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APPLYING THE EUROPEAN SUSTAINABLE DEVELOPMENT STRATEGY THROUGH UNIVERSITY RESEARCH AT 7TH DEVELOPMENT REGION

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Abstract: *The present paper emphasizes the role that research and innovation plays as part of the efforts that the Romanian society is making in order to achieve the goals of Sustainable Development. At the same time, based on an argument analysis, it is desired to point out some of the causes of the poor cooperation between universities and the business environment at regional level, by suggesting solutions that would bring about major changes at the three levels: social, environmental and economic. The final conclusions reiterate the need of putting into practice the new breakthroughs in science and technology with the help of structures and cooperation network as catalytic factors in economic development and smart specialization at regional and national level.*

Keywords*: Sustainable Development; innovation and innovative enterprise; technological transfer; innovation and research clusters*

1. SUSTAINABLE DEVELOPMENT WITHIN THE CONTEXT OF INTERNATIONAL, EUROPEAN AND NATIONAL LAW-MAKING

Sustainable Development is a word that holds a world of promises; which conjures up peace, prosperity and being in harmony with nature. Not surprisingly, Europe has a strong desire for Sustainable Development. This European desire became clear in 2001 and increased, reaching a peak in 2007. In January 2007, Jose Manuel Barroso, president of the European Commission declared:

> Europe needs to lead the world into a new or maybe one should say post-industrial revolution in order to develop a low-carbon emission economy (Gibbs, 2002).

However, one year later, the biggest financial crisis since 1929 hit de world. Consequently, Europe was affected, thus deepening and creating new macroeconomic imbalances. That crisis made it clear that the financial boom of the previous decades had been a durable one. Yet, the way in which most European nations tried to fight against a global financial crisis that would shape the 21st century, lacked completely the Sustainable Development perspective. Romania, as a member of the United Nation (UN), has adopted the 2030 Agenda and its 17 Sustainable Development Goals, approved by the UN at the United Nation Sustainable Development Summit through UN General Assembly resolution A/RES/70/1, on 15 September 2015. Also, as a member of the European Union (EU), Romania has adopted the political document to which the member states have committed themselves, "A Sustainable European Future: The EU Response to the 2030 Agenda for Sustainable Development" (SNDDR, 2008).

Thus, in Romania the national framework for implementing the 2030 Agenda for Sustainable Development and the 17 Sustainable Development Goals (SDGs) is set, by implementing the UN and EU resolutions. This strategy promotes the sustainable development of Romania, by concentrating on three dimensions: (1) The economic dimension; (2) The social dimension; (3) The environmental dimension (ADRC, 2016).

This three-dimension-strategy, which was defined as a concept in the Brundtland Report in 1987, may be put into practice by emphasizing this concept of" Exceed boundaries", in the sense that natural resources have been overused and the excessive economic growth has created an environmental imbalance. Table 1 shows the ranking of compound indexes and the main problems that they create within the three dimensions of Sustainable Development (Keiner, 2006).

Table 1 The ranking situation of compound indexes and critical problems

	Sustainable development		
	the environmental dimension	**the social dimension**	**the economic dimension**
critical problems	biodiversity air quality water quality soil quality energy resource usage climate changes	population health and safety education and knowledge welfare perception institutional capacity	**new materials and new energy** **economic exchange flux** **income distribution** **economic growth** **debt payment**
compound indexes	global warming the ozone layers reverse of the earth poles river pollution afforestation ocean fishing	life expectancy loss of earning capacity crime rate institutional participation literacy school drop-out	**the Gini coefficient (index of inequality)** **natural disasters damage natural** **increase in solid waste quantity**
data base	**Habitat**	**population**	**economic structure**

On the one hand, it is clear that the current model of global development poses a number of risky for future generations, ranging from the risk of a nuclear war to risk brought about by the volatility of international financial markets or the risk of flooding of megalopolis on the American or European coast. On the other hand, it is not clear how to reduce these risks, step by step, by starting from de current institutional, social, technological and cultural conditions.

It is clear that the risks mentioned before, can entail seismic waves that will affect all domains of the social and economic life all around the world. Europe cannot solve the problem of Sustainable Development on its own, neither can it give directions to the rest of the world on how this problem can be solved, it can nevertheless help by coming up with appropriate solutions to this global issue. In this context, education and research in support of Sustainable Development are a major opportunity for Europe and thus for Romania, as an EU member to take responsibility, along other states, as an equal partner in these global issues.

2. FACTORS THAT PROMOTE SUSTAINABLE DEVELOPMENT AT NATIONAL, EUROPEAN AND INTERNATIONAL LEVEL

In this respect, we have considered it would be an opportunity to study the horizontal factors that promote the Sustainable Development, from the point of view of science in service to the public good (Phillis, 2009). If we are to think logically about the factors that could influence Sustainable Development horizontally, we will discover that we have five structural factors-conditions in order to create a sustainable social economy that can also achieve the seventeen Sustainable Development Goals. These factors are as follows: (1) Education; (2) Science; (3) Technology; (4) Research; (5) Innovation. The five factors have been grouped according to three categories in order to be studied from the point of view of their output, due the determining connections between them, ranging from the level of understanding of the phenomena to their mutual interinfluence. These three categories will be analyzed in detail next (Munier, 2005).

2.1. Education. Easy access and mass participation to quality education are essential in order to be successful in a society that benefits from Sustainable Development, and education as part of the process prior to entering the labor market, has to become a process that will prepare future generations, in line with the challenges of the future, promoting innovation, meritocracy together with constructive thinking, giving way to inquisitives as well as empowerment behavior. This is possible in the next decades, yet being conditioned by all children's access to mass education, to early education that would result in professional skills witch are relevant in a changing society, based on Sustainable Development.

As a result of a study carried out by the European Union in 2017, the share of early leavers from education or school dropout stood at 18,1% of the school population. This rate decreased by

1,9% compared to 2006 and it was higher than the rate in the European Union, which stood at 10,6%. Obviously, school dropout represents one of the most serious problems that education has to cope with nowadays being closely linked to the economic and social situation of different groups. The school dropout rate is different in the eight development regions, as presented in figure 1.

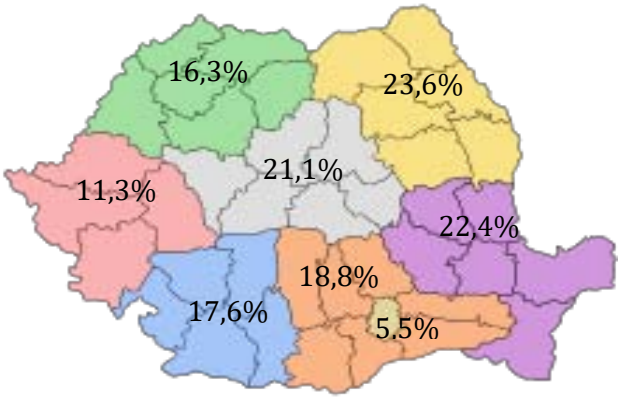

Fig. 1 School dropout rate according to development regions in 2017

This difference is caused by a number of factors, one of them being the poor social inclusion and employability in poorly industrialized regions. In predominantly agricultural regions the social failure of families appeared as a result of low income. In addition, monoparental and biparental work migration to other countries in the European Union appeared as a result of the need for a decent salary. As a rule, work migration in poorly industrialized development regions or in predominantly agricultural regions occurs among fit for work adults. Thus, school dropout is encouraged, by replacing parents' duties with children's duties for children's not older than 16.

Sustainable Development is a model to be followed, based on ethics and education for Sustainable Development and its goal is developing skills that help individuals to reflect on their own actions, by taking into account their present and future impacts, their social, cultural impacts and especially the economic, social and environmental impacts (Gibbs, 2008).

Table 2 Percentage of GDP on Education in Romania

Year	% of GDP for Education
2014	3,09
2015	3,24
2016	2,85
2017	2,86
2018	2,98
2019	3,02

According to EUROSTAT data, Romania has the lowest general government expenditure in the EU on education, a figure which is two times lower than the European average. Thus, the education budget accounts for approximately 3% of GDP, as it can be seen in Table 2.

2.2. Science and technology. Science and technology also have an important role among factors that can influence Sustainable Development, as they decisively determine and have a long term effect on economic growth at national and European level, due to the new concepts regarding the usage of "green" technology Add to this, using Artificial Intelligence, as a drive that turns our present society into an information society or a digital society in which creating, sharing and using the information has significant impact on the economic, political, social and cultural environment. Unfortunately, Europe is only in third place after USA and China when it comes to information technology and to using Artificial Intelligence (AI) in informational technology. Therefore, science and technology need to play a more important role as determining factors of Sustainable Development.

2.3. Research and Innovation. Research and innovation act as catalysts of transition to a society based on Sustainable Development, due to their more significant role in economy and society. They are analysis tools that assess the impact of change and ways for guaranteeing the fact that transition leads to improving our welfare in a society based on the concept of Sustainable Development. Also, these tools, namely research and innovation, allow as to save money due to technological innovations that help to increase the potential of production, due to reducing production costs, thus resulting in a smaller final cost of products. Bigger investment in research and technology will contribute to achieving long term political goals, such as those related to climate and environmental goals, by using" green" technologies or biodegradable row materials (SN CDI, 2007).

Europe has the intelligence and the necessary skills, as well as a native creativity which, combined with a completely reformed education system can change and bring about future change in world evolution. Due to the large community of researchers and inventors, who are also one of Europe's strong points, Europe has the chance to become a leader in developing and applying radically innovative solutions to support green

growth that helps inclusion in the EU, as well as social and economic worldwide as a social pattern. However, in order to fully take advantage of this potential, it is necessary the EU states should increase research expenditures. EU agreed that 3% of the GDP of EU states should be spent on research, development and innovation by 2020, but we are still far away from reaching that goal.

In Figure 2 we can see the evolution of the budget allocated to research and innovation in Romania between 2011 and 2017:

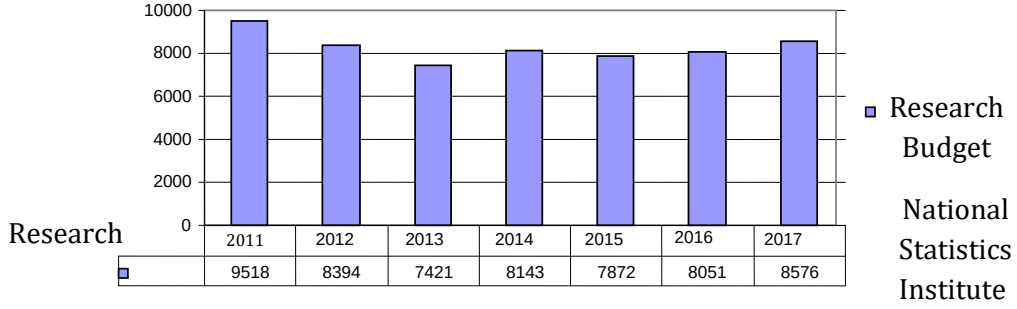

Fig. 2 Graph with Romanian budget allocation for research and innovation between 2011-2017

3. RESEARCH AND INNOVATION IN ROMANIA-DETERMINING FACTOR THAT SUPPORT SUSTAINABLE DEVELOPMENT

Research and innovation in Romania place our country in the category of modest innovators, occupying for many years one of the final positions in the European ranking, due to the law share of expenditures on research-innovation-development (RID), which has constantly stood below 0,5% of GDP. The duration and the negative effect of these negative developments have bad as a result the fact that research community in Romania is currently the largest scientific community in EU, whose activity has attracted attention even overseas (Rus, 2015).

This situation is due to the little interest that the economic environment has shown to the research-development activities in general, and to the ones carried out by their own effort in particular. Given that private investment in financing research due development projects is low, in order to support research, measures have been taken to increase the income of research-innovation-development (RDI) personnel, by Emergency Act 751 adopted by the Parliament on October 11, 2017, regarding the maximum level of which salaries are determined, and also by applying tax exemption for the income of research-innovation-development (RDI) personnel.

Also, measures have been taken to stimulate the research-innovation-development (RDI) in companies by means of direct finance tools, using National Founding Programs, research-innovation-development (RDI) Sectorial Operational Programs, loan guarantee instruments or venture capital investment and other tax relief schemes.

Major investments have been made in major infrastructures, included in international scientific circulation, specific to state-of-the-art technology, emerging in a major European project:

- ELI-NP Extreme Light Infrastructure-Nuclear Physics Project, with a high-power LASER and a high intensity Gamma-ray beams;
- The DANUBIUS Project and the International Centre for Advanced Studies on River-Sea Systems-DANUBIUS RI, a distributed research infrastructure that aims to develop interdisciplinary research on River-Sea Systems;
- The Project of the research-innovation-development (RDI) Institute: High-Tech products for Sustainable Development at Transylvania University of Brasov (ADRC, 2016).

Another goal of European Union is increasing the budget allocated to research by 30% every year, by ensuring a balanced budget distribution, meant to support both the applicative research and innovation, the fundamental and the border research and focusing on Smart Specialization domain that have growth potential (Dobrescu, 2007). Developing Sector programs that finance applicative research is made from the state budget, and also by encouraging private investment and by developing partnerships in this sector. A member of goals has been set for 2030 as follows (Caloghirou *et al.*, 2004):

- Modernizing and developing the quality, durable, strong and reliable infrastructure, including the regional and cross border infrastructure, in order to support the economic development and people's welfare, focusing on mass equal access for all people;
- Improving road safety;
- Redeveloping industries in order to make them sustainable, showing high efficiency in using resources and adopting new technology and clean and environmentally-friendly industrial processes,

as all countries should take proper measures, according to their own capability;

- Stimulating digital economy and industrial investment in particular, that would bring more value, thus capitalizing on the national research-innovation-development (RDI) efforts and that are aimed at stable and developed market;
- Developing scientific research, modernizing technological capabilities of industrial sectors;
- Encouraging innovation and increasing the number of people working in research and development and increasing public and private expenditures on research and development;
- Promoting inclusive and sustainable industrialization and increasing the occupancy rate;
- Increasing the access of small industrial business to financial services, including accessible loans, and integrating then on global markets and value chains.

4. ANALYSING SOLUTIONS PROVIDED BY LOCAL AND REGIONAL UNIVERSITY RESEARCH TO BUSINESS ENVIRONMENT THAT SUPPORT THE SUSTAINABLE DEVELOPMENT

In Romania there are currently over 560 faculties in over 40 universities, but their number has decreased by 100 mainly due to, first of all, the small number of students, and secondly because of the stricter and stricter conditions imposed by ARACIS (The Romanian Agency for Quality Assurance in Higher Education) in order to approve an academic programme. In figure 3 it is shown the number of faculties, which has seen a constant decrease, compared to 2011.

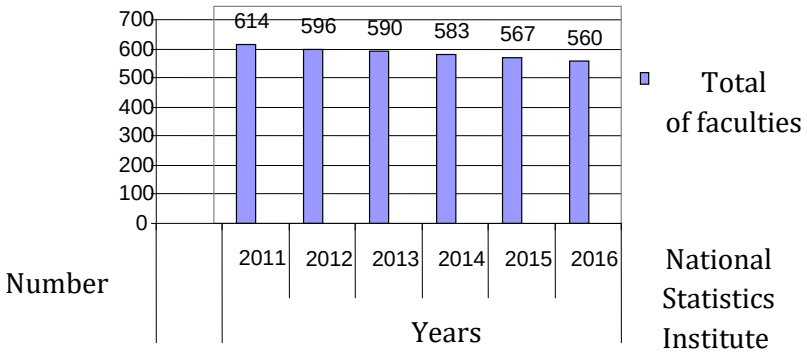

Fig. 3 Graph with decreasing of total number of faculties between 2011-2016

Domestic university research still plays a minor role in economic development, the transfer of results and applying them in economy being a slow and difficult process. Re-establishing a strong connection between research and economy and increasing innovation are means that ensure a Sustainable Development of the economy in the Central Region thus some recent initiative proving that promoting such a development model is desired.

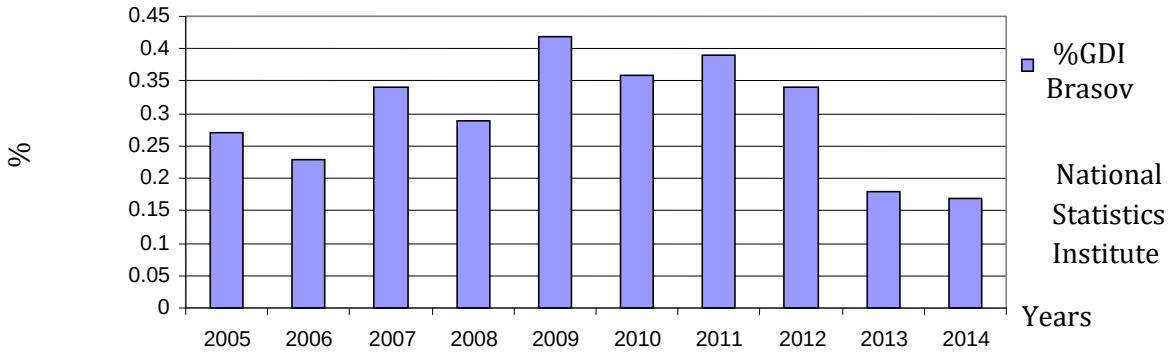

Fig. 4 Graph with research expenditure in Brasov between 2005-2014-percentage of GDI

In order to become more competitive from an economic point of view, the Central Region has to stimulate research and innovation and the available human resource should be better used, Generic technologies, the new information and communication technologies, the eco-technologies, the creative industries are key-domain that the Central Region has to focus on. Innovation and research should not be restricted only to the economic sector, but they should find practical application in as many areas of society, with positive effects on people's life. In figure 4 it is shown the research expenditure in Brasov, starting with 2005 and until 2014 as a percent of GDI.

It is obvious that there was an increase in the research expenditure before 2009, the year when the research crisis happened. After 2009 [9], there was a drop in the expenditure. The situation improved in 2017 when the GDI also saw a significant rise (SN CDI, 2014).

Active involvement in research of researchers, companies and business support structures, of public authorities and universities represent the key to success of any endeavor that aims at increasing the role of research and development of the economy in the Central Region. In figure 5 we can observe the changes in the financing of research in Central Region compared to Brasov.

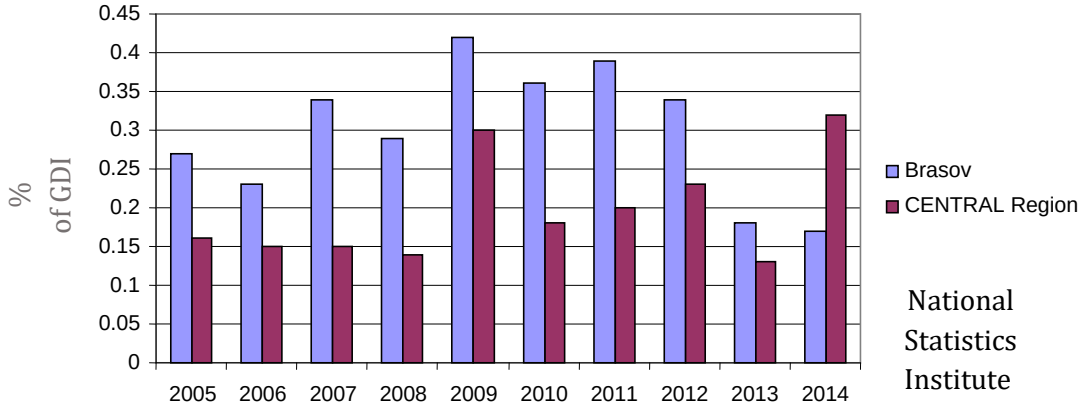

Fig. 5 Graph with comparison of financing research in percentage of GDI between Central Region and Brasov

Researchers, research companies and local companies are, at the same time, beneficiaries of this financing and the main innovation agents, but the snowball effect should also be taken into consideration.

In the Central Region, clusters have the highest contribution to supporting research, innovation and technology transfer. A society based on Sustainable Development can only by successful there is a transfer of ideas from the field of research and innovation to organizational or local society in order to help businesses to reinvent themselves by using new discoveries in their field of work. It is a well-known fact that we have to come up with solutions in order to increase the process of technology transfer to local economic businesses.

Firstly, in order to improve technology transfer, a first strategic step has been taken by setting up the Transylvania Cluster Consortium in Seventh Central Region that currently has 21 clusters, the main fields of activity being tourism and health care, food industry and agriculture, renewable energy, creative industry, wood and furniture industry, textile and clothing industry, space industry, mechatronics, electrical industry and metal industry, which are actually priority areas or successful areas in the Central Region.

The term" innovation" is more and more frequently used in the European Union, due to the setting up of clusters in industry economy or innovative industry. Innovation represents introducing a new product, a new or significant improved process, a new organization method or a new marketing strategy.

Innovation must have new characteristics or new usage intentions that lead to a significant improvement compared to what was used or sold by the industry. However, an innovation can fail or may take time in order to prove its technical and economic efficiency.

Innovative companies are active companies that have launched products (goods or services) that are new or significantly improved, or have introduced new or significantly improved

processes, together with new organization or marketing methods.

Thus, using the only available data provided by the National Institute of Statistics, in figure 6 it can be seen that when it comes to innovative companies, Centre Region hold the third position in the national ranking of the Development Region. Also, the ranking is the same, regarding the product/process innovation aspect. As far as organization and marketing innovation is concerned, Centre Region is on the seventh position at national level.

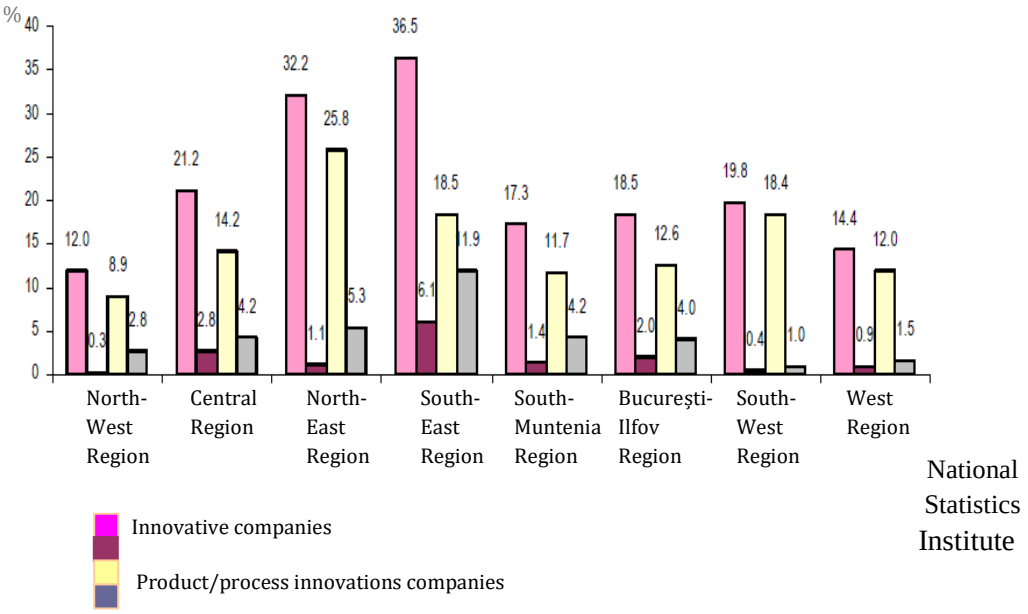

Fig. 6 Graph with the percentage of innovative companies according to types of innovations and development regions, between 2010-2012

Secondly, local and regional economic development must be supported by setting up business entities that would offer companies certain business facilities and services, as long as they put into practice the concept of Sustainable Development.

Over the last 15-20 years there have been attempts to set up a new business infrastructure that would meet the specific need of the investors, one that is made up of technological and industrial parks, business centers, etc. Industrial parks have a special place in the business structures, so that in the Central Region there are 11 such industrial parks [12], some of them coming into being on former industrial sites belonging to different business that were had been sold off or artificially bankrupted due to the real estate bubble between 2005-2008.

The most recent example is the first Business Center, technology transfer and business incubator (CATT) in Brasov which was inaugurated on November 11, 2018, built in Bartolomeu Nord neighborhood, near the Institute for Research and Development of Transylvania University and near the future site of Regional Hospital. The Business Center, technology transfer and business incubator (CATT) is a major investment founded by the Regional Operational Program 2007-2013 Priority 1-" Support for sustainable development of urban growth poles"-key area of intervention 1.1-Integrated plans of urban development, Sub-the poly growth, and by the local budget. Initially the project began in 2014 and the total value of the construction work and commissioning was 64,495,761.87 RON, out of which 8,542,264.36 RON were from grants, the remainder being supported by the local budget. Business Center, technology transfer and business incubator (CATT) aims at becoming one of the key points Brasov and Central Region business map.

Supporting the activity of innovative clusters, business centers, technology transfer centers and business incubators as well as other economic cooperation structures, has to be based on a diversified and modern infrastructure, endowed according to the European standards both at regional and local level. Expanding and supporting the activity of innovative clusters, of business centers, technology transfer center, business incubators and other structures and cooperative networks, as well as economic promotion activities in the Central Region, are also a necessity. Also, it is appropriate to promote as efficiently as possible, all structure and cooperation network, as catalysts

for economic development and smart specialization in Central Region.

5. PROPOSAL FOR SOLUTIONS TO ACCELERATE TECHNOLOGY TRANSFER AND INNOVATION IN REGIONS THAT EMPLOY SUSTAINABLE DEVELOPMENT STRATEGIES

We, therefore, put forward the following immediate measure in order to accelerate the technology that is necessary for the innovation of business in Central Region: (1) Developing the new technology transfer centers and innovation centers; (2) Supporting research-based business (spin-off, innovative start-up, companies which are active in the field of research).

The following measures are to be put into practice in order to support Sustainable Development:

- Short-term measures:
  - Measures that can be put into practice by means of punitive legislation, namely by developing the legal framework, which means to aligning the Romanian legislation with the European Sustainable Development legislation;
  - Stimulating legislation, namely harmonization of financing tools to the specificity of the Development Region with a view to increasing the material welfare of the local and regional economic actors.
- Long term measures:
  - Stimulating the marketing by advertising products, technologies and equipment that are in support of the environment and the Sustainable Development;
  - Environmental education at pre-university and university education level, to support a society aiming at Sustainable Development;
  - Involving NGOs in" NGO21" projects, namely getting NGOs involved in Education for Sustainable Development policy. This type of project is an initiative of the" Reper 21" Association (partnership leader) and it is implemented in partnership with the Civilian Society Development Foundation. The project is founded by the Operational Programs " Administrative Capacity" in the period 2014-2020 and its main goal is to improve the participation of the NGOs to working and promoting government policies related to Sustainable Development Education.

At the level of the central Region, other public or private institutions that could benefit from developing or creative RDI infrastructures are in the field of industry, technology, environment, energy, agriculture, education, social care etc. Thus, in this domain, some immediate measures can be taken in order to increase the number of RDI units within public or private institutions. Therefore, in order to develop RDI activities at regional level, we are putting forward the following proposals: (1) Developing RDI infrastructures by renovating, arranging, expanding, modernizing and equipping them within public entities (universities centers, research institutes); (2) Enabling the creation of partnerships between the research institutions; (3) Efficient integration of research institutions in the Central Region in international network;

The best valorization of the potential of the Central Region researchers must be based on supporting creating and developing high level scientific and technological competencies centers that would meet the economic and society challenges in line with the Sustainable Development tendency.

Also, it is necessity to support the most talented and creative researchers (especially the young one), including those who have earned their PhD and who are actively involved in public and private institutions that do not have as main activity research funded by grants, scholarships etc. More researchers have to be evolved in projects and partnerships between the academic and business environment whose main goal is to contribute to the progress of science and economic growth. Last but not least, supporting the geographical mobility of researchers by giving them access to mentoring and the research infrastructure of the European Union, provides the opportunity of continuous development and correlating the competences of the Romanian researchers to international standards , in order to offer society research products which are similar to those of the European researchers, in line with the European integration and with turning the Romanian society into one based on Sustainable Development.

6. CONCLUSIONS

Within the knowledge Triangle between Research-Education-Innovation, which is the foundation of a society based on Sustainable Development, university have a key role by generating new knowledge, by forming highly qualified human resources, by knowledge transfer and innovation diffusion towards the social and economic environment. Thus, universities have to be evaluated from the point of view of Sustainable

Development, of education, of research-development and innovation, of the impact of the results on the Sustainable Development economy based on knowledge. By completing the Research-Education-Innovation correlation, a high-quality education system means a high level of scientific production based on quality, quantity and easy transfer of know-how al the social level, as well as a significant contribution to the process of turning the society into one that has Sustainable Development as its driving force.

Creativity and the innovation capacity of university have to be restated and we have to get over the apathy moment caused waiting for financial or financing opportunities by overcoming difficulties by expanding the research end the innovation horizons. This can also be done by means of a substantial investment in the human capital and research, namely young researchers. Reaffirming the recent tendency to open innovation and Sustainable Development, new types of cooperation between education institutions, research institutes and business and increase in the knowledge transfer. All these have been possible due to knowledge transfer in society and to direct or indirect cooperation with economic companies contributing to the development of the intellectual capital and to the increase in industrial productivity by setting up new companies in line with a Sustainable environmental society, connected to social realities.

It is therefore important to point out that reaching the European standards related to increasing competitiveness and improving the quality of life, depends mainly on the progress of science and on moving to more and more modern and performant means and technologies. This thing can only be accomplished where there is an institutional dynamic which means harmonization of the legislation that apply to research in the European Union, as well as proper financing of research.

At national and regional level, financing will be possible by using financial resource from the state budget or from private sources. A proper measure would be setting up Regional Innovation Centers that would be interconnected to National Innovation System and that would include connections between all the actors involved in the innovation process. Thus, a National Network of Innovation Regions can be set up in the future, on that is interconnected and founded by the local budget or from the external sources that will be interconnected to the European Innovation Network, thus benefiting much fasters from the latest tendencies in innovation in the European Union.

The interest I took in this research topic motivates me to further my research, namely to attempt a quantitative study on innovation in Central Region.

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