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Effectiveness of European Open Science Policies on Improving Economic Competitiveness

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Abstract

This study evaluates the European Commission's strategy to enhance innovation and competitiveness through the research, innovation and development (R&I&D) sector, with a particular focus on Open Science (OS). Recognising OS as a global megatrend with promising societal impacts, the paper explores its economic implications, which to date remain insufficiently evidenced. The research examines investments made during Horizon 2020 and Horizon Europe, highlighting successes and ongoing challenges, such as the EU's fragmented policy environment, regulatory hurdles, and the underutilisation of research by the private sector. The analysis draws on key findings from the European Innovation Scoreboard and insights from the Letta and Draghi reports, which underscore declining EU competitiveness in the global R&I&D landscape, particularly compared to China and the U.S. The paper identifies critical obstacles, including low industry engagement, the lack of standardised practices, and disparities in member states' capacities and disciplinary differences. Not only does it emphasise the necessity for more effective governance structures, harmonised policies, and investment strategies tailored to industry and end-user needs, but it also highlights the need for new, collaborative skills and readiness to collaborate from all disciplines and stakeholders. Recommendations align with the Budapest Declaration on the New European Competitiveness Deal, advocating for a robust Single Market, improved data integration, and increased private-sector investment. By addressing these barriers, the EU can leverage the R&I&D sector to regain its competitive edge, enhance innovation-driven economic growth, and deliver impactful solutions to societal challenges.

***Keywords/key phrases*:** open science, economy, competitiveness, EU, R&I&D

1. Introduction

Since 2016, Open Science (OS) has been a policy priority of the European Commission, meaning that a significant number of Horizon 2020 and then Horizon Europe projects have been commissioned with a view to building-related capacities, taking OS mainstream, and underlining its importance as well as fostering the development of an international open science community underpinned by an interoperable set of infrastructures based on FAIR (findable, accessible, interoperable, reusable) guiding principles. During the period of Horizon 2020, a sum of 320 million EUR was directly spent from its budget; meanwhile, during the current

programming period of the Multiannual Financial Framework (2021-2027), more than 1 billion EUR is planned to be spent or has been spent directly from the common EU budget while from member states and associated countries the same amount is expected (European Research Executive Agency, 2025; European Commission, 2025) to be invested. The Strategic Research and Innovation Agenda (SRIA) (EOSC Association, 2024) identifies OS as having the positive effects of improved trust in science, quality and productivity gains in research, development of innovative services and products as well as improved impact of research and innovation in addressing societal challenges, supported by a federated, European infrastructure, the European Open Science Cloud (EOSC). The following paper will briefly consider whether OS is the right approach, as well as whether the past few years' significant related investments have delivered expected returns in the light of current competitiveness requests, stemming from the Draghi and Letta reports (Draghi, 2024; Letta, 2024) and the Strategic Research and Innovation Agenda (SRIA) (EOSC Association, 2024).

2. Piloting with slow progress

2.1. Literature review on the impact of Open Science

In the Scoping Review of Open Science Impact (Klebel et al., 2024), where the authors reviewed approximately 30,000 records, they found 479 relevant studies on the impact of open science. Most of the records (311) were found for the academic, then (155) for the societal and only 13 were found to provide evidence for economic impacts. The impact on academics was sometimes controversial due to the variable quality of collected data, predatory publishing practices and article processing charges (APC) that might cause the exclusion of under-resourced regions and institutions but can achieve high-efficiency gains. The outcome of societal impact has more positive underlying evidence according to the studied literature. Plenty of sources suggest positive outcomes in the areas of education, engagement and empowerment of communities in need as well as uptake in policy and decision making. However, there was a significant lack of economic evidence, something that can be viewed as problematic when most policymakers and economic stakeholders are interested in economic cost-benefits.

2.2. The European Innovation capacity

On the other hand, the European Commission issues its European Innovation Scoreboard (EIS) (European Commission, 2024) which indirectly suggests the value added of science to the slowly improving trend of innovation capacity of the EU. The performance improved with a faster pace between 2019 and 2023, resulting in 110 points, compared to 100 in 2017. The picture of the EU remains diverse and unequal due to the diverse policy environments, capacities and investments of different member states. Cyprus and Estonia have been able to improve their innovation index the fastest (by 39% and 27% points respectively), while Denmark, Sweden, Finland and the Netherlands rank as the most innovative EU countries. These latter countries are also global innovation leaders with long-term and predictable strategies and investments. However, a significant number of EU countries, produce only negligible value added through their research, innovation and development activities, a fact which serves to decrease the overall performance of the EU. In the meantime, China has improved its performance by 28%; it has now reached the level of the EU in innovation capacity.

The question, therefore, is whether the EU's overriding focus on open science policy as opposed to emphasising the creation of optimal conditions for all sectors to increase and attract R&I&D investments —particularly from the private sector— is the most effective and efficient way to achieve the ultimate strategic goal: a productive, high value-added, innovative, and competitive economy driven by cross-sectoral and cross-disciplinary collaboration.

Based on the previously listed outcomes, the following EIS indicators are presumed to showcase positive impact in previous years' data: international scientific co-publications, the top 10% most cited publications, employed ICT specialists, public-private co-publication, innovative SMEs collaborating with others, employment in knowledge-intensive activities, PCT patent applications, and trademark applications.

According to these indicators, the answer to this critical question appears to be no. The overall performance of the EU underlines the key messages of the Letta and Draghi reports: the EU's relative weight in the global R&I&D landscape is decreasing and the EC's centralised approach through the European Open Science Cloud (EOSC) so far seems to be ineffective. Not only did China's performance match the performance of the EU overall in 2023 (and it may well have surpassed it by now), but additionally the gaps that exist between the performance of the EU and that of the US, Japan and South Korea remain significant or have even increased. It is important to note that the EU ranks second in terms of providing the most excellent research outputs after the US. Therefore, the potential for improvement can be said to be there, through the available resources, but there is an identified and acknowledged problem of low uptake of research by the private sector.

2.3. Contextual challenges of the EU

While the EU has recognised the problem, significant challenges hinder progress. These include fragmented and diverse policy environments, regulatory and bureaucratic barriers across Member States, which exhibit varying infrastructural capacities, and shortcomings in terms of standardised protocols and practices across disciplines and infrastructures. While the EC aims to coordinate and harmonise policies to improve interoperability, governance complexities arise from conflicting interests among key stakeholders with equal decision-making powers, creating an additional EU-level layer of power struggles. This fragmented governance structure complicates initiatives. Collectively, these issues have brought about an ambiguous environment that is not conducive to the engagement of key stakeholders, such as the industry and the private sector. Another identified problem is the size deficit of European enterprises if we compare the EU to its Chinese or American competitors (Abramo & D'Angelo, 2018; Letta, 2024). The SME sector, especially in the EU context, has a lower risk appetite, which hinders the private funding of research and innovation activities; meanwhile, the EC keeps itself at a distance from direct engagement with large private enterprises in Horizon Europe R&I&D procurements, instead focusing (too) heavily on the involvement of SMEs in such projects, while this sector often lacks the capacity and/or motives to be actively involved (opportunity costs are viewed as problematic for innovation capitalisation). While SMEs undeniably provide the backbone of the EU's economy, the importance of having EU champions – large European companies (like Societas Europea, SE) collaborating with academia – is crucial to attracting global capital. These powerful companies have the most potential to attract global investments to cover capital-intensive endeavours in R&I&D and the development of tomorrow's

infrastructures. In this respect, the EU lags far behind the US (see the just announced 500 billion USD Starlink Project) and China.

Another factor is the differences in cultures not only between countries but between disciplines and industries, an issue that is accompanied by a low level of interest in collaboration within and between quadruple helix stakeholders (academia, government, industry, and societal partners) (Nguyen & Marques, 2022). For improvement to take place, a reassessment of requirements in higher education and research is needed. Transversal, multidisciplinary knowledge and collaborative skills are crucial in the current new context as well as an open and proactive mindset from relevant individuals: the greater the use of inter- and cross-disciplinary research infrastructures by all quadruple helix stakeholders, the stronger the evidence for the need for systemic change.

The European Commission, Member States and other key stakeholders are now building capacities and infrastructures to overcome some key burdens of insufficient data transfer. Recently, EU decision makers also accepted the Budapest Declaration on the New European Competitiveness Deal. They recognised the importance of innovation and the need for private funding to enhance R&I&D. The declaration highlighted the request to build a fully functioning Single Market, build an Investments Union by 2026, reduce administrative burdens for businesses, increase their R&I&D expenditures and enhance digital transformation (European Council, 2024). Based on these acknowledgements, revision of the concept of SEs (European Companies) and their potential to build European champions in R&I&D should be explored.

The EU decision makers have addressed key issues that were raised by both the Letta and Draghi reports. Letta (2024) highlighted the importance of creating a single market for data, through common dataspaces in key sectors and suggested creating the European Knowledge Commons for publicly funded research. It also highlighted the importance of seamless mobility of researchers within the EU and beyond. The alignment of strategies between private and public R&I&D funders was mentioned as crucial. The Draghi (2024) report emphasises the importance of attracting companies and capital globally through competitive regulatory environments that also motivate R&I&D. Current regulatory frameworks create uncertainties for industry players, while fragmentation of policy environments and the lack of possibilities for creating the necessary critical mass in data and capital are key disadvantages of the EU compared to the US (witness the 500 billion USD Starlink project proposal) or China. Large, competitive and innovative companies are the ones that can attract global capital, which is essential if capital-intensive investments into R&I&D activities and the infrastructures of the future are to be covered.

3. Conclusion

The paper set out to evaluate key aspects of the European Commission's strategy for fostering a more innovative and competitive economy through the research, innovation and development (R&I&D) sector, based on related literature. It also aimed to underscore relevant data and evidence in the context of expected outcomes to induce an evidence-based debate amongst related stakeholders. While Open Science has emerged as a global megatrend with the potential for significant societal benefits, its economic impact remains an area in need of further exploration and analysis. The current literature suggests that the EU approach is not as effective in achieving the internally agreed and set objectives as it was intended to be. The industry's

uptake of research outcomes is still low, while regulatory and disciplinary complexities and administrative burdens are hindering progress. Based on the Letta and Draghi reports, the need for revisiting intended drivers of competitiveness and for significantly decreasing hindering factors is in high demand. As the R&I&D sector is one of the keys to finding back the competitive edge of Europe, it is crucial to find a more efficient structure of governance, a more effective way of investments and most of all delivering infrastructures and tools that are in line with industry's, researchers' and overall, the end-users' expectations. There is also a need to revisit European R&I&D strategies and their effectiveness in the current context of global competition towards leading innovation. Based on the paper, closer collaboration, not only within academia between different disciplines, but also with industry, is recommended. Overemphasising the role of SMEs in capital-intensive projects can lead to inefficiencies and ineffective project results with low uptake. Both the literature and empirical evidence suggest that an equal distribution of power on policy and project implementations can also give rise to inefficiency and ineffectiveness due to the leeway it provides for mismanagement (Hudson et al., 2019).

Although the format and space of the current paper are not adequate for a fully in-depth analysis of different indicators and trends, it nonetheless aims to prompt policymakers and related stakeholders to ask themselves questions, based on the aggregated data and policy analysis outlined above.

As a concluding remark, the author's top recommendations would be to ensure a supportive policy and tax environment across the EU to strengthen European companies (and SEs in particular), to enhance and attract R&I&D investments, and to motivate close collaboration between academia and industry, including European multinational companies, from the inception to the implementation and operationalisation of initiatives in this space.

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