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Translation from Romanian language

Executive Summary

The second Evaluation Report is carried out under the agreement "**Implementation of the Evaluation Plan of the Competitiveness Operational Programme 2014-2020, Lot 1: Evaluation of the POC interventions in the field of research development innovation**" (Programme) concluded between the Ministry of Investments and European Projects and the association consisting of the National Institute for Scientific Research in Labour and Social Protection (Leader) and S.C. ERNST&YOUNG SRL (Associate), an agreement carried out within the project "**Implementation of the Evaluation Plan of the Competitiveness Operational Programme 2014-2020**". The report presents the findings of the second evaluation exercise carried out during the period August 2021- March 2022 on the interventions funded by POC 2014-2020 for research, technological development and innovation (CDI) in support of economic competitiveness and business development.

Interventions dedicated to research, technological development and innovation contribute directly to the implementation of the National Strategy for Research, Development and Innovation 2014-2020 and support the Partnership Agreement 2014-2020, in particular by contributing directly to the achievement of the objective - Development of research, technological development and innovation.

The specific objectives of POC for research, technological development and innovation, which are also the evaluation themes (TE) of this report, are:

- Increasing scientific capacity in the areas of smart specialisation and health (evaluation theme TE1)
- Increasing involvement in EU research (evaluation theme TE2)
- Increasing private investment in CDI (evaluation theme TE3)
- Increasing the transfer of knowledge, technology and personnel with CDI skills between public and private research (evaluation theme TE4)

The evaluation methodology included a broad set of tools and types of analysis. The counterfactual impact assessment carried out added value to the findings and conclusions issued, representing an important exercise at national level, from the perspective of the complex methodology applied in order to highlight the impact of the Operational Programme, but also their sustainability.

The results of the first evaluation exercise showed that a reconstruction of the theory of change is necessary to better understand the effects and the causes that generated them. Therefore, in the second evaluation, reconstruction was undertaken, with the evaluation team considering an approach that better tracks how interventions contribute to direct, immediate, intermediate and long-term outcomes. At the same time, the revised methodology in this second evaluation exercise incorporated the exploration of heterogeneous causal impacts for evaluation theme 3 and the empirical testing of the different-in-differences method at the regional level for all the four evaluation themes. In estimating the heterogeneous causal impacts, different characteristics were taken into account such as the sector of activity of the company (agriculture, industry, construction and services), the size of the company (micro, small and medium-sized companies), the type of instrument (C and D project, innovative technology project depending on the year of intervention), but also the area of smart specialisation (Bioeconomy, Information and Communication Technology, Space and Security, Energy, Environment and Climate Change, Eco-nanotechnology and Advanced Materials, Health).

In order to avoid the presence of spillover effects and treatment contaminations (the treatment effect can also spread to untreated units), which can be important and affect the conclusions of the counterfactual assessment, a regional counterfactual assessment has been implemented, in which using geographically aggregated data at the level of outcome indicators and support intensities, it explores what part of the



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change in the relevant outcome indicator is likely to be caused by the POC activity under investigation and what part is instead caused by spontaneous change.

The horizontal limits of the evaluation are due to the low number of projects completed by November 2021, the date on which the MySMIS database information was submitted. Although the date by which the information was collected is close to the end of the programme implementation period, the **number of completed projects remained quite low**, with the completion date of many projects being extended by addenda due to the additional implementation difficulties created by the COVID-19 crisis.

In order to analyse the distribution of project results in regional profile and smart specialization areas, information extracted from the MySMIS database for projects contracted before November 2021 was used. Some **limitations** have thus arisen, which relate to the fact that the programme indicators declared at project level are validated at the completion of projects, and the MySMIS database provided to the evaluation team did not contain complete information for all ongoing projects. Validation of the data used was achieved by comparison with the information contained in the 2019 POC Annual Implementation Report and by triangulating the results of the analysis with other methods and data collected.

Overall, **POC has responded to the needs and challenges related to the low level of economic competitiveness at national level, ensuring the relevance of the programme to the economic and CDI context during the period 2014-2020**, despite modest progress on relevant indicators on the evolution and performance of the CDI system. **The impact of interventions was generally positive** and with the investments made contributing in some cases to halting the decline in the indicators and in others to maintain or slightly increase them.

The results of the current evaluation have, to a large extent, confirmed those of the 2020 evaluation exercise, in some cases detailing some new aspects. These results underlined that the change envisaged at the time of programme design can occur to a large extent if interventions are correctly targeted to the identified needs. We believe that the **positive effects obtained would have been more significant if certain contextual factors had been more favourable** (the intensity of funding of the CDI system would have been as planned, the legislative and institutional framework would have been more stable and predictable, economic developments would not have been negatively affected by the COVID-19 crisis).

The evolution of indicators of the CDI sector, related to the objectives of interventions during the period 2014-2020, showed general trends of either decrease for most of them or insignificant increase, with some cyclical variations by sub-periods. The 2014-2020 period was mainly characterized by a very small increase (by 0.09 percentage points) in private CD expenditure, amid underfunding of the field, negative developments in the number of innovative companies and the number of employees in these companies. In 2020, the share of private DC expenditure in GDP was only 0.47% of the assumed target of Romania amounting 1% of GDP, putting us on the last place in the European Union. An important contextual factor that has slowed down the implementation of projects and the achievement of results is the economic and social impact of the COVID-19 pandemic.

The actual execution of funds in regional profile is unbalanced, with the Bucharest-Ilfov region contributing almost two thirds of the total expenditure of the CD activity. On the other hand, the most significant increases compared to 2014 were registered in the West region, and the smallest in the North-East region. The need for continuous implementation of the activities provided by the Programme was also substantiated by strategic developments at national and European level. The European Union-level strategic framework for CDI pursues the long-term strategic development vision, mainly related to strengthening an European Research Area (ERA). At national level, however, **the delayed adoption of the National Research, Development and Innovation Strategy 2014-2020 by one year, as well as the National Research-Development-Innovation Program 2015-2020 by another eight months, negatively influenced the development of POC interventions, delaying their start**. Moreover, the existing institutional framework for CDI field is moving away from its governance character, with **frequent**



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institutional changes leading to dissipation of accountability and delays in the adoption of the legislative framework.

Despite recent changes in tax legislation to increase the attractiveness of CDI activities, the assessment reveals that the **modernization of the legislative and institutional framework** is necessary in order to be better adapted to the strategic objectives of increasing scientific capacities, better strategic programming and planning, favorable conditions and financial instruments support to stimulate the participation of **private companies in CDI** activity and to increase the attractiveness of CDI career.

At present, **the delay in adopting a new strategic framework and a new national plan for CDI until now will continue to cause dysfunction in accessing funds and in the implementation of the future programme.**

Overall, **research infrastructures in our country have been on a development trend** during the period of implementation of POC 2014-2020, and **the number of public-private co-publications and international scientific co-publications per million inhabitants has increased**, with the Programme making an important contribution from this perspective. However, **Romania remains well below the European average** in terms of developments in the period 2014-2020.

Interventions on increasing scientific capacity in the fields of smart specialization and health they have proved to be **successful interventions, supporting the recruitment of new researchers and increasing the number of researchers working in improved research infrastructures.** The implementation of projects has contributed to the beneficiaries' increased performance in: obtaining new/improved products, processes, technologies, publications and articles, improved C&D collaborations. These effects have led to improved technology transfer of products, processes, technologies, as well as knowledge spill-over effects to other companies and CD organizations. At the level of the relevant/project targeted sectors/fields, the POC interventions on scientific capacity building in the areas of smart specialisation and health have contributed, along with other equally important factors, to the emergence of additional economic activities and have contributed substantially to the improvements observed in the strengthening of the CDI system. At the regional level, the intensity of POC interventions on increasing scientific capacity in the fields of intelligence and health specialization had a direct effect on the number of international scientific co-publications, total research and development expenditure and the number of highly educated people employed in science and technology. With regard to the overall expected impact, the support of the POC on increasing scientific capacity in the areas of smart specialization and health has contributed, along with other equally important factors, to improving internal competitiveness and economic growth in the project areas, i.e. increasing the levels of public and private CD investment in the project areas.

During the period 2014-2021, participation of Romania in the European Union research has increased compared to 2007-2013. **The funded interventions on increasing involvement in research at the Union level of the POC have contributed to increasing Romanian participation in Orizont 2020 Programme**, as demonstrated by the increase in the frequency of participation, the number of funded projects and their value. The results were also confirmed by difference-in-differences analysis in regional profile.

Although the success rate of proposals submitted by Romanian beneficiaries is slightly above the European average, the average value of a funded project is much lower than at the European Union level. This shows that the level of project complexity and CDI capacity is still low compared to the European Union average.

Examples have been identified, which demonstrate that the POC has contributed to strengthening the CD capacity of beneficiary organizations. With the support of foreign researchers, the projects have created the necessary premises for the development of new partnerships at national and international level, the creation of centers of excellence and the enhancement of the visibility and reputation of the beneficiary organizations.



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The contribution of POC on increasing research involvement at the European Union level to increasing innovation capacity is limited. The main reason is that public policy priorities are set for the long term, while changes in competitive sectors are frequent and create a high pressure to innovate in the short term based on technological progress. Thus, there is a risk that investment priorities are not aligned with the changing needs of these sectors.

Interventions to increase private investment in CDI have had **positive effects on CD businesses**. The counterfactual analysis indicates a positive impact on the growth of private expenditure on CDI, one year after the intervention (short term). But **in the medium term** (two or three years after the intervention), the **effect of the intervention is rather negative**. The results are also preserved in the heterogeneous causal effect by categories of companies: micro-enterprises, companies in the service sector or in the TIC, space and security smart specialization area, companies funded by the Type C project intervention.

As regards the effect of the POC interventions on the profitability of the supported companies, the analysis undertaken showed that the effect on turnover is positive and sustainable. The same type of effect was also obtained on different categories of companies, considering 2017 as the pre-intervention year. This shows an increase in turnover two and three years after the intervention for micro-enterprises, companies in the service sector and companies financed by the Type C Project intervention. Operating income was also influenced to increase during the period under review, including for certain categories of companies: small and micro enterprises, companies in Services and Industry, companies in Information and Communication Technology, Space and Security and companies funded by the Type C Project intervention. By categories of companies, positive results were obtained for: small companies, those in the Services and in the fields of Information and Communication Technology, Space and Security (one year after intervention), respectively micro enterprises and companies financed by Type C Projects (2 and 3 years after intervention). The only category for which the effect on net profit was positive in all post-intervention years was the Industry sector. The evolution of the number of employees was not sustained by the POC interventions, with the effect being positive only in the first year after the intervention. By company category, the results show the same effect for the companies in Services and those in Information and Communication Technology, Space and Security.

Considering the pre-intervention in 2019 year, for projects started in 2020, there is a positive effect on turnover for small companies, those in the service sector, in the field of information and communication technology, space and security and those funded by the Innovative Technology Project intervention. In the case of operating income, the effect was positive for: small companies, those in Services and Industry, companies in the fields of Information and Communication Technology, Space and Security and Eco-nano-technologies and Advanced Materials, as well as those funded by the Type C Project and Innovative Technology Project instruments. The effect on net profit was positive for micro and small companies and those in the fields of information and communication technology, space and security, eco-nano-technologies and advanced materials. In the case of the average number of employees, the effect was positive for firms in Industry and those in the field of Eco-nano-technologies and advanced materials, as well as for those funded by the Type C Project and Innovative Technology Project instruments.

The results in regional profile showed that interventions to increase private investment in CDI led to increased demand for trademarks, a relevant indicator of innovation in the service sector.

In fact, **although modest overall, the increases in capital expenditure were almost exclusively due to programme interventions**. The beneficiaries consider that in the absence of the support provided by the POC for increasing private investment in CDI, the implementation of the activities foreseen in the projects would not have been carried out at all or would have been carried out partially or late.

The evolution of the programme indicators shows a positive contribution of the Programme to the increase in the number of companies supported and to the attraction of new researchers to them, leading implicitly to an increase in CDI expenditure. Positive effects can also be seen on the increase in patent applications resulting from projects, while the contribution of these interventions to the increase in public-



private co-publications is rather modest. In regional profile, Bucharest-Ifov region stands out with a significant contribution to the achievement of the indicators. In terms of sectors, the information and communication technology, space and security sector stands out with a majority contribution of 53%, while the other sectors have more modest contributions.

Although the POC interventions *to increase private investment in CDI* did not sustain the evolution of the number of employees among the enterprises that received the interventions, it was observed that the Programme stimulated in the short term the increase of the profitability of enterprises with *CD* activity and their chances of survival in the period 2018-2020. Even amid the effects of the COVID-19 crisis on the economy, companies and research organisations remain optimistic about turnover and profitability.

Regarding the evolution of the progress observed in the behavior of research organizations and enterprises for the transfer of knowledge, technology and personnel, since the adoption of POC, there is **an intensification of cooperation between small and medium enterprises, although large firms continue to collaborate more**. *Interventions dedicated to increasing the transfer of knowledge, technology and personnel with CDI skills between the public research environment and the private sector* have had **positive effects** on them. The POC support was the determining cause for the implementation of the projects, without it the activities carried out would be carried out later or not at all by both the CD organisations and the partner companies. Project beneficiaries, both research institutions and SMEs, appreciated the complex design of the funding instrument, the diversity and mix of activities foreseen, and the opportunities for public-private collaboration provided by the instrument, together with the generosity of the funding.

Analyzing the collaborative networks between participants, it can be observed that information flows between them are rather difficult and links are not established very easily, which may hinder the transfer of knowledge, technology and personnel between network entities. Partnerships between the organizations involved are based on long-standing collaborative relationships, which also explains the very high degree of clustering in the collaborative network, with the presence of groups of entities with a high density of intra-group collaboration. The comparison of the evolution of network between the two evaluations shows primarily its expansion, some components have been incorporated into the major component through the formation of new partnership links, but new components have also emerged. Well-positioned and well-connected nodes from the previous form of the network continue to accumulate links and influence in the network.

The funded projects have led to the **attraction of new researchers in research institutions, as well as to a better exploitation of existing CD infrastructures**, to the development of human capital, knowledge and skills of CD staff, to the creation and maintenance of jobs in CD institutions, as well as to the development of products and processes, new technologies required by the market, to the acquisition of knowledge, including skills and competences to meet the development needs of the firm and to the creation and maintenance of jobs in the company. The funding instruments developed through POC dedicated to *increasing the transfer of knowledge, technology and personnel with CDI skills between the public research and private sectors* have proved attractive for the four smart specialization areas, but less so for the public priority area "Health".

In the case of *the POC interventions dedicated to increasing the transfer of knowledge, technology and personnel with CDI skills between the public research environment and the private sector*, the evolution of the programme indicators shows a significant contribution to the **increase in the number of companies collaborating with research institutions**, with the target for 2023 well exceeded. The programme has also contributed positively to an increase in the number of companies supported or receiving support for bringing new products to market, although for the latter the effects have been more modest. The projects have also led to new patent applications and public-private co-publications. The results of the gap-in-differences analysis in regional profile revealed direct effects of the POC interventions dedicated to *increasing the transfer of knowledge, technology and personnel with CDI skills between public research and private sector* on the number of public-private co-publications. The case studies confirm that in all



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projects the proposed indicators for the implementation period have been met or exceeded, with all projects at the beginning of the sustainability period.

The recorded effects assigned to the Programme are potentially sustainable. The POC interventions on increasing scientific capacity in the areas of smart specialization and health have the potential to have a significant, net positive effect on the competitiveness of smart specialization and health areas in the future. Also, evaluations have shown that the positive effects of the intervention on the number of employees tend to be maintained. It is estimated to keep the newly created jobs, to continue the collaboration with the specialists from abroad and to look for new financing. Also, the services and products resulting from the funded projects have the capacity to sustain and generate new products.

The programme also has a lasting but small positive impact on the chances of survival of businesses. The positive effects on turnover, profit and number of employees continue to be maintained over time, but their growth rate is declining. However, the effects on the volume of research activities and the number of research posts decreased significantly after the completion of interventions dedicated to increasing private investment in CDI.

The effects of the interventions of the POC dedicated to *increasing the transfer of knowledge, technology and personnel with CDI skills between the public research environment and the private sector* can be amplified, as the entities that received the intervention propose to continue and establish new partnerships, develop new CD products and services, continue the positive effects on the supported companies in terms of turnover, diversification of production, increased competitiveness and private investment in CD.

The sustainability of the effects needs to be supported by future policies and programmes to support the partnership between research and industry, predictability of funding, stability and predictability of the legal, institutional and fiscal framework, but also global developments such as the increasing impact of digitization. On the other hand, the sustainability of the effects could be jeopardised by the lack of the necessary funding sources, unfavourable economic or health developments, the unpredictability of the legislative framework, the migration of highly specialised labour, and the lack of priority given to the CDI sector in national public policies.

Mechanisms that facilitated or prevented the achievement of the effects **are multiple**, but some of them manifested themselves in a horizontal manner, for all or most of the specific objectives. Among these, the most important mechanisms that have supported the achievement of positive effects are: **the pre-financing mechanism, the relatively good cooperation of beneficiaries with funding bodies and progress in simplifying administrative procedures for setting up and running a business.**

In contrast, the Programme-specific factors that **prevented** the effects from occurring are:

- long evaluation time and very late signature of grant contracts (due to changes in public procurement legislation)
- lack of clarity of the funding guidelines (the model guidelines are universal for all authorities as requested by the Ministry of European Investment and Projects)
- the high bureaucracy associated with the reporting process during implementation,
- long processing period for reimbursement requests,
- the unintuitive MySMIS platform.

The findings of the evaluation led to the formulation of **recommendations addressed in particular to the Managing Authority of the Programme**, which also have an impact on other institutions in the management system of European funds (intermediary bodies, other departments within the Ministry of Integration and European Projects), as well as the **Ministry of Research, Digitisation and Innovation.**



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For the success of future interventions, it is essential to **modernize the legislative and institutional framework** in order to better adapt it to the strategic objectives of increasing scientific capacities, to ensure **better strategic programming and planning**, favourable conditions and supporting financial instruments to stimulate the participation of private companies in CDI activity and to increase the attractiveness of CDI careers.

The success of the Programme and of the funded interventions in the field of CDI is significantly influenced by the legislative and institutional context in which it is implemented. Thus, the evaluations highlighted the need to redesign the legislative framework to be better adapted to the strategic objectives, i.e. to support the implementation of the "Open Science" principles, which is absolutely necessary for the participation of Romania in the ERA. The legislative framework must be transparent, predictable and easy to implement. It is also necessary to review the institutional framework in order to establish a governance that ensures the necessary conditions for the development of the CDI field.

The evaluations signalled that there is a need to **increase the level of funding for CDI** as well as the **predictability of funding mechanisms at CDI sector level** in order to enhance the complementarity of POC interventions on scientific capacity building in the areas of smart specialisation and health with other programmes to strengthen and develop the CDI sector and support the sustainability of the effects of POC.

The recommendations to improve the implementation strategy are mainly aimed at reducing the project evaluation and contracting periods, so that projects are implemented as close as possible to the time of the funding applications. Also, in the context of the COVID-19 pandemic, it is recommended to make project implementation periods more flexible, taking into account the delays in the project selection process. **It is also recommended to reduce the bureaucracy of the interventions of POC** on increasing scientific capacity in the areas of smart specialization and health so as to reduce the administrative burden for beneficiaries. The efficiency of the institutional circuits and the provision of the human resources needed to reduce the time taken to approve addenda to financing agreements will enable beneficiaries to adapt rapidly the schedule of activities, the budget structure and investments to external constraints generated by procurement, obtaining authorisations, price variations, technological developments, disruption of supply chains, epidemiological situation, etc. **The recommendations for improving implementation and monitoring procedures** aim to reduce bureaucracy, simplify the accompanying documents required, improve the MySMIS platform and use it to facilitate communication between programme beneficiaries and those carrying out technical and financial monitoring. Improving the functions of the MySMIS platform, the accessibility of information, the mechanisms for validating information and making logical links between them can make the monitoring process more efficient. It is recommended to improve the monitoring process of the Programme and to develop a dashboard within the platform showing in real time the degree of achievement of the indicators targeted by the Programme. **Recommendations to improve the financial circuit of projects** mainly aim at streamlining the processing of reimbursements submitted and implicitly the payments to beneficiaries, making the rules for allocating funding per expenditure chapter more flexible as well as the legal procurement framework for small companies. Also from a financial perspective, it is recommended to set up and strengthen instruments to facilitate the access of beneficiary organizations, especially SMEs, to open market financial instruments. **Applying measures to support beneficiaries in managing the risks generated by unfavourable sectoral developments** (energy crisis, price increases for some products and services) so as to support project implementation and the achievement of the proposed results.

Securing future sources of funding is essential to support the strengthening, expansion, exploitation and popularization of the enhanced CDI capacities of the POC on increasing scientific capacity in the areas of smart specialization and health in order to upgrade software, purchase necessary complementary equipment and consumables, change or adapt certain components, popularise available services.



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Thus, the evaluation team considers that the priority for the future is to continue to fund the POC interventions to increase the capacity of CDI to reach the critical mass needed for performance, to support the connection of as many CDI organisations as possible to national and international CDI networks, scientific literature and international databases.

It is also recommended to continue the implementation of programmes to stimulate research capacity building and increase excellence in synergy with the actions of the Orizont 2020 programme of the European Union, with a focus on adapting these interventions to economic developments and avoiding accentuating existing inequalities between development regions.

In order to **ensure the sustainability of the intervention in attracting specialists** with recognized expertise **from abroad**, it is recommended to encourage the participation of organisations that have already developed a mechanism that allows for continued collaboration and funding of the work of the foreign researcher after the end of the project. This could mean that additional points could be awarded to organizations that already benefit from such a mechanism within the institution.

As a recommendation, it is proposed to continue implementing programmes to stimulate the growth of private investment in RDI, with a focus on adapting these interventions to economic developments and avoiding accentuating existing inequalities between development regions. In this regard, the Ministry of European Investment and Projects and especially the Managing Authority for the Competitiveness Operational Programme must ensure the full implementation of the Objective aimed at increasing private investment in CDI of POC by the end of the current programming period and plan for the period 2021-2027 interventions in the field, with a view to adapting them to the current challenges of the CDI field and the economic context. More predictability and regularity of competitions dedicated to small innovative firms is needed, but also the continuation of existing programmes with programmes to support further development and support through to commercialisation, both on the national and international markets.

Last but not least, it is recommended to **continue to implement programmes that stimulate the establishment and development of collaborative relationships between research organisations and businesses**, and to make a **financial allocation that allows the launch of several competitions in one programming cycle** (only one such competition was launched in 2014-2020). There is also a need for greater predictability and regularity in competitions dedicated generally to public-private knowledge transfer; an analysis to identify the reasons for the low number of project applications for the "Health" area; stimulating the attraction in partnerships of small companies that are very dynamic and have the potential to exploit different market niches, but the success in attracting small companies depends on the percentage of co-funding requested for certain types of applied research activities; continue to implement programmes to stimulate the establishment and development of collaborative relationships between research organisations and enterprises for the transfer of knowledge, technology and CDI personnel, with a focus on adapting these interventions to economic developments, but also on supporting the dissemination of knowledge to less developed regions.