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# Summary of WP Student Team

## Navigating Funding Selection. A Comprehensive Study of Company Selection Processes for the National Recovery and Resilience Plan Funding in Portugal

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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 an sector-specific case studies, the research identifies key determinants influencing entity eligibility for funding, showcasing dynamics in for the thematic area of Natural Resources and Environment and Health. 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

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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 | |
|---|---|
| Component | M € |
| C1. National Health Service | €1383 |
| C2. Housing | €1633 |
| C3. Social Responses | €583 |
| C4. Elimination of AM Poverty Scholarships | €250 |
| C.5 Investment and Innovation | €1396 |
| C.6 Qualifications and Skills | €1359 |
| C.7 Infrastructures | €833 |
| C.8 forests | €665 |
| C.9 Water Management | €441 |
| TOTALS | €8543 |

| Climate transition | |
|---|---|
| Component | M € |
| C10. Sustainable mobility | €1032 |
| C11. Decarbonization of industry | €715 |
| C13. Sustainable economy | €150 |
| C14. Energy efficiency in buildings | €620 |
| C15. Hydrogen and renewable | €371 |
| TOTALS | €2888 |

| Digital transition | |
|---|---|
| Component | M € |
| C16. Digital School | €559 |
| C17. Companies 4.0 | €650 |
| C18. Quality and Sustainability of Public Finance | €406 |
| C19. Economic Justice and Business Environment | €267 |
| C20. Public Administration - Training, Digitization and Interoperability and Cybersecurity | €631 |
| TOTALS | €2513 |

| Loans | M € |
|---|---|
| C2. Housing | €1149 |
| C.5 Investment and Innovation | €1250 |
| TOTALS | €2399 |

| Loans | M € |
|---|---|
| C10. Sustainable mobility | €300 |
| 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).

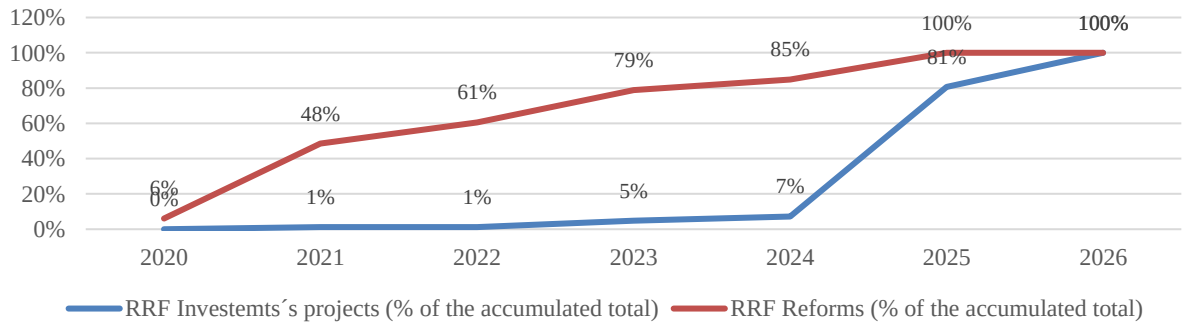



*Figure 2. Timeline for completion under Portuguese NRRP, by year (% of the total)*

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.

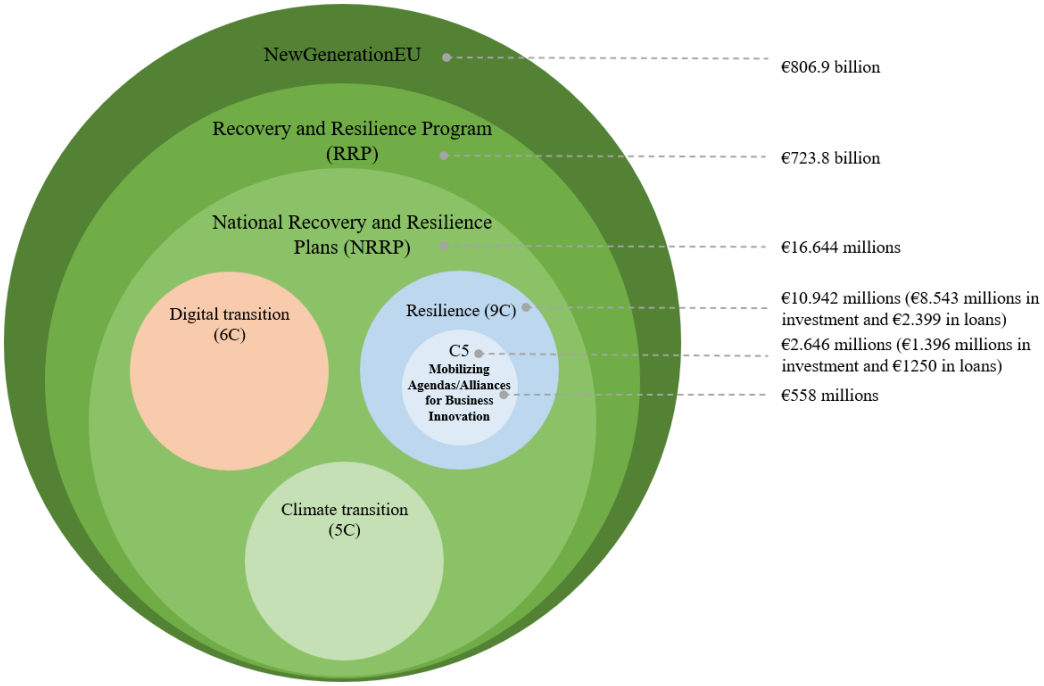



*Figure 4. Summary Diagram of the Strategies with amount of investment information*

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).

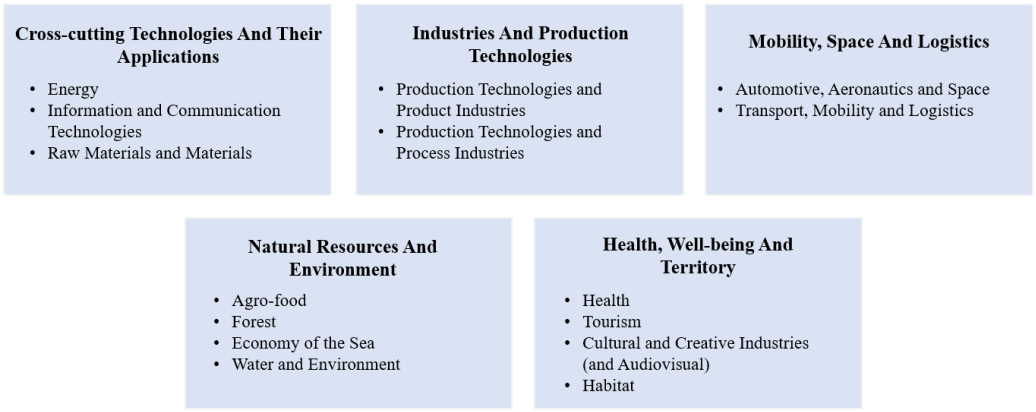



*Figure 5. Thematic areas and subareas for the Mobilization Agendas for Business Innovation*

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 programms, 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 Comission, 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: Natural Resources and Environment – (by Sara Gálvez Gutiérrez)

### 4.1.1. Overview of the thematic area

Europe is home to a diverse range of natural resources and environments that play a significant role in its economy and environmental sustainability. Key areas of focus include agro-food production, forests, the economy of the sea, and water and environmental conservation.

**Agriculture and food** production´s significance is crucial due to global trends like the need for trustworthy sustenance for a growing population and increased health-consciousness, yet in Portugal, the agro-food and forestry sector has been losing weight in the national economy. This is reflected by evaluating the weight of agriculture GVA in % of GDP (which was 8.9% in 1980, 2.4% in 2000 and only 1.7% in 2021) (Grupo CaixaBank, 2023).

Unfavorable weather, increased energy and production costs linked to the Russian invasion in Ukraine have led to elevated industry producer prices for food, driving higher food index inflation (17.48%[1]) (Word Bank, 2023) than the overall inflation rate (8%) (European Commission, 2023) and several products in the sector, including meat, cereals, and fruits, exhibit external dependence due to insufficient national production for domestic consumption, reflected in degrees of self-sufficiency of 80%, 20% and 77% respectively (Instituto Nacional de Estadística, 2021). In contrast, olive oil and wine industries exhibited improved productivity and trade balance from 2020 to 2021, with wine production rising by 14.7% to 7.2 million hectoliters and olive oil reaching a record 2.29 million hectoliters (Instituto Nacional de Estadística, 2021).

Ongoing supply threats brought on by the conflict in Ukraine prompted in 2022 a focus on cereals and fertilizers due to low self-sufficiency levels and reliance on conflict-involved nations (Grupo CaixaBank, 2023). In the 2020/2021 agricultural year, autumn/winter cereal production marked a 35-year low at 189.2 thousand tons, underscoring sector-wide reductions (Instituto Nacional de Estatìstica, 2021).

Secondly, Europe's **forests** are essential for biodiversity, climate regulation, and raw material provision, including exports of forest products in Portugal, accounting for around 8% of exports in 2021 while comprising less than 4% of imports (Instituto da Conservação da Natureza e das Florestas, 2022). However, the sector's vulnerability to market developments elsewhere is evident, with forest product exports declining from 11% of Portuguese international trade in 2000 to nearly 8% by 2021, mainly due to the COVID-19 pandemic crisis, which hit wood-related industries unevenly (Instituto da Conservação da Natureza e das Florestas, 2022). Besides the pandemic, the impacts of wildfires threatening raw material supply are crucial.

[1] This value of food index's inflation rate on average between January and May of 2023.

However, Portugal's forest fires have decreased since 2017, with 2021 experiencing 15% fewer rural fires compared to 2020, reflecting a declining trend (Instituto da Conservação da Natureza e das Florestas, 2022).

Thirdly, Europe's extensive coastline and Portugal's oceanic expanse with 2,500 km of coastline and a vast exclusive economic zone (1.7 million km2)[2] highlight the significance of the **Economy of the Sea** or "Blue Economy." This sector encompasses fishing, aquaculture, maritime transport, offshore energy, and coastal tourism sustainably, as evidenced by the National Strategy for the Sea 2021–2030 (Direção-Geral de política do mar, 2023) and backed by initiatives like the European Maritime, Fisheries and Aquaculture Fund 2021-2027 (European Commission, 2023). Notably, when comparing 2018 to 2015, Portugal experienced a substantial increase in marine product exports (25%), Blue Economy businesses' GVA (30%), and Merchant Navy (94%), indicative of the sector's rapid growth and its substantial contribution to national GVA (2.3% in 2023) and employment (5%) (International Trade Administration, 2020). Portugal's pioneering projects like Winfloat85's scaling from 2 MW to 25 MW have solidified its leadership in this realm, with projects like these reflecting the nation's pivotal role in the "Blue Economy" sector (European Commission, 2023).

Finally, **Water resources and environmental conservation** are prominent EU priorities as emphasized through the EU Water Framework Directive (WFD)[3] (Europenan Parliament, 2023). While Portugal's southern regions increasingly rely on storage for water supplies, the northern regions benefit from ample natural water resources, with Spain sharing basins under the Spanish-Portuguese Albufeira Convention (United Nations, 1998) creating significant degree of external dependence. Portugal's water supply and sanitation connectivity approach

[2] The Portuguese maritime triangle, which includes the Mainland, Madeira, and Azores, accounts for 48% of all marine waters in areas near to the European continent that are governed by two EU members (República de Portugal, 2021).
[3] The WFD is a legal framework to protect and restore clean water in the EU and to ensure its long-term sustainable use (Europenan Parliament, 2023).

the EU average, but network performance lags, impacting compliance with the Urban Wastewater Treatment Directive (OECD, 2023).

The EU's commitment to the sector is evident in the "Horizon Europe" program's establishment, with a budget of €95.5 billion addressing climate change, UN Sustainable Development Goals, and boosting competitiveness (European Commission, 2023). In addition to the different programs and strategies mentioned above, the Natural Resources and Environment sector has been prioritized in the MABI´s strategy, which is reflected in Portugal's NRRP.

### 4.1.2. General information on the projects

Initially of the 149 project applications to the strategy 12 were directly classified in the Natural Resources and Environment sector, eventually one additional one (led by Altri Florestal S.A.) was reclassified from Industries and Production Technologies to Natural Resources and Environment due to its component supporting the forest economy. Therefore, there are 13 projects submitted in this category Table 7.

Accepted projetcs

| Leader name | Thematic sub-area | Investment | Co-promoters |
|---|---|---|---|
| Altri Florestal, S.A. | Forestry and other forestry activities | € 150,983,011.06 | 59 |
| Gran Cruz Porto | Production of ordinary and liqueur wines | € 91,624,402.50 | 52 |
| Inovamar, LDA | Research and development in biotechnology | € 168,375,955.71 | 89 |
| Mc Shared Services, S.A. | Manufacture of soft drinks and other non-alcoholic beverages, n.e.c. | € 142,391,205.20 | 54 |
| Totals | | € 553,374,574.47 | 254 |

* Investment distributed among three major subsectors: forestry (27%), agro-food (42%) and Economy of the Sea (30%).
*Allocation of funds: productive investment (49%) and research and technological development (45%), dissemination and promotion (3%), qualification and internalization (2%) and human resources (1%).

Rejected projecs

| Leader name | Thematic sub-area | Investment | Co-promoters | Results of selection |
|---|---|---|---|---|
| Be Water, S.A. | Water and Environment | € 58,939,841.00 | 26 | Eligible Not Selected |
| Ovolider - Ovos Do Centro LDA | Water and Environment | € 43,639,415.00 | 21 | Eligible Not Selected |
| C. M. E. - Construção e Manutenção Electromecânica S.A. | Agri-food | € 95,613,969.00 | 89 | Not Eligible |
| A4F, Alga Fuel, S.A. | Water and Environment | € 88,826,730.00 | 21 | Eligible Not Selected |
| Agromontesinho - Casa Agrícola de Vinhais, LDA | Water and Environment | € 36,664,236.00 | 20 | Eligible Not selected |
| Xsealence - Sea Technologies S.A. | Sea Economy | € 20,354,262.00 | 14 | Eligible Not Selected |
| SGS Portugal - Sociedade Geral de Superintendência S.A. | Forestry | € 66,110,151.00 | 43 | Not Eligible |
| Edia - Empresa de Desenvolvimento e Infra-Estruturas do Alqueva S.A. | Water and Environment | € 99,356,545.00 | 50 | Not Eligible |
| Ba Glass Portugal, S,A. | Water and Environment | € 24,653,967.00 | 9 | Not Eligible |
| Totals | | € 534,159,116.00 | 293 | |

* Investment distributed among four major subsectors: Forestry (12%), agro-food (18%) and Economy of the Sea (3%) and water and environment (67%).

*Table 2. Accepted and rejected projects - Natural Resources and Environment Sector*

### 4.1.3. Analysis of companies accepted and rejected in the selection phase.

For the "Natural Resources and Environment" sector, a total of 429 entities applied. Taking into account that the ultimate objective of the strategy is improving the competitiveness and economic development of productive companies in Portugal, 87 entities classified as "Public Administration, Education, Health Social Services", 26 classified as associations of producers / cooperatives and 21 Academic Institutions were eliminated. Therefore, the universe was reduced to 298 entities. There was also no information available for 36 of them and 8 were not found in the very comprehensive data base of Orbis, so they were also excluded leaving a sample of 254 companies.

According to the rules of the NRRP Strategy, it was possible for an entity to participate in more than one project. As a result, within the group of 254 entities, 17 (6.7%) of them are repeated in both selected and rejected projects. In this part of the analysis, historical information from

2017 to 2021 from both selected and rejected project leaders (13 leaders) as well as information from the rest of co-promoters and leaders for the year 2021 (254 - included the ones both rejected and accepted) is considered.

Including leaders belonging to both categories (selected and rejected) in this part of the analysis avoids possible biases and maintains the integrity of the data by taking these companies into account in the selection and rejection scenarios, avoiding incomplete or biased conclusions about their influence on the results of the variables studied.

**Degree of innovation and differentiation**

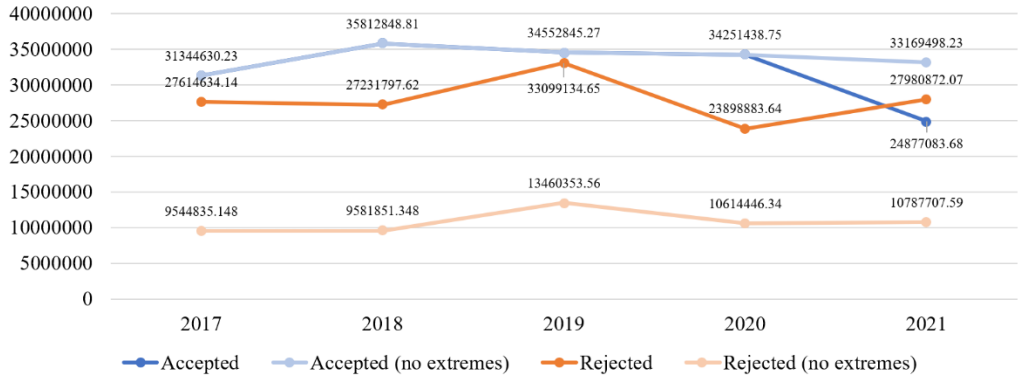



*Figure 5. Added Value of Leaders 2017 - 2021 - Natural Resources and Environment Sector*

Regarding the **added value**, although the trends among several of the leaders are similar and overall higher than leaders with rejected projects, in 2021 the trend seems to change, being outperformed for the first time by the group of rejected projects as seen in figure 43.

It is important to notice that Inovamar, L.D.A, a leader of a selected project, is the only one in its group with a negative value added (€ -160). However, this company was created in 2021 as a Business Services institution and it is part of the Sociedade Francisco Manuel Dos Santos, Sgps S.E., an entity with presence in 6 countries and an important financial muscle. In fact, for 2022 its added value increases to €5927,86. Excluding this leader for its characteristics, as can

be seen in Figure 43, in 2021 the companies with selected projects remain above the other group which can indicate their ability to differentiate its products or services.

BA GLASS PORTUGAL S.A. is the leader with the highest aggregate value (€165,526,187.9) and is among the leaders with rejected projects. This is followed by significantly less amount by MC Shared Services S.A (€68,062,028.45). The remaining leaders have values ranging from €333,124 to €33,789,510.

The aggregate Added Value of all of the accepted companies for 2021 was €16,693,149.21, significantly higher than the value of all of the rejected companies of €12,332,766.14. This trend does not change even excluding outlier performance (Added value of accepted leaders of €11,910,834.9 compared to €11,297,675.4 of the rejected ones).

**Business competitiveness and productive specialization**

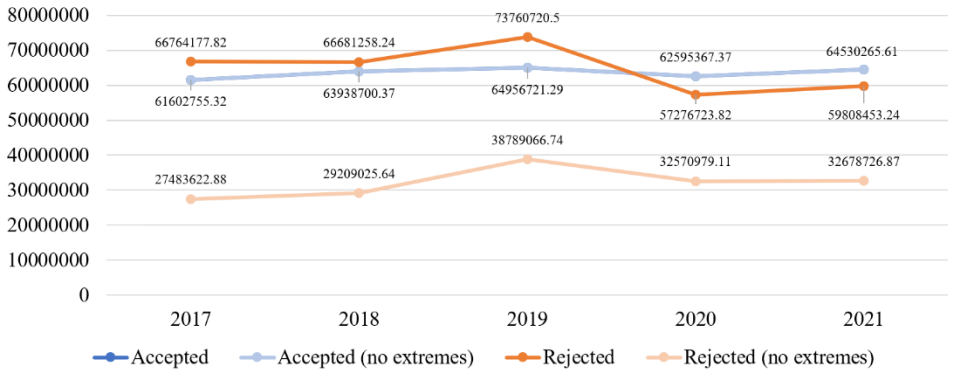



*Figure 6. Operating Revenue of Leaders (Turnover) 2017 – 2021 - Natural Resources and Environment Sector*

Regarding the Operating Revenue, and including all leaders, in figure 44 it is possible to see a trend where those selected remain below those rejected from 2017 through 2019 with a drop in 2020 that left them below those selected through 2021. However, from a closer look, this position is leveraged by only one of the rejected leaders: BA Glass Portugal, S.A.

BA Glass Portugal, S.A. is by far the leader with the highest amount of operating revenue (€276,846,264) only followed by C. M. E. - Construção E Manutenção Electromecânica S.A. (€123,726,149). However, if BA Glass Portugal, S.A. is excluded, leaders with selected projects have on average a higher operating revenue (€63,524,762) than those with rejected projects (€32,146,284.2) which can indirectly indicate their impact on business competitiveness.

For 2021, the Operating Revenue of all of the selected companies was €58,575,574, higher than the value of all of the rejected companies of €43,514,524.05. This trend does not change even excluding outlier performance (Operating Revenue of accepted leaders of €47,992,360 compared to €34,142,689.4 of the rejected ones).

**Capacity to leverage the investment.**


*Figure 7. Total assets, Shareholders´ Funds and Cash flow of Leaders 2017 – 2021 - Natural Resources and Environment Sector*

Regarding **Total Assets**, on average leaders with rejected projects had higher values as seen in figure 45 (a). This result is leveraged by two of their leaders EDIA - Empresa de

Desenvolvimento e Infra-Estruturas do Alqueva S.A. (€790,455,964) and BA Glass Portugal, S,A. (€777,901,750), since without these two, the rest of the leaders of rejected projects would have total assets in average of €36,000,873.2, significantly lower than the accepted project leaders, even including Inovamar, L.D.A., which, as previously explained, due to its characteristics, affects the average of the group of accepted projects downwards.

For 2021, the Total Assets of all the selected companies was €88,082,009, higher than the value of all of the rejected companies of €66,715,157. This trend does not change even excluding outlier performance (Total Assets of selected companies of €62,373,005 compared to €47,311,149 of the rejected ones). This result can indicate the capacity of accepted companies to leverage those assets for investment purposes.

Regarding **Shareholders Funds,** on average, and even including Inovamar, L.D.A, the leaders of selected projects have higher shareholder's Funds (€118,694,288.4) than leaders of rejected projects (€37,209,889.9) as seen in figure 45 (b). For 2021, the Shareholders Funds of all the selected companies were €35,353,501.83, higher than the value of all of the rejected companies of €24,967,902.08. This trend does not change even excluding outlier performance (Shareholders Funds of selected companies of €31,684,777.7 compared to €20,269,752.7 of the rejected ones). This can be an important factor in determining the company's ability to leverage additional investment.

Regarding **Cash flow (Net Income before D&A)**, on average, selected project leaders have had more cash flow (€18,198,209.54) than rejected projects (€14,567,217.42) as seen in figure 45 (c). During most of the time analyzed, the results of the rejected project leaders are lower than those of the accepted ones with the exception of 2021 where they outperformed selected projects by 1,642,757.885. However, if BA Glass Portugal, S.A. is not taken into account as it

is considered an extreme case, the difference would increase significantly (on average the rejected ones would have €8,400,612.302 of cash flow) as shown in the figure 45.

For 2021, the Cash flow of all the selected companies was €9,021,225, higher than the value of all the rejected companies of €6,055,809. This trend does not change even excluding outlier performance (Cash flow of accepted companies of €6,015,740 compared to €5,354,652 of the rejected ones). This can show the ability to generate sufficient cash flow to support and leverage investment opportunities of the accepted companies.

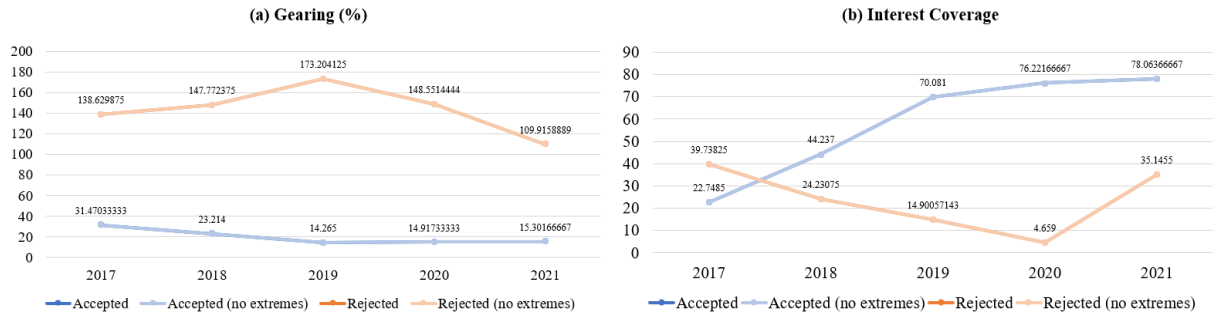



*Figure 8. Gearing, Solvency Ratio and Interest Coverage of Leaders 2017 – 2021 - Natural Resources and Environment Sector*

Regarding the variable **Gearing**, on average, selected project leaders had a gearing of 19.83 while unselected leaders of 143.61, showing that rejected leaders have a higher risk of financial failure. For 2021, Gearing of all of the accepted companies was 88.35, lower than the value of all of the rejected companies of 110,12. This trend does not change even excluding outlier performance (accepted companies of 85,15 compared to 92,64 of the rejected ones) as seen in figure 46 (a).

Regarding the **Interest coverage**, on average, the selected project leaders had a value of 58.27. This result was leveraged by Altri Florestal, S.A. (128,23). Without this leader the value would have been 33,83. It is important to note that there is no information available for Inovamar LDA. The leaders of non-selected projects had an interest coverage of 23.73. It is important to

point out that there is no information available for SGS Portugal – Sociedade Geral de Superintendência S.A. As can be seen in figure 46 (b), the interest coverage of the selected project leaders in 2021 is significantly higher than that of those not selected.

For 2021, interest coverage of all the selected companies was 61.49, higher than the value of all of the rejected companies of 32.43. This trend does not change even excluding outlier performance (Gearing of selected companies of 42.80 compared to 28.06 of the rejected ones) which can show the higher ability of selected companies to pay interest on its outstanding debt.

**Potential economic value of innovation and scalability**


*Figure 9. Profit Margin of Leaders 2017 – 2021 - Natural Resources and Environment Sector*

Regarding the **Profit Margin**, on average, the leaders with selected projects had a value of 16.30, while those with rejected projects had a profit margin of 8.53 as seen in figure 47. It is important to highlight that within the group of rejected projects EDIA - Empresa De Desenvolvimento e Infra-Estruturas Do Alqueva S.A. has a negative value of -10.94. Without this leader, the average value would be 10.93, which is still significantly lower than the selected group. This trend is reversed when all the companies are included, since by 2021, the Profit Margin of all the selected companies was 3.2, lower than the value of all of the rejected companies of 4.18. This trend does not change even excluding outlier performance (Profit

Margin of selected companies of 5.1 compared to 5.8 of the rejected ones). This result could indicate greater capacity to generate returns and leverage investment by rejected companies.

**Contribution of the project to carbon neutrality and energy resilience**

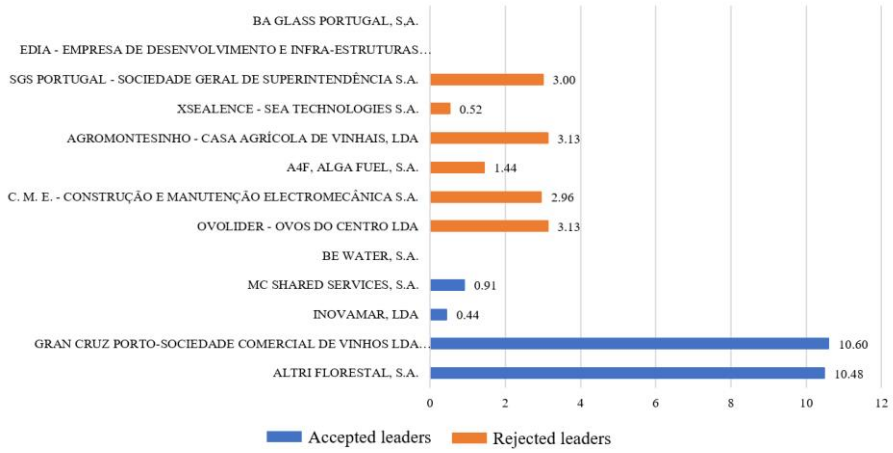



*Figure 10. Environmental Score by Trucost 2020 - Natural Resources and Environment Sector*

Regarding the Environmental Risk Score made by Trucost, and as shown in Figure 48, two of the four accepted leaders have a higher risk in environmental terms: Altri Florestal, S.A. and Gran Cruz Porto-Sociedade Comercial de Vinhos LDA (Granvinhos, LDA). For 2021, the Environmental Risk Score of all the selected companies was on average 12.98, lower than the value of all of the rejected companies of 35.38. This trend is reversed when excluding outlier performance (score of selected companies of 12.98 compared to 7.9 of the rejected ones).

**Quality of the consortium in terms of the promoters´ competences**

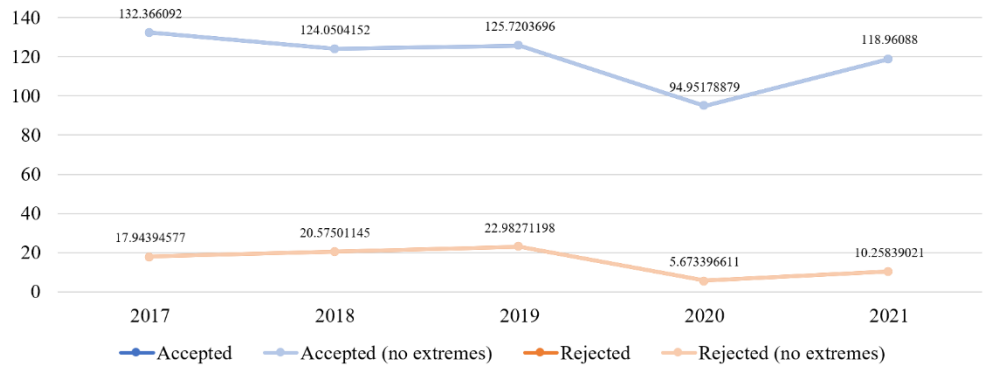



*Figure 11. Profit per Employee of Leaders 2017 - 2021 - Natural Resources and Environment Sector*

Regarding profit per employee, on average, leaders of selected projects had a value of 119.21 versus 15.49 for leaders with non-selected projects as seen in figure 49. For 2021, the profit per employee of all the selected companies was on average 25.59, higher than the value of all the rejected companies of 16.35. This trend does not change when excluding outlier performance (value of selected companies of 15.55 compared to 9.96 of the rejected ones).

## Economic and financial viability of the proponents

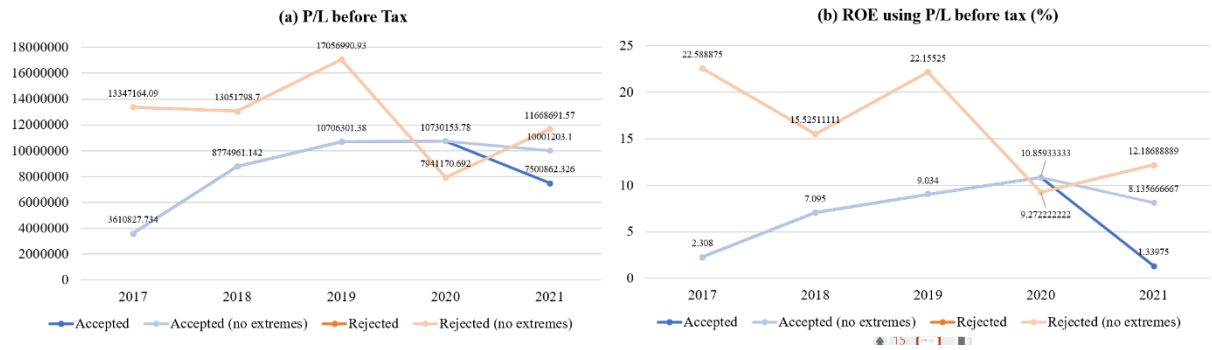



*Figure 12. P/L Before Tax and ROE Using P/L Before Tax of leaders 2017 - 2021 - Natural Resources and Environment Sector*

Regarding the **P/L Before Tax** (Pre-tax profit/loss) variable as seen in figure 50 (a), on average, rejected project leaders do not have a value higher than the selected ones until 2020 when this trend reversed showing that the rejected companies may have been more likely to be affected by the crisis resulting from the COVID-19 pandemic than the selected project companies. However, by 2021 the trend is again, with the rejected leaders (€11,668,691.57) positioning

above the selected ones (€7,500,862.32). For 2021, the P/L Before Tax of all the selected companies was on average €4,875,836, higher than the value of all of the rejected companies of €2,956,157. This trend does not change when excluding outlier performance (P/L Before Tax of selected companies of €3,539,431 compared to €2,296,094 of the rejected ones).

The **ROE using P/L before tax** has a behavior similar to P/L Before Tax when talking about the leaders of projects both selected and rejected as seen in figure 50 (b). However, when talking about all companies, for 2021, the value of all the selected companies was on average 6.37, lower than the value of all of the rejected companies of 63401.26. This trend does not change when excluding outlier performance (value of selected companies of 5.15 compared to 10.74 of the rejected ones). In summary, on average, companies with selected projects have higher profits (before taxes) than companies with rejected projects. However, this trend is reversed for profits in relation to the equity invested.

### 4.1.4. Acceptance into the program based on entities´ financial indicators.

While selection or rejection depended mainly on the project that each consortium submitted, this section will explore if it can be predicted whether a business will be accepted or rejected into the program based on its financial and environmental indicators. With this goal, it is used a binary logistic regression. In this case, the independent variables are some features related to the companies (see Figure 5), and the dependent variable would be whether the company is part of a selected (1) or rejected (0) project.

**Data Preparation and Cleaning.**

Within the group of 254 entities, 17 (6,7%) of them are repeated in both selected and rejected projects. To ensure that the features used in the model are relevant and informative for both

accepted and rejected groups this analysis exclude the companies simultaneously selected and rejected on different projects.

In this analysis, missing data is retained due to data heterogeneity, arising from diverse companies leading to variable data availability differences. This mirrors real-world variations in data collection and highlights authentic disparities between companies. Additionally, retaining missing values sustains dataset representativeness, ensuring findings accurately encompass the studied population. Removing cases with missing values risks introducing bias and compromising the broader applicability of results across a diverse spectrum of companies.

On the other hand, outliers can exert undue influence and lead to biased coefficient estimates. For this reason, Z-Scores were calculated for each variable and values outside of three standard deviations from the mean were treated as outliers. A total of 37 outliers were removed leaving a sample of 199 companies.

**The Binary Logistic Regression Model**

A first model was run including almost all the variables included in the analysis of the previous section. Upon thorough examination, it was decided to eliminate Interest Coverage and Solvency Ratio from the model since the lack of information for several companies affects the number of observations, as well as the presence of another debt-related ratio variable such as gearing can cover this issue within the model.

A collinearity diagnostic was also run to identify if independent variables in the binary regression model including all the variables shown Figure 5 were highly correlated, or not, with each other. The VIF (Variance Inflation Factor) was used and variables with values greater than 10 were studied. As a result, added value, Profit per Employee, PL Before Tax, Cash flow,

Total assets and Shareholders´ Funds got values greater than 10. The variables could be interconnected due to underlying economic relationships.

Total Assets and Shareholders' Funds are often closely related, as the latter is a component of the former, so the latter was eliminated. It is also possible that larger Total Assets might lead to higher Cash Flow, so this variable was also eliminated. With these adjustments, all the variables within the model shown below comply with the required VIF to be considered.

$$Acceptance = \beta_0 + \beta_1\, Number\ of employees + \beta_2\, Added\ value + \beta_3\, Operating\ revenue + \beta_4\, PL\ before\ tax + \beta_5\, ROE\ using\ PL\ before\ tax + \beta_6\, Profit\ margin + \beta_7\, Working\ capital + \beta_8\, IProfit\ per\ Employee + \beta_9\, Trucost\ 2020 + \beta_{10}\, CRIF + \beta_{10}\, Total\ Assets + \beta_{11} Gearing + \in$$

**Model Interpretation**

The operational liquidity (Working Capital) and the Environmental Risk Score calculated by Trucost are statistically significant (P-values lower than 0.05) and all the coefficients are positive which indicates a positive relationship between the predictor variables and the likelihood of being selected occurring.

- The Working Capital coefficient of 1.49 suggests that for a one-unit increase in the variable, the log-odds of being selected increases by 1.49 units.
- The Environmental Risk Score coefficient of 0.06 suggests that for a one-unit increase in the variable, the log-odds of being selected increases by 0.06 units.

As seen in the Annex 7, an LR chi2(11) (Likelihood Ratio chi-squared) value of 44.47 indicates that the model with the predictor variables provides a significantly better fit to the data compared to a model with no predictors. The Prob > chi2 value of 0.0000 associated to the previous result suggests that the chi-squared statistic is extremely unlikely to have occurred by random chance alone. In other words, the p-value is effectively zero. This indicates strong

evidence against the null hypothesis, supporting the conclusion that the predictor variables collectively have a highly significant effect on the outcome variable.

The Pseudo R2 of 0.2002 suggest that the predictors in the model collectively contribute a moderate amount of explanatory power. This value indicate that the model is explaining a substantial portion of the variation, but there might still be room for improvement.

**Model Assessment**

In order to assess model fit, the Hosmer-Lemeshow test was used (See Annex 8). With 162 observations, the results show a Prob > chi2 of 0.3805, which indicates that there is not strong evidence to reject the null hypothesis (the model's predicted probabilities align well with the observed outcomes, indicating good model fit and calibration). This suggests that the model's predicted probabilities are reasonably well-calibrated to the observed outcomes. A Hosmer–Lemeshow chi2(8) equal to 8.46 indicates that a chi-square statistic as extreme as 8.46 can be expected to occur about 38.95% of the time due to random chance.

**Model limitations and future research**

The current model, while providing valuable insights, is subject to certain limitations and considerations. Missing values could affect the overall accuracy and generalizability of the results. Although proxy variables are employed, it is important to assess their appropriateness and explore further options to fully capture the underlying relationships. The relationship between environmental risk score and outcome presents complexities that require further investigation, including potential omitted variables and interaction effects.

Future lines of research encompass addressing missing data issues, refining proxy variables, and delving into the impact of omitted variables. Exploration of advanced modeling techniques

can shed light on complex dynamics and improve the predictive capability of the model for more informed decision making.

### 4.1.5. Conclusions

On average, the performance of companies with approved projects in 2021 in terms of Company Size and Resources (Number of Employees, Total Assets and Shareholders' Funds), Liquidity and Risk (Working Capital, Interest Coverage, Solvency Ratio, Gearing, CRIF), Environmental and Social Factors (Trucost_2020) and Financial Performance and Efficiency (Operating Income, Profit per Employee, PL before Taxes, Cash Flow, ROE using PL before Taxes) was better than that of companies with rejected projects. The only exceptions were Profit Margin and ROE using pre-tax P/L (belonging to Financial Performance and Efficiency).

In trying to find out if it is possible to predict whether a company will be accepted or rejected in the program based on its financial and environmental indicators, it was found that both Working Capital and Environmental Risk Score are statistically significant. For working capital, the results suggest that that for a one unit increase in the variable, the log-odds of being selected increase by 1.49. This means that the liquidity of the companies and their ability to cover short-term obligations played a relevant aspect in belonging to selected projects or not.

For the Environmental Risk Score the results suggest that for a one-unit increase, the log-odds of being selected increase by 0.06. This is counter-intuitive, since higher values of the score indicate higher levels of risk should a company have to pay for its environmental damage, so a positive coefficient implies that the higher the risk of damage, the higher the probabilities of being selected. Some explanations may be related to aggregating various environmental factors into a single risk score as this could be masking individual factors' relationships with selection

or also companies with higher risk scores might have better reporting practices or be more transparent about their environmental impact.

## 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.

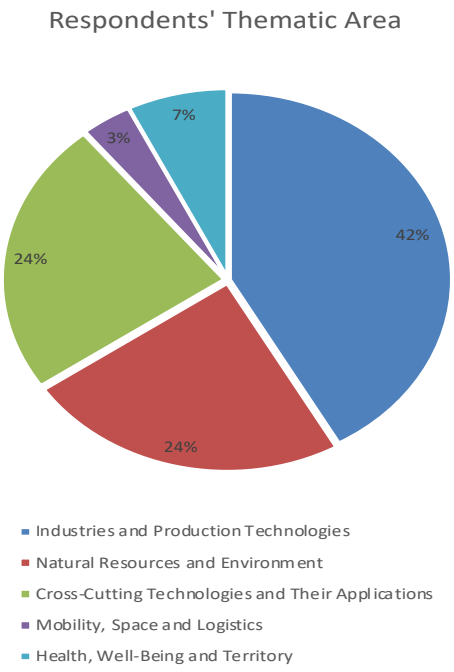



*Figure 60. Respondents´ Thematic Area*

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%).

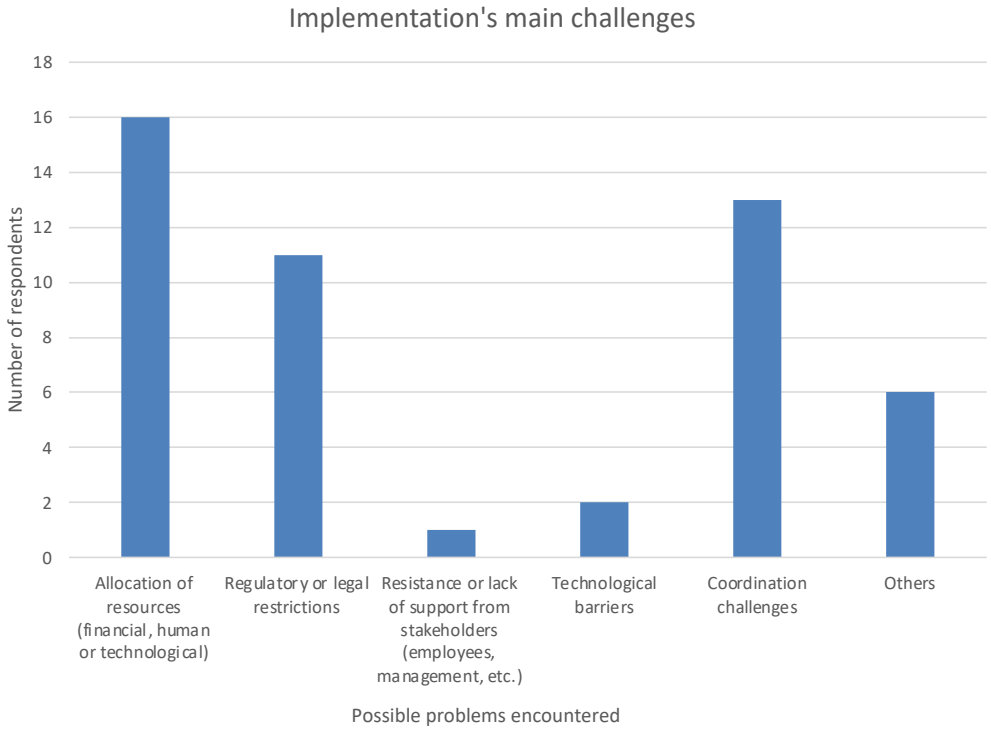



*Figure 61. Program implementation´s Main Challenges*

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.

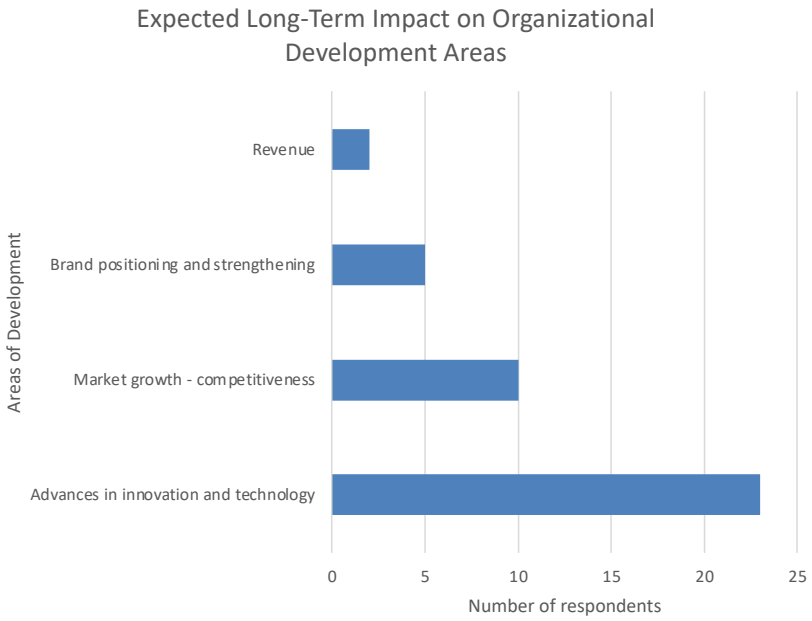



*Figure 62. Project’s long-term impact on companies’ areas of development*

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.

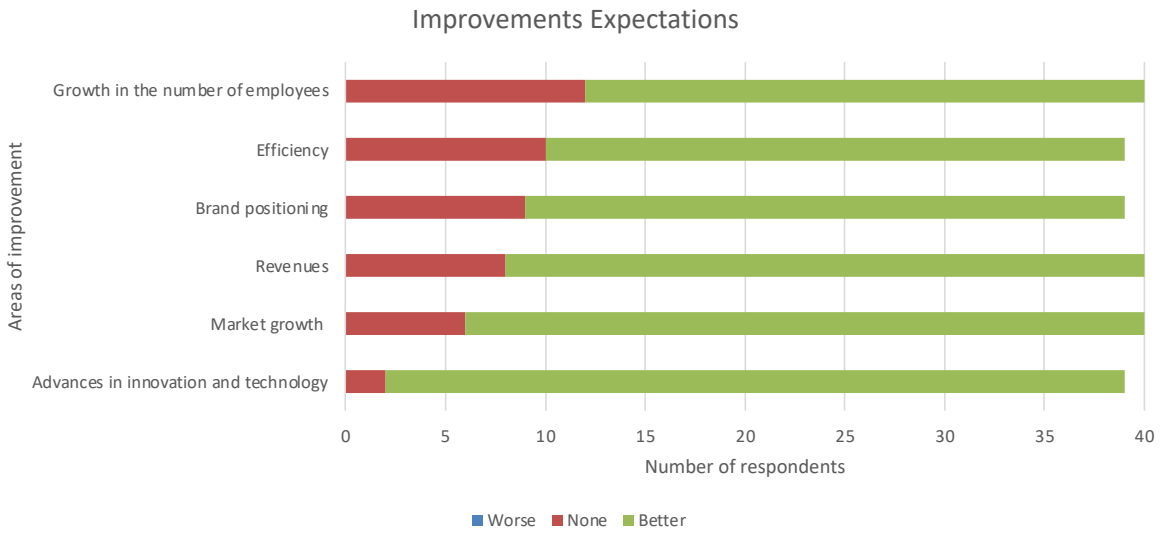



*Figure 63. Companies' Expectations for Improvements*

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).

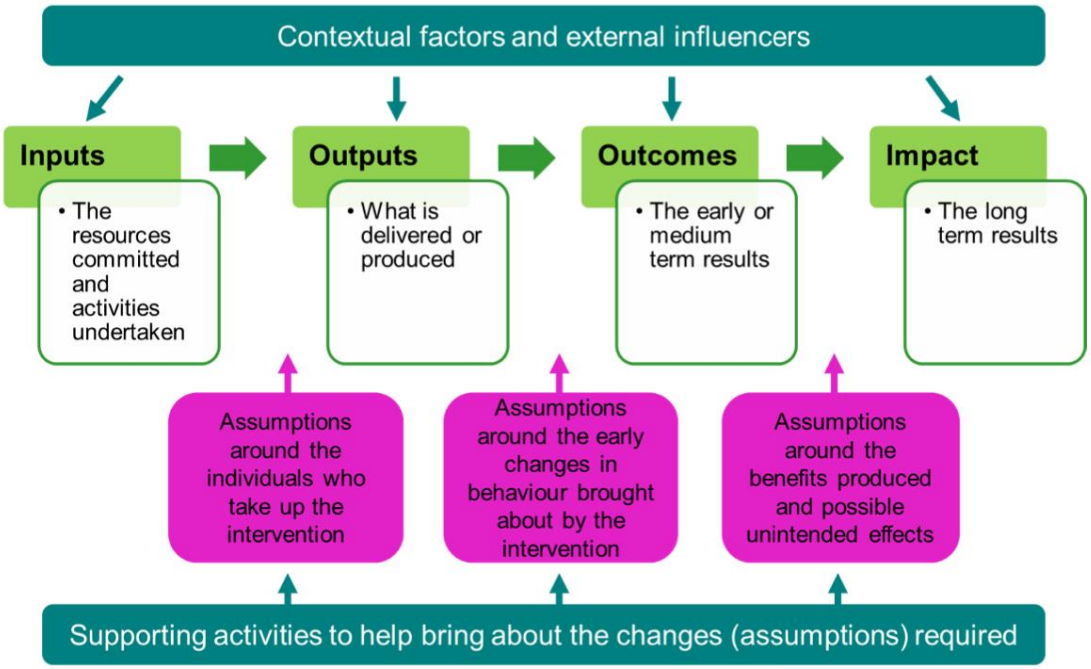



*Figure 64: Example of a linear Theory of Change* (Mayne, 2017)

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 |

* 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

### 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)<br>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)<br>** 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.

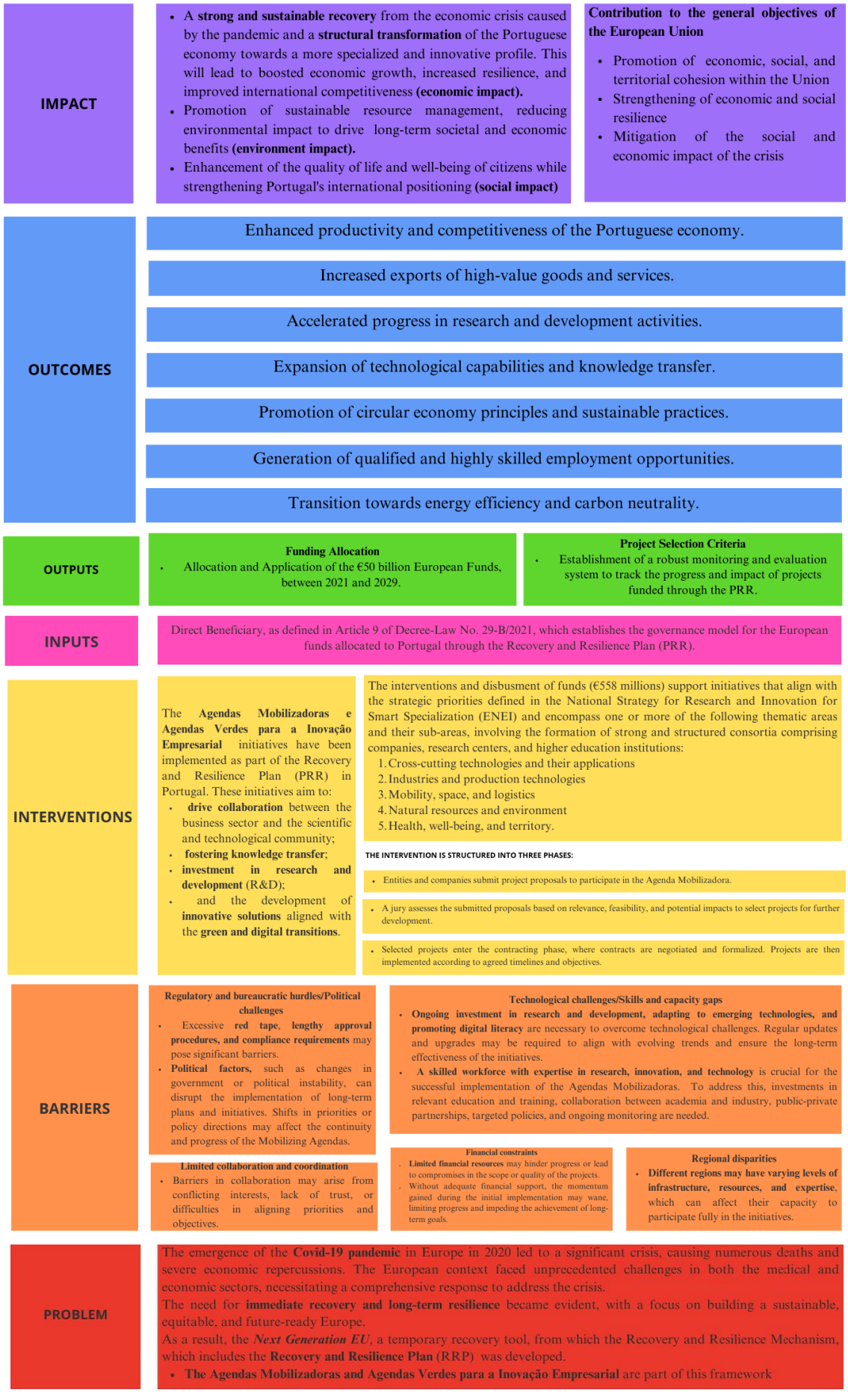
By understanding and accounting for these external factors, the evaluation process becomes more nuanced, attributing the outcomes more accurately to the intervention itself rather than extraneous influences.

### 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 7**. Model estimations for The Natural Resources and Environment

Logistic regression — Number of obs = 162; LR chi2(12) = 44.47; Prob > chi2 = 0.0000; Log likelihood = -88.817635; Pseudo R2 = 0.2002

| 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 13. 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

# 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<br>2. No | 1. Yes<br>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<br>2. No | 1. Yes<br>2. No |
| State of the initiative | 7 | Started_Implementations | Did you company start the implementation of the initiative already | 6 | Boolean | 1. Yes<br>2. No | 1. Yes<br>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<br>2<br>3<br>4<br>5 | 1 Strongly disagree<br>2 Disagree<br>3 Neutral<br>4 Agree<br>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<br>2<br>3<br>4<br>5 | 1 Strongly disagree<br>2 Disagree<br>3 Neutral<br>4 Agree<br>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<br>2. No | 1. Yes<br>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<br>2. No | 1. Yes<br>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<br>2. No | 1. Yes<br>2. No |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Processes - implementation | 13 | Challenges | What were the main obstacles or difficulties encountered during the implementation of the program? | 7 | Numeric - discrete | 1<br>2<br>3<br>4<br>5<br>6 | 1. Resource allocation (financial, human, or technological)<br>2. Regulatory or Legal Constraints<br>3. resistance or lack of buy-in from stakeholders (employees, management, etc.)<br>4. Technological Barriers<br>5. Coordination Challenges<br>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<br>2<br>3<br>4<br>5 | 1. Not supportive<br>2. partially supportive<br>3. Neutral<br>4. Supportive<br>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<br>2<br>3<br>4<br>5 | 1 Strongly disagree<br>2 Disagree<br>3 Neutral<br>4 Agree<br>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<br>2<br>3<br>4<br>5 | 1 Strongly disagree<br>2 Disagree<br>3 Neutral<br>4 Agree<br>5 Strongly agree |
| Collaboration/partnerships | 18 | Collab-Uni | Did your company collaborate with research institutions or universities through the initiative? | No | Boolean | 1. Yes<br>2. No | 1. Yes<br>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<br>2<br>3<br>4<br>5 | 1 Very helpful<br>2 Helpful<br>3 Neutral<br>4 Not so helpful<br>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<br>2<br>3<br>4<br>5 | 1. Revenue (1 to 5)<br>2. Efficiency (1 to 5)<br>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)<br>5. Positioning and strengthening as a brand (1 to 5)<br>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<br>2. No | 1. Yes<br>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<br>2. No | 1. Yes<br>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<br>2<br>3<br>4<br>5<br>6<br>7 | 1. Revenue<br>2. Efficiency<br>3. Growth in terms of market (e.g., expansion to new markets / bigger market share / expansion to other geographical areas / expansion of partnerships)<br>4. Growth in terms of number of employees<br>5. Positioning and strengtening as a brand<br>6. innovation and technology advancement<br>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<br>2. No | 1. Yes<br>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<br>2. No | 1. Yes<br>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)<br>2. (1,2,3)<br>3. (1,2,3)<br>4. (1,2,3)<br>5. (1,2,3)<br>6. (1,2,3)<br>7. (1,2,3) | 1. Revenue (1. Worst 2. No change 3. Better)<br>2. Efficiency (1. Worst 2. No change 3. Better)<br>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)<br>4. Growth in terms of number of employees (1. Worst 2. No change 3. Better)<br>5. Positioning and strengthening as a brand (1. Worst 2. No change 3. Better)<br>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)<br>2. (1,2,3,4,5)<br>3. (1,2,3,4,5)<br>4. (1,2,3,4,5)<br>5. (1,2,3,4,5)<br>6. (1,2,3,4,5)<br>7. (1,2,3,4,5) | 1. Revenue (1. Strongly disagree 2. disagree 3. neutral 4. disagree 5. Strongly disagree)<br>2. Efficiency (1. Strongly disagree 2. disagree 3. neutral 4. disagree 5. Strongly disagree)<br>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)<br>4. Growth in terms of number of employees (1. Strongly disagree 2. disagree 3. neutral 4. disagree 5. Strongly disagree)<br>5. Positioning and strengthening as a brand (1. Strongly disagree 2. disagree 3. neutral 4. disagree 5. Strongly disagree)<br>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<br>2. No | 1. Yes<br>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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