



UNIVERSIDADE CATÓLICA PORTUGUESA

Regional Trends In Horizon Europe Pillar 2: Insights Into Collaborative Research Dynamics

Josipa Dias

Católica Porto Business School,

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Josipa Dias

Under supervision of
Prof. Sofia Salgado Pinto

Católica Porto Business School, Universidade Católica Portuguesa

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Abstract

This study examines regional collaboration patterns, coordination roles, and funding distribution within Horizon Europe Pillar 2, the EU's primary research and innovation program addressing global challenges and enhancing industrial competitiveness. Analyzing data from 120 top-funded Research and Innovation Actions (RIA) and Innovation Actions (IA) across six thematic clusters, the findings reveal persistent disparities in participation and leadership. Western Europe dominates project coordination and funding allocation, while Eastern Europe remains underrepresented despite increased involvement in multi-regional consortia. Southern Europe shows significant engagement, particularly in mission-driven clusters like Civil Security, indicating that thematic relevance can partially bridge innovation performance gaps. Northern Europe plays a consistent but secondary role, and higher education and research organizations lead most projects, limiting SME participation in coordination. By integrating regional classifications, innovation performance data, and organizational roles, this research provides a comprehensive overview of the geographic and institutional dynamics shaping EU research funding, highlighting the need for more inclusive design mechanisms to reduce barriers for less-represented regions and foster a more cohesive European Research Area.

Key-words: Horizon Europe, Regional Disparities, Research and Innovation, Research Consortia, Project Coordination

Resumo

Este estudo analisa os padrões de colaboração regional, os papéis de coordenação e a distribuição de financiamento no âmbito do Pilar 2 do Horizonte Europa, o principal programa de investigação e inovação da UE que visa enfrentar desafios globais e reforçar a competitividade industrial. Através da análise de dados de 120 Ações de Investigação e Inovação (RIA) e Ações de Inovação (IA) com maior financiamento, distribuídas por seis clusters temáticos, os resultados revelam disparidades persistentes na participação e liderança. A Europa Ocidental domina a coordenação de projetos e a alocação de financiamento, enquanto a Europa de Leste continua sub-representada, apesar de um aumento na participação em consórcios multirregionais. A Europa do Sul demonstra um envolvimento significativo, sobretudo em clusters orientados por missões, como a Segurança Civil, indicando que a relevância temática pode ajudar a atenuar lacunas no desempenho em inovação. A Europa do Norte assume um papel consistente, embora secundário, e as instituições de ensino superior e de investigação lideram a maioria dos projetos, o que limita a participação das PME na coordenação. Ao integrar classificações regionais, dados sobre desempenho em inovação e os papéis das organizações, esta investigação oferece uma visão abrangente da dinâmica geográfica e institucional que molda o financiamento da investigação na UE, salientando a necessidade de mecanismos de conceção mais inclusivos para reduzir as barreiras enfrentadas pelas regiões menos representadas e promover um Espaço Europeu de Investigação mais coeso.

Key-words: Horizon Europe, Regional Disparities, Research and Innovation, Research Consortia, Project Coordination

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Introduction

Since the 1950s, the European Union (EU) has been funding research initiatives. The initial sources of EU research funding were established through the treaties of the European Coal and Steel Community (ECSC) in 1951 and the European Atomic Energy Community (Euratom) in 1975. These initial treaties laid the groundwork for funding research at the European level, They focused primarily on the coal, steel, and nuclear energy sectors. By 1973, it was established that research activities were necessary to achieve specific community objectives in operating the common market. Thus, the goal was to utilize these funds to promote technical and economic research. (Reillon & Dietrich, 2015).

Over the years, EU research funding has expanded to encourage advancements in various sectors and address broader societal needs. It has evolved into a crucial driver of economic growth and competitiveness. The introduction of the Framework Programmes in the 1980s marked a significant transition toward a comprehensive approach to funding all European research activities. This change shifted focus from sector-specific funding to a more inclusive strategy with EU-wide programmes for research (Reillon & Dietrich, 2015).

The EU Framework Programmes (FPs) have developed since the inception of the 1st Framework Programme (FP1) was introduced in the year 1983 and subsequently evolved and led up to the 7th Framework Programme (FP7) and later to Horizon 2020 and the current Horizon Europe, thereby shaping the EU's research and innovation landscape. These programmes have supported and continue to support the establishment and sustainability of European networks that enhance coordination, promote the exchange of best practices, and foster

joint project development (Reillon, 2017). During the early implementation of the Framework Programmes, the policy justification for EU involvement in research and technological cooperation was formally defined as the 'Riesenhuber criteria.' In simple terms, it meant that if a project was too large or expensive for one country alone, it made more sense to collaborate at the EU level—especially if the results could benefit the entire EU and help advance the goals of the common market (Georghiou, 2001). The framework programmes not only supported research but also encouraged collaboration, knowledge sharing, and the translation of research outcomes into tangible benefits for society and the economy (Georghiou, 2001) (Reillon, 2017)

The evolution of the European Framework Programmes (FPs) from 2002 to 2027 illustrates a significant shift in the EU's research and innovation policies. Although the 6th Framework Programme (FP6) (2002–2006) established the European Research Area (ERA) with tools like Integrated Projects and Marie Curie Actions but faced challenges like lack of reach of smaller organizations, synergies direction and stakeholder engagement. However, in FP7 (2007–2013) was outpaced the FP6 by expanding the budget and introducing the European Research Council and public-private partnerships. Horizon 2020 (2014–2020) marked a pivotal change by aligning research with societal challenges and the Sustainable Development Goals (SDGs), enhancing stakeholder involvement through a three-pillar structure. Finally, Horizon Europe (2021–2027) continues this trend by reinforcing direction through EU Missions and improving regulatory learning, although there remains room for policy experimentation. Overall, this progression reflects the EU's commitment to a more inclusive and transformative approach to research and innovation (Reillon, 2017) (Cavicchi et al., 2023).

The FPs have played a crucial role in developing the European Research Area (ERA) by promoting researcher mobility, enhancing infrastructure, and fostering collaboration. Furthermore, the FPs improved European competitiveness by supporting innovation, small and medium-sized enterprises (SMEs), and public-private partnerships. By tackling shared societal issues and encouraging cross-border cooperation, they have created substantial European added value and acted as catalysts for increased public and private investment in research and innovation. (Reillon & Dietrich, 2015).

Over time, the FPs gained a stronger legal foundation and increased funding, shifting their focus from basic research to encompass broader innovation and societal challenges. Research funding is vital because it fuels economic growth, drives innovation, addresses societal challenges, informs policy development, promotes regional development, encourages collaboration, builds human capital, and represents a long-term investment in European capabilities (Reillon & Dietrich, 2015).

Horizon Europe (2021–2027), the current and most ambitious Framework Programme (FP), continues this trajectory. Its second pillar – Global Challenges and European Industrial Competitiveness – channels the largest share of funding toward collaborative research addressing key thematic areas such as health, climate, digital transformation, and more. This pillar emphasizes transnational collaboration, cross-sectoral partnerships, and societal relevance, making it a particularly valuable lens through which to assess the dynamics of research coordination and distribution across Europe (European Commission: Directorate-General for Research and Innovation, 2021a). Within this pillar, there are 6 thematic clusters. Each thematic cluster is organized around specific Types of Actions (ToAs), which categorize the nature of funded projects. Each action

type has its own scope, funding rate, and expected outcomes. For the purposes of this research, the focus will be on Research and Innovation Actions (RIA) and Innovation Actions (IA), as the majority of funded projects within Pillar 2 fall under these two categories (European Commission, 2024a)

Despite ongoing efforts to promote balanced development through EU research funding, significant regional disparities in research and innovation (R&I) performance continue to exist across Europe. While regions in Central and Eastern Europe (CEE) and parts of Southern Europe have made strides, particularly in business R&D and publication volume, Western and Northern Europe still lead in terms of overall R&D investment, high-impact scientific output, and technological innovation. Capital cities and urban areas remain hubs of R&D activity, benefiting from concentration effects and enhanced institutional capacity. In contrast, less developed regions often struggle to convert incremental gains into leadership roles within EU-funded projects. These disparities raise important questions about the effectiveness of Horizon Europe—particularly Pillar 2, which supports large-scale, transnational collaboration (European Commission: Directorate-General for Research and Innovation, Borunsky, Deiss, Martino, & Ravet, 2020).

During my internship at INOVA+ Innovations, a consultancy firm specializing in Horizon Europe funding, in my role, I reviewed previous project proposals to identify strategies for improvement. I also built a database of potential partner organizations across various EU member states, including contact information for relevant stakeholders.

As my internship progressed, I became increasingly curious about the patterns of collaboration within Horizon Europe projects. I began to ask questions such

as: Which regions collaborate most frequently? Which countries tend to lead these projects? How is funding distributed across these networks? This curiosity sparked a deeper interest in exploring regional dynamics in EU research funding, ultimately shaping the focus of my thesis.

This thesis investigates the following key questions:

1. Are there observable trends in regional collaboration among EU member states in projects funded under Horizon Europe Pillar 2?
2. Which regions and types of organizations most commonly take on the role of project coordinator, and are there any regional patterns in this regard?
3. What differences exist in funding allocation between the highest and lowest funded regional clusters, and what factors might account for these differences?

By addressing these questions, this study aims to enhance our understanding of how Horizon Europe funding operates not only in relation to scientific priorities but also concerning geographic equity, institutional capacity, and the realization of the European Research Area.

1. Literature Review

1.1. Horizon Europe Funding

The European Union (EU) provides funding to a variety of projects and programs. Funding types included in the form of grants, subsidies, financial assistance, loans and prizes. The funding programs are either directly managed by the EU or shared with national authorities of member countries or indirectly managed by partner organizations or other authorities outside of the EU (Funding, Grants, Subsidies | European Union, n.d.).

The EU introduced the Horizon Europe Funding (HEF) project in 2021. The project is similar to the Horizon 2020 program that ran from 2014-2020. The Horizon 2020 had a budget of €80 billion. (Horizon 2020, n.d.). Horizon 2020 aimed to make Europe a key player in research and innovation, with a focus on effectively tackling societal challenges, driving economic growth, and maintaining competitiveness internationally (European Commission, 2013). (European Commission, 2024b). The final published report on the Horizon 2020 program confirmed that it successfully achieved its objectives, significantly enhancing the scope and quality of research and innovation in Europe. It also supported larger-scale, more complex, and ambitious research and innovation activities. (European Commission, 2024b)

According to the Horizon Europe Programme guide (European Union, 2024a) the HEF programme has a proposed budget of €95.5 billion for 2021-2027. The strategic plan of this program is to align EU research and innovation investments with key policy priorities to tackle major challenges and deliver impactful results.

The strategic plan published for the Horizon Europe programme aims to advance scientific knowledge through pioneering research, drive breakthrough innovations, and facilitate the development and demonstration of cutting-edge solutions. Additionally, it seeks to restore Europe's industrial leadership and strengthen its strategic autonomy in critical sectors. Aligned with EU policy priorities, Horizon Europe integrates research and innovation to support ecological and digital transitions, promote social progress, and contribute to Europe's long-term resilience. The programme provides strategic direction, creates synergies with other EU funding programs and national initiatives, and engages European civil society in shaping the research agenda. By enhancing public trust in science and technology and fostering entrepreneurship, Horizon Europe seeks to maximize the societal impact of research, ensuring broad and lasting benefits across Europe (European Commission: Directorate-General for Research and Innovation, 2021a).

As per the guide published by the European Commission (2024a) describes the Horizon Europe, which is structured around three pillars and one additional part, each addressing different priorities.

The first pillar is called the Excellent Science Pillar, and the aim is to increase the European Union's global presence. It supports the European Research Council, funds researchers through Marie Skłodowska-Curie Actions and invests in world-class research infrastructure.

The second pillar is called Global Challenges and European Industrial Competitiveness. This pillar aims to tackle societal challenges and reinforce technological and industrial capacities through 6 different clusters. The cluster areas focus on Health, Culture Creativity & Inclusive society, Civil Security for

Society, Digital Industry space, Climate Energy and Mobility, Food Bioeconomy
 Natural Resources Agriculture and Environment.

The third pillar is called Innovative Europe. This pillar aims to make Europe a frontrunner in the innovation market via the European Innovation Council and the European Institute of Innovation and Technology (EIT).

In addition to the three pillars, another part is focused on Widening Participation and Strengthening the European Research Area (ERA). This initiative is designed to provide greater support for EU Member States, especially those with underdeveloped research and innovation capacities. It enables them to maximize their national potential by promoting collaboration and improving access to research and innovation opportunities.

Figure 1:Horizon Europe Framework Structure



Source: (European Commission, 2024a)

1.1.1. Pillar 2- Global Challenges and European Industrial Competitiveness

As stated by the Directorate-General for Research and Innovation, the primary goal of the Global Challenges and European Industrial Competitiveness pillar is to encourage research and innovation investments in areas that need them the most, ultimately delivering tangible results. This initiative aims to tackle the twin transitions toward environmental sustainability and digital recovery with ambition, providing significant financial support for these transformations (European Commission: Directorate-General for Research and Innovation, 2021b).

The Horizon Europe budget allocated around 52 billion towards this pillar (European Commission: Directorate-General for Research and Innovation, 2021b). As per the current data from the horizon dashboard, the total funding received for this pillar stands at 25,52 billion euros (European Commission, n.d.a).

The Pillar 2 has six unique thematic priorities called clusters. These clusters are interconnected and play a role in achieving the overall goals of the Horizon Europe program. Each cluster has specific expected impacts and intervention areas, contributing to at least one of Horizon Europe's four key strategic orientations (European Commission: Directorate-General for Research and Innovation, 2021a).

Cluster 1: Health

The current Net EU Contribution Health cluster stands at €4.37 billion. (European Commission, n.d.a). This cluster aims to enhance Europe's autonomy in

healthcare by developing safer, more effective, efficient, and affordable tools, technologies, and digital solutions for health promotion, disease prevention, diagnosis, treatment, and monitoring. It also seeks to foster a competitive and sustainable health-related industry, ensuring EU leadership in breakthrough health technologies. Emphasis on personalized healthcare and active public involvement in design and decision-making. Additionally, the cluster aims to deepen the understanding of how environmental degradation and other risk factors affect human health (European Commission: Directorate-General for Research and Innovation, 2021a).

Cluster 2: Culture, Creativity, and Inclusive Society

The Culture, Creativity, and Inclusive Society's Net EU contribution stands at €989.7 million (European Commission, n.d.a). It focuses on sustainable innovation, job creation, and fostering a sense of European belonging through engagement with citizens, social partners, and economic sectors. It facilitates the transition to new forms of work while ensuring social inclusiveness and unlocking the potential of cultural heritage, arts, and creative industries. Research promotes access to heritage through new technologies and digitization (European Commission: Directorate-General for Research and Innovation, 2021a).

Cluster 3: Civil Security for Society

The Civil Security cluster is the least funded among all clusters in terms of the Net EU contribution which stands at €610.7 million (European Commission, n.d.a). The aim of this cluster is to strengthen resilient digital and physical infrastructures, enhance cybersecurity capacities, and promote 'security-by-design' and 'privacy-by-design' in digital technologies. It upholds EU standards on privacy, data protection, and fundamental rights while improving resilience

to natural and man-made disasters (European Commission: Directorate-General for Research and Innovation, 2021a).

Cluster 4: Digital, Industry, and Space

The Digital, Industry, and Space is the 2nd largest funded cluster with a Net EU contribution of €7.46 billion (European Commission, n.d.a). This cluster supports the development of digital and key enabling technologies, enhancing adaptability and resilience in production. It aims to give EU industries a competitive edge and strengthen the digital supply chain. Investments focus on technologies that reflect European social and ethical values, including human-centred artificial intelligence (European Commission: Directorate-General for Research and Innovation, 2021a).

Cluster 5: Climate, Energy, and Mobility

The Climate, Energy, and Mobility cluster is the largest funded cluster, with a Net EU contribution of €7.99 billion (European Commission, n.d.a). This cluster aims to work toward climate neutrality and zero pollution in energy and transport while maintaining competitiveness and reducing impacts on air quality, ecosystems, and biodiversity. It promotes a cleaner environment, a just transition, and innovative low- and zero-carbon solutions (European Commission: Directorate-General for Research and Innovation, 2021a).

Cluster 6: Food, Bioeconomy, Natural Resources, Agriculture, and Environment

The Food, Bioeconomy, Natural Resources, Agriculture, and Environment clusters Net EU contribution stands at €4.2 billion (European Commission, n.d.a). This cluster aims to support healthy ecosystems, a clean environment, and sustainable natural resource management. It addresses the interdependence of biodiversity, water, food, and health and contributes to the European Green Deal.

Goals include restoring ecosystems, reversing biodiversity loss, reducing disaster risk, and enhancing climate change mitigation and adaptation (European Commission: Directorate-General for Research and Innovation, 2021a)

All clusters contribute to the overarching strategic goals of promoting open strategic autonomy, fostering a more resilient, inclusive, and democratic European society, and advancing Europe as the first digitally enabled, circular, climate-neutral, and sustainable economy (European Commission: Directorate-General for Research and Innovation, 2021b).

1.1.2. Types of Actions

Types of Actions are used within Horizon Europe to categorize the nature of funded projects. Each type defines the scope, funding rate, and expected outcomes of the activities it supports. A project type refers to a specific category of funded activity, characterized by its objectives, the nature of the work involved, and its intended impact. These classifications enable the program to adopt a targeted and structured approach to supporting different stages of the research and innovation process, ranging from knowledge generation to market deployment (European Commission, 2024a).

As the introduction outlines, this thesis focuses on two primary Types of Actions: Research and Innovation Actions (RIA) and Innovation Actions (IA). These two categories represent most project types funded under Horizon Europe Pillar 2.

Research and Innovation Actions (RIA) support activities that generate new knowledge or explore the feasibility of novel technologies, products, services, or processes. These projects often encompass both basic and applied research, as

well as technology development, integration, and validation at the prototype level, typically conducted in laboratory or simulated environments. EU funding for RIAs can cover up to 100% of eligible project costs (European Commission, 2024a) (European Research Executive Agency, n.d.a).

Innovation Actions (IA) focus on bringing innovations closer to market. These projects typically involve prototyping, testing, demonstrating, piloting, and large-scale validation of products, services, or processes. The aim is to support the development of market-ready solutions with strong commercial potential. EU funding for IAs generally covers up to 70% of project costs (European Commission, 2024) (European Research Executive Agency, n.d.a).

1.1.3. Participants and Project Coordinator Role In Horizon Europe

Horizon Europe welcomes participation from diverse organizations, including universities, research institutes, public bodies, small and medium-sized enterprises (SMEs), non-governmental organizations (NGOs), and industry players, depending on the specific focus of each call for proposals. Most projects require a consortium of at least three independent legal entities from different EU or associated countries, with at least one entity based in an EU member state. Some calls may also necessitate a multi-actor approach involving engaging end-users or stakeholders directly affected by the project results. Applicants must demonstrate the operational and financial capacity to execute the proposed work. The designated project coordinator will serve as the primary contact with the European Research Executive Agency (European Research Executive Agency, n.d.b).

Horizon Europe is focused on enhancing international collaboration by allowing non-EU countries with strong science, technology, and innovation capabilities to associate with the programme (European Commission: Directorate-General for Research and Innovation, 2021a). It aims to provide more precise guidance in its work programmes about standard calls that require international participation, as well as the specifics of various call types. Additionally, dedicated guidelines for the execution of special calls will be created. These initiatives reflect a commitment to engaging researchers and organizations from a variety of cultural backgrounds (Implementation Strategy for Horizon Europe Version 1.0, 2020).

The program aspires to draw in top researchers and the most innovative companies, implicitly valuing various cultural perspectives. It recognizes the significance of diversity among the evaluators, considering factors such as geographic representation, gender, and the balance between industry and academia. Furthermore, Horizon Europe is dedicated to promoting participation and narrowing Europe's research and innovation gap by supporting countries that perform lower in R&I, developing centers of excellence, enhancing their capabilities, and fostering collaborative connections (Publications Office of the European Union, 2021a).

The European Commission officially defines the Project Coordinator (PC) as the main contact and initiator of proposals. However, the role is much more extensive in Framework Programmes such as Horizon Europe. Project Coordinators act as scientific entrepreneurs; they drive project conceptualization and consortium formation, provide scientific leadership, manage complex collaborations, and play a crucial role in translating research funding into impactful innovation outcomes. It is essential to recognize and support this

broader role to maximize the innovation potential of European Framework Programmes (Cunningham et al., 2020).

According to a study conducted by Tenhunen-Lunkka and Honkanen (2024), there is a notable lack of research on the success factors contributing to effective project management in European Union-funded Research and Innovation (RDI) projects. This study highlighted that cross-cultural management is a key factor, emphasizing the need for a broader approach to diversity, equity, and inclusion.

Collaborative RDI projects funded by Horizon Europe are inherently multicultural and multinational. They are complex because they aim to co-develop novel technologies and solutions involving high uncertainty. Since consortium members come from various European countries and possess diverse expertise, managing these cross-cultural teams can be challenging. These projects typically engage various stakeholders, including research organizations, universities, businesses, and non-governmental organizations (NGOs). Cross-cultural management is crucial in these projects, involving individuals from diverse cultural backgrounds. Project leaders should strive to create an inclusive and diverse environment that fosters empathy and cultural intelligence. Good communication skills and building positive relationships among team members are essential. Leaders must be aware of their own cultural biases and work towards creating an atmosphere where all voices are heard and valued (Tenhunen-Lunkka & Honkanen, 2024).

A study conducted under the Horizon 2020 initiative evaluated the collaborative success of research and development (R&D) projects and identified several key factors influencing consortium performance. The experience of consortium members was crucial, as groups lacking prior experience with EU Framework

Programmes were significantly less likely to succeed. Additionally, consortia, with a higher proportion of partners from Western European countries, had a better chance of securing funding. In contrast, those with more representation from Central and Eastern European nations fared worse. The type of organizations involved also mattered; consortia that did not include well-reputed or top-tier universities tended to underperform, especially when they were primarily academic in nature. In contrast, projects with application-oriented organizations were more successful. Lastly, the study found that limited interaction between different types of organizations, such as universities and industry partners, hindered the overall effectiveness of collaboration (Wanzenböck, Lata, & Ince, 2020).

According to the European Research Executive Agency website (2023) interested participants can get the application process steps are as follow:

STEP 1: Identifying the Appropriate Funding Opportunity

The European Commission periodically issues calls for proposals aligned with the Horizon Europe work programmes. These calls are categorized into thematic areas known as "destinations," which correspond to the European Union's (EU) strategic policy priorities and intended funding impact.

Comprehensive information on active calls for proposals, including specific topics, deadlines, and application forms, is available on the Funding and Tenders Portal. Additionally, all programmes managed by the European Research Executive Agency (REA) can be accessed through the agency's website. To support the application process, REA organizes Information Days that provide detailed guidance on proposal submission. Information on upcoming

Information Days, as well as recordings and presentations from past events, can be found in the events section of the agency's website.

STEP 2: Proposal Submission

For most funding opportunities, applicants must form a consortium consisting of at minimum of three partner organizations from different countries. The submission process requires creating a profile on the Funding and Tenders Portal. Here, applicants can select their desired call for proposals and complete the online application form before the specified deadline.

Some calls follow a two-stage application procedure. In the first stage, applicants submit a concept note summarizing their project. If the concept note is successful, applicants proceed to the second stage, where they submit a comprehensive project proposal.

STEP 3: Proposal Evaluation

After the submission deadline, proposals enter the evaluation phase. The European Research Executive Agency (REA) oversees this process according to Horizon Europe's established procedures. Evaluation is conducted by independent experts who have specialized knowledge in the relevant field. These experts assess each proposal using predefined criteria set by the European Commission.

The evaluation process involves expert peer review, after which a consensus is reached within the review panels. Once finalized, the REA notifies successful applicants and proposes funding allocations based on the available budget. This evaluation phase typically lasts up to five months.

STEP 4: Grant Agreement and Funding Allocation

Upon selecting successful proposals, a grant agreement is drafted between the project partners—referred to as the beneficiaries—and the European Commission. This agreement outlines the project's research and innovation activities, timeline, budget, EU financial contributions, and all parties' rights and obligations.

2.1. Regional Disparities in Funding

The Horizon Europe fund is distributed through a competitive process focused on excellence, which benefits regions with strong innovation capabilities. However, this approach may inadvertently leave some regions behind, leading to a "closed-club effect" that exacerbates the innovation and economic gap across Europe. A study conducted from 2014 to 2020 highlights this issue. Although there are other policies aimed at reducing regional disparities, the framework programs play a crucial role in boosting research and innovation. Therefore, it is essential to implement more inclusive actions (Molica & Marques Santos, 2024).

From the mid-2000s until 2020, funding from the EU framework programs was unevenly distributed across various European regions and R&D sectors. This phenomenon, known as the "Blue Banana Corridor," indicates that regions from Central to Northern Europe have been more successful in securing funding, particularly in higher education. In contrast, Southern regions have attracted more private sector funding, while Eastern regions have struggled in both areas. Although the overall budget for framework programs has increased over the years—especially for the private sector—regional disparities have continued to widen (Piro, Seeber, & Wang, 2024).

2.1.1 European Regional Division

The European Union uses the Nomenclature of Territorial Units for Statistics (NUTS) to classify regions for statistical and policy purposes. This system consists of three hierarchical levels: NUTS 1 represents major socio-economic regions, NUTS 2 refers to basic regions designated for implementing regional policies, and NUTS 3 encompasses smaller areas used for detailed analysis and local-level diagnostics. While the NUTS classification is crucial for EU funding mechanisms and cohesion policy, this study takes a broader regional approach to more effectively capture macro-level patterns in project coordination under Horizon Europe (Eurostat, 2024).

In addition to territorial classifications like the NUTS system, the European Commission classifies countries into two categories: Widening Member States and Non-Widening Member States to support more inclusive participation in EU research programs. Widening countries are those identified as having lower research and innovation (R&I) performance, making them eligible for targeted measures designed to "spread excellence and widen participation." These countries are primarily located in Eastern and Southern Europe, which aligns with the broader regional classifications used in this study. In contrast, Non-Widening Member States, typically found in Western and Northern Europe, are characterized by stronger R&I performance and a historically more significant presence in EU-funded projects. This policy-based distinction highlights the geographic disparities that often exist in research coordination and participation (European Commission, Directorate-General for Research and Innovation, 2024a).

The European Union consists of 27 member countries. To categorize EU countries based on geography, this study will utilize the United Nations (UN) M49 classification system. This internationally recognized framework, developed by the United Nations Statistics Division, groups countries according to demographic and territorial similarities. By providing a transparent and standardized method for dividing nations into continental, sub-regional, and intermediary regions, the M49 system allows a structured approach to consistently analyzing countries. The M49 classification system enables more effective comparisons across different regions, with the aim of achieving greater homogeneity (UN Statistics Division, n.d.).

EU Member States are a vital component of the Horizon Europe programme, with their legal entities typically having broad eligibility. The programme also strongly encourages collaboration among entities from different Member States (European Commission: Directorate-General for Research and Innovation, 2021a).

As per the classification, it is Northern Europe, Southern Europe, Western Europe and Eastern Europe.

Northern European Countries- Denmark, Estonia, Finland, Ireland, Latvia, Lithuania, Sweden

Southern Europe Countries- Croatia, Greece, Italy, Malta, Portugal, Slovenia, Spain

Western Europe Countries- Austria, Belgium, France, Germany, Liechtenstein, Luxembourg, Monaco, Netherlands

Eastern Europe Countries- Bulgaria, Czechia (Czech Republic), Hungary, Poland, Romania and Slovakia

This classification helps provide a consistent and practical way to group countries for the purpose of this study. By using the Northern, Southern, Western, and Eastern Europe categories, the analysis can more clearly identify regional trends and patterns in project coordination and participation under Horizon Europe.

2. Methodology

This study employs a quantitative research design that utilizes secondary data to investigate regional collaboration patterns, coordination roles, and funding disparities in projects funded under Horizon Europe Pillar 2. The analysis specifically focuses on two types of action-funded projects: Research and Innovation Actions (RIA) and Innovation Actions (IA), the primary mechanisms for supporting research and innovation initiatives under this pillar.

Data for the study was sourced from two leading platforms. The first is the Horizon Europe Dashboard, an official online platform the European Commission manages. This dashboard is an intuitive and interactive tool designed to provide real-time access to data about the Horizon Europe program. Its user-friendly and flexible interface allows for effective data sharing and in-depth analysis (European Commission: Directorate-General for Research and Innovation, 2018). From this source, the top 10 RIA and top 10 IA projects were selected from each of the six clusters under Pillar 2, based on the size of their EU contributions, resulting in a sample of 120 projects.

This selection approach enables the study to concentrate on high-impact projects that are likely to align with strategic priorities, established networks, and enhanced organizational capacity. According to Wanzenböck, Lata, and Ince (2020), larger and better-funded projects typically involve consortia with stronger research reputations and previous experience in EU programs. This increases their likelihood of success and their ability to reveal systemic trends in coordination.

The second data source is the European Innovation Scoreboard (EIS) Interactive Tool 2024, developed by the European Commission's Directorate-General for Research and Innovation. This tool offers a comprehensive assessment of research and innovation performance across EU countries as well as other European nations and regional neighbors. It helps users visualize performance results, access detailed country profiles, compare relative strengths and weaknesses, and examine various indicators related to innovation systems. This facilitates a deeper understanding of national innovation landscapes and highlights areas that need improvement (European Commission, 2024b).

The European Innovation Scoreboard (EIS) offers a comparative and data-driven assessment of innovation performance among European countries and is widely used in regional innovation studies. By incorporating EIS scores into this research, we can enhance our analysis by connecting coordination roles to broader national innovation capabilities. Previous studies have indicated that countries and regions with stronger innovation profiles—especially those situated in the Blue Banana region—are significantly more likely to secure funding from the EU Framework Programme and lead high-impact projects (Balland & Boschma, 2024; Rodríguez-Pose & Crescenzi, 2023). Utilizing EIS classifications in this context helps us evaluate whether these trends are also evident in the coordination landscape of Horizon Europe's Pillar 2.

From the Horizon Europe Dashboard, the top 10 RIA and top 10 IA projects were selected from each of the six clusters under Pillar 2, based on the size of their EU contributions, resulting in a sample of 120 projects.

For this analysis, I selected specific components to isolate distinct dimensions of project activity within Horizon Europe:

- Programme: Horizon Europe
- Country Group: EU Member States
- Pillar: Global Challenges and European Industrial Competitiveness (Pillar II)
- Cluster: All six thematic clusters under Pillar II. Analyzed one at a time.
- Type of Action: Research and Innovation Action (RIA) and Innovation Action (IA). Analyzed one at a time
- Selection Criteria: The top 10 projects per cluster based on the highest EU contribution

The data was downloaded from the Horizon Dashboard and processed using Google Sheets. For each selected project, I recorded the total number of participants and categorized them according to the type of organization within the consortium. The organizational categories were defined as follows:

- HES: Higher Education Institutions
- REC: Research Organizations
- PRC: Private for-profit Companies
- PUB: Public Bodies
- OTH: Other Organizations

I then combined the selected RIA and IA projects and recorded the type of organization acting as the project coordinator, along with its country of origin. Based on the country information, I assigned each coordinator to one of four regions—North, South, East, or West—using the UN geoscheme. Additionally, I matched each coordinator's country to its corresponding European Innovation Scoreboard (EIS) classification, identifying whether the country was an Innovation Leader, Strong Innovator, Moderate Innovator, or Emerging Innovator.

Additionally, during this process, a note was made of whether the coordinating organization was identified as an SME (Small and Medium-sized Enterprise), based on its profile in the Horizon Dashboard.

The analysis included the following components:

1. Counting the number of projects coordinated by each type of organization (HES, REC, PRC, PUB, OTH)
2. Counting the number of project coordinators in each EIS performance category
3. Tallying the number of coordinators from each European region
4. Calculating the average EIS score per region

I created pivot tables to analyze:

- The distribution of project coordinator types by country
- The distribution of project coordinator types by region

These steps were taken to identify regional trends and organizational patterns in the coordination of Horizon Europe's top-funded collaborative projects. By focusing on high-funding projects, it highlights key initiatives within each cluster. Classifying coordinators by organization type, region, and innovation performance provides insights into which institutions or regions are likely to lead major projects and how this aligns with the EU's goals of inclusiveness, cohesion, and research excellence.

After identifying the project coordinators, the next step was to analyze the overall participation of countries in the selected top 10 RIA and IA projects from each cluster. We extracted and compiled a list of all participating countries in each project consortium. Each country was then categorized into one of four macro-

regions—North, South, East, or West Europe—based on the UN geoscheme. In addition, we assigned each country its ranking in the European Innovation Scoreboard (EIS) and its corresponding innovation performance category, which includes Innovation Leader, Strong Innovator, Moderate Innovator, or Emerging Innovator.

Using this data, calculated the following metrics:

- The number of countries from each region represented across all selected projects.
- The number of countries in each EIS performance category.
- The average innovation score for each region, based on the individual EIS scores of the countries present in the dataset.

This part of the analysis provided a broader perspective on regional and innovation performance representation among participating countries, extending beyond the coordinator level.

To further explore regional collaboration and funding dynamics, I selected the same top projects identified as 10 RIA and IA from each of the six Pillar 2 clusters. For each project, I recorded the net EU contribution allocated to each consortium member country. These countries were categorized into one of four regions—North, South, East, or West—according to the UN geoscheme. The funding share received by each country within a project was classified into four tiers based on its percentage of the total project funding:

- Highest: More than 25%
- High: Between 15% and 25%
- Medium: Between 5% and 15%
- Low: Less than 5%

I then created a table for each project that included the project name, total EU contribution, and a breakdown of the regions represented by the consortium member countries. This approach enabled me to determine how many regions were involved in each project—whether two, three, or all four regions—providing insight into the geographic diversity of the collaboration.

Finally, I constructed a cross-table showing the regional distribution of consortium member countries across all projects alongside their corresponding funding tiers. This allowed me to analyze whether certain regions consistently received larger or smaller shares of funding within highly funded collaborative projects under Horizon Europe.

After analyzing each cluster individually, the results were combined to create a comprehensive overview of regional and organizational trends across all six clusters. This process of aggregating the results for analysis was facilitated by an AI tool to ensure accuracy.

3. Results

This section presents the findings from a comparative analysis of 120 top-funded Research and Innovation Action (RIA) and Innovation Action (IA) projects across the six thematic clusters under Horizon Europe Pillar 2. The results are structured to address two of the study's central research questions:

1. Are there observable trends in regional collaboration among EU member states?
2. Which regions and types of organizations most commonly assume the role of project coordinator, and are there any regional patterns in this regard?

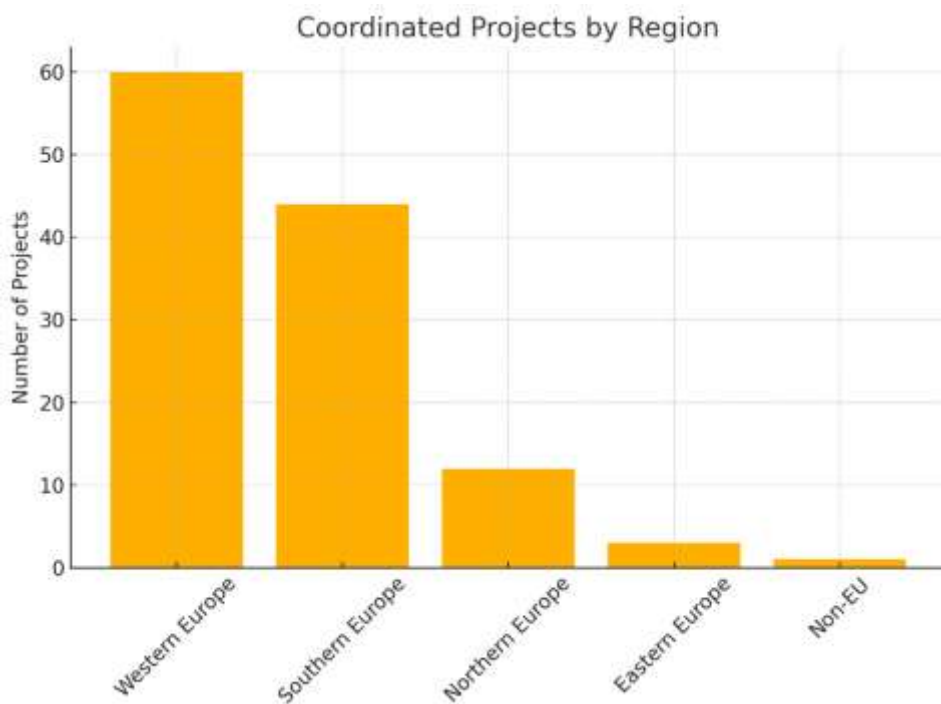
Drawing on data related to project leadership, participant collaboration, funding shares, organizational types, and innovation classifications, this section provides a comprehensive overview of how Horizon Europe Pillar 2 projects are regionally and institutionally structured.

The analysis reveals consistent regional patterns across all six clusters. Western Europe emerges as the dominant region in nearly every domain. In the Health, Digital, Climate, and Food clusters, countries such as Germany, France, the Netherlands, and Belgium lead in participation, coordination roles, and EU funding contributions. Southern Europe also demonstrates significant engagement, though its role varies by cluster. In the Health and Digital clusters, countries like Spain, Italy, and Greece frequently participate as partners and occasionally as coordinators. In the Civil Security and Food clusters, Southern Europe takes a leading role in both participant count and project coordination. Northern Europe maintains a steady presence in supportive roles, while Eastern

Europe, although increasingly involved in multi-regional projects, consistently ranks lowest in coordination roles and funding shares.

The aggregated analysis further illustrates this regional hierarchy. Of the 120 projects, Western Europe coordinated 60 (50%), followed by Southern Europe with 44 (37%), Northern Europe with 12 (10%), and Eastern Europe with just 3 (2.5%). One project (0.8%) was coordinated by a non-EU country.

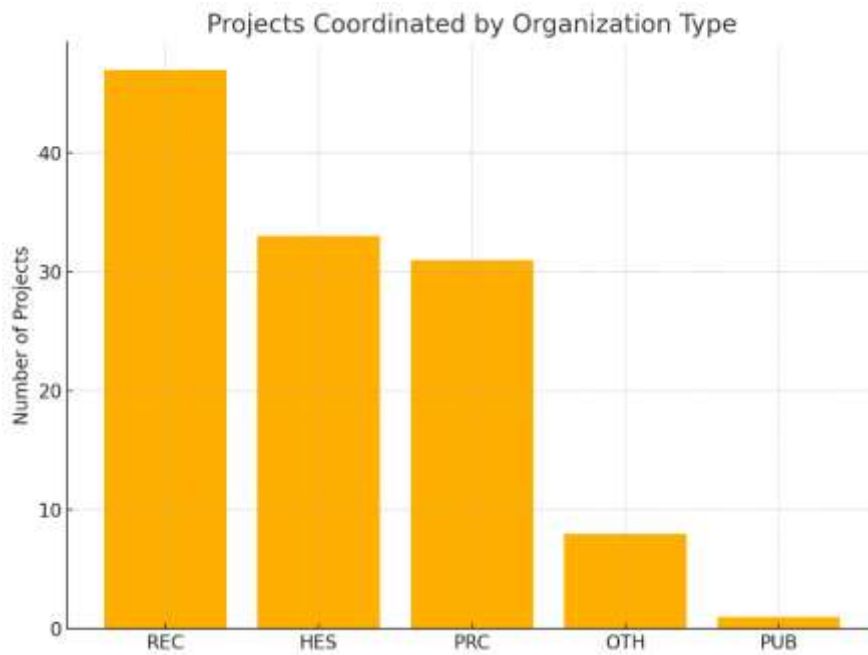
Figure 2: Regional representation in Project Coordinators



Source: By the Author with AI tool to create the graph

In terms of organization type, Research Organizations (REC) led 47 projects (39%), Higher Education Institutions (HES) coordinated 33 (28%), and Private for-profit Companies (PRC) coordinated 31 (26%). Other organizations (OTH) and Public Bodies (PUB) were responsible for 8 and 1 projects, respectively.

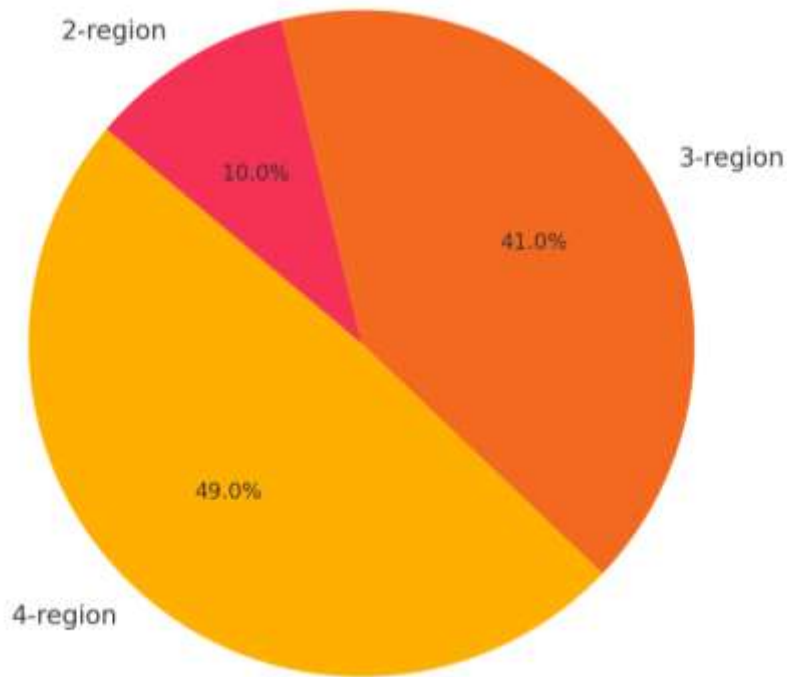
Figure 3:Type of Organization of the Project Coordinator organizations



Source:By the Author with AI tool to create the graph

Regional collaboration patterns were also evident. A majority of projects (49 out of 120; ~41%) involved all four EU macro-regions (West, South, North, and East). Another 41 projects included three-region combinations, most commonly involving the West, South, and North. Only 10 projects (8.3%) involved two regions.

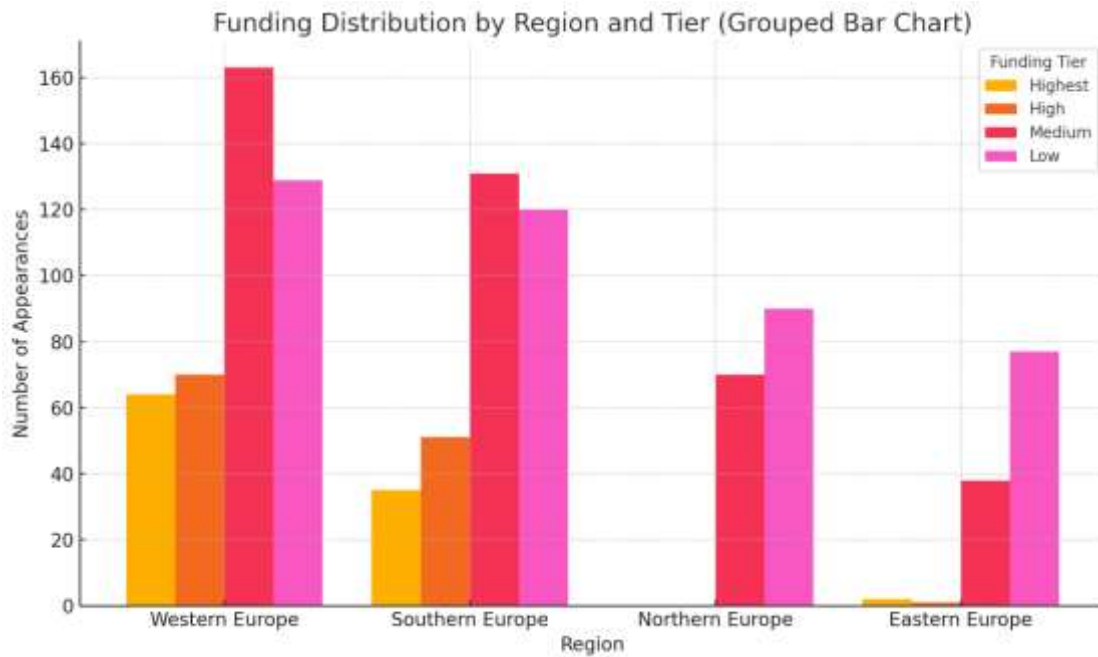
Figure 4:Regional Collaboration pattern across 120 Project across 6 clusters



Source: By the Author with AI tool to create the graph

Funding distribution across regions follows a similar pattern. Western Europe appears 64 times in the “Highest” tier, 70 in “High”, 163 in “Medium”, and 129 in “Low”. Southern Europe follows with 35 “Highest”, 51 “High”, 131 “Medium”, and 120 “Low”. Northern Europe is largely in “Medium” (70) and “Low” (90) tiers, while Eastern Europe is concentrated in “Medium” (38) and “Low” (77), with only 2 “Highest” and 1 “High” entries.

Figure 5:Regional Collaboration pattern in 120 projects across all 6 clusters

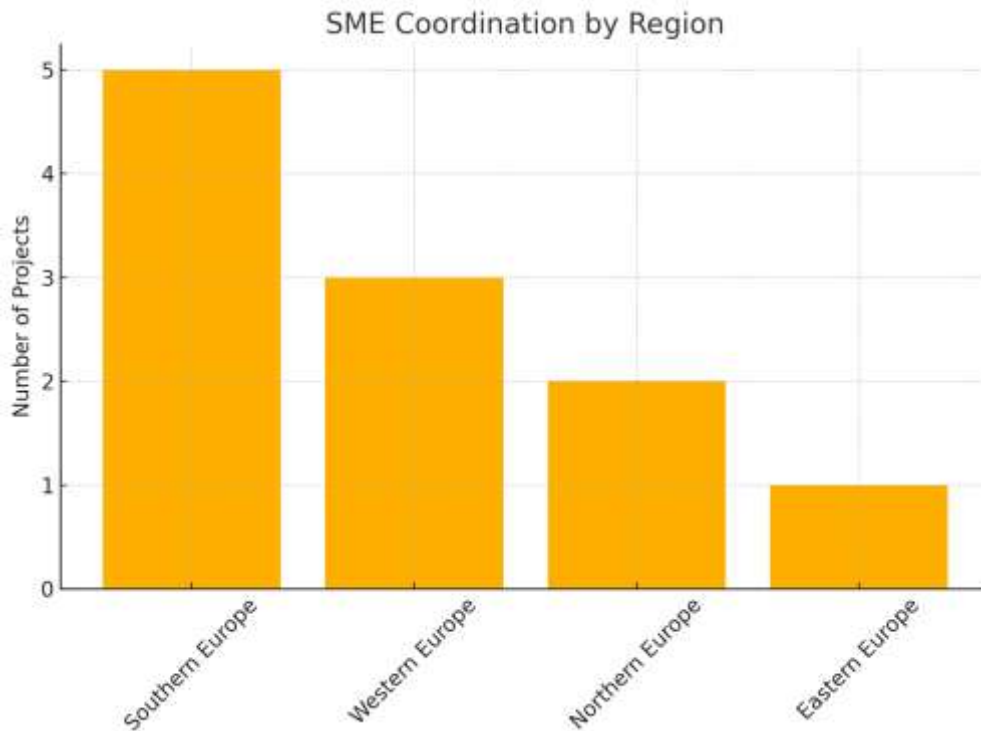


Source: By the Author with AI tool to create the graph

In terms of innovation performance classification, most coordinators came from Strong or Leader Innovator regions, particularly in Western and Northern Europe. Moderate Innovator regions, especially in the South, also coordinated a notable number of projects. Emerging Innovator regions and non-EU countries were rarely represented.

SME participation in coordination was limited. Of the 120 projects, 11 (9.2%) were led by SMEs. Regionally, Southern Europe coordinated 5 SME-led projects, followed by Western (3), Northern (2), and Eastern Europe (1). Most SME-led projects were in the Food & Bioeconomy cluster (4), followed by Civil Security, Digital, and Culture & Creativity. No SME coordinators appeared in the Health cluster.

Figure 6:Representation of Project coordinators that categorizes as SMEs



Source: By the Author with AI tool to create the graph

A comparison between the highest and lowest funded clusters reveals further contrasts. The **Climate, Energy, and Mobility** cluster received the **highest total EU contribution** of €5,063,860,853. The **Civil Security for Society** cluster received the **lowest**, at €559,444,903.90.

In the Climate cluster, Western Europe coordinated 13 projects, while Southern Europe coordinated 5, and Northern Europe coordinated 1. One project was led by a non-EU country. No coordinators came from Eastern Europe. REC led 8 projects, PRC led 7, HES led 3, and OTH led 2. Only 1 project was SME-led.

In the Civil Security cluster, Southern Europe led coordination with 12 projects, followed by Western Europe with 6. Eastern and Northern Europe each

coordinated 1 project. This was the only cluster where all four macro-regions had coordinators. PRCs led 11 projects, RECs 8, and HES 1. Two projects were SME-led: one from the South and one from the East.

4. Discussion and Conclusion

The results highlight a persistent regional hierarchy in Horizon Europe Pillar 2 projects. Western Europe, particularly countries classified as Strong or Leader Innovators, consistently dominates coordination roles and receives the highest shares of funding. This finding supports the work of Balland and Boschma (2024), who argue that innovation hubs enjoy structural advantages when it comes to securing EU funding and leading large-scale collaborations.

Southern Europe demonstrates strong involvement across various clusters, despite being largely categorized as Moderate Innovators. Notably, in the Civil Security and Food clusters, its leadership in coordination indicates that applied expertise and thematic relevance can somewhat mitigate the impact of innovation classification. This observation aligns with the conclusions of Rodríguez-Pose and Crescenzi (2023), who suggest that when policy design allows for it, thematic priorities in EU funding can enable moderate-performing regions to assume leadership roles.

Northern Europe plays a steady, though secondary role, often contributing in Medium and Low funding tiers. In contrast, Eastern Europe remains significantly underrepresented, even as it participates more frequently in larger, multi-region collaborations. These findings echo the arguments made by Wanzenböck et al. (2020), who note that major, well-funded projects tend to cluster around experienced, high-capacity actors, pushing emerging regions to the margins.

A comparison of the Climate and Civil Security clusters highlights these dynamics. The Climate cluster, aligned with the EU's Green Deal and digitalization goals, attracts substantial funding and is predominantly led by

high-capacity Western regions. On the other hand, the Civil Security cluster, despite being significantly smaller in total funding, displays a more distributed leadership pattern, with Southern Europe coordinating the majority of projects and Eastern and Northern regions occasionally taking on coordinator roles. This suggests that clusters focused on mission-driven, implementation-based research may lower entry barriers and promote broader regional inclusion.

However, even within the Civil Security cluster, Western Europe maintains a strong financial presence. Furthermore, participation by small and medium-sized enterprises (SMEs) remains limited across both clusters, highlighting ongoing structural barriers for smaller firms trying to access and lead large Horizon-funded projects. This underscores the need for more inclusive design mechanisms if the EU aims to achieve its cohesion goals.

To conclude, this study highlights persistent regional disparities in the collaborative dynamics of Horizon Europe Pillar 2 projects. Although multi-regional participation is relatively common, coordination roles and funding allocations remain concentrated in Western Europe, underpinned by strong innovation ecosystems and institutional capacities. Southern Europe emerges as an active secondary player, particularly in mission-driven clusters like Civil Security and Food, where thematic alignment provides entry points even for moderate innovator regions. Northern Europe contributes consistently in supportive roles, while Eastern Europe continues to face limited access to coordination leadership and funding despite increasing involvement in broader collaborations. Research organizations and higher education institutions dominate project coordination, while SME involvement remains minimal, pointing to structural challenges for smaller actors. Variation in funding between clusters such as Climate and Civil Security underscores how thematic focus can

influence regional inclusion. Ultimately, while Horizon Europe Pillar 2 encourages broad participation, systemic imbalances remain. Enhancing inclusivity will require targeted strategies that strengthen the capacities of underrepresented regions and foster a more equitable research and innovation landscape across the EU.

5. Limitations and Future Research

This study provides valuable insights into the regional disparities within Horizon Europe Pillar 2, but it also has several limitations that need to be acknowledged. By focusing primarily on top-funded RIA (Research and Innovation Action) and IA (Innovation Action) projects, there is a risk of selection bias that may favor well-established institutions. As a result, smaller, emerging, and regionally diverse initiatives could be overlooked. Furthermore, the research relies exclusively on quantitative data, which restricts the exploration of the motivations, experiences, and structural challenges faced by underrepresented regions. Factors such as limited administrative capacity, lack of experience with EU funding, and the complexity of the application process may deter participation, especially from institutions in Eastern and parts of Southern Europe.

Additionally, the prevalence of existing networks means that coordinators often work with familiar partners, which may unintentionally exclude new or less-connected actors. Cultural factors in multinational collaborations—including communication styles, leadership expectations, and trust-building—can also affect how partnerships are formed and how they perform, but these aspects are underexplored.

Future research should adopt a more holistic and inclusive approach to address these gaps. Qualitative studies focusing on regions with low participation could provide valuable insights into their specific challenges and institutional barriers. A larger and more diverse sample of projects, which includes smaller-scale initiatives, would present a more balanced view of participation patterns. There is also a need to investigate whether regions that are underrepresented in Horizon Europe are instead prioritizing national

funding schemes, which could indicate a divergence in research focus across the EU.

To promote more equitable participation, future studies should evaluate the impact of policy instruments, such as incentives for including partners from underrepresented regions in specific project types, or even making their inclusion mandatory in large-scale collaborative calls. These mechanisms, along with enhanced support structures and targeted capacity building, could play a crucial role in achieving a more balanced, inclusive, and cohesive European Research Area.

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Statement: During the preparation of my written work thesis, Regional Trends in Horizon Europe Pillar 2: Insights Into Collaborative Research Dynamics, ChatGPT (paid version), Grammarly Pro, Google NotebookLM, and ResearchRabbit were used for the following tasks: The prompts used are listed at the end of the document in the Prompts List section. After using these tools and services, I reviewed and edited the content as necessary, and I take full responsibility for the content of the work presented.

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Appendices

Cluster Summary: Health Regional Collaboration Overview

- Western Europe dominates in participation, coordination, and EU contributions (e.g., Germany, France, Netherlands).
- Southern Europe (Spain, Italy) is strongly involved, mainly as partners.
- Northern Europe, though involved in fewer projects, contributes from high-innovation regions in strategic support roles.
- Eastern Europe is minimally present and does not play leadership roles.
- Innovation performance correlates with leadership: Leader and Strong Innovators are more likely to coordinate and receive funding.

Collaboration Pattern (RIA + IA Projects)

- Collaboration is typically tri-regional (West, South, North).
- Western Europe is present in every project and often receives the highest funding.
- Southern Europe appears in most projects, generally in supportive roles.
- Northern Europe participates primarily in Medium or Low funding tiers.
- Eastern Europe has minimal representation, always in lower funding roles.

Funding Distribution by Region

| Region | Highest | High | Medium | Low |
|-----------------|---------|------|--------|-----|
| Western Europe | 12 | 13 | 27 | 16 |
| Southern Europe | 3 | 7 | 19 | 19 |
| Northern Europe | 3 | 3 | 14 | 10 |

| | | | | |
|----------------|---|---|---|---|
| Eastern Europe | 0 | 0 | 3 | 9 |
|----------------|---|---|---|---|

Project Coordination Patterns

- Western region coordinated 9 projects: 6 HES, 3 REC.
- Southern region coordinated 6 projects.
- Northern region coordinated 5 projects.
- Eastern region did not coordinate any projects.

Organization Types Involved in Coordination

- HES: 10 projects
- REC: 7 projects
- PRC: 2 projects
- OTH: 1 project

Innovation Classification of Coordinator Regions

- Western: 6 Strong Innovators, 3 Leader regions
- Southern: All 6 from Moderate Innovator regions
- Northern: 4 Leader, 1 Strong Innovator
- Eastern: No coordinators

SME Involvement

- No projects were coordinated by SMEs

Cluster Summary: Culture, Creativity and Inclusive Society

Regional Collaboration Overview

- Western Europe leads this cluster, with Belgium, France, Germany, and the Netherlands showing strong coordination and funding roles.
- Southern Europe (Italy, Spain, Portugal) contributes actively to both coordination and participation.
- Northern Europe is active but mainly in a supporting role.
- Eastern Europe is present in several projects but remains underrepresented in leadership and receives lower funding.
- Coordination tends to originate from Strong or Leader Innovator regions, though Moderate Innovator regions in the South are also highly active.

Collaboration Pattern (RIA + IA Projects)

- Most projects involve three to four regions, often combining East, West, South, and North.
- Western Europe appears in nearly every project with High or Highest funding roles.
- Southern Europe often collaborates with the West and receives substantial financial support.
- Northern Europe regularly appears in supportive roles (Medium or Low funding).
- Eastern Europe shows increased visibility here compared to the Health cluster but is still mostly limited to Low funding roles.

Funding Distribution by Region

| Region | Highest | High | Medium | Low |
|-----------------|---------|------|--------|-----|
| Western Europe | 12 | 13 | 28 | 12 |
| Southern Europe | 7 | 10 | 21 | 11 |
| Northern Europe | 1 | 6 | 10 | 6 |

| | | | | |
|----------------|---|---|----|---|
| Eastern Europe | 0 | 0 | 10 | 3 |
|----------------|---|---|----|---|

Project Coordination Patterns

- Southern region coordinated 10 projects: 6 REC, 3 HES, 1 PRC.
- Western region coordinated 8 projects.
- Northern region coordinated 2 projects (both HES).
- No coordinators were found in the Eastern region.

Organization Types Involved in Coordination

- HES: 10 projects
- REC: 8 projects
- PRC: 1 project
 - OTH: 1 project

Innovation Classification of Coordinator Regions

- Southern: All 10 from Moderate Innovator regions
- Western: 6 Strong Innovators, 2 Leader regions
- Northern: 2 Leader regions

SME Involvement

- 1 project coordinated by an SME (from Southern region)

Cluster Summary: Civil Security for Society

Regional Collaboration Overview

- Southern Europe leads this cluster in participation, coordination, and funding, especially Greece, Spain, and Italy.
- This leadership is notable as these countries are Moderate Innovators, indicating strong implementation capacity.
- Western Europe (e.g., France, Germany) plays a significant financial role but has fewer coordination roles in this cluster.
- Northern Europe appears less frequently and mostly in supporting roles.
- Eastern Europe is more involved than in other clusters but remains limited in funding and leadership.

Collaboration Pattern (RIA + IA Projects)

- Projects generally involve 3–4 regions, showing strong interregional collaboration.
- Southern and Western Europe appear in nearly every project.
- Eastern Europe has a stronger presence here than in other clusters, mostly in Medium and Low funding roles.
- Northern Europe plays a modest role, primarily in supportive capacities.

Funding Distribution by Region

| Region | Highest | High | Medium | Low |
|-----------------|---------|------|--------|-----|
| Southern Europe | 7 | 18 | 34 | 10 |
| Western Europe | 2 | 11 | 40 | 13 |
| Eastern Europe | 1 | 0 | 14 | 12 |
| Northern Europe | 0 | 0 | 13 | 12 |

Project Coordination Patterns

- Southern region coordinated 12 projects: 7 PRC, 5 REC.
- Western region coordinated 6 projects: 3 PRC, 3 REC.
- Eastern and Northern regions each coordinated 1 project: Eastern by PRC, Northern by HES.
- Only cluster with coordinator representation from all four EU macro-regions.

Organization Types Involved in Coordination

- PRC: 11 projects
- REC: 8 projects
- HES: 1 project

Innovation Classification of Coordinator Regions

- Southern: All 12 projects from Moderate Innovator regions
- Western: All 6 from Strong Innovator regions
- Northern: 1 from Leader region
- Eastern: 1 from Moderate Innovator region

SME Involvement

- 2 SME-coordinated projects: 1 from Southern region, 1 from Eastern region

Cluster Summary: Digital, Industry and Space

Regional Collaboration Overview

- Western Europe dominates this cluster, with France, Germany, and the Netherlands leading in coordination and funding.
- These countries are all classified as Leader or Strong Innovators.
- Southern Europe (especially Spain, Greece, Italy) is highly active, with Spain coordinating several projects despite being a Moderate Innovator.
- Northern Europe is visibly involved but plays a limited leadership role.
- Eastern Europe is present but only in a few coordination roles and generally holds a smaller funding share.

Collaboration Pattern (RIA + IA Projects)

- Most projects involve 3–4 regions, typically Western, Southern, and Northern Europe.
- Western Europe appears in nearly every project and often holds the Highest or High funding roles.
- Southern Europe regularly appears in Medium and High funding roles.
- Northern Europe plays a consistent supporting role, mostly in Low or Medium categories.
- Eastern Europe is visible but limited to Low funding levels.

Funding Distribution by Region

| Region | Highest | High | Medium | Low |
|-----------------|---------|------|--------|-----|
| Western Europe | 18 | 7 | 20 | 27 |
| Southern Europe | 6 | 2 | 15 | 29 |
| Northern Europe | 2 | 1 | 10 | 23 |
| Eastern Europe | 0 | 0 | 1 | 15 |

Project Coordination Patterns

- Western region coordinated 14 projects: 6 PRC, 4 REC, 3 HES, 1 OTH.
- Southern region coordinated 5 projects: 3 REC, 1 PRC, 1 HES.
- Northern region coordinated 1 project (OTH).
- Eastern region had no project coordinators.

Organization Types Involved in Coordination

- PRC: 7 projects
- REC: 7 projects
- HES: 4 projects
- OTH: 2 projects

Innovation Classification of Coordinator Regions

- Western: 10 Strong Innovators, 4 Leader regions
- Southern: All from Moderate Innovator regions
- Northern: From Leader region

SME Involvement

- 2 projects coordinated by SMEs: 1 from Western region, 1 from Northern region

Cluster Summary: Climate, Energy and Mobility

Regional Collaboration Overview

- Western Europe leads the cluster with Germany, France, and the Netherlands showing highest EU contributions and most coordination roles.
- These countries are all Strong or Leader Innovators, reflecting their strategic dominance.
- Southern Europe (Spain and Italy) shows robust participation and increasing coordination, despite being Moderate Innovators.
- Northern Europe consistently contributes, especially from high-performing regions.
- Eastern Europe appears in several projects but remains marginal in funding and leadership.

Collaboration Pattern (RIA + IA Projects)

- Most projects involve three or four regions, demonstrating strong interregional collaboration.
- Western Europe is present in every project, frequently with High or Highest funding roles.
- Southern Europe also frequently included with Medium to High funding levels, sometimes Highest.
- Northern Europe plays a supporting role, typically in Medium and Low funding categories.
- Eastern Europe appears more than in other clusters but remains in Low and Medium roles.

Funding Distribution by Region

| Region | Highest | High | Medium | Low |
|-----------------|---------|------|--------|-----|
| Western Europe | 10 | 11 | 27 | 38 |
| Southern Europe | 4 | 7 | 21 | 28 |

| | | | | |
|-----------------|---|---|----|----|
| Northern Europe | 3 | 3 | 11 | 20 |
| Eastern Europe | 0 | 1 | 6 | 22 |

Project Coordination Patterns

- Western region coordinated 13 projects: 5 PRC, 3 REC, 3 HES, 2 OTH.
- Southern region coordinated 5 projects: 3 REC, 2 PRC.
- Northern region coordinated 1 project (REC).
- 1 project coordinated by a non-EU institution (REC).
- Eastern region had no coordinating organizations.

Organization Types Involved in Coordination

- REC: 8 projects
- PRC: 7 projects
- HES: 3 projects
- OTH: 2 projects

Innovation Classification of Coordinator Regions

- Western: 7 Strong Innovators, 6 Leader regions
- Southern: All from Moderate Innovator regions
- Northern: 1 from Leader region
- Non-EU coordinator not classified in EIS

SME Involvement

- 1 project coordinated by an SME (in Western region)

Cluster Summary: Food, Bioeconomy, Natural Resources, Agriculture and Environment

Regional Collaboration Overview

- Southern Europe leads the cluster, especially Spain and Italy, with high participant counts and coordination roles (Spain: 110 participants, 5 coordinators).
- Western Europe (Netherlands, France, Germany) shows strong leadership and funding roles.
- Northern Europe is consistently involved but mainly in supporting roles, with limited coordination.
- Eastern Europe participates in several projects but remains in a secondary role in terms of funding and leadership.

Collaboration Pattern (RIA + IA Projects)

- Most projects involve all four regions, marking one of the broadest regional spreads in any cluster.
- Southern and Western Europe appear in nearly every project, typically in High or Highest funding roles.
- Northern Europe regularly appears in Medium or Low funding tiers.
- Eastern Europe is more present here than in other clusters but mostly in Low funding roles.

Funding Distribution by Region

| Region | Highest | High | Medium | Low |
|-----------------|---------|------|--------|-----|
| Western Europe | 10 | 15 | 23 | 23 |
| Southern Europe | 8 | 7 | 21 | 21 |
| Northern Europe | 1 | 1 | 12 | 19 |

| | | | | |
|----------------|---|---|---|----|
| Eastern Europe | 1 | 0 | 4 | 16 |
|----------------|---|---|---|----|

Project Coordination Patterns

- Western region coordinated 10 projects: 5 REC, 2 HES, 1 PRC, 1 OTH, 1 PUB.
- Southern region coordinated 6 projects: 3 REC, 2 PRC, 1 HES.
- Northern and Eastern regions each coordinated 2 projects with a mix of REC, HES, and OTH organizations.

Organization Types Involved in Coordination

- REC: 9 projects
- HES: 5 projects
- PRC: 3 projects
- OTH: 2 projects
- PUB: 1 project

Innovation Classification of Coordinator Regions

- Western: 5 Strong Innovators, 5 Leader Innovators
- Southern: All 6 from Moderate Innovator regions
- Northern: Both from Leader regions
- Eastern: From Moderate and Emerging Innovator regions

SME Involvement

- 4 SME-coordinated projects: 3 from Southern region

Prompts List

Content Simplification & Research Comprehension (ChatGPT & Google

NotebookLM):

- “Summarize this research article.”
- “Explain this section in simpler terms.”
- “What are the key findings of this study?”
- Used NotebookLM to interact with uploaded academic papers by asking clarification questions and using the audio playback feature for better understanding.

Writing Support (ChatGPT):

- “Write an abstract based on this content.”
- “Improve the flow and structure of this paragraph.”
- “Give suggestions for rewording this sentence for clarity.”
- “formatting citation in APA7”

Data Analysis, Cleaning, and Visualization (ChatGPT):

- Uploaded Excel datasets and used prompts such as:
 - “Analyze this data and summarize key insights.”
 - “What trends can be observed in this dataset?”
 - “Generate a chart or graph idea for this data comparison.”
- Asked for support in **data cleaning and preparation**, including:
 - “What Excel formula should I use to [describe task]?”

Language & Style Enhancement (Grammarly Pro):

- Used the “Improve It” “Shorten it” feature to enhance grammar, clarity, tone, and sentence structure across the document, ensuring better readability and academic tone.