THE ROLE OF SMART SPECIALISATION IN REGIONAL DEVELOPMENT

ROLUL SPECIALIZĂRII INTELIGENTE ÎN DEZVOLTAREA REGIONALĂ

PISICĂ RODICA, masterandă
Programul: Tranzacţii Internaţionale şi Diplomaţie Economică
Academia de Studii Economice din Moldova
Republica Moldova, Chișinău, str. Bănulescu-Bodoni 61, www.ase.md
e-mail autor: pisicarodica@gmail.com

Abstract. *Specializarea inteligentă reprezintă o formă a sistemelor inovaționale regionale scopul căreia este de a oferi o abordare complexă menită să contribuie la realizarea obiectivelor de creștere economică ale statelor. În vederea plasării specializării inteligente în context, am analizat inovația ca concept și am definit modelul triplu helix, care stă la baza specializării inteligente, explicând totodată noua tendință către modelul cvadruplu helix. Au fost analizate strategiile inovaționale regionale și clusterele, definiția specializării inteligente precum și procesul de descoperire antreprenorială, care reprezintă elementul de bază al Strategiilor de Cercetare și Inovare pentru Specializarea Inteligentă (RIS3). În urma cercetării aspectelor menționate, am obținut o bază solidă pentru analiza datelor cu privire la investițiile UE în cercetare și dezvoltare per ansamblu și ale fiecărui stat membru ca % din PIB și a resurselor atrase de la Fondul European de Dezvoltare Regională ca indicator prezumptiv al eficacității specializării inteligente.*
Cuvinte cheie: *specializarea inteligentă, sisteme inovaționale regionale, triplu helix, cvadruplu helix, descoperire antreprenorială, cercetare și dezvoltare, Fondul European de Dezvoltare Regională.*

CLASSIFICAREA JEL: R 10; R58; O 10; O18; O30

INTRODUCTION

Once the Horizon 2020 has been implemented, the EU countries are now assessing whether the targets have been met, what the current trends in R&D are and how these evolutions were conditioned by the smart specialisation strategy, as well as the lessons learnt that could be used in the implementation of the subsequent programme - Horizon Europe.

The main objective of our research is to analyse the role of smart specialisation in regional development by considering the amount of funding channelled from the European Regional Development Fund (ERDF) towards the EU member states. The rationale of this correlation resides in the fact that the identification of priority R&D investments areas through smart specialisation is an ex-ante precondition for the regions to access the ERD funding. Another objective of our research as related to smart specialisation is to provide an overview of the Research and Development (R&D) investments by the country/region and to draw some conclusions about the R&D investment trends. In order to achieve accurate conclusions, we look also into the smart specialisation concept and the context in which it is viewed and analysed.

In addition, as the smart specialisation concept originated from the "productivity gap" noted between the EU and the USA, and the reason of the gap was inter alia considered to be the scarce investments in area focused R&D, in this research we will analyse the current position of the EU as compared to the USA, China and Japan, that are leaders in this respect.

The paper is structured in the following way: Introduction; Literature review; The role of R&D investments and smart specialisation in EU: Research methodology; Results of data analysis on R&D investments and ERDF implementation; Conclusions and References.

LITERATURE REVIEW

Smart specialisation is a concept that has gained a large popularity among researchers. Due to its practical utility, the application of the concept has gone far ahead of its theoretical basis. To get a better understanding of the place of smart specialisation in the overall regional innovation system and to

provide a theoretical and analytical foundation for the concept, in an attempt to catch up with its practical widespread, a number of researchers have devoted their works to studying the concept from different perspectives. For instance, Foray *et al*. (2007), who is considered one of the contributors to the academic spread of the concept and who devoted many of his researches to smart specialisation (SS), argues that SS in an integrated research area is crucial for attracting more R&D to Europe [1]. Based on this assumption, Foray (2009) is further trying to define the concept of smart specialisation analysing it in the light of the European policy on Research, Technology and Development. The focus is again on regions for which smart specialisation is vital if they seek to keep abreast with the changes brought about by the progress of the European Research Area [2]. However, some researchers like Charles et al. (2012) were still wondering if smart specialisation was a strategy for all regions. They argued that even though each region sets from a different starting point and has different strategies depending on their characteristics and path, not all of them are able to comply with the requirements and in the article, the feasibility for those regions to follow this model is analysed [3].

In the same order of ideas, Benner (2014) refers to smart specialisation as a major pillar of EU structural funds in the program period from 2014 to 2020. In his article, the author proposes a new term, that of "smart experimentation" which aimed to complement smart specialisation that would focus on micro-level dynamics to provide the base for experimentation [4].

Over the RIS3 implementation period, some challenges faced by less favoured regions were noted, therefore, Kroll (2017) in his research attempted to reveal the bottlenecks that less developed regions are dealing with while trying to implement the smart specialisation strategy [5].

At the same time, Uyarra *et al* (2018) are looking into the capacity of RIS3 to contribute to inter-regional connectivity making use of an outward looking approach to cooperation that RIS3 policies foster. Original data collected from a survey of EU regions and neighbouring countries and supplemented by interviews are used to support the conclusions of the research [6].

Further on, Gianelle *et al* (2020), in their article, tried to "strike a balance" in the smart specialisation experience after six years since the incorporation of the concept in the EU Cohesion Policy and since it became an important component of the innovation policy in European regions and countries. The authors claim that in the post COVID-19 era, the smart specialisation approach with its place-based industrial and innovation policies, might play a crucial role in promoting innovative activities to help the regions to discover opportunities "for more sustainable and inclusive economies" [7].

Innovation, research and development are undoubtedly the drivers of economic growth, whereas smart specialisation is a concept that targets harnessing the regional potential in achieving growth through R&D, making good use of entrepreneurial discovery process. The concept of innovation stems from the idea of continuous improvement. As stated by Langvik *et al* quoting Gustavsen *et al*. innovation "has placed change in the driver's seat of economic policy"[8]. In addition, Gordon *et al* (2005) point out at three common, identifiable features of all innovation, which are newness, improvement, and overcoming of uncertainty [9].

As for the innovation process, the model that lays at the basis of smart specialisation is the triple helix model (Leydesdorff/ Etzkowitz (1996)) [10]. The triple helix model is based on the assumption that interactions between science, industry and government are crucial factors determining conditions for an innovation process [10]. However, the latest tendency has been to extend the triple helix model to the so-called quadruple helix approach assuming that by generating demand, the society is a key actor in the innovation process along with academia, industry, and government [11].

One of the embodiments of regional innovation systems is smart specialisation. According to Doloreux *et al* (2005) the concept of the regional innovation systems "is typically understood to be a set of interacting private and public interests, formal institutions, and other organizations that function according to organizational and institutional arrangements and relationships conducive to the generation, use and dissemination of knowledge"[12].

The concept of smart specialisation is closely linked to regional clusters and the cluster policies are thought to bring a potential contribution to the design and implementation of Smart Specialisation Strategies. A cluster has been defined as "a geographically proximate group of interconnected companies, suppliers, service providers and associated institutions in a particular field linked by

externalities of various types" [13]. As pointed out in the definition "geographical proximity" is a core prerequisite for a cluster, which should be understood as going beyond the geographical dimension and comprising cognitive, organizational, social and institutional components [13].
In this order of ideas, in the interrelation between regional innovation systems, clusters and smart specialization strategies, the clusters are nodes that might become part of the regional innovation system, whereas smart specialization strategies represent policies with a wider application meant to transform the so-called eco-system [13]. As for the relationship between clusters and smart specialization, in particular, it could be stated that clusters represent important constitutive elements in the design of smart specialization strategies.
On the Smart Specialisation Platform (S3Platform), which is a platform of services to support regions in their efforts to develop and implement a smart specialisation strategy, smart specialisation is defined as "a place-based approach characterized by the identification of strategic areas for intervention based both on the analysis of the strengths and potential of the economy and on an Entrepreneurial Discovery Process (EDP) with wide stakeholder involvement. It is outward-looking and embraces a broad view of innovation including but certainly not limited to technology-driven approaches, supported by effective monitoring mechanisms" [14].
There are several elements in the definition above that can be highlighted. Firstly, smart specialisation rests on "a place-based approach" which means that it focuses on the potential of a certain, specific region. Then, in this specific region, "strategic areas" are identified by which one can understand the areas with economic potential, with certain strengths and competitive advantage over the other areas and regions and where the competitive advantage is reached through innovation and by a "wide stakeholder involvement"; the whole process being well managed due to "effective monitoring mechanisms" in place.
Another crucial process that is associated with smart specialisation is the entrepreneurial discovery process (EDP). The EDP, considered to be one of the pillars of the Smart Specialisation approach, has been defined by some authors "as an inclusive and interactive mainly bottom-up process in which participants from policy, business, academia, as well as other sectors, engage with each other to identify potential new activities and opportunities" [15].
From the regional perspective and in the light of the "learning regions" concept, the entrepreneurial discovery was defined as "a learning process by which a region gradually discovers which should be their priorities in R&D and innovation linked these to the ability to transform the current economic structure orientated to maintaining a path of growth and employment" [16]. Any definition though assumes that EDP should be led by entrepreneurs.
To sum up, we can conclude that innovation, research and discovery can be achieved through smart specialisation with its associated elements that include innovation processes and models, clusters and EDP.

THE ROLE OF R&D INVESTMENTS AND SMART SPECIALISATION IN EU: RESEARCH METHODOLOGY

Research and development (R&D) investments are key in developing an innovation-driven economy. However, the investments in R&D should be targeted and focused and smart specialisation strategies comes in to help the states identify the priority areas for these investments.
In our research, we aim at analysing the role of smart specialisation as expressed in R&D investments and the level of implementation of ERDF by the EU member states. In order to assess the overall R&D investments situation in EU we shall compare it to that of the leading countries in this field (Japan, the USA and China). Further, we will analyse the R&D investments as relative to GDP by EU countries and the R&D investments by sector. Subsequently, the status of the ERDF implementation by EU member states and each EU country separately will be looked into in order to infer the role of smart specialisation as one of the ex-ante conditions to access these funds. To this end, we shall analyse the data provided by EUROSTAT and the European Commission data on European Structural and Investment Funds. In addition, data to compare the planned, decided and spent ERD funds, as a total per EU member states and per each individual country will be considered.

The methodology selected for this research aims at achieving the objectives set forth in the introductory part. As smart specialisation has to be seen in the context of a system that includes R&D, regional innovation systems, clusters and EDP, in the literature review section we have provided an overview of these concepts and have tried to show how they relate to smart specialisation. The concept of smart specialisation has been analysed and defined and the grounds for the emergence of the concept have been provided. This overview has ensured a solid basis for drawing conclusions related to the scope of our research. The research is restricted from the geographical point of view as we are referring to EU member countries and specifically to the regional development. Moreover, the research is restricted from the thematic point of view as we specifically look into data on R&D investments in EU, and ERDF as the source of funding for regional development the access of which is ex-ante conditioned by setting R&D priorities through smart specialisation. Analysis and synthesis are the main tools the author resorts to in this research.

The information used in the research paper derives from expert articles, analysis, reports and from the data retrieved from the official EU webpages and platforms. Quantitative data provided by Eurostat on R&D investments and by the European Commission on ERDF implementation will be further analysed and interpreted to meet the objectives of our research. The results of the research will be summed up and conclusions will be provided.

RESULTS OF DATA ANALYSIS ON R&D INVESTMENTS AND ERDF IMPLEMENTATION IN THE EU

Statistical data has been analysed in order to see the real picture of current R&D investments and subsequently, the implementation of ERD funds, which are accessed based on the smart specialisation strategy. As the data show, the overall investment in R&D in EU is on a positive trend. In line with the data provided by Eurostat [38], the gross domestic expenditure on R&D as related to GDP has risen from 2014 to 2018 (the latest available confirmed data). A steady gradual increase has been noted from 2,10 % in 2014 to 2,18 % in 2018 with a slight decrease of 0,01 percentage points in 2016 (2,12%) as compared to 2015 (2,11%). However, in comparison with other leading countries in R&D investments, it can be noticed that even though EU investment in research and development as percentage relative to GDP is slightly above that of China's (2,14 % of R&D in 2018), it is still lagging behind Japan (3,28% of R&D investments in 2018) and the USA (2,82 p.p. in 2018). Nevertheless, the discrepancy is not too big.

A closer look at the gross domestic expenditure on R&D as % of GDP, lets us notice that among the EU 27 countries, the top 5 countries that invested the most in R&D, as relative to GDP in 2018, are Sweden (3,32%), Austria (3,14%), Germany (3,12%), Denmark (3,03%) and Finland (2,76%). Thus, four of them already in 2018 achieved and even exceeded the target of 3% that had to be reached by 2020. At the same time, we can't help noticing that two of the 5 top countries have showed a decrease in R&D investments as compared to 2008, Sweden (-0,15%) and Finland (-0,78%) [38].

Concurrently, the five EU-27 countries that invested the least in R&D in 2018 are Romania (0.50% of GDP, down by 0,05 since 2008), Malta (0,60% of GDP, up by 0,07 since 2008), Cyprus (0,63% of GDP, up by 0,24 since 2008), Latvia (0,64% of GDP, up by 0,06 since 2008) and Bulgaria (0,76% of GDP, up by 0,31 since 2008) [38]. Moreover, as many as seven EU countries have shown a decrease in the R&D investments since 2008 (Sweden- down by 0,15%; Finland – down by 0,78%; Portugal-down by 0,08%; Spain-down by 0,09%; Luxembourg- down by 0,41%; Ireland- down by 0,40% and Romania- down by 0,05%) [38].

Thus, as per the 2018 data, it is unlikely that by 2020 the EU achieved the 3% target of R&D investments relative to GDP set in the Europe 2020 Strategy if we take into account the gap between the top EU countries in terms of R&D investments and the ones that are showing a lower performance. Moreover, the restrictions related to the COVID-19 pandemic situation that affected the economy of the EU countries should have had a negative impact on R&D investment results in 2019-2020. In this context, the European Commission predicted in late March 2020, a decrease of €3.9 billion (1.3 per cent) in R&D investments.

If we look at the overall EU-27 investments made in R&D by sector, in 2018 as % of GDP, we will

notice that the sector that invested in R&D the most was the Business enterprise sector (1,45 %) followed by the Higher education sector (0,47%), the Government sector invested as much as (0,25%) and the Private non-profit sector (0,01%). Also, the investments in R&D by the business enterprise sector has followed an upward trend since 2008 whereas the other sectors have invested almost the same amount since 2008 with no particular increase or decrease trend (Eurostat, 2020) [38].

Now that we know the R&D investment situation in the EU, in order to assess the contribution to growth that smart specialisation has brought about, we shall analyse the volume of funding that EU-27 member states attracted through ERDF, which is part of European Structural and Investment Funds (ESIF) and is the core fund for regional development. The rational to focus on the ERDF is twofold, on the one hand, smart specialisation is an instrument that focuses on regional development and on the other hand, the access of ERD funding is contingent upon the implementation of smart specialisation strategy. Therefore, in order to assess the effectiveness of smart specialisation in the EU member states, we will consider the amount of ERDF accessed by particular member states.

According to the information presented in **Figure 1**, the investment progress of ERDF is based on three variables: planed, decided and spent funds. As we can see, the total planned investments amount, including EU and national financing, as of 31.12.2020 was of € 277.7 BN (100%). The total allocated funds on selected projects exceeded the planned volume and amounted to € 301.4 BN (109%). Whereas the total investments expenditure that has been reported by the selected projects so far, total € 140.3 BN (51%). Thus, on the one hand we notice an increased interest of the EU countries in the regional development as the decided volume exceeds (by 9%), the one originally planned. On the other hand, we can infer that there are many high-quality projects in the EU regions, which indirectly points at an effective application of the smart specialisation concept that is a conditionality for attracting funds from ERDF to the regions.

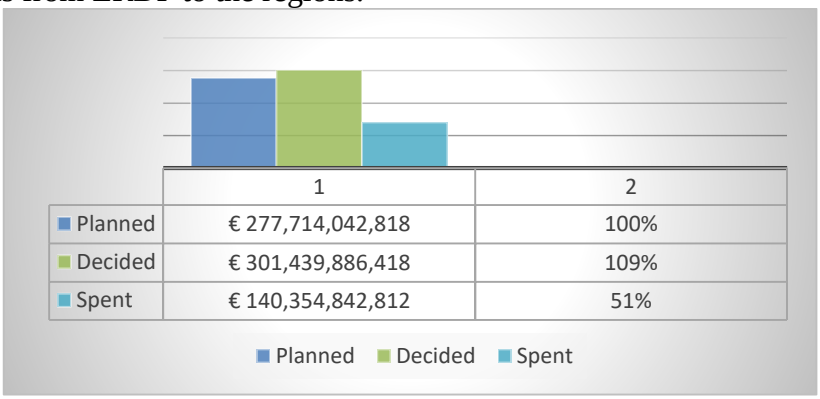

Figure 1. Implementation of ERDF for EU Overview, (Total Cost), % of Planned (period covered up to 31/12/2020)

Source: *Developed by the author based on the data from the European Commission European Structural and Investments Funds Data [39]*

In the context of the researched topic, it is also interesting to analyse the top 5 EU countries in terms of ERDF decided and spent funds. As well as, to consider the 5 EU countries that rank low with regard to the ERDF amounts decided and spent.

In the figure 2 the funding decided for and spent by the following top 5 EU countries, Portugal (decided 149%; spent 66%), Greece (decided 148%; spent 61%), Netherlands (decided 129%; spent 72%), Romania (decided 129%; spent 37%) and Cyprus (decided 126%; spent 64%). The fact that these countries are at the top in terms of decided ERD funds implies that they have the highest number and quality of regional projects, which indirectly points at a good implementation of smart specialisation, the implementation of which is an ex-ante requirement for accessing funding from the ERDF. It could be also noticed that besides Romania, the countries are also doing well as regards the implementation of the projects as they spent over 60% of the decided funds.

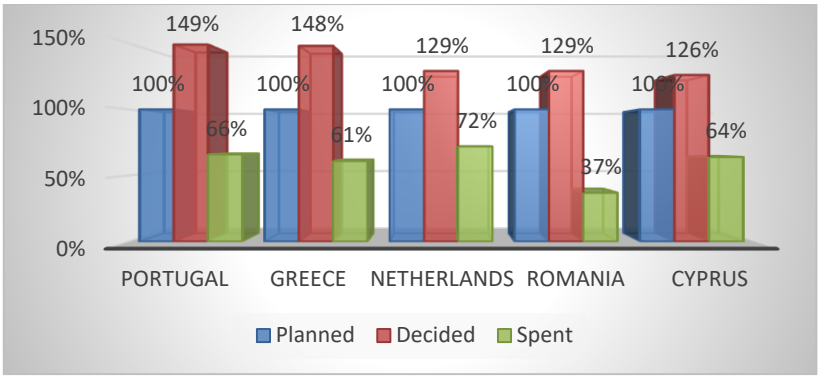

Figure 2. Top 5 EU countries in terms of decided ERD funds, including percentage of planned and spent funds (%), (period covered up to 31.12.2020)

Source: *Developed by the author based on the data from the European Commission European Structural and Investments Funds Data [39]*

With regard to the funds spent, the top 5 countries are Netherlands (decided 129%; spent 72%), Portugal (decided 149%; spent 66%), Finland (decided 101%; spent 65%), Cyprus (decided 126%; spent 64%) and Bulgaria (decided 93%; spent 62%) [39]. In the case of Finland and Bulgaria a higher implementation rate might be due to lower decided amounts as compared to other EU countries with a lot more funds allocated yet showing a lower spent percentage. At the same time, it is worth noting that Netherlands, Portugal and Cyprus are in the top 5 EU countries in terms of decided funds, are also in the top countries as related to the spent amount, which suggests a high overall performance related to regional development and implicitly suggests that the smart specialisation concept is applied successfully.

Concurrently, in the chart below we can see the amount of ERD funds accessed by the five countries, which have benefited the least from funding through ERDF. These are: Ireland (decided 66%; spent 40%), Spain (decided 91%; spent 35%), Bulgaria (decided 93%; spent 62%), Slovakia (decided 95%; spent 31%) and Malta (decided 97% and spent 58%)(see Fig.3**)**. Form the chart we notice that Slovakia, Spain and Ireland show both low performance in terms of attracting ERD funding and in implementing the funds. This might be an indication of low performance regarding the implementation of the smart specialisation strategy. On the other hand, Bulgaria, is in the top 5 EU countries in terms of spending the attracted ERDF and thus in the implementation of the projects, but the decided funds for the country are among the least. One of the causes might be the insufficient or a low quality of the project proposals.

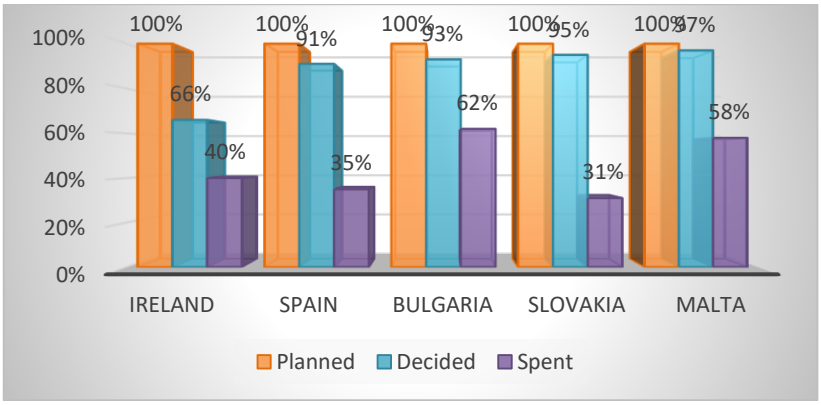

Figure 3. Implementation by 5 EU countries least performing for ERDF, in terms of decided funds, including data on planned and spent funds (period covered up to 31.12.2020)

Source: *Developed by the author based on the data from the European Commission European Structural and Investments Funds Data [39]*

As for the five EU countries that spent the least from the decided ERD funds, the following can be mentioned: Slovakia (decided 95%; spent 31%), Spain (decided 91%; spent 35%), Romania (decided 129%; spent 37%), Belgium (decided 101%; spent 43%) and Ireland (decided 65% and spent 40%).

It is interesting to note that even though Romania is in the Top 5 countries that have showed the best performance in terms of decided funds (number and quality of projects), in terms of implementation and therefore consumption of resources it is lagging behind. As for Slovakia, Spain, and Ireland they rank the lowest in both attracting and spending funds from ERDF, which makes us believe that they should be showing low results in the implementation of their RIS3 strategies [38].

From the above data, we can presume that since the access to the ERD funding is contingent upon the implementation of smart specialisation, the implementation of RIS3 is in full swing and most of the countries are doing well in developing regions through smart specialisation. The reasons why some of the countries have accessed and implemented less ERD funds might be due to insufficient absorption capacity, low number and quality of projects and implicitly, a low performance regarding the smart specialisation.

CONCLUSIONS

The research performed allows us to highlight the following conclusions:

1. The gross domestic expenditure on R&D relative to GDP has risen from 2014 to 2018. However, as compared to other leading countries in R&D investments, even though EU R&D investments is slightly above that of China's, it is still lagging behind Japan and the USA. Nevertheless, the discrepancy is not too big and the trend is positive.

2. The gross domestic expenditure on R&D as % of GDP among the EU-27 countries has revealed that the top 5 countries that invested the most in 2018 are Sweden, Austria, Germany, Denmark and Finland. Four of them already in 2018 achieved and even exceeded the target of 3% that had to be reached by 2020. At the same time, two of the 5 top countries have shown a decrease in R&D investments as compared to 2008, i.e. Sweden and Finland.

3. The EU member states that invested the least in R&D in 2018 are Romania, Malta, Cyprus, Latvia and Bulgaria.

4. As of 2018 data, it is unlikely that EU achieved by 2020 the 3% target of R&D investments relative to GDP set in the Europe 2020 Strategy. Moreover, as many as seven EU countries have even showed a decrease in the R&D investments since 2008.

5. The sector that invested in R&D the most was the Business enterprise sector. In addition, the investments in R&D by the business enterprise sector has followed an upward trend since 2008, whereas the other sectors have invested almost the same amount since 2008 with no particular increase or decrease trend.

6. Given that the decided volume of ERD funding for certain EU member state exceeds the one originally planned, we can infer that there are many high-quality projects in the EU regions, which indirectly points at an effective application of the smart specialisation concept that is a conditionality for attracting ERD funds.

7. Implicitly, since the access to the ERD funds is contingent upon the implementation of smart specialisation, we can presume that the RIS3 is in full swing and overall, it is being implemented well, as all of the EU member states have managed to access a certain volume of ERD funding.

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Coordonator științific: CRUDU Rodica, dr., conf. univ.
Academia dem Studii Economice din Moldova,
Republica Moldova, or. Chișinău, str. Bănulescu-Bodoni, 61, www.ase.md
e-mail: crudu.rodica@ase.md