing. Incorrect orientation, in turn, leads to a loss of accuracy in the machine's movement along a predetermined trajectory. The use of multiple sensors, both GPS and MEMS, at a distance from each other and from the center of the geometric rotation of the machine body results in their greater relative sensitivity and allows for more precise corrections than in the case of one sensor located close to the center of rotation. On the other hand, the function of folding and unfolding the arms allows the use of remote sensors during machine operation and folding them while driving or parking the machine, which reduces the risk of their damage.

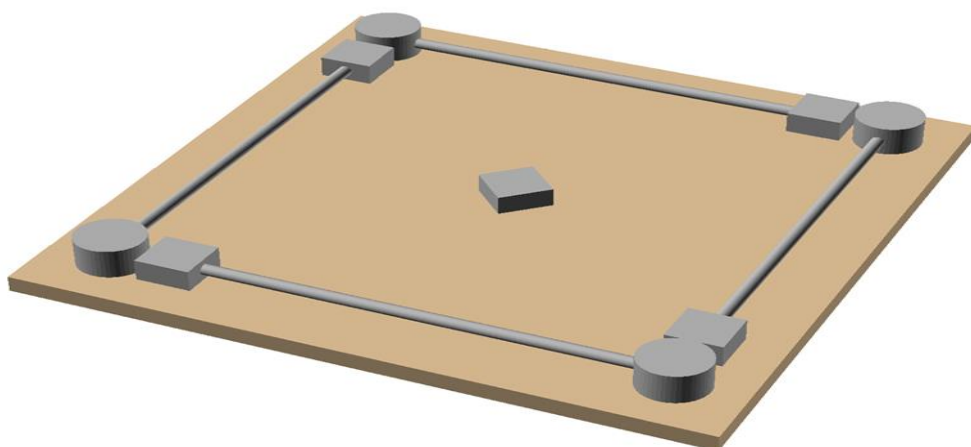


Figure 1. Functional outline of a device for precise positioning of agricultural machines with folded arms for mounting MEMS and GPS sensors. In the center of the device there is a central sensor that allows to increase the precision of the measurements.

Source: own materials.

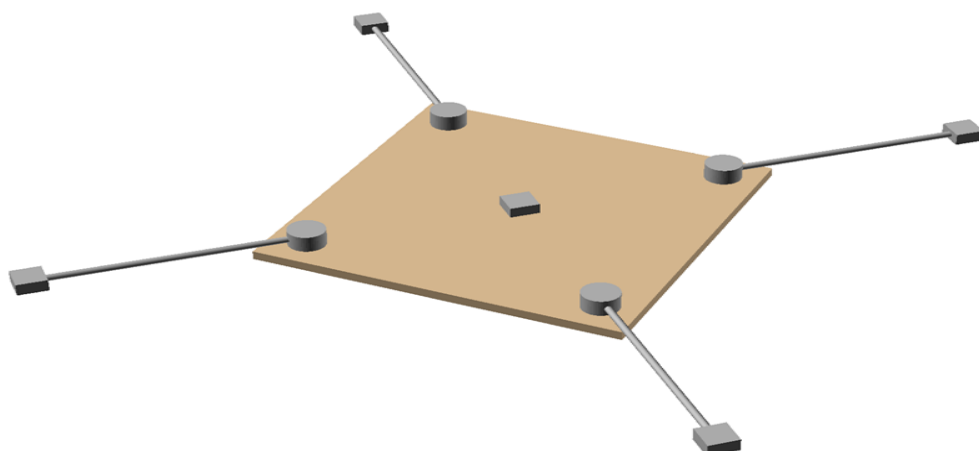


Figure 2. The unfolded mounting arms allow for a significant increase in the precision of measuring the position of the agricultural machine in three-dimensional space using MEMS and GPS sensors.

Source: own materials.

5. Summary

The aim of the project was to generate new knowledge through the implementation of research and development tasks, in the form of technology for accurate positioning of agricultural machinery in precise agriculture based on the GPS satellite signal using the Internet of Things, big data and cloud solutions. This technology will allow the introduction of new products and services related to precision farming and information processing to the market, supporting the optimal use of resources such as fertilizers, pesticides, water, fuel, working hours, and at the same time will significantly contribute to the protection of the natural environment

through reduced nutrient deposition. from farmland to groundwater. Paradoxically, smaller farms that cannot afford expensive precision farming solutions are more expensive because they incur higher costs related to the sub-optimal use of production resources. In addition, they also record greater losses in yields caused by imprecise dosing of the agents. Hence, they need to use inexpensive technologies and devices that improve the quality of agricultural activity. The results of the implemented project meet these needs. However, the results obtained in the project should not be treated as final. The constantly increasing power of computing clouds and cheap electronic sensors will allow for another significant reduction in agricultural production costs in the future.

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Technology to provide continuous monitoring services of inland and coastal waters with the use of bioindication organisms

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Abstract

*As part of the implemented project, a new technology was developed that allows for the provision of continuous monitoring services of inland and coastal waters with the use of bioindication organisms. The use of organisms as bioindicators is not a new topic, but many of the systems on offer are either very simple or require frequent maintenance. The proposed technology allows for the construction of cheap, floating, fully automatic water biomonitoring stations using various species of mussels, both fresh and saltwater. Contamination of water used for food purposes and on farms is a major contributor to increased mortality, growth retardation and disturbance and physiological functions, changes in DNA (genotoxicity), changes in tissues (cytotoxicity) and organs of individuals exposed to chemical compounds. One of the most dangerous classes of toxins affecting animals and humans in contact with contaminated water are cyanotoxins released by dying cyanobacteria. They contribute to serious medical conditions as well as fatal events. This type of toxin is relatively difficult to detect due to the seasonal variability of blooming. One of the effective and automatic methods of detecting water contamination in continuous mode is biomonitoring with the use of *Dreissena polymorpha* mussels.*

Keywords: *water biomonitoring, inland and coastal waters, mussels, *Dreissena polymorpha*.*

1. Introduction

Research conducted by many research groups over the last thirty years shows more and more clearly how important is the quality of water, not only that used for food, but also used on farms (e.g. for watering animals) or naturally circulating in the environment. The impact of pollutants on living organisms, including humans, has been shown to result from the interaction between the contamination and the organism, population or biocenosis. It manifests itself, inter alia, in increased mortality, inhibition and disturbances in growth and physiological functions, changes in DNA (genotoxicity), changes in tissues (cytotoxicity) and organs of individuals exposed to chemical compounds [1]. Since in Poland (as in an increasing number of other countries) the principle of sustainable development has gained a constitutional rank, the method of socio-economic development that integrates political, social and economic activities should be carried out in keeping with the natural balance and durability of basic natural processes. According to the report of the Energy for Europe Foundation, Poland is classified as a country with relatively small water resources. In the international program Population and Environment carried out in 1993, Polish water resources were ranked 72nd out of 100 analyzed countries of the world. Among European countries, Poland is the country most threatened by water deficit. Calculated per capita, Polish water resources amount to approx. 1,580m³/year, and currently the threshold of renewable water resources in the world is equal to 1,700m³/year per person. The average level in Europe is 4,500m³/year per person. In the period of the greatest droughts, water resources in Poland can drop below 1000m³/year per person.

The level of increased interest in the state of the environment, and especially in its potential threats, may be demonstrated by the systematically growing financial outlays allocated, inter alia, to for activities identifying them and counteracting these threats. According to a report prepared by researchers from the Department of Chemistry and Biochemistry, Bureau of Technology Commercialization at the University of Texas in Austin, USA, the market for detecting and protecting the environment against biological substances and chemicals in 2002 reached the value of USD 2.3 billion, and in 2007 it was estimated at USD 4 billion. In turn, the market for detecting environmental threats in 2003 was valued at USD 3.4 billion and continues to grow. The above data shows how crucial the task is to find effective methods of detecting and preventing environmental threats. On the other hand, as already mentioned, many of them are not used on a large scale, as they lack the appropriate economic justification. For example, it is difficult to imagine water surveys in all water intakes in the country performed at least once every hour (only "large" intakes with an annual consumption of more than 800,000 cubic meters are 258 in Poland, and there are around 5.5 thousand inventoried water intakes - on the basis of the Guidebook of the State Hydrogeological Service [2]). The situation is quite dramatic in the case of Polish lakes as well as of many European ones.

According to the study by prof. Adam Choiński, Poland has 7,081 lakes with an area of more than 1ha, therefore Poland belongs to the zone with a small lake area [3]. Hence, the loss of each of them (eutrophication, overgrowth, overgrowth and transformation into marshes) is an irreparable and irreversible loss of national and

social property, especially in the face of future generations of citizens. It has an impact on the country's climate, water management, species balance, domestic tourism and the general health condition of the society. The scale of the phenomenon is reflected by the fact that in just less than 40 years (1954-1992) as many as 2215 lakes disappeared, which accounts for 11.22% of the lake area at that time (data from the catalogs of Polish lakes in 1954 and 1992 by Prof. A. Choiński). The process of disappearance of small lakes with an area of up to 5ha, which in Poland account for about 44% of the total number of lakes, is particularly dynamic. It should be emphasized that lakes are a significant link in the circulation and retention of water in the balance catchments, and in the system of changes taking place at the present time, water pollution manifested by eutrophication is the most noticeable. We are dealing here with inflows of both water nutrients and toxic agents. Accumulation of pollutants is a complex and long-lasting process that may go unnoticed for years. It is mainly related to the concentration of pollutants in bottom sediments and deeper parts of lake basins, and their intensity and importance (as a result of progressive eutrophication) is most often evidenced by the disappearance of many fish species. Restoring the state of equilibrium is a time-consuming and costly process, but it is nevertheless necessary if future generations are to inherit the natural environment in good condition and subjected to anthropogenic pressure as little as possible. It should also be noted that, as is well known, the costs associated with prevention are many times lower than those associated with reversing undesirable phenomena. Therefore, such an important role is played by effective and common methods of monitoring the state of the environment, including flowing and stagnant waters. These methods undoubtedly include systems based on biosensors, which are cost-effective, have a wide range of applications and can be deployed continuously in real time.

2. Occurrence and determination of impurities

The impact of pollutants can be divided into two categories depending on the extent of their impact. Point pollutants are relatively easy to identify and examine their nature (type of pollutant emitted, its concentration, total amount released into the environment over a period of time, etc.). They usually come from industrial and municipal wastewater discharges, outflows from industrial, municipal and hazardous waste landfills, sometimes they appear only temporarily (e.g. as a result of an accident, failure of transport lines, deliberate discharge of harmful substances to the environment). On the other hand, diffuse pollution, i.e. pollution covering large areas or water bodies, is very difficult to identify, characterize and then to counteract (e.g. neutralization, protection). They are mainly caused by runoff from agricultural crops, contaminated soils and urban areas, as well as bottom sediments, dry and wet deposition from the atmosphere, etc. They are characterized by the fact that in many cases diffuse pollution is an unknown mixture of substances with difficult to determine toxicity (due to differences in the proportions of quantitative components and the amount of emissions difficult to determine). Moreover, many diffuse pollutants (as opposed to the most intensive point pollutants) cause the

transfer to the environment of substances with concentrations that become dangerous only after prolonged exposure to living organisms, and temporarily do not clearly mark their presence. In addition, their distribution over a larger area causes a decrease in point detection with possible long accumulation in the bodies of organisms. Hence, diffuse pollution is the main cause of diseases of individual organs, especially among mature animals. They also lead to genotoxicity, which manifests itself in mutations often transferred to the next generations, leading to significant phenotypic changes in a sufficiently long time. Mutations refer to genetic changes in somatic or germ cells. Mutations in somatic cells can contribute to a variety of defects up to the formation of cancer, while mutations in germ cells can cause genetic diseases in the next generation. While the relationship between exposure to individual chemicals and carcinogenesis in humans is well researched, similar relationships for hereditary defects are difficult to prove [1]. Nevertheless, exposure of living organisms to long-term effects of various substances is not only toxic, but often teratogenic and genotoxic, because the scope of contamination and their persistence may be so large that their effect is chronic and its effects appear after a sufficiently long time [4]. One of the greatest threats is cyanobacterial blooming and the cyanobacterial toxins released by them in eutrophic water reservoirs (lakes, ponds, dam reservoirs) and coastal waters, which are dangerous to human health and life. Among cyanobacteria toxins, we can distinguish, among others neurotoxins (e.g. anatoxin-a, anatoxin-a(s), saxitoxin and neosaxitoxin), causing cancer (e.g. microcystins, lipopolysaccharides), dermatotoxins (e.g. lyngbyatoxin-a, aplysiatoxin and lipopolysaccharides, nodrocularins, and nodroculars cylindrospermopsin) [5]. The most common toxin is a hepatotoxin called microcystin. Currently, more than 70 different structures of these compounds are known. Hepatotoxins, which include microcystins and nodularins, are responsible for poisoning animals and humans that come into contact with toxic blooming. Due to their chemical structure, they are characterized by high durability in the water environment. Moreover, neurotoxins (anatoxins and saxitoxins), due to the low value of the lethal dose, are among the strongest natural toxins. The presence of the neurotoxic amino acid BMAA (β -N-methylamino-L-alanine) may be closely related to cases of Alzheimer's disease registered in Canada [6].

Determination of water components by chemical or physical methods, apart from the significant cost-consumption, has several other features that significantly limit their use as elements of constant environmental supervision. One of them is the need to conduct most of the tests in a laboratory equipped with appropriate reagents and research equipment. Another is related to the time that elapses between the moment the sample is taken and the moment the results are obtained (this also includes the time needed to collect samples and transport them). Nevertheless, one of the most important features is the need to determine in advance what risk is to be related to a specific study. Is it e.g. a marking of the presence of a specific species of bacteria, an element or a toxin? There is a very high probability that for a particular series of tests, factors that have not been thought of before and then ignored in selecting a test method will go unnoticed. This property is practically absent in the case of using live bioindicators with an appropriate

sensitivity spectrum. If any substance or biotic factor adversely affects the selected test organism, an appropriate response to the adverse factors (including death) will occur, whether or not the researcher predicted certain stimuli (e.g. poisons). Hence, biomonitoring methods are much more versatile than laboratory physico-chemical approaches (although the latter are much more precise and are necessary in the processes of accurate hazard identification). Particularly noteworthy is the fact that the high seasonal variability of phytoplankton, which is a good indicator of early eutrophication, makes the assessment of reservoir fertility difficult [7]. Phytoplankton, like phytobenthos, absorb nutrients directly from the water. Then part of it is filtered through filterers, which also include mussels. Hence, the indicative methods based on these molluscs can reliably inform about the risk of early eutrophication.

3. Biomonitoring

The main idea of the use of mussels of the species *Dreissena polymorpha*, together with the classification of patterns observed in the behavior of molluscs, comes from Prof Ryszard Wiśniewski, a hydrobiologist known in Poland and abroad, a long-term employee of the Nicolaus Copernicus University in Toruń. The mere fact of using living organisms, including mussels, to monitor the surrounding environment is not a new idea. Many solutions were created decades ago. Most of them, however, stopped at the level of technical advancement of that time and still offer only the basic functionality. It consists in measuring the angle of the shell and inferring the state of the environment on the basis of the results of this measurement. In the simplest version, the measuring system consists of a group of mussels that are permanently attached to the prepared base. The zebra mussel belongs to sedentary species which are not disturbed by the phenomenon of permanent immobilization. Often, these mollusks settle on their kinsmen, creating extensive colonies. Organisms form such a dense system that most of them are practically forced to stay in one place. The mussel eats by taking water up through the inlet siphon, trapping food particles, and then removing the water through the drain siphon. The matter that the mollusk finds valuable is digested and absorbed, and the unfit particles are clumped into larger clumps (pseudofecal matter) and removed from the body along with the discarded water. A side effect of this process is the filtration of water from suspensions, the particles of which are small enough to remain in the water for a long time. The phenomenon of floating matter is particularly visible in the so-called re-suspension layer, i.e. the area of highly hydrated sediments directly adjacent to the bottom of the eutrophic reservoir. Due to the action of filtering organisms, the particles of the suspension are bound into larger lumps, which more easily fall to the bottom and clump into the soil of greater density than the resuspension layer. In the case of mussels, the filtration process is accompanied by contractions of the shell sphincters, which are manifested in the movements of both flaps.

In biomonitoring, a system measuring the opening angle is placed on the one flap or both shell flaps, thanks to which it is possible to register changes and dynamics of dilation over time. In older designs, a system of metal rods was used to change the resistance of the active element. Today, the magnet Hall effect sensor is

used, which can measure changes in field strength with high accuracy and resolution over a wide range. Moreover, this type of construction is resistant to the factors prevailing in water reservoirs and has a relatively low temperature dependence (most systems independently perform temperature compensation). By collecting the matter floating in the water, the mussel reacts to its chemical composition. Since *Dreissena* is a eurytopic species, it can survive very unfavorable conditions, including significant contamination of the aquatic environment. On the other hand, it is sensitive to the composition of the absorbed food, which allows its reactions to be used in biomonitoring. Both of these facts make *Dreissena* a very useful and quite universal bioindicator. Eurytopicity is ensured by a wide range of concentrations and harmful substances detected by molluscs. Food sensitivity, in turn, enables a reaction to even low concentrations of harmful substances. It has one more important meaning. Due to the characteristic reactions of the mussel, it is possible to detect which class of substances the contamination belongs to and in which concentration class it occurred. Obviously, the clam is not a physico-chemical sensor and as such does not provide a response comparable even to a small degree with a laboratory or even field test. Nevertheless, biomonitoring has two main advantages. First, it is universal. If a physico-chemical sensor is not designed to detect a specific substance, it will not respond to it during operation. A living organism was designed by nature and thus reacts to anything that is harmful to it. As a rule, what harms mussels is also dangerous to humans, and the concentrations detected by mollusks are so low that mussels reactions can be interpreted as a potential hazard rather than contamination. Secondly, the mussels can function continuously and are cheap to obtain. A set of physico-chemical sensors, which would have a similar versatility and sensitivity and could work in a continuous mode, is incomparably more expensive, not to mention the necessity of servicing and the risk of theft (mussels, unlike measuring equipment, are rather not an object of desire even for scrap collectors, and the biomonitoring station can only be damaged by the robber's ignorance). Importantly, mussels are such a complex organism (e.g. compared to bacteria) that they have a whole range of specific reactions, which allows for labeling the classes of substances and their concentrations, and on the other hand, simple enough (e.g. in comparison with fish) that they can function practically without human care.

4. Technology

As already mentioned, using the mussels reaction to infer the purity of the water is not a new idea. They are used in selected water intake stations, treatment plants, rivers and lakes. Nevertheless, the vast majority of these solutions work basically in two states, i.e. they either indicate the absence of a threat or its presence. In the first case, individual specimens have their shells open to varying degrees and move them, which is characteristic of their life activity. However, when all or almost all shells are closed, this situation is interpreted as a threat (stress occurs in mussels). The worst condition is the complete opening of the shells and the absence of any movement for most or all individuals. Such a situation means the death of mollusks, possibly caused by high and deadly water contamination. The creators of biomonitoring

solutions sometimes add mixed states, i.e. they inform about a potential, unspecified threat if most of the mussels close their shells. The problem is that mussels can succumb to a variety of stress factors, not necessarily chemical ones. One example would be noise from a motor vehicle, human activity or oars hitting the water surface. Mussels also react to rapid changes in lighting, temperature, fluctuations in pH, and many other stimuli. Hence, the functioning of biomonitoring in a two-state manner is quite ambiguous and often erroneous (false alarms).

The idea of the founders of Bionitec differs from the approach described above. The first distinguishing feature is the use of a sufficiently large colony of mussels so that their reactions are statistically significant. Besides, there is always a certain proportion of individuals that may die, which should not be of great importance, as long as this proportion is sufficiently small compared to the entire group. In many previous solutions 8-10 individuals were used. For comparison, Bionitec devices contain at least 50 of them. The second distinguishing feature is the approach to recorded data. First, in an appropriately equipped laboratory, research is carried out on a large group of individuals (approx. 1000), how mollusks react to particular chemical stimuli, other physical stimuli and how they behave in the absence of these stimuli. Recorded time series are then subjected to filtering and advanced data analysis. Among others, methods based on DWT (Discrete Wavelet Transform) and classifiers k-NN (k-Nearest Neighbors), SRDA (Spectral Regression Discriminant Analysis) and FDA (Fisher Discriminant Analysis) are used. This approach was successfully used for the first time by the team of R. Wiśniewski, P. Przymus and K. Rykaczewski [8] [9]. Due to the large amount of recorded data, the solution uses techniques for processing big data in real time, utilizing the capabilities of specialized GPGPU computing processors (architecture used, among others, in the world's strongest supercomputers). The detected patterns are indicators determining the most probable type of contamination and the class of its intensity (details are determined later as a result of a toxicological laboratory test). If a threat is detected, an appropriate message or alert is sent to authorized persons or bodies. The solution can also make autonomous decisions, e.g. to temporarily shut off the drinking water intake.

The project also resulted in the development of a new biomonitoring station with easy assembly and disassembly of bioindicators. Hall sensors installed in bioindicator mounting bars record the strength of the magnetic field from a small magnet attached to the mussel shell. Bioindicators are attached with one shell to the bioindicator plate, which is then placed in milled slots on the bioindicator mounting bar. A small magnet is attached to the second, free shell. During the free movement of the shell, the magnetic field recorded by the Hall sensor changes. From the recorded time series, machine learning algorithms (e.g. discriminant classifiers) identify markers related to the presence of pollutants in the water that are dangerous for humans and animals (e.g. farms), as well as the processes of over-fertilization of the reservoir. Recorded waveforms are sent by a GSM transmitter (modem) to analytical servers. On the other hand, servers can automatically notify appropriate services or activate specific devices after detecting disturbing tags. The simplicity and modularity of the station's construction allows for the implementation and maintenance of water monitoring points with relatively low costs and low overhead. The station can also be serviced by

people without specialist technical qualifications, immediately after undergoing a short on-line training.

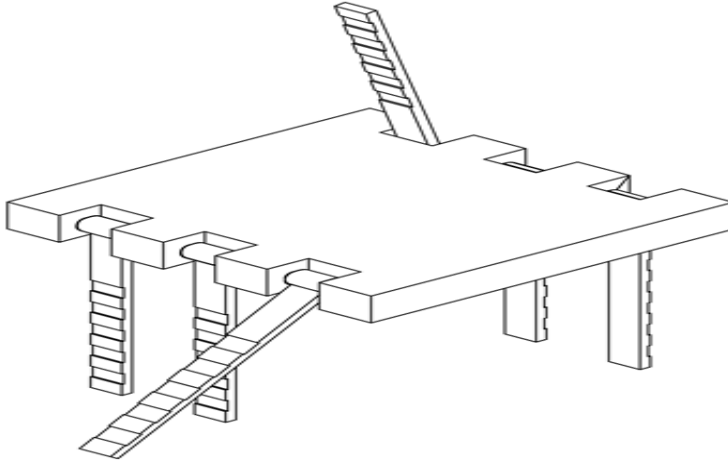


Figure 1. The biomonitoring station with rotationally movable mounting bars.

Source: own materials.



Figure 2. Mounting method of bioindicating plates with mussels on station mounting bars.

Source: own materials.

During the project the following technological domains have been developed and implemented:

- multidimensional spaces of measurement data and the characteristics of their areas,
- designating similar and self-similar areas in a multidimensional space,
- visualization of the results of advanced data analysis,
- classification machine learning,
- probabilistic classification,
- regression models and SVM in the construction of classifiers,
- optimal classifiers and techniques of results representation.

5. Test results

The new technology developed as a result of the project allows for early warning against contamination of water reservoirs with substances that are harmful and toxic to both humans and animals, e.g. farms. It can also be used in public health systems, systems of counteracting terrorist attacks, as well as in military systems protecting bases against chemical and biological attacks. The diagrams below show examples of bioindicators' reactions (patterns detected) in a monitoring station to contamination of utility waters with the chemical compound $C_3H_8NO_5P$ known as glyphosate. It is an organic chemical compound from the phosphonate group and it is often used as an active ingredient in non-selective herbicides utilized in agriculture. In 2017, the European Chemicals Agency sustained reports that glyphosate causes serious eye damage and is dangerous to aquatic organisms [10]. On the other hand, the International Agency for Research on Cancer (MABR) has classified glyphosate as a possibly carcinogenic substance to humans (group 2A) due to limited evidence increasing the risk of non-Hodgkin's lymphoma [11].

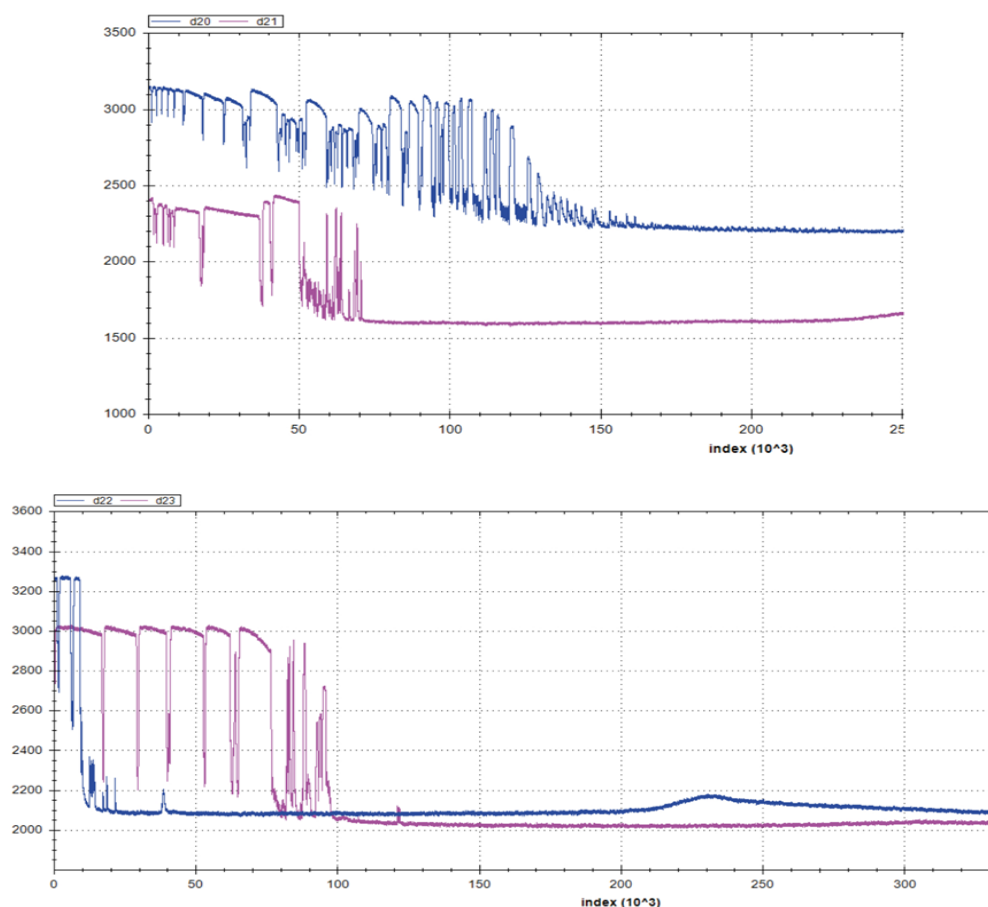


Figure 3. Recorded movements of the mussel shells in response to a toxin. There can be noticed a repetitive pattern of movements of each individual.

Source: own materials.

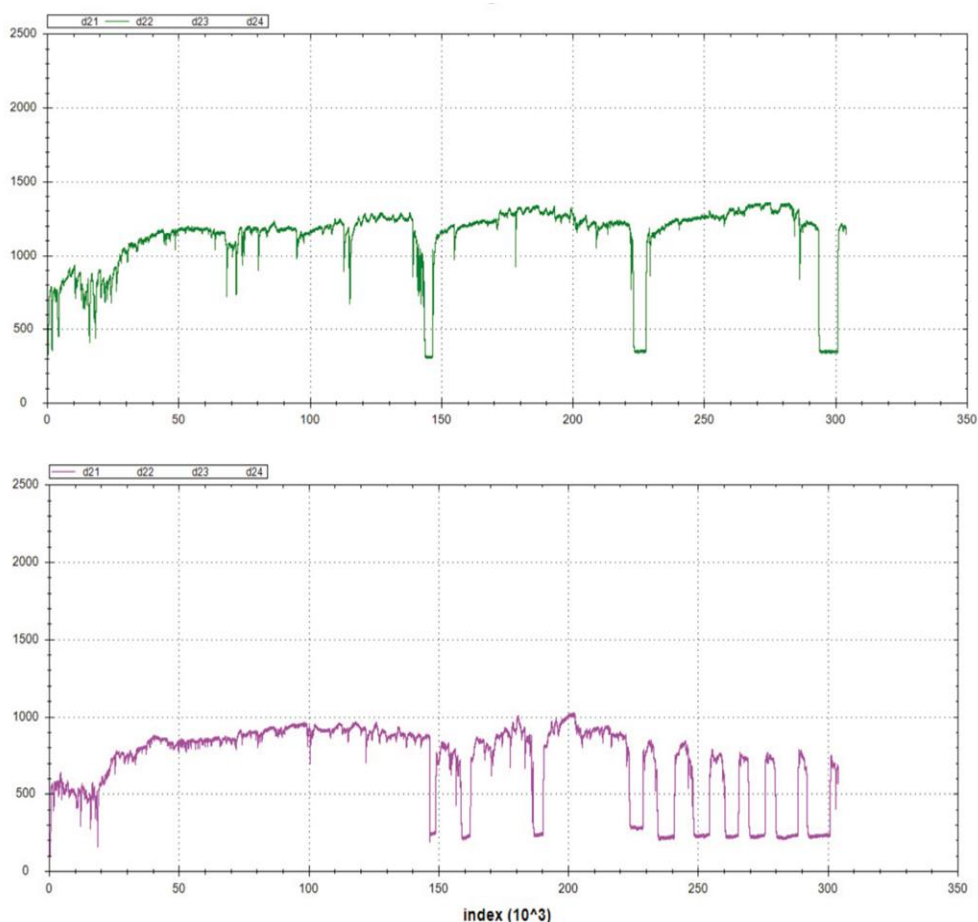


Figure 4. Recorded movements of mussel shells in the control group. A significant difference in the movements of shells compared to the previous, toxin treated group can be seen.

Source: own materials.

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Technology of multidimensional contextual analysis using the Internet of Things, data with a large volume of Big Data as well as cloud and mobile solutions

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Abstract

The presented project was implemented based on the following research areas: extraction of data of analytical significance from data sets registered by means of two-way BLE radio communication, a digital user profile built dynamically on the basis of data analysis from many sources, management and processing of big data in cloud resources, advanced analysis of profile data using classification, statistical and machine learning methods. As a result of the research and development work carried out, the technology of multidimensional contextual analysis using the Internet of Things, data with a large volume of Big Data as well as cloud and mobile solutions was created and implemented. This technology will allow in the near future to provide the market with new components and services related to the exchange of digital profiles of moving terminals, allowing for calculations and predictions helpful in the analysis of tourist data, matching offers for travelers and many other services, mainly from the SME sector. The use of systems using the BLE standard allows for the location of terminals in places normally inaccessible for classic GPS positioning, such as shop halls, shopping malls, public facilities, large hotels, historic churches, undergrounds, tunnels, etc. Moreover, it allows for significant energy savings and extending the operation of the device from the battery. The author's team applied approaches based on programmable FPGA gate systems, thanks to which it will be possible to optimize the functionality of future products in terms of market needs and significantly reduce their production costs.

Keywords: *Internet of Things, Big Data, mobile solutions, FPGA.*

1. Introduction

The implemented project concerned the development of a new technology of multidimensional contextual analysis using the Internet of Things, data with a large volume of Big Data as well as cloud and mobile solutions. Currently, many mobile devices communicate by exchanging information on various data transmission channels. An example may be the transfer of data to and from mobile devices via the cloud, i.e. distributed internet resources made available via GSM bands. Nevertheless, nowadays, the use of permanently switched on GPS positioning modules in terminals as well as radio data transmission causes the battery to quickly deplete, and thus to a reduced practical utility of these solutions. Therefore, a large number of users disable or block the positioning and data transmission by terminals when they absolutely do not need them. The exception to this rule is the Bluetooth Low Energy (BLE) transmission, which is characterized by a very low power consumption from version 4.0, a relatively long range (up to 100m in the field without obstacles), and a reasonable transmission speed of 1Mbps. Moreover, unlike GPS positioning, BLE technology does not require precise tracking of transmitters (in the case of GPS, these are satellites in orbit around the earth). The terminal can be in a pocket or bag, and if the materials are not HF attenuating (i.e. not manufactured exactly to attenuate them), the terminal will operate without problems. This effect is used today in the so-called BLE beacons, which position the user in objects where the GPS signal is not spread. An example may be shop halls, shopping malls, public utility facilities, large hotels, historic churches, undergrounds, tunnels, etc. Beacons are designed to allow the terminal (or more precisely, a mobile application) to determine the position, and secondly to give it a small portion of information such as the ID of the beacon and a few - a dozen bytes to be used for additional marking of the place, e.g. determining whether it is a commercial, utility or historic place. Nevertheless, it turned out that these types of devices do not meet the many needs of users using mobile applications in tourism or while shopping. One-way communication does not allow for the full interaction of beacons and terminals that is currently expected.

The very limited data exchange makes it impossible, for example, to leave characteristic information about the user who was in the range of a given beacon at a certain moment. Hence, manufacturers of BLE devices are currently introducing the so-called smart beacons that can use two-way communication. This allows, for example, user authorization and access to limited or paid services, making micropayments or full use of promotional programs. The pace of the appearance of new BLE devices and mobile applications, as well as the popularity of smartphone or tablet terminals (and soon also smartwatches, smartbands and other devices from the Internet of Things category incorporated into e.g. clothes - wearable) causes a significantly combinatorial explosion of information circulating in highly dispersed networks. This causes two major problems. Firstly, it is difficult to control the standardization of data exchange processes, especially since there are many manufacturers of BLE solutions and terminals in the world. Secondly, there is a big problem with the analysis of such unstructured data belonging to the category of big data, i.e. large-volume data. For example, if the device records one terminal every

1 second for 10 hours, and the data exchange package is only 10kB, after a month we will get a data set of 10.8GB. A small network of 1000 BLE devices will already give 10.8TB, which already exceeds the analytical capabilities of many systems, including advanced commercial systems. Hence, the author noticed a dynamically growing need to provide the market with an appropriate environment that would implement advanced analytical processes based on large data sets. In order to save transmission and to optimize the amount of data transferred in relation to the capacity used, the author's team developed a methodology for automatically building and updating the electronic user profile (in bit form). The innovation of the profile is that it allows you to send the so-called BLE (intelligent beacon) to the BLE device. digital imprint, i.e. only parts of data that are contextually related to a given beacon (e.g. due to its location, role). Thanks to the author's solutions, it will be possible to massively analyze the traffic of users using mobile terminals, which will be used in many areas of life now and in the future, such as tourism, shopping, local information, promotional campaigns, short messages, monitoring of basic life parameters, etc.

The solution's operation can be compared to a basket analysis, sometimes called a receipt analysis. This approach is practically used in all stores with a sufficiently wide range of products. Each customer, when approaching the checkout and paying for the purchased goods, automatically transfers the data on what was in his basket, i.e. what products were purchased together. Thanks to the basket analysis, it is possible to answer many different, significant questions, such as: what products are bought together most often?, what is the distribution of the intensity of purchase of a given product on a daily, weekly, monthly, annual, seasonal basis?, is there a correlation between individual products?, does the sale of the products correlate with a specific time?, are there any autocorrelations in sales?, what is the statistical character of the distribution of sales of a given product over time? and many more. A practically correctly conducted basket analysis allows for such selection of the assortment and its distribution in a given store so that the value of sales is subject to specific parameterization, e.g. profit optimization, minimization of storage time, optimization of the supply chain, etc. Research of additional data, e.g. anonymous customer profiles, strengthens the effectiveness basket analysis. The area of this type of research in relation to medium and large-format stores is very developed and improved for many years. On the other hand, the author noted that this type of research is not carried out, or is carried out only in a very limited form, in relation to broadly understood tourism. The main limitation here is the lack of relevant data left by tourists who are usually not interested in appearing in the research. Moreover, the scope and type of data, especially unstructured data, is downright overwhelming and rarely any mechanism of their collection and processing can handle it. Appropriate marriages between distributed devices (agents) are required, e.g. in the form of the Internet of Things and mobile terminals, as well as efficient processing of large-volume (big data) sets in the cloud, preferably in learning networks [1].

Both of these factors effectively limit the ability to analyze the traffic of tens of millions of people. There were about 6.2 million Polish tourists traveling around the country in the first half of 2019 [2]. There were almost 10 million foreign tourists

during this period [2]. This means over 90 thousand active authors of various analytical events daily. If each of them undertakes dozens of different activities daily related to stay and travel, as well as between them and the environment and interactions between them, a complex network of huge amounts of data is created, with almost no analytical structure, which cannot be analyzed without specific, advanced tools and methodology. On the other hand, the value of this type of data and analyzes is significantly high, as their use is of interest to many economic entities providing tourist and tourist services, as well as sellers of various types of goods (the tourist population is almost equal to the population of the entire country). Thanks to the results of the analyzes, they can better select their offers to meet the dynamically changing needs of travelers. Additionally, thanks to the Globedata system based on FPGA [3] [4] [5], they will be able to more precisely reach specific target groups with their offer. All this will translate not only into better service of tourist traffic in Poland and abroad, but will also result in optimization of related profits, generated by local economic entities, especially from the SME sector. Hence, the author noticed significant needs in the so far undeveloped analytical niche, and thus intends in the near future, as a result of the implementation of the project, to introduce advanced and innovative tools to the market to support it.

2. Research area

As part of the project, research and development work was carried out in the following research areas:

- Extraction of data of analytical significance from data sets registered by means of two-way BLE radio communication.
- A digital user profile built dynamically on the basis of data analysis from many sources.
- Management and processing of big data in cloud resources.
- Advanced analysis of profile data using classification, statistical and machine learning methods.

The research areas presented above were related to the implementation of the following technological issues:

- A methodology for collecting and basic processing of big data.
- Methodology of data processing by distributed mechanisms.
- Methodology of data extraction of analytical significance.
- Methodology of building bit markers used to carry profile data.
- A methodology for encoding the information carried through the digital user profile.
- A methodology for dynamically changing the digital user profile as a result of informational feedback loops.
- A methodology for distributing part or all of the fingerprints of user profiles on an IoT device network.
- Methodology for extracting contextual data from distributed digital fingerprints of user profiles.

- Methodology for processing analytical data from large volume in cloud resources along with the management of unstructured databases.
- A methodology for describing unstructured data with automatically generated metadata.
- Methodology for analyzing contextual data using statistical and predictive methods.
- Methodology of contextual data analysis using classification methods and machine learning.

3. Communication solutions

In the communication processes of terminals with BLE beacons, standardization was applied based on principles similar to modified protocols used especially in the field of the Internet of Things. The protocol used is distinguished by its lightness and simplicity, thanks to which it can be successfully used on small microcontrollers, with limited hardware resources, and also when we are dealing with low link bandwidth, which perfectly fits the IoT concept. Therefore, it is not surprising that the developed solution will also be used for connecting devices to clouds (eg Amazon Web Services or Microsoft Azure). Its implementation can be carried out on many platforms, such as Arduino, ESP8266 or Raspberry Pi, as well as on more and more popular specialized FPGA (Field Programmable Gate Arrays) systems. Systems of this type have been used by the author's team in the project, as well as in their own research equipment.

The data exchange protocol, like the ubiquitous HTTP standard, is at the top of the TCP/IP stack in the application layer, but the specificity of their operation is completely different. The data exchange protocol is based on the publish / subscribe model, which enables asynchronous communication between publishers and subscribers. A protocol client is any device connected to the network (e.g. FPGAs, microcontroller, computer, terminal) that has implemented the TCP/IP stack and data exchange protocol, i.e. any device that can communicate with it. Each individual protocol client can simultaneously act as subscriber and publisher.

Clients, publisher and subscriber, do not communicate directly with each other. Moreover, one client can forward a message to another client without knowing its IP address and its existence. This is possible because there is always an intermediate element between clients in the publish / subscribe model, the so-called message broker. It receives messages from publishing clients and then distributes them to the appropriate subscribing clients.

3.1. Publishing data

The question is, how does the broker know which subscribers to send a given message to? Well, the publisher, when sending a message, adds additional information to it, a text called topic, and the broker sends the message to those customers who subscribe to this topic. This process is shown in the diagram below:

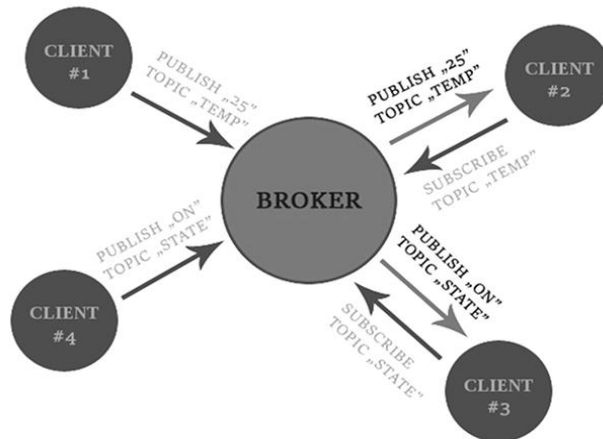


Figure 1. Functional diagram of data publication and subscription processes in networks exchanging data related to digital fingerprints.

Source: own materials.

Thanks to this mechanism, one node of the network can transmit information to many clients at a very low cost. It is enough for him to send a message to the broker and he will pass the information on to the other moving or stationary vertices of ad-hoc established network. It is thanks to this that the client can be implemented on small microcontrollers or cheap and simple FPGAs. Of course, in this case, the broker needs much more resources. After all, there may be many clients connected to it, it has to filter and send many messages, deal with client authentication and authorization, as well as message storage. Therefore, it is usually installed on more efficient platforms. Nevertheless, here too, specialized gate arrays come in handy, which can be strongly optimized for the tasks performed. This also lowers the manufacturing costs.

3.2.Client

The developed client libraries can be implemented in many languages, eg C#, C++, Python, Scala and many others. They can also be precompiled for platforms like Arduino, ESP8266, or FPGA. Libraries were created according to the POSIX standard. This applies, inter alia, to handle the TCP/IP stack (eg POSIX Sockets) as well as multithreading (POSIX Threads).

The client can work in two modes: synchronous and asynchronous. In synchronous mode, when executing one task, you must wait for it to complete before proceeding to the next task. The program works in a blocking manner, which very often introduces unnecessary delays. In the case of asynchronous mode, you can move to the next task without waiting for the previous one to finish. A client working in synchronous mode runs on one thread. When we send a message and want to be sure that the message has been delivered successfully, it is necessary to call the blocking function. When receiving a message, it is necessary to periodically call a function that blocks the program until a message arrives or the specified time has

elapsed. A client working in asynchronous mode runs on multiple threads. Handshaking and connection hold are performed in the background, so you don't have to worry about it. The feedback function mechanism, the so-called callbacks. In this case, it is enough to define the necessary functions, register them, and then they will be automatically, asynchronously called when an event occurs, e.g. when a sent message is delivered.

4. Project results

The project implemented a new technology in both the test cloud resources and the test data collecting devices. Mobile terminals were also used as active data carriers, exchanging digital profiles in networks created in ad-hoc mode. The following briefly presents examples of the main components of a behavioral skeletal function implemented on the FPGAs of a broker implementing a device using the technology for collecting and transferring digital fingerprints and preprocessing using simplified deep learning mechanisms. The code has been optimized for the VHDL standard.

```
begin
mx: mux port map (a=>mux_in, s=>cycle, y=>mux_out);
Ai_mux: mux port map (a(0)=>tbl(A, idx(0)),
                    a(1)=>tbl(A, idx(1)),
                    a(2)=>tbl(A, idx(2)), s=>cycle, y=>Ai);
Bi_mux: mux port map (a(0)=>tbl(B, idx(0)),
                    a(1)=>tbl(B, idx(1)),
                    a(2)=>tbl(B, idx(2)), s=>cycle, y=>Bi);
Ci_mux: mux port map (a(0)=>tbl(C, idx(0)),
                    a(1)=>tbl(C, idx(1)),
                    a(2)=>tbl(C, idx(2)), s=>cycle, y=>Ci);
Di_mux: mux port map (a(0)=>tbl(D, idx(0)),
                    a(1)=>tbl(D, idx(1)),
                    a(2)=>tbl(D, idx(2)), s=>cycle, y=>Di);
mul1: FPP_MULT port map(Ai, p, fpu_clk, start, start, done(1), open,
fequ_p(1));
mul2: FPP_MULT port map(Bi, mux_out, fpu_clk, start, start, done(2), open,
fequ_p(2));
mul3: FPP_MULT port map(mux_out, mux_out, fpu_clk, start, start, done(3),
open, fequ_p(3));
mul4: FPP_MULT port map(Ci, fequ_p(3), fpu_clk, start, done(3), done(4),
open, fequ_p(4));
mul5: FPP_MULT port map(Di, PU2pPV2, fpu_clk, start, start, done(5), open,
fequ_p(5));
done(6) <= done(1) and done(2);
sum1: FPP_ADD_SUB port map(fequ_p(1), fequ_p(2), fpu_clk, start, done(6),
done(7), fequ_p(6));
done(8) <= done(4) and done(5);
```

```

    sum2: FPP_ADD_SUB port map(fequ_p(4), fequ_p(5), fpu_clk, start, done(8),
done(9), fequ_p(7));
    div_mux <= div_opa when (do_div_opa_by_p = '1' and mux_s_buff = '0') else
fequ_p(7);
    div1: FPP_DIVIDE port map(div_mux, p, fpu_clk, start, done(9), done(10),
open, fequ_p(8));
    done(11) <= done(7) and done(10);
    sum3: FPP_ADD_SUB port map(fequ_p(6), fequ_p(8), fpu_clk, start, done(11),
done(12), fequ_p(9));
    opa_div: if do_div_opa_by_p = '1' generate
    div_done <= done(10);
    p_cmp: fcmp port map(opa=>p, opb=>float_0, altb=>open, blta=>pLT0,
unordered=>open, aeqb=>open, inf=>open, zero=>open);
    end generate opa_div;
    pipe_done <= '1' when do_div_opa_by_p = '0' else div_done;
    pipe_result <= div_opa when do_div_opa_by_p = '0' else div_result when
(div_done = '1' and pLT0 = '0') else float_0;
    mux_s_buff <= '0' when state = RESET_WAIT else '1' when state = WAIT4DONE
else mux_s_buff;
    f_eq_buff <= float_0 when state = RESET_WAIT else f_eq_buff when state /=
VALID_ON else pipe_result when mux_s_buff = '0' else alu_result;
    process(rst, alu_done, cycle)
    begin
        if rst = '1' then
            if rising_edge(alu_done) then
                case cycle is
                    when "00" =>
                        cycle <= "01";
                    when "01" =>
                        cycle <= "10";
                    when "10" =>
                        cycle <= "00";
                    when others => NULL;
                end case;
            end if;
        else
            cycle <= (others=>'0');
        end if;
    end process;
    SYNC_PROC: process(clk, rst, out_valid_buff)
    begin
        if rising_edge(clk) then
            if rst = '1' then
                state <= next_state;
                f_eq <= f_eq_buff;
            end if;
        end if;
    end process;

```

```

        output_valid <= out_valid_buff;
    else
        state <= RESET_WAIT;
        f_eq <= (others=>'0');
        output_valid <= '0';
    end if;
end if;
end process;
NEXT_STATE_DECODE: process(state, alu_done, enable, pipe_done)
begin
    next_state <= state;
    case state is
        when VALID_ON =>
            if alu_done = '0' then
                next_state <= VALID_OFF;
            end if;
        when VALID_OFF =>
            next_state <= WAIT4DONE;
        when WAIT4DONE =>
            if (alu_done = '1' and enable = '1') then
                next_state <= VALID_ON;
            end if;
        when others =>
            if (pipe_done = '1' and enable = '1') then
                next_state <= VALID_ON;
            end if;
    end case;
end process;
OUTPUT_DECODE: process(state, mux_s_buff, rst)
begin
    case state is
        when VALID_OFF =>
            start <= '1';
            out_valid_buff <= '1';
        when VALID_ON =>
            if mux_s_buff = '0' then
                start <= '1';
            else
                start <= '0';
            end if;
            out_valid_buff <= '0';
        when WAIT4DONE =>
            start <= '1';
            out_valid_buff <= '1';
        when others =>

```

```

if rst = '0' then
    start <= '0';
else
    start <= '1';
end if;
out_valid_buff <= '0';
end case;
end process;
end Behavioral;

```

As a result of the project, the concept of a device for generating promotional codes in terrain games (aka city games) supported by mobile applications for smartphones was also developed. It is a device for generating a promotional code based on the amount of money spent by the smartphone user in the place of use of the device, e.g. bar, restaurant, cafe. When the user of the promotional application makes the payment at the point of use of the device, the seller uses the numeric keypad to enter the value of the paid amount, which appears on the display above the keyboard. The device can also be directly connected to the cash register system. The processor of the device converts the entered amount into a promotional code, which is displayed on the display on the opposite side of the case. The application user reads the code and brings his smartphone closer to the NFC reader with the application running to start the procedure of entering the promotional code. The smartphone user can also use only NFC transmission since deployment of additional display is related to the compatibility with older phones not supporting NFC technology. The promo code allows you to earn loyalty points in terrain games supported by mobile applications. The promotional code is only valid for the specified time required to enter it. Only the application launched by touching the NFC reader allows the code to be entered, thus avoiding its use by a third party.

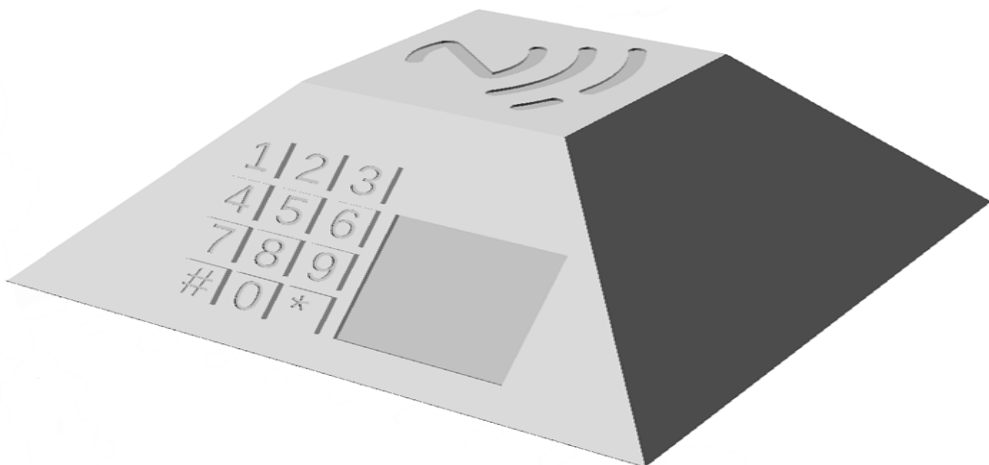


Figure 2. An exemplary implementation of a device for generating promotional codes in field games supported by mobile applications for smartphones.

Source: own materials.

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Technology of auscultatory data analysis obtained in a non-invasive home examination of the fetal heart rate in the prevention of prenatal diseases and defects

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Abstract

According to estimates, there are approximately 2.6 million miscarriages worldwide each year, 1.3 million of which can be effectively prevented. This was confirmed by The Lancet, publishing data on nearly 3 million miscarriages worldwide each year. The key fact is that 98% of miscarriages occur in low- and middle-income countries where professional fetal health care is not as good as in high-income countries, is difficult to access, or even absent. In high-income countries, the number of miscarriages is also relatively high, amounting to approximately 60,000 cases per year. Importantly, most cases related to miscarriages and other complications during pregnancy and childbirth could have been avoided if the staff operating such complex devices as professional CTGs were better trained. Nevertheless, as recent studies show, there is no evidence that the complex and advanced, and therefore difficult and expensive to apply CTG methodology gives better results than the non-invasive auscultation method in the case of cerebral palsy or stillbirths or the overall assessment of the health of the fetus in women who are at low risk of prenatal disease and complications. However, as shown by scientific research, the CTG method caused an increase in unnecessary cesarean sections and instrumental vaginal deliveries. The Goldcitadel team has developed a technology for the analysis of auscultatory data obtained in a non-invasive home examination of the fetal heart rate in the prevention of prenatal diseases and defects, which will enable the introduction of inexpensive devices and cloud

services allowing for early warning of potential abnormalities in the heart development in the prenatal period. Currently, there are no similar technologies or related products or services in the world.

Keywords: *Fetal heart auscultation, prenatal diseases, prenatal defects, non-invasive home examination.*

1. Introduction

The main goal of the project was to enable future parents to perform a regular examination at home to monitor the fetal heartbeat using a non-invasive auscultation method and provide early warning of any detected significant irregularities. The developed new technology will be used to market new products and related services. Conducting the study will require only a commonly available mobile device such as a mobile phone or tablet or a personal computer (desktop or laptop) and an electronic acoustic earpiece-like device, holding working name "Sonicor". The main advantage of the study is the fact that it does not require a doctor's visit or going to a medical center, which is very important during advanced pregnancy, especially in areas far away from health facilities. The signal recorded during the study will be analyzed in two stages: preliminary using software installed on a mobile device or personal computer, and accurate, in the cloud resources of the system, with significant computing power (scalable cloud computing Big Data and HPC - High Performance Computing).

Monitoring testing with a new product system and related services can be compared to measuring blood pressure in a home environment with a commercially available blood pressure monitor. Its task is not to replace professional ECG or CTG equipment available in medical facilities, just like a home blood pressure monitor does not replace a Holter apparatus or equipment for examining the echo of the heart. Nevertheless, today a personal blood pressure monitor is considered a diagnostic device that is indispensable in every home. They allow millions of lives to be saved. Worldwide, 5 million people die of stroke each year, and the other 5 million become permanent disabilities [1]. High blood pressure causes strokes in 12.7 million people each year. According to estimates, there are approximately 2.6 million miscarriages worldwide each year, 1.3 million of which can be effectively prevented [2]. This was confirmed by The Lancet publishing data on nearly 3 million miscarriages worldwide each year [3]. The key fact is that 98% of miscarriages occur in low- and middle-income countries where professional fetal health care is not as good as in high-income countries, is difficult to access, or even absent. In high-income countries, the number of miscarriages is also relatively high, amounting to approximately 60,000 cases per year [3].

Importantly, most cases related to miscarriages and other complications during pregnancy and childbirth could have been avoided if the staff operating such complex devices as professional CTGs were better trained. Nevertheless, as recent studies show, there is no evidence that the complex and advanced, and therefore difficult and expensive to apply CTG methodology gives better results than the non-

invasive auscultation method in the case of cerebral palsy or stillbirths or the overall assessment of the health of the fetus in women who are at low risk of prenatal disease and complications. However, as shown by scientific research, the CTG method caused an increase in unnecessary cesarean sections and instrumental vaginal deliveries. On the plus side of CTG, however, it must be noted that it contributes positively to the reduction of convulsions in newborns, which can rarely be detected using only a regular auscultation method [4] [5]. However, the Goldcitadel team noted that when using regular auscultation of the fetal heart rate, the human is not the best subject to analyze acoustic signals. While an expert can generally say that there are accelerations and decelerations in the rhythm of the working heart, she or he is not able to precisely define the intervals between them, as well as their signal fills. It is also difficult for the expert to compare the intensities of both phenomena, and finding a correlation "by ear" is practically impossible. Microelectronics and modern data processing systems, as well as solutions such as the Internet of Things, mobile applications and cloud resources with high computing potential come to the rescue. The target analytical system working in cloud resources will allow for in-depth and advanced signal analysis related to the modes of the fetal heart and thus to detect early signs of potential threats of affections and diseases. The use of the planned products and services will contribute to reducing infant mortality and improving their health through faster preventive actions. For example, a fetal or a newborn's heart surgery is definitely less risky than in a healthy adult person due to the newly developing organs.

2. The project

The aim of the project was to generate new knowledge in the form of auscultatory data analysis technology in non-invasive home examination of the fetal heart rhythm in the prevention of prenatal diseases and defects as a result of the implementation of the planned research agenda. Research and development works were carried out in the following functional areas:

- Data recording with automatic sensor position correction as a result of feedback.
- Basic data analysis using a mobile device and results representation method.
- Advanced data analysis using cloud resources and the representation of results along with their sharing.
- Reasoning as a result of advanced signal analysis and creating dynamic models of the fetal heart rate.
- As part of the above-mentioned areas, research and development work was carried out on the following issues:
- Methodology of initial sampling and evaluation of the quality of the recorded signal
- Feedback loop generation methodology based on acoustic data
- Acoustic data recording correction methodology

- A methodology for pre-processing data with reduced resolution in a mobile device, taking into account the limitations of the mobile processor and the system environment
- Methodology for analyzing the characteristics of the recorded acoustic signal and for marking markers
- Methodology for analyzing the correlation of individual markers, detecting potential threats and representing the results
- Methodology of processing high-resolution and big data in cloud resources
- Methodology of advanced data analysis with ad-hoc pattern setting and statistical dependence detection methods
- Methodology of detecting irregularities and potential threats based on advanced statistical signal analysis methods
- Methodology of advanced signal analysis based on teaching classifiers, including methods of artificial neural networks
- Advanced signal analysis methodology based on genetic algorithms and machine learning
- Methodology of automatic inference about potential threats based on advanced signal analysis and non-algorithmic methods

The new technology will allow the Goldcitadel team to introduce new products and services to the market in the form of a set: acoustic sensor, mobile application, advanced signal analysis system in cloud resources. The necessity to achieve the goal resulted mainly from the possibility of providing the market with an innovative technology, which may significantly reduce the birth rate and early detection of heart defects, which enables the operation to be performed at a safe fetal age or immediately after birth. Importantly, there have been mobile devices for acoustic CTG testing on the market for a long time, an example of which was the Hungarian device called Fetaphon (currently unavailable), which has been developed for over 20 years. In Poland, a few years ago, the Fetaphon device was introduced to the e-medical program by Comarch. The device used acoustic sensors, but was not based on strictly auscultatory methods. All interpretation of the data was left to the attending physician. In addition, this type of device is characterized by a high price of USD 3,500. Importantly, it was the only long-range device on the market that used purely acoustic methods, i.e. without the use of ultrasounds and the Doppler effect.

As part of the project, the Goldcitadel team implemented a completely different technology than that implemented in the Fetaphon device. The main element of this technology is the low price of the device (around EUR 100-150), the use of common mobile terminals such as tablets or smartphones for basic signal analysis and visualization of results, and the use of cloud resources for advanced, in-depth analysis of registered signals using machine learning, patterns, statistical and non-statistical analysis, automatic inference, functionality of expert systems, correlation and autocorrelation analysis, as well as methods used to study complex dynamical systems. It should also be emphasized that home examination based on a regular auscultation method is not an alternative to cardiotocography, but a complementary method that can perfectly complement the image of the normal

course of pregnancy, especially as it does not require a stay in a medical facility and can be performed in comfortable conditions as often as only the expectant mother finds it tiring. Each test can then be made available to the attending physician or trained obstetricians for graphical analysis based on the mechanisms included in the service (examples may be heart rate variability, filling accelerations and delays in rhythm, states of temporary stops, significant irregularities, autocorrelations), and typical auscultatory analysis (the signal can be reproduced without and with the use of selective filters enhancing specific frequencies). In the near future, the Goldcitadel team intends to expand the group of patients to include newborns and developing children, who are still at risk of developing myocardial diseases and revealing previously hidden defects. The next step will be a group of elderly people with cardiovascular diseases, which significantly increases the capacity of the target market.

3. Research apparatus

During the project implementation, the own research equipment in the form of a test chamber was used. A chamber for testing the propagation of low-frequency sound signals in liquids simulating amniotic waters, is a device with the shape of a double-ended cylinder for filling with a liquid with a chemical composition similar to the amniotic waters, used to study the distortions of sound waves that pass through the liquid contained in the chamber. The sound waves are generated by a separate source applied to one end of the chamber cylinder. Both ends of the chamber are closed by lids, which have holes, and in them are mounted silicone membranes held by tight stainless steel flanges. The user of the chamber, after filling it with liquid, puts the source of sound waves to the bottom lid of the chamber, and puts the sound receiver to the upper one, e.g. the tested Sonikor device. The chamber allows to study the phenomena of distortion of sound waves originating from sources simulating sound sources in the womb and to test the receivers of these sound waves or their parameters. After recording the distorted waves, the user can compare the source waveforms that are applied to the source of the sound waves and the waveforms recorded by the sound sensor. This allows for the study of the phenomena of distortion of low-register sound waveforms with a different frequency spectrum and amplitude by the liquid simulating amniotic waters and the membrane simulating human skin, as well as for testing the sensitivity and fidelity of reproduction of distorted sound waves by various sound sensors. The tests then enable the selection of optimal recording parameters, optimization of the geometry of the acoustic mirror system, optimization of the structure of the sound sensor and the use of algorithms correcting the effects of distortions in the recorded sound waves.

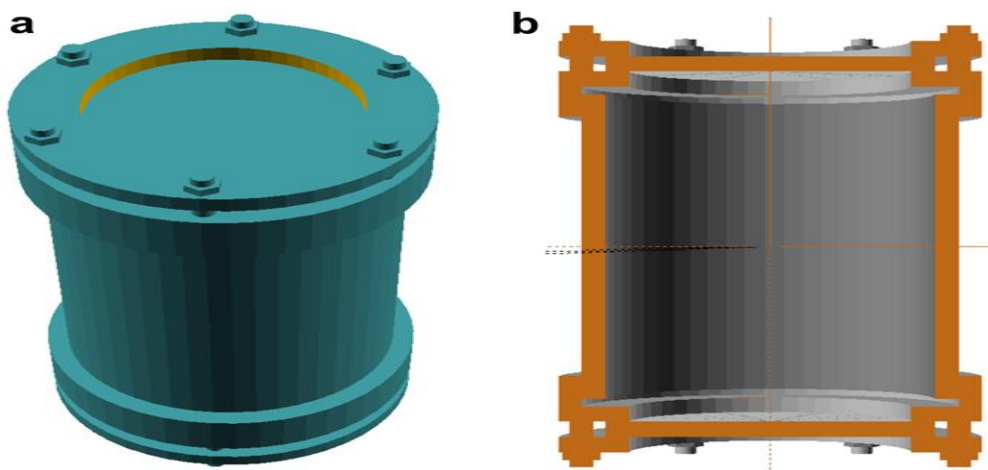


Figure 1. (a) main view of the test chamber; (b) the cross section through the test chamber

Source: own materials

4. Results

4.1. Measurement quality comparison

Knowledge in the field of ASF (Adaptive Signal Filtering) algorithmics and RDA (Reconstructed Dynamics Analysis) methodology as well as the results obtained in the course of industrial research and experimental development works carried out during the project allowed, apart from the technology itself for the development of the Sonikor earpiece prototype, used to auscultate pregnant women with high efficiency and low production costs. ASF-class numerical algorithms are based on the latest achievements of signal analysis, applicable in practically all natural and technical fields of science and engineering. In recent times, more and more attention has been paid to adaptive algorithms using various algorithmic techniques, including linear and non-linear, discrete and averaged approaches, artificial neural networks, wavelength and chirplet transforms, and fuzzy logic as well as fuzzy sets. The mentioned methodologies allow for precise determination of the noise factor in the signal and high quality of the signal after filtering. Their significant advantage is the ability to reduce or completely remove artifacts that may appear as a result of noise reduction of the recorded signal (e.g. relative amplitude inaccuracies, false frequencies). On the other hand, the RDA methodology is based on a modern approach to physical dynamical systems, when the measurement results are known only for a very few dynamic variables characterizing the system (e.g. only one component of momentum). Such a phenomenon occurs, among others in the case of recording the human heart rate, where only a time series of acoustic peaks corresponding to successive contractions of the heart muscle is obtained. The RDA methodology allows the dynamic characteristics of the system to be reconstructed

from sparse data, such as the acoustic signal of the heart rhythm. An important requirement that allows for an effective RDA analysis is the measurement time, which lasts for a sufficiently large number of beat cycles (hence this method is particularly suitable for periodic and quasi-periodic systems with possible irregular and chaotic areas). The analysis of the signal filtered by ASF algorithms in order to detect significant irregularities requires the use of innovative methods that are the achievements of modern science, especially the physics of chaotic dynamical systems. Such methods undoubtedly include the RDA approach based on the methodology of reconstructed dynamics (the so-called reconstructed phase space). RDA allows to detect hidden signal dependencies, whether regular, quasi-regular or irregular (including chaotic). Since the heart of the fetus changes its working characteristics as it grows, it is associated with frequent changes in its rhythm. Areas of irregular rhythms, especially chaotic, of significant statistical significance, which are very difficult to detect in the source signal, even by a person with long medical practice, can be dangerous to health. Thanks to the use of RDAs in new products and services, it will be possible to automatically detect irregularities that may herald potential threats, and then report them to the attending physician or medical guardian for a correct diagnosis.

The effectiveness of the created prototype was compared on the basis of the results of measurements made with a professional 3M electronic stethoscope - Littmann Model 3200. The current price of this stethoscope is approx. 400 USD. Fig.2 and Fig.3 show graphs of both measurements to compare their accuracy. As shown by the waveform analysis, the signal-to-noise ratio is nearly 2.5 times better in the case of the Sonicor device. This is shown in the graph by a better ratio of the signal peaks to the background, i.e. the signal outside the peaks. Moreover, the electronic stethoscope uses a low-pass filter to remove excessively high frequencies that add to noise. In the case of the Sonicor device, this practice was not used in the comparison, as it is not known what cut-off frequency was used in the electronic stethoscope. Using an appropriate low-pass filter should further improve the results for Sonicor. What is most important, however, the basic version of Sonicor (without the BLE module, with cable transmission) will cost less than 50 Euro, probably around 35 Euro (work on reducing the cost of production is still in progress), which is about 10 times less than an electronic stethoscope. Littmann Model 3200. Combining these facts, it can be briefly said that thanks to the implementation of the project in question, the recording efficiency of acoustic signals related to the heart's work in a characteristic frequency range was nearly 25 times better than that of the world leader, ie the 3M group. What's more, the handset will be equipped with a much faster processor and a higher sampling frequency than electronic stethoscopes, which will allow for more precise recording of signal acceleration or deceleration. This, in turn, will translate into more accurate detection of irregularities and chaotic areas suggesting possible diseases or defects of the developing heart.

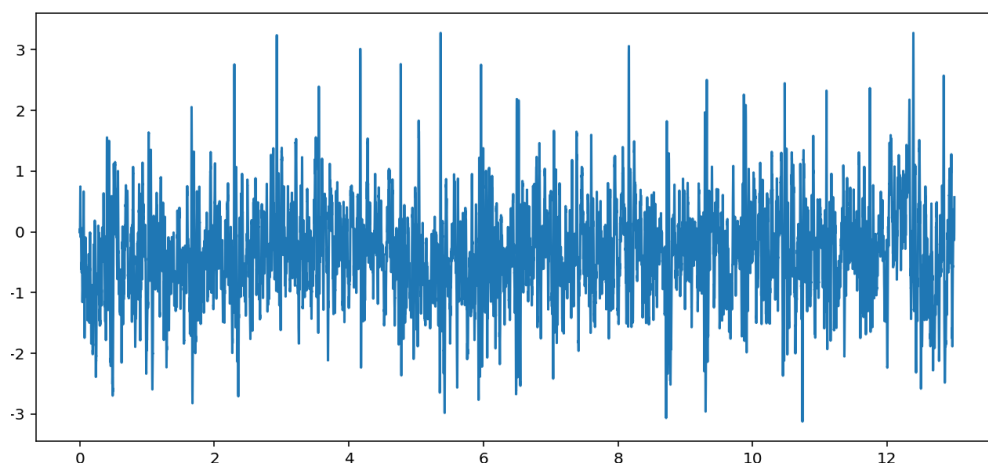


Figure 2. Fetal heart rate signal recorded using a 3M Littmann Model 3200 electronic stethoscope utilizing a low-pass filter.

Source: own materials.

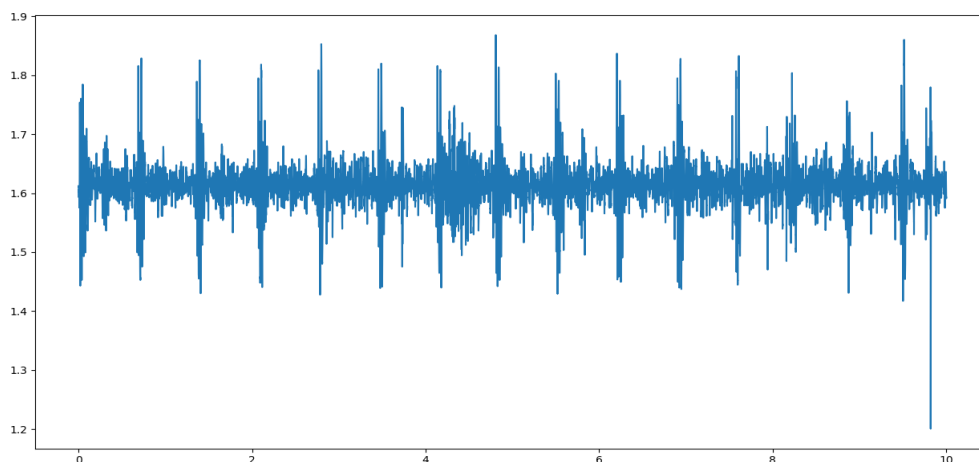


Figure 3. Signal recorded using the Sonicator handset prototype without a low-pass filter (scale based on the recorded voltage).

Source: own materials.

4.2. The acoustic sensor

Sonicator consists of two acoustic mirrors, i.e. curved surfaces with a specific stiffness, reflecting acoustic waves coming from the diaphragm as a secondary source. This source is usually human skin (the skin of the abdominal cavity of a pregnant person). The primary mirror has the form of a cavity resulting from the rotation of a curve with a specific geometry in relation to the symmetry axis of the mirror. The diagram of the device is shown in Fig. 3. This construction is designed to collect acoustic waves and direct them to the secondary mirror through the focusing area (P_B). The secondary mirror then directs the focused waves to the collecting point (P_A). At this point, an acoustic sensor is placed to record the focused sounds.

The appropriate selection of the surface geometry of both mirrors, the material from which they are made and the frequency range of the sensor and the noise factor is crucial for the effective registration of the fetal heart rate.

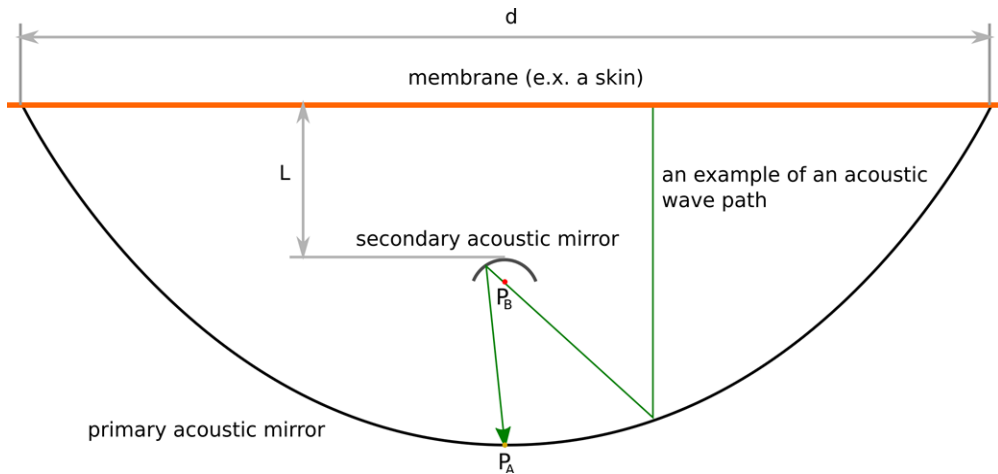


Figure 4. Functional scheme of Sonicator device implementing two acoustic mirrors set, i.e. primary and secondary acoustic mirror. L denotes effective depth of the device, d is the effective area for auscultation, P_B is focal area of secondary mirror while P_A denotes focus point where sound recording component should be placed.

Source: own materials

In the simplest case, we can assume that both acoustic mirrors have the simplest possible symmetry, i.e. the primary mirror has paraboloid symmetry and the secondary mirror spherical one. In this case, we can write the relationship:

$$\frac{1}{A} + \frac{1}{B} = \frac{2}{R} \quad (1)$$

Where:

A is a distance between P_A and vertex of the secondary mirror,

B is a distance between P_B and vertex of the secondary mirror,

R is a radius of the secondary mirror.

One can notice that the focal p of a parabolic primary mirror surface is equal to a distance between P_B and the vertex of this parabola and one can write:

$$A - B = p \Rightarrow A = B + p \quad (2)$$

And then:

$$2B^2 + 2(p - R)B - Rp = 0 \quad (3)$$

We get two roots of the above equation:

$$B = \frac{1}{2} \left(R - p + \sqrt{R^2 + p^2} \right) \quad (4a)$$

$$A = \frac{1}{2} \left(R + p + \sqrt{R^2 + p^2} \right) \quad (4b)$$

It follows from the above (4) that the geometry of the system is given by at least two parameters, e.g. the focal length of the parabola p and the mirror radius R :

$$A(R, p) = \frac{1}{2} \left(R + p + \sqrt{R^2 + p^2} \right) \quad (5)$$

These parameters unequivocally define the entire mirror system. Thus, two other parameters that are based on the above geometry can be introduced, namely:

L - an effective depth of the device (i.e. a distance between vertex of the secondary mirror and membrane) and

d - an effective area for auscultation (i.e. skin area generating derivative sounds).

One can write the following relationship:

$$L = \frac{d^2}{16p} - A(R, p) \quad (6)$$

Using (5) one can get:

$$L(R, p, d) = \frac{d^2}{16p} - \frac{1}{2} \left(R + p + \sqrt{R^2 + p^2} \right) \quad (7)$$

Thanks to the above equation, it is possible to determine any three parameters, e.g. L , p and d , and then calculate the fourth, e.g. R getting the device geometry.

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Take the risk or lose the chance – the impact of social media on the developing of businesses today

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Abstract

The study focuses on informing the readers about the dangers that can occur when using social media in their work place, educating users on data security and easing the process of transmitting information for the purpose of improving organization at work and the proper functioning. The paper relates to the concept of social media as a friendly yet somewhat dangerous environment, specifically when talking about businesses. The research was based on similar books and articles which share this view on the matter. The main method employed was case study. Ensuring users that even though using these communication methods, the transmission of information between employees is much easier and more efficient, the problems that may arise exceed or not the benefits listed above. The article highlights some useful insight into the usage of social media as an asset that any business has access to.

Keywords: social media, e-Business, security, work place, data.

1. Introduction

1.1. Technology development over time

Nowadays, technology has developed so much that it can be found in all fields of activity, from education and health to recycling and infrastructure. Although people did not seem to be giving much importance and confidence at first, technological progress made these innovations necessary. The battle to take pole position is evolving at the speed of light. Whilst traditional media is experiencing challenges in attracting future audiences, social media started with the same audience that traditional media disregarded and despite this, they failed to create relevance even with their current audience [1]. With this development, people are trying to keep up with this fast and inevitable expansion, one of the ways being to implement IT education from the primary classes. Although the rate of people with Internet access increased to 89% in the EU in 2018, most of them do not have other devices to use it, apart from mobile phones [2].

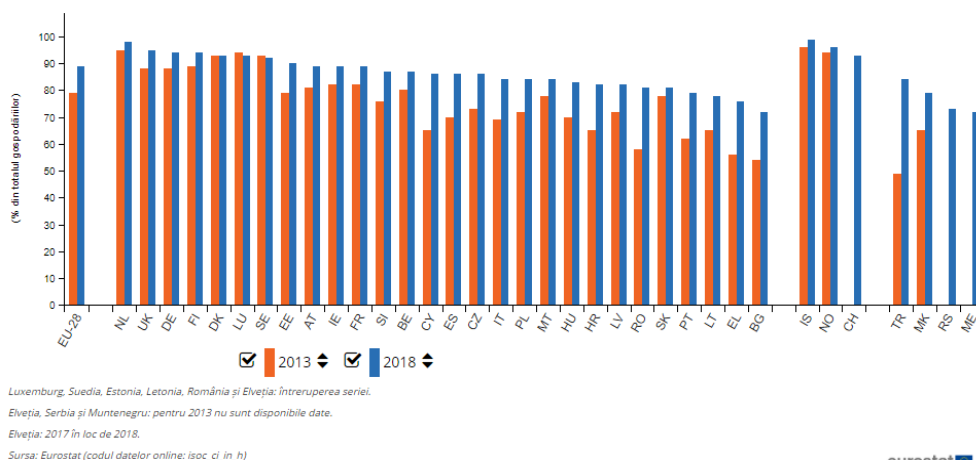


Figure 1. The access to Internet in homes, 2013 and 2018

On the other hand, there is a wide disparity between certain continents, it is looking for political regimes and the economic structure, where people's access to the Internet is restricted and often they do not have the opportunity to acquire an appropriate gadget.

1.2. The impact over society

In addition to freely accessing information, the Internet is a place where users are protected by anonymity and can express their opinion on a wide range of areas. The noise was reduced and meaningful communication and instant participation enabled. It empowered the individual who had a story to tell with the tools to proclaim their news to the world [1]. Because of people's need to assert themselves in the online environment, different platforms have emerged where

people can express their thinking, not being constrained by certain external factors. At the same time, the unrestrained expression of users has generated controversy among people, hence has resulted in certain phenomena, such as "bullying", which affects not only children who use these platforms, but also adults who can go through similar situations. Bullying is defined as an aggressive act that is carried out by a group or an individual repeatedly and over time against a victim who cannot easily defend him or herself [3]. With the use of Internet and mobile phones, a new form of bullying has emerged, often called 'cyber-bullying' [4]. In cyber-bullying, aggression occurs via electronic method, via the Internet and especially through social media [3]. Because of these situations, people are less inclined to try all technology and choose to protect themselves from the effects. Taking these consequences into account, people have started processes to educate and specialize all users in order to avoid threats from the online environment.

1.3. Implementation of technology in people's everyday life

Social Media are various forms of user generated content and the collection of websites and applications that enable people to interact and share information online. Social media is based on computer interface technology that acts as a platform to enhance education by facilitating sharing and exchange of thoughts, ideas, information through usage of communication network called internet. This gives access to any information virtually at an immense speed at the location of the user making it distance free [5].

The implementation of Internet access has expanded globally as a necessity for society, because employees need to facilitate their work and to be able to organize their tasks more efficiently, as time is a limited resource. Another innovation was the introduction of private networks (intranet) that made working hours more efficient, as the information on the server at the workplace can be accessed via a password from the home computer. Due to the use of technology in all fields of activity, a number of software applications have been developed for use in certain areas of competence such as accounting, personal records and word processing. Another section in which technology is indispensable is the health field, with databases being specially created to centralize patient information, being useful to doctors to compare different symptoms and to make a diagnosis.

1.4. Promoting through social media

Currently, people attach great importance to the online environment, as marketing departments have developed an entire industry based on this type of promotion. Online promotion makes the businesses profitable and less expensive, because most of the expenses made over a business are for advertising and promotion. This can be decreased by constantly and regularly involving on the social media to connect with the right audience [6]. Social networking sites can also create the user profile according to the needs of the user, transmit data contrary to large commercial companies, thus making a wide range of products available to the user.

The monetisation of information involves collaboration between search engines and social networks, which can offer consumers products or services that meet specific needs. In the context of the promotion of certain businesses on social media, people have started to give greater confidence to companies that have better publicity of the goods and services offered, than in the case of those that cannot be found in the virtual environment, no reviews of people who have been in contact with them. Given that 39% of the fastest growing companies in the US have implemented e.g. blogging compared to only 11.6% of Fortune 500 companies [7], it cannot be ignored that social media can offer businesses a competitive edge. Today the potential of customer contributions and recommendations for products and services is more highly valued than ever before [1].

1.5. Threats that occur with the online platform

Along with the benefits of technological development, there are also disadvantages, because there are hidden dangers of this field. In addition to the data processing and the above-mentioned bullying, there is a risk of theft of the identity that can be occurred by securing the weak accounts created, from which it can degenerate into illegal access of bank accounts, for example. Given the ease of creating a website that can be used for illicit purposes, users can be caught in the "phishing" phenomenon, in which they make personal data available to the creators of that site without any reference to the danger behind them. Moreover, another threat can be an error in the system, a good example being the flights agencies that issue more tickets to travellers than aircraft number of available seats, with the risk of a flight being lost.

2. Materials and methods

In little more than a decade, the impact of social media has gone from being an entertaining extra to a fully integrated part of nearly every aspect of daily life for many [8]. The importance of this media has evolved due to the attention and interest of market consumers. In the field of business, it is necessary to implement these ways of communicating with customers interested in products or services provided by companies established in the sales market. Online platforms have a wide influence on consumers who can easily be manipulated by a fast presentation of a particular good or service, people want to try something new, something different from everything they have seen so far. Today, most firms involved in computer technology, social media, and e-business use a more intelligent approach to development and realize the need to satisfy customer needs. The long-term view held by the vast majority of analysts is that the use of the Internet will continue to expand along with related technologies [9].

In the business world, the most important agent is represented by the amounts collected by the company owned [1]. For an entrepreneur the most important aspect is money production, they are interested in business growth due to increased sales, as well as increased turnover and earned profit. A company's

director or manager will always invest the resources needed for increased, stable and impact production. A prosperous business is the one that offers a social impact, because it is the people who have the power of expansion and those who hold the demand. The offer from a company is due to the percentage set by the demand of consumers. Thus, in order to make the greatest and most significant return, entrepreneurs use all possible ways to attract customers, and the social media world is the best possible way.

For social media implementation in businesses, the first people to interact with these modalities are employees of the company who are trained to make the best use of the resources provided by employers. While using these online platforms, aiming for better communication between employees and consumers, this advantage brings with it threats such as the promoting of false information or data leakage. Data leaks can be expensive, harm an organisation's brand and reputation, and diminish trust. Customers and shareholders alike expect organisations to take appropriate measures to properly safeguard their data and investment. A successful data leakage prevention (DLP) programme can significantly reduce these risks [10]. Even though the aim is to prioritize consumer needs and their interests, social media can be seen as an enemy in the processing of the requirements received, because of this data leakage, that consumers also provide, maximizing the profit of large companies. The legal definition of social robots should be characterised by the following traits/capabilities: embodied (they have a physical form - software), emergent (they learn and adapt to changing circumstances), social valence (they are thought of as more than an object and have the ability to elicit emotional social responses from their users). Social robots use artificial intelligence to interact and communicate with humans and possibly with their brethren. They learn from us through our choices and actions on their platforms. For example, robotic shopping assistants in the form of algorithms have been designed to keep track of our past purchases and recommend future buying [11].

Businesses have also attempted to exploit social media for internal uses. Social media has been touted as a way to enhance communication among employees for the purposes of innovation and collaboration, and to heighten employee loyalty and commitment [9]. For instance, One Tech Company and Tupperware have implemented internal social media platforms to facilitate communication within the organization [9]. CEMEX, a cement company, has used social media to improve sustainability in its operations [9]. The project was initiated by the innovation department, which also invited a large number of employees to participate in the initiative, in a grass-roots way, instead of being implemented top-down by executive mandate. This led to a 5% improvement in the use of alternative fuels in just five weeks. Xilinx, a software company, increased its engineers' productivity by 25% after using social media for knowledge management instead of its large, unwieldy knowledge management database that was never consulted [9]. Finally, researchers and practitioners see great potential in exploiting Big Data generated by social media. Big Data has been used for planning, for market forecasting, to provide real-time data, and to obtain information on competitors [9]. Researchers have found that Big Data obtained from social media sources can be of benefit to a company's

brand image and stock performance, and that LinkedIn and other similar Social Media platforms can be used to measure an organization's competitive intelligence and employ self-developing ranking systems. We argue that the mistake most businesses have made in attempting to exploit social media for their benefit is that they have used a market or a hierarchical logic approach to address social media. When organizations engage with social media from a market logic perspective, they are trying to exploit it, without considering whether they are bringing any value to the community. When they engage with social media from a hierarchical logic perspective, they are trying to control it rigidly. Both approaches destroy trust, and therefore communities. In the long run, they will eventually fail [9]. In summing up the challenge, we've identified six factors that make social media so difficult to address because, combined, they illustrate how the conventional wisdom of customer communications and brand engagement no longer applies:

- "You Give Up Control":
 - There's no viable regulation of the media, so the content doesn't have to be true.
 - The impact of social media cannot be stopped or undone, even in court.
- "It Is Everywhere":
 - Social media transcends traditional geographic, demographic, and economic boundaries.
 - Social media content is amplified via the "viral effect".
- "It Is Emotional, as well as Functional":
 - User-generated content often is triggered by an emotional reaction.
 - Social media forces companies to shift from dealing with long, predictable cycle times to having to make decisions much more quickly and with less precise information [12].

"You Give Up Control"

There are countries such as India which do not have specific laws to deal with menace of fake news but still have existing legal provisions under Indian Penal Code [13]. Judicial interpretation of intention behind speech is and always has been difficult. A slip of the tongue has simply morphed into a slip of the thumb [14]. Even if the information submitted is false and is proven to be so in a court, the damage is already done and it will be very difficult for the firm to regain the respect and trust of its clients.

"It Is Everywhere"

Because geographical, demographic and economic barriers no longer exist, the Internet with all social media is enjoying a rapid increase in the number of users that make it difficult to control information about a company's activity. As more and more people on the street or in the means of public transport are spending more and more time talking to other people who are not physically present it's changing before our eyes. Some of these changes will bring benefits for the state of good in society, others will erode it [15]. The information is spread quite easily through a single share and it can be modified by any user without prior approval. Once the

information has undergone transformation during its transmission, it is extremely difficult to identify the author.

“It Is Emotional, as well as Functional”

The main feature of social media is the presence of human interaction, which is why the information or responses to specific informations are based on emotions rather than critical thinking related on science-based documentation. There is evidence of the relevance of emotions in online communication, many yet unanswered questions remain, and the field seems to not yet have established internal coherence. The results of our literature review show that not many studies draw from theories on emotions, and some concepts could use clarification. An additional challenge in researching social media is that it is a moving target: previous research indicates that the way people communicate online seems to have changed markedly during the last decade [16], although we know little about how and how much, exactly. This means that some of the previous findings in the field may no longer apply and should not be relied on blindly [17]. This puts companies in difficulty, because they are forced to constantly defend themselves by taking prompt decisions that deviate from their business plan. It is demanding for companies to prevent such situations from the social media uncontrollable environment.

Regardless of the reasons for rapid changes to the social media landscape, the constant change in demographic and technological character of these websites has resulted in a significant knowledge gap relating to user motivations for usage and its impact on e-business for both practitioners and academics. One of the challenges to understanding the role of social media in e-business relates to our ability to understand cognitive usage motivations and how that translates to effective business strategies.

With social media playing an increasingly important role in today's e-business, it becomes imperative that e-business professionals and managers be aware of the ways in which the motivations for social media usage can impact the communication and marketing strategies of e-business. E-businesses are increasingly using social media as advertising and marketing vehicles. And knowing that advertisements on social networking sites that appeal to users' motivations for joining the site tend to be more effective than others, e-business practitioners are advised to pay particular attention to user motivations for using a particular technology before deciding to invest in advertising on that medium. The discovery of self-expression as a new motivation for social media usage has several implications for both social media websites and e-businesses. Self-expression and personal brand management is becoming important, and in some ways, easier on social media. For instance, an individual can position him or herself as an expert in a certain area by regularly posting links to news and articles in that area, by creating and regularly updating a blog in that area, or by “liking” topics and activities on a website that establish a certain level of credibility. Gillin calls such an expert the “new influencer” [18]. E-businesses can start by identifying such “influencers” in online networks as these individuals act as key links between marketers and the public in general. Orienting marketing activities around these influencers can potentially yield greater ROI than targeting the public at large.

Along the lines of personal brand management is our finding that social media users are using such websites as tools to enhance and build professional networks. What this means for e-businesses is that social media need to be well incorporated into not just their marketing and communications plans but also into HR and hiring plans. This finding and implication is underscored by the fact that recently the main social networking site for professionals, LinkedIn, went public and generated a market value of \$9 billion USD, the highest for any Internet company since Google [19]. Social media websites such as LinkedIn provide e-businesses opportunities to find and hire employees based exactly on their needs. The online profiles-personal brands-and the wealth of content created by social media users provides e-businesses all the necessary information that is needed in their hiring process [21].

The role that information plays is key. Yet, the last decade has seen a steady erosion of trust in institutions and traditional media, with social media often facilitating the spread of fake news – often times politically engineered. This may undermine the public sector’s ability to effectively communicate with citizens and exacerbate the fallout. Nevertheless, it is imperative that governments aim for clear communication explaining specific actions and measures [13].

Without employees, a company could no longer exist in the real sense of the word. But with everything that’s happening today, the amazing technology development is a disadvantage in terms of employee productivity in the workplace. They seem to be tempted to use their time on social media instead of taking advantage of it.

The worldwide rapid diffusion and growing popularity, potential risks, negative impacts or controversial issues of social media exists. Das and Sahoo describe the impact of social networking on individuals: “The growing popularity of social networking sites (SNS) among the Internet users demands an introspection of personal and social behavior of human beings [22]. Today 1.5 billion people across the world have their profiles in social networking sites. Everything looks nice when you create a profile on social networking site, but how you feel when someone starts blackmailing using your personal data. Your boss threatens to fire you for posting comments on SNS. You feel compulsive to check your profile during work hours. SNS becomes a reason for anxiety and addiction. It starts affecting personal relationship with spouse and family members. Such sites make private life and public life of an individual a digital document” [23].

The interface is not necessarily addictive even in this autonomy-compatible sense, since it really functions as a deferral of desire satisfaction combined with a substitution of its mechanism for the original desires that brought someone to the scene. This becomes evident when we compare other examples of the interface, such as the search library function available within music storage sites or computer software. Here, we can observe the very same restlessness and failures of choice associated with the dating apps. “I scroll and scroll for something to listen to, but never settle on anything; soon, the act of scrolling itself is the activity I am engaged in, which is offering me pleasure. A similar example is the constant scroll feature of online news sources, blogs, and (notoriously) Facebook. One can never come to the end of such experiences: there is always more being added to the feed-suggestive

word-and hence no opportunity for even the momentary sense of satisfaction experienced by the addict or, a fortiori, someone with a less troubled relation to their own desires" [23].

The person caught up in the interface is, in this sense, worse off even than the addict, at least those of the unwilling variant. The analogy to the willing addict is closest-though it is worth bearing in mind that the willing addict looks a lot like a "healthy" person, except for the adverse effects of the drug or stimulus [24].

Business processes have become so complex that they must be automated because employees can no longer perform all the tasks required in the time available. 'None of us can work in a vacuum in today's world; we must work with one another to get things done [25]. Organizations today are constantly facing the challenge of contextualizing this phenomenon and its effects on the employees' ability to perform duties assigned to them and the ability to draw boundaries between personal and professional use of organizational information technology resource. Wasting time through internet activities is simple and it is a huge hidden cost to business. If the company has an eight-person department and each of them spends an hour a day on the above activities, that is a whole employee wasted [26] [27].

3. The conclusions of the case study

As a result of the above, we can say that social media have certain weaknesses in the business environment that pose quite high risks, which entrepreneurs are willing to take on, without having the best training to avoid exposure to potential online attacks.

Security scans performed on 60,000 Magento websites, the most popular e-commerce platform, show that 78% are missing critical security patches, while 5% are confirmed to have payment card data harvesting malware stealing their customer details.

The scans were carried out, in the last week, using Foregenix's free online scanner, WebScan.

The findings follow a number of high profile breaches of customer data over the past year, involving companies including Oracle, Cisco and Yahoo.

The cyber security company, which is renowned globally for its work with banks and payment providers, has an active threat intelligence team researching and analysing attack trends, with a strong focus on the eCommerce sector [27].

According to ENISA Threat Landscape report 2018, leaks continue to be one of the growing cyber risks, covering a wide range of compromised information - from personal data collected by internet companies and those providing online services, Up to business data stored in it infrastructures. However, the indisputable truth is that - despite the impact or target concerned - the leakage of information is usually caused by individual actions by individuals or as a result of an error in the internal processes of the company in question. Occasionally, a technical error or incorrect configuration may also cause a leakage of information. However, the European Union Agency for Network and information Security (ENISA) highlights the issue

that, according to a recent report, unintentional disclosure was the basis for most information leaks in 2018 [28].

Finally, social media has a mass impact because people are influenced by them due to the fact that it is an easy-to-access environment. For companies, the interaction with customers could mean a successful business, but also the failure of it. People should know the limits of using the Internet and the harmful effects that follow from it. Including those mentioned above, in order to have a thriving business... take the risk or lose the chance!

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Sustenabilitatea în administrația publică – un nou cadru de organizare și funcționare

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Abstract

Într-o lume neliniară, rolul administrației publice este unul complex, care presupune crearea unui echilibru între sisteme, adaptabilitate și continuitate în dezvoltarea societății. În acest context al incertitudinii, sustenabilitatea este necesară să fie integrată în funcționarea și organizarea administrației publice pentru a contribui la bunăstarea atât a generațiilor prezente cât și a celor viitoare.

Lucrarea se bazează pe aspecte legate de dezvoltarea unei administrații publice sustenabile bazată pe schimbări organizaționale, în actualul context marcat de globalizare și de schimbări radicale. Metodologia cercetării a constat în documentarea și analiza teoriilor organizaționale și lucrărilor de specialitate, de la nivel internațional și național. Apelul la resursele bibliografice și observația spontană au reprezentat chei de boltă ale lucrării.

Această cercetare atrage atenția asupra importanței aplicării conceptului de sustenabilitate și înțelegerii impactului său pe termen lung.

Cuvinte-cheie: dezvoltare sustenabilă, administrația publică, principiul sustenabilității, performanță.

1. Introducere în cadrul conceptual al sustenabilității

Cuvântul „sustenabilitate” provine din verbul în limba latină “sustinere” care înseamnă „a menține, susține, a dura”. Echivalentul în limba germană “nachhaltigkeit”, a apărut pentru prima dată în cartea forestieră «Silvicultura Economică» („Sylvicultura Oeconomica”) din 1713 scrisă de Hans Carl von Carlowitz, un administrator minier într-o regiune a cărei industrie minieră și metalurgică depindea de cherestea și care a realizat că defrișările ar putea cauza prăbușirea economiei locale, însă gestionarea durabilă a acestei resurse regenerabile ar permite pentru totdeauna o utilizare continuă, perpetuă [1].

Prima utilizare a termenului "sustenabil" în sensul modern a fost făcută de Clubul de la Roma, în martie 1972, în raportul său de epocă privind «Limitele de creștere» („Limits to growth”), scris de un grup de oameni de știință coordonați în principiu de profesorii Dennis și Donella Meadows [2].

Raportul «Viitorul nostru comun» („Our Common Future”) publicat de World Conservation on Environment and Development WCED (1987) este punctul de plecare pentru majoritatea discuțiilor actuale privind conceptul de dezvoltare sustenabilă și reprezintă un raport cuprinzător realizat printr-un parteneriat global care a constituit un punct major de transformare pentru conceptul de dezvoltare sustenabilă.

De la introducerea conceptului de dezvoltare sustenabilă până în prezent, Uniunea Europeană și Organizația Națiunilor Unite au propus și au votat mai multe acte legislative și politice pentru îndeplinirea obiectivelor de bază și de mare importanță pentru sustenabilitate. Importante tratate și conferințe care au avut loc din 1992 până la acest moment (Conferința de la Stockholm, Tratatul de la Maastrich, Amsterdam, Protocolul de la Kyoto, Declarația de la Johannesburg, Strategia de la Lisabona etc.) au reprezentat piloni în evoluția dezvoltării sustenabile la nivel global. Începând cu Agenda 21, semnată la Rio în 1992 până la Agenda 2030 se depun eforturi continue la nivel global pentru a echilibra cei trei piloni ai sustenabilității - dimensiunea socială, ecologică și economică.

Cadrul politic de la nivelul Uniunii Europene, important de menționat pentru această lucrare, privind dezvoltarea într-un mod sustenabil îl reprezintă Strategia de Dezvoltare Sustenabilă (“EU Sustainable Development Strategy”). Aceasta a fost revizuită de câteva ori pentru a fi adaptată la contextul social, economic și ambiental, în care obiectivul său este îmbunătățirea durabilă a bunăstării și a nivelului de trai al generațiilor actuale și viitoare.

Ca perspectivă a României asupra dezvoltării durabile, aceasta a pornit cu prima Strategie de Dezvoltare Durabilă a României din 1999 care a avut ca obiectiv îmbunătățirea progresivă, menținerea bunăstării populației și pregătirea pentru aderarea la Uniunea Europeană [3]. România s-a aflat printre primele state care au semnat Protocolul de la Kyoto, din 2001 și au ratificat Acordul de la Paris privind Schimbările Climatice. După ce România a devenit stat membru al UE, aceasta și-a ajustat prioritățile naționale, prin Strategia Națională pentru Dezvoltare Durabilă Orizonturi 2013-2020-2030 în 2008, vizând reducerea decalajului socio-economic față de cel al statelor membre ale Uniunii Europene [4].

Mai târziu, România și-a exprimat adevărată aderență la cele 17 Obiective de Dezvoltare Durabilă (ODD) ale Agendei 2030 iar concluziile Consiliului UE, adoptate în data de 20 iunie 2017, „Un viitor durabil al Europei: răspunsul UE la Agenda 2030 pentru Dezvoltare Durabilă” reprezintă documentul asumat de statele membre ale UE privind implementarea Agendei 2030 pentru Dezvoltare Durabilă. În acest context, România își stabilește cadrul național pentru susținerea Agendei 2030 și implementarea setului de 17 ODD, astfel că își stabilește Strategia Națională Pentru Dezvoltare Durabilă a României 2030 care este structurată în capitolul II, pe 17 obiective de dezvoltare sustenabilă.

În Strategia Națională pentru Dezvoltare Durabilă a României Orizonturi 2013-2020-2030 este prezentată situația sistemului socio-economic și a capitalului natural al României, obiectivele țintă și modalitățile de acțiune, problemele cu care se confruntă țara și preocupările specifice, precum și modalitatea de implementare

și monitorizare. Strategia conține o secțiune privind capacitatea administrativă și calitatea serviciilor publice în partea a IV-a a acesteia.

La sfârșitul primului deceniu al secolului XXI se recunoștea decalajele considerabile între România și celelalte state membre ale Uniunii Europene privind însușirea și transpunerea în practică a principiilor și practicilor dezvoltării sustenabile și încercările administrației publice de căutare a unei viziuni unitare.

La baza redactării Strategiei au existat o serie de documente precum Tratatul de Aderare România – Uniunea Europeană, Planul Național de Dezvoltare 2007-2013 (PND), Cadrul Strategic Național de Referință 2007-2013 (CSNR), Programul Național de Reformă (PNR) și Programul de Convergență (PC). Unele documente fiind reactualizate până în prezent, pe mai multe perioade.

S-a constatat la acel moment existența unor suprapuneri sau omisiuni din punct de vedere al coordonării interdepartamentale, strategiile și programele acopereau orizonturi diferite de timp și, mai ales, nu erau subsumate unei viziuni integratoare, așa cum era cea oferită de conceptul dezvoltării sustenabile.

Strategia reprezintă pașii de început ai României în procesul de tranziție către un nou model de dezvoltare sustenabilă. Descentralizarea administrației publice pe diferite domenii a presupus transfer de competențe, atribuții și responsabilități către administrația publică locală.

Pentru recuperarea unor decalaje în cazul României privind indicii de performanță s-au luat măsuri de reorganizare instituțională a ministerelor, a structurilor din subordine și/sau coordonarea acestora.

Se pune accent pe introducerea criteriilor de eco-eficiență în toate activitățile și serviciile administrației publice, acestea se bazează pe principiul utilizării celor mai eficiente tehnologii și metode. Competitivitatea, eco-eficiența și performanța sunt prezentați ca factori determinanți ai sustenabilității administrației publice. Astfel, dezvoltarea, specializarea și creșterea calității serviciilor administrației publice reprezintă un instrument pentru creșterea eficienței și competitivității în toate celelalte sectoare economice și sociale.

În Strategia Națională Pentru Dezvoltare Durabilă a României 2030, se pune accent pe “orașul inteligent și durabil, a datelor colectate de la echipamentele utilizate în furnizarea serviciilor, prin proiectarea inteligentă a dezvoltării localităților – toate acestea sub coordonarea unei administrații „inteligente / smart” pentru a atinge sinergia necesară pentru a îmbunătăți calitatea vieții, eficiența operațiunilor și serviciilor urbane”. Așa cum menționează strategia, “un oraș necesită, în tranziția sa către un oraș inteligent, progrese și schimbări în jurul a trei piloni principali: administrativ, tehnologic și social”.

Pentru orizontul 2020, s-a dorit introducerea unui cod al sustenabilității care să permită o raportare complexă a atitudinii organizațiilor privind aplicarea principiilor dezvoltării durabile.

O abordare sustenabilă necesită “crearea unor structuri legislative și instituționale eficiente, responsabile și incluzive la toate nivelurile”, în care se conștientizează și se însușește această perspectivă. Astfel că strategia promovează „dezvoltarea capitalului social, reducerea semnificativă a corupției, dezvoltarea

instituțiilor eficiente și transparente la toate nivelurile, un proces decizional receptiv, participarea factorilor interesați”.

Strategia pentru consolidarea administrației publice pentru orizontul de timp 2014-2020 (SCAP 2014-2020) este un document creat pentru consolidarea eficientizării administrației publice centrale și locale

Strategiile Naționale pentru Dezvoltare Durabilă a României semnifică începutul unui proces de lungă durată, în etape succesive, care va conduce la o schimbare sustenabilă a administrației publice.

2. Integrarea sustenabilității în principiile aplicabile administrației publice

Conform Codului administrativ [5], principiile generale aplicabile administrației publice sunt:

1. Principiul legalității (art. 6) care prevede faptul că autoritățile și instituțiile administrației publice, precum și personalul acestora au obligația de a acționa cu respectarea prevederilor legale în vigoare și a tratatelor și a convențiilor internaționale la care România este parte.

2. Principiul egalității (art.7) specifică faptul că Beneficiarii activităților autorităților și instituțiilor administrației publice au dreptul de a fi tratați în mod egal, într-o manieră nediscriminatorie, corelativ cu obligația autorităților și instituțiilor administrației publice de a trata în mod egal pe toți beneficiarii, fără discriminare pe criteriile prevăzute de lege.

3. Principiul transparenței (art.8) face referiri la procesul de elaborare a actelor normative, în care autoritățile și instituțiile publice au obligația de a informa și de a supune consultării și dezbaterii publice proiectele de acte normative și de a permite accesul cetățenilor la procesul de luare a deciziilor administrative, precum și la datele și informațiile de interes public, în limitele legii. Astfel, beneficiarii activităților administrației publice au dreptul de a obține informații de la autoritățile și instituțiile administrației publice, iar acestea au obligația corelativă a acestora de a pune la dispoziția beneficiarilor informații din oficiu sau la cerere, în limitele legii.

4. Principiul proporționalității (art.9). Formele de activitate ale autorităților administrației publice trebuie să fie corespunzătoare satisfacerii unui interes public, precum și echilibrate din punctul de vedere al efectelor asupra persoanelor. Reglementările sau măsurile autorităților și instituțiilor administrației publice sunt inițiate, adoptate, emise, după caz, numai în urma evaluării nevoilor de interes public sau a problemelor, după caz, a riscurilor și a impactului soluțiilor propuse.

5. Principiul satisfacerii interesului public (art.10). Autoritățile și instituțiile administrației publice, precum și personalul din cadrul acestora au obligația de a urmări satisfacerea interesului public înaintea celui individual sau de grup. Interesul public național este prioritar față de interesul public local.

6. Principiul imparțialității (art.11). Personalul din administrația publică are obligația de a-și exercita atribuțiile legale, fără subiectivism, indiferent de propriile convingeri sau interese.

7. Principiul continuității (art.12). Activitatea administrației publice se exercită fără întreruperi, cu respectarea prevederilor legale.

8. Principiul adaptabilității (art.13). Autoritățile și instituțiile administrației publice au obligația de a satisface nevoile societății.

Consider faptul că un nou principiu ar trebui adăugat să ghideze activitatea administrației publice, și anume, principiul sustenabilității, în care autoritățile și instituțiile administrației publice, precum și personalul din cadrul acestora au obligația de a gestiona eficient și cu responsabilitate resursele umane, naturale și financiare ale societății fără a compromite generațiile viitoare.

Considerăm imperativă introducerea acestui principiu pentru a încorpora responsabilitatea administrației publice față de viitorul generațiilor următoare, pentru a nu periclita niciun tip de capital, și anume, cel natural, intelectual, cultural, material și financiar. În acest caz sustenabilitatea presupune un angajament pe termen lung al administrației publice față de cetățeni și crearea unei relații durabile echilibrate între subsistemele societății. Intenția principală a adoptării principiului sustenabilității este, prin urmare, de a lărgi perspectiva abordării administrației publice.

3. Schimbarea sustenabilă a administrației publice

Administrația publică are nevoie de profesioniști în sustenabilitate care să ghideze planificarea sustenabilității în organizațiile în care lucrează sau cu care pot încheia parteneriate. Fiecare organizație este unică, cu setul său particular de provocări și oportunități, probleme și soluții și fiecare poate decide să se îndrepte spre sustenabilitate din mai multe motive [1]. Sustenabilitatea este locală iar strategiile sunt adaptate la situația particulară a fiecărei organizații. Principiile și metodele generale pot fi adaptate și utilizate în orice tip și dimensiune de organizație.

Guvernanța este un factor cheie în programele de sustenabilitate de succes. Cercetările arată că organizațiile care reușesc să planifice și să implementeze programe de sustenabilitate fie au deja cultura organizațională și sisteme de guvernanță care susțin aceste programe, fie fac schimbări culturale și de guvernanță ca parte a strategiilor generale de sustenabilitate. Cercetările profesorului Bob Doppelt privind tranzițiile de succes către sustenabilitate au arătat că din gama factorilor potențiali, cultura organizațională și guvernanța au oferit cea mai mare pârgie.

Câțiva pași care ar trebui urmați potrivit cărții cercetătorului „Leading Change toward Sustainability” [6] în schimbarea sustenabilă sunt următorii:

- Modificarea setului de mentalitate dominant care a creat sistemul prin imperativul atingerii sustenabilității;
- Rearanjarea părților sistemului prin organizarea profundă, echipe largi și puternice de tranziție la sustenabilitate;
- Modificarea obiectivelor sistemului prin crearea unei viziuni și principii directoare ale sustenabilității;
- Schimbarea fluxurilor de informații ale sistemului prin comunicarea nevoilor, viziunii și strategiilor pentru realizarea sustenabilității;

- Corectarea buclelor de feedback ale sistemului prin încurajarea și recompensarea învățării și inovării;
- Reglarea parametrilor sistemului prin alinierea sistemelor și structurilor cu sustenabilitate.

Planificarea sustenabilității într-o organizație implică dezvoltarea a două tipuri de strategii: strategii pentru operațiuni (cum ar fi proiectarea serviciilor, achiziții) și strategii pentru guvernare și proces[1]. În timp ce unele schimbări sunt dramatice și ajută la susținerea motivației, altele sunt incrementale.

Membrii implicați în schimbare sustenabilă și care lucrează pentru a dezvolta strategii trebuie să înțeleagă starea condițiilor existente făcând evaluări. Viziunea arată unde doresc să fie în viitor, evaluările arată unde se află în prezent, iar diferențele sunt dezvăluite ca lacune care trebuie închise. Procesul de cartografiere în sine poate începe să clarifice ceea ce ar fi putut părea o imagine neclară.

Viziunea definește ce vrea să realizeze o organizație; obiectivele și strategiile stabilesc planuri-cadru pentru atingerea viziunii iar tacticile sunt acțiunile întreprinse de organizație pentru a-și implementa strategiile.

Măsurarea este un element fundamental al activității de sustenabilitate . Organizațiile cu o viziune a serviciilor sustenabile sau a unei operațiuni durabile au nevoie de mai mult decât o viziune; au nevoie de instrumente pentru a înțelege unde se află, cât de departe sau cât de aproape sunt de obiectivele lor și dacă se îndreaptă în direcția corectă. Măsurarea este cheia realizării muncii de sustenabilitate. Indicatorii de sustenabilitate sunt folosiți de organizații pentru a oferi un cadru pentru a decide unde să se concentreze eforturile; pentru a motiva oamenii spre îmbunătățirea procesului; să demonstreze progresul în performanța funcționarilor sau responsabilitatea socială.

Sustenabilitatea într-o organizație este o întreprindere colaborativă. Echipele sunt inima inițiativelor de schimbare a sustenabilității, iar liderii de sustenabilitate pot proveni de la orice nivel al unei organizații, coordonatorii de sustenabilitate facilitează efortul de schimbare. Un proces de planificare a sustenabilității începe cu o declarație de viziune care duce la obiective măsurabile și apoi la strategii sau planuri de acțiune specifice și tactici, acțiunile pe care o organizație le întreprinde pentru a-și implementa strategiile.

Schimbarea la scară largă („Leading Large Scale Change”) [10] reprezintă un model aplicat în sistemul de sănătate britanic ce poate fi utilizat pentru o schimbare durabilă, care presupune mobilizare a unei mase de indivizi, grupuri și organizații spre o viziune a unei noi stări fundamentale prin teme cheie care pot face o mare diferență (în viața lor, în cea a comunității și/sau în viața organizației), prin schimbarea puterii și o conducere mai distribuită, prin angajarea cuprinzătoare și activă a părților interesate și întărirea reciprocă a schimbărilor în mai multe sisteme și procese.

Profesorul John Kotter a propus un model în opt etape pentru schimbări de durată, bazat pe revizuirea experienței din sectorul privat, prezentat în 3 etape, crearea condițiilor pentru schimbare, implicarea întregii organizații, implementarea și susținerea schimbării [7],[8]. De asemenea este important de știut și cele 8 greșeli

frecvente făcute de organizații în schimbarea la scară largă, menționate de profesorul John Kotter [9].

Există multe abordări organizaționale privind schimbarea sustenabilă în organizații care au în principiu aceleași etape care trebuie parcurse, cu detalii suplimentare care sunt necesare a fi luate în calcul, pentru succesul schimbării.

4. Concluzii

Sustenabilitatea în administrația publică trebuie răspândită la scară largă în multiple organizații pentru a schimba profund modelele de mentalitate din prezent ale funcționarilor publici, aceasta va avea un impact general asupra a ceea ce fac funcționarii publici la locul de muncă și necesită schimbări coordonate pe mai multe planuri. Vorbim așadar de eforturi de schimbare socială care afectează un număr mare de persoane, necesită schimbări pretutindeni și provoacă modelele mentale actuale. Sunt necesare schimbări coordonate în structuri, procese și modele de comportament, pentru a realiza o schimbare durabilă.

Integrarea principiului sustenabilității în principiile generale reprezintă o piatră de temelie la consolidarea administrației publice pentru a se adapta provocărilor viitoare de naturi diferite.

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