Review Article

Sustainable Innovation and Knowledge-Transfer in Public Administration

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Abstract - This article highlights the role of innovation in the public sector and which direction has been followed in order to support the improvement of the quality of management through innovations outputs. When we speak about public services, we must be aware that the services' innovation approach needs improvements at the highest point in order to grow a developing economy. This study suggests that a positive impact comes from implementing innovative ideas in products that public organizations decide to offer to their citizens. Besides the role of improving the services and increasing the degree of satisfaction regarding citizens' experience, innovation also aims to use resources efficiently. The public sector from different countries acts like a smart buyer using the technological knowledge transfer to stimulate competitiveness so that it adequately meets the public's needs. The public sector is facing important challenges derived from the efficiency in sectors like health, security, transport; therefore, it is crucial to access programs that contribute to the development of a system responding to digitization's future. To extend the knowledge regarding sustainability, we must clarify what does the difference between using traditional services and what means bringing service innovation in the public sector, used to obtain citizens' positive feedback. The focus of this study is the highlight of the good practice examples regarding the way efficient and feasible (from both government and citizens' point of view) public services work.

Keywords - Innovation, knowledge-transfer, continuous digitization, public services, electronic governance.

I. INTRODUCTION

In these troubled times for exploring public innovation, it is so difficult for the government to create programs and strategies that can be sustained in this field. Therefore, the local community must research and gather information about the community's needs and, after the moment when community's leaders can put them on the table, they must identify the potential benefits of their social impact.

Leaders of the organizations must program their resources to become sustainable; actually, the inclusion of new technologies is the catalyst that supports the organization in front of the whole society. Organizations' representatives intend to maintain a balance in all the strategic directions, so the use of new technologies must facilitate the increase of the quality of services, analyzing at the same time and the sustainability of innovation.

Sustainable management is an essential tool used in the context of changes that have taken place, established on sustainable development principles. The expertise of the specialists in the university field, respectively, of the university canters, will influence both the performance of the organizations, as well as the community's perception of the activity they carry out [1]. Research centres must increase the connections to collaborate and to act more effectively because, without these positive changes, those research units cannot strengthen the links with the media business, local communities, civil society and the government.

In order to include a knowledge transfer in the structure of an organization, the legal representatives of the organization must draw up an analysis of needs both at the system level and subordinated structures so that the proposal of a certain type of technology will pass the phase of prototype, to bring added value to the work [2].

Electronic governance, recorded as continuous digitization, represents the way public administration is revitalised, more precisely by adopting new information management techniques. All states have taken steps towards improving the performance of the public sector both for increasing the degree of administrative act's transparency, as well as for improving the quality of services offered in relation to community's requests.

II. STATE-OF-THE-ART

The European Union has adopted a series of strategic measures to achieve a single digital market. The digital intensity index is the one that quantifies the degree of digitization of the member states. Nordic countries, such as Finland, Sweden, Denmark, have successfully fulfilled the mission of maximizing as much as possible the value of this index.

The mix of policies and tools to stimulate innovation and cross-border research make the European Union the most open space for promoting investments in research

and innovation programs, but the synthetic innovation index shows that, in some areas, Europe is still deficient. It is notorious that Romania and Bulgaria are below the European average, falling into the category of modest

innovation; on the opposite side is Sweden, considered the main promoter of innovation as per the data analyzed from 2019's statistics.
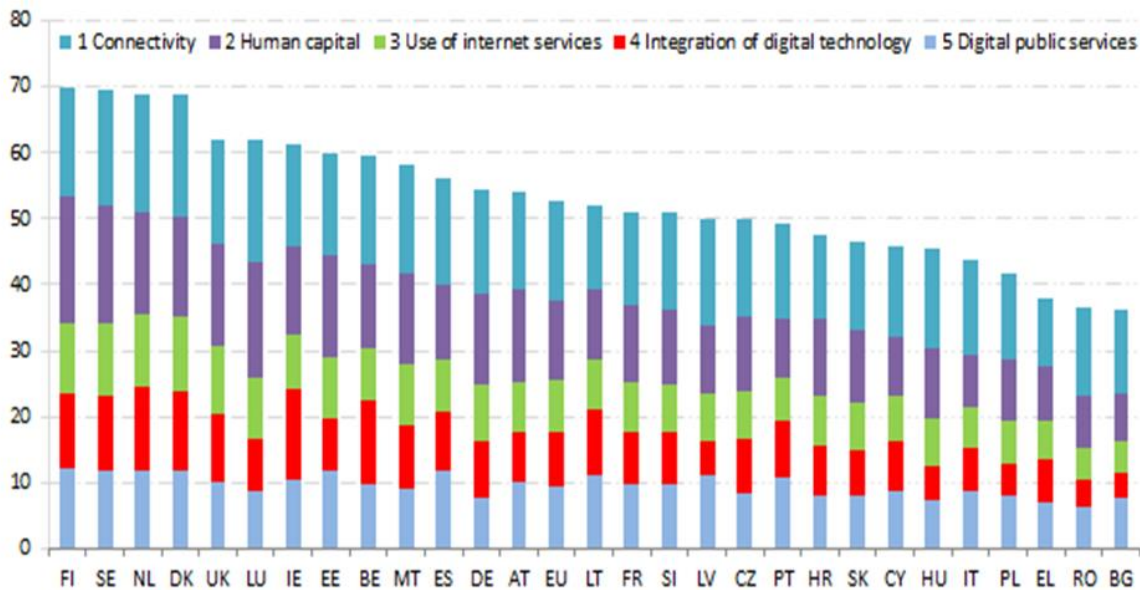

Fig. 1 Digital Economy and Society Index (DESI) - 2019 ranking [3]

The innovation output indicator analyses the inclusion of innovative products in terms of connectivity, human capital, use of the internet, digitalization of public services and integration of new technologies. The interface of e-government solutions must be friendly, accessible to all citizens and, last but not least, intuitive; therefore, in their construction, the experts recommend keeping in mind these principles:

- one-stop-shop: authorities provide a single point of provision of services, citizens having everything with "one-stop";
- just once: citizens should be questioned only once, after which institutions should reuse data for future applications;
- digital default: the use of new technologies is associated with the efficient use of resources and capitalizing on all the opportunities offered by the digitization of systems.

The European public sector came out in full force over the last years, especially by continuously improving the evaluation process, using the feedback provided by all institutions on the e-government platform. It is focused both on the integration of new technologies in order to facilitate the interaction between citizens and state's institutions or other organizations, as well as to improve their capacity to manage information and deliver quality services in an efficient manner [4].

We are assisting lately to the development of a multitude of small canters mind-labs created for the operationalization of new technologies in all sectors, respectively encouraging the local administration to

promote innovation emphasizing the satisfaction of the users of public services. Public organizations exist to give citizens the highest quality of services: this means they must have access to the real data in order to be able to compare the quality of the educational system (schools, universities), of the hospital services, or the way organizations can evolve in the economic environment [5]. This process is not possible without including technology knowledge outputs and innovation.

Nowadays, the focus of all public organizations in achieving the optimum level of performance, transparency of decisions is crucial for all levels of government. It is all organizations' duty to facilitate the interface between society, companies and public organizations, giving citizens democratic rights to participate in the process of decision-making.

III. METHODOLOGY

The full contribution of the infrastructure's digitalization for the administrative system is due to the openness of the organization's management to understand and take advantage of the opportunities offered by the scientific environment. A sustainable innovation policy is implemented by educating the behaviour of the human resource.

Launching and adopting an innovative product implies an overall analysis of the improvement process from various points of view:

- *technical,* to anticipate if the result of applying the solution will increase the lifespan of the product or service);

- **technologically,** ensuring the processing parameters are compliant;
- **economic,** as we must answer the main question: whether the development of a new product or the improvement of the current technology will ensure the expected economic growth;
- **social,** to investigate the actual way the implementation of new technologies will ensure the functional contribution, as well as the number of jobs created) [6].

The feedback provided by the market in relation to research innovation and technology transfer will have to be positive in order for this whole process to be feasible. The support of the innovation and transfer infrastructure is offered at the national level by Technology Transfer Canters, Technology and Business Incubators, Technology Information centres, Science and Technology Parks, Industry Relations Offices [7].

The capitalization of the research results may have a predominant practical incidence, which can be applied both for the development of the business environment as well as for the transformation of the operational procedures in all organizations. In the latter case, the mission of the research is to improve the public services, respectively, to contribute to citizens' satisfaction, which can be measured by the CSI ("citizen satisfaction index") [8].

The governmental authority will focus its efforts on keeping up with international communities by including innovation in the activity of the different systems so that the policies created to be permanently improved. It is revealing that organizational innovation can be the success key to strategic management by continuous professional training of human resources.

Many countries share a common goal to build skills and, further, work to strengthen regional innovation support, highlighted by the cohesion policies. That brings together to the table players from the academic environment and business environment in order to perform actions focused on technology transfer.

When technology changes quickly, governmental services also need to be able to respond quickly to policy changes and to the public's needs; therefore, the development of partnerships such as public-private is an imperative solution before the implementation of innovative technology [9]. Before launches on the market, the new service must follow a few steps: create it in accordance with the market's requirements; analyze the prototype with respect to citizens' needs and with the actual testing capabilities of the organization.

IV. RESULTS

In a fast-changing world, we are currently witnessing a consultation process of each public organization to identify the directions of action they would like to improve by applying innovative technologies in order to create more value in the activity that undertakes it. According to the definition of innovation, it indicates the way forward after including new technology, applied to respond to clients' requests, and in the case of public agencies, to citizens.

In order to develop a creative organizational growth plan, the process of information transfer should be focused on transition both at the top and within any system, as well as at the decision-making level. Among other things, this growth plan is an essential move to change the way a government organization delivers its services. All the transformations are from the perspective of:

- Civilians (reforming the way government connects with residents and companies, online, either at international borders, face-to-face, on the phone or in an emergency).
- Policy: adopt the policy agenda of the government to allow social change and improve the lives of citizens.
- Efficiency: to make the government-run more price-effectively. [10]

New forms of exchanging data among the civil society need to be established so that the value produced by data analysis and new algorithms can be more equitably shared to the benefit of European society across all parties involved.

Regarding research centres, to enhance their ability to follow the new technology plans in local government or industry, the Canadian government signed a federal act in 1986, authorizing the lab and entering the market with two innovators [11]. This attitude supports the policies of the 2020 strategy for the development of the UE, creating connections between infrastructure and knowledge from different fields to underpin the actions of the European innovation partnerships.

European leaders have joined forces to create Horizon 2020, a program that supports communities through the development of innovative solutions to global change. The financial support granted for the activities foreseen in public-private partnerships is substantial, and it provides assistance in order to develop the skills of the industrial sector, skills used further to implement the products proposed through these partnerships. For example, in Finland, results of the connection between public research and industry are involved in all policies issued by the government [12]. Increased visibility of programs that stimulate technology transfer is an issue that European Union wants to disseminate by creating programs that can have captivating research results in the technological field.

Improving the professional performance of the organization, as well as helping staff to achieve the

objectives described in the organization's strategy, is possible by including innovation in the process of all public services' digitization.

The process of knowledge transfer is more obvious in the United States when compared with the rest of the world, but we see the effort of all countries that are trying to find similar actions in innovation because they have the same mission: to improve the results of any institution.

From the report of the European Commission called „ Boosting Open Innovation and Knowledge Transfer in the European Union", we can extract the actions that the EU must undertake, for example, find solutions required to build systems based upon common efforts between universities, economic institutes, governments on the one hand and economic thoughts in productivity, output and innovation on the other hand. The EU wants to combine all the cohesion policies to improve absorption from programs that use innovation opportunities to improve relations between citizens, markets, networks that should interconnect resources [13].

We believe that the expansion of economic hubs, including the innovative field, can minimize the disparities between different subdivisions and make the presentation of services across government easier and the associated user experience more consistent.

The essence of innovation knowledge is one of the ways that can solve global concerns like climate change, digital economy, or issues that will prevent future financial crises. This concept is properly implemented, can provide the results expected by the governments. Our answer is simple: we need to identify the keys to exchanging and accepting each other's concepts (institutional mindsets for entities or other actors) for stronger collaboration. Thinking about sustainable economic growth, which means increasing the living standards, it is vital to ensure that the performance can be replicated, providing better service and increasing the level of the operations, transforming the partnership between the customer and the state. To move forward in this process, we must find the ability to access, implement innovation results, and disseminate technological knowledge. Revitalizing the public sector and encouraging a new kind of interaction between citizens and state is happening through an understanding of the transition from traditional public services to modern, technologized public services. Innovation can act as an umbrella for organizational values and practices. We can describe a technological system as a machine based on material resources, including the technical method that provides results convertible into data.

When we build the structure of the organization is necessary to decide the type of technology we will going to use (according to the organization type) [14]. From this point of view, technological risks are unavoidable because they are directly linked with temporal and spatial limitations (for example, a senior manager can be a junior

in a bigger process, so things are divided, and the technological flow is interrupted).

Every state must have a policy-making system that should aim to explore technology as systematic knowledge and translate the results of researching in the manufacturing process of a product or form delivery on one service. The technology is not the finished product or service. It may mean delivery or performance provide professional knowhow in the final product service. Today we are facing a phenomenon in which the firms improve their abilities tool to be more efficient using knowledge management [15], [16]. They support supervisory work to grow, using Learning, establishing their vision, sharing knowledge and innovation like a high point of development. The concept of knowledge can be used like different sets: to define the firm's innovation performance or like a public set in the demonstration of haw can the public authority improve their services.

The recent empirical study named "Knowledge management practice" highlights how the government's digital services work in Finland, focusing on developing changes that offer efficiency and increase citizen degree, re-inventing itself each time a new technology is adopted [17].

In this study, Henri Inkinen suggests that the strategic management of knowledge and confidence is associated with the ability of the organization to access programs that can increase human skills and measure economic performance according to knowledge sharing, creation and utilization of new products [18]. This study suggests that improving performance in each organization is possible only if it is included within the strategic planning keys like knowledge and competencies.

The program Horizon 2020, developed by the European Union, has a topic called „*Europe in a changing world: inclusive, innovative and reflective societies"* that supports actions for all the Member States in the field of research and innovation. This program is a prop for the whole process of optimizing the data used in developing, so its finality is to explore new ways to be innovative. To evaluate the effect of the technological transfer in all financial sectors, the Union permanently supports the market that creates innovations because the normal public procurement procedure must get it. An example is the European Capital of Innovation selected yearly by the European Union. The relevant rules are published, so the award will find the city where there are implemented most innovative local policies and, after this moment, the EU can replicate these best practices across all Europe.

Research is a big tool used to approach challenges in projects like reducing inequalities, social exclusion or discrimination and, therefore, to produce the desired changes of society, we must integrate innovation in the public sector. The foundation of these actions was established in 2013, within the report of Expert Group on

Public Sector Innovation called "Powering European Public Sector Innovation: Towards a New Architecture" [19]. This document specifies some principles all countries have to respect:

- co-design and co-creation of innovative solutions;
- adopting new and collaborative service delivery models;
- embracing creative disruption from technology using big data, cloud computing or social media;
- adopting an attitude of experimentation and entrepreneurship [20];

The starting point in the transformation of public policy is the re-think of the health issues, namely welfare, environment, transport, the reduction of inequalities and social exclusion; challenges to which the EU must find solutions, developing new technologies to support these sectors.

Reusing data collected through different platforms can represent an indicator of the organization performance useful for understanding its operational mode, as well as for developing an alternative methodology for economic and social growth. In Denmark, an organization called Mind Lab was created to design policy or reform in different areas; all meetings are recorded audio and video. Therefore it is obvious that communication is the key to development, but without the inclusion the technical knowledge, we cannot create big data for solving other problems.

Among the investment priorities of the European Union, we discover Structural Funds named Competitiveness Operational Programs or Operational Regional Programs 2014-2020, which are supporting innovation and technology transfer units within areas not very developed, creating science parks, supporting programs that finance implementation of the research-innovation results, provide multi-sectorial support by including innovative elements in investment.

In 2019, Romania was the host of the event "Innovative Enterprise Week" and, at the panel session "Bridging the Innovation Gap", all the attention was focused on disseminating research results which can be the basis for new directions regarding market innovation. Transforming scientific innovation results into concrete innovation opportunities are pieces of advice the Europeans Commission embraces through the development of programs used later to fund these topics.

In the current context of climate change, we cannot just rely on education behaviour because the rapid decline of biodiversity asks for urgent innovative solutions. All countries are trying to focus on the capacity of organizations to use digital innovations to access funds for permanent investments in research and development. This process is performed both in developing countries in order not to miss opportunities in obtaining digitization but also for developed ones that want to benefit from the result of technological progress. The research results have been used in a responsible approach for science, education or funded projects to develop different financial sectors [21]. The cohesion policy of the European Union describes the assumed items for all countries: effective collaboration of all partners to ensure the sustainability of the results, their developing ideas are fully transparent for European citizens.

Under the ongoing process of globalization, the life cycle of products and services must reduce the cost of manufacturing and allow those to be sustainable. A model for collaboration performed in order to create strategies used further for implementing the current research system in its social contexts is partnerships like university–industry–government. Dissemination of research results will offer exclusive solutions to all interested factors, strengthening cross-border connections [22]. Public administration serves the needs of society and works always focused on organizational structures, procedures, responsibilities, interactions, policies, and programs. It seems that after the past two decades of reforms, the Europeans Union has tried to create policies to improve the effectiveness and efficiency of public administration.

In order to understand why Europe's future was uncertain at a time, especially under conditions of reducing the importance of scientific disputes, we must start from the bottom and analyses the severe effects that have occurred since the last financial crisis. Directing funding in the digital content market area has propelled Europe to the next level of evolution. Now it is globally comparable with forces like China or South Korea.

The organizational culture in the public sector of each European state will be upgraded with the community ACQUIS since it will have informational resources that can be reused, functioning as a laboratory for "citizen automation".

Peter Drucker compares innovation to "a change that creates a new dimension of performance"; under the desire of the previous comparison, Romania intensified its efforts in the process of digitizing public services and accessing technology transfer programs to recover the gaps compared to the developed countries of the European Union. The scientific environment in Romania is a qualitative provider in terms of programming, incubation and operationalization of the organizational architecture [23]. Initiatives are taken to end bureaucracy in the administrative system by using open data stored within platforms for the use of public services such as e-government to align the Member States to adhere to unitary policies in terms of service efficiency offered to citizens.

The integration of the information systems in the public administration has a multidisciplinary character, including management strategies, legal and political, sociological and others; therefore, the radiography of the

administrative digitization is characterized by collaborative aspects. The diversity of data sets, the multitude of devices (hardware), the data processing procedures (software) as well as the multitude of communication channels forces the public sector to comply with the most modern information standards.

The existence of an accessible way to collect, centralize and use the desired information offers true support to the decision-making factor, both for the construction of the strategies of development of the organizations, as well as for the automation of the working procedures. Present on the market since the 60s, and the information systems has two components: support systems for operational processes respectively support systems for management.

The biggest challenge of the public sector is the identification of an integrated solution oriented towards an efficient management system of resource management [24]. Companies have been much more open initially to adopt e-business solutions to interconnect their suppliers and customers-basically, the entire production process - respectively to stimulate sales (e-commerce applications). The administrative sector is now copying this model, and it is using web technologies to correlate the information between the government and other institutions in the public sphere, namely the simplification of the community consultation process [25].

The applications in the e-government sphere have the mission to optimize all the processes in a public organization, respectively, to revitalize all the operational procedures, from the collection and processing of data to the generation of databases that will support the decision-making factor. They can take future decisions based on the overall image offered by these socio-technological systems [26].

Promoting the inclusion of technological transfer in the public sector by imposing unitary adoption of some computer applications has not been a real success in all public institutions because they are closed organizations that fight for autonomy so that administrative defragmentation prevents the debureaucratization of public institutions. However, today, we are talking more and more about the benefits of electronic governance, from access to information of public utility to the freedom of information and participation of citizens in the decision-making process.

The European perspective on sustainable communities involves the development of the institutional structure for increasing the accessibility of the services so as to keep the users permanently informed and protected. The validation of specific technology can ensure sustainability. The use of 3D printing equipment can carry out a certain prototype, afterwards through crowdfunding, the amount of money required to implement this prototype is collected in a production cycle or of service delivery [27].

The mixture of economic, social and environmental factors allows communities to develop sustainably, and if we include in this equation the results of the research, applied through public-private partnerships, the transformation will have a positive effect, delivering efficiency in providing services to citizens.

Although there has been an increase in the use of innovative tools, they are only in certain sectors; overall, the average of European citizens who have accessed public information through digital platforms in 2019 is 44%, compared to 37% in 2008, the progress is remarkable. If we analyze the degree of technology use in the EU member countries, we reach the same conclusion: Denmark, next to the other Nordic countries, gets a score of 89%, and Romania is at the other end, quantifying only 6% [28].

Permanent modernization of the institutional infrastructure by digitizing the services offered is an obligation when we want to achieve performance. The acceleration of the governmental transformation, established by the 2016-2020 e-Government action plan has seven pillars:

- "Digital by Default" describes how connectivity between users (citizens) and public institutions should be ensured.
- "Once Only" is a principle by which the data, once collected, should be reused; the citizen should be questioned only once in relation to certain data while ensuring the security of the data provided.
- "Openness and Transparency" require that the delivery and architecture of public services be transparent, the accessibility of citizens and the business environment be open so that they have control over the data provided.
- "Inclusiveness and accessibility" principle oblige the organizations to consider the impossibility of the current social categories to move and access certain services so that the architecture of public services must be synchronized in order to provide equal access to the same type of services.
- "Cross border by default" is a rule institution should not ignore, given that the main objective of the EU (but also of states outside it) is to create a unique platform for accessing services, encouraging mobility.
- "Interoperability by default" encourages open data formats to be used simultaneously by a secure service delivery market
- "Trustworthiness & Security" is a precondition of technology transfer, highlighting efforts to maintain data security so that digitization enhances citizens' trust in state institutions [29].

The digital revolution has produced changes in consumer behaviour of both public and private products/services; therefore, the application of a unitary law is the foundation of the single connected market. The integration of Information and Communication Technology (ICT) in all sectors of society represents an

opportunity for the European Commission to propel its business in a global dimension, an opportunity treated with maximum priority, because it will allow both free movement of goods, people, services and capital, benefiting from online technical assistance, under conditions of maximum data security [30].

The maximum exploitation of the digital economy implies the improvement of the existing infrastructure by allocating storage spaces for large volumes of data, as well as budgeting the technological transfer in order to stimulate the competitiveness, respectively increasing the quality of the public services.

EU develops its policies for digitizing the economy by reducing cross-border barriers for online commerce (stimulating the right to multicultural creation and innovation by automating copyright) maintaining a unique

VAT rate for telecommunications and broadcasting. The dynamism of the telecommunications sector determines that the digitization tools of the economy will be permanently adapted to European norms, generating lower costs visibly improved services.

Technological evolution, supported by innovation factors such as search engines, social media, electronic commerce platforms, online application stores, etc., is a source of progress in terms of efficiency, economic growth, employment, informing consumers.

The lack of portability between services and data security is a problem in terms of respecting fundamental rights (at this moment, consumers are travelling, and they want to have access to information from anywhere and by any electronic means) [31].
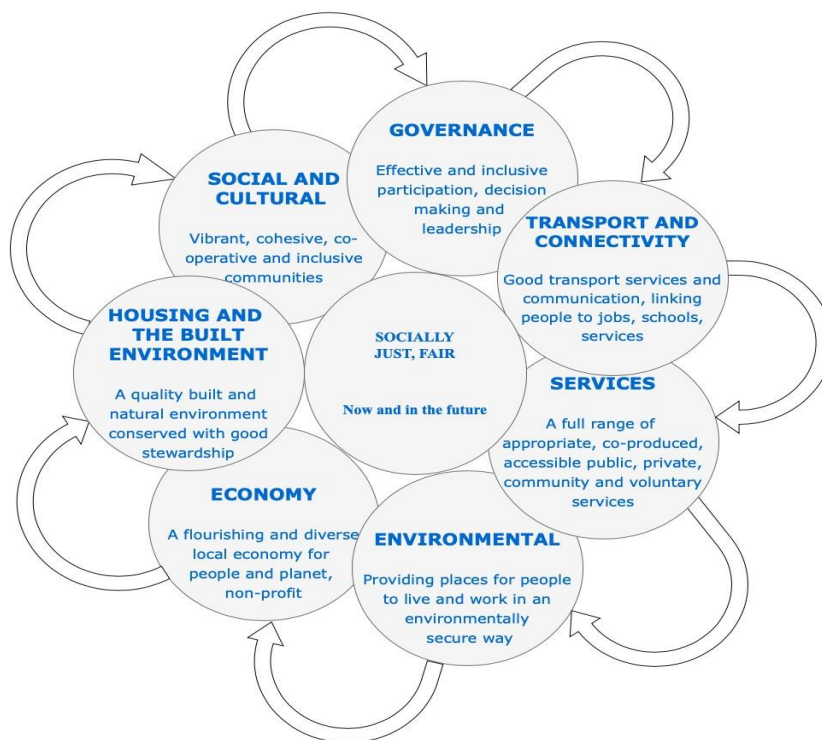

Fig. 2 Dimensions of Sustainable Communities (Adapted From Ergan 2004)

In the publication "The Ergan Review Skills for sustainable communities", Ergan J. draws up the diagram of sustainable communities, highlighting the connection between the pillars of development [32]. This aspect corroborated with the statement of the researcher Coote A. that defines sustainable communities as: "places where people want to live and work, now and in the future, meeting the diverse needs of existing and future residents within the wider context of economic and environmental security."

V. CONCLUSION

The regulation of the modalities of providing the services in real-time for the citizens of the European Union

is an important objective for the European Commission. The policies in the field of health, environment, communications, transport, research and innovation, access to the labour market and not only, are monitored through networking activities in order to maximize the benefits of public sector technology.

The open data interoperability and the unitary operation of the platforms imply a close collaboration between all the poles of interest in the member states, facilitating the development of a single digital market [33]. Currently, this process is difficult at the macro level due to data interpretation (multilingualism), but also for specific legal regulation; many administrations have focused their

efforts on developing unique platforms for updating information at the national, regional and local levels. The European public administrations want to be perceived as being open, flexible and cooperative in their relations with citizens and with businesses. Using electronic governance, public services are constantly improving, continuously meeting user needs.

The availability of innovative technologies allowed citizens access to electronic platforms aimed at public acquisitions, health, electronic identity, citizen inclusion; however, the access level to cross-border services is not very high, although social networks have promoted access to certain services (tax collection, document supply and access to information, regulation of pension rights, work, residence, education, health) [34].

The only perspective to analyze the context of sustainable communities is of public-private partnerships because the research in the field of digitizing the seven dimensions is a work with a huge potential for the academic environment. The technological transfer contributes to sustainable development, maximizing the resources on both sides, both of the communities and of the academic environment [35]. If there is no diligence on the collaboration between public institutions and the academic environment, operating certain co-development models to validate the scientific results, the advantage of the innovation concept is diminished. The result of adopting new technology, both in the industrial sector and in the administrative field, can become sustainable only if the latter can satisfy the specific needs of the market and, implicitly, of the citizens.

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