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**NAVIGATING FUNDING SELECTION. A COMPREHENSIVE STUDY
OF COMPANY SELECTION PROCESSES FOR THE NATIONAL
RECOVERY AND RESILIENCE PLAN FUNDING IN PORTUGAL**

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Abstract

This thesis examines the European Recovery and Resilience Program (RRP) with a focus on Portugal's National Recovery and Resilience Plan and the Mobilizing Agendas for Business Innovation (MABI). Initially, it offers a historical overview of the RRP and analyzes Portugal's socio-economic challenges pre-Covid-19. Through sector-specific case studies, the research identifies key determinants influencing entity eligibility for funding, showcasing dynamics in several thematic areas such as Cross Cutting Technologies, Industries and Production Technologies, Mobility, Space and Logistics, Natural Resources and Environment and Health, Well-Being, and Territory. Finally, the study introduces a comprehensive evaluation methodology for the program, combining empirical data, theoretical insights, and recommendations, to provide a thorough understanding of MABI, its hurdles, and future potential.

Keywords

European Union (EU); National Recovery and Resilience Plan (NRRP); Portugal Economy; Natural Resources and Environment; Mobility, Space and Logistic; Health, Well-Being, and Territory; Cross Cutting and Their Applications.

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1. Introduction - (Group Part)

In recent years, the global panorama of economic development and innovation has undergone considerable changes. Governments across the European Union have launched ambitious projects aimed at boosting recovery, resilience, and innovation in response to changing challenges. The European Recovery and Resilience Program (RRP) is one such program, a massive undertaking aimed at rebuilding economies and boosting member states' resilience in the aftermath of the COVID-19 pandemic.

This paper carries on an in-depth examination digging into the complexities of the RRP, with a focus on its implementation process in Portugal. It investigates how this program was channelled through the Mobilizing Agendas for Business Innovation (MABI), a strategic initiative meant to promote innovation and transformation across five different economic sectors. The core of this analysis comprises case studies that delve into specific economic sectors, each presented by a dedicated contributor.

These case studies specifically examine the sectors of Cross-Cutting Technologies and Their Applications; Industries and Production Technologies; Mobility, Space, and Logistics; Natural Resources and Environment; and Health, Well-being, and Territory in depth. This work explores the complexities of program selection and rejection through these case studies, investigating the underlying financial indicators, possible variables influencing selection, and drawing conclusion over the overall future impact of the project. In parallel, qualitative data are collected through a survey and administrative data via specific governmental and financial platforms, obtaining information from stakeholders and respondents to further define the program's performance. This detailed research concludes with the program possible improvements and recommendations, and a guideline for evaluation of forecast program effectiveness.

2. The Recovery and Resilience Program (RRP) and the Mobilizing Agendas for Business Innovation (MABI) - (Group Part)

2.1. Background and context of the RRP in EU

The first news of the virus that was spreading rapidly in Asia, later known as “COVID-19”, came out in November 2019. On January 30, 2020, The World Health Organization (WHO) declared the outbreak a public health emergency of international concern (PHEIC) and on March 11, 2020, began to refer to it as a pandemic.

Governments around the world began to establish restrictions to prevent the spread of the virus. The EU countries were not the exception as they had to enact measures to close the borders, limit the movement of people, and halt business operations in non-essential sectors. The deep restrictions put in place threatened to send the world into the greatest economic shock since the Great Depression of the 1930s. To prevent a catastrophic economic collapse, this circumstance

forced the leaders of the EU to immediately implement urgent steps in the shape of stimulating packages (Fedajev, et al., 2022).

In this context, **NextGenerationEU** (NGEU) was born as an unprecedented response to the crisis. Under this strategy, “the Commission is empowered to borrow up to €806.9 billion between 2021 and 2026 to drive Europe's recovery from the pandemic via a combination of loans and grants to Member States and centrally managed EU programs” (European Commission, 2022, pag. 4).

The cornerstone of NextGenerationEU is the **Recovery and Resilience Facility (RRF)**. This is an instrument “that offers grants and loans to support reforms and investments in the EU Member States for a total of €723.8 billion in current prices” (European Commission, 2023). Part of the funds (up to 47%) are provided to Member States in the form of grants, another part (up to 53%) in the form of funds loans to individual Member States. These funds are provided to member states in accordance with their **National Recovery and Resilience Plans (NRRP)**, which are guidelines for reforms and investments focused on three dimensions: Resilience, Climate Transition and Digital Transition.

2.2. Portugal before the European RRP

Portugal has been hit hard by the pandemic crisis compared to other EU members, with a GDP decline of 7.6% in 2020 compared to 2019. The government implemented a fiscal package that was intended to support households (1% of GDP), employment (0.6% of GDP), and healthcare (0.6% of GDP) in response to the sharp decline in economic activities related to tourism, a sector that accounts for 10% of the total workforce and 8% of the nation's GDP (Corti, Nuñez, Ruiz, & Regazzoni, 2021, pag. 49).

The steps taken to address the Covid-19 problem, except for those concerning liquidity, had a significant influence on the public deficit, which was predicted to be negative until 2025 (-1.1% of GDP) (Corti, Nuñez, Ruiz, & Regazzoni, 2021, pag. 49). In fact, it was predicted that Portugal will experience high fiscal sustainability risks in the short and medium terms (European Commission, 2020, pag. 26). The situation is aggravated as even before the pandemic, Portugal faced significant structural challenges.

2.3. Portuguese structural challenges before Covid-19

According to the Country Report Portugal 2020 (European Commission, 2020), there are some structural country-specific challenges that must be addressed.

Firstly, in the context of **labor market**, despite a decline in unemployment, Portugal has unused labor market reserves (PT 3.2% of the active population, vs. 2.9% in the EU) and youth unemployment is still comparatively higher (PT 18.2% in Q3-2019, vs. 14.4% in the EU) (European Commission, 2020, pag. 38)

Secondly, although there has been improvement in the Portuguese educational system over the past ten years (between 2009 and 2018, the rate of early leavers from education and training decreased from 30.9% to 11.8%, and tertiary education attainment grew from 21.3% to 33.5%), there are still significant issues about **education and skills** that need to be resolved. Examples include high levels of grade repetition and high dropout rates as well as high percentage of adults who have not completed their upper secondary studies (European Commission, 2020, pag. 46). Education inequality remains a concern and there is a lack of digital skills which is a significant barrier for Portugal: 48% of Portuguese people lacked even the most fundamental digital abilities in 2019, while 26% had none (European Commission, 2020, pag. 49).

Thirdly, Portugal is considered a moderate innovator since the **research and development** intensity is below the EU average. The low investment in intellectual property, intangible assets, R&D, and economic and digital competencies directly affect productivity. Portugal's economy is still grounded in conventional low and medium-tech industries (European Commission, 2020, pag. 52).

Finally, regulations continue to restrict **competition for business and professional services**. The framework law of 2013, which was part of a financial assistance program, aimed to simplify rules for highly regulated professions. However, this law was not completely put into effect, leaving certain barriers in the legal services sector. Restrictions on multidisciplinary practices, legal form, shareholding, management, and advertising in the legal market could harm competition by limiting access to capital and reducing economies of scale. In addition, the lack of reforms in other regulated professions, such as architects and engineers, and the prohibition of business groups in regulated professions hinder competition and business growth in Portugal. For several professions, regulation is more restrictive than the EU average (European Commission, 2020, pag. 55).

2.4. The Portuguese NRRP overview

Considering the structural challenges and the problems caused by the measures to control the COVID-19 pandemic, Portugal prepared its NRRP and was the first member state to present it to the European Commission (Corti, Nuñez, Ruiz, & Regazzoni, 2021). The NRRP was organized into 20 Components which integrate a total of 37 Reforms and 83 Investments. The components are grouped into three main dimensions: *resilience* (9 components), *climate transition* (6 components) and *digital transition* (5 components) as seen in figure 1 (República Portuguesa, 2021).

Resilience		Climate transition		Digital transition	
Component	M €	Component	M €	Component	M €
C1. National Health Service	€1383	C10. Sustainable mobility	€1032	C16. Digital School	€559
C2. Housing	€1633	C11. Decarbonization of industry	€715	C17. Companies 4.0	€650
C3. Social Responses	€583	C13. Sustainable economy	€150	C18. Quality and Sustainability of Public Finance	€406
C4. Elimination of AM Poverty Scholarships	€250	C14. Energy efficiency in buildings	€620	C19. Economic Justice and Business Environment	€267
C.5 Investment and Innovation	€1396	C15. Hydrogen and renewable	€371	C20. Public Administration - Training, Digitization and Interoperability and Cybersecurity	€631
C.6 Qualifications and Skills	€1359				
C.7 Infrastructures	€833				
C.8 forests	€665				
C.9 Water Management	€441				
TOTALS	€8543	TOTALS	€2888	TOTALS	€2513

Loans	M €	Loans	M €
C2. Housing	€1149	C10. Sustainable mobility	€300
C.5 Investment and Innovation	€1250		
TOTALS	€2399	TOTALS	€300

€16.644 millions of RRP funding

€13.944 million in grants (84% of the total)
 €2.700 million in loans (16%).

Figure 1. RRP Components and Associated Investments (Values at current prices)

Source: Own elaboration based on Plano de Recuperação e Resiliência 22 April 2021 (2021) República Portuguesa.

As shown in figure 2, in terms of the reforms, Portugal greatly accelerates the completion of the structural reforms. However, in terms of investment, projects will be completed mostly by the end of the programming term, between 2025 and 2026 (Corti, Nuñez, Ruiz, & Regazzoni, 2021).

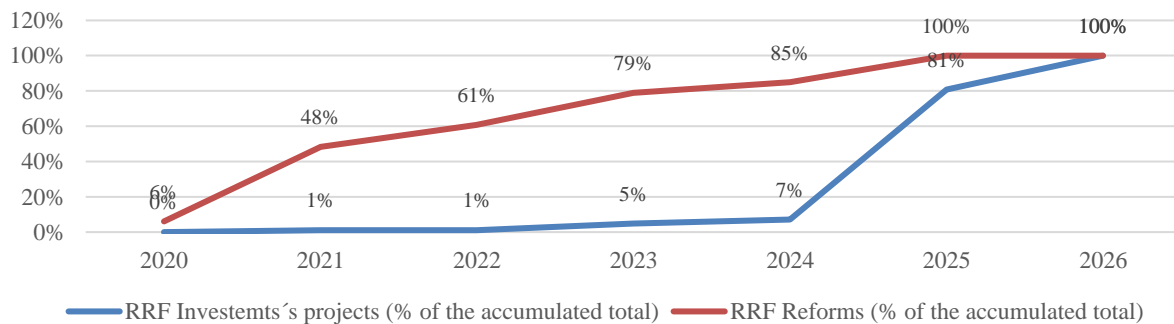


Figure 2. Timeline for completion under Portuguese NRRP, by year (% of the total)

Source: Own elaboration, based on Plano de Recuperação e Resiliência 22 April 2021 (2021) República Portuguesa

2.5. Component 5: Capitalization and Business Innovation

As mentioned earlier, the 20 components of the NRRP in Portugal are grouped into the dimensions of resilience, climate transition and digital transition. In the present study we will

focus on component 5 belonging to the first dimension. This dimension "concentrates 60% of the overall amount of RRP grants and reflects the strong priority given to the objective of preparing for overcoming crises and structural challenges" (República Portuguesa, 2021, pag. 106).

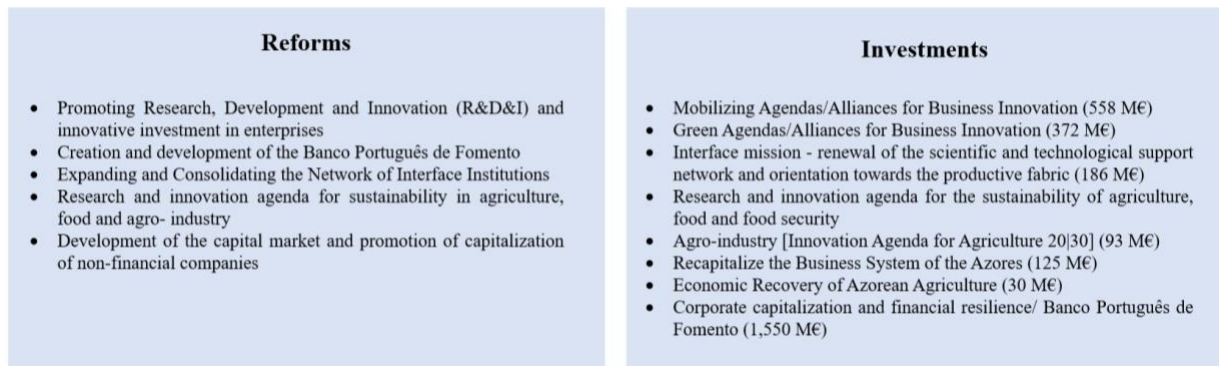


Figure 3. Reforms and investments withing component 5

Source: Own elaboration, based on Plano de Recuperação e Resiliência 22 April 2021 (2021) República Portuguesa

In accordance with the above, it is possible to see in Figure 4 how the different components described above and the amount of investment for each of them are "hierarchically" related.

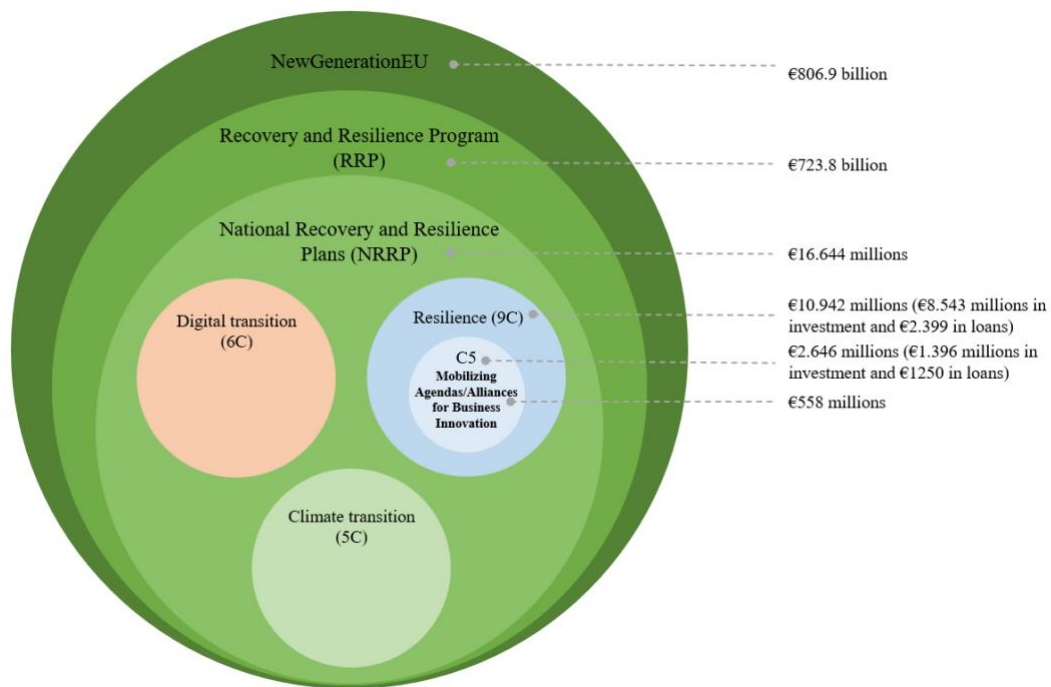


Figure 4. Summary Diagram of the Strategies with amount of investment information

Source: Own elaboration, based on Corti, Nuñez, Ruiz, & Regazzoni, 2021 and Plano de Recuperação e Resiliência 22 April 2021 (2021).

2.6. Mobilizing Agendas for Business Innovation (MABI)

As mentioned before, component 5 includes MABI. Through the definition, support, and promotion of a set of agendas in innovative strategic areas, the MABI has the goal of accelerating the structural transformation of the Portuguese economy while also improving its specialization profile. In particular, MABI expect to contribute to Portugal achieving strategic objectives by 2030 such as contributing to change the specialization profile of the Portuguese economy, increase exports of goods and services, increase investment in R&D, ensuring 3% of GDP by 2030 and reduce CO2 emissions by 55% by 2030.

The call was for the creation of mobilizing agendas aiming to identify investment opportunities and implementation capabilities, as well as the innovation pacts and the mobilizing projects to be supported, through an open and competitive consultation process in which all relevant

business entities could participate, taking on different roles: leaders of the consortia, co-promoters and partners (República Portuguesa, 2021).

The identification of the true investment prospects and implementation capabilities requires the active participation of many possible actors. Therefore, “the proposals may be promoted by companies, R&D institutions and non-business entities of the research and innovation system, municipal entities and higher education institution” (República Portuguesa, 2021, pag. 110).

The collaborative projects supported by the strategy should leverage the development of new, higher-value products and services with an eye toward potentially increasing export and the hiring of qualified human resources in conjunction with an increase in business investment in R&D which has the potential to transform the Portuguese economic landscape. Also, the projects should lead to the successful implementation of green technology towards a broader environmental sustainability.

The strategy establishes thematic areas and subareas (see figure 5) “aligned with the strategic priorities defined in the National Research and Innovation Strategy for Smart Specialization (ENEI), combining the country's competitive and comparative advantages with those for which it has growth potential” (República Portuguesa, 2021, pag. 111).

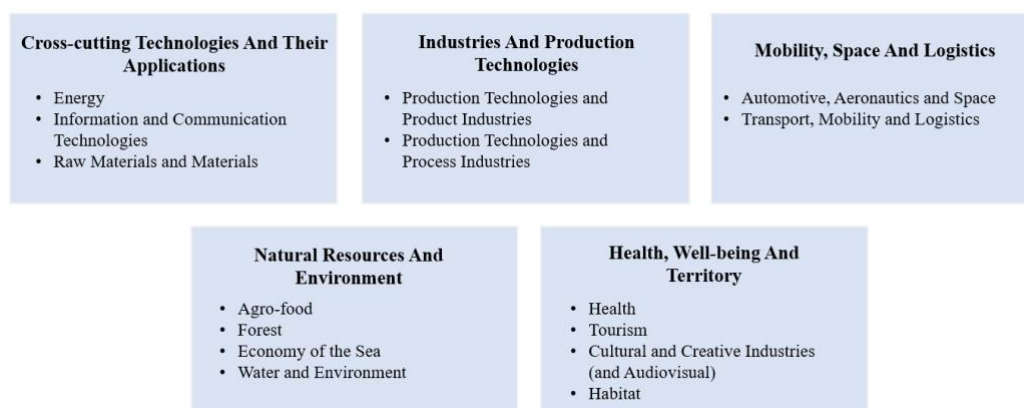


Figure 5. Thematic areas and subareas for the Mobilization Agendas for Business Innovation

Source: own elaboration, based on Notice of Bid Opening No. 01/C05-i01/2021 Re-C05-I01.01 (República Portuguesa, 2021)

NRRP Implementation Indicators so far

As of July 5, 2023, 100% of the contracts have been signed between "Recuperar Portugal", which is an entity created to negotiate, contract and monitor the execution of NRRP, and the entities responsible for the implementation of investments. In relation to the resilience dimension, 100% of the contracts have been signed, for a value of 11.125 million euros, 82% have approvals of the investments and 11% of the payments to the direct and final beneficiaries have been made (Recuperar Portugal, 2023, pag. 1).

3. Literature Review - (Group Part)

3.1. Overview of EU Funding Programs and Policy Evaluation

The EU provides a variety of funding programs to help projects and initiatives that benefit the EU and its citizens. These initiatives are intended to promote economic growth and development, social cohesion and solidarity, environmental protection, and cultural and educational advancement. EU funding programs seek to address common challenges, foster collaboration, and promote development throughout Europe. They usually involve the allocation of a large budget for a specific period, which can last several years. The European Commission, the EU's executive branch, manages these programs in collaboration with other EU institutions, agencies, and national authorities.

The European Union offers various types of funding to support a wide range of initiatives and projects. These funding opportunities include grants, loans, guarantees, equity, prizes, awards, and public contracts.

- **Grants:** financial contributions provided by the EU to organizations and occasionally individuals to support projects that align with EU policies and objectives. Grants do not require repayment, but the recipient may need to contribute a percentage of the project's funding.
- **Loans, Guarantees, and Equity:** Loans involve the provision of financial resources that need to be repaid with interest. Guarantees reduce the risk for lenders or investors, facilitating access to finance for specific projects. Equity financing involves the EU taking partial ownership or shares in a company in exchange for capital.
- **Prizes and Awards:** The EU bestows prizes and awards on contest winners under various EU initiatives. These awards recognize accomplishments and innovations in specific fields or industries.
- **Public Contracts:** The EU uses public contracts to procure market services, works, and goods for internal use. These contracts are awarded through competitive bidding processes and are not considered EU funding. (European Commission, s.d.)

The EU funds are distributed in three ways:

- **Shared Management** (approximately 70% of EU funding programs): Under shared management, the European Commission and national governments in EU countries work together to administer specific programs. This shared responsibility includes program implementation, monitoring, and evaluation.
- **Direct Management:** EU funding is sometimes managed directly by EU institutions. From program design to project implementation and financial disbursement, these organizations handle the entire process.
- **Indirect Management** (10% of the overall EU budget): Indirect management entails the partial or complete implementation of funding programs by third parties such as

national governments or international organizations. These entities are responsible for executing projects and adhering to the funding program's guidelines after receiving subsidies through national-level applications.

EU funds are managed in a variety of ways. Indeed, the funding programs vary in their objectives, target sectors, and eligibility criteria. Approximately the main part of EU budgetary funds is allocated in collaboration with national and regional authorities through a shared management system, primarily through, and resilience of the members states in EU (EU Funding programmes, s.d.).

3.2. Importance of EU funding programs for economic development, innovation, and resilience

EU funding programs play an important role in promoting economic growth and development throughout the European Union. These programs provide critical financial assistance to projects that have the potential to create jobs, stimulate innovation, and improve infrastructure. As a result, the EU's economy stands to gain in terms of prosperity and sustainability.

Also, EU funding programs promote social cohesion and solidarity among member countries and contributes to the creation of a more united and equitable society by allocating funds to reduce regional disparities and promote social inclusion. This commitment to social cohesion contributes to ensuring that all citizens can actively participate in and benefit from collective progress. To continue, the EU funding programs prioritize environmental protection and long-term sustainable development. EU funding actively contributes to mitigating environmental challenges by providing financial resources for environmental projects such as renewable energy initiatives and sustainable transportation endeavors. This dedication to environmental sustainability ensures that future generations will inherit a healthier and more livable planet.

While EU funding programs have played a key role in promoting development and fostering collaboration within the European Union, they are not without difficulties. Behind the guise of financial assistance and noble goals, there are several drawbacks and issues that must be addressed. These challenges can impede the smooth implementation and effectiveness of EU funding programs, ranging from bureaucratic complexities and limited accessibility to concerns about unequal distribution and delays in fund disbursement. We delve into the more complicated corners of EU funding in this investigation, shedding light on issues that need closer examination to pave the way for more streamlined and efficient funding mechanisms. (European Commission, s.d.)

3.3. Role of policy evaluation in assessing the effectiveness and impact of EU programs

Evaluation is an important part of the policy cycle because it promotes evidence-based policy design and implementation, increases accountability and transparency, demonstrates progress toward policy objectives, and assesses policy effectiveness, efficiency, results, and impacts.

There are numerous types of evaluation (ex-ante evaluations, mid-term evaluations, evaluations during the implementation period, thematic evaluations, and ex-post evaluations), each of which serves a specific purpose in the policy cycle. In the context of EU programs, policy evaluation is critical. It can measure the outputs, results, and impacts of these programs to determine their effectiveness in achieving their goals. Furthermore, it can aid in the identification of factors that contribute to the success or failure of EU programs, which can then be used to improve the design and implementation of future programs. Finally, by making evaluation results public, policy evaluation can improve the transparency and accountability of EU programs. This ensures that these programs are accountable to the public and that they meet citizens' needs. (European Commission, s.d.)

There are several different methods that can be used to evaluate EU programs. Some common methods include:

- **Output evaluation:** This type of evaluation measures the output of a program, such as the number of people who have been trained or the number of new businesses that have been created.
- **Result evaluation:** This type of evaluation measures the results of a program, such as changes in behavior, attitudes, or outcomes.
- **Impact evaluation:** This type of evaluation measures the long-term impact of a program, such as changes in the social, economic, or environmental context. (EU Evaluation reports, s.d.)

3.4. Theoretical Frameworks and Models

The section provides an in-depth analysis of prominent theoretical frameworks that examine the relationship between EU funding programs and their impact on innovation, competitiveness, and resilience. The main objective is to gain a comprehensive understanding of the mechanisms through which these programs facilitate innovation, enhance competitiveness, and foster resilience. This analysis further involves exploring how previous approaches and methods employed in EU funding programs have influenced these desired outcomes. By thoroughly reviewing these frameworks, we can shed light on the dynamics and effects of EU funding programs on the mentioned areas without incorporating personal perspectives.

3.4.1. Theoretical framework behind the EU funding programs

The principles and structure governing the Next Generation EU (NGEU) funding programs negotiations, based on the rules and regulations outlined in the EU Treaties, provide a

framework for decision-making within the European Union. The involvement of member states and their representatives in the negotiation process reflects a system where unanimous agreement is required, granting each member state veto power. This approach emphasizes achieving acceptable outcomes rather than pursuing optimal solutions (Stenbæk & Jensen, 2016).

The policy conditionality relates to specific policy requirements linked to the commitment of funds under the NGEU, specifically concerning the macroeconomic environment, climate policy, and digitalization. The theoretical concept of actor constellation describes the positions of actors and coalitions concerning conflicts.

During the negotiation period, which is time-bound, actors have limited time and incomplete information (Stenbæk & Jensen, 2016). Certain member states form explicit coalitions on specific issues to sway the outcome, while others refrain from forming formal alliances leading to a weaker negotiation stance. As part of the analysis, we will evaluate the level of coordination among actors and how it may affect the outcomes of the implementation and effectiveness of the selection criteria for the funds in Portugal.

The final element to consider is the mode of interaction, determined by the institutional setting under which the result is decided (Scharpf, 1988). The method of exchange in our context comes through distributive bargaining, with actors concentrating on allocating resources in the negotiation process (Stenbæk & Jensen, 2016).

EU funding programs facilitate research and development, foster stakeholder collaboration, and provide financial resources to governments, research institutions, and businesses. By understanding the relationship between EU funding programs, innovation, competitiveness, and resilience, we can fully harness their transformative potential and drive sustainable

economic growth (Jiménez-Rodríguez, 2012). Several theoretical frameworks offer valuable insights into understanding the intricate relationship between these factors.

One prominent framework is the Resource-Based View (RBV) of the firm proposed by Wernerfelt (1984) and later developed by Barney and colleagues (1991) (Barney, Wright, & Ketchen, 2001). According to RBV, a firm's sustainable competitive advantage hinges on its capacity to deploy valuable, rare, inimitable, and non-substitutable resources at its disposal. In the context of EU funding programs, they are considered crucial resources firms can employ to enhance their competitiveness and innovation. The availability of funds can enable businesses to undertake high-risk, high-reward innovative projects they otherwise couldn't consider, improving their capacity to compete in a volatile marketplace (Lubis, 2022).

Another influential framework is the innovation system theory; according to this theory, innovation results from a systematic phenomenon where different institutional actors and their reciprocal relationships play a significant role in the process. The System of Innovation (SoI) emphasizes the interconnections between players, the influence of the institutional background, knowledge exchange flows, and dynamics that impact innovation (Galician Innovation Agency & Norte Regional Development and Coordination Commission, 2015).

Applying this framework to EU funding programs reveals their critical role as financial tools aiding the complex environment of innovation. They serve as catalysts in an innovation system composed of government institutions, universities, research institutions, and firms. Funding research and development activities enhance firms' innovative capacities, contributing to competitiveness (Giordano & Dubois, 2019).

3.4.2. Models & theories: Design and Implementation of EU funding programs

Designing and implementing EU funding programs can be complex, requiring strategic evaluation of economic, political, and societal priorities. The EU is home to diverse regions and member states, each with distinctive financial capacities, socio-cultural factors, and development trajectories. Creating effective funding programs requires a thorough understanding of Europe's myriad contexts and a detailed strategy that can capitalize on each region's unique strengths, ensuring that all areas have the necessary tools and opportunities to thrive (Melecky, 2018).

EU funding programs, such as the European Regional Development Fund (ERDF), are instrumental in implementing the Smart Specialization Strategy (S3). This strategy embraces a bottom-up approach that accounts for regional diversity and unleashes latent potential in the European Union landscape. The process involves a comprehensive analysis of regional assets, capabilities, and opportunities to identify priority areas in technology, research, or industry for targeted investments (Patel & Pavitt, 1994).

Cohesion policy is another cornerstone of EU policymaking and is indispensable in shaping the allocation and deployment of EU funding. This theory reduces economic and social disparities among EU regions, creating a more balanced and harmonious union. Its main principle is to promote equal opportunities for all citizens, regardless of their geographical location, and to ensure that every region is included regarding growth and development (European Commission, 2023)

In Spain, for instance, the ESF supported the "Operational Program of Youth Employment in Andalusia" as part of the Youth Employment Initiative. This project focused on addressing high youth unemployment rates and social exclusion among young people in the region. It

offered targeted support to those facing difficulties in accessing the labor market, such as long-term unemployed youth and school dropouts (European Commission, 2023).

The project aligned with the principles of Cohesion policy by targeting a specific group (young people) that faced higher unemployment rates and lacked access to opportunities. Through its support, the ESF aimed to level the playing field by providing resources and interventions to bridge the gap and create equal access to employment opportunities. The initiative aimed to reduce social inequalities, promote cohesion and create a more inclusive society by empowering young individuals and equipping them with the necessary skills and support (European Commission, 2023).

3.5. Comparison with Similar EU Programs

To provide a comprehensive analysis of EU funding approaches for economic resilience, competitiveness, and innovation, it was decided to go further with the study of another unique and exceptional program established in response to a European crisis: the European Economic Recovery Plan (EERP).

The idea to study the EERP stems from the need to understand the evolution and effectiveness of European funding programs that share characteristics with the NRRP. Indeed, contrarily to other European funding programs that are part of the EU's multiannual budget, the EERP was introduced ad hoc in response to the global financial crisis of 2008-2009. Thus, by looking at this specific EU initiative, this study aims to assess the advancements and changes in policy priorities, funding allocations, and objectives. By doing so, this analysis seeks to provide insights into the effectiveness of these ad-hoc programs, to identify successful strategies, and to ensure the optimal allocation of resources to foster economic recovery and sustainable development in Portugal.

Lessons learned from the implementation of the EERP can provide valuable insights for designing and implementing the NRRP. The EERP experience highlighted the importance of targeted investments, strategic planning, and coordination between member states and EU institutions. Insights on project selection, monitoring, and evaluation can be applied to ensure effective utilization of funds, maximize impact, and facilitate the recovery and resilience of economies in the post-pandemic context. Indeed, this comparison provides the means to analyze MABI through insights into the impact of the EERP, highlighting the evolution of the strategy and offering practical implications for the Portuguese initiative.

3.5.1. Previous studies on the European Economic Recovery Plan

As a response to the global financial crisis of 2008-2009, the primary objective of the EERP was to stimulate economic growth, create jobs, and support investment across the EU member states. The plan was characterized by several key features, among these and like the RRP: infrastructure investments, research and innovation, support for SMEs and green investments (European Commission, 2008).

The impact of the EERP varied across different beneficiaries and member states, it helped create job opportunities, stimulate economic growth, and enhance competitiveness in various sectors. The plan's emphasis on green investments also contributed to the transition towards a more sustainable and low-carbon economy (European Commission, 2023).

Different studies take in consideration the effects of the EERP as one of the main large-scale fiscal stimulus packages following the financial crisis of 2008. Among these studies, two in particular seem to provide important insights on the effectiveness of the ad-hoc European fundings and will be analyzed in the next section.

3.5.2. Assessing the impact of the EERP

The first study taken into consideration to evaluate the effects of the EERP mentions that the fiscal stimulus measures for the euro area countries amounted to 1.1% and 0.8% of GDP in 2009 and 2010, respectively (Coenen, Straub, & Trabandt, 2012). These measures primarily targeted support for households' purchasing power, investment, businesses, and labor-market measures. Reductions in value-added tax (VAT), direct taxes, social security contributions, and direct aid for households were implemented to support purchasing power. Investment was primarily focused on public infrastructure, while business support measures aimed to reduce costs and promote export promotion. Labor-market measures included wage subsidies and active labor-market policies (Coenen, Straub, & Trabandt, 2012).

The paper further discusses the simulation of the likely economic effects of the EERP, with the fiscal multipliers and output effects compared to the model's baseline. It mentions that the fiscal multipliers of the EERP were positive in the first two years, converging to a long-run multiplier of around 0.73. Yet, the effects on real GDP fade away quickly once the fiscal stimulus measures are lifted (Coenen, Straub, & Trabandt, 2012).

Second, an article by the European Central Bank (ECB) discusses the effectiveness of fiscal policy and the implementation of counter-cyclical fiscal stimulus measures within the framework of the EERP in response to the global financial and economic crisis. It highlights the conditional nature of the efficacy of such fiscal policy, considering factors like the fiscal instrument chosen, the persistence of the fiscal stimulus, government indebtedness, interest rate policies, and price flexibility (European Central Bank, 2010).

The ECB suggests that the fiscal measures implemented within the EERP have been broadly supportive for output, with a focus on short-lived fiscal stimulus. However, it also acknowledges the high cost of accommodating automatic stabilizers and implementing

counter-cyclical fiscal policies, which has led to significant deficits and rising debt-to-GDP ratios in euro area countries. The ECB's paper emphasizes once again the importance of restoring fiscal balances and implementing fiscal exit and consolidation strategies to ensure long-term fiscal sustainability. Also, it notes that some countries have been slow to undertake fiscal consolidation, posing increased risks to financial stability and undermining confidence in public finances (European Central Bank, 2010).

Finally, it is important to underline that the article by the ECB suggests that fiscal adjustment should primarily occur on the expenditure side, as empirical evidence points to a higher degree of success for expenditure-based fiscal consolidation. It also suggests that the additional budgetary room created by consolidation efforts can be used to lower taxes that are detrimental to labor supply and capital accumulation in the long run, such as labor and capital income taxes.

Overall, the two studies emphasize the need for fiscal consolidation, long-term fiscal sustainability, and the benefits of restoring sound fiscal positions in the euro area, while considering the trade-offs and challenges associated with fiscal policy effectiveness. Hence, both studies stress the crucial importance of maintaining confidence in longer-term fiscal sustainability when designing fiscal stimulus programmes.

Considering what has been outlined, in the case of the MABI, its fiscal sustainability to maintain long-term benefits can be ensured through a targeted approach, aligned with broader economic strategies and sustainability objectives, and by including constant and transparent monitoring and evaluation of outcomes. As a matter of fact, component 5 of MABI aims to invest in economic areas by combining the country's competitive and comparative advantages with those for which it has growth potential.

Keeping this in mind, the study proposes a thorough analysis of the five above mentioned areas included in the MABI.

4. Case studies per economic sector – (Individual Parts)

This section of case studies aims to comprehensively investigate the MABI's acceptance dynamics on five different sectors: cross-cutting Technologies and their Applications, Industries and Production Technologies, Mobility, Space and Logistics, Natural Resources and Environment as well as Health, Wellbeing and Territory. This, by focusing on three main objectives.

Firstly, identifying the characteristics that significantly influence program acceptance or rejection for companies independently of the presented project. Although the call for proposals establishes certain criteria for acceptance, the idea of this work is to be able to determine which of these criteria really weighs most heavily on the decision, and if in fact it is a proxy for evaluating a leader or consortium as the most suitable for accessing investment funds from the strategy.

This analysis is based on data from ORBIS, a database developed by Bureau van Dijk that contains comprehensive information on companies worldwide. By analyzing a range of variables selected as proxies of the selection criteria for the projects (see table 1), the study seeks to uncover what are the specific characteristics, if any, that have a substantial impact on an applicant's likelihood of being accepted or rejected.

Criteria for Companies	Variable	Why working as a proxy
Degree of innovation or differentiation	Added value	This variable measures the value added by a company to its inputs during the production process, which can indicate its ability to differentiate its products or services.
Business competitiveness and potential for specialization	Operating revenue (Turnover)	This variable reflects the project's impact on the company's revenue generation, which can indirectly indicate its impact on business competitiveness.
	Added value	This variable measures the value added by the company to its inputs during the production process, which can indicate the project's ability to enhance the competitiveness and specialization of the country's overall economy.
Capacity to leverage the investment	Total assets	This variable represents the total value of assets held by the company, which can indicate its capacity to leverage those assets for investment purposes.
	Shareholders funds	This indicator reflects the amount of capital contributed by shareholders, which can be an important factor in determining the company's ability to leverage additional investment.
	Cash flow [Net Income before D&A]	This variable represents the cash generated by the company's operations, which can indicate its ability to generate sufficient cash flow to support and leverage investment opportunities.
	Profit margin	This indicator measures the profitability of the company by calculating the percentage of profit generated from its operating revenue. A higher profit margin may indicate a greater capacity to generate returns and leverage investment.
	gearing (%)	Debt-related ratios: Indicators such as gearing (%), solvency ratio (liability based) (%), and interest coverage can provide insights into the company's debt levels, ability to service debt, and capacity to leverage additional debt financing.
	solvency ratio (liability based) (%)	
	interest coverage (x)	
Potential economic value of innovation and scalability	Operating revenue (Turnover)	This indicator measures the revenue generated by the company, which can provide insights into its economic value and potential scalability.
	Profit margin (%)	This variable represents the percentage of profit generated relative to revenue, which can indicate the economic value generated by the company's operations.
	Added value	This variable measures the value added by the company to its inputs during the production process, which can indicate its potential economic value and scalability.
Contribution of the project to carbon neutrality and energy resilience	Trucost	information about a company's greenhouse gas emissions or carbon footprint can provide insights into its contribution to carbon neutrality.
Quality of the Companies	Number of employees	This indicator can provide insights into the size and human resources capacity of the promoters and consortium members, indicating their competence and capability to execute the project.
	Profit per employee (th)	This indicator provides an indication of the company's efficiency in generating profits based on its workforce.
	Operating revenue (Turnover)	This variable reflects the revenue generated by the promoters and consortium members, which can indicate their business performance and level of competence.
	Profit margin (%)	This indicator represents the profitability of the promoters and consortium members, reflecting their ability to generate profits and manage financial aspects effectively.
	Total assets	This indicator represents the total assets of the promoters and consortium members, providing insights into their financial strength and resources available to support the project.
	Shareholders funds	This variable reflects the equity invested by the promoters and consortium members, indicating their financial commitment and stake in the project's success.
Economic and financial viability of the projects and of the proponents	P/L before tax	This indicator represents the profit or loss before tax, which provides insights into the financial performance of the proponents and their ability to generate income.
	Cash flow [Net Income before D&A]	This variable reflects the cash flow generated by the proponents, which is crucial for evaluating their financial viability and ability to meet financial obligations.
	Total assets	This indicator represents the total value of assets held by the proponents, which can provide insights into their financial strength and ability to support the projects.
	Profit margin (%)	This indicator measures the profitability of the proponents and can indicate their financial viability.
	ROE using P/L before tax (%)	Return on Equity (ROE) using Profit (Loss) before tax measures the profitability generated in relation to the equity invested, providing insights into the financial efficiency of the proponents.
	Working capital	This indicator reflects the liquidity and short-term financial health of the proponents, indicating their ability to cover short-term obligations.
	Gearing (%)	Although not explicitly listed, the gearing (%) indicator can provide insights into the financial structure of the proponents by measuring the proportion of debt to equity, which affects their financial stability and viability.
	Operating revenue (Turnover)	This variable represents the revenue generated by the proponents, indicating their ability to generate income and sustain their operations.
	Profit per employee (th)	This indicator measures the profitability generated per employee, providing insights into the efficiency and productivity of the proponents.
	CRIF	The score is designed to assess the financial stability and creditworthiness of companies. The Financial stability score aims to provide insights into a company's ability to meet its financial obligations, manage its debts, and sustain its operations.

Table 1. Description of the Variables and their relation to each Assessment Criteria

Source: own elaboration based on the MABI's criteria to select projects

Secondly, it seeks to assess the potential benefits associated with program participation by examining outcomes such as expected benefits in terms of efficiency, growth, innovation, among others. It aims to quantify and understand the positive and negative impacts that program participants can experience. This assessment will help determine the program's value and effectiveness in delivering desired outcomes for participating companies beyond leaders.

Thirdly, it explores the real and potential constraints or bottlenecks that may impede strategy implementation and effectiveness. These constraints can be related to the own processes of MABA in the different stages (application and selection, implementation, monitoring, collaboration dynamics) as well as external, resulting from market dynamics. The aim is to provide insights that can guide program administrators and policymakers in mitigating obstacles and optimizing program delivery in the early implementation stage that can avert possible setbacks, inefficiencies, among others.

The last two objectives are analyzed based on a survey elaborated by the research team and applied virtually and with free participation both to consortium leaders and to the co-promoters of these consortia (see annex 11).

The findings from this research will contribute to evidence-based decision-making, enabling program administrators and policymakers to optimize program design, improve participant outcomes, and overcome barriers to program success.

4.1. Sector: Mobility, Space and Logistics – (by Edoardo Sacchi)

4.3.1 Overview of the thematic area

The Portuguese economy is a dynamic mix of industries that contribute to its growth and development. Portugal's economic landscape is diverse, ranging from the thriving agro-food and forestry industries to the **emerging fields of logistics, mobility and space.**

This country's strategic emphasis on sustainability, innovation, and international collaboration positions it to excel in a variety of sectors and make significant contributions to both regional and global economies.

Portugal's strategic location on the Iberian Peninsula has positioned it as a key player in the sectors of logistics, mobility, and space. These sectors collectively contribute to the nation's connectivity, economic growth, technological advancement, and global partnerships.

Distinguishing between the sectors of space's industry and the domains of logistics and mobility is of paramount significance within the contemporary economic landscape.

While **logistics and mobility** focus on efficient transportation systems and sustainable urban mobility solutions, otherwise the **space sector** focuses on technological innovation, satellite development, and international collaborations for advanced exploration.

- **Logistics and mobility**

In Portugal, the logistics and mobility sector are critical to facilitating efficient transportation of goods and people both within the country and across international borders. Portugal has made significant investments in transportation infrastructure, such as roads, railways, ports, and airports, to promote seamless movement and trade connectivity.

For much of the twentieth century, transportation and logistics were severely neglected, but beginning late in the century, there was a concerted effort to remedy the situation, backed by massive EU funding. As a result, the overall road network has grown, a four-lane highway links Lisbon to Porto, the northern capital, secondly a highway connects Lisbon to Madrid, and a four-lane highway connects Lisbon to the Algarve. The highways connect the major cities and extend to the border and ports, improving mobility's situation in the country. Road transportation infrastructure includes national roads, municipal roads and highways and accounts for 28.2 percent of total infrastructure for the sample period.

Portugal			
	total	per 1 mio inhabitants	per km²
Railroads	3,622 km	348.97 km	0.04 m
Waterways	210 km	20.23 km	0.00 m
Airports	18	1.73	0.00020

Europe		
total	per 1 mio inhabitants	per km²
351,447 km	21.87 km	0.02 m
380,162 km	54.16 km	0.02 m
710	0.09	0.00003

Table 2. Comparison Transport in Portugal vs Europe

In the above table there is a comparison between the situation of transport in Portugal with rest of Europe. According to the data, Europe has a much larger infrastructure network in terms of railroads and waterways than Portugal. Europe also has a higher per-square-kilometer and per-million-person density of railroads, waterways, and airports. However, when interpreting these figures, it is critical to consider the geographical and population differences between Portugal and the rest of Europe. (Transport and infrastructure in Portugal, s.d.)

The Portuguese railway system has been improved, and the enterprise Rede Ferroviária Nacional (REFER) was formed to manage it in 1997. Lisbon's metro system was expanded outside the city limits in the early twenty-first century with the addition of several new stations, and the 25th of April Bridge, once Europe's longest suspension bridge, was adapted to include a railway line. Porto has also built a light rail system, parts of which are underground.

Portugal's transportation and aviation networks are well-developed and well-connected. The primary international entry point is Lisbon's Portela Airport, which is joined by the

international airports of Faro and Porto, as well as those of Madeira and the Azores. TAP Portugal is the national airline leader, with local and international carriers providing passenger and cargo services.

Significant investments have been made in Portugal's ports to improve cargo handling capabilities and services. To meet rising demand, major ports such as Lisbon, Leixões (serving Porto), Setubal, and Sines have expanded. River transport adds versatility, with the now-navigable northern Douro accommodating both leisure cruises and commercial barges. (BRITANNIA, PORTUGAL , s.d.)

During the 1990s, investment efforts and highway extension in Portugal grew drastically, particularly in the last ten years, which saw a significant increase in roadways investment made possible by public-private partnerships. In absolute terms, this amounts to an increase from 0.75% of GDP in the 1980s to 1.56% in the last decade.

Railroads, airports, and ports are examples of other transportation infrastructures that accounted for 9.0 percent of total infrastructure investment between 1978 and 2011. These investments reached their highest levels, as a percentage of total infrastructure investment, with railroad network modernization and port expansion projects, while the last ten years have also seen significant growth in airport investment. (Pereira, Alfredo Marvão Pereira Rui Marvão, s.d.)

- **Space Industry**

The aerospace industry in Portugal exhibits a compact yet robust industrial foundation, encompassing diverse domains such as aircraft and drone manufacturing, space exploration software development, and aviation maintenance. The nation's expertise extends internationally to both civil and military aircraft. Renowned for its proficiency, Portugal excels in aircraft and drone manufacturing and space software innovation. Furthermore, companies

play a pivotal role in producing aero structures and components for renowned aircraft manufacturers including Airbus, Embraer, and Pilatus.

The Portuguese aviation experience also includes the maintenance of complex planes and the development of new businesses such as wet leasing. We build aerostructures for the innovative KC-390 and develop unmanned aircrafts for NATO, the United Nations, and the European Union's military and public safety operations (Portugues Chamber of commerce, s.d.).

The national space strategy, Portugal Space 2030, establishes new goals for the sector's development. In 2019, the government established "Portugal Space" (the Portuguese Space Agency), a private, non-profit organization dedicated to promoting and strengthening space in Portugal, as well as its ecosystem and value chain, for the benefit of society and the economy in the country and around the world. According to the Portugal Space 2030 Strategy, Portugal Space serves as a business and development unit for universities, research institutions, and businesses. Portugal passed a new military programming law in 2019, with an estimated €5.3 billion in spending through 2030.

The planned defense expenditure may contribute to improve Portugal's NATO goal of 2% of GDP dedicated to military spending. (ITA, s.d.)

In general, Portugal's recovery and resilience plan responds to the urgent need to foster a strong recovery and prepare Portugal for the future. The plan's reforms and investments will help Portugal become more sustainable, resilient, and better prepared for the challenges and opportunities of the green and digital transitions. To that end, the plan includes 83 investments and 32 reforms.

They will be supported by €13.9 billion in grants and €2.7 billion in loans. 38% of the plan will support climate goals, while 22% will promote the digital transition. The recovery strategy emphasizes Portugal's commitment to fostering sustainable development as a cornerstone of its

economic recovery. By putting sustainability first in all sectors, the country hopes to achieve long-term growth, resilient industries, and a greener future that benefits both the economy and the environment.

Portugal's plan supports the green transition with a €300 million investment program to improve the energy efficiency of residential buildings. This investment is accompanied by additional investments in public building energy efficiency. Over €600 million in metro network extensions in Lisbon and Porto will make transportation more sustainable. Furthermore, the plan calls for the private sector to build 15,000 electric vehicle charging stations by 2025. Portugal's ambition to increase renewable hydrogen production is supported by €185 million. More than €800 million will also be allocated to greening industrial projects. (European Commission, s.d.)

4.3.2 General information on the projects

Initially, out of the total of 149 applications received for the strategy, 21 applications were directly categorized under the sector of Mobility, Logistics, and Space. This sector encompasses significant entities within the Portuguese economy, including leaders of specific sector in the country.

Furthermore, it is essential to underscore the existence of various sub-sectors relating to energy, transportation, mobility, and automotive industries.

Consequently, the tally of projects within this category amounts to 21. In accordance with the Phase I selection criteria, ten projects were assessed as highly commendable, representing 48% of the total, eight projects were deemed acceptable, accounting for 39%, and three projects were found to be ineligible, constituting 13%.

It can be deduced that merely ten companies have successfully met the requirements for advancement within the selection process.

4.3.3 Analysis of companies accepted and rejected in the selection phase

In the forthcoming assessment, it shall conduct a comprehensive analysis of companies that have recently undergone the selection phase, delving into both the accepted and rejected entities.

	Name of Company.	Sub-sector	Total Investement
Accepted	IMPrensa NACIONAL - CASA DA MOEDA S.A.	Tecnologias Transversais e suas Aplicações	35 562 812 €
	PEUGEOT CITRÖEN AUTOMÓVEIS PORTUGAL, S.A.	Mobilidade, Espaço e Logística	145 255 349 €
	NOS COMUNICAÇÕES, S.A.	Energia	274 315 152 €
	NEURASPACE, S.A.	Automóvel, Aeronáutica e Espaço	25 998 640 €
	GEO SAT, LDA	Mobilidade, Espaço e Logística	259 032 546 €
	ALTRANSPORTUGAL, S.A.	Transportes, Mobilidade e Logística	50 233 194 €
	EEA - EMPRESA DE ENGENHARIA AERONÁUTICA E AUTOMÓVEL, S.A.	Mobilidade, Espaço e Logística	121 960 491 €
	CONTINENTAL ADVANCED ANTENNA, SOCIEDADE UNIPessoal LDA	Automóvel, Aeronáutica e Espaço	30 044 393 €
	POLISPORT PLASTICOS S.A.	Transportes, Mobilidade e Logística	258 056 568 €
Rejected	LINK CONSULTING - TECNOLOGIAS DE INFORMAÇÃO S.A.	Transportes, Mobilidade e Logística	37 769 756 €
	HORÁRIOS DO FUNCHAL - TRANSPORTES PÚBLICOS S.A.	Transportes, Mobilidade e Logística	35 364 254 €
	RANGEL DISTRIBUIÇÃO E LOGÍSTICA, S.A.	Automóvel, Aeronáutica e Espaço	27 377 041 €
	LUSOSPACE, PROJECTOS ENGENHARIA LDA	Automóvel, Aeronáutica e Espaço	77 010 403 €
	WEATHER STREAM, UNIPessoal LDA	Automóvel, Aeronáutica e Espaço	25 316 166 €
	RANGEL TRANSITARIOS, S.A.	Transportes, Mobilidade e Logística	25 591 191 €
	SANTOS & VALE SUL - DISTRIBUIÇÃO, LDA	Transportes, Mobilidade e Logística	45 305 489 €
	EVA - TRANSPORTES, S.A.	Transportes, Mobilidade e Logística	26 356 809 €
	PROEF, SGPS S.A.	Transportes, Mobilidade e Logística	48 240 951 €
	MITSubishi FUSO TRUCK EUROPE - SOCIEDADE EUROPEIA DE AUTOMÓVEIS S.A.	Transportes, Mobilidade e Logística	45 410 504 €
	SIMOLDES-PLASTICOS, S.A.	Automóvel, Aeronáutica e Espaço	26 177 081 €
	EARTH PROXIMITY LDA	Transportes, Mobilidade e Logística	58 110 984 €

Table 3. Results After the Selection Process for the 21 leaders - Mobility, Space and Logistics Sector

The evaluation of 21 company applications in the Mobility, Logistics, and Space sector resulted in an in-depth look of the selection phase outcomes. Only eight companies advanced after the second selection phase, as the above table shown.

Of the 21 submissions, the rejection of 13 companies provided valuable insights. While each company held an influential position in the industry, certain challenges emerged. Concerns focused primarily on demonstrating the feasibility of their proposals and defining long-term financial projections. These impediments prevented them from meeting the program's stringent evaluation criteria.

The program's chosen participants have been dominant entities in distinct sub-sectors of the Portuguese economy. The total investment in the sector under consideration is 7.131.847.368. The budget allocation of 6.874.422.409 was primarily directed towards the highly specialized domains of Automobile, Aeronautics, and Space, with the remainder invested in complementary sub-sectors such as Energy and Mobility.

4.3.4. Factors influencing the selection process

In the following segment of the analysis, we consider historical data spanning from 2017 to 2021, encompassing the total project leaders who were both accepted and rejected.

This inclusion of leaders, from both acceptance and rejection categories in both phases of the analysis, ensures statistical robustness and a well-balanced examination. This methodology mitigates potential biases and upholds data integrity by considering these leaders in both acceptance and rejection scenarios, thereby preventing any incomplete or skewed conclusions regarding their impact on the studied variables' outcomes.

Furthermore, this sub-section conducts an extensive descriptive analysis using a comprehensive analytical framework with multiple dimensions. It considers critical factors such as the degree of innovation, business competitiveness, productive specialization, capacity to amplify initial investments, potential economic value derived from innovative ventures, prospects for scaling, contributions to achieving carbon neutrality and improving energy resilience, quality of consortiums as measured by promoter competencies, and the economic and financial viability of the project proponents. Furthermore, it delves deeply into the anticipated impact of these initiatives on their respective regional development landscapes.

i. Degree of innovation

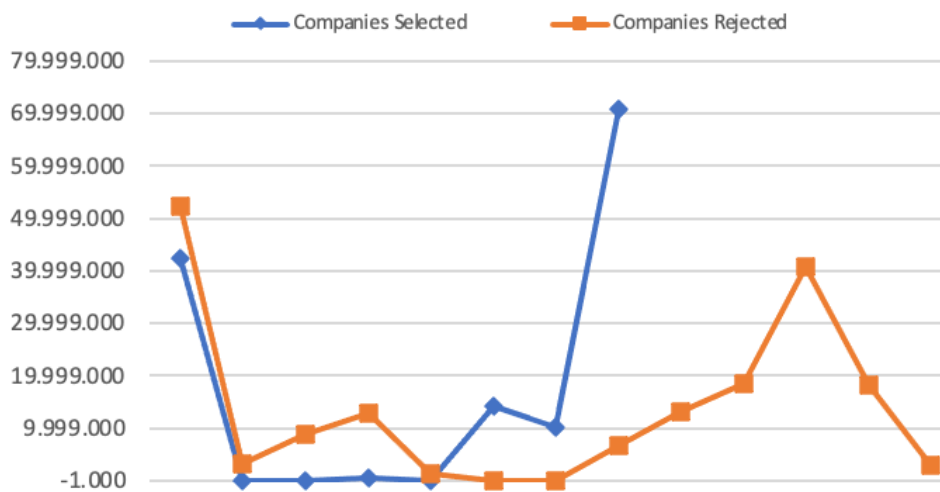


Figure 5. Added Value (€) 2017 – 2021 - Mobility, Space and Logistics Sector

The graphical representation, as illustrated in Figure 32, shows a distinct scenario wherein the trajectories of accepted and rejected companies exhibit a slight divergence in *Added Value*. The line tracking the progress of rejected companies showcases a singular peak, attributed specifically to the entity known as IMPRENSA NACIONAL - CASA DA MOEDA S.A. This particular entity demonstrates an average of €52,196,044 in added value over the temporal period from 2017 to 2022. This stands in stark contrast to the relatively consistent trend observed in the accepted companies' trajectory.

Notably, this elevated point represents a unique instance of exceptional performance among the rejected firms. However, beyond this remarkable peak, the line for rejected companies reveals a prevailing trend of generally lower values, averaging around €16,200,000. This resides below the average demonstrated by the accepted companies, which hovers at approximately €17,241,569. This intriguing contrast raises inquiries about the factors that underlie this brief yet remarkable surge in added value among rejected companies, while the persistently lower trajectory prompts consideration of the broader dynamics influencing their overall performance.

Additionally, it's worth noting that within the realm of rejected companies even if it is not clear from graph, one entity reports added values below zero, specifically EARTH PROXIMITY LDA.

ii. Business competitiveness and productive specialization



Figure 6. Operating revenue (€) 2017 – 2021 - Mobility, Space and Logistics Sector

The graphical representation depicted (Figure 33) is useful in investigating the complex dynamics surrounding the evaluation of Business Competitiveness and Productive

Specialization. The entities being considered for grant allocation have divergent trajectories, with a particular emphasis on the metric of operating revenue turnover.

The trajectory of accepted companies is notable in this analysis, with a prominent peak exemplified by the exceptional performance of PEUGEOT CITREN AUTOMOVEIS PORTUGAL, S.A., with an average operating turnover of €626,784,482 between 2017 and 2022. Following this ascendant peak is a comparable apex, this time representing a rejected entity, RANGEL DISTRIBUIO E LOGISTICA, S.A., with an average operating turnover of €208,013,635. In contrast, the overall trend among accepted companies is characterized by consistently strong operating revenue, which averages €104,052,362. Conversely, the trajectory of rejected entities reveals a descending arc, indicative of waning momentum in the realm of productive specialization. A cross-sectional observation reaffirms this disparity, with accepted entities generally commanding higher operating revenue. In summary, the graph, supported by its trend lines, unveils a complex narrative, providing insights into the intricate interplay between business competitiveness, productive specialization, and the outcomes resulting from the grant allocation process.

iii. Capacity to leverage the investment



Figure 7. Total Assets (€) 2017 – 2021 - Mobility, Space and Logistics Sector

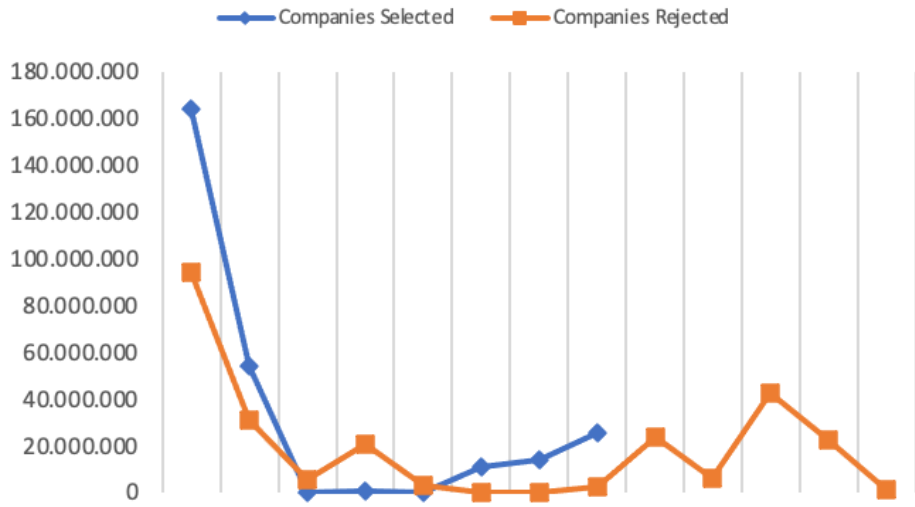


Figure 8. Shareholders' Funds (€) 2017 – 2021 - Mobility, Space and Logistics Sector

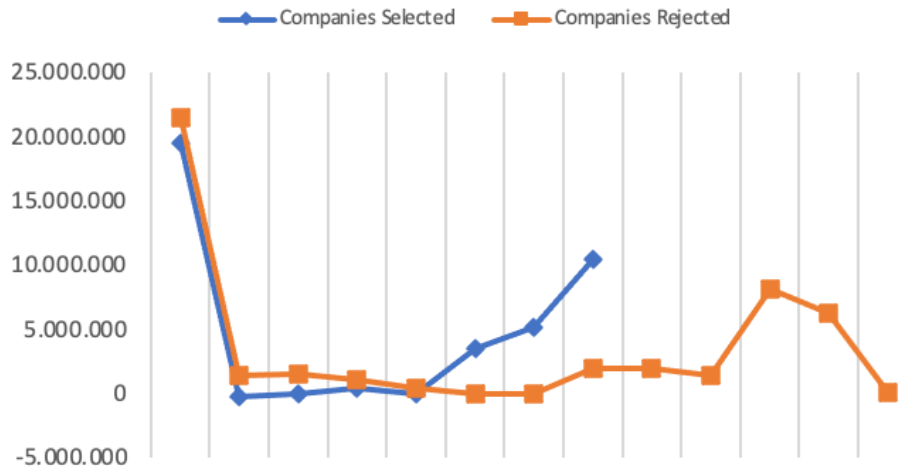


Figure 9. Cashflow (€) 2017 – 2021 - Mobility, Space and Logistics Sector

The set of graphical representations presented here serves as a platform for investigating the complex dynamics underlying companies' ability to capitalize on investment opportunities. This investigation is aided by a thorough examination of three critical financial metrics, namely total assets, shareholders' funds, and cash flow, each averaged over the period from 2017 to 2022.

The Total Assets metric represents the total value of the company's assets, and it serves as an indicator of the company's ability to use these assets for investment purposes. Surprisingly, leaders associated with rejected projects had higher total assets value on average (shown in Figure 34). The average value for rejected companies in the Total Assets variable is approximately 52,456,789, whereas accepted companies have a notably lower average value of 42,367,400.

For the accepted companies, with an average Shareholders' Funds of 33,629,395, it suggests that these companies have a stronger financial base contributed by shareholders. This can be beneficial because it shows their potential to use this wealth for a variety of purposes, including investment opportunities. The greater average Shareholders' Funds in this category may signify a larger financial buffer, thus improving their financial stability and capacity to embark on new

endeavors. The rejected firms, on the other hand, had a lower average Shareholders' Funds number of 21,116,010. This implies less capital input from stockholders. While this does not necessarily imply financial insecurity, it does suggest that these companies have a more constrained resource base to support and leverage investment prospects. To acquire a thorough knowledge of the companies' overall financial health and eligibility for investment projects, this statistic must be considered with other financial indicators and factors influencing the selection process.

Cash flow (Net Income before D&A) represents the cash generated by the company's operations and can indicate the company's ability to generate enough cash flow to support and leverage investment opportunities. Accepted project leaders had more cash flow than rejected projects on average as Figure 36 shown, but the general trend of the two groups are similar; the graph does not show an important difference.

Combining Total Assets, Shareholder Funds, and Cash Flow charts into a single visualization can be a powerful trend analysis tool. By observing how these variables interact over time, trends can be identified.

iv. The potential economic value of innovation and scalability



Figure 10 Profit Margin (%) 2017 – 2021 - Mobility, Space and Logistics Sector

This graph investigates how businesses manage their potential for innovation and growth. To accomplish this, a key financial metric known as profit margin can be used, which examines how much profit a company makes in relation to its revenue.

It's worth noting that both accepted and rejected trajectories have a lot of peaks. Notably, the average profit margin for accepted entities is 4%, while the corresponding average for rejected entities is 5%.

The profit margin metric, at its core, is a conduit for determining a company's ability to translate innovation and scalability into tangible economic outcomes. Peaks in the trajectories highlight instances where these characteristics translate into favourable financial outcomes. Profit margin variations demonstrate that both the accepted and rejected groups face challenges.

v. Contribution of the project to carbon neutrality and energy resilience

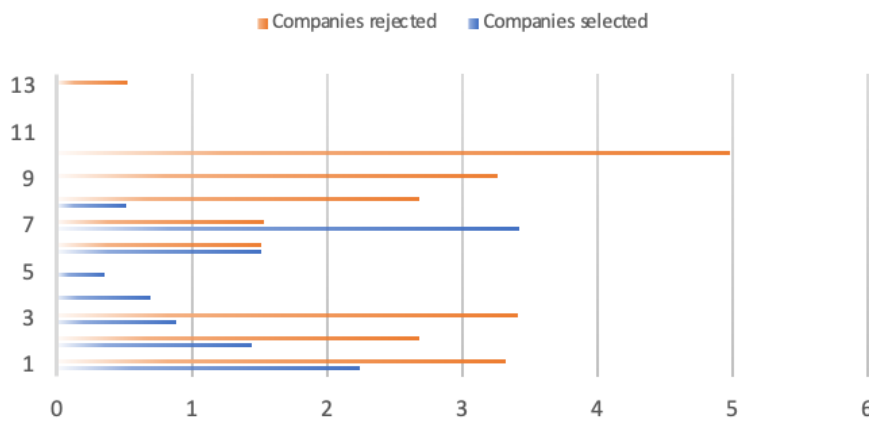


Figure 11. Environmental Score by Trucost - Mobility, Space and Logistics Sector

Regarding Trucost's Environmental Risk Score, as shown in Figure 38, the average value of the companies accepted is lower than the ones denied. For the years 2017-2021, the average Environmental Risk Score of all accepted companies was 1.38, which was lower than the value of all rejected companies of 3. This indicator demonstrates the significance of the environmental theme in the project's conclusion.

vi. Quality of the consortium in terms of the promoters' competencies



Figure 12. Profit per Employee 2017 – 2021 - Mobility, Space and Logistics Sector

On average, leaders in charge of the chosen projects displayed a significant profit per employee of 26, which markedly outperformed the figure of a minimum number associated with leaders overseeing projects that were not selected. This underscores the clear advantage held by accepted companies in terms of their efficiency in generating profits relative to their workforce.

Economic and financial viability of the proponents



Figure 13. ROE Using P/L Before Tax (%) 2017 - 2021 - Mobility, Space and Logistics Sector



Figure 14. P/L Before Tax (%) 2017 - 2021 - Mobility, Space and Logistics Sector

The graph illustrating P/L before tax values demonstrates a contrast between accepted and rejected proponents, indicating a probable variance in their financial success. Notably, accepted proponents had slightly greater P/L values than their rejected counterparts. The presence of some peaks indicates the possibility of outliers within the dataset, which may correlate to uncommon situations of extraordinarily high earnings.

The first graph, which depicts the ROE using P/L before tax, shows three distinct peaks below zero, indicating instances of negative ROE, particularly for the companies dismissed. These are examples of initiatives that may have failed to deliver sufficient returns in proportion to the invested equity.

4.3.5. Conclusion

In this section, the Stata analysis appears to produce results indicating a lack of statistical significance among variables related to mobility, transportation, and space. Despite scrutiny, it appears difficult to develop a reliable forecasting model for a company's acceptance or rejection into the program solely based on financial factors using data from the Orbis Dataset. This result could imply that the interplay of factors determining acceptance or rejection is

more complex than previously thought. Furthermore, the minor statistical significance observed for these variables highlights their limited impact in elucidating the acceptance or rejection dynamics.

This result serves as a valuable reminder of the complexities that are frequently inherent in empirical study, emphasizing the importance of considering broader contextual aspects and pursuing other lines of investigation to gain a thorough grasp of the research issue. This investigation has been limited to a group of twenty-one leaders and twenty-nine compromotores who faced acceptance or rejection at the final selection stage. While the lack of statistical significance in the mobility and transportation sector variables is perplexing, it highlights the need for a more comprehensive understanding of the intricate dynamics influencing program participation, as well as the importance of investigating additional contextual factors that may contribute to more accurate forecasting models.

The study reveals a subtle distinction between entities that are accepted and those that are rejected. Based on the characteristics under consideration, the organizations accepted into the program regularly outperformed their rejected counterparts. These executives demonstrated exceptional financial stability, profitability, and overall toughness. This distinction emphasizes the program's stringent selection requirements as well as the critical importance of strong financial management for firms aiming to pioneer breakthrough activities in this area.

Furthermore, our analysis emphasizes the importance of financial data in decision-making. It highlights how important data-driven insights are in selecting prospective candidates for government-backed investment initiatives. Our findings highlight the relevance of data-driven evaluations for making informed decisions and advancing strategic objectives in a period of rapid technology innovation and altering market dynamics within the Mobility, Space, and Transport sector.

Finally, our research highlights not only the differences between accepted and rejected enterprises in this industry, but also the critical significance of financial data in determining the landscape of innovation and growth in Portugal's Mobility, Space, and Transport domain.

5. Survey and administrative data (Group Part)

5.1. Survey

The use of surveys to assess the Portuguese NRP is certainly a valuable tool for gathering information and feedback. The advantages of surveys generally lie in their ability to effectively collect data from a wide range of participants and, considering the number of companies within the 143 consortia, this specific case fits the purpose.

However, the shortcomings of the survey conducted in this study, with only 40 companies responding, compromise its external validity and limit its generalizability. Also, as the projects presented by the selected consortia are still in the development phase, it is impossible to assess the investments' impact. For this reason, the survey employed focuses only on the evaluation of the application process, further limiting the depth of understanding of the broader impact of NRP funding. Therefore, the inclusion of more comprehensive evaluation measures in future evaluations is necessary.

The survey, consisting of 24 qualitative questions, analyses the effectiveness and inclusiveness of communication within the entities and assesses how the application process facilitates the implementation of the initiative. Respondents are also asked to identify the most relevant aspects of the application process and to identify any challenges encountered during its implementation. In addition, the survey measures the level of support and guidance provided by the public bodies responsible for the programme, as well as the companies' perceived benefits of working with universities. Finally, respondents are given the opportunity to express

their interest in non-financial incentives and their expectations of the long-term impact of the programme, and then conclude with suggestions to make the application process more feasible and easier for the applicants. This comprehensive approach, despite the shortcomings mentioned above, allows for a holistic assessment of the effectiveness of the programme application process and its influence on various dimensions of the operations and development of participating entities. Ethical considerations in conducting such a survey are included ensuring the privacy of participants, by obtaining informed consent and safeguarding the confidentiality of data, all of which are fundamental to maintaining the trust and integrity of the research process.

5.1.1 Data Collection

The survey was distributed to participating companies with the valuable assistance of IAPMEI, the Portuguese Agency for Competitiveness and Innovation, which operates within the Portuguese Ministry of Economy. The participants' responses were collected through the KoboToolbox platform.

The distribution of the survey began on 14 July 2023, with a deadline for responses set for 21 July 2023. A total of 44 responses were received. Of these, three were left blank and one was a company that had already completed the survey. Specifically, The Cricket Farming Co, Lda, a company involved in two consortia (number 59 and 20), provided two responses, while the other companies involved in multiple consortia provided only one response each. This dataset was meticulously prepared and organised using Microsoft Excel, incorporating rigorous data cleaning procedures to ensure accuracy and consistency. Through analysis, it is intended to extract insights from the data collected on the programme, mainly shedding light on the challenges and effectiveness of its various components. These results, though few in number,

are a valuable resource for understanding the programme's strengths and areas for improvement, to inform future initiatives and policy adjustments.

5.1.2 Analysis of the responses

Among the companies that answered to the survey, 23 (42%) were involved in consortia and projects in the thematic area of Industries and Production Technology, 13 (24%) in Cross-Cutting Technologies and Their Applications, 4 (7%) in Health, Well-being and Territory, 13 (24%) Natural Resources and Environment, and only 2 (3%) in the thematic area of Mobility, Space and Logistics. As briefly mentioned above, different companies were part of more than one consortium, thus differing also in thematic area, and hence resulting in a total of 55 different responses for the thematic area.

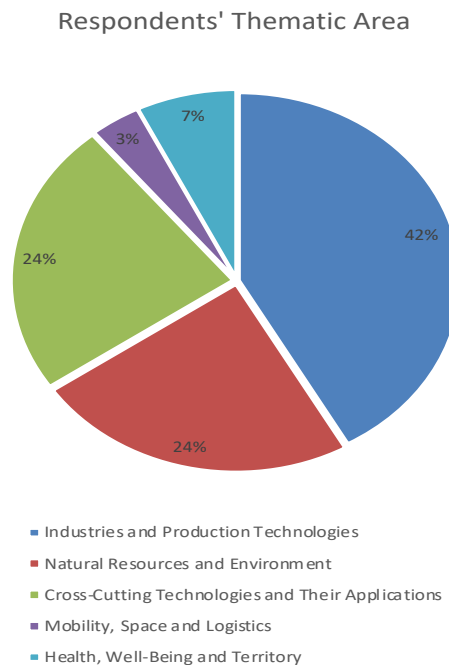


Figure 60. Respondents' Thematic Area

By looking at the data, one can see that 77,5% of the respondents already received the funds, and 97,5% already started the project implementation. On the same line, only 25% of the entities believe that the program is not respecting the established agenda and timetable. The different type of investments received are divided, within the survey, in four categories: “Fixed

investments”, “Intangible investments”, “Training” and “Other”. The “Training” investments were the ones less allocated among the companies that answered the survey (only 3%).

To continue, 21 of the 40 companies agree that the initiative was communicated effectively and inclusively, covering various levels of the organisation, and no company answered, "Strongly disagree". Also, 20 companies agree that the application process facilitated the implementation of this initiative in their organisation. In the application process, the aspects considered most relevant to facilitating implementation were the identification and scheduling of implementation stages and phases (57,5%) and the identification of co-promoters (27,5%).

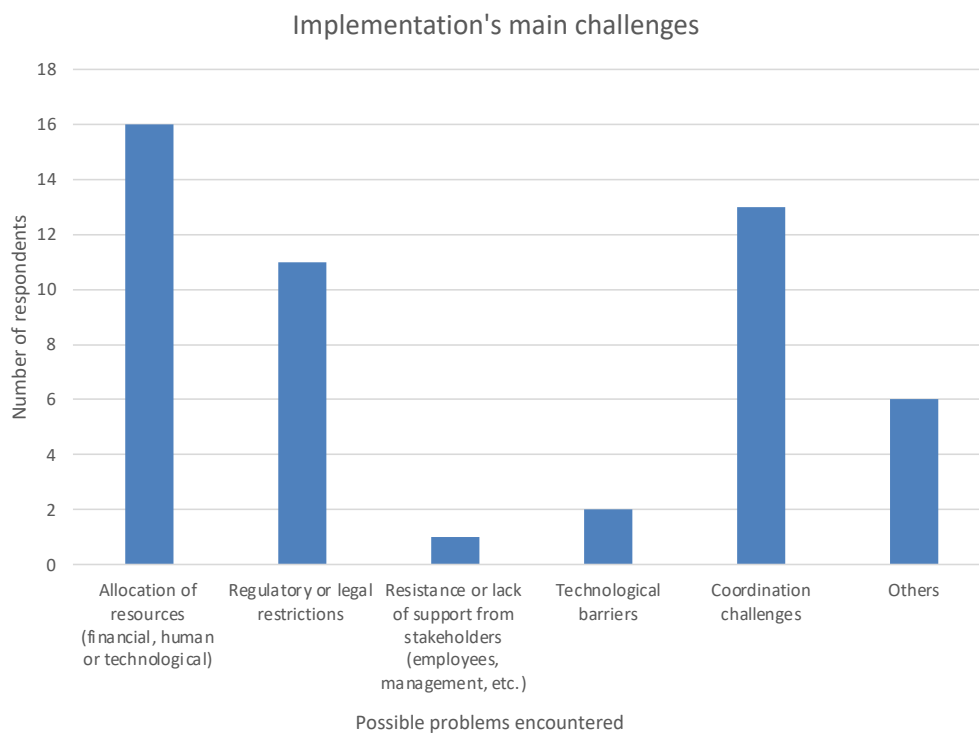


Figure 61. Program implementation’s Main Challenges

Analyzing the responses, the surveyed application process appears to be flawed. In fact, 75% of the companies declared they experienced difficulties during the process. Specifically, 16 companies had problems with resource allocation (financial, human, or technological), 13 had difficulties with coordination, and 11 had problems with regulatory or legal restrictions. Despite the difficulties encountered, the answers to the subsequent questions in the survey give

the program a positive note. Specifically, 85% of respondents agree or strongly agree with the statement that guidance and monitoring allow the companies to identify any obstacles or challenges during project implementation. However, when asked “How do you rate the general help and guidance provided by the public entities responsible for the program in relation to the specific objectives outlined in the project?” only two companies responded "Excellent", 11 "Good", 16 "Neutral", and 11 "Insufficient", pointing to a need to increase support to companies during the project implementation process.

Moving on, the survey denotes a positive attitude on the collaboration of companies with public entities, especially Portuguese universities. However, this contrasts with the administrative data collected on the Orbis platform in which universities and many public entities do not present any data, creating imbalances if one wants to analyze the future impact of the NRP on public entities that are part of the consortia.

In the final questions of the survey, respondents are asked to answer to enquiries related to the project's future impact and areas of development within the companies, as well as expectation on the company's performance because of the implemented program.

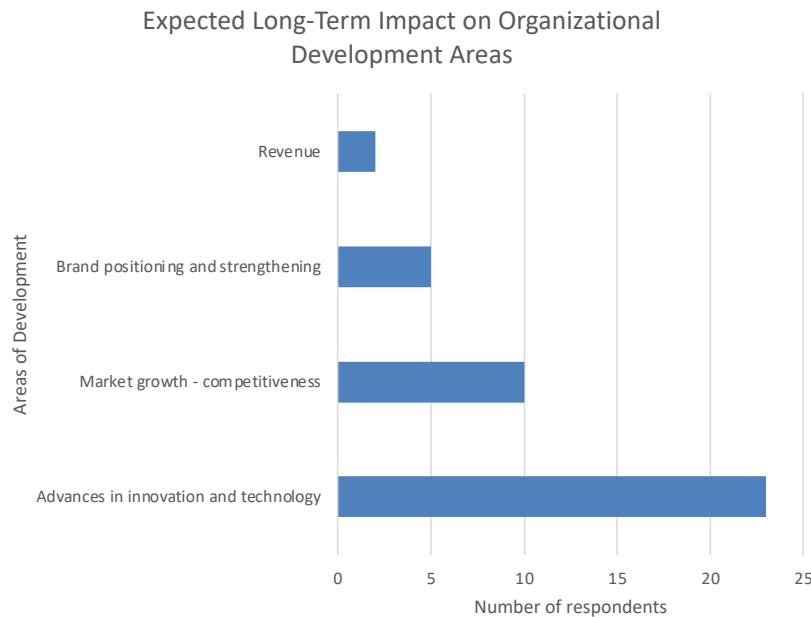


Figure 62. Project's long-term impact on companies' areas of development

Firstly, regarding the desire for additional non-financial incentives, a considerable number of companies expressed agreement with the idea: 6 companies strongly agreed, 16 agreed, and 15 were neutral. This suggests that companies are open to receiving non-financial support. Secondly, when asked about the areas where they believe the project will have the most significant long-term impact, most respondents (23 out of 40) indicated “Advances in innovation and technology”. This points to a strong emphasis on innovation as a key expected outcome of the program.

To continue, in assessing whether the program helped the selected participants identify and adopt innovative practices or technologies, it's notable that a significant number (25 companies) agreed, while 8 companies strongly agreed. However, 5 companies were neutral. This suggests that the program has indeed been effective in promoting innovative practices among a substantial portion of the participants. Lastly, the expectations of companies regarding improvements in various areas resulting from their participation in the program indicate a positive outlook. Many respondents expected improvements in areas such as innovation and technology advancement, market growth, revenue generation, brand positioning, and

efficiency. This suggests that the program is perceived as a catalyst for positive changes in these crucial aspects of business operations.



Figure 63. Companies' Expectations for Improvements

In summary, while the survey indicated a generally positive sentiment among respondents, emphasizing innovation as a pivotal goal and recognizing the program's effectiveness in promoting innovative practices, there were notable concerns. Respondents voiced apprehensions regarding bureaucratic processes, the need for better communication and support from program administrators, and a desire for non-financial incentives such as mentorship and training. These concerns, although raised by a limited number of respondents, are significant as they highlight areas for potential program improvement. As the "Agendas para a Inovação Empresarial" initiative progresses, addressing these concerns and building upon the positive sentiment expressed in the survey can lead to more effective support for companies' growth and innovation endeavours in Portugal.

5.1.3 Recommendations

Looking forward, to assess the impact of NRP funding once projects have been implemented, it is essential to include questions that capture both qualitative and quantitative aspects. These

questions should assess not only the financial results, but also the broader social and environmental impacts, in line with the multiple objectives of the programme.

Unlike the questions presented in the above-mentioned survey, in assessing the impact of NRP funding after its implementation, it will be essential to consider a comprehensive set of criteria and variables encompassing various aspects of the funded initiatives. These criteria include corporate financial performance indicators such as revenue growth, profit margins, changes in operating costs and return on investment (ROI). In addition, the impact on employment and labour must be assessed, including the creation of new jobs, wages, and skills development within the company. The adoption of innovation and technology, by looking at the number of patents or innovations developed in the company, can translate into business productivity and efficiency. Once projects are implemented, environmental sustainability efforts, such as the reduction of carbon emissions and social and community impact, will be key considerations. Finally, risk management, cost-benefit analysis, collaboration, inclusiveness, and diversity must be evaluated to provide a holistic understanding of the impact of the NRP programme.

6. Recommendations for Program Improvement (Group Part)

6.1 Importance of Data

The analysis conducted was based on numerous companies, no less than fifty companies in each sector, which includes both industry leaders and co-promoters, between accepted and rejected participants, evaluating each company under different perspectives.

This extensive research allowed an in-depth investigation of the possible strengths and weaknesses inherent in each field and included some possible recommendations for future analysis.

To undertake a full data analysis of the companies, it was necessary to delve into the financial profiles of firms from all sectors of the Portuguese economy. The building of a dataset with a variety of factors was required to support this undertaking. These characteristics efficiently separate and differentiate the firms under consideration, such as the number of employees, date of incorporation, or size, allowing for a thorough evaluation.

The thorough validation of data completeness is a crucial endeavour in economic analysis. It necessitates meticulous scrutiny of financial data for all selected companies to identify and rectify gaps or missing information. Failing to do so can undermine the precision and reliability of the analytical process.

It is necessary to emphasize the underlying role of data in economic analysis. Data, particularly financial data obtained from sources such as Orbis, serves as the foundation for comprehensive and analytical studies. This data's quality, consistency, and comprehensiveness are not only needed but also required for effective decision-making and accurate assessments of a company's financial health and performance.

These difficulties must be handled methodically to guarantee that the data on which key choices are made is both robust and dependable. Furthermore, the importance of data goes beyond the quantitative sphere. It is also critical to integrate qualitative data, such as contextual knowledge about market circumstances, competitive dynamics, and regulatory environments. This qualitative layer supplements the quantitative data, offering a comprehensive picture of the economic environment in which businesses function. (Why is data validation important in research? s.d.)

Data is especially important in programs like the 'Agenda Mobilizadoras,' where firm selection is a critical stage. Financial stability, innovation potential, environmental obligations, and

project alignment are all dependent on data-driven insights. The availability of extensive and reliable data serves as the foundation for firms' eligibility to engage in transformative projects.

6.1.1 Statistically significance

In data analysis, the significance of variables having a statistically significant p-value must be emphasized. The p-value in statistical analysis shows the probability that the observed results, or even more extreme outcomes, occurred just by chance. When a variable produces a low p-value, often less than a present significance level (commonly 0.05 or 0.01), it indicates that there is strong statistical evidence to reject the null hypothesis and accept that the variable has a substantial influence on the result under consideration.

The foundation of reliable and believable analysis is statistically significant variables. They provide a firm foundation for reaching meaningful findings and making sound judgments based on factual facts. These are the variables that researchers and analysts may safely attribute as having a true impact on the phenomena under study. Variables with high p-values, on the other hand, are often regarded as non-significant and may not give accurate insights into the connections under investigation. (Stats Value, s.d.)

Identifying variables with statistical significance is important not only for hypothesis testing but also in several fields, where the accuracy of predictions, policy recommendations, and treatment decisions is dependent on the strength of evidence provided by these variables. In essence, the important drivers are statistically significant factors. Identifying variables with statistical significance is important not only for hypothesis testing but also in fields like medical research, economics, and social sciences, where the accuracy of predictions, policy recommendations, and treatment decisions is dependent on the strength of evidence provided by these variables. In the analysis conducted in different sectors.

6.2 Limitations

Several significant constraints arose during the analysis. A noteworthy concern was the dataset's missing values and omitted variables, which limited the study and impacted the completeness and correctness of our analysis. Also, the dataset has a limited number of variables with statistically significant p-values. This issue was especially important since it impacted the robustness of our statistical inferences.

An important issue was discovered in the entity dataset: certain firms were present in both accepted and rejected projects. This was a problem since we needed to guarantee that the attributes included in the analysis were still relevant and useful for both approved and rejected groups. Furthermore, because our analysis was undertaken so close to the start of the project, the availability of previous data for a fuller review was limited.

Each of these constraints necessitated careful study and mitigation to assure the trustworthiness and usefulness of our findings in the project context. While these issues increased the research's complexity, they also underlined the importance of rigorous procedures and data management practices in similar future attempts.

6.3 Variables

Rigorous data analysis seemingly forms the backbone of these explorations. The process involved the construction of comprehensive datasets through detailed consideration of fundamental factors, such as the number of employees, date of incorporation, size, among others. Such factors distinguish the companies under scrutiny and lay a foundation for a thorough evaluation. The completeness of the data diligently ensures the integrity and reliability of this evaluation. Scrutiny doesn't halt at the dataset's foundation; it continues into detecting and rectifying potential missing information or gaps.

Although indispensable, it came to light that the dataset housed a limited number of variables with statistically significant p values. The lack of significant p values can subsequently obscure our statistical inferences, questioning the robustness of the outcomes. A significant complication arose when there was an overlap of firms participating in both the accepted and rejected project brackets, challenging the relevancy and usefulness of certain attributes in the analysis.

The constraints laid out by the project's initiation time compounded these complications, limiting the data available for more comprehensive scrutiny. Yet, these limitations also underscored the importance of rigorous data processes and management practices to ensure the robustness of the project's analytic outcomes.

Combined, these elements contribute to a focused, critical analysis of integral variables determining the final decision. These variables' identification follows a logical progression rooted in methodological rigor, aiding in future decision-making processes. This continuous, critical exploration enhances further research, with each constraint acting as a catalyst, directing towards improved methodologies and more comprehensive datasets for future analyses.

While specific limitations, all echoing the need for extensive, well-rounded datasets and meticulous management practices were uncovered, the in-depth exploration provided fertile ground for both immediate and future analyses. Ensuring data integrity and focusing on the significance of variables, both statistically and methodologically would substantially enhance future research undertakings within these sectors, and indeed, investigations of a similar kind.

6.4 Recommendations

Our research has unveiled several knowledge gaps within the methodology and research taken into practice. These gaps, stemming from our findings, beckon for comprehensive investigation, with the potential to enrich and expand the theory we have meticulously crafted through realist evaluation. We propose the following avenues for future research:

Enhanced Model Fit and Significance: Given the non-significant p-value associated with the LR chi-square value, it is imperative for future research to delve into potential confounding variables or unanticipated influences that might be contributing to this outcome. Conduct a comprehensive review of the model's underlying assumptions and the dataset to identify any factors that could be obscuring the significance of the predictors.

Exploring Additional Predictors: To address the relatively modest explained variability indicated by the Pseudo R-squared value, consider broadening the scope of predictors used in the model. Explore the inclusion of additional relevant predictors that could capture nuances within the economic landscape. Collaborate with subject-matter experts to identify potential variables that could enhance the model's predictive power and better capture the complexities of the outcome variable.

Advanced Modelling Techniques: Given the non-significant individual coefficients, it might be advantageous to experiment with advanced modelling techniques that can handle non-linear relationships and interactions more effectively. Techniques like polynomial regression, interaction terms, or machine learning algorithms could help capture intricate interactions among predictors that might be influencing the outcome variable.

Diverse and Enriched Dataset: Expand the dataset's breadth by incorporating a wider range of industries, economic contexts, and operational scenarios. This approach can offer a more

holistic understanding of the model's applicability across diverse contexts. Additionally, consider including industry-specific indicators, market trend data, and external factors such as geopolitical events, which could contribute to a more nuanced and comprehensive analysis.

Validation and Sensitivity Analysis: Perform thorough validation exercises to ensure the model's robustness across different datasets and scenarios. Employ sensitivity analyses to gauge the model's stability in the presence of varying assumptions or changes in predictor values. This step can enhance the reliability and generalizability of the model's findings.

Collaboration with Domain Experts: Engage in collaborative efforts with domain experts who possess intricate knowledge of the economic sectors under study. Their insights can guide the selection of relevant predictors and the interpretation of results, contributing to a more accurate and contextually informed analysis.

7. Evaluation of Program Expected Effectiveness (Group Part)

7.1 Program Objectives definition

This section is devoted to present a framework tailored for the evaluation of program effectiveness seeking to provide a systematic approach to measure the impact of the intervention. At its baseline lies the “Theory of Change”, a structured methodology that illustrates the intervention's strategy to achieve desired outcomes by tackling existing challenges. By considering the broader context, including changes in policies and socio-economic factors, the Theory of Change provides a holistic viewpoint. This methodology empowers intervention designers and implementers to thoroughly evaluate and enhance the intervention's structure, guaranteeing consistency regarding its envisioned mechanisms and results (UK Government , 2020).

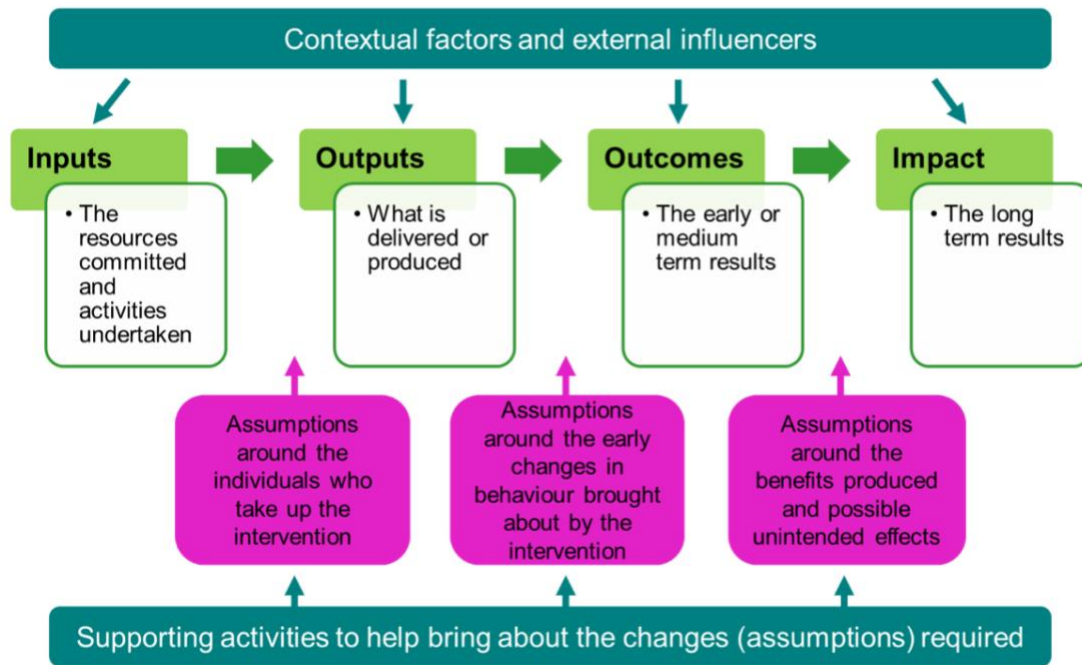


Figure 64: Example of a linear Theory of Change (Mayne, 2017)

As mentioned above, the European Union introduced the Next Generation EU as a temporary recovery tool, which included the implementation of National Recovery and Resilience Plans. The Portuguese PRR incorporates Component 5 - Capitalization and Business Innovation within its Resilience Dimension.

Within this context, the Theory of Change should break down the end goal into smaller, achievable steps that can be easily measured and tracked. By doing so, it should become clear which strategies are working and which ones need to be adjusted (EvalCommunity, 2023).

Firstly, identifying the obstacles to implement the Component 5 plan is essential, and there are numerous such barriers. Regulatory and bureaucratic hurdles, as well as political challenges, pose substantial obstacles. Excessive red tape, lengthy approval procedures, and demanding compliance requirements may impede progress. Furthermore, political factors, such as changes in government or political instability, have the potential to disrupt the implementation of long-term plans and initiatives. Shifts in priorities or policy directions can impact the continuity and

advancement of the mobilizing agendas. Technological challenges and skills gaps require investment and collaboration. Financial constraints can hinder progress, and regional disparities need to be addressed for equal participation.

Secondly, the intervention should be clearly outlined. In this case, the intervention in response to these challenges involves the disbursement of funds amounting to €558 million, supporting initiatives that align with the strategic priorities defined in the National Strategy for Research and Innovation for Smart Specialization (Estratégia Nacional de Investigação e Inovação para uma Especialização Inteligente).

The intervention follows a structured process consisting of three phases: first, entities and companies submit project proposals; second, a jury evaluates and assesses the proposals; finally, the selected projects enter the contracting phase for implementation.

After the successful completion of Phase I, an extensive assessment of the proposed ideas took place, resulting in the advancement of 70 Agendas to Phase II out of 143 total proposals. During this phase, a total of 64 final funding applications were submitted. Subsequently, all final proposals underwent a thorough analysis, leading to the pre-selection of 53 Agendas for the negotiation phase (IAPMEI, 2023).

The third step in building a Theory of Change involves the identification of expected outcomes which, in this case, are numerous and significant. They include enhanced productivity and competitiveness of the Portuguese economy, increased exports of high-value goods and services, accelerated progress in research and development activities, generation of qualified and highly skilled employment opportunities, expansion of technological capabilities and knowledge transfer, promotion of circular economy principles and sustainable practices, and a transition towards energy efficiency and carbon neutrality.

Lastly, the Theory of Change should outline how the actions implemented by the initiatives lead to a series of outcomes culminating in the desired or observed impacts (BetterEvaluation, s.d.). The impact of the Recovery and Resilience Plan and its associated initiatives are aimed to facilitate a strong and sustainable recovery from the economic crisis caused by the pandemic, leading to a structural transformation of the Portuguese economy towards a more specialized and innovative profile. This transformation will result in boosted economic growth, increased resilience, and improved international competitiveness. Additionally, the initiatives will promote sustainable resource management, reduce environmental impact, and drive long-term societal and economic benefits. They will enhance the quality of life and well-being of citizens while strengthening Portugal's international positioning. Furthermore, the interventions will contribute to economic, social, and territorial cohesion within the European Union and mitigate the social and economic impacts of the crisis, thereby aligning with the general objectives of the European Union (Annex II).

7.2.Key Indicators, baseline data and monitoring

7.2.1 Quantitative indicators

The quantifiable indicators that would measure progress towards the 7 objectives established by the strategy and summarized in its Theory of Change (see Annex 1). These indicators may be more or less sensitive to changes caused by the strategy depending on the type of project being implemented. Since until 2023 most projects are in the contracting stage or have just completed it (Jornal de Negocios, 2023), and in terms of investment, projects will be completed mostly by the end of the programming term, between 2025 and 2026 (Corti, Nuñez, Ruiz, & Regazzoni, 2021), it is essential to start with the pre-pandemic data collection approximately three to four years before the pandemic since provides a substantial amount of data points and a robust sample size and allows for more reliable trend identification and forecasting. Also, by

2017, economic and market conditions had largely recovered from the global financial crisis of 2008, offering a relatively stable environment to begin data collection. The data collection must go until now (2023) and continue until the end of the implementation of the projects in 2026 and at least 3 or four years for a post-implementation evaluation.

Enhanced Productivity and Competitiveness of the Portuguese Economy

Assessing productivity and competitiveness helps to measure the efficiency of companies and the economy in general, which is vital for economic growth and long-term stability.

Indicator	Description	Source
Operating Revenue (Turnover) per Employee (th)	This indicator shows how much revenue each employee generates. Higher revenue per employee suggests higher productivity and effectiveness in utilizing human resources.	Orbis Data Base (by Bureau van Dijk)
Profit Margin (%)	Profit margin indicates how efficiently a company converts revenue into profit. A higher profit margin reflects better operational efficiency and competitiveness.	Orbis Data Base (by Bureau van Dijk)
ROE using Profit (Loss) before Tax (%)	Return on Equity (ROE) measures how effectively shareholders' equity is being utilized to generate profit. A higher ROE signifies better use of investor capital.	Orbis Data Base (by Bureau van Dijk)
ROCE using Profit (Loss) before Tax (%)	Return on Capital Employed (ROCE) assesses how efficiently a company uses its capital to generate profit. A higher ROCE indicates effective capital management.	Orbis Data Base (by Bureau van Dijk)
ROA using Profit (Loss) before Tax (%)	Return on Assets (ROA) gauges how efficiently assets generate profit. A higher ROA reflects better utilization of assets.	Orbis Data Base (by Bureau van Dijk)
Average Cost of Employee (th) **	This metric provides insight into the cost of human resources. A lower average cost per employee may suggest streamlined processes and cost efficiency.	Orbis Data Base (by Bureau van Dijk)
Working Capital per Employee (th)	Higher working capital per employee indicates greater liquidity and financial stability, which can contribute to competitiveness.	Orbis Data Base (by Bureau van Dijk)

* Although the indicators are included in the Orbis database, no information was found for the Portuguese companies analyzed, so it is necessary to gather information from direct sources

** These indicators are not included in the ORBIS database; therefore, it is necessary to gather information from direct sources

Increased Exports of High-Value Goods and Services

Export growth can stimulate economic expansion, reduce trade deficits, and show the country's competitiveness on the world stage.

Indicator	Description	Source
Export Revenue* / Operating Revenue (%)	This ratio indicates the proportion of total revenue that comes from exports. A higher percentage suggests a greater focus on exporting and potentially high-value products or services.	Orbis Data Base (by Bureau van Dijk)
Export Revenue*	The actual revenue generated from exports, showing the success of efforts to increase high-value exports.	Orbis Data Base (by Bureau van Dijk)
Export Revenue* Growth Rate	This rate quantifies the increase in export revenue over a specific period, indicating the success of strategies aimed at expanding valuable exports.	Orbis Data Base (by Bureau van Dijk), own calculations

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Accelerated Progress in Research and Development Activities

Monitoring R&D progress fosters innovation, which is fundamental for economic development and staying competitive in the global market.

Indicator	Description	Source
Research & Development Expenses* / Operating Revenue (%)	This ratio shows the portion of revenue allocated to research and development. A higher percentage indicates a stronger commitment to innovation and progress.	Orbis Data Base (by Bureau van Dijk) Own data collection
Number of Employees in Research & Development	This count reflects the scale of R&D activities and signifies the company's investment in innovation.	Own data collection
R&D Expenses* Growth Rate	Measures the rate of increase in R&D spending over time, indicating the pace of R&D acceleration.	Orbis Data Base (by Bureau van Dijk), Own calculations

* Although the indicators are included in the Orbis database, no information was found for the Portuguese companies analyzed, so it is necessary to gather information from direct sources
 ** These indicators are not included in the ORBIS database; therefore, it is necessary to gather information from direct sources

Expansion of Technological Capabilities and Knowledge Transfer

Technological advancement and knowledge transfer improve industries' capabilities, attracting investment, and driving economic growth.

Indicator	Description	Source
Technological Investment** / Total Assets	This ratio measures the extent to which the company invests in technology relative to its asset base. A higher ratio indicates greater technological investment and potential expansion.	Orbis Data Base (by Bureau van Dijk) ** Own data collection
Number of Technology Partnerships	The count of partnerships suggests the company's engagement in collaborations for technology sharing and knowledge transfer.	Own data collection
Knowledge Transfer Ratio	Measures the effectiveness of transferring R&D knowledge to practical applications in the industry.	Own data collection

* Although the indicators are included in the Orbis database, no information was found for the Portuguese companies analyzed, so it is necessary to gather information from direct sources
 ** These indicators are not included in the ORBIS database; therefore, it is necessary to gather information from direct sources

Promotion of Circular Economy Principles and Sustainable Practices

Adopting sustainable practices contributes to environmental protection, resource efficiency, and long-term economic viability.

Indicator	Description	Source
Trucost (Environmental Cost) / Added Value	This ratio reveals the environmental cost in relation to value generated, indicating efforts to promote sustainable practices.	Orbis Data Base (by Bureau van Dijk)
Percentage of Recycled Materials Used in Production **	Higher use of recycled materials reflects commitment to circular economy principles.	Own data collection
Sustainable Product Development Investment **	Investment in sustainable product development indicates efforts to align with circular economy and sustainability goals.	Own data collection

* Although the indicators are included in the Orbis database, no information was found for the Portuguese companies analyzed, so it is necessary to gather information from direct sources
 ** These indicators are not included in the ORBIS database; therefore, it is necessary to gather information from direct sources

Generation of Qualified and Highly Skilled Employment Opportunities

Creating high-quality jobs increases the standard of living, reduces unemployment, and enhances workforce skills, essential for overall prosperity.

Indicator	Description	Source
Trucost (Environmental Cost) / Added Value	This ratio reveals the environmental cost in relation to value generated, indicating efforts to promote sustainable practices.	Orbis Data Base (by Bureau van Dijk)
Percentage of Recycled Materials Used in Production **	Higher use of recycled materials reflects commitment to circular economy principles.	Own data collection
Sustainable Product Development Investment **	Investment in sustainable product development indicates efforts to align with circular economy and sustainability goals.	Own data collection

* Although the indicators are included in the Orbis database, no information was found for the Portuguese companies analyzed, so it is necessary to gather information from direct sources

** These indicators are not included in the ORBIS database; therefore, it is necessary to gather information from direct sources

Transition Towards Energy Efficiency and Carbon Neutrality

Moving toward energy efficiency and carbon neutrality is critical for environmental sustainability, meeting international commitments, and mitigating climate change's adverse effects.

Indicator	Description	Source
Energy Consumption Reduction Rate	This rate shows the reduction in energy consumption over time, reflecting efforts toward energy efficiency and carbon neutrality.	Own data collection
Carbon Emissions per Unit of Production	Measures carbon intensity, indicating progress toward carbon neutrality goals.	Own data collection
Investment in Renewable Energy Sources	Higher investment suggests commitment to transition to cleaner energy sources.	Own data collection

* Although the indicators are included in the Orbis database, no information was found for the Portuguese companies analyzed, so it is necessary to gather information from direct sources

** These indicators are not included in the ORBIS database; therefore, it is necessary to gather information from direct sources

7.2.2. Qualitative indicators - Perception (surveys)

The survey was designed to identify and assess, from the perspective of the participating companies, the processes, and results within the strategy. Additionally, a section was added to collect data that is not possible to find in databases such as Orbis. Therefore, it contains nine sections:

- **Identification & others:** includes different identifiers and number of employees.
- **State of the initiative:** inquire about whether the company has already received funds and whether it is already implementing the project.
- **Processes – Elaboration:** inquire about the development of the proposal in terms of inclusiveness and effectiveness / efficiency in implementation.

- **Processes - Application and selection:** inquire about the allocation of funds in terms of fairness and funding for performance-enhancing measures.
- **Processes – implementation:** inquire about challenges or barriers in the implementation process as well as possible solutions.
- **Processes – Monitoring:** inquire about the overall support and guidance provided by the program as well as the monitoring processes and its ability to identify any bottlenecks or challenges during the initiative's implementation.
- **Collaboration/partnerships:** inquire about the dynamics of collaboration between participating companies.
- **Expected benefits:** inquire about the perception of obtaining benefits as a result of the program in terms of efficiency, growth, innovation, among others.
- **Additional data:** Include the collection of data related to Export and Revenue Enhancement, Research and Development (R&D) and Innovation, Circular Economy and Sustainability, Workforce Development as well as Energy Efficiency and Carbon Neutrality.

The survey must ensure clear instructions and confidentiality.

7.2.3. Qualitative indicators - stakeholders interview

Once quantitative administrative and perception information has been collected, as mentioned above, semi-structured interviews should be conducted with stakeholders from the different groups analyzed in order to complete the "narrative" and information that was not possible to collect with the previous instruments.

7.3. Treatment and control groups

Control groups and treatment groups are essential components of the strategy evaluation. They allow to assess the impact of the intervention by comparing the outcomes of those who receive the intervention (treatment group) with those who do not (control group). This comparison helps to determine whether any observed changes can be attributed to the program itself rather than other external factors, so it can be possible to establish causality, rule out other factors that might influence outcomes and enhances the internal validity of the study. For the evaluation of the Mobilizing Agendas for Business Innovation, the following groups should be identified and created:

- **Treatment group (Receives the Program Intervention):** This group receives the intervention since their projects were selected. If the total number of co-promoters who applied to the program and were selected is not taken, a significant sample of them should be taken at random (with a confidence level of 95% and a margin of error of 5%). It is important to ensure that the treatment group receives the full intervention as planned.
- **Control Group That Doesn't Receive the Program Intervention:** co-promoters that receives no intervention but is otherwise similar to the treatment group. Randomly assign eligible participants to the treatment and control groups. If the total number of co-promoters who applied to the program is not taken, a significant sample of them should be taken at random (with a confidence level of at least 95% and a margin of error of at least 5%). It is important to ensure that the control group experiences the same conditions as the treatment group, except for the intervention itself (through techniques such as random assignment, Matching and control external factors)

- **Control Group That Did Not Apply to the Program:** businesses that did not apply for the program. They can be randomly selected from the same Orbis Data Base considering relevant characteristics to the treatment group to minimize bias. It is important to ensure they were not exposed to the possibility of receiving the intervention. Ideally, control candidates should be identified in advance, before the program is widely known or promoted. However, this is not a possibility, so the best option is to randomly select participants for this control group from the eligible population that did not apply to participate in the program and ensure that the random selection process is truly random and avoids any deliberate or unintentional bias.

7.3 Implementation monitoring

The objectives of monitoring are to ensure that the intervention is working as planned, to identify possible bottlenecks to act on them, and ultimately to make it possible to identify the impact of the strategy on the different strategic objectives established and mentioned above. For this reason, a set of quantitative and qualitative indicators were identified in this document to be monitored, as they allow to account for both the processes and the results of this strategy.

It is important to specify the timeline and personnel responsible for data collection to ensure the adequacy and flow of data. continuously collecting data on the indicators as the program progresses helps to identify early trends and provides insight into any required adjustments.

once the quantitative data is analyzed to calculate relevant metrics and trends, the survey responses to understand perceptions and the stakeholder interviews to extract valuable qualitative insights, cross-source validation should proceed in which findings are compared across the different sources of information to identify areas of convergence and divergence validating quantitative trends with qualitative insights from surveys and interviews.

Finally, results from all sources should be synthesized to form a comprehensive understanding of the progress and challenges of implementation with both descriptive statistics and inferential tools. Based on the integrated results, actionable insights could be identified that can guide decision making and program adjustments.

7.4 Data preparation

At the heart of any meaningful analysis is the foundational task of data preparation. Raw data, by its very nature, often contains inconsistencies—missing elements, inaccuracies, and discrepancies. By enhancing raw organizational data—such as by amalgamating internal and external data sources or harmonizing datasets—the information becomes not only more coherent but also richer in context (TIBCO , 2023). As a tool in this endeavor, the Orbis Database offers an expansive repository of data that can be utilized to enrich and fine-tune the primary datasets, fortifying the analysis and providing a broader perspective for the program evaluation. Once determined key indicators, outlined in the Figure 5, it is possible to leverage the Orbis Database to source pertinent data. This step can facilitate a more in-depth quantitative assessment, ensuring that our evaluation is both comprehensive and robust.

7.4. Data analysis and impact on indicators

A core component of the evaluation is data analysis, that is using the appropriate statistical techniques for a comprehensive examination of the collected information. A key aspect of this analysis involves comparing the outcomes on indicators of the treatment group (companies which received the program intervention) with a control group (companies that didn't receive the program intervention or did not apply to the program). This helps delineate the program's genuine impact (Samad, 2010).

One of the intricate challenges of impact evaluations is crafting a robust counterfactual. This is visualizing the trajectory participants might have taken in the program's absence addressing potential biases that might tint the understanding of the program's genuine impacts. This can be done through various methodologies such as randomized controlled trials (RCTs), regression discontinuity (RDD), difference-in-differences (DiD) or propensity score matching (PSM). Each of these methodologies has its own strengths, limitations, and assumptions. The best method to use often depends on the nature of the data or the design of the program (Samad, 2010). In this case, considering that data on financial indicators can be used as part of the evaluation, using RCTs, though rigorous, might not always align with the practical dimensions of certain business contexts. Regression Discontinuity is contingent upon a clear threshold, which is absent in this scenario. On the other hand, DiD could be a viable choice if companies would follow the same trends; however, the unpredictable and dynamic nature of the broader economic environment, can make this assumption questionable.

Conversely, PSM emerges as the most suitable approach for understanding the impact of receiving funds. Operationalizing PSM begins by identifying financial indicators influencing a company's likelihood to receive funds. A statistical model, often logistic regression, is then employed to estimate propensity scores, which are then used to match companies that received funds with those that didn't, based on their predicted propensity. This matching process aims to construct a comparison group that is as similar as possible to the treated group based on observed characteristics. By comparing outcomes between these matched groups, the effect of receiving funds can be inferred.

Advantages of PSM include its ability to significantly reduce selection bias, its flexibility with observational data, and its intuitive matching concept which simplifies explanation to a varied audience. However, it comes with disadvantages: the inability to account for unobserved confounders, potential challenges in finding a perfect match for every treated unit, assumptions

of common support, reliance on the quality of the model generating propensity scores, and possible loss of data when not all treated subjects are matched.

Tracking shifts in matched companies over specific durations can also provide deeper insights into the prolonged impact of the funds, allowing for a more dynamic understanding of their effect (Samad, 2010).

7.5 External factors

When evaluating the impact of the program, it is essential to consider external factors that might have played a role in influencing the observed outcomes. These externalities can either augment or diminish the perceived effectiveness of an intervention.

Economic conditions, for instance, can exert a substantial influence; a sudden economic downturn or upswing can affect a company's performance irrespective of the funds received. Similarly, policy changes at EU level, in this case, might either complement the benefits of the program or negate them. For instance, an EU-wide economic stimulus or a trade agreement can impact the business environment in which companies operate, irrespective of the funds they received from the program. Additionally, unforeseen events, such as natural disasters, pandemics, or significant market disruptions, can significantly sway results.

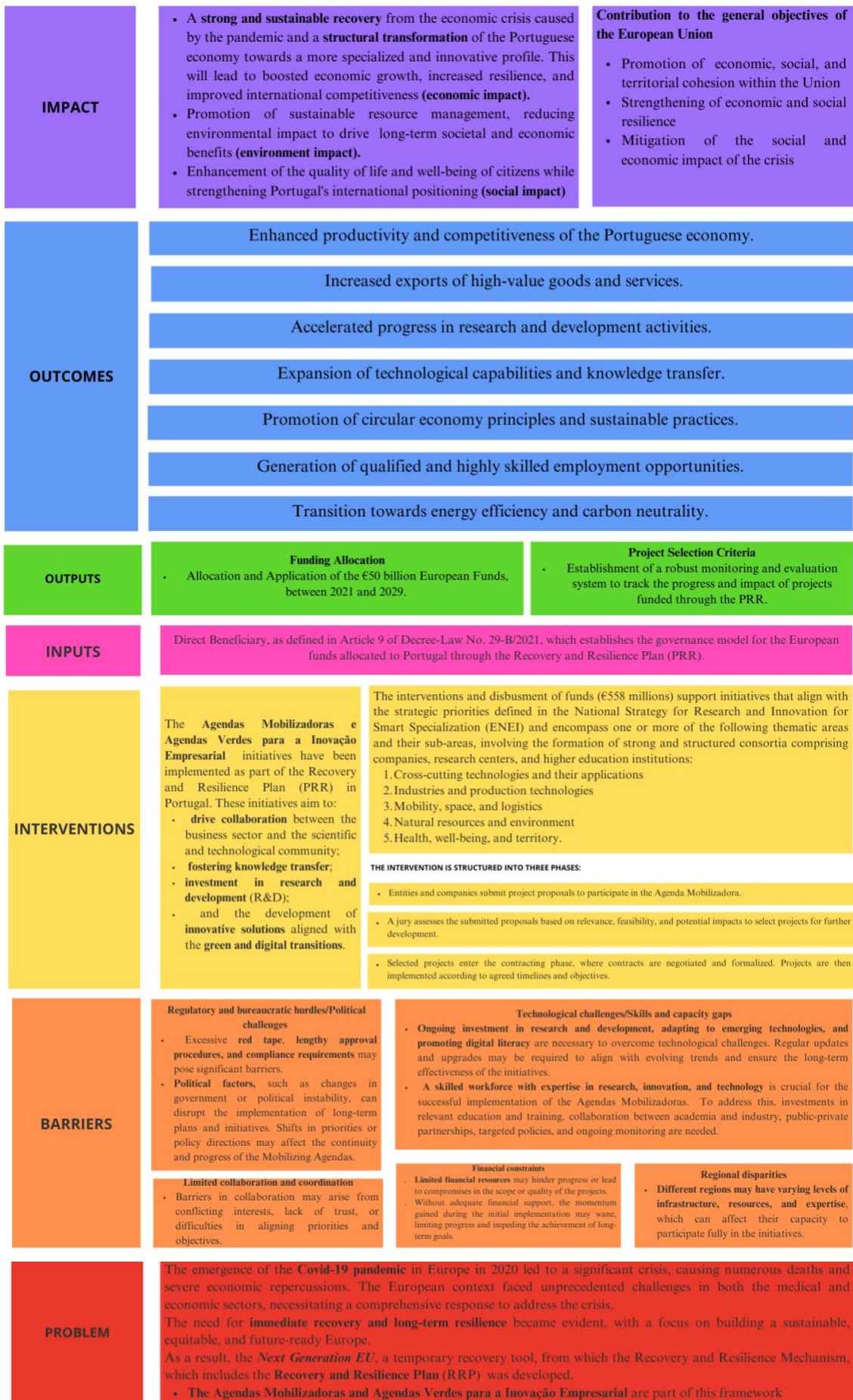
By understanding and accounting for these external factors, the evaluation process becomes more nuanced, attributing the outcomes more accurately to the intervention itself rather than extraneous influences.

7.6 Cost-effectiveness evaluation

It is equally crucial to juxtapose these outcomes against the resources expended to achieve them. Cost-effectiveness evaluation delves into understanding the economic efficiency of the

program, determining whether the benefits derived are justifiable given the expenses incurred. By comparing the costs associated with the program (both direct and indirect) against the positive outcomes achieved (be they monetary or non-monetary), one can ascertain the value the program brings. If the benefits substantially outweigh the costs, the program can be deemed cost-effective. Conversely, if the expenses run high with minimal observable advantages, it may prompt a reconsideration of the program's design or implementation.

Annex 2. Theory of Change Scheme



Annex 3. Industries and Production Technologies accepted leaders

Leader	Investment	Agenda verde	Copromotores	Summary of the project
PALBIT, S.A.	49.694.142,56	No	24	<p>Hi-rEV – Recuperação do Setor de Componentes Automóveis</p> <p>The project addresses the automotive industry's evolving landscape, responding to challenges including pandemic recovery, energy transition, digitalization, and manufacturing restructuring. The objective is to establish local automotive entities as models of sustainable growth, innovation, and advanced technology supply. Through strategic collaborations and industrial partnerships, the initiative aims to reshape the national manufacturing landscape, fostering progress and specialization in accordance with industry needs.</p>
EROFIO - ENGENHARIA E FABRICAÇÃO DE MOLDES S.A.	97.278.006,08	No	81	<p>INOV.AM – Inovação em Fabricação Aditiva</p> <p>The initiative centers on Additive Manufacturing's distinctive attributes, with applications spanning sectors for tailored, high-value, and sustainable products. Collaboration between cross-industry corporations and national scientific bodies defines the program, focusing on novel materials, advanced manufacturing methods, automation, and more. A core objective is to train personnel comprehensively in additive manufacturing, accompanied by an encompassing advanced training and certification strategy.</p>
BONDALTI CHEMICALS, S.A.	147.814.482,01	Yes	5	<p>H2Enable - The Hydrogen Way for Our Chemical Future</p> <p>The H2Enable Agenda aims to accelerate and reshape the green hydrogen value chain in Portugal, commencing from the Estarreja Chemical Complex—home to major industry players Bondalti and Air Liquide. These corporate promoters, supported by two Research and Innovation entities—the Faculty of Engineering at the University of Porto and the Collaborative Laboratory HyLab—alongside APQuímica, the chemical and petrochemical cluster management entity, will drive Research & Development, Productive Investment, and Promotion efforts. The core objective is the establishment of a pivotal large-scale green hydrogen plant and associated infrastructure, allowing broad distribution across numerous economic sectors.</p>
DOMINGOS DA SILVA TEIXEIRA S.A.	215.080.294,4 2	No	53	<p>R2UTechnologies - modular systems</p> <p>This Innovation Pact is born from the integration of the initiatives "R2U Technologies" and "Glass Net," aiming for a profound transformation in the modular construction sector. It seeks to shift from labor-intensive production to knowledge-intensive paradigms. This pact aims to empower businesses, academia, and human resources to create a global modular construction cluster.</p>
VOLKSWAGEN AUTOEUROPA, LDA	167.272.966,8 3	No	46	<p>Transição para a fábrica do futuro</p> <p>The "Drivolution Agenda" aims to establish a Future Factory model addressing energy transition and digital transformation challenges in the automotive sector, fostering intelligent, sustainable, inclusive, and resilient growth. Designed around 5 key actions—Digitalization, Industry 5.0, Safety & Ergonomics, Materials, and Specialized Digital Training—this initiative comprises 20 sub-projects, driving innovation in each area. With the participation of 40 entities, including 20 companies and 20 scientific and technological institutions, this Agenda targets impactful process and product innovation, contributing significantly to the national economy.</p>
ATEP - AMKOR TECHNOLOGY PORTUGAL, S.A.	76.652.612,28	No	17	<p>Agenda Microeletrónica</p> <p>The "Microelectronics Agenda" aligns with European initiatives like IPCEI on Microelectronics and the EU Chips Act, aiming to enhance Europe's autonomy in this pivotal sector. Designed as a proactive response to address systemic shortcomings, this Agenda prioritizes investments in production capacity, innovation, skill development, and information generation within the national semiconductor industry. It represents a crucial initial step towards bolstering Europe's position and societal value amidst Asian market dominance and digital transition imperatives.</p>
VISTA ALEGRE ATLANTIS, S.A.	118.153.431,5 5	Yes	35	<p>Ecocerâmica e Cristalaria de Portugal</p> <p>The ECP Pact presents an inclusive, cross-cutting proposition for the Ceramic and Glass sectors, targeting competitiveness drivers to enhance international positioning. Focusing on 4 core themes—energy sustainability, circular economy and industrial symbiosis, digital transition, and capacity-building—it fosters high-value product, process, and service development through novel trans-sectoral industrial models. This initiative advances the value chain globally by prioritizing higher-value activities and encouraging collaboration, innovation, and investment across segments. Anchored in a vital national sector, the ECP Pact aims to heighten competitiveness through innovation, differentiation, robust collaboration, and asset qualification improvements</p>
CARITE - CALÇADOS, LDA	59.363.113,15	No	47	<p>FAIST - Fábrica Ágil Inteligente Sustentável e Tecnológica</p> <p>The FAIST Agenda—Agile, Intelligent, Sustainable, and Technological Factory—unites 45 entities to enhance the footwear and leather goods sector's agility and competitiveness. By leveraging innovative technologies, sustainable materials, and reinforced digitization, it aims to foster industry growth. Advancements will hinge on automation, robotics, ICT, artificial intelligence, and ecodesign.</p>

INGREDIENT ODYSSEY, S.A.	60.132.740,58	No	45	InsectERA InsectERA Agenda propels circular economy and high-value-added innovation for sustainable environmental transition. It fosters new products, processes, and services anchored in research and technology, encompassing the innovation cycle. With a focus on technologically advanced production, it comprises four main work packages: InFood—utilizing insects for sustainable nutrition; InFeed—using insects in animal feed for sustainability; InIndustry—creating insect-derived materials for cosmetics, bioplastics, and more; InBioremediation—using insects for bioremediation, such as waste elimination.
FUSION FUEL PORTUGAL, S.A.	161.997.896,25	Yes	4	Sines Green Hydrogen Valley (SinesH2GValley) Sines H2 Green Valley Agenda unites diverse partners and initiatives to establish a comprehensive green hydrogen value chain, catalyzing innovation in Sines as a technological hub. Aligned with the National Hydrogen Strategy, it fosters inventive services linking producers and consumers directly. This initiative focuses on introducing two Public-Private Partnerships (PPS): green hydrogen production and distribution, alongside HEVO-SOLAR Generation 2 electrolyzers developed within the Agenda. With external partners in Sines embracing future green hydrogen consumption, this initiative echoes national hydrogen goals while creating innovative regional services.
NAVIGATOR PAPER SETÚBAL, S.A.	118.590.327,71	Yes	31	From Fossil to Forest This "Innovation Pact" targets cellulose-based packaging and products to replace fossil plastics. It encompasses six work packages: (1) high-yield pulps and brown papers, (2) mechanically enhanced papers, (3) barrier-enhanced papers, (4) biocomposites, (5) smart packaging paper sensors, and (6) molded cellulose for rigid packaging.
PETROGAL, S.A.	578.610.439,6	No	20	Moving2Neutrality The Agenda addresses the energy transition challenge in transportation by producing sustainable fuels for carbon neutrality. Led by Petrogal, the consortium unites visionary partners sharing the ambition and expertise to decarbonize and reduce energy dependency. Centered at the Green Energy Park in Sines, this hub capitalizes on unique regional resources to become a green energy production nucleus.
DST SOLAR, S.A.	239.227.191,89	No	57	NGS - New Generation Storage The New Generation Storage (NGS) Innovation Pact aligns with the EU's energy transition strategy by 2040 and complete electrification of mobility by 2035. Organized into 8 Work Packages covering the entire value chain—components, packs, and battery recycling—this initiative adds value at every step, culminating in a shared objective: creating a new battery technology ecosystem to elevate national industry on the global stage.
COLEP PACKAGING PORTUGAL, S.A.	203.600.655,93	No	126	PRODUTECH R3 The PRODUTECH R3 project aims to empower the Production Technologies sector (FTP) to leverage the substantial investments anticipated during the green and digital transition. It aims to reduce external technological dependence, enhance domestic value addition, and shift Portugal's economic specialization.
NAU VERDE, LDA	119.697.962,77	No	21	Projeto Lusitano The Lusitano Project aims to revitalize the national Textile and Clothing Industry (ITV) by reindustrializing and restoring a crucial segment of the value chain within Europe. Through R&D, Productive Innovation, Training, and Internationalization, it aims to develop the capability to manufacture recycled and natural fiber threads, leading to high-value textile and clothing innovations. Additionally, it seeks to enhance sector competitiveness by integrating intelligent systems aligned with Industry 4.0 and the Internet of Things, while implementing wastewater treatment and reuse solutions to minimize water resource consumption. By sharing results, the project intends to inspire and spread its impact across other entities.
ESTAMPARIA TÊXTIL - ADALBERTO PINTO DA SILVA S.A.	22.624.131,59	No	30	GIATEX - Gestão Inteligente da Água na ITV The GIATEX project addresses water-intensive challenges faced by textile finishing companies. Its objective is to develop tools enabling these companies to reduce water consumption through less intensive finishing technologies and adoption of water treatment methods for reuse. Simultaneously, it supports informed decision-making for water utilization through integrated monitoring and process control systems. The strategy involves (i) studying and characterizing wet processes, (ii) R&D in intelligent process monitoring systems, low-water-consumption finishing technologies, and wastewater treatment methods, (iii) implementing developed technologies in pilot units, and (iv) creating a decision-support software for water management. This initiative aligns with sustainability objectives, fostering water-efficient practices within the textile industry.
ASCENZA AGRO, S.A.	57.105.150,59	No	18	TEC4GREEN The Agenda TEC4GREEN aims to prepare the agro-industrial sector (food and forestry) for future technological and environmental challenges, while minimizing environmental impacts on soil, water, and the atmosphere, thereby promoting sectoral sustainability. Guided by circular principles, the agenda focuses on protection (of crops), nutrition (of crops), production (agricultural), and valorization (of waste) in the agro-industrial value chain.

SERMEC II - INDÚSTRIA, COMÉRCIO E SERVIÇOS, S.A.	68.558.152	No	14	<p align="center">PRODUZIR MATERIAL CIRCULANTE FERROVIÁRIO EM PORTUGAL</p> <p>This Innovation Pact aims to diversify and enhance Portugal's economic structure and specialization. By horizontally integrating specialized companies within a broad national consortium, it endeavors to construct three types of carriages to develop an innovative and much-needed "Portuguese train." Through research promotion, business innovation, and cooperation, the project aims to bolster the national industry's capability in meeting the growing demand for railway rolling stock. This demand stems from trains being the most energy- and environmentally-efficient mode of transportation, aligning with EU mobility policies and global shifts in transportation strategies.</p>
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Annex 4. Model estimations for Industries and production technologies

Status	Odds ratio	Std. err.	z	P> z	[95% conf. interval]	
number_employees	1.011957	.0049721	2.42	0.016	1.002258	1.021749
revenue_2021	1.000098	.0000423	2.33	0.020	1.000016	1.000181
pl_before_tax	1.000226	.0004479	0.50	0.614	.9993483	1.001104
cash_flow	1.000415	.0004375	0.95	0.343	.999558	1.001273
roe_2021	1.00336	.0169538	0.20	0.843	.9706759	1.037146
total_assets	1.000009	.000045	0.19	0.848	.9999205	1.000097
shareholders_funds	.9998233	.0001054	-1.68	0.094	.9996167	1.00003
working_capital	.99997	.0000823	-0.36	0.716	.9998086	1.000131
added_value	.9994285	.0002712	-2.11	0.035	.998897	.9999603
profit_margin	.9309685	.0779609	-0.85	0.393	.7900488	1.097024
interest_coverage	1.002006	.0068707	0.29	0.770	.9886294	1.015563
solvency_	1.074223	.0266849	2.88	0.004	1.023175	1.127819
gearing_	1.008719	.005254	1.67	0.096	.998474	1.01907
profit_per_employees	.9896748	.0385724	-0.27	0.790	.9168896	1.068238
trucost_	1.130538	.1158348	1.20	0.231	.9248493	1.381972
falcon_	.9757506	.2942926	-0.08	0.935	.5402702	1.762246
CRIF_	1.004361	.0042187	1.04	0.300	.9961261	1.012663
_cons	.0029729	.0079816	-2.17	0.030	.0000154	.5733746

Annex 5. Model estimations for The Cross-Cutting Technologies and Their Applications

Outcome	Coefficient	Std. err.	z	P> z	[95% conf. interval]	
OperatingrevenueTurnover202	2.09e-08	3.15e-08	0.66	0.508	-4.09e-08	8.27e-08
ROEusingPLbeforetax	-.0076174	.0148672	-0.51	0.608	-.0367566	.0215217
PLbeforetax	2.87e-07	4.33e-07	0.66	0.507	-5.61e-07	1.14e-06
CashflowNetIncomebeforeDA	-6.25e-07	5.68e-07	-1.10	0.271	-1.74e-06	4.89e-07
Totalassets	-4.74e-09	4.26e-08	-0.11	0.911	-8.83e-08	7.88e-08
Shareholdersfunds	-9.06e-08	1.13e-07	-0.80	0.422	-3.11e-07	1.30e-07
added_value	2.79e-07	1.68e-07	1.66	0.098	-5.13e-08	6.09e-07
Profitmargin	-.010557	.0261008	-0.40	0.686	-.0617136	.0405996
Gearing	-.002379	.0033834	-0.70	0.482	-.0090105	.0042524
Profitperemployeeth	.0175398	.0139094	1.26	0.207	-.0097223	.0448018
numberofemployers	-.0001282	.0004831	-0.27	0.791	-.0010751	.0008187
_cons	.0248971	.6439274	0.04	0.969	-1.237177	1.286972

Logistic regression
 Log likelihood = -22.932666
 Number of obs = 50
 LR chi2(11) = 10.95
 Prob > chi2 = 0.4476
 Pseudo R2 = 0.1927

Annex 6. Goodness-of-fit test for The Cross-Cutting Technologies and Their Applications

Goodness-of-fit test after logistic model
 Variable: **Outcome**

Number of observations = 50
 Number of groups = 10
 Hosmer-Lemeshow chi2(8) = 9.86
 Prob > chi2 = 0.2747

Annex 7. Model estimations for The Natural Resources and Environment

Logistic regression

Number of obs = 162
 LR chi2(12) = 44.47
 Prob > chi2 = 0.0000
 Pseudo R2 = 0.2002

Log likelihood = -88.817635

Decision	Coefficient	Std. err.	z	P> z	[95% conf. interval]	
Number_of_employees	.0036017	.0021257	1.69	0.090	-.0005645	.007768
Added_value	-5.97e-08	6.16e-08	-0.97	0.332	-1.80e-07	6.10e-08
Operating_revenue	-7.10e-09	1.53e-08	-0.46	0.643	-3.71e-08	2.29e-08
Profit_per_employee	.0095106	.0102158	0.93	0.352	-.0105121	.0295332
PL_before_tax	9.32e-08	1.22e-07	0.76	0.445	-1.46e-07	3.33e-07
ROE_using_PL_before_tax	.0025506	.0141495	0.18	0.857	-.0251819	.0302831
Total_assets	-3.44e-09	5.99e-09	-0.58	0.565	-1.52e-08	8.29e-09
Profit_margin	-.0106368	.0309969	-0.34	0.731	-.0713896	.050116
Working_capital	1.49e-07	5.63e-08	2.65	0.008	3.90e-08	2.60e-07
Trucost_2020	.0639497	.0198968	3.21	0.001	.0249527	.1029468
CRIF	-.0039797	.0023743	-1.68	0.094	-.0086332	.0006739
Gearing	-.002659	.001945	-1.37	0.172	-.0064712	.0011531
_cons	1.864756	1.430701	1.30	0.192	-.9393677	4.668879

Figure 15. Model Estimation without companies with both accepted/rejected status

Annex 8. Goodness-of-fit test for The Natural Resources and Environment

Goodness-of-fit test after logistic model
 Variable: Decision

Number of observations = 162
 Number of groups = 10
 Hosmer-Lemeshow chi2(8) = 7.31
 Prob > chi2 = 0.5037

Figure 16. Goodness-of-fit test

Annex 9. Model estimations for The Health, Well-Being and Territory sector

Status	Coefficient	Std. err.	z	P> z	[95% conf. interval]	
PL_before_tax	-2.12e-08	5.28e-07	-0.04	0.968	-1.06e-06	1.01e-06
ROE_using_PL_before_tax	.0085969	.0120138	0.72	0.474	-.0149496	.0321434
Total_assets	-1.05e-08	8.59e-09	-1.22	0.221	-2.73e-08	6.33e-09
Working_capital	2.10e-07	2.59e-07	0.81	0.418	-2.98e-07	7.18e-07
Added_value	-2.88e-08	5.23e-08	-0.55	0.582	-1.31e-07	7.37e-08
Profit_margin	-.0330793	.04023	-0.82	0.411	-.1119287	.04577
Interest_coverage	-.0049676	.0319239	-0.16	0.876	-.0675372	.057602
Solvency_ratio	-.0164796	.0178595	-0.92	0.356	-.0514835	.0185243
Gearing	.0010026	.005912	0.17	0.865	-.0105847	.01259
Profit_per_employee	.0198362	.025828	0.77	0.442	-.0307858	.0704582
Falcon_2021	.8533751	.446757	1.91	0.056	-.0222525	1.729003
CRIF_2021	-.00614	.0066597	-0.92	0.357	-.0191928	.0069128
Trucost	.4057508	4.142929	0.10	0.922	-7.714241	8.525742
_cons	.8653447	3.754896	0.23	0.818	-6.494116	8.224806

Figure 68. Logistic Regression -Health, Well-Being and Territory

Annex 10. Python's coefficient in descending order for The Health, Well-Being and Territory sector

```

Working capital                2.214543e-07
Cash flow [Net Income before D&A] 1.652906e-07
P/L before tax                 8.956090e-08
Added value                    8.167310e-08
Operating revenue (Turnover)   1.761061e-08
Shareholders funds            6.494208e-09
Total assets                   1.324601e-09
Gearing (%)                    1.027099e-10
CRIF 2021                      6.386961e-11
Profit per employee (th)       4.096110e-11
ROE using P/L before tax (%)   3.088692e-11
Profit margin (%)              2.977754e-11
Solvency ratio (Liability based) (%) 1.045202e-11
Interest coverage (x)          4.359976e-12
Falcon 2021                    3.500392e-12
Trucost                        9.600104e-14
RepRisk                        0.000000e+00
dtype: float64

```

Figure 69. Python Coefficients -Health, Well-Being and Territory

Annex 11.

Section	Number	Variable	Description	Dependency	Data type	values/ domains	Description of Values
Identification & others	1	Privacy consent	Privacy consent	No	Boolean	1. Yes 2. No	1. Yes 2. No
Identification & others	2	Company	Name of the company	No	Alphabetic		
Identification & others	3	N_Employees	Number of employees	No	Numeric - discrete		
Identification & others	4	Tematic_Area	Thematic area	No	Alphabetic		
Identification & others	5	Initiatives	what specific initiatives or activities did you engage in?	No	Alphabetic		
State of the initiative	6	Received_Funds	Did your company received funds already?	No	Boolean	1. Yes 2. No	1. Yes 2. No
State of the initiative	7	Started_Implementations	Did you company start the implementation of the initiative already	6	Boolean	1. Yes 2. No	1. Yes 2. No
Processes - Elaboration	8	Inclusiveness_Elaboration	How much would you agree with the following statement: The initiative was effectively communicated and inclusive, reaching all levels of the company, not just limited to the CEO?	No	Numeric - discrete	1 2 3 4 5	1 Strongly disagree 2 Disagree 3 Neutral 4 Agree 5 Strongly agree
Processes - Elaboration	9	Efficient/effective_Elaboration	In your opinion, how much would you agree with the following statement "the process of elaborating the candidature contribute to a more efficient and effective implementation of the initiative"	No	Numeric - discrete	1 2 3 4 5	1 Strongly disagree 2 Disagree 3 Neutral 4 Agree 5 Strongly agree
Processes - Application and selection	10	Allocation_Funds	Do you feel that the allocation of funds among consortia was fair and equitable?	No	Numeric - discrete	1. Yes 2. No	1. Yes 2. No
Processes - Application and selection	11	Access_funding	Did the program provide your company with access to funding or financial incentives to invest in overall performance-enhancing measures?	6	Numeric - discrete	1. Yes 2. No	1. Yes 2. No
Processes - implementation	12	Challenges_Boolean	Has your company faced any challenges or barriers in implementing the "Agendas para a Inovação Empresarial" in Portugal?	No	Boolean	1. Yes 2. No	1. Yes 2. No

Processes - implementation	13	Challenges	What were the main obstacles or difficulties encountered during the implementation of the program?	7	Numeric - discrete	1 2 3 4 5 6	1. Resource allocation (financial, human, or technological) 2. Regulatory or Legal Constraints 3. resistance or lack of buy-in from stakeholders (employees, management, etc.) 4. Technological Barriers 5. Coordination Challenges 6. Other, what?
Processes - implementation	14	Possible_Solutions	What are the possible solutions to these problems you envision	13	Alphabetic		
Processes - Monitoring	15	Overall_Support	How would you rate the overall support and guidance provided by the program to help your company improve overall performance?	No	Numeric - discrete	1 2 3 4 5	1. Not supportive 2. partially supportive 3. Neutral 4. Supportive 5. Very supportive
Processes - Monitoring	16	Monitoring_Incidence	In your opinion, how much would you agree with the following statement "the monitoring processes enable your company to identify any bottlenecks or challenges during the initiative's implementation"	No	Numeric - discrete	1 2 3 4 5	1 Strongly disagree 2 Disagree 3 Neutral 4 Agree 5 Strongly agree
Collaboration/partnerships	17	knowledge-sharing	Did "Agendas para a Inovação Empresarial" encourage collaboration and knowledge-sharing among companies in Portugal?	No	Numeric - discrete	1 2 3 4 5	1 Strongly disagree 2 Disagree 3 Neutral 4 Agree 5 Strongly agree
Collaboration/partnerships	18	Collab-Uni	Did your company collaborate with research institutions or universities through the initiative?	No	Boolean	1. Yes 2. No	1. Yes 2. No
Collaboration/partnerships	19	Collab-Uni-helpful	To what extent do you think such a collaboration would be / was helpful?	18	Numeric - discrete	1 2 3 4 5	1 Very helpful 2 Helpful 3 Neutral 4 Not so helpful 5 Not helpful
Expected benefits	20	Effectiveness_Program	How would you rate the effectiveness of the program in enhancing your company's?	7	Numeric - discrete	1 2 3 4 5	1. Revenue (1 to 5) 2. Efficiency (1 to 5) 3. Growth in terms of market - competitiveness (e.g., expansion to new markets / bigger market share / expansion to other geographical areas / expansion of partnerships) (1 to 5)

							4. Growth in terms of number of employees (1 to 5) 5. Positioning and strengthening as a brand (1 to 5) 6. innovation and technology advancement (1 to 5)
Expected benefits	21	Non-Financial_Resources_Program	Would you have preferred for the provision of any additional non-financial support, such as mentoring or training?	7	Boolean	1. Yes 2. No	1. Yes 2. No
Expected benefits	22	Overall_Growth	Do you believe the funding from the initiative will contribute to the overall growth of your company in the long term?	7	Boolean	1. Yes 2. No	1. Yes 2. No
Expected benefits	23	Overall_Growth_specific	What do you think the initiative will contribute to the overall growth of your company in the long term in?	7	Numeric - discrete	1 2 3 4 5 6 7	1. Revenue 2. Efficiency 3. Growth in terms of market (e.g., expansion to new markets / bigger market share / expansion to other geographical areas / expansion of partnerships) 4. Growth in terms of number of employees 5. Positioning and strengthening as a brand 6. innovation and technology advancement 7. Other, what?
Expected benefits	24	Measurable_improvement	Have you observed any measurable improvements in your company's innovation capabilities or technology adoption as a result of participating in the program?	7	Boolean	1. Yes 2. No	1. Yes 2. No
Expected benefits	25	Innovation	Did the program help your company identify and adopt innovative practices or technologies to improve performance?	7	Boolean	1. Yes 2. No	1. Yes 2. No

Expected benefits	26	Comparison	How would you compare your company's before and after engaging with "Agendas para a Inovação Empresarial"?	7	Numeric - discrete	1. (1,2,3) 2. (1,2,3) 3. (1,2,3) 4. (1,2,3) 5. (1,2,3) 6. (1,2,3) 7. (1,2,3)	1. Revenue (1. Worst 2. No change 3. Better) 2. Efficiency (1. Worst 2. No change 3. Better) 3. Growth in terms of market (e.g., expansion to new markets / bigger market share / expansion to other geographical areas / expansion of partnerships) (1. Worst 2. No change 3. Better) 4. Growth in terms of number of employees (1. Worst 2. No change 3. Better) 5. Positioning and strengthening as a brand (1. Worst 2. No change 3. Better) 6. innovation and technology advancement (1. Worst 2. No change 3. Better)
Expected benefits	27	Portuguese_Challenges	In your opinion, did the program successfully address the challenges and needs of Portuguese businesses regarding?	No	Numeric - discrete	1. (1,2,3,4,5) 2. (1,2,3,4,5) 3. (1,2,3,4,5) 4. (1,2,3,4,5) 5. (1,2,3,4,5) 6. (1,2,3,4,5) 7. (1,2,3,4,5)	1. Revenue (1. Strongly disagree 2. disagree 3. neutral 4. disagree 5. Strongly disagree) 2. Efficiency (1. Strongly disagree 2. disagree 3. neutral 4. disagree 5. Strongly disagree) 3. Growth in terms of market (e.g., expansion to new markets / bigger market share / expansion to other geographical areas / expansion of partnerships) (1. Strongly disagree 2. disagree 3. neutral 4. disagree 5. Strongly disagree) 4. Growth in terms of number of employees (1. Strongly disagree 2. disagree 3. neutral 4. disagree 5. Strongly disagree) 5. Positioning and strengthening as a brand (1. Strongly disagree 2. disagree 3. neutral 4. disagree 5. Strongly disagree) 6. innovation and technology advancement (1. Strongly disagree

							2. disagree 3. neutral 4. disagree 5. Strongly disagree)
Expected benefits	28	Recommend_Program	Would you recommend the initiative to other companies seeking funding and support for innovation activities?	No	Boolean	1. Yes 2. No	1. Yes 2. No
Extra data collection	29	R&D_expenses	How much is invested in research and development purposes?	No	Numeric - continuous		
Extra data collection	30	Technology_investment	How much is invested in technology?	No	Numeric - continuous		
Extra data collection	31	Sustainable_product_development_investment	How much is invested in sustainable product development?	No	Numeric - continuous		
Extra data collection	32	Investment_renewable_energy_sources	How much is invested in renewable energy sources?	No	Numeric - continuous		
Extra data collection	34	Number_Employees_R&D	How many employees work in R&D related activities?	No	Numeric - discrete		
Extra data collection	35	Highly_skilled_employees	Of your workforce, how many of them are considered Highly Skilled Employees?	No	Numeric - discrete		
Extra data collection	36	Technology_partnerships	How many Technology Partnerships do you have, which ones?	No	Numeric - discrete		
Extra data collection	36	Recycled_materials_production	What is the percentage of recycled materials used in production?	No	Numeric - continuous		
Extra data collection	36	Energy_consumption	what are your energy consumption levels?	No	Numeric - continuous		
Extra data collection	37	Carbon_emissions	What are the carbon emissions per unit of production in your company?	No	Numeric - continuous		

Carbon Emissions per Unit of
Production

Measures carbon intensity, indicating progress toward carbon neutrality goals.

Own data collection

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