COMPARATIVE ANALYSIS OF THE COSTS FOR RESEARCH AND DEVELOPMENT IN THE COUNTRY

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СРАВНИТЕЛЕН АНАЛИЗ НА РАЗХОДИТЕ ЗА НАУЧНО-ИЗСЛЕДОВАТЕЛСКА И РАЗВОЙНА ДЕЙНОСТ В СТРАНАТА

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Abstract: *The report presents summarized statistical data on research and development (R&D) in the period 2000-2018 in the Republic of Bulgaria. Summary data are presented graphically by various criteria - statistical regions, districts and municipalities, by size of enterprises, by sources of funding, by fields of science and by types of expenditures. Data on the employment of staff by gender in categories, staff engaged in R&D, by sectors, by statistical regions, by fields of science, by level of education, staff engaged in R&D - general and researchers are presented. A sample is also presented for researchers by age groups and gender in the public sector and the higher education sector, by size of enterprises, as well as for budget expenditures for R&D for socio-economic purposes.*
The data are analyzed, and conclusions are made about the development trends of research and development in the study period.
An analysis, comments and conclusions have been made regarding the distribution of R&D investments in the country. The main conclusion is that the expenditures for research and development in the studied period increase but remain strongly unbalanced and are among the lowest in the EU in relation to the size of the national economy and the gross domestic product of Bulgaria.
Keywords: *R&D, statistical data analysis, regions, district, funding, fields of science, education, gender.*

***Абстракт*:** *В доклада са изнесени обобщени статистически данни за научно-изследователската и развойната дейност (НИРД) в периода 2000-2018 г. в Република България. Обобщени данни са представени в графичен вид по различни критерии – статистически райони, области и общини, по големина на предприятията, по източници на финансиране, по области на науката и по видове разходи. Представени са данни за заетостта на персонала по пол в категории, персонал зает с НИРД, по сектори, по статистически райони, по области на науката, по степен на образование, персонал, зает с НИРД – общо и изследователи. Представена е извадка и за изследователи по възрастови групи и пол в държавен сектор и сектор висше образование, по големина на предприятията, както и за бюджетни разходи за НИРД по социално-икономически цели.*
Данните са анализирани и са направени изводи относно тенденциите на развитие на научно-изследователската и развойна дейност в изследвания период.

Направени са анализ, коментари и изводи относно разпределението на инвестициите в НИРД в страната. Основният извод е, че разходите за научноизследователска и развойна дейност в изследвания период нарастват, но остават силно дебалансирани и са сред най-ниските в ЕС спрямо размера на националната икономика и брутния вътрешен продукт на България.

Ключови думи: *НИРД, анализ на статистически данни, региони, област, финансиране, области на науката, образование, пол.*

The study is based on statistical data collected in connection with the implementation of the project „Regional indexation of innovation activity in the economy (IRISI) – scenarios for the four priority thematic areas identified in ISIS for smart specialization and their place in the circular economy" – MES, Research Fund In general, the objectives of the research in the IRISI project can be summarized as follows:

- To conduct research and seek scientific evidence, as well as to make suggestions for additional focus on areas of specialization in their regional dimension. The results of the research aim to establish the real implementation and use of innovations and this will lead to a change in the developed regional focus of ISIS.
- To study whether and how the circular economy will create business opportunities that will attract private financing.
- Raising public awareness of the challenges we face will help stimulate the choice of responsibly produced products.
- To look for common ground with the instruments of the European Fund for Strategic Investments (EFSI) to complement the existing support for circular economy projects through advisory and financial instruments of the European Investment Bank (EIB) under the InnovFin program.
- Look for scientific indices on innovation potential and the possibility of launching a platform, together with the EIB and national banks, to support the financing of the circular economy.

To achieve these goals, two pilot studies were conducted:

- on innovation processes, products and services in SMEs, investments, their cooperation with other business units, etc.
- on innovation processes, products and services in SMEs, organizational and marketing innovations, investments made and planned, usual and new business practices, their cooperation with other business units (SMEs, branch organizations, consultants, technology transfer offices, etc.) innovative products and processes, environmental impact, evaluation of efficiency, etc.

To achieve the goals of the project the following tasks were solved:

- Analyzing and assessing the current state of the innovation capacity of SMEs by studying available data on the economic condition of companies in Bulgaria and creating a database of 5,000 SMEs.
- Implementation of a pilot study on innovation processes, products and services in SMEs, investments, their cooperation with other business units, etc.
- Implementation of a pilot study on innovation processes, products and services in SMEs, organizational and marketing innovations, investments made and planned, common and new business practices, their cooperation with other business units

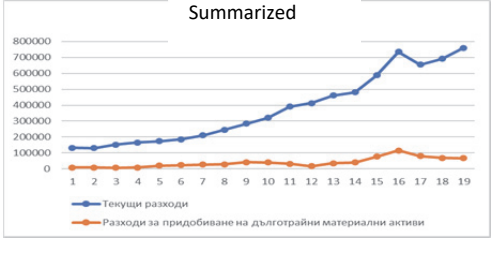
(SMEs, industry organizations, consultants, technology transfer offices and etc.) for innovative products and processes, environmental impact, efficiency assessment, etc.

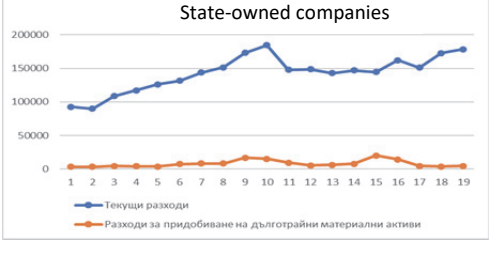
A database (according to Eurostat standards) of 5,000 SMEs was created on the nature and level of their innovation activity and cluster formation. A pilot sample of these 5,000 companies was conducted and a pilot survey was conducted among 125 companies, which were asked 12 main groups of questions, with an average of about 10 questions per group. As a result, responses based on 350 variables were formed.

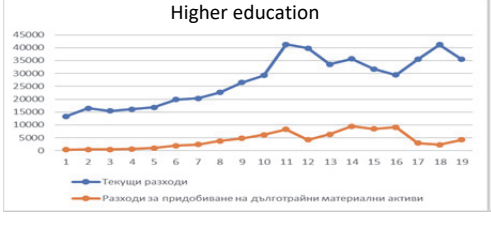
Conducting this large, well-structured and planned study gathered a very large amount of data, the analysis of which can provide us with information far beyond the scope of the project. This gave us the opportunity to try to make an analysis of the cost structure for research and development in the country and to try to draw some conclusions.

All graphs below provide data on the main types of R&D expenditures in thousands of BGN by sectors for the period 2000-2018. The main data are taken from the National Statistical Institute and collected and processed for the project purposes.

R&D expenditure by type of expenditure and sector.

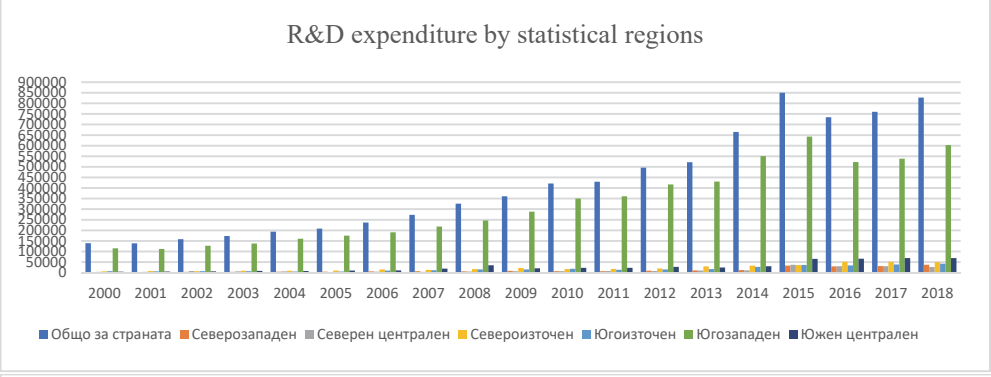


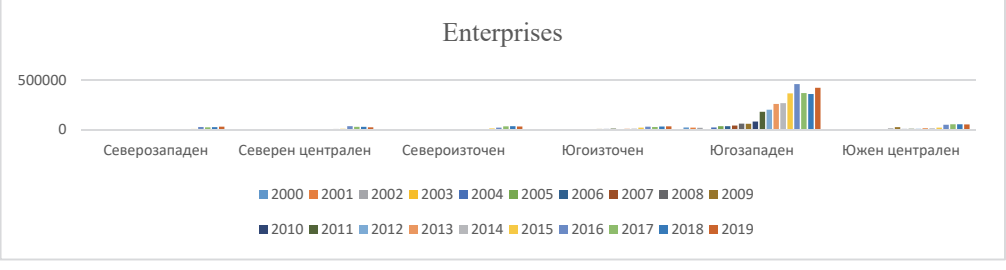


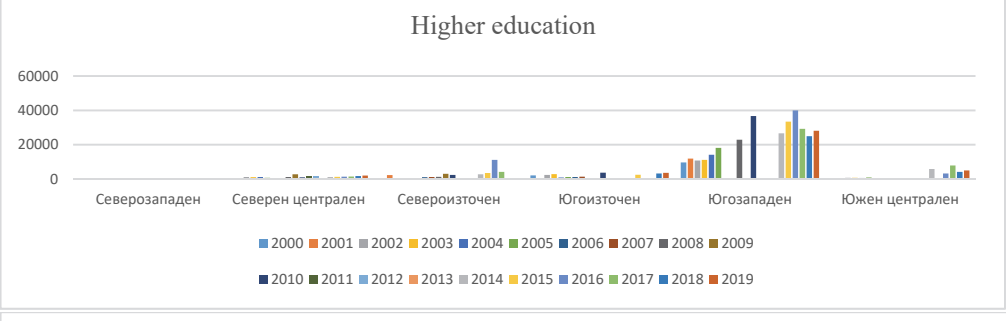


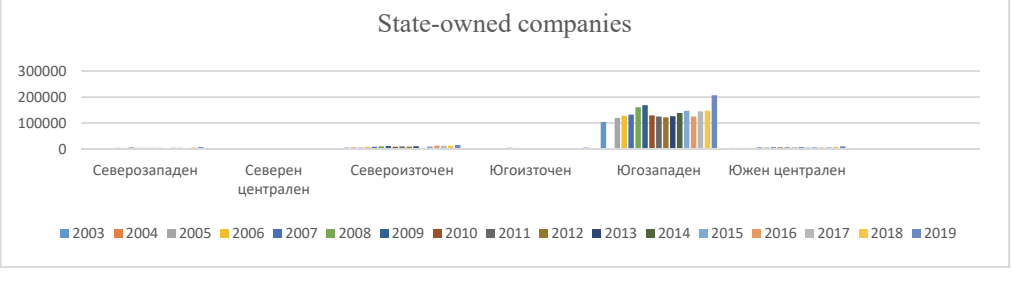
The analysis of the data presented in graphical form above shows that a large part of the investments in R&D in the country go for current costs of the companies, which are on average about 18 times more than the costs for acquisition of tangible fixed assets. In enterprises and in the higher education sector this ratio is 8 times, and in the public sector it is about 45 times.

R&D expenditure by statistical regions and sectors



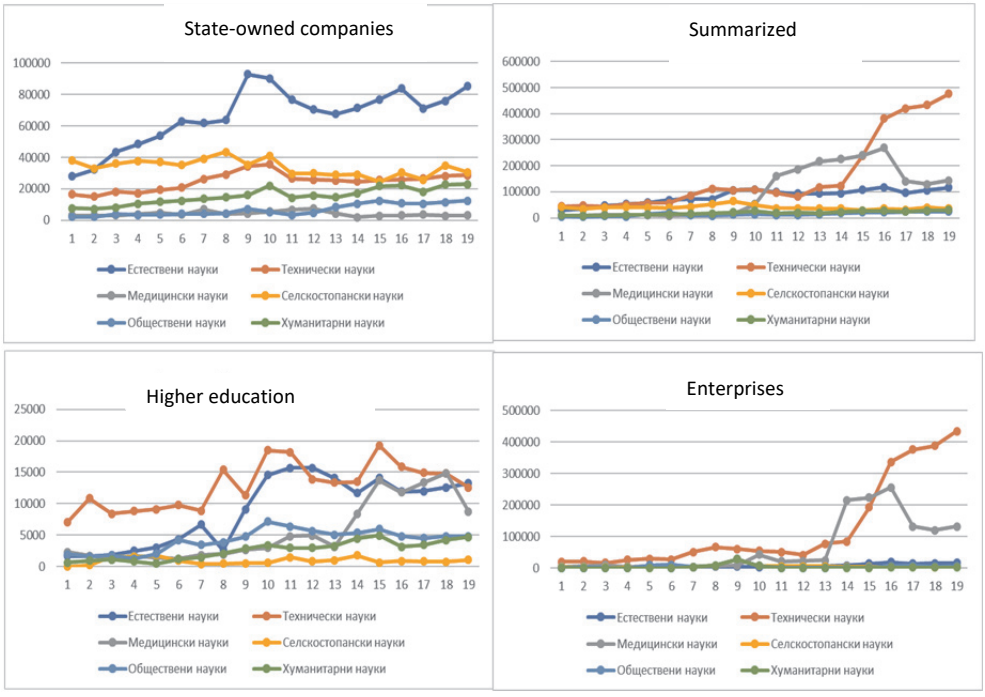






R&D expenditures by statistical regions and sectors show a sharp imbalance in favor of the South-Western region, with huge investment activity concentrated in the capital Sofia. Investments in the South-Western region exceed on average about 10-12 times those in other regions separately, and in absolute terms exceed about 4 times investments in the rest of the country.

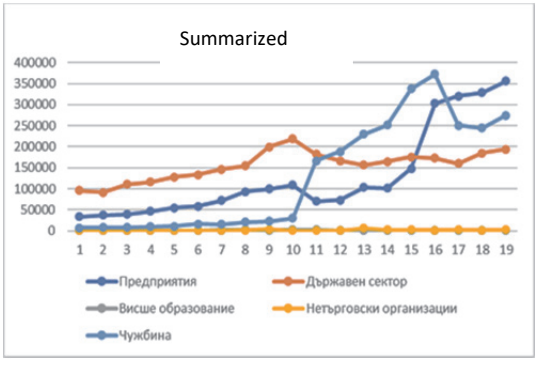
R&D expenditure by fields of science and sectors



The trend is similar for R&D expenditures by fields of science and sectors. Here, too, the bulk of investment is concentrated in enterprises, mainly in the South-West region, in particular in Sofia. After 2012, the overall picture shows a significant growth of investments in the field of technical sciences and medicine, and currently in the technical sciences they exceed on average about 5 times investments in natural sciences and medicine and more than 10 times in other fields.

Funds for R&D in the public sector exceed those for higher education on average about three times a year, with approximately half of the funds going to the field of natural sciences. In the field of higher education, R&D in the field of technical sciences has traditionally been developed. After 2009 there is an increase in natural sciences, and after 2014. and medical, with the latter three currently having relatively balanced budgets.

R&D expenditure by source of funding and sector



It is interesting that in the last 10 years the state has not allocated any additional funds for R&D, and they remain within about 180 million levs per year. In contrast, investments from abroad marked a significant increase in the period 2010 - 20015, followed by a serious decline. This decline, however, is largely offset by the activity of companies, as they are currently the largest investor in R&D in the country

with a share of about BGN 350 million for 2018, against BGN 280 million of foreign investment and about BGN 200 million. BGN state.

Conclusions

R&D expenditure by statistical regions and sectors.

As noted above, there is a huge imbalance in favor of the Southwest region, with the main investment activity concentrated in the capital. This trend became clear in 2009. in the financing of enterprises and is constantly deepening in all sectors to date. In the last 10 years, there has been no significant increase in the funds provided for R&D in the public sector and in higher education, at the expense of investments in enterprises, mainly gravitating around Sofia. SWR has the highest share of grants, as for 94.6% of the grants under OPIC is concentrated in Sofia-city (503 projects, out of a total of 625 for the region). In the other regions there are several districts with a high share of submitted projects for the period: for SZR: Pleven – with 264 projects, of which 202 completed, Montana and Vratsa also have a large number of projects for the period, respectively 217 and 215, for North Central (SCR): Ruse – with 92 projects, of which 82 completed, for Northeast (SIR): Varna – with 113 projects, of which 94 completed, for Southeast (SIR): Stara Zagora - with 116 projects, of which 105 completed and for South Central (SCR): Plovdiv - with 300 projects, of which 271 completed. In the other areas there is a relatively lower interest on the part of the beneficiaries in the currently announced OPIC procedures. The findings regarding the distribution of the grant by regions of level 2 for the period 2014-2018. are that in the Northwest region of level 2 (NWR) there is a larger share of resources than in other areas (except for the Southwest SWR). The largest values in terms of the number of submitted projects for the period were reported in the NWR – 890 projects, of which 674. are fulfilled, and 216 pcs. are in the process of implementation. This figure exceeds the number of projects in SWR, but this does not change the fact that almost all financial resources are actually concentrated in SWR. Consequently, although in 3 procedures under PO1, in 3 procedures under PO2 and in 1 procedure under PO3 criteria for regional prioritization in the evaluation of project proposals are set, with preference given to enterprises located in the NWR of level 2 SZR continues to be the last in terms of indicators and contributes only 7% of the national GDP. The centralization of these funds for R&D development creates a serious precondition for the emergence of a significant imbalance in the economic as well as in the social and demographic development of the other regions in the country.

R&D expenditure by type and sector.

Much of the country's R&D investment goes to running costs. The ratio of current expenditures to the acquisition of tangible fixed assets is striking, especially in the public sector. A more detailed analysis of the investments in these structures leads to the conclusion that the main part of the funds is directed to projects with a theoretical end result (mainly in the public sector and mainly in the field of natural sciences), with a subjective assessment of their implementation. The formal control exercised over the final results obtained from these projects also contributes to this situation. The idea of the implementation of OPIC 2014-2020 was to have a positive impact on tangible assets, as the priority axes, investment priorities and specific objectives of the program are related to the creation of new enterprises and modernization of existing ones. The increase in investment is evident, but the structure of R&D expenditures leads to the conclusion that very serious changes are needed, mainly in the planning and control of expenditures, as well as linking them to real unconditionally provable final results.

R&D expenditure by fields of science and sectors.

Investments in the public sector are mainly in the natural sciences, which exceed more than two and a half times those in agriculture and technical sciences. This also corresponds to the previous conclusion on R&D expenditure by type and sector, which shows that there is a tendency to use most of the funds for activities that do not contribute to the effectiveness of innovation and worsen the ratio of inputs to investment. for innovative solutions. The same tendencies are observed in the field of higher education institutions, although in less pronounced dependence. Unlike the public sector, there is an increase in R&D investment in technical areas after 2009. and medical sciences after 2013, which is due to the more even distribution of investments at the moment.

R&D expenditure by source of funding and sector.

The main conclusion to be drawn is due to the fact that state subsidies in the field of R&D have hardly changed in the last 10 years. There is even a decline compared to investments in 2009 and 2010. The conclusion is that the state support in the last ten years does not correspond to the ideology for development of R&D in the country. After the short-term interest to the country from foreign investments in the period 2010 - 20015 the main investor in R&D in the country remained the Bulgarian companies. These conclusions are also supported by the data presented in the report of OPIC for 2020 regarding the grant provided to support Bulgarian companies.

The total amount of disbursed funds as of 31.12.2018 amounts to BGN 917.75 million or 35.51% of the OPIC budget, distributed within 1601 executed contracts under the five priority axes.

Regarding the distribution of grants from OPIC by types of beneficiaries with the largest share of received grants are small enterprises – 28.7%, medium - 27.0%, large – 18.2% and micro – 15.9%, institutional beneficiaries – 10.2%.

Despite all that has been said so far, in the report of the Global Innovation Index for 2020 for Bulgaria, we rank 3rd among the 37 economies in the group of high average income, 24th among the 39 economies in Europe and ranked 37th among the 131 economies represented in the GII for 2020. In 2020, Bulgaria ranks 45th in innovation. In terms of innovation results, Bulgaria is in 30th place.

We should not overlook the fact that according to the methodology of the Global Innovation Index, the advantages of Bulgaria are mainly related to the results of innovations with low technological intensity, high energy intensity and relatively short term impact on the country's economy, which is also found in the ranking. on the Innovation Union Scoreboard.

Reference:

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[3.] Global Innovation Index. https://www.wipo.int/global_innovation_index/en/
[4.] European Innovation Scoreboard. https://ec.europa.eu/growth/industry/policy/innovation/scoreboards_bg.