Prof. Rossitsa Chobanova, Dr. Ec. Scs.

RESEARCH AND INNOVATION POLICY: TOWARDS SMART SPECIALIZATION FOR ECONOMIC DEVELOPMENT OF BULGARIA

The discussion is about a formation of an smart specialization as a core policy for contemporary economic development of Bulgaria under the accelerating global changes in the applied technologies. The main problem of this policy is defining its purpose, priorities and criteria for their determination within the specific national research and innovation promotion policy, characterizing and estimating the policies, applied in Bulgaria to promote scientific research and innovations during the first programme period 2007 - 2013 from the EU membership of Bulgaria as well as their effect on the innovation performance of the country. The analysis is based on the EC and national framework regulatory documents and on the results of the Operational Programme "Competitiveness" at the end of the programme period. The reliability of the conclusions is achieved by means of various methods of evaluation of the research and innovation promotion policies. It is proven, that the objectives of the current research and innovation policy have not been achieved, mainly due to the lacking scientifically verified national concept on the development of economy, as a result of a deficiency in the economic theory and the inadequate research potential. The concept and the policy has been developed in view of the smart specialization of Foray, that has become a generator of the new EU approach in generating the innovation policy during the second programme period until 2020, applied as defined in Regulation (EU) 1300/2013. It turned out, that the application of this programme in Bulgaria encountered barriers, that could be overcome by means of nationally based approach. Finally recommendations are defined for targeted policies to promote research and innovation policies for smart specialization for innovative development of the country as well as to update the formulation of objectives in the National Development Programme for the period 2014 - 2020.

JEL: O1; O38; O52

The Bulgarian national economy is at a decicive stage of development. In order to belong to the global economy, Bulgaria should restructure its economy by turning research and innovations into key drivers of growth, (identified by Swann, G.M. Peter, 2015 as contemporary wealth of nations). This makes policies to promote innovation and research a core of development policy.

In view of the above, one of the main tasks of the first programming period 2007-2013 of Bulgaria's membership in the European Union was the formation and implementation of a national policy to promote research and innovation. The

completion of this period is a time for balance and formation of better policies for the current second programming period.

Purpose of the research and innovation policy

One of the key issues of the current management practice is to define the objectives of the national research and innovation policy. Ususlly the objectives involve just defining the R&D intensity – the costs for research and innovation as a percentage of GDP. Most often only the funding of research and innovation from the budget is subject to discussion, being just a part of the costs for research and innovation of Bulgaria. The funding of research and innovation from the businesses and from abroad, etc, is not being discussed. In fact there is no debate on the allocation of the state budget funding especially for research and innovations in scientific subjects and in technological and industrial priorities. In Bulgaria this approach is considered neoliberal, although in the United States (the most apparent example of following the neoliberal paradigm) it is not applicable in view of scientific policy. There the total amount of public funding and the allocation of budget funds in scientific areas is subject to wide debates since the beginning of each fiscal year, being associated with the welfare of the country.

The required change in the approach of generating a research and innovation policy of Bulgaria in the part of domestic financing is associated mostly with the insufficient resources, which hinder the achievement of considerable innovation results. Actually in addition to increasing the scope of the total funding of research and innovations, this policy requires the defining of some research, technological and industrial *priority directions*, where the limited state resources should be targeted. Here the question is raised – Which are the priority directions? Who determines them? According to I. Ansoff we could sum up, that the priorities to be changed are determined by the objectives of development of society.

The new Foray's concept on promotion research and innovation

The new approach to promote research and innovation in European policy is associated with the idea of promoting smart specialization, which arose around 2009 in the group "Knowledge for Growth" of the European Commission composed by the idea of Yan Potočnik. The first monographic scientific paper, which summarizes the achievements in this area is by the professor from Lausanne Dominique Foray “Smart Specialisation: Opportunities and Challenges for Regional Innovation” (Foray, 2015). This book summarizes past research on the understanding of smart specialization, discusses the necessity of smart specialization strategies, explains why the approach is new and different from the standard political processes and what are the conditions for successful implementation.

Policy for smart specialization, according to Foray, suggests the promotion of research and innovation going through prioritization and territorial concentration of their resources. In promoting research and innovation following the principles are applied: compliance with the opinion of entrepreneurs, gradualily and inclusion - all territories participate as a chance at presence of transformational projects that lead to restructuring the economy through research and innovation. This understanding blurs the boundary between so-called modern or high-tech sectors and traditional sectors. It is recognized that this policy is experimental in nature, which means it can also be unsuccessful. It is therefore necessary to use very clear *indicators*.

The smart specialization policy focuses on the principle of *priority* on technology areas, identified by companies and defines the method by which to identify these priorities intervention of national innovation policy (p. 3).

The *objective* of smart specialization is to concentrate resources on those activities that most likely will transform the existing economic structures through research and innovation. Such activities, if they meet a set of criteria should become the focus of concentration and the prioritization of resources.

Policy for smart specialization is horizontal – traditional, and vertical – which is a new aspect of activities in the process of defining its priorities. The first one refers to creating conditions for innovation and research activities - human capital development, the development of universities and institutions for intellectual property. The second one relates to the formation of a set of priority areas and technologies and networks of actors (p.6). According to Foray specialization means forming new peculiarities of development based on regional concentration of knowledge and competence.

Applying this approach to Bulgaria Foray defines following areas of smart specialization:

- Paper-pulp production to be modernized through nanotechnology.
- Engineering, through which new medical technologies lead to modernization and diversification.
- Production of organic food to be modernized through the application of biotechnology.
- Tourism in which fundamental changes should be made, applying technologies for its development (see Foray, 2013)

Important point in the concept of Foray is that its implementation implies entrepreneurial initiative and commitment to use its own financial, human and other assets for radical innovations resulting in competitive restructuring of the economy.

This requirement for the formation of the national strategy is being developed also in the implementation of thematic objective 1 of Art. 9 of Regulation (PE) 1300/2013 on - "strengthening research, technological development and innovation."

New concept on formation of policy to promote research and innovation in nationally based studies

According to earlier studies (see Chobanova, 2012) formation of national science and innovation policy implies developing a concept for the promotion of research and innovation as a concept to enhance innovation through public impact on the renovation of the national economy. The aim of this concept is to promote the ability of self-development through the creation, adoption and use of new knowledge to meet the modern realities and needs as well as long-term goals of the country (p. 23). The concept is based on the assertion that innovation is becoming a major problem of progress in the conditions of globalization and rapid technological change (p. 94). It also considers that the societal impact on generating and using new knowledge is determined by the perceived objectives of development of society. Main mechanism of self-development is the market, and respective relations of competition. But demand, no supply of knowledge from research institutions and universities, and the search of ideas for the realization of the objectives of the conscious development of society and business is the key driver. (p. 104). The business demand is of great importance in this respect. Specific characteristics of the demand in the business sector is that large companies have greater potential to create, generate and implement radical innovations, while smaller imitate them or are in subcontracting relationships with them. To overcome this barrier to innovations in smaller enterprises a new type of coordination their economic activities has appear – so called innovation network, where competition is in coordination of activities (p.105). The exchange of ideas and complex coordination and alignment of interests - governance - between institutions of the state, business, financial and non-profit sector of micro, macro - national, European, international level - regarding creation, distribution and commercial use of new knowledge are becoming much more important (p. 106).

There are two approaches to selecting of criteria to identify priorities for national policy to promote research and innovation. The first is the market oriented one. Its focus is on developing good conditions for competition, but it is rejected due to the proven trend of decreasing the nationally based demand on research and innovation. It is leading to reducting research and innovation supply in the national economy. The second approach suggests consideration of public choice for development (the goal of social and economic development) and limitation of resources. The criteria for setting priorities for public support to creation, adoption and use of new knowledge are grouped into five groups of activities to be supported:

- Activities that contribute to the development of a national society (improving the quality of nutrition, health, education, culture, security, etc.);
- Activities that form and realize absolute and relative competitive advantages in international trade;

• Activities that contribute to economic growth;

• Activities that are identified by companies as necessary;

• Activities that contribute to achieving the overall objectives of the EU and the country has accumulated potential for this (p.348-349).

On the basis of this concept a methodology and methods with appropriate indicators and grouping have been developed. Calculations were made on this basis and priorities were determined for research and innovation by 2005.

The priority industry sectors are:

• Natural resource based production - processing of products of agriculture and forestry;

• Production of equipment - electrical equipment, medical;

• Tourism.

This concept for research and innovation promotion could increase the innovativeness and accelerate economic development and economic growth. It suggests government policies for both supply and demand - internal and external - of research results and industrial high-tech products in the country. Content of such policy considers country-specific societal challenges, mobilizes relevant actors at European, national and regional level to formulate policies to promote research and innovation relevant scientific, technological and industrial priorities. It takes also into account a country's research and deployment of emerging technologies.

A comparison shows that the two concepts – the nationally based concept and Foray's concept include many common issues, including the defined production areas of specialization for Bulgaria, as well as specific characteristics. The difference is, that the concept of Foray implies available entrepreneurial initiative with the potential to restructure the economy, enabling it to cope with globalization and continuous updating of technologies. The second concept proposes an approach, overcoming this obstacle.

Regulatory framework to promote research and innovation in Bulgaria

National policy to promote innovation and research (research and development - R & D) is defined by the National Development Programme: 2020 Bulgaria (BG 2020 NDP). This program is a leading strategic and program document setting out policy objectives for socio-economic development of the Republic of Bulgaria by 2020. According to the vision embedded in her 2020 Bulgaria should "be a country with a competitive economy, providing conditions for full social, creative and professional development of personality through smart, sustainable, inclusive and regionally balanced economic growth."

The objectives of the Programme are:

"1. Raising living standards through competitive education and training, creation of conditions for quality employment and social inclusion and ensuring affordable and quality healthcare.

2. Construction of infrastructure networks to ensure optimal conditions for economic development and quality and healthy environment for the population.

3. Increasing the competitiveness of the economy by creating a favorable business environment, investment promotion, implementing innovative solutions and increase resource efficiency"(NDP, p. 8).

The priorities are as follows:

1. Improving access and quality of education and training and the quality of the labor force.

2. Reducing poverty and promoting social inclusion.

3. Achieving sustainable integrated regional development and use of local potential.

4. Development of the agricultural sector to ensure food security and production of products with high added value in the sustainable management of natural resources.

5. Supporting innovation and investment activities to increase the competitiveness of the economy.

6. Strengthening the institutional environment for greater efficiency of public services for citizens and businesses.

7. Energy security and increasing resource efficiency.

8. Improvement of transport connectivity and access to markets."

The legal framework formulated priority interventions and provided them outline a clear focus on the policies of the State on:

1. Improving the quality of human capital and strengthening its relationship with labor market;

2. Promoting innovation and raising competitiveness of the Bulgarian economy;

3. Improving the physical and institutional infrastructure.

The National Policy to promote innovation and research is one of three focuses of government policy and is linked to the achievement of Strategic Objective 3, namely improving the competitiveness of the economy by creating a favorable business environment, investment promotion, implementing innovative solutions and increase resource efficiency. National Reform Programme (NRP) as the policy objectives of encouraging innovation and research states: "Investments in R&D amounted to 1.5% of GDP[1], support to stimulate R & D and innovation

[1] This estimated cost of R & D investment is calculated at the following estimates and assumptions: 1) use at least 15% of the structural funds for Bulgaria in the next programming period to finance research and innovation. For comparison, the average share of investment expenditure of the total Structural Funds for the EU is over 30%; 2) nominal growth in national R & D funding by 5 percent a year, which is close to the expected rate of inflation; 3) increase in investment by enterprises in R & D and innovation by 15% annually.

activity (in accordance with the flagship initiative "Union Innovation") and "Achieving a 16% share of renewable energy sources in gross final energy consumption and increase energy efficiency by 25% by 2020 (in line with the flagship initiative 'Europe for efficient use of resources").

Implementing the new concept of the European Union laid down in Regulation (PE) 1300/2013 of the European Commission, based on developments from the group of Foray suggests the aim of the national policy to promote research and innovation to accelerate the socio-economic development, concentrating its limited resources to solve country-specific most important challenges for society, in addition to long-term problems of its development. In this connection it is necessary to activate the stakeholders both at European and at national and regional level to find new solutions and financing. It is also necessary to identify relevant scientific and technological areas and industrial sectors, in order to stimulate their development to solve the indicated problems. It is necessary to determine the country's place in the research and commercialization of emerging technologies (in case of public request for such implementation), and the allocation of budgets concerned, an important role among them are those of the business. At the same time this priority approach imposes on research and innovation to influence except through market instruments and tools such as coordination between stakeholders from the national and international business for co-financing of priority fundamental and applied scientific research, technological research and industrial research, etc. etc.

It could be summarized the national policy to promote research and innovation does not contain requirements for smart specialization, corresponding to the new approach of the European Commission. It does not also respect the nationally based concept for increasing innovativeness of national economy.

National policies to promote research and innovation in the first programming period

This policy is carried out by the Operational Programme "Development of the Competitiveness of the Bulgarian Economy (OPDCBE)." The objective of the OPDCBE is ambitious: "to develop the potential for competitive and efficient production and business, contribute to increasing the economic effect and support the necessary structural changes in order to achieve sustainable progress and feasible cohesion during the programming period." The results of the funded R & D and innovation are expected to be in "supporting the development of SME productivity and innovation and new technologies and improving the business environment." It is also expected operational program to "contribute to the general EU horizontal objectives such as environmental protection, equal opportunities and development of the information society" (OPDCBE, p. 7-8)

It is interesting to note that this growth was over 20% per annum for 2005-2009 (See NDP, updated 2014).

The policy objective of promoting innovation and research is the development of a dynamic knowledge economy that is efficient and competitive in the European and global market. This policy covers the following areas (priority axes):

- Development of economy based on knowledge and innovation
- Increasing efficiency of enterprises and promoting supportive business environment
- Financial resources for developing enterprises
- Strengthening the international market positions of Bulgarian economy
- Technical support

The main *instruments* for implementing research and innovation policy in the period 2007-2014 are the state budget and the Operational programme "Development of the Competitiveness of the Bulgarian Economy (OPDCBE)." To promote research and innovation through this program the European financing by the ESF and ERDF is crucial.

The national policy to promote research and innovation sets ambitious goals, but allocates very limited resources to implement them. This assumption is based on a comparison of the current state of R & D intensity (R & D expenditure to GDP in percentage) with past periods. It is confirmed by the low level of R & D intensity compared with the respective EU average value for the period. It is of big concern low target level of R & D intensity - for 2020 Bulgaria was 1.5% vs. 3% EU average.[2]

Such a policy would not contribute significantly to the development of the potential for competitive and efficient production. It could not be a generator of the necessary structural changes to achieve sustainable progress in economic development and feasible cohesion during the programming period. However, such a policy has been applied for the programming period 2014-2020 through two tools - Operational Program "Competitiveness and Innovation" (OPIC coordinated by the Ministry of Economy), and operational program “Science and education for smart growth 2014-2020” (OPNOIR, coordinated by the Ministry of Education and Science). Objectives and priorities of both programs for the second programming period are set out in the "Innovation Strategy for smart specialization of the Republic of Bulgaria 2020" from December 2014[3] to present can be concluded that there is consistency and continuity in policies to promote research and innovation, without applying the new approach advocated by the European Commission

[2] R&D intensity remained unchanged at one of the lowest levels in EU. In 2011 it was 0.57% for Bulgaria, and during the period 2000-2011 was negative – 1.06% (EU, 2013, p. 5). For comparison – the average R&D intensity for EU -28 for 2011 was 2.03%, and the growth for the period 2000- 2011 was 0.8% (EU, 2013, p. 33).

[3] Goog practices during the implementation of the policies could be followed at http://www.opcompetitiveness.bg/module0.php? menu_id=110

Financing

Volume, structure and level of allocated and utilized funds to promote research and innovation characterize the opportunities for increasing the competitiveness of the Bulgarian economy. Great importance is attached to scientific and foremost, innovation policy within the existing operational programs during the first programming period, reflected in the fact that OPDCBE given second volume budget - 1162 mln. EUR. Prevailing in it (85%) are EU funds (Table 1).

Table 1

Implementation of OPDCBE to 31.12.2014

Total and priority policies / axes	Total	Co-Financing by the ESF and ERDF	National co-financing	Actually paid money to 31.12.2014 31.12.2014
OPDCBE (million EUR)	1162	987,8	174	909,3

Source. Annual Report on the use of OPDCBE 2007-2013 - 2014, http://www.eufunds.bg/bg/page/987.

From the point of view of the percentage of the contract and that of the acquired total planned volume of funds implemented policies for funding research and innovation can be defined as effective. To 31.12.2014 contracted funds according to official data are 1198 mln. Euros, i.e. they are 103% of the planned ones. At the same date amounts actually paid are € 909,300, which is 78% of the contract. Tranches received by the European Commission (EU share) to 31.12.2014 are € 799,300, i.e. there is 81% implementation of the EU-funded program budget. The total amount of funds that must be certified by the end of 2015 (only the European part of the financing) for OPDCBE is 283,800 euro. This is quite a good level of absorption of European funds, approaching that of OPHRD. The high percentage of agreement and the actual disbursements showed a relatively good performance of the policy to absorb funds planned in the program. It is noteworthy, however, significant differences in the rate of implementation of the various strands (priority axes) to promote research and innovation - from 12 to 99%.

Allocating funding for innovation and research by OPDCBE priority axes and their absorption warrants evaluation of the planned and implemented policies to encourage them. For the status on 31.12.2013 see Table 2.

Planned policies by priorities. According to the volume of funds provided the first place in promotion of innovation and research policy takes policy for increasing efficiency of enterprises, technological innovation and developing a favorable business environment. Nearly half of all funding is allocated for his purpose. Second important policy is policy for improving businesses' access to capital, which provided nearly one third of the funds. Thirdly, nearly 1/5 of the funds are to support R & D for and in enterprises to enhance their innovation

potential and establishing a respective pro-innovative business structure to strengthen the "science - business" relationship. For policy to strengthen the international market positions of Bulgarian economy are allocated relatively small amount of money.

Table 2

Implementation of OPDCBE to 31.12.2013 by priorities

Total and by priority policies / axes	Total, incl. (mln. EUR)	Distribution	Actual disbursements (mln. EUR)	Percentage of performance to
Total OPDCBE (mln. EUR), incl .	1162,2	100,0	636	55
Development of economy based on knowledge and innovation (PA1)	210, 6	18,1	26	12
Increasing efficiency of enterprises, technical support. renovation and development of a favorable business environment (PA2)	529, 0	45,6	243	46
Financial resources for developing enterprises (PA3)	350, 0	30,1	349	99
Strengthening the international market positions of Bulgarian economy (PA4)	37, 7	3,2	10	27
Technical Assistance (PA5)	34, 9	3,0	8	24

Source. Own calculations based on the Annual Report on use of OPDCBE 2007 to 20,013 years – 2014, p. 12 http://www.eufunds.bg/bg/page/987

Implemented policies. The greatest advances have policies related to the provision of financial resources for the development of enterprises (PA3). 99.72% are the certified funds from the general budget for the axis when in total absorption of the program is 54.7%. This progress has taken place since 2012 onwards and is the result of failure of indicators linking allocations of finance to the upgrading of enterprises. Second place take policies to enhance the efficiency of enterprises, technological innovation and development of a favorable business environment (PA2). Here certified amounts are 46%. Significant delays in the implementation shows the policy for the development of economy based on knowledge and innovation (PA1). There are actually utilized only 12.36%. This low rate of actual funds utilized is due more to the fact that the majority of contracts for the implementation of policies priority axis were signed in 2013 and their implementation will be completed in 2014 and 2015. At the end of 2014 contracted are 131% of planned amounts. Therefore, the effects are expected to occur by the end of the programming period.

Delay in absorption of funds under priority axes 1 and 2 is due to several circumstances. On the first place among them is that although disbursements are

grants, it is not possible to relate the projects promotion and implementing economic impact, which is largely insurmountable barrier. The delay in the implementation of grants for priorities 4 and 5 contributes is due to the fact that the beneficiaries are by definition specific contracts with large and diverse operations, which require more time for their organization.

The effectiveness of policy to promote innovation and research is determined exept by means utilized and by how far the results achieved correspond to the targets, respectively. policy for economic development of the country.

Results of policies to promote research and innovation at the micro level

Policies to promote research and innovation at micro level are determining the acceleration of economic development of the country. They are grouped into four groups corresponding to the four priority axes of OPKRBI.

Policies for development of economy based on knowledge and innovation (PA1)

Specific policies here include promoting the development and commercialization of innovations in enterprises, protection of industrial property rights of Bulgarian enterprises and research organizations and the development of pro-innovative infrastructure. Evaluation of these policies, according to the annual report on the implementation of OPDCBE 2007-2013 (published in 2014) has adopted targets for 14 indicators. Of these, 7 are zero at the end of 2013, five of them are not included in the report because they are dropped on the proposal of the Managing Authority. This change was approved by Commission Decision C (2012) 5768 of 10.08.2012, the Annex 3 "List of indicators". However, relatively unsatisfactory results have been reported. As of 31.12.2013 the number of 9 indicators for the 22% reported zero values. For the rest - the values are relatively low (17 to 65%) against targets (pp. 34-36).

In other words, the policy of promoting research and innovation for the development of the knowledge economy is inadequate. This is due to a number of weaknesses, including lack of sufficient economic knowledge required for decision making and underestimation of existing national concepts and tools with which to implement genuine and effective links between existing research centers of excellence in the country and in the business sector. Failure to develop such a concept reflected in the extensions mentioned and some other changes in the methodology, etc. in order to better absorption. For example, dropped were indicators such as number of successful projects prepared by research staff employed in companies; number of registered trade marks, designs, patents, etc. by supported enterprises and research organizations; number of enterprises using the services of pro-innovative firms (which are financed by PA3); number of R & D projects implemented with supplied equipment for applied research, number of institutions /

organizations involved in the national innovation system. On the other hand, the specific objectives of priority axes are not clearly enough defined, cast doubt on the overlap, although originally set indicators are largely well-defined and adequate to the declared policy.

As a positive impact of the program we can recognize that support, though few in number - 25 (in stead of 95-130) innovative start-ups in 2013 all 100% have survived. On the other hand, the number of innovations introduced / ready to be introduced in the market is only 26 pieces (in order 76-104 2015). This means that their impact on economic development can not be defined as significant, moreover, that these innovations are not registered as *industrial* property, i.e. their degree of novelty is quite low. And progress is unsatisfactory number of R & D projects supported in the experimental stage - in the period 2007-2013 are 11 R & D (under order number 90 of 2015). The number of R & D projects supported for introduction on the market (reported a total of 29 projects in order to 30-40 in 2015) has shown the very good achievement of a not very high goal. Looking at the data on this indicator observed some inconsistencies in the reported results, which can not be found acceptable explanations. For example, good performance on the "number of researchers employed in enterprises" (reported are 105 people against the goal of 110 in 2015) does not correspond with the lack of patent applications or prepared successful projects of this staff.

In fact, the policy for development pro-innovative environment failed. Not supported any center for technology transfer, technology incubators, technology innovation center or other intermediary. In all likelihood the lack of support renovation projects of applied research equipment at research organizations for 2013 is related to the lack of communication with these organizations, on the one hand, and with their low activity caused by the lack of demand for innovative machinery / products produced by new equipment. Not reported any institution or organization to participate in the national innovation networks.

Overall results achieved in the development of the knowledge economy are unsatisfactory. Dropping important monitored parameters related to evaluation of improved microfundament of macroeconomic growth raises serious skepticism about OPKRBE management to achieve the programme objectives to contribute to economic development.

Policies to increase the efficiency of enterprises, technological innovation and development of a favorable business environment (PA2)

Policies to improve the efficiency of enterprises, technological innovation and development of a favorable business environment are pledged as most important to promote research and innovation. In the completion they provided nearly half of the funds OPCRBE. These policies have the following specific objectives - modernization of technology, providing easily accessible and of good quality consulting and information services to business, reduce energy intensity and diversification of energy sources used by enterprises, increasing the efficiency

of production and marketing performance of enterprises using the advantages clusters and business networks. The assessment of these policies is carried out by 12 indicators, of which 1 renamed, dropped 4 and 4 added. Dropout indicators, as well as PA1 refer to the contribution of the renovation. However, too high proportion of performance with zero results (58.33% of the indicators have zero values). On the other hand, the signed contracts at the end of 2013 are about 89% of the estimated budget and the amounts certified are of 45.9% of the budget.

As a positive result of the policy of PA2 is increase the potential for active involvement of Bulgarian enterprises in the global economy: certificates introduced in supported enterprises by 2013 are 712, instead of a target of 537 to 2015. Against this background alarming is the very modest decrease in the average age of equipment in supported enterprises. In the starting position in 2007 by 45.5% and 30% target for 2013 and the period as a whole to 2012 it was recorded 12.58%. This indicator has dropped in 2012, which effectively deprives the financing of projects in the economic context of the renovation. In connection with this puzzling data on 508 companies that bring in new technologies / products (2010 target is 60 pcs. and 550 for 2015). The fact that no one supported enterprise has used specialized consulting services financed under the program proves once again broken link "Business Science", which is a serious obstacle to the use of scientific knowledge for the modernization of technology and business management.

At the same time the evaluation of the implementation of policies in this direction there is a contradiction when compared to the reported indicators. For example in the implementation of specific policies aimed at increasing the production capacity in supported enterprises aim at 15% for the period 2012 reported increase its average of 80%. If it is unable to explain how the increased production capacity provided that during this period is not accounted for any purchase of equipment (see 1 priority, indicators 12 and 13). This indicator has dropped in 2012.

In conclusion, the implementation of policies to promote innovation in PA2 is currently does not create a basis for increasing the efficiency of enterprises, technological innovation and development of a favorable business environment. Dropping important indicators of monitoring is narrowing the possibility of a comprehensive knowledge for the processes. There are problems in goal setting and mechanisms for implementation of this policy.

Policies to provide financial resources for the development of enterprises (PA3)

Enterprise development by upgrading provided about one tird of budget OPDCBE. These funds are almost one hundred percent utilized. Here, however, there are specifics that should be considered. Ministry of Economy and Energy (MEE) has set a budget to improve access to finance for SMEs through various

financial engineering instruments by initiative JEREMIE. In Bulgaria, the Holding Fund JEREMIE (HFD) is financed under the Operational Programme "Development of the Competitiveness of the Bulgarian Economy" 2007- 2013 from the European Regional Development Fund together with the state budget. JEREMIE is a central fund and as such is aimed at financial intermediaries and not directly to SMEs. JEREMIE Holding Fund provides: SME-focused financial instruments, incl. guarantees, guarantees and counter-guarantees, equity guarantees, (micro) loans, securitization, venture capital, business angel matching funds, and investments in technology transfer funds to financial intermediaries. These financial intermediaries in turn provide SMEs (which are "final beneficiaries") with loans and equity. There were utilized funds from the selected financial intermediaries during the reporting period: a venture capital fund, guarantees covering losses on a portfolio of loans, fund investments in companies in the growth stage (suspended), Mezzanine Fund instrument for promoting entrepreneurship and providing initial and financing instruments provided funding through risk sharing.

From the point of view of resource utilization policies conducted in PA3 are the most successful. At the end of 2013 funds in this direction are almost exhausted. This means that there is significant demand for loan capital.

On the other hand, with the change in performance in 2012, characterized above, the PA3 policy has been changed as well. The possibility of direct financing of enterprises has dropped. From policy to innovative development PA3 policy has become a policy for corporate financing. For example, new indicators results are impressive - 7 created / developed financial products, when the objective were 5; 5018 enterprises, backed by debt products in stead of 2000 at 2015; 73 companies backed by venture capital instead of 158 in 2015. The same numbers ares start-ups, backed by financial services at goal 195 in 2015.

It can be concluded that there has been significant progress in the utilization of funds by enterprises and for implementing the policy, assessed on new indicators reflecting the results of the activities of providing financial resources for enterprises introduced in 2012. However, dropping the first set of indicators reflects the purpose of the loan and other funding, it limits the ability to assess the effectiveness of the use of funds in terms of achieving the objective of smart growth and employment. The adopted scheme facilitates the absorption of the program, but their positive impact on the development of enterprises is postponed in time.

Policies to strengthen the international market positions of Bulgarian economy (PA4)

Strengthening the international market position of the country is an important stimulus for economic development. According to the adopted methodology for OPDCBE of the effectiveness of policies to promote innovation and research we are udging by the increasing competitiveness of the economy and increasing

exports - in particular, the high-tech. The specific objectives of policies PA4 are associated with an increase in the volume of attracted investments and economic effects thereof; facilitating access to external markets of Bulgarian enterprises through comprehensive services for enterprises and export information; compliance of the Bulgarian projects with international standards and quality.

According to the methodology adopted, achievements in the implementation of activities in the statement for the period up to 31.12.2013 are good - 29 investment projects implemented in target sectors in stead of 15. Achievement in policy to support innovation in enterprises exporting is 46 supported laboratories in stead of 33. 40 are new and improved services for businesses provided by organizations of national infrastructure, almost tvice lower than the goal at 77.

On the other hand, the policies pursued in this area raise questions about their effectiveness in terms of achievement of the goals. First, as noted above, there are indicators dropped out by economic context. For example, dropped out is indicator which is directly linked to achieving the objectives of the program. It implies an increase in the volume of exports in the supported enterprises. This index is zero-sum in stead of 18% by 2012. Secondly, it should be noted that many indicators are related to marketing when data on the results of those activities is not available. Recorded 244 inquiries from potential investors in target sectors, twice more than the objective for the period 100. 38 187 people have used the website of the ASME in order for the period 3000. According to the indicator "Number of enterprises participating in promotion projects in Bulgaria" the objective is 200, but the performance is 351 (end of 2013). Another indicator "number of enterprises participating in promotion projects abroad" aimed 900, but peformed 951 ones. "Number of promotional events to promote conformity assessment, certification and product quality" aimed 71, the performance was 37 in 2013.

The positive effects of PA will occur in the future.

Results of the policy on macro level

The results of the promotion of research and innovation through the implementation of OPDCBE could be assessed by comparing the levels of pre-defined macroeconomic indicators with those at the beginning and end of the program period (see Table 3).

Data from Table 3 show that the state policy to encourage innovation and research has achieved some success. Overall, however, the targets are not achieved. The levels of some indicators have been even deteriorated. The latest, in addition to the lack of a systematic approach to management and changes in the methodology for assessing the effectiveness, are associated with the impact of the crisis.

Table 3

Indicators for achieving the OPCRBE objectives

Indicators		2007	2008	2009	2010	2011	2012	2013	2015	Total
1. GDP per capita in PPS (EU27 = 100) (%)	Achieved results	40	43	44	44	42,2	45	44,7		44,7**
	Objective							51,2	52,0	52,0*
	Starting position	40*								
2. R&D expenditure (% of GDP)	Achieved results	0,5	0,5	0,5	0,6	0,57	0,62	0,65***		0,62
	Objective							1,15	1,2	1,2
	Starting position	0,51								
3. Export / GDP (%)	Achieved results	59,5	58,2	47,5	57,4	66,5	66,7	68,4		68,4
	Objective							89,77	91,0	91,0
	Starting position	60,8								
4. Energy intensity of economy (kgoe per 1000 EUR)****	Achieved results	770	717	664	671	706	671			671
	Objective							1250	1150	1150
	Starting position	1628								
5. Volume of foreign investments (% от of GDP)	Achieved results	29,4	19	7	3,2	3,4	3,7			3,7
	Objective							32,8	34,5	34,5
	Starting position	26,2								

* EU27 = 100; ** ES28 = 100; *** Forecast data; **** Ratio of gross inland energy consumption (in kilograms of oil equivalent) to GDP (at constant 2005 prices in EUR).

Source. Data from Annual Report on the implementation of OPCRBE 2013 and data from the Eurostat website visited January 19, 2015.

What are the specific results and what is their contribution to economic development? On the one hand, the positive assessment of the policy of innovative development today is associated with reducing the energy intensity of the economy. For this purpose OPDCBE indicator used is "kgoe per € 1,000", i.e. gross inland energy consumption in kilograms of oil equivalent to GDP at constant prices by 2005. The aim is 1150.00 in 2015. In 2012 it was reached 671.3, where at the starting position was1628.16. In practice, the change is not particularly significant as in 2007 this indicator was 770.31.

Main result of the promotion of innovation and research for economic development should be the increase of the level of productivity, defined as GDP per capita in PPP compared to the average European (EU-28 = 100). For the reported period the country remains in the group of European countries with the lowest labor productivity, even registered a slight increase: from 40% of the

average for the 28 European countries in early 2007, it reached only 45% in 2013.

R&D intensity is a key indicator of the efforts that the country is making to achieve smart growth through the development of knowledge economy. The data show that there is no any significant progress in this regard recent years. The target of 1.15 percent in 2013 and 1.2% in 2015 were not reached. R&D intensity was 0.62% for 2012 and 0.65% in 2013. R&D intensity is staing stable low for a long time. It was 0.57% of GDP in 1999, 0.49 percent - in 2004, 0.53 percent - in 2009, 0.6% - in 2010 and 0.57% - in 2011. This level is about four times lower than the EU average. With these levels Bulgaria is one of the European countries which do not use research results to achieve economic growth and development.

Policies to promote innovation and research are not connected and are not contributing enough to expand foreign markets for Bulgarian products and services. In this regard, progress has been modest. In the item "Export goods and services / GDP" aimed to achieve 89.77% in 2013, has reached only 68.4%. Progress from the baseline 60.8% and endpoint 2015 - 91% is not particularly significant, which can be explained mainly by the low R& D intensity that defines low productivity, respectively - low competitiveness and only then by shrinking foreign markets due to the global economic crisis.

An important element of the policy of rejuvenating the economy is to promote foreign direct investment. The success of this policy is generally characterized by the volume of foreign investments as % of GDP. They were 26.2% in 2007 with a target for 2015 - 34.5%. In practice, the levels of this indicator marked a sharp decrease in 2008 and in 2009 (the early years of the global crisis) and reached 3.2 in 2010. In 2012, according to preliminary data, this amount is 3.7% of GDP. In other words, policy renewal by attracting foreign investment can not be defined as successful.

It must be emphasized that the optimism expressed in the Annual Report of the program in 2013 that the program objectives are achievable by the end of 2015 raises skepticism, if you take into account the preliminary data for 2013 and 2014.

Evaluating the achieved results

Evaluating the effectiveness of policies to promote research and innovation is based on comparison of the state of the art of innovation performance of the Bulgarian economy against the the average for European countries, as well as on the basis of change in the global rankings and on the basis of contribution to increasing the supply and demand for natioinaly produced R&D results.

Changes of innovation performance of the Bulgarian economy

European practice for assessing the effectiveness of policies to encourage research and innovation is related to the use of the European Innovation Scoreboard. It evaluates the performance and its change through an innovation

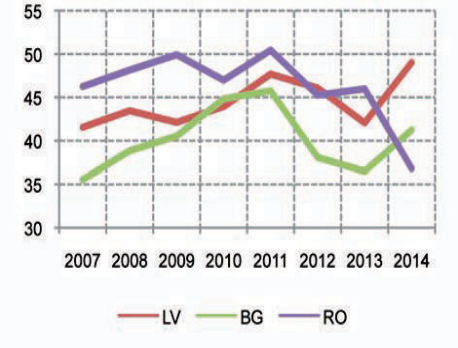
index for every country and for average of the European Union's countries. This index is published annually in the European Innovation Scoreboard. Evaluation of ongoing research and innovation policy by this index, as well as the indicators used for its construction, by grouping different policies for different signs, is the basis for assessing the contribution of the research and innovation policy to implement "the strategy of catching up."

According to the European Innovation Scoreboard 2014 (p. 44) Bulgaria, together with Romania are the weakest innovators (see the Figure). The optimism is due to the transposition moving up one place from the last place in 2014.

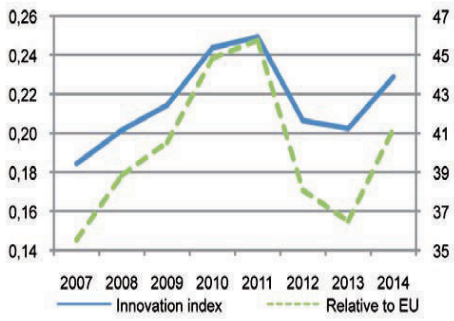
Figure

Dynamics of Innovation Index of Bulgaria in the first programming period, compared to the weakest innovators and to EU average

Weakest innovators in the EU



Bulgaria and the EU average



Source. IUS – 2015.

What is the genesis of this state of the art? By 2010, the innovation performance of the country based on the summary innovation index has improved steadily. Then the trend changed and started a period of decline. *At this level of innovation index for Bulgaria dropped faster than the average* for the EU-28 - from 44% in 2011 to 33 % in 2013. This trend is very worrying as during this period was expected beginning of the positive impacts of policies to encourage research and innovation by OPCRBE.

In terms of innovation Bulgaria performs poorly not only in Europe, but also in global rankings. According to a World Bank report on global competitiveness in many aspects that relate to innovation, Bulgaria is lagging behind some of developing countries. Among 144 monitored countries it takes 125 place on the level of technology absorption in companies and 117 place in R&D cooperation between universities and industry.

Therefore, implementation of the policy to promote research and innovation does not contribute to "catching up", and in practice leads to retardation of achievements against the European average level. This gap can not be justified by the crisis, as all countries are affected by it. Apparently, the reason must be sought somewere else - in concept, policy, tools and mechanisms for their implementation. Similar are the key recommendations made by the EU, namely that countries should be encouraged to develop their own models of politics; funding to remain concentrated in science and technological research; innovation policies to be focused on promotion of cooperation between industry and science.

Changes of intensity, supply and demand of R&D in the country

The main indicator for the assessment of research and innovation policy is the level of R&D intensity (R&D expenditures as % of GDP). This level is low for long period, affecting negatively the ability for selfdevelopment of the country. Despite political declarations of change, such is not noticeable. National R&D expenses remained stable low for a long period of time - 0.57% of GDP in 1999, 0.49 percent - in 2004, 0.53 percent - in 2009, 0.6% - in 2010 and 0.57% - in 2011. This level is about four times lower than the EU average, and than of the country level in early 90s. The potential for innovation is limited and for research - dramatically lower. Employment in R&D in full time equivalent (FTE) is twice lower than of the EU average. In this respect, the policy to reduce R&D employees in the public sector is inadequate to the European practice.

Funding for research in the country is insufficient, its structure and priorities are not directly tied to the priorities of development of certain technologies, industries, end products and services. This is due to the fact that national policies to promote research (supply) are not bounded to respected policy to promote industrial research and relevant business needs to expand domestic and foreign markets for new products and services (demand). The smart specialization of the country is not clearly detreminated.

In the Government sector policy to promote research and innovation is not consistent from the viewpoint of the principle of efficiency – to invest (increase the supply of research and innovation), where R&D is better performed. For example, there is a certain imbalance between the distribution of investment and research results by institutional sectors. In 2011, the share of R&D expenditure for sector "Higher Education" and the main representative of the public sector - BAS are similar (10.24% and 13.78% of total R & D expenditure in the country). But the results of the research output differ. Only one research organization from the public sector - BAS produces more than half of the scientific articles from Bulgaria noted in the system SCOPUS, namely 3177. Or a fifth of researchers in the country (employed BAS), are authors of the 2938 publications in refereed journals of which 1823 have impact factor. The latter is 56% of all scientific

publications by Bulgarian authors. The ISI web of science has registered 11 Bulgarian scientific journals, 6 of them are issued by BAS and 5 - from business and NGO.

The promotion of research in the business sector is not accompanied by policies to encourage demand for R&D results. The shock rise of foreign R&D investment for the business sector creates positive expectations for increasing demand for such activities (by creating markets for realization of results) and thus for the realization of a sustainable smart growth and better employment. The calculations made so far do not provide arguments for expecting significant positive changes. The results of R&D investments in the business sector, measured by the share of exports of high-tech products of all exports are quite modest. Despite the sharp increase in these investments since 2010, at that period, the share of high-tech exports compared to that in 2009 is lower. Overall, the level of its share is 4-5 times lower than average EU-28 (Table. 4). On the other hand, the sharp increase in foreign R&D investment in the business is accompanied by a reduction in the absolute volume of self-financing of business R&D and innovation. It is a result of lack of the above mentioned policies to promote demand and adapted supply policies for research and innovation.

Table 4

Share of high-tech exports in total exports (%)

	2008	2009	2010	2011	2012
EU-28		15,4	17,0	16,1	15,4
EU-27		15,4	17,1	16,1	15,4
Belgium		6,8	8,8	8,4	7,7
Bulgaria	3,6	4,6	4,1	3,7	3,8

Source. Data compiled by Eurostat 11/2013.

The lack of a clear policy of encouraging demand for R&D results in line with that of supply (and contravesly) is also reflected in other dimensions of contemporary development. Not noticed a positive change in the creation and increase of *industrial property* in enterprises and in the country as a whole in its registration in the country and abroad. Patent activity remains at a low level as marked deterioration. The decline in the activity in ordering for European patents judging by Eurostat in May, 2014 patent application by Bulgaria before the EPO in 2005 were 24 and in 2011 - only 11. For the Czech Republic were respectively 109 and 183, for Estonia 6 and 59 for Greece - 11 and 85 requests.

Data on patent applications in the Patent Office in Bulgaria are presented in Table. 5. They show relatively low growth in patent applications from Bulgarian applicants in 2011, which even decreased in 2012.

Table 5

Applications for patents and utility models for the period 2006-2012

	Year						
	2006	2007	2008	2009	2010	2011	2012
Patent (Bulgarian applicants)	243	210	250	243	243	264	245
Patent (foreign applicants)	48	29	20	24	17	20	14
Total patents	291	239	270	267	260	284	259
Applications for PM* (Bulgarian applicants)	129	214	135	178	167	205	190
Applications for PM (foreign applicants)	4	10	12	2	11	14	11
PM Total	133	224	147	180	178	219	201
Total patents and PM	424	463	417	447	438	503	460

*PM - utility models.

Source. Patent Office of the Republic of Bulgaria, www.bpo.bg, visited Sept. 2013.

In summary the lack of a policy of a stimulating demand for R&D and innovation results, which corresponds to the policy for the promotion of their implementation - the increased supply (foreign R&D investment in business sector) does not lead to visible changes to accelerate economic development. Quoted data show that there is no increase in the results of the research and innovation activities - corresponding increase in GDP and labor productivity, the high-tech exports, applied for and registered patents, etc.

These results lead to the conclusion that the management of research processes in the enterprise sector, despite the availability of funds has serious problems. There is a need for change in the policies to promote research and innovation in the country on all levels of economic activities.

*

At present the national policy to promote research and innovation, is aimed at important objective, namely the development of a dynamic knowledge economy that is efficient and competitive in the European and world market, but not yet specified for implementation of effective smart specialization of the country. Funding of this policy from European funds through OPCRBE for 2007-2013 has identified significant positive effects, but quite more are unrealized goals. Still we could not identify the effects of policy to promote research and innovation on the increase of economic growth, exports, productivity and industrial property.

Positive result of the policies is the absorption of substantial financial resources, especially from companies in the Bulgaria (start-up innovative enterprises, micro,

small and medium, and large enterprises). Assisted in development are a number of organizations from various institutional sectors.[4]

Positive impact on the utilization of funds under the program has the change of performance indicators OPDCBE on a proposal of the Managing Authority and approved by the EC in 2012. It, however, prevent the policy of encouraging innovation and research and achieving the targets of policy.

Major problem is the lack of smart specialization strategies considering programming period. It is regarding the formation of priorities for sectoral and territorial specialization in the implementation of research and innovation that contribute to effective industrial restructuring of national economy and become the core of the development strategy.

Another problem in the first programming period is that formulated ambitious overarching objectives remain unattainable in certain limited resource. Consistent policy of underestimating the need for a significant increase in funding reflects the planned low R&D intensity and continuing decline in levels of innovation.

Policy to encourage innovation is not bound by this research. The results from the implementation of policies to promote research and innovation are unsatisfactory. The low target and even lower realized R&D intensity is reflected in the deterioration of the innovation index of the country during the first programming period. Macro effects of policy to promote research and innovation are weak the policies do not change the positioning of the country in the European and international research area.

There is little success in promoting development for the upgrading of. Unresolved remain a big part of the problems of modernization of technology, providing easily accessible and quality consulting and information services business, reduce energy intensity and diversification of energy sources used by enterprises, increasing the efficiency of production and marketing performance of enterprises using the advantages clusters and business networks. Do not carry out activities for the protection of industrial property rights of Bulgarian enterprises and research organizations.

Particular emphasis should be placed on implementation of the restructuring of R&D for the business sector. It is obvious that the use of the provided significant external R&D funding in the first programming period, expenditure within the sector gives no positive effect. Policies should encourage research where the country has accumulated competence. In case it comes to building a mutually beneficial relationship between effective business and accumulated expertise in the so-called public sector, whose representatives are mostly BAS Agricultural academy.

Important direction of the required change in policy is the funding of R&D to respond to demand - internal and external, of the results of those activities. In other

[4] The good practices in the implementation of the policies could be followed at http://www.opcompetitiveness.bg/module0.php? menu_id=110

words, this policy should be the core of the strategy for smart specialization by focusing not only to promote the supply, but the demand for results of research and innovation carried out in the country.

The smart specialization is understood as a prerequisite for efficient and effective use of public investment in research. Its purpose is to promote regional innovation to achieve economic growth and prosperity, based on the strengths of the regions. Considering that investments in several areas are on the border of technological risk and limited impact in each area, the strategy for smart specialization is supposed to be developed based on in-depth analysis of regional assets and technologies. It should be based on the analysis of potential partners in other regions to avoid unnecessary duplication. A prerequisite for the success of the smart specialization is a strong partnership between businesses, public entities and institutions of knowledge. The development of regional strategies for smart specialization helps regions to identify activities with high added value, which offer the best chance of strengthening their competitiveness.

The importance of developing a national strategy for smart specialization is determined by the fact that according to Annex XI of Regulation (PE) 1300/2013 on "strengthening research, technological development and innovation" it is a precondition for allocation of funds under OP "Competitiveness and Innovation" and "Education and Science for smart growth.

It must be emphasized that it is necessary an abrupt *change in policy to promote research and innovation*. A revision of targets (greater detail and include smart specialization, combined with higher R&D intensity target for the realization of national development goals), improvement of instruments and precision mechanisms to achieve them. This requires upgrading and objective setting of the National Programme for Development as a program for accelerated innovative development based on smart specialization of the country. Moreover, it is necessary to apply specific nationally based new concept of promoting research and innovation, which in contrast to Foray precondition, consider absence of initiative and potential entrepreneurs for radical innovations that lead to competitive restructuring of the economy.

References:

Chobanova R. (2014) Demand and supply of R & D in the business and governmental sectors in Bulgaria. - Economic Studies, Vol. 3 (*in Bulgarian*).

Chobanova R. (2012). Innovation of the national economy. Sofia: Academic publishing house "M. Drinov" (*in Bulgarian*).

Foray, D. (2015). Smart Specialisation: Opportunities and Challenges for Regional Innovation. Rotledge.

Foray D., (2013). Smart Specialisation: the Concept, Smart Specialisation Conference, Sofia May 10-11 2012 http://www.opcompetitiveness.bg/images/module6/files/26/99_Foray_Sofia.pdf

Swann, G., M. Peter (2015). How We Create the Wealth of Nations. University of Nottingham, UK.

Annual report on the use of OPDCBE 2007-2013; 2014, http://www.eufunds.bg/bg/page/987

Consolidated Operational Programme "Development of the Competitiveness of the Bulgarian Economy 2007-2013" after the change, according to Commission Decision of 10.08.2012, http://www.eufunds.bg/bg/page/14

Communication Plan of the Operational Programme "Development of the Competitiveness of the Bulgarian Economy" 2007-2013, http://www.eufunds.bg/bg/page/14

Eurostat, www.eurostat.eu

Horizon 2020 Policy Support Facility Peer Review of the Bulgarian Research and Innovation system. 8.10.2015, https://rio.jrc.ec.europa.eu/en/library/horizon-2020-policy-support-facility-peer-review-bulgarian-research-and-innovation-system

Innovation Union Scoreboard 2015, http://ec.europa.eu/enterprise/policies/innovation/ policy/innovation-scoreboard/index_en.htm

Ministry of Economy, http://www.opcompetitiveness.bg/module0.php?menu_id=110

OECD (2010). The Innovation Policy Mix. OECD Science, Technology and Industry Outlook 2010, OECD Publishing, http://dx.doi.org/10.1787/sti_outlook-2010-48-en.

Operational Programme "Development of the Competitiveness of the Bulgarian Economy" 2007-2013 http://www.eufunds.bg/bg/page/14

2.VI.2015