Technical University of Crete

Master in Technology & Innovation Management

Management of Greek Research Centers: FORTH's Case Study (Foundation for Research and Technology - Hellas)

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ABSTRACT

In the context of the current dissertation, we analyzed the management of Greek research centers. We followed a case study of the Foundation for Research and Technology–Hellas (FORTH) and a benchmarking analysis against FORTH and Germany's Max Planck Society. The main purpose of this dissertation is to identify which governance, funding, human-resources and innovation practices enable excellence. Even more, the purpose was to conclude to recommendations for Greek institutions. Methodologically, we combined a literature-based theoretical framework, that included professional bureaucracy, resource dependence, NPM, Triple Helix and organizational ambidexterity, with a primary qualitative research through semi-interviews, with a qualitative comparative benchmarking analysis. The main findings are threefold. More specifically, they include that (1) FORTH's semi-decentralised model, strong leadership and grant support and innovation structures, including PRAXI and STEP-C, underpin high performance and international visibility; (2) systemic constraints exist, such as for example limited multi-annual core funding, administrative rigidity and non-competitive salaries, and through their existence they create vulnerability to project cycles and talent loss; (3) targeted reforms, including for instance performance-linked baseline funding, periodic international evaluations, professionalised TTOs and industry liaison, digitalised administration and mobility-centered human resources policies, are able to strengthen resilience and impact.

Keywords: Greek Research Centers, Foundation for Research and Technology – Hellas, Organizational Management, Benchmarking Analysis.

1. GENERAL DESCRIPTION:

This thesis intends to present the complex management process of the Greek research centers focusing on the Foundation for Research and Technology - Hellas (FORTH), situated in Heraklion, Crete. In this evolving era where technological advancements and global collaboration increase this thesis seeks to unravel how FORTH's organizational structure and leadership strategies are effectively leading a research institution to success.

2. OBJECTIVES:

The primary objective of this research is to analyze the management practices employed by FORTH and evaluate their effectiveness in fostering innovation, collaboration, and sustained research excellence. By focusing on the intricacies of research center management, this thesis aims to contribute valuable knowledge to academic discourse and serve as a practical guide for policymakers, administrators, and researchers involved in the administration of similar foundations. Eventually, the study aspires to enhance the overall efficiency and impact of Greek research centers and, by extension, benefit the broader scientific community.

In addition to the comprehensive analysis of FORTH's management practices, this research endeavors to broaden its scope through a benchmarking exercise by comparing FORTH's strategies with those of a comparable European research center.

3. METHODOLOGY:

This research will combine qualitative and quantitative methodologies for its findings with a mixed-methods approach. This research will combine qualitative and quantitative methodologies for its findings, with a mixed-methods approach. It will involve an in-depth examination of FORTH's organizational structure, administrative mechanisms, and decision-making processes through interviews with key stakeholders, analysis of archival documents, and a questionnaire survey. The methodology will draw upon relevant bibliography in management theory and public administration to create the research framework. Specific research questions include the assessment of the effectiveness of current management practices, the identification of key challenges, and suggested recommendations for improvement.

4. EXPECTED RESULTS:

Expected outcomes include an understanding of FORTH's management practices, highlighting both its successful strategies and areas for improvement. The findings will

offer insights into the broader implications of the management of this research center. These results aim to inform policymakers, administrators, and stakeholders, facilitating evidence-based decision-making. Furthermore, the study intends to pave the way for tailored management guidelines and policy recommendations, fostering the sustainable development of Greek research centers and enhancing their international competitiveness.

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CHAPTER 1. INTRODUCTION

1.1 Background and Context of Greek Research Centers

The overall environment of the research in Greece is distinguished by a dual structure. In this specific structure, higher education institutions, such as for example the universities, and dedicated research centers, coexist as principal conduits of scientific activity. They are, also, frequently operating in close cooperation (OpenAIRE, 2024).

Historically, research institutions, such as for example the Foundation for Research and Technology-Hellas (FORTH), in which we focus in the context of this thesis, and that is established in 1983, have emerged as prominent actors. They combine multidisciplinary capacity and international engagement (FORTH, 2025).

More specifically, FORTH is the largest Greek research center. It includes numerous institutes across several scientific domains. These domains range from astrophysics and molecular biology to information systems and social sciences. It also functions under the supervision of state authorities (FORTH, 2025).

This institutional multiplicity creates a model of multifaceted scientific governance. This model has been proven as remarkably effective. This is specifically evidenced by consistent national evaluations. In the con text of these evaluations, FORTH has regularly been ranked first, among research centers, in terms of quality and productivity (FORTH, 2023).

Despite the above-mentioned or relevant individual successes, the broader Greek research ecosystem faces significant structural challenges. In more analysis, the ecosystem’s capacity for technology transfer and innovation is still underdeveloped (Stamatakis et al., 2024). Therefore, Technology Transfer Offices (TTOs) across universities and research centers, frequently lack the regulatory frameworks. They also lack institutional support and operational maturity, that are both needed, in order to effectively connect their research outputs with commercial or societal application (Sachini et al., 2024).

Moreover, research institutions in Greece must cope with an environment, that is intensively characterized by constrained public funding. It is about an environment, that requires strong reliance on external European and international funding streams, in order to support the research and development activities (OECD, 2016). This dynamic,

on the one hand leads to high motivation for securing competitive grants. On the other hand, it has also shaped the behavior of research institutions, in ways that might prioritize external funding acquisition, over strategic internal development.

In addition, the Greek institutional contexts are imbued with cultural and managerial legacies. These legacies influence organizational practices. In fact, paternalistic traditions and informal networks may coexist uneasily with the demands for modernization and procedural transparency. This, inevitably, creating complexities for institutional reform (Psychogios & Wood, 2010). Thus, international collaborations and comparative institutional learning assume heightened significance, as vehicles for institutional improvement. They also assume heightened significance towards policy development and improved governance, as well.

In the above-described context, an inquiry in the organizational structure and management practices of FORTH is both timely and instructive. FORTH is a high-performing example among Greek research institutions. It encapsulates the strengths of the Greek R&D ecosystem, that include its scientific excellence and strategic adaptability. It also encapsulates the systemic challenges, that frame the institutional effectiveness across the national scientific landscape. The understanding of this duality offers a strong basis for deriving information, that are relevant to FORTH and to the broader community of Greek research centers, too. These information concern particularly the strategies that facilitate collaboration and sustainable development.

1.2 FORTH in the Greek and International Research Landscape

Since its establishment in 1983, the FORTH has firmly positioned itself as the leading multidisciplinary research institution, in Greece. It operates under the oversight of the Ministry of Development's General Secretariat for Research and Innovation. Even more, its network covers multiple areas. Characteristic examples are Heraklion, Rethymno, Patras, Ioannina, Chania and Athens. It also consists of ten distinct research institutes, exploring a wide array of scientific domains. These domains vary from astrophysics and molecular biology to information and computational science (FORTH, 2025; GSRI, 2025; Tsitaris & Siddiqi, 2018).

Even more, FORTH emphasizes on cross-disciplinary research (Karnesis et al., 2024). This research lies from lasers and microelectronics to Mediterranean studies and geoenergy. This means its broad scientific mandate (GSRI, 2025).

Further, the FORTH's stature is also reflected in its sustained recognition. It is consistently ranked first among Greek research centers, according to assessments by external international panels and in securing competitive European Research Council grants (FORTH, 2025; Sifakis, 2001).

Its organizational infrastructure does not only feature research institutes. It also features supportive entities. Characteristic examples are the Science and Technology Park of Crete (STEP-C), the PRAXI Network for research-industry linkages, Skinakas Observatory and the Crete University Press publishing arm. This further increases and proves its multifaceted role in the innovation ecosystems (GSRI, 2025; Sifakis, 2001).

Internationally, FORTH has built a collaborative profile. It, more analytically, participates actively in EU-funded research initiatives. Indicative examples are Horizon 2020 and Horizon Europe. FORTH, also, serves leadership roles in consortiums spanning data methodology, resilience modelling and pilot design. Indicative is the example of Radioval, Bounce Project (Radioval Consortium, 2025; Bounce Project, 2025). Also, its research output is evidenced by high-impact publications and awards. Such examples are ERC Consolidator Grants and translational breakthroughs in biology and medicine. Therefore, this further emphasizes FORTH's global scientific engagement and reputation (FORTH, 2023; IMBB, 2024).

1.3 Thesis' Objectives and Scope

The aim of this thesis is to present the complex management process of the Greek research centers focusing on the Foundation for Research and Technology - Hellas (FORTH), which is situated in Heraklion, Crete. In the context of this evolving era, in which technological advancements and global collaboration increase, the current thesis seeks to unravel how FORTH's organizational structure and leadership strategies are effectively leading a research institution to success.

Taking this into consideration, the main objective of this thesis is to analyze the management practices, that are employed by FORTH. An additional objective is to

evaluate their effectiveness in increasing innovation, collaboration and sustained research excellence, as well. By focusing on the intricacies of the research center management, the current thesis aims to contribute to the existing academic knowledge. It also aims to serve as a practical guide, that could be used by policymakers, administrators and researchers and all the relevant parties, who are involved in the administration of similar foundations. Eventually, this thesis aspires to contribute to the overall efficiency and impact of Greek research centers. By extension, it aspires to benefit the broader scientific community.

In addition to the analysis of FORTH's management practices, this thesis, through its primary qualitative research endeavors to broaden its scope, through a benchmarking exercise. It is going to be succeeded by comparing FORTH's strategies with those of a comparable European research center, that is the Germany's Max Planck Society.

In summary and taking the above-mentioned into consideration, the main objectives of this thesis are the current ones:

- The presentation of the complex management process of Greek research centers, with a focus on the Foundation for Research and Technology – Hellas (FORTH).
- The analysis of the management practices, that are employed by FORTH, in order to understand their structure, mechanisms and strategic orientation.
- The evaluation of the effectiveness of these practices in increasing innovation and sustained research excellence.
- To broaden the study's scope by conducting a benchmarking analysis, comparing FORTH's strategies with those of the Max Planck Society in Germany.
- The identification of specific lessons learned from the comparative analysis, that may inform future reforms and sustainable management strategies for the case of the Greek research centers.

1.4 Significance of the Study

This thesis's significance is its attempt to clarify and provide useful information about the management dynamics of Greek research centers. This is going to be served through the in-depth exploration of the Foundation for FORTH.

It is a fact that the current period of time is characterized by rapid technological advancements and intensified global collaboration. It is also characterized by the growing competition, that exists among research institutions. In that context, the capacity of such organizations to maintain their excellence and international visibility is increasingly dependent on the effective management.

At this point, it is mentioned that FORTH represents one of the most prominent and successful examples of a Greek research center. Thus, it provides an ideal case for the examination of how organizational structures and leadership approaches, together with the decision-making processes, might increase innovation and research productivity, too.

By analyzing the practices, that are employed by FORTH, this thesis aims to evaluate their effectiveness. It furthermore, aims to uncover the conditions, that either enable or obstruct the sustained excellence. We consider this focus as relevant for the Greek research ecosystem. The reason is that the Greek research ecosystem operates under constraints of limited funding. It also operates in complex administrative frameworks. Therefore, there is a need for an international integration.

The better understanding of the way through which FORTH faces the above-mentioned challenges, might offers important lessons. These lessons may be applied to other institutions in Greece and beyond. In this sense, the current thesis aims to extend the discussion from a single case to a broader set of implications. This broader set includes research governance, organizational adaptability and institutional sustainability, as well.

Furthermore, this thesis intends to enrich the academic discourse on research management. This might happen by combining theoretical perspectives from management and public administration, with empirical information, that are derived from interviews and document analysis. This integration offers an inclusive and concise framework. It's a framework, that contributes both to scholarly debates and to practical decision-making.

Even more, the findings of the primary research of this thesis, are expected to serve as a guide, that can be practically used by policymakers and stakeholders, who are responsible for the future operations and the role that is played by the research institutions. Emphasizing in both successful strategies and areas that require reform, the current study is going to facilitate the decisions that are based on specific evidence. Therefore, it aims at improving efficiency and competitiveness of these organizations.

Finally, it is mentioned that the significance of the study is further increased through its comparative dimension. More analytically, its comparative dimension includes a benchmarking exercise. This exercise concerns the Max Planck Society in Germany. It's about an international perspective, that, on the one hand contextualizes FORTH in the European research and on the other hand, also gives information about the best practices, that may inspire tailored reforms, in Greece.

This means that the current research aspires to contribute to the sustainable development of Greek research centers. It also aspires to strengthen their role in the global scientific community and to empower their long-term impact on innovation and socio-economic progress, too.

1.5 Thesis' Structure

The current thesis is organized into nine chapters, as following:

Chapter 2 presents the Literature Review. It establishes the theoretical foundations of this study. In more analysis, it begins with a discussion of the management of research institutions and the relevant theoretical frameworks. Then, an examination of organizational structures in research centers, follows. The second chapter further explores public sector research management in Greece and Europe. In that context, it analyzed particular challenges and policy contexts. Even more, the role of innovation and collaboration is then addressed. Finally, this section concludes with a review of benchmarking and comparative management practices. This serves as a basis for the afterward comparative analysis.

Then, Chapter 3 outlines the Research Methodology. More analytically, this chapter describes the research design. It also justifies the choice of a qualitative approach. Even more, the third chapter explains the use of the interview guide, as the primary research

tool. Then, it details the data collection process, through the conduction of interviews with nine FORTH's main stakeholders. Finally, it presents the data analysis methods, focusing on thematic analysis.

Chapter 4 is focused on the FORTH's Organizational Overview and Structure. This chapter includes the main background information, that concern the history and mission of FORTH. Also, its organizational structure and its administrative mechanisms and decision-making processes are analyzed. The fourth chapter also emphasizes on the leadership framework. Then, it presents a general description of the main research units, that operate under FORTH. Thereby, this chapter establishes the institutional context for the empirical analysis.

Chapter 5 examines the FORTH's Management Practices. More specifically, it investigates strategic leadership and vision, human resource management and talent development, financial management and budgeting practices, research funding and external collaborations. It also investigates innovation management and technology transfer. Finally, this chapter concludes with a discussion of the main challenges and opportunities of the current institution, in its management practices.

Chapter 6 includes the Benchmarking Analysis. It begins with the selection of a comparable European research center, the Max Planck Society in Germany. It then proceeds with a comparative analysis of FORTH's strategies and practices. Then, the lessons that have been learned from the benchmarking exercise are identified. Finally, we consider the implications of these findings, for the FORTH's future management strategy.

Chapter 7 presents the Findings and Challenges, that came from the primary research's results. This chapter evaluates FORTH's management effectiveness. It does so, by outlining both the strengths of its management model and the areas, that require improvement. This chapter, also, identifies the main challenges in the Greek research centers' management. It then explores the opportunities for improving the management practices that are followed. Finally, it assesses the broader impact of management on research and innovation at FORTH.

Chapter 8 develops a set of Recommendations for Improvement. These recommendations include suggested reforms for organizational structure and leadership. They also include measures for increasing collaboration and networking.

This chapter also includes policy recommendations, that are addressed to both national and international stakeholders. Finally, it includes and strategies for the implementation of sustainable management practices in the case of the Greek research centers.

Chapter 9, which is the last chapter, includes the Conclusion. More analytically, it summarizes the main findings of the research. Then their implications are discussed, especially for the management of Greek research centers. Also, this chapter emphasizes on the contribution of this thesis to academic knowledge, as well as to practical management information. Finally, this last chapter closes by identifying directions for future research. These directions might further expand the understanding of research center governance and its effectiveness, too.

CHAPTER 2. LITERATURE REVIEW

2.1 Management of Research Institutions: Theoretical Framework

At first, it is needed to be mentioned that unlike the organizations that operate in the context of the private sector, the research centers, use to operate in environments, that are characterized by high levels of uncertainty. They are also characterized by knowledge intensity and multiple numbers and types of stakeholders. Even more, their stakeholders tend to necessitate specialized frameworks of governance and management (Whitley, 2014).

At this point, it is mentioned that one of the main perspectives in the context of the current subject area, comes from the concept of "*professional bureaucracy*". This had been especially proposed by Mintzberg (1993). According to this context, the research centers share many characteristics with universities. The reason for that is that they rely on highly trained professionals. They are scientists, more specifically, who require freedom to conduct research.

Therefore, in this model, the role of management is not direct supervision. On the contrary, it is the provision of resources and infrastructure. At the same time it includes a regulatory environment, which enables the professionals to function in an effective way. This is overall aligned with the principle of academic freedom (Mintzberg, 1993). At least, this principle is still central to the governance of research institutions.

If we see this subject from the perspective of resource dependency theory, we conclude that research institutions must secure and manage critical external resources. They must also secure and manage primarily funding, talent and infrastructure (Pfeffer & Salancik, 2003).

It is a fact that the scarcity of public funds, together with the increasing reliance on competitive grants in Europe, means that the research centers have no other choice, but to develop strong administrative capacities. This is the only solution that they have, in order to attract external financing. At the same time, they are obliged to ensure their alignment with national and European research priorities (OECD, 2016).

From the above, it is understood, that a tension is created between long-term scientific planning and short-term responsiveness to funding calls. This tension must be reconciled by effective management.

Then, a complementary theoretical strand comes from the new public management. New public management has influenced reforms in publicly funded research institutions. Even more, it has to be mentioned that new public management emphasizes efficiency and accountability. At the same time, it places emphasis on performance measurement. It does so, by often introducing managerial practices borrowed from the private sector (De Boer et al., 2007).

In the research contexts, this has been translated in performance-based funding models and in evaluation frameworks, as well. It is also translated in strategic planning mechanisms. These mechanisms are designed in order to increase the levels of competitiveness and societal impact (Whitley et al., 2010).

As for the triple helix model of innovation, it further enriches the already existing theoretical framework. More analytically, the triple helix model of innovation has the ability to situate the research institutions in an interplay between universities and research centers, industry and government, that is dynamic (Etzkowitz & Leydesdorff, 2000).

If we examine this subject from triple helix model of innovation's view, we critically conclude that research institutions are not isolated knowledge producers. Instead of this, they have the role of the key nodes in innovation systems, which are able to generate economic and social value. Effective management, therefore, involves, on the one hand in internal governance and on the other hand, on external engagement with industrial partners and international collaborators, too.

Even more, institutional theory also informs about how research centers adapt to external pressures. More specifically, according to DiMaggio & Powell (1983), the organizations use to converge toward similar structures and practices, through processes of isomorphism. They include for example regulatory requirements, imitation of successful peers and normative and professional standards. If we examine this through the context of the research institutions, it is possible to explain the diffusion of international practices. Characteristic examples are the peer review evaluation, performance metrics and technology transfer offices across diverse national contexts.

Finally, we mentioned that the concept of organizational ambidexterity has been applied to research management. This mentions the need to balance "*exploration*", that means pursuing new knowledge and risky research, with "*exploitation*", that means

applying existing knowledge for innovation and commercialization (O'Reilly & Tushman, 2013). Therefore, it is concluded that the research centers must adopt management strategies, which allow for both basic, curiosity-driven research and applied, mission-oriented projects aligned with societal needs.

2.2 Organizational Structure in Research Centers

As for the organizational structure of the research centers, unlike the businesses that operate in the private sector, the research centers operate at the intersection of knowledge production and public accountability. They also have a significant societal impact. All of these, require structures, that balance autonomy with coordination. They must also balance flexibility with accountability (Whitley, 2014).

At first, it is mentioned that one dominant feature of the research centers, that exists worldwide, is the decentralization. More analytically, many leading institutions, such as for example the Max Planck Society or the French CNRS, adopt a model, in which institutes or laboratories have high levels of autonomy. This autonomy is mostly about defining their research agendas and their staff, while it includes their allocating resources, too (Sachse, 2025).

In any case, this structure recognizes that the scientific creativity increases, in the case of which the researchers are free to pursue novel and innovative ideas. However, decentralization must be balanced. This balance comes with coordination mechanisms. These mechanisms are the central level, in order for these organizations to avoid fragmentation and in order for them to further ensure the alignment with the general institutional and national priorities (OECD, 2016).

Even more, a main element of the organizational design, in the context of the research centers, is the matrix structure. In the context of that structure, researchers use to participate in many projects, at the same time. This practice stops any disciplinary and institutional boundaries. It is about a structure, that promotes interdisciplinarity and that enables these centers to address complex global challenges. Some examples of these challenges are climate change, public health and digital transformation (Etzkowitz & Leydesdorff, 2000).

For example, the project-based teams might involve scientists from different institutes, that are supported by administrative units. These units are possible to handle finance, human resources and legal affairs. At the time when matrix structures encourage collaboration, they also require powerful and clear communication channels. They also require strong leadership, able to mitigate conflicts that arise between the competing priorities (O'Reilly & Tushman, 2013).

As for the governance arrangements, they also differ significantly between the different contexts. In more analysis, in some systems, the research centers are directly supervised by the ministries or by state agencies. On the other hand, in other systems, they operate as semi-autonomous public bodies. This means that in the second paradigm, they have their own boards of directors. In any case, the autonomy in governance, is generally associated with higher scientific productivity of the research centers. It is also related to higher levels of international competitiveness. The reason is that autonomy allows institutions to respond more flexibly to any funding opportunities. It also allows them to have higher flexibility in emerging scientific fields (Aghion et al., 2010).

However, autonomy must be coupled with accountability. Accountability is ensured through external peer review and performance indicators. At the same time, accountability might be ensured through regular evaluations (OECD, 2016).

Even more, one further feature is the establishment of technology transfer offices (TTOs) and the science parks, together with the innovation hubs in or alongside the research centers. All of these units institutionalize collaboration with industry and society. Therefore, their presence is significant in the minimization of the gap that exists between basic research and commercialization. At this point, as Siegel & Wright (2015) mentioned, research centers that have integrated TTOs and that are characterized by clear innovation governance structures, are more successful in producing patents and spin-offs. They also have higher societal impact (Siegel & Wright, 2015).

Additionally, the role of support services and professional staff is also important and it has to be mentioned. Since the research centers engage in even more complex research projects, the efficient support, that is on the one hand administrative and on the other hand technical is essential for grant management and compliance. It also creates knowledge dissemination (Whitley et al., 2010). So, the well-structured administrative units make sure that researchers have the ability to focus on scientific work. This means

that they allow researchers not to get stuck to bureaucratic procedures. Undoubtedly, this improves institutional efficiency and competitiveness.

Finally, the organizational culture interacts with structure. This interaction might shape some positive outcomes. More analytically, a collaborative culture tends to encourages knowledge sharing and interdisciplinary cooperation. This structure might enhance the benefits of decentralized and matrix structures. Conversely, the following of an hierarchical and rigid culture, might neutralize structural flexibility. This leads to inefficiency and reduced innovation, too (Gulbrandsen & Smeby, 2005).

2.3 Public Sector Research Management in Greece and Europe

It is a fact, that in many European countries, the reforms in research management have been influenced by the new public management principles. As it was also said before, new public management emphasizes efficiency, accountability and performance-based funding (De Boer et al., 2007).

A characteristic example at this point, is the case of Germany, in which institutions like the Max Planck Society and the Helmholtz Association, combine stable funding with competitive grants. At the same time, they hold their significant autonomy in governance (Toribio-Flórez et al., 2021).

A similar example is the one of the United Kingdom, where the Research Excellence Framework allocates the resources, being based on research quality and impact. This links public investment with performance outcomes (Wilsdon et al., 2015).

All of these systems, that were given as paradigms, show us how performance evaluation and strategic planning are able to be institutionalized, in ordser to strengthen accountability. By doing so, they also strengthen scientific excellence.

On the other hand, Greece's public sector research management has been characterized, over the years, by limited funding and by bureaucratic rigidity. It is also characterized by fragmented policy frameworks (OECD, 2016).

In that context, the research centers, such as for example FORTH, the National Centre for Scientific Research "*Demokritos*" and the Hellenic Centre for Marine Research, operate under the supervision of the General Secretariat for Research and Innovation. On the one hand, this situation offers a degree of coordination. But at the same time,

this same situation makes Greek research institutions to face constraints from central government regulations. They include rigid procurement procedures, salary structures and public administration rules. All of these facts conflict with the flexibility required for high-performing research environments (Psychogios & Wood, 2010).

Also, it is mentioned that a main difference, that exists between Greece and leading European countries, lies in the level of the core state funding. More analytically, some countries, such as for example Germany and the Netherlands, offer stable multi-annual funding. This funding enables long-term strategic planning. On the contrary, Greece relies on European Union structural funds, and at the same time it relies on competitive project-based grants (Stamatakis et al., 2024).

Critically examining this this dependency, it has pushed Greek research institutions to become highly competitive at the European level, but at the same time it has created financial uncertainty. So, we believe that it has made them them more vulnerable to changes in the EU funding priorities.

Even more, one more challenge is human resource management. More analytically, the Greek research centers try to attract and retain top talent and they are facing difficulties during this effort. The reason is that there are limited permanent positions and at the same time, the salaries are significantly lower than the European averages (GSRI, 2025).

So, there is a situation, that has fueled the phenomenon of brain drain. In that negative context many highly skilled Greek scientists pursuing careers abroad (Karnesis et al., 2024). If we conduct a comparison, countries like for example Germany and the UK offer structured tenure-track systems and competitive salaries. They also offer career development opportunities. Therefore, this increases the attractiveness of their research systems.

At the same time, there are worth-noting strengths in the Greek system. More specifically, despite the above-mentioned financial and administrative limitations, the Greek research institutions, such as FORTH, have developed positive international reputations. They also consistently perform well in securing competitive funding (FORTH, 2023).

These research centers' ability to integrate into European research networks, lead consortia. It, at the same time, produces high-impact publications. Therefore, this shows high levels of resilience and adaptability. Moreover, EU initiatives, such as for example Horizon Europe's "*Widening Participation*" schemes, offer opportunities for countries like Greece, in order to strengthen their capacity and their collaboration, while at the same time they have the opportunity to reduce disparities in the European Research Area (European Commission, 2021).

Proceeding to a comparative perspective, after a critical evaluation of the analysis of the current section, Greece's main challenge is bridging the gap that exists between structural constraints at the national level and the dynamic environment of the European research system. Therefore, we think that there is a need for reforms. These reforms must enhance autonomy and at the same time must be able to reduce bureaucracy and increase baseline funding. Through these reforms, the Greek institutions will be more closely aligned with their European counterparts. At the same time, European collaborations and strengthening technology transfer mechanisms, while addressing human capital challenges, too, could allow the Greek research centers to consolidate their position globally.

2.4 Innovation and Collaboration in Research Centers

As for the innovation in research centers, it is a context that is increasingly understood as a networked and collaborative process. This means that it is not a linear progression from basic research to market. At this point, we consider the Triple Helix framework as helpful to mention, due to the fact that it positions the research organizations as co-producers of innovation alongside industry and government. In that context, emphasis is placed on the hybrid arrangements. Characteristic examples are joint labs, shared infrastructures and co-funded programs. These arrangements accelerate knowledge flows and problem-solving (Etzkowitz & Leydesdorff, 2000).

Building on this, open innovation perspectives support the fact that porous organizational boundaries increase the efficiency and impact of the research portfolios. Some indicative example are licensing out, engaging in collaborative research ands development and sourcing external ideas (Chesbrough, 2006). In these paradigms' context, collaboration is been fairly considered as a strategic capability. In more

analysis, research centers, which tat orchestrate diverse partners, are able to both explore frontier science and exploit emergent opportunities, at the same time.

At this point, worth-noting are both studies of Perkmann et al. (2013) and Chesbrough (2006). They both examine the mechanisms and outcomes of university–industry engagement, being generalized to public research centers. More specifically, Perkmann et al. (2013)'s evidence shows that multiple interaction channels produce complementary benefits. Some examples of these channels are contract research, consulting, co-publication, personnel mobility and student pipelines. At this point, it is mentioned that the formal commercialization, that includes for example patenting, licensing and spin-offs, is only one piece of a broader collaboration spectrum (Perkmann et al., 2013).

Importantly, Perkmann et al. (2013) and Chesbrough (2006) mention that collaboration intensity and mode are shaped by disciplinary norms. They are both also shaped by appropriability conditions. Therefore, engineering and life sciences show higher rates of patenting and also higher rates of firm formation. Whereas collaborations in ICT and data science use to prioritize open standards. They also use to prioritize platforms, that diffuse value through ecosystems (Perkmann et al., 2013; Chesbrough, 2006).

Seeing this issue from the governance standpoint, the research centers, which professionalize technology transfer achieve higher rates of licensing income and spin-off survival. Although, this result comes only if these instruments are integrated in a culture, which values academic and entrepreneurial goals, too (Siegel & Wright, 2015).

Even more, Bozeman's "*public value*" view cautions against using revenue as the one and only metric. At this point, broader societal outcomes are the dominant returns to public research. These outcomes, for example, concern standards, human capital and policy advice (Bozeman, 2000). Consequently, the evaluation systems tend to combine the bibliometrics with indicators of engagement and impact (OECD, 2016).

Furthermore, O'Reilly & Tushman (2013) mentioned that the collaboration also increases the scientific performance. More specifically, the cross-institutional and international co-authorship correlates with higher citation impact. This partly happens by enabling the access to complementary resources and diverse knowledge bases, as well (OECD, 2016).

Internally, the matrix structures and mission-oriented programs help research centers to knit together their multidisciplinary teams. This is helpful for them, due to the fact that they give them the ability to address complex challenges. Indicative examples of these complex issues are health, climate and digital transformation. Therefore, organizational ambidexterity appears critical for sustaining both novelty and application. In any case, organizational ambidexterity is balancing exploratory basic research with exploitative development (O'Reilly & Tushman, 2013).

However, some issues, like transaction costs, IP negotiations, misaligned time horizons and academic–industrial incentive gaps need to be taken into account. They might erode the above-mentioned benefits (Perkmann et al., 2013; Siegel & Wright, 2015).

More analytically, the effective practice typically features the following ones:

- Clear IP and publication clauses that protect academic freedom while enabling commercialization
- Boundary-spanning roles, like industry liaison officers and embedded research managers, to reduce coordination frictions
- Portfolio approaches that separate high-risk exploratory projects from nearer-to-market work
- Mobility schemes, like for example industrial PhDs and sabbaticals, that create durable relational capital (Perkmann et al., 2013; Siegel & Wright, 2015).

In the European context, the program architectures, that for example include Horizon Europe, institutionalize the collaboration, through large-scale consortia. They also do so by research infrastructures and mission clusters, which couple excellence with impact. These frameworks encourage the participation's widening. They, at the same time, standardize data management and open science practices. By doing so, therefore, they further lower the barriers about the collaboration and, at the same time, they enhance and support reuse (European Commission, 2021; OECD, 2016).

2.5 Benchmarking and Comparative Management Practices

At first, for the sake of the better understanding, it is mentioned that benchmarking, in the management of research institutions, is considered as a structured process. This process is useful for the performance's identification of any existing gaps. It is also useful for adapting superior practices from the peer organizations to the contexts, that

are mostly considered as local. Even more, it is mentioned that benchmarking, in the management of research institutions, is originating in their operations and quality management (Camp, 1989; Spendolini, 1992).

Furthermore, it is clarified that benchmarking has been progressively used in the context of the higher education and public research, as well. In these both contexts, the outputs are more complex and even more time-lagged. In these contexts, also, the outputs are multi-dimensional, as well. At this point, it is mentioned that in this domain, benchmarking combines input, process and outcome indicators. For example, it combines funding mix, governance autonomy, human-capital policies, publication and citation impact, technology-transfer effectiveness and societal engagement, too. All of these elements are interpreted through a comparative vision. This comparative vision accounts for disciplinary and national heterogeneity (OECD, 2016; Geuna & Martin, 2003).

It also has to be mentioned that the first pillar in comparative management is the one of governance and autonomy. In more analysis, the cross-country analyses show that systems, that are granting the institutions' strategic and managerial autonomy, present the tendency to perform better on international research indicators (Aghion et al., 2010).

At the same point, it is also mentioned that the comparative benchmarking across organizations, such as for example Germany's Max Planck Society, the Helmholtz Association and the France's CNRS, and the applied research organizations, like for instance Fraunhofer, reveals distinct governance archetypes. More specifically, we are talking about director-led scientific autonomy with periodic international reviews (Max Planck), programmatic mission management, that is tied to state-negotiated performance contracts (Helmholtz) and finally, about large-scale disciplinary institutes, that exist under the centralized coordination (CNRS) (Toribio-Flórez et al., 2021; OECD, 2016). Even more, it is clarified, that in the case of the institutions that have either smaller or resource-constrained systems, the lesson is not replication. On the contrary, the lesson is the selective adaptation. In more analysis, it is clarified that selective adaptation is able to clarify that the decision rights and to professionalize the boards and the advisory bodies, at the same time. It is also able to institutionalize the cyclical and peer-review evaluation.

Continuing to the second pillar, it concerns funding models and incentives. More analytically, the international comparisons emphasize on the importance of the predictable core funding. This funding is complemented by competitive project grants and philanthropic sources, while at the same time it comes from there industry partnerships, too (Hicks, 2012; OECD, 2016).

At this point, benchmarking here assesses on the one hand, the share of baseline funding. On the other hand, it assesses its multi-annual stability and linkage to performance agreements, too. Even more, it has to be mentioned that the systems that are overly dependent on short project cycles risk managerial myopia. Conversely, the well-designed performance-based core funding, is able to underwrite high-risk and long-horizon research. At the same time, it is able to preserve the academic freedom, that in any point, it is required and the necessary (Aghion et al., 2010; Hicks, 2012).

As for the case of the human capital management, it is the third axis, that needs to be explained and described. More specifically, in the context of the human capital management, the benchmarking is informative. For example, the comparative study that have has contacted by Aghion et al. (2010), show the role of tenure-track pathways and competitive remuneration. At the same time, the scholars mention the important role that is played by the international mobility and the doctoral training structures. These structures, for example, include the international research schools. The role of all of the above mentioned elements is important for, on the one hand attracting, and on the other hand, retaining the talent (Aghion et al., 2010; OECD, 2016).

Even more, it has to be declared the fact that the institutions are able to benchmark career-stage pipelines, together with time-to-independence, gender and international diversity and co-supervision practices. Then, they are able to align the incentives, in order to support the organizational ambidexterity. Also, it is declared that organizational ambidexterity includes simultaneous exploration, which means frontier science, and exploitation, that includes application and commercialization) (O'Reilly & Tushman, 2013).

The fourth and the last pillar is the innovation and technology's transfer. At this point, it is useful to mention the evidence that is given by the study that had been conducted by Siegel & Wright (2015). More analytically, they mentioned that dedicated, professionally staffed TTOs, the clear IP policies, the proof-of-concept funds and the

standardized agreements, presented statistically significant correlation with the higher levels of licensing and spin-off performance. This means that they are implemented in the context of organizational culture, that value both academic and entrepreneurial outputs (Siegel & Wright, 2015; OECD, 2016).

Even more, it is pointed out that comparative benchmarking extends beyond revenue to "*public value*" outcomes. Characteristic examples of this outcomes are standard-setting, policy advice, open data/software and human-capital formation, too (Bozeman, 2000).

Examining the benchmarking process through its methodological perspective, it is pointed out that the effective benchmarking procedure, at least in research management, blends quantitative indicators with qualitative peer review and case-study learning. It is also explained that the quantitative indicators include, for example, normalized citation impact, ERC/Horizon success rates, industry income per researcher and co-authorship centrality (Geuna & Martin, 2003; OECD, 2016).

Even more, it has to be taken into account the fact that the caution is necessary. Caution includes bibliometric and ranking metrics and can distort behavior if it is used uncritically. It might also privilege the volume over the quality or over the disadvantaging certain fields (Dill & Soo, 2005; Hicks, 2012). Critical evaluating the above mentioned methodological dimension of the benchmarking process, we consider as the best practice, the one that triangulates metrics with narrative evaluations and field-sensitive indicators and that it focuses on the "*learning from difference*" and not on an isomorphic copying.

CHAPTER 3. RESEARCH METHODOLOGY

3.1 Research Design

The methodological design of the current thesis' research is based on a qualitative research paradigm. It is particularly suited for exploring organizational processes and managerial practices. Unlike the quantitative research approaches, qualitative designs emphasize contextual understanding. They also emphasize meaning-making and the exploration of complex social realities (Creswell & Poth, 2018). Taking into consideration that the central objective of the current study is to analyze how FORTH's management structures and leadership practices shape innovation and institutional performance, the qualitative research design gives the flexibility that is needed. Flexibility is needed, due to the fact that it offers the opportunity to gain information from multiple stakeholders, who are directly involved in the process of decision-making.

Even more, this research adopts a case study design. The reason is that it focuses on the FORTH, which is its single, bounded case. The methodology of the case study is useful when the phenomenon of interest is included in its real-life context. It is also useful when multiple sources of evidence are able to be triangulated, in order to increase to the research's validity (Yin, 2018). Specifically, by concentrating on FORTH, this research, on the one hand offers a detailed empirical account of one of Greece's most prominent research centers. On the other hand, it has the potential to generate new information with broader relevance to the governance of research institutions, in similar socio-political environments.

3.2 Research Tool - Interview Guide

The main that is used in the context of this research is a semi-structured interview guide (Annex I). This interview guide is developed in order to elicit perspectives from the main stakeholders of FORTH. The semi-structured interviews are advantageous in the organizational research. The reason is that they balance consistency across the interviews, offering the flexibility in order to probe deeper in specific areas of interest (Kallio et al., 2016). Moreover, it is mentioned that the interview guide is structured

around core themes. Characteristic examples are strategic leadership and vision. One further theme is organizational structure and decision-making, talent recruitment and development, as well. Also, it includes questions about financial management and sustainability, about innovation and technology transfer, collaboration and partnerships. Finally, it concerns issues about the challenges and opportunities in research management, too.

Each section of the interview guide consists of open-ended questions. These questions had been designed, in order to encourage participants to share factual information and their subjective experiences and interpretations, as well. It is about an approach, that facilitates the exploration of the way through which policies and practices are perceived internally. This approach, also, facilitates the exploration of how these perceptions influence the institution's capacity about innovation.

3.3 Data Collection Method - Interviews with Key Stakeholders at FORTH

The collection of the research data had been conducted through interviews with six main stakeholders at FORTH. The research sample, more analytically includes members of the administrative leadership, institute directors, senior researchers and other staff, whose job roles and job positions are linked with managerial or strategic roles. In order for us to collect the research sample, the purposive sampling method was used. So, it was ensured that participants represented diverse perspectives across the institution (Etikan et al., 2016).

Also, the interviews were scheduled in advance. They were conducted through online platforms, depending on each one of the participants' availability. Even more, each interview lasted approximately 40 minutes. All of the interviews were recorded with the consent of participants. This allowed the accurate transcription that followed afterwards. In addition, participants were informed of the research objectives. They were also informed about the voluntary nature of their involvement and about the measures, that had been taken, in order for us to ensure the necessary confidentiality and their anonymity, too. Finally, the ethical approval for the study was obtained in line with standard academic protocols.

3.4 Data Analysis Methods - Thematic Analysis

At first, it is mentioned that the interviews were transcribed verbatim. They were then analyzed, using thematic analysis. It is about a widely adopted method in qualitative research. This method is helpful for identifying and reporting patterns in the research data (Braun & Clarke, 2006).

In further analysis, the process followed a systematic approach. We begun with data familiarization, whereby transcripts were read multiple times. So, we gained a specific overview of the content. This step was then followed by the generation of initial codes. These codes captured recurring ideas and issues, that had been raised by the participants.

Then, the codes were organized in potential themes. These themes reflected the broader patterns. These patterns are relevant to the research objectives. Themes, such as for example leadership vision, organizational constraints, collaboration practices and innovation mechanisms were refined, through comparison with the raw data. After this procedure, we ensured the representativeness.

Finally, it is clarified that throughout the analysis, attention was given to both convergence and divergence in participants' accounts. This allowed for a better understanding of FORTH's management practices. Then, triangulation with archival documents even more increased the credibility of the findings. Thus, the thematic analysis offered a structured and yet flexible framework. Through this framework the complexities of research management at FORTH, could be efficiently explored and meaningfully interpreted, as well.

CHAPTER 4. FORTH'S ORGANIZATIONAL OVERVIEW AND STRUCTURE

4.1 FORTH's History and Mission

As it is declared at FORTH's official website, the organization's priority "*is to cultivate an environment that fosters Learning, Research and Innovation*" (FORTH, n.d.). Also, the organizational strategy "*in achieving this goal is the pursuit of scientific quality and excellence*". As it is also declared at FORTH's official website, this is "*central towards meeting three targets*". These targets are characterized as the main pillars for "*Regional, National and European socio - economic growth*" (FORTH, n.d.).

The first pillar is "*Scientific and technological research in targeted strategic areas, characterized by high scientific and economic added value*". The second pillar that it is declared is "*Training and preparation of the next generation of researchers in close collaboration with the Universities of Greece*". The third and last pillar is "*Exploitation of the research output through the development of innovative products and services, which benefit society and support further economic growth*" (FORTH, n.d.).

Finally, it is mentioned that FORTH's aim is to "*foster a prosperous environment in order for researchers to perform high-level scientific research in Greece*" (FORTH, n.d.). As about FORTH's history, as it is also declared and described through its official website, this organization "*traces its roots to the Research Center of Crete (RCC)*". The operations of this RCC in May 1983, and its location was at Heraklion. At its inception, "*RCC comprised three institutes in collaboration with the University of Crete: The Institute of Molecular Biology & Biotechnology (IMBB), the Institute of Electronic Structure & Laser (IESL), and the Institute of Computer Science (ICS)*" (FORTH, n.d.).

Then, during November of 1984, "*the Crete University Press (CUP) was established in Heraklion through an agreement between the Pancretan Association and RCC*", while by June of the year 1985, "*two additional institutes were founded in Crete: The Institute of Applied and Computational Mathematics (IACM) in Heraklion, and the Institute for Mediterranean Studies (IMS) in Rethymnon*" (FORTH, n.d.).

Afterward, in April 1986, "*the Skinakas Observatory was jointly founded by FORTH (then RCC), the University of Crete, and the Max Planck Institute for Extraterrestrial Physics of Germany, under a Greek–German scientific cooperation framework*" and by

November of the year 1987, "*RCC expanded further by including two more institutes*". The first one was the so-called "*Institute of Chemical Engineering and High Temperature Chemical Processes (ICE-HT) in Patras*" and the second one was the "*Chemical Process Engineering Research Institute (CPERI) in Thessaloniki*". Also, it has to be mentioned that the second one had been founded during the year 1984. Also, the same year, "*the RCC was formally reorganized and re-named as the Foundation for Research and Technology – Hellas (FORTH), becoming an administratively independent center and one of Greece's largest research organizations*" (FORTH, n.d.).

Then, during February 1991, FORTH "*helped establish the PRAXI Network (HELP-FORWARD Hellenic Project for Wider Application of R&D)*" and this happened in cooperation with the "*Hellenic Federation of Enterprises (SEV) and the Federation of Industries of Northern Greece (FING)*" (FORTH, n.d.). Proceeding to December of the year 1993, the "*Science and Technology Park of Crete (STEP-C)*" had been founded. At this point, it is mentioned that its aim was the promotion of "*the diffusion of technological knowledge and know-how developed within academia and research institutes*" (FORTH, n.d.).

Afterward, during March of 2000, "*CPERI*", that was located in the area of Thessaloniki, "*split off to form a distinct nucleus of the Center for Research & Technology – Hellas (CERTH) in northern Greece*" (FORTH, n.d.). In January 2002, the "*Biomedical Research Institute*", that had been founded in 1998, in the city of Ioannina, also joined FORTH. Then, during April of the year 2012, the "*Biomedical Research Institute*" was merged into the IMBB, as the "*Department of Biomedical Research*", which had been based in the city of Ioannina (FORTH, n.d.).

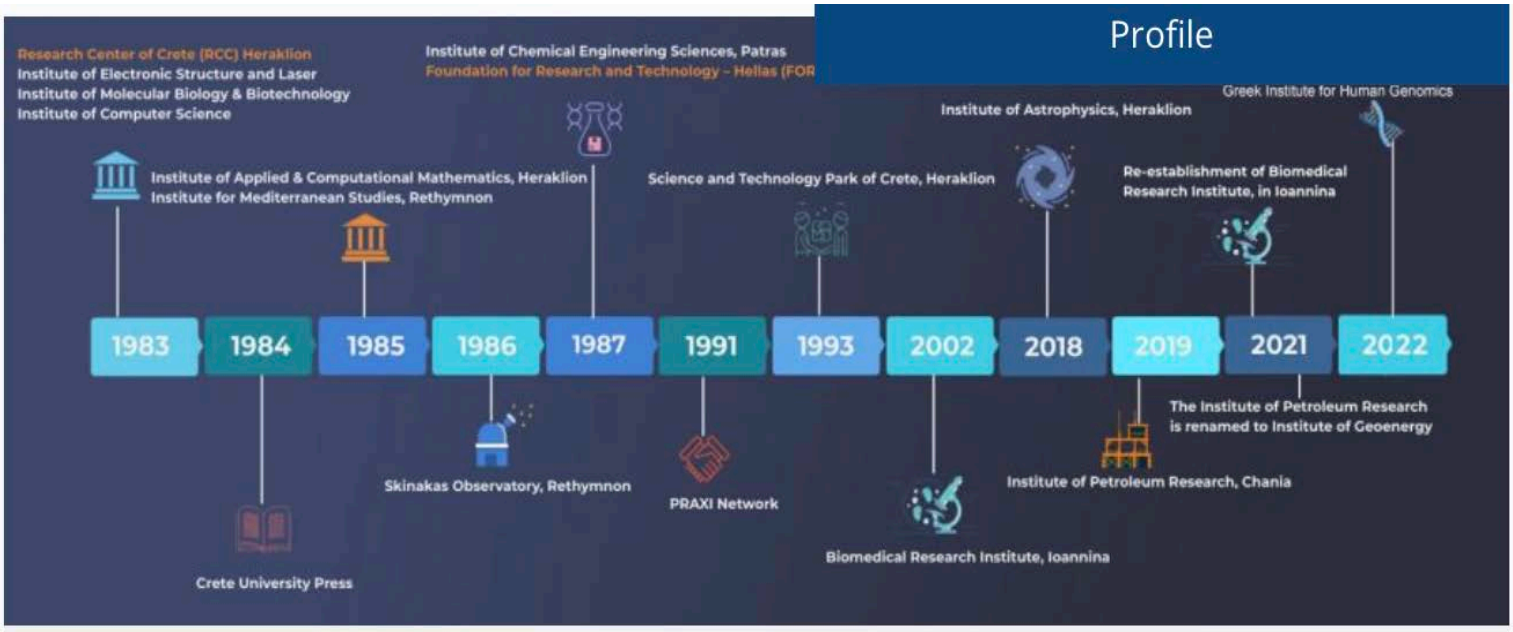
During February of the year 2018, FORTH founded the "*Institute of Astrophysics (IA)*". It was founded, more specifically, in Heraklion city. A year later, and more specifically, during January of 2019, the "*Institute of Petroleum Research (IPR) was established in Chania*". Then, during December 2021, it was renamed as the "*Institute of Geoenergy (IG)*". Also, during December of the year 2021, the "*Biomedical Research Institute (BRI) was re-established as a separate entity*" (FORTH, n.d.).

Finally, and more recently, during September 2022, the "*Greek Institute for Human Genomics was founded in Athens*". Nowadays, FORTH "*comprises ten research*

institutes, spanning fields from molecular biology and astrophysics to geoenergy and computational research" (FORTH, n.d.).

For the sake of better understanding, FORTH's history, as it had been described above, it is shown in the following picture:

Picture 1. FORTH's history



Source: https://www.forth.gr/en/content/History.26/

4.2 FORTH's Organizational Structure and Decision-Making Processes

At first, concerning the information that are already given in FORTH's official website, about its organizational structure, this foundation is "*organized as a legal entity governed under private law, operating under the supervision and funding of the General Secretariat for Research and Innovation of the Greek Ministry of Development*". Its structure "*comprises three main layers*". The first layer is the "*Board and central governance*", the second one is "*the Central Administration*" and the last one is "*its network of research institutes and special units*" (FORTH, n.d.).

Even more, it is mentioned that the "*Board of Directors*" is located to the top of the organization's structure. In more analysis, "*Board of Directors*" defines strategic directions and supervises the FORTH's general and overall functions and operations.

Beneath the "*Board of Directors*" are the core executive functions. These functions are handled by the "*Central Administration*", that is located at the headquarters in Heraklion. Even more, it is mentioned that the "*Central Administration*" is responsible for all administrative, financial and technical services (FORTH, n.d.).

As about its specific structure, it includes the following ones:

- An Administrative Service: It handles the BoD decisions, the human resources, coordination with peripheral institutes and the liaison with the governmental bodies.
- A Financial Service: It is tasked with budgeting and expense monitoring, while at the same time it is responsible for logistics and overseeing the research program finances.
- A Technical Service: This service is mostly responsible for planning, execution and maintenance of buildings and infrastructure.
- Supporting departments: these departments that report directly to FORTH's legal representative, such as for example the "*Legal Department, the Data Protection Office (DPO), International & Public Relations, and the Library Department*" (FORTH, n.d.).

Parallel to the "*Central Administration*", FORTH is composed of a number of research institutes. Each of these research institutes specializes in distinct scientific or technical domains. Also, it is mentioned that these institutes cover multiple areas. Characteristic examples are the areas of molecular biology and biotechnology, the area of computer science, the one of applied and computational mathematics, the area of electronic structure and lasers, the astrophysics' area, the field of geoenergy, Mediterranean studies, the area of chemical engineering and finally, the one of biomedical research (FORTH, n.d.).

In addition to the institutes, FORTH includes special structural units, as the ones that were said before. More specifically, we refer to the "*Crete University Press (CUP), the Science & Technology Park of Crete, and the PRAXI Network*". All of these, support the organization's functions in publishing, technology transfer and external collaboration (FORTH, n.d.).

Concerning FORTH's organizational structure and decision making process, the organization's Associate Director supported that "*FORTH's decentralized structure*

allows for flexibility in decision-making, enabling each Institute to tailor its strategies in terms of research focus, pursuing of funding, and innovation initiatives" and he also added that "*However, this autonomy can also introduce coordination challenges, which calls for efficient communication and governance mechanisms to maintain overall operational efficiency and strategic alignment*".

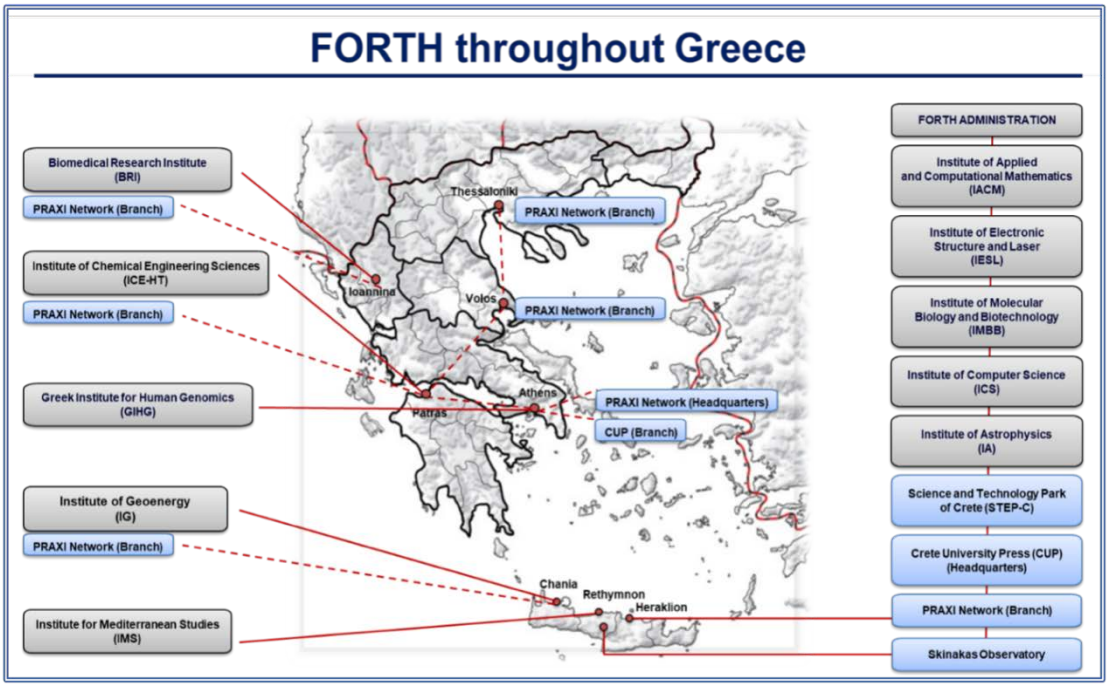
Then, FORTH's Head Project Monitoring & Management Service mentioned that "*The decentralized structure makes operational decision making more focused to the specificities of each institute but adds administrative burden due to the need for administrative staff in each institute*", while the FORTH's Director's opinion was that "*FORTH has grown into a complex, distributed organization with presence in several cities in various regions*" and that "*Institutes enjoy autonomy in carrying out daily administrative tasks in a distributed manner*". Therefore, he added that "*This means that several administrative departments are replicated in Institutes that are located away from the headquarters*".

FORTH's Head Project Monitoring & Management Service also mentioned that "*Digital transformation and standardization of processes facilitate this distributed operation*" and that "*Further optimization is required in order to achieve operational efficiency*". Nonetheless, he said that "*major decisions are discussed during the monthly meetings of the Board of Directors with the participation of all Institute Directors*".

Then, FORTH's Assistant Researcher declared that "*It's a big mesh that gives flexibility to those that want to do their job but also justifies huge delays to those that don't want to do their job*". At the same time, the organization's Administrative & Finance Director mentioned that "*FORTH currently comprises 10 Research Institutes and 3 Units, with facilities and more than 1700 staff located in 8 cities throughout Greece*".

The following picture justifies the answer that was given by FORTH's Assistant Researcher, as it was sent by himself, as a part of his answer to the specific question in the context of the interviews:

Picture 2. FORTH's institutes and units throughout Greece



Source: Part of the interviews

Continuing with the FORTH's Assistant Researcher's answer, he also mentioned that "*FORTH has been designed, already since its inception, and is still operating on the basis of a well-established balance between science/research and administration/finance*" and that "*The science/research related activities, which among others include priorities, strategy, initiatives but also funding and projects, are taking place solely at Research Institute level, decided by the relevant bodies which, depending on the practices followed – include the Director, the Scientific Council, Heads of Departments/Laboratories and PIs*".

Then he also declared that "*On the other hand, the need for achieving economies of scale but also to secure uniform, same standard, place blind support, led to the establishment of the Central Administration, mandated with providing all non-research related services*". He then mentioned that "*The Central Administration has an instrumental role for enabling FORTH's researchers and scientists throughout Greece to conduct state-of-the-art research, but also to support the functioning and operation of FORTH itself, and its business development and expansion, by horizontally supporting and implementing all non-research related activities, processes and*

requirements, i.e. all horizontal administrative, financial, technical, legal, reporting, human resources and IT support throughout FORTH and all its Institutes irrespective of their location".

Finally, according to the FORTH's Chairman of the Board of Directors, FORTH "*is the premier research institution in Greece, recognized for its scientific excellence and innovation*". It has been "*established in 1983, FORTH has grown into a beacon of interdisciplinary research, contributing to cutting-edge discoveries across multiple scientific fields*" and the "*10 diverse research Institutes of FORTH, which span across the Country, foster scientific excellence in areas that are ushering the new era of the 4th Industrial Revolution, such as nanotechnology, genetic engineering, the internet of things, artificial intelligence, quantum computing, genomics, photonics, energy, and climate change*".

4.3 Leadership at FORTH

As it is characteristically declared in the context of the FORTH's official website, "*The Board of Directors (BoD) consists of the Director of the Central Administration (Chair), the Directors of the Research Institutes, a Representative (appointed) of the General Secretariat of Research and Innovation, a Representative of FORTH Researchers and a Representative of FORTH employees. The BoD is the highest administrative body of FORTH*" (FORTH, n.d.).

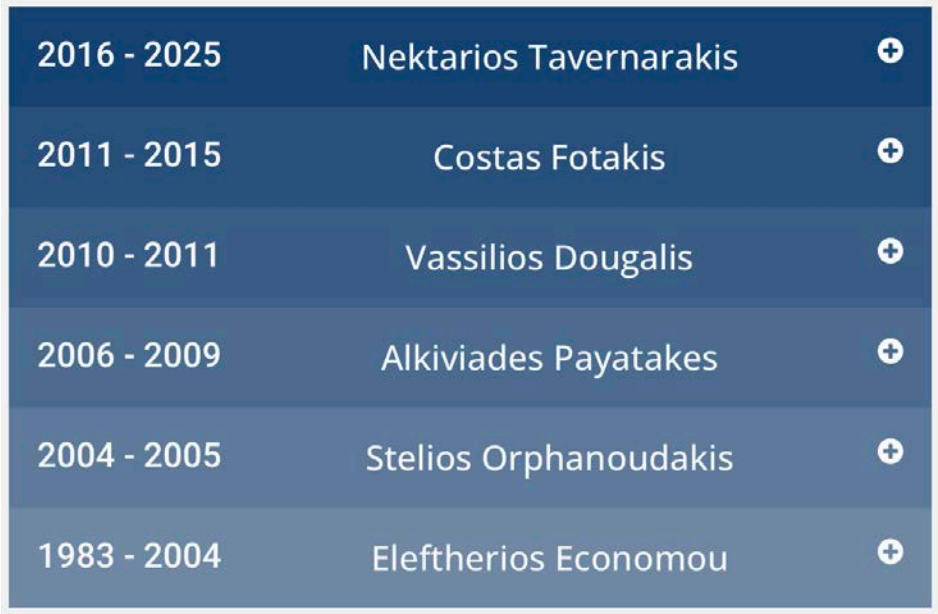
In more analysis, according to the most recent information that are given by FORTH's website during September of 2025, the FORTH's leadership is formed as following:

- Vassilis Charmandaris is the Director of the Central Administration, serving as Chairman of the Board
- Gelina Harlaftis is the Vice Chairwoman, as the Director of the Institute for Mediterranean Studies
- Emmanouel Stratakis, is the Deputy Director of the Institute of Electronic Structure & Laser (IESL)
- John Vontas, is the Director of the Institute of Molecular Biology & Biotechnology (IMBB)
- Panagiotis Tsakalides, is the Deputy Director of the Institute of Computer Science (ICS)

- Charalambos Makridakis, is the Director of the Institute of Applied & Computational Mathematics (IACM)
- Theophilos Ioannides, is the Director of the Institute of Chemical Engineering Sciences (ICE-HT)
- Vasiliki Pavlidou, is the Deputy Director of the Institute of Astrophysics (IA)
- Ioannis Yentekakis, is the Director of the Institute of Geoenergy (formerly IPR)
- Savvas Christoforidis, is the Director of the Biomedical Research Institute (BRI)
- Panagiotis Deloukas, is the Director of the Greek Institute of Human Genomics (GIHG)
- Maria Klapa, is the Representative of FORTH Researchers and Research Director in ICE-HT
- Kostas Hatzigiannakis, is the Representative of FORTH Employees and affiliated with IESL
- Eleni Maraki, is the Representative of the General Secretariat of Research & Innovation

The following picture, presents the history of the FORTH's former presidents during the years:

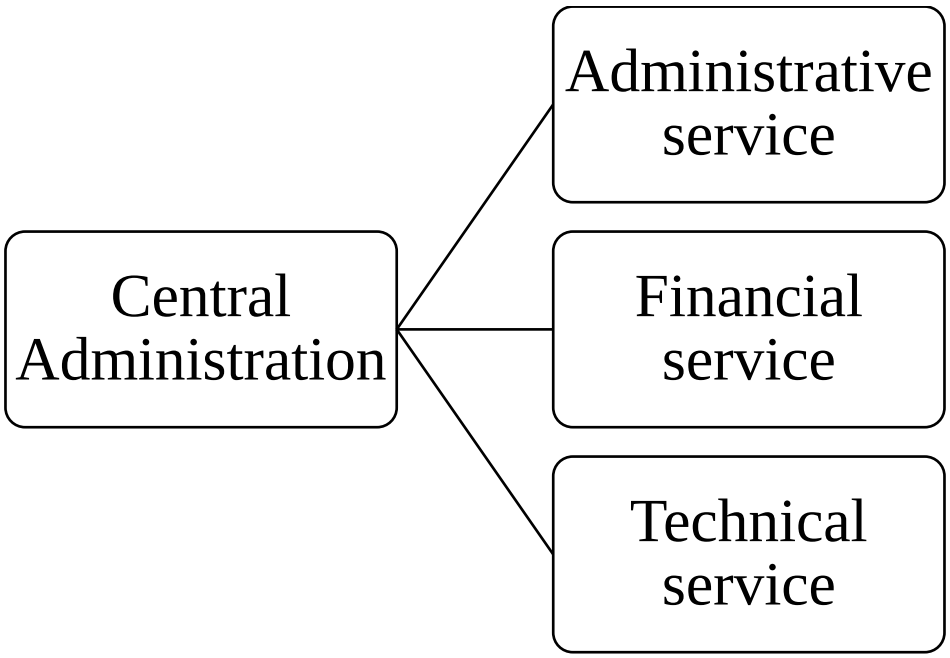
Picture 3. FORTH's former presidents



Source: https://www.forth.gr/en/content/Former-Presidents.31/

As about FORTH's central administration, as it is mentioned at the official website of the organization, it is "*responsible for the management of administrative and financial matters and operates at its headquarters, in Heraklion, Crete*" (FORTH, n.d.). The following diagram presents the FORTH's central administration basic structure:

Figure 1. FORTH's central administration basic structure



Source: https://www.forth.gr/en/content/Central-Administration.34/

More analytically, the administrative service, is responsible for "*implementation of BoD decisions, correspondence, protocol and archive, management of human resources, administrative coordination and consulting of the peripheral Institutes, coordination of projects execution and relations with the State and its bodies*". As for the financial service, it is responsible for "*budget planning, execution & monitoring, logistics, management of revenues and expenses and financial monitoring of research programs*". Lastly, as for the technical service, it is responsible for "*engineering projects management, planning and execution and buildings operation and maintenance*" (FORTH, n.d.).

As for the "*Departments supporting the administrative and research activities, reporting to the legal representative of FORTH*" these are the following ones:

- *"The Legal Dept., offering legal support and advice to FORTH.*
- *The Data Protection Officer (DPO) who is responsible for the personal data protection policy and its implementation, in order to ensure that FORTH is compliant with the General Data Protection Regulation (GDPR).*

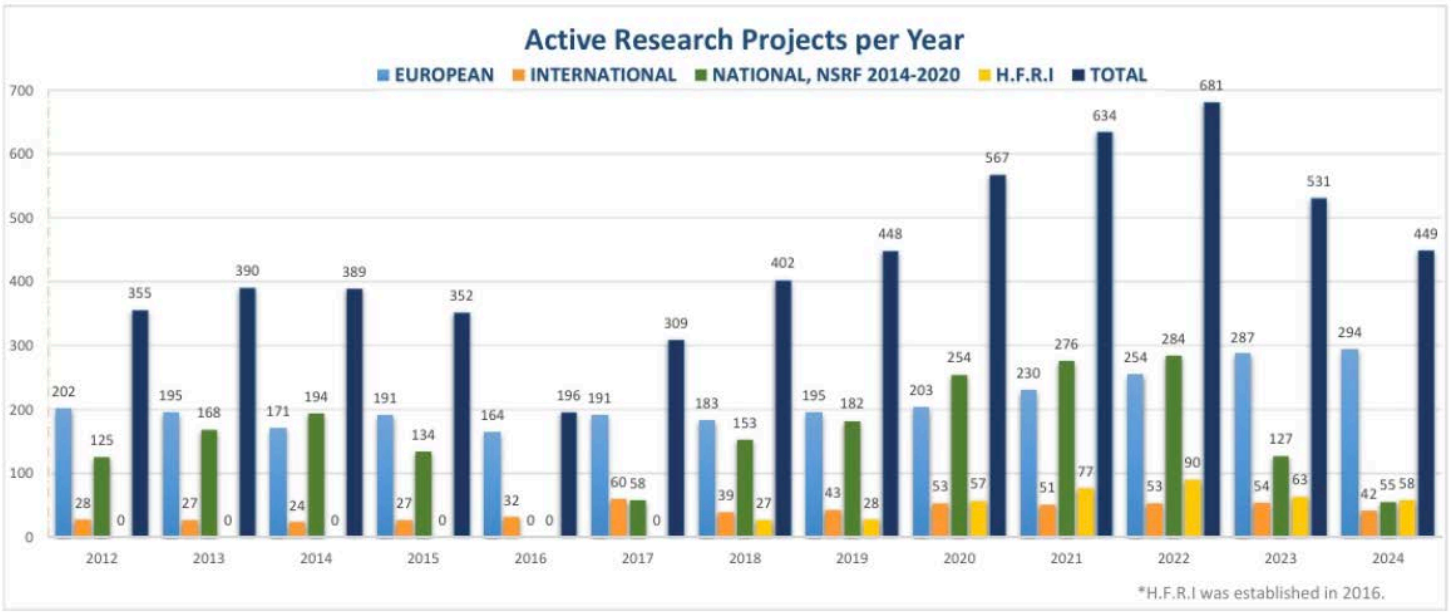
- *The International and Public Relations Dept., implementing actions for the promotion of FORTH's research accomplishments.*
- *The Library Dept., managing a large collection of journals and books, providing bibliographic information and collaborating with all academic libraries in Greece and many abroad*" (FORTH, n.d.).

4.4 Key Research Units under FORTH

At this point, it is mentioned that over the last ten years, and more specifically between the period 2015-2024, "*1,537 International, European and National research projects as well as projects funded by the Hellenic Foundation for Research and Innovation (H.F.R.I.) of over 0.5 b€, have been implemented at FORTH*" (FORTH, n.d.).

The following diagram shows the active research projects of FORTH, per year:

Diagram 1. FORTH's active research projects per year



Source: https://www.forth.gr/en/content/Research-Projects.48/

The above-mentioned diagram shows the progression of active research projects at FORTH between 2012 and 2024. It distinguishes among European, international, national (NSRF 2014-2020) and H.F.R.I. projects. At first, an upward trend is observed over these years. Despite this fact, although, there are fluctuations in individual categories.

More analytically, in the early period that ranges from the year 2012 to the year of 2015, European projects dominated, consistently accounting for the largest share. For example, during the year of 2012, there were 202 European projects. They are far surpassing both international and national initiatives. At the same time, national projects remained significant during this phase. Then, the international ones made only a marginal contribution.

Continuing between the years 2016 and 2018, we observe a temporary decline in the general activity of FORTH. More analytically, we observe a total dropping to 352 in the year of 2016 and 309 in the year of 2017. Nevertheless, this pattern was followed by a recovery in the year of 2018 and particularly during the year of 2019. More analytically, during the years 2018-2019, the research projects again exceeded the number of 400. Also, during this stage, the first contributions of the H.F.R.I. are starting to become visible, following its establishment in 2016. This means that the H.F.R.I. is steadily adding value to the total number of research projects of FORTH.

Continuing to the period between the years 2020 to 2022, it seems to present the most dynamic growth for the FORTH's research projects. More specifically, the number of its research projects increased from 448 in 2019 to 567 in the year of 2020. Then, they continued to increase, reaching the number of 681, during the year of 2022. This positive fact, does not show only the FORTH's strong performance in European research funding. It also proves the FORTH's worth-noting expansion of national and H.F.R.I. projects. Even more, the international collaborations, despite the fact that they are seem to be smaller in scale, they also showed a worth-mentioning growth. This means that they support the overall diversification of the foundation's research activity.

Finally, it is observed that after the year of 2022, the picture of the above diagram shows a decline. More analytically, the number of the active research projects fell to 634 during 2021. Then, they were increase in 2022 and afterward, they was decreased once more, to 531 in 2023 and to 449 in the year 2024. Although the European projects are

still the backbone of FORTH's research portfolio, we observe that the national and H.F.R.I. projects begin to play a more substantial role, at least in comparison with the earlier years of the above-presented period of time.

Finally, at this point, we consider as worth-noting the fact that FORTH "*is placed among the leading research centers in Greece and abroad based on various external evaluations and reports*". More analytically it has been placed as first:

- "*Among the Research Centers of Greece, in all evaluations carried out by the General Secretariat for Research & Innovation (GSRI) using external, internationally renowned scientists as experts*
- *In the Ranking Web of Greek Research Centers, Webometrics 2017, 2018, 2019*" (FORTH, n.d.).

It has also gained the second place among the "*10 best research and educational organizations in Greece in Nature INDEX*" and the fifth position among all "*European Research Foundations and 35th among all Research Foundations and Universities, for its participation in research projects of the 7th Framework Programme approved for funding during the period 2007-2012*". It has also gained 191 Marie Curie grants and it has gained the 46th place in the "*European Research Council Grants (ERC)*", which was the highest "*number in Greece*" (FORTH, n.d.).

CHAPTER 5. MANAGEMENT PRACTICES AT FORTH

5.1 Strategic Leadership and Vision

As for strategic leadership and vision, the Associate Director of FORTH-ICS mentioned, "*FORTH is the only Research Center in Greece that encompasses all Physical Sciences while also addressing various aspects of the Humanities*". He also mentioned that FORTH "*is primarily dedicated to research excellence and places growing emphasis on interdisciplinary collaboration among its Institutes through programs in Space Technologies, Bioinformatics, Digital Humanities, and more*".

According to FORTH's Head Project Monitoring & Management Service, FORTH "*has always had a vision of excellence and trying to attract top talent from across the globe; also expanding nationally with setting up institutes across Greece*", while FORTH's Director mentioned that its vision "*comprises the following goals: Continue pursuing excellence in both basic and applied research; Develop and promote research in emerging areas of strategic importance (e.g. Quantum Technologies, Technologies for Space and Defense); Foster synergies for addressing interdisciplinary challenges; Promote innovation by transforming mature research results into products and services with relevance to the international market*".

As FORTH's Assistant Researcher mentioned about its vision, it "*depends primarily on the Head, i.e. the President*". FORTH's Assistant Researcher also added that "*Given the recent assignment of the new President, we will have to give him time and check in practice which is his vision and how he will implement it*".

Then, FORTH's Administrative & Finance Director mentioned that "FORTH historically has been achieving excellent evaluations among other Greek research centers, evaluations that bring FORTH in the first position in Greece in all official rankings". Then it was added that "*to date, 46 FORTH Researchers have been awarded highly competitive European Research Council (ERC) grants, securing more than 65 million € for FORTH*". According to his point of view, "*this is attributed among others to the fact that FORTH's scientific orientation is driven by a dedication to conducting high-impact, frontier, internationally competitive research that addresses global challenges and emerging scientific questions*". He also added that "*this excellence driven research remains FORTH's main compass for future planning*". Then, he mentioned that FORTH "*envisions becoming a global leader in interdisciplinary*

research, simultaneously addressing key challenges that mainly relate to the following objectives: Excellence in Research, Education and Training and Innovation and Societal Impact".

As about the FORTH's Chairman of the Board of Directors, he mentioned that "*Looking ahead, FORTH aims to improve its attractiveness for researchers to perform groundbreaking research in Greece and expand its infrastructure and research capabilities through key initiatives*". He then continued mentioning the first initiative, which was "*the development of an Innovation Hub, aimed at fostering high-level scientific education and technology-driven innovation*".

He said that "*this initiative, funded with over 56 million €, represents the largest investment in FORTH's history and is poised to significantly enhance its role in both the national and European research landscapes*". He also declared that: "*This milestone investment will be a catalyst for the attraction of new scientists and the expansion of FORTH's research activity in new scientific fields (…) It will also facilitate the creation, hosting and support of new start-up companies, and the attraction of competitive funding*".

Then, he mentioned the second milestone, that was "*Strengthening FORTH's partnerships with leading academic and industrial organizations worldwide to drive collaborative research and innovation, ensuring that FORTH remains at the forefront of technological and scientific advancements*". He said that "*as FORTH moves into the future, it remains deeply committed to its core values of scientific excellence, innovation, and societal responsibility, shaping a brighter, more sustainable future for Greece and the world*".

The third initiative that he mentioned had to do specifically with the FORTH's strategy. More analytically, he said that: "*Our strategy is to maintain and further enhance FORTH's excellence, as well as, expand into emerging and exciting research fields (…) We aspire to attract more foreign investments, aiming to initiate new research activities and collaborations. Investing in pioneering research conducted at FORTH is a wise strategy towards reaping enormous benefits for our collective future*".

Finally, he fulfilled his declaration saying that "*…as FORTH grows, its commitment to cutting-edge research and technological innovation will continue to contribute to global advancements, ensuring a brighter future for science, industry, and society*".

5.2 Human Resource Management and Talent Development

Concerning the human resource management and talent development, FORTH's Associate Director mentioned that "*attracting and retaining top international researchers has been a key priority for FORTH, driving its research excellence and fostering a dynamic community since its inception*". However, he continued mentioning that "*challenges arise from salary levels in Greece, the limited availability of permanent positions, and inconsistent research funding from the Greek state*". Then he said that "*to support its staff, FORTH offers a free and collaborative research environment, well-maintained facilities, an upcoming childcare center for families, and salary enhancements through research grants*".

For the same subject, Head Project Monitoring & Management Service mentioned some main challenges, which are "*the relatively isolated geographical position of Crete, and secondly the legal status which does have limits on FORTH's remuneration policy*". Then, Director of FORTH said that "*a major challenge is the scarcity of Researcher positions which are allocated by the State to the public research centers*" and he further explained that "*a small number of such positions were last allocated in 2017 (…) recruiting takes place for positions that become vacated because of leave or for non-tenured positions on soft money*". He furthermore added that "*salaries of research personnel are low as compared to the European average*" and that "*FORTH strives to attract talented personnel by salary top-ups with resources originating in European or private funds*".

The Assistant Researcher's answer about the same subject was that the "*big challenge is to attract motivated young students*" and that "*the location of FORTH's institutes at the periphery of the country does not make it visible to the best Greek students, which traditionally choose the central universities located in Athens or Thessaloniki*".

Administrative & Finance Director's point of view is that "*although FORTH is a strong brand-name by itself, both in Greece and abroad, attracting new talent is becoming a significant challenge, with impact in the ageing of the research staff*". He then mentioned some main factors that are hidden behind this, and that these factors are "*the limitations in offering competitive remuneration, due to the relevant national legislation modalities, but also the fact that FORTH is (mainly) located in the periphery of Greece, having thus limited access to the pool of human capital located in Athens or*

Thessaloniki". One further factor that he mentioned is the "*limited (or comparatively lower) access to critical infrastructure relating to the attraction of new human capital, such as access to international, foreign schools, logistics related limitations (eg extra flight needed to Athens etc)*". On the other hand, he mentioned that "*FORTH has designed and pursues policies to reverse such challenges, which among others include policies accompanying the HR Logo related prerequisities, constant trainings, links to the industry and career office, attractive work conditions and non-monetary provisions*".

Finally, Chairman of the Board of Directors mentioned that "*FORTH's scientific orientation is driven by its dedication to conducting high-impact, frontier, internationally competitive research that addresses global challenges and emerging scientific questions*" and he then added that FORTH "*has transformed the research landscape in Greece, by effectively promoting investigator-driven, frontier research, on the basis of scientific excellence*". Then he supported that by "*prioritizing and supporting frontier research and science, FORTH has increased its international competitiveness substantially*" and that "*this strategy significantly contributes towards curtailing brain drain and brain waste, which is a thorny issue for Greek science*".

5.3 Financial Management and Budgeting Practices

Concerning the financial management and the budgeting practices of FORTH, its Associate Director at FORTH-ICS characteristically said that "*the bulk of FORTH's operational budget is derived from securing competitive funding, primarily through EU framework programs, as well as national projects, private industry contributions, and spin-off companies created by its researchers*" and he then added that "*since the EU's expansion in the 2000s, FORTH has encountered growing competition for EU funding from new member states* (…) *As EU funding becomes increasingly competitive and national funding remains unpredictable, FORTH must diversify its revenue sources by seeking additional private funding to ensure long-term sustainability*".

Continuing with the point of view of the Head Project Monitoring & Management Service, he said that "*FORTH relies on a constant flow of funding from varied sources to support its research and productive activities*" and that "*the challenge is the large competition regarding research funding available from national and EU programmes;*

as an institution of the broader public sector there is limited support from the state budget".

The Director's point of view on that subject area is that "*FORTH has been very successful in attracting funds from National, European and private sources*" and that "*this success has allowed the organization of grow substantially and sustain its operation*". Then, he mentioned that he has to note that "*roughly ¾ of FORTH's personnel is employed with limited term contract and remunerated with external funds*" and that a "*major challenge is securing funds for co-funded programs, in which major parts of the budget (30%-50%) must be secured from national or private sources*". He also declared that in "*numerous cases of co-funded programs the Greek state does not provide the necessary funds or provides part of the budget in the form of matching funds several months or years after the projects have ended, if at all*".

Then, the Assistant Researcher answered that "*securing funding mainly relies on FORTH's PIs (Researchers and affiliated Professors)"* and that *"there is little or zero help from FORTH's structures or departments or Heads*", while the Administrative & Finance Director mentioned that *"with respect to the financial sustainability however, although FORTH has established itself as both a competitive research player but also an efficient grant administrator, FORTH could be liable to all variations in policies, both in Greece but also in the EU, which usually directly reflect to funding mechanisms and opportunities*".

The Chairman of the Board of Directors said that "*most of FORTH's funding comes from international competitive sources (…) Therefore, it is of paramount importance for us to be able to compete at the highest international level for funding*" and he added that "*for this reason, we have established the internal structures and procedures to aid our researchers towards preparing their proposals, by minimizing unnecessary burden and bureaucracy*". He then mentioned that at FORTH, they "*strive to accomplish and maintain international competitiveness*" and that for them, "*this is an existential effort*", because, in order to "*be able to compete for funding, through Horizon Europe Instruments, such as the ERC, Marie Skłodowska-Curie, and the Widening programs, among others"* they need to "*maintain research excellence*". Therefore, he explained that they tend to "*place special emphasis in attracting highly talented scientists, both from within Greece but also from abroad*". As for their "*secret for success*", he

mentioned that it "*is the creation of an environment that is conducive to top-level research, and promotes interdisciplinarity, based on meritocracy and close collaboration between the 10 diverse research Institutes of FORTH*".

Finally, he added that "*fostering the efforts of our researchers and their endeavours, aiming to obtain international funding mainly through European Framework Programs, such as Horizon Europe, is of strategic importance for FORTH, which also faces the challenge of being a Research Institution in the periphery of Europe, away from the main centers of excellence of central Europe*".

5.4 Research Funding and External Collaborations

Continuing to the research funding and the development of external collaborations, the participants gave a clear picture through their answers. In more analysis, the Associate Director mentioned that "*this type of collaboration largely relies on (and should continue to rely on) the individual efforts, networks, and joint activities of FORTH researchers with their international colleagues*". He also said that "*institutional involvement in international associations (such as ICS in ERCIM, IMBB in EU-LIFE, etc.) plays a crucial role in enhancing FORTH's visibility on the global stage*" and he added that in the FORTH's case, "*collaboration between its Institutes is supported through initiatives like the FORTH synergy grants, joint external projects, retreats, and more*".

Then, as for the Head Project Monitoring & Management Service's answer, the external collaborations happen "*through creating research areas of common interest, meetings and networks that are built within the context of research projects*", while the FORTH's Director mentioned that "*all FORTH Institutes maintain networks of partners for collaboration in the context of competitive European projects*" and that "*in the European research funding landscape this is an absolute necessity*".

As about FORTH's research funding and collaborations, he mentioned that its "*research personnel and project administration personnel are well-versed in the collaboration with other public and private entities in Europe*" and that the "*participation in international organizations and associations is also very important as it provides access to partners with complementary expertise*". He also added that

"*FORTH emphasizes the collaboration with industry in Greece and abroad for the purpose of technology transfer*".

Then, FORTH's Assistant Researcher added that "*collaborations within research units is mainly triggered by the needs or interests of the unit's members (…) Collaborations between researchers from different Institutes is promoted through the FORTH Synergy Grants that FORTH has created*". He then said tha "*collaborations between FORTH members and other academic institutions or the private sector is based a lot on the motivation, interest and the extroverting actions of FORTH's researchers*" and that "*FORTH's President and the Directors also act as promoters for extroversion*".

FORTH's Administrative & Finance Director answered that "*FORTH is the first and only research center in Greece that has designed and implemented an intramural funding program dedicated to promoting cross-Institute, cross-scientific research and collaborations*". He, more analytically, mentioned the "*Theodore Papazoglou FORTH Synergy Grants*" and he said that it "*was therefore first put in place in 2019, with the aim to fund – on an annual basis - innovative, multidisciplinary, collaborative projects that involve research teams originating from at least two (2) FORTH Institutes*". Then, he mentioned that "*since 2019, through the FORTH Synergy Grants mechanism, FORTH has selected twenty-eight (28) projects for funding, out of 104 submitted and evaluated proposals, supporting cross-disciplinary research with a total funding of EUR 2,225,780.00 engaging sixty-three (63) principal investigators*".

As fir the point of view of the Chairman of the Board of Directors, he declared that "*approaching sustainable development goals and battling unpredictable existential threats, akin to the recent pandemic are, in my view, among the major global challenges, for the future*". He said that "*rising up to these challenges will require the concerted efforts of scientific communities across the globe, such as inter-continental collaborations*" and that they "*have recently witnessed such spontaneous, bottom-up global coordination of research activities, in response to the COVID-19 crisis*". Concerning the pandemic crisis, he pointed that "*in a very short period of time, the virus and its modus operandi have been characterized in great detail, and we even now have highly efficient vaccines and therapeutics (…) this is a truly amazing feat and speaks volumes about the power and value of scientific research, as well as, about the importance of international collaboration*". He then added his personal perspective,

saying that "*I believe it is critical to promote inter-continental academic and research cooperation*" and that "*such partnerships facilitate the mobility of students and academic personnel between Countries, in addition to supporting joint education and research initiatives*". He concluded adding that "*FORTH is rapidly reinforcing its position in the global research and innovation scene, while becoming a popular destination for scientists from abroad*".

5.5 Innovation Management and Technology Transfer

As for the innovation management and technology transfer, FORTH's Associate Director mentioned that its "*Praxi network is a key technology transfer and innovation support organization in Greece, dedicated to promoting innovation and facilitating technology transfer*". However, he said that it is "*currently understaffed*" and he also characterized it as "*unable to fully meet the growing demands of FORTH researchers seeking to commercialize their research outcomes*". He also mentioned that "*legal advice, IPR management, and clear guidelines for establishing spin-offs should be easily accessible to all FORTH staff*" and he then added that "*both past and recent success stories should be communicated more effectively within the FORTH community*".

Then, Head Project Monitoring & Management Service added that "*FORTH has many tools and structures in place to support technology transfer, i.e. PRAXI and STEP-C which are structure specifically setup to assist with these issues*", while its Director mentioned that "*in addition of the Research Institutes themselves, the Innovation ecosystem of FORTH comprises a Science & Technology Park that functions as an incubator for new endeavors in the form of spin-off or start-up activities and a technology-transfer office that assists with patent application preparation and with contacts for access to finance for newly established companies*". He also said that "*some of the Institutes (e.g., ICS, IESL, ECEHT) have been quite successful in terms of patents, license agreements with industry and spin-off company creation*" and that "*there are skills that are still missing (…) these include specialized legal services, marketing research and business development services*".

Then, FORTH's Assistant Researcher also mentioned the "*Praxis Network and STEP-C*", saying that these are "*the two FORTH's structures, dedicated to support innovation*

and technology transfer (…) in some cases Praxis has provided valuable support". As about the reason for the limited commercialization of the research outcomes, he supported that it "*is the mindset of FORTH's PIs*", adding that they "*are mainly trained to do basic research that may give exploitable results in 20 years from now*" and that the "*applied science is considered second-division science in FORTH*".

The Administrative & Finance Director said that "*FORTH was the first Research Center in Greece that engaged in actively pursuing strategies and establishing mechanisms supporting innovation and technology transfer*". Taking this into account, he added that "*FORTH operated PRAXI Network as well as STEP-C*" and that "*already since 1991 PRAXI Network was established. PRAXI Network, the Technology Transfer unit of FORTH, was established in 1991 with the aim to assist Greek small and medium-sized enterprises (SMEs) and research organizations in their technology transfer and innovation related endeavors*".

Also, FORTH's The Administrative & Finance Director mentioned that "s*ince inception, its mission has been to render the aforementioned entities more competitive via the linkage between research and industry, the promotion of innovation and entrepreneurship as well as the transnational cooperation*". He pointed that "*it is a nation-wide agency, which operates the one-stop-shop principle serving Research Centers, Universities, the Industry, the SMEs and the Public Administration all over Greece*". He also added that its activity is "*diverse*" and that it ranges "*from pure technology transfer advice and mediation to the Greek research community, innovation consultancy and business support to SMEs, internationalization and international cooperation of research systems across the world, foresight and future research to cluster creation and support, offering a complete set of services such as Technology Transfer, Access to Public Funding, Industry and entrepreneurship support, High impact/added value Innovation support, Advice & Consulting*".

On the other hand, FORTH's The Administrative & Finance Director made a reference to "*The Science and Technology Park of Crete (STEP-C)*", explaining that it "*was established in 1993 to support research-driven innovation and to promote academic and start-up entrepreneurship for regional development and economic growth*". He also said that "*as FORTH's Business Incubator, STEP-C spans approximately 4,000 sq.m. of on-campus office and laboratory space, distributed across three buildings with*

around 100 offices (…) it hosts 40 high-tech companies employing over 400 professionals. STEP-C plays a crucial role in creating an environment that facilitates the practical application of scientific knowledge, drives technological innovation, and supports the growth of entrepreneurial ventures for the broader benefit of society".

In order for the STEP-C achieve the above-mentioned mission, as FORTH's The Administrative & Finance Director said, it "*operates along four strategic axes: start-up and spin-off creation; hosting and supporting high-tech companies; training and upskilling researchers and entrepreneurs and bridging the research and business ecosystems*". On the other hand, he adds that "*main industry links lie within the mandate and initiatives of PRAXI Network*" and he indicatively mentions that "*PRAXI Network co-created the Hellenic Center for Additive Manufacturing, which is a unique one-stop-shop for 3D printing, providing end-to-end technological solutions and integrated services in energy, maritime, aerospace, and medical*".

Moreover, FORTH's The Administrative & Finance Director continues saying that "*PRAXI Network co-created the Mediterranean Agri-Food Competence Centre - MACC, the organization with the mission to strengthen the competitiveness of the Greek agro-economy through innovation, knowledge and human resources*" and that "*PRAXI Network additionally has launched as co-creator of 4 clusters (Hellenic- Photonics Cluster (HPhos), Hellenic BioCluster (HBio), Innovation Greece and MACC)*". Besides, he supported that "*PRAXI Network has signed multiple MOU with industry representatives, business associations, chambers of commerce and associations of industries for close collaboration*".

Finally, the Chairman of the Board of Directors in FORTH, answered that FORTH "*has established a highly experienced Technology Transfer Unit (the PRAXI Network) to this effect, which further supports our scientists to exploit their most innovative research findings*". In addition, he said that "*FORTH operates, in its premises, the Science and Technology Park of Crete, an incubator of start-up companies that maintain close ties with the academia and research groups of the Institution*". He calls it a "*symbiosis*", that it "*nurtures a conducive science ecosystem that facilitates our close interaction with leading international research, educational and business Institutions"*. Then he characterizes this context as a "*knowledge triangle"* saying that it "*has proven to be a prudent strategy towards boosting FORTH's research and*

innovation capacity". Then, he added that FORTH "*promotes collaborative, interdisciplinary projects that turn fundamental research into practical applications*" and that "*it is indicative that over the 4 decades of its existence, FORTH has become the cradle of many successful spin-off companies, and productive international partnerships*".

5.6 Challenges and Opportunities in Managing at FORTH

Concerning the challenges and opportunities in research managing at FORTH, its Associate Director supports the opinion that "*as FORTH celebrates its 40th anniversary, its key challenge in maintaining research competitiveness is to remain an outward-facing organization, constantly attracting new talent and avoiding inbreeding and stagnation*". He says that "*people are the most important factor in making a difference*" and that "*a significant opportunity for staying at the forefront of future science lies in the ability to conduct outstanding interdisciplinary research by leveraging the top-tier expertise across its various Institutes*".

Then, FORTH's Head Project Monitoring & Management Service answered that "*as previously mentioned, our geographical position, and our status as an organization of the public sector are the main factors that requires extra effort to be competitive*". He also added that "*our research track record, history and outstanding and renowned researchers that have been part of FORTH, is our competitive advantage*".

The Director's point of view on that subject area is that "*FORTH needs to revisit its organizational structure and further optimize its processes (…) research competitiveness relies on efficient and effective management*". He also added that "*it needs to strengthen certain units as mentioned in previous items in the questionnaire*". As for the research targets, he mentioned that "*FORTH must invest in developing its newer institutes in order to make them competitive*" and in order to ensure availability of funds, he believes that "*FORTH must target an appropriate mix of basic and applied research activities which will lead to further development and the promotion of innovation*".

FORTH's Assistant Researcher mentioned that "*FORTH's administration (both in central and institute level) should become simpler*". Then he said that being a Private Law Legal Entity "*hinders this, as many processes are imposed by the central*

government". The he said that, in order to maintain its research competitiveness, "*FORTH should re-create a grants office and hire competent personnel to work in it"*. He also noted that "*researchers do not trust the current personnel of the existing office because it does not exhibit the necessary qualification or experience*". Finally, he said that he thinks that "*FORTH should invest in lobbying in Brussels*".

Then, FORTH's Administrative & Finance Director supported that "*challenges mainly relate to the landscape and the context FORTH is operating within*" and that these challenges, "*indicatively include the lack of competitive remuneration offered to staff, the bureaucracy imposed by the legal framework, the low awareness at political level on the importance of science and research, as well as the very recent shifts in policies and priorities worldwide*".

Finally, FORTH's Chairman of the Board of Directors, mentioned that "*FORTH envisions becoming a global leader in interdisciplinary research, expanding its contribution to the scientific community, and enhancing its role as a driver of research and innovation in Greece and Europe*". He explained that "*through the synergy of research and technological innovation, FORTH aims to stimulate a knowledge economy, strengthen Greece's global scientific standing, and provide solutions for sustainable societal growth*". He then proposed that in order for FORTH to be able to achieve this goal, it need to be committed to three factors. "*Excellence in Research*" was the first factor. In that context, FORTH's Chairman of the Board of Directors mentioned that "*upholding its tradition of scientific rigor, FORTH will continue to attract top-tier researchers and nurture a collaborative, conductive science ecosystem that encourages groundbreaking discoveries*". The second factor that he mentioned was "*Education and Training*", supporting that "*FORTH recognizes the importance of preparing the next generation of scientists and innovators*" and that "*collaborating closely with academic and business institutions, the Foundation empowers young researchers, promotes innovation, and lifelong learning*". At his point of view, "*fostering this knowledge triangle has proven to be a prudent strategy towards boosting the research and innovation capacity of FORTH*". The third and last factor that he mentioned was "*Innovation and Societal Impact*". In the context of the third factor, he mentioned that "*FORTH is committed to translating research into tangible societal benefits*" and that through "*its innovative initiatives, the Foundation aspires to expand its support for start-ups, spin-offs, and collaborations with industry, ensuring that*

research output contributes to the economic and social progress of Greece and beyond".

CHAPTER 6. BENCHMARKING ANALYSIS

6.1 Selection of a Comparable European Research Center

The benchmarking process, as it was already mentioned, in the context of the second chapter of this dissertation, requires the careful identification of a comparable European research center that mirrors, to a reasonable extent, the FORTH's structural, organizational and at the same time its scientific profile. In the context of the benchmarking studies, the choice of the reference institution shows the validity of the comparative analysis. The reason that this happens, is that it provides both a standard of excellence and a source of transferable practices (Camp, 1989).

In the context of the present dissertation, the Max Planck Society (MPG) in Germany, had been selected. This selection was made, due to the fact that we considered this specific organization as the most suitable FORTH's counterpart. This choice is justified by many converging factors. At first, we took into account the Max Planck Society's similarity with FORTH in multidisciplinary orientation. We also took into account its global scientific reputation and the emphasis on excellence. Finally, we took into account the fact that it serves governance model, that succeeded in balancing the autonomy with the accountability.

More analytically, the Max Planck Society had been established in 1948. It was established as the successor of the Kaiser Wilhelm Society. It is about a leading research organization in Europe, that has more than 80 institutes across a wide spectrum of disciplines. They also range from natural sciences and life sciences to humanities and social sciences (Max Planck Society, 2024).

Even more, much like FORTH, the Max Planck Society operates under public supervision. At the same time, it still maintains a distinctive level of autonomy in the decision-making. It also holds distinctive levels of autonomy in staffing and resource allocation. Therefore, it represents a structural alignment, that is essential for benchmarking. The reason for this is that it reflects common governance challenges, that research centers face, in reconciling public accountability with their scientific independence (OECD, 2016).

One further decisive factor for the selection of the Max Planck Society as the comparable institution, is its international prestige, alongside with its consistent ranking

among the world's top research organizations. Moreover, the Max Planck Society's record of producing Nobel laureates, pioneering discoveries and high-impact publications sets this organization as a benchmark of excellence, in the context of the scientific management and at the same time, in the context of innovation (Sakmann & Stahnisch, 2023; Schmaltz et al., 2023).

On the other hand, FORTH, although it operates on a smaller scale, aspires to sustain excellence across multiple domains, similarly with the Max Planck Society. Even more, FORTH's strong international collaborations make the Max Planck Society a relevant comparator, in order for understanding the way through which the smaller institutions might scale their performance, through targeted reforms and through strategic alliances, as well.

Even more, it is mentioned that the Max Planck Society also represents an instructive funding. At the same time, it represents an instructive management model, as well. At the time when the Greek research ecosystem, including FORTH, relies on competitive European funds, such as or example the Horizon Europe, the Max Planck Society benefits from a dual funding mechanism. In the context of this dual funding mechanism, there is a solid base of federal and state funding, that is combined with diversified external resources (Toribio-Flórez et al., 2021).

Therefore, it represents a stable financial environment. This financial environment of the Max Planck Society supports long-term and high-risk research. This often leads to groundbreaking discoveries. Therefore, the benchmarking against this model might help us to identify lessons for improving the financial resilience of FORTH. These lessons might be even more important and useful, particularly in the context of Greece's limited national investment, in the sector of research and development (Stamatakis et al., 2024).

Further and equally important is the structural similarity in the autonomy of research institutes. More analytically, FORTH's decentralized model creates an environment, in which individual institutes enjoy considerable flexibility in shaping their research agendas. This decentralized model mirrors the Max Planck model of "*scientific autonomy*" granted to institute directors (Sachse, 2025). Therefore, it is about a shared feature, which allows for a meaningful comparison of how autonomy impacts strategic

coordination. It is also a able to allow a meaningful comparisons of how autonomy impacts innovation and performance evaluation in the different national systems.

Furthermore, both institutions, FORTH and the Max Planck Society, put emphasis on the international collaborations. More analytically, the Max Planck Society has established research partnerships worldwide. These partnerships had been established, especially through the Max Planck Partner Groups and International Max Planck Research Schools (IMPRS). They also serve as models for increasing and supporting talent mobility and global visibility (Max Planck Society, 2024). The same happens in the case of FORTH's active participation in European networks and consortia. This means the existence of the relevance of learning from the Max Planck Society's structured programs for internationalization.

6.2 Comparative Analysis: FORTH vs. Germany's Max Planck Society

At first, it is mentioned that one of the most striking differences in the context of the comparative analysis between FORTH and the Max Planck Society, is observed in the scale and financial stability of these two organizations. More analytically, the Max Planck Society benefits from substantial and stable core funding. This comes especially from the German federal government and the federal states (Länder). They cover approximately a high percentage off 80% of the Max Planck Society's budget. As for the remaining percentage of 20%, it is derived from competitive grants and collaborations (Toribio-Flórez et al., 2021).

Therefore, in the context of the Max Planck Society, a funding structure is followed that it provides Max Planck Society with long-term stability and the capacity to invest in high-risk. This funding structure allows the Max Planck Society to proceed to frontier research without immediate concern for financial sustainability. These, on the contrary, does not happen in the case of the FORTH. In more analysis, FORTH relies on European competitive funding schemes. Indicate examples are the Horizon Europe and the national project-based grants. Therefore, FORTH has comparatively limited baseline state support (FORTH, 2025; OECD, 2016). So, there is a reliance on competitive external sources and this reliance makes FORTH even more agile and performance-driven, in comparison to the Max Planck Society. It also makes FORTH

more vulnerable to fluctuations in funding availability, compared to the Max Planck Society.

Then, a second dimension of the comparison between these two organizations, concerns organizational structure and governance. More specifically, both institutions adopt a decentralized model. In this model, the individual research institutes have high autonomy. More specifically, the case of the Max Planck Society, institute directors exercise substantial independence in defining research agendas, in hiring staff and in managing the available resources. This happens as well, while the Society offers overarching coordination and evaluation mechanisms (Sachse, 2025).

The same happens in the case of FORTH, which similarly grants autonomy to its institutes. This means that the FORTH's institutes are allowed to tailor their research priorities. They are also allowed to pursue specific funding opportunities. However, while the Max Planck Society has created a well-established evaluation system, especially through periodic reviews by international experts, on the contrary, FORTH's evaluation and accountability mechanisms are less institutionalized. They are also more fragmented. At this point it has to be taken into account the fact that FORTH's evaluation and accountability mechanisms are more influenced by national bureaucratic processes (Psychogios & Wood, 2010). So, there is a distinction between FORTH and the Max Planck Society, that highlights the Max Planck Society's capacity to align autonomy with systematic accountability. This is a balance, that FORTH still seeks and tries to implement.

Even more, the talent recruitment and development further show some indicative differences between the Max Planck Society and FORTH. The Max Planck Society is renowned for attracting top international scientists through competitive salaries. It does so, also, through world-class facilities and structured career development opportunities. These opportunities include the International Max Planck Research Schools (IMPRS), which train doctoral candidates in interdisciplinary settings (Max Planck Society, 2024).

On the other hand, FORTH is recognized for its scientific excellence. Despite that positive fact, though, it faces structural barriers. Some indicated examples of these barriers are comparatively low remuneration, limited permanent positions and

geographical challenges. These prove its strong presence outside Greece's metropolitan hubs (FORTH, 2023).

Even more, the above-describe context restricts FORTH's capacity to compete for global talent. Although, FORTH's collaborative and flexible environment partially compensates for these constraints, and it does so, by creating strong internal synergies and international partnerships, too (Karnesis et al., 2024).

As for the innovation and technology transfer, they also represent divergent trajectories. More specifically, the Max Planck Society has historically focused on fundamental, curiosity-driven research, with technology transfer. This had been further facilitated through Max Planck Innovation GmbH. The above-mentioned Max Planck Society's structure offers a systematic support for patents and collaborations with industry (Sakmann & Stahnisch, 2023; Schmaltz et al., 2023).

In turn, FORTH, has been a pioneer in Greece in establishing technology transfer mechanisms. It was notably succeeded through the PRAXI Network and the Science and Technology Park of Crete (STEP-C), too. However, both of these FORTH's units often face staffing limitations. They also face resource constraints. These limitations reduce their ability to fully meet researchers' commercialization needs (Sachini et al., 2024).

So, while both FORTH and the Max Planck Society recognize the importance of bridging basic research with societal applications, finally, the Max Planck Society benefits. The reason is that the Max Planck Society creates a more institutionalized and professionalized framework for innovation.

As for the international collaboration, it is another area of both convergence and divergence. In that context, the Max Planck Society operates a strong system of global partnerships. This system includes initiatives, such as for example the Partner Groups and the IMPRS. Therefore the Max Planck Society is positioning itself as a global leader in internationalization (Max Planck Society, 2024).

Continuing with FORTH, it has also been successful in securing participation, in the context of the high-level European and international consortia. Characteristic examples are the Horizon Europe's projects. Even more, FORTH has forged links with

prestigious universities and institutes, in a worldwide extend (Radioval Consortium, 2025).

Yet, FORTH's capacity for the sustained long-term partnerships is constrained. These constraints com by its financial uncertainty and dependence on short-term project cycles. Whereas, the Max Planck Society is more able to leverage its stable funding and global brand, in order to anchor enduring collaborations.

Afterall, the above comparative analysis showed both similarities and asymmetries between FORTH and the Max Planck Society. More specifically, we saw that both FORTH and the Max Planck Society support autonomy, interdisciplinarity and scientific excellence, as their main principles. Although, the Max Planck Society benefits from superior financial stability and it also has a stronger institutionalized system for talent development. Even more, the Max Planck Society has a more robust technology transfer framework. On the other hand, FORTH demonstrates resilience and adaptability. It also shows an impressive record of performance, taken into account its resource limitations. Afterall, this FORTH's benchmarking against the Max Planck Society, allows FORTH to identify areas, in which structural reforms, the increased state support and the professionalized innovation mechanisms, could significantly strengthen its long-term competitiveness.

6.3 Lessons Learned from Benchmarking

At first, one main lesson that had been learned from the above mentioned benchmarking analysis between FORTH and the Max Planck Society, concerns the importance of the stable core funding. More specifically, the Max Planck Society benefits from a strong and predictable financial base. This base had been provided by the German federal and state governments, as it had also been said before. It also allows its institutes to engage in long-term, high-risk research, that may not have immediate market applications (Toribio-Flórez et al., 2021).

On the contrary, FORTH's reliance on competitive project-based funding, increases the uncertainty. It also places pressure on the researchers, so as for them to continuously secure external grants (FORTH, 2025).

Afterall, this comparison shows the need for Greece to reform its research funding mechanisms. There is also one significant need for Grace to increase its baseline state support. In that case, it can be ensured that institutions, including for example FORTH, are able to plan strategically and that, at the same time, are able to pursue frontier science, without excessive dependency on fluctuating external sources (Stamatakis et al., 2024).

One further lesson that is learned from the above benchmarking analysis is the balance between autonomy and accountability. More analytically, the Max Planck Society's model showed us how decentralization, in the case that it is combined with rigorous evaluation processes, is able to yield flexibility and high standards of excellence, too (Sachse, 2025).

Even more, it is a fact that each Max Planck institute enjoys substantial autonomy. But at the same time, directors are regularly evaluated through peer reviews. These reviews are conducted by international experts. On the other hand, the FORTH's institutes also have their own autonomy. Yet, the evaluation systems remain less systematic. They are also often shaped by national bureaucratic practices (Psychogios & Wood, 2010). Thus, the lesson for FORTH, in that specific case, is that autonomy must be paired with structured evaluation mechanisms. In this way, FORTH will be able to ensure coherence and alignment with the general institutional goals.

Then, the third lesson comes from talent management practices. More analytically, the Max Planck Society attracts top-tier international scientists. It succeeds that by offering competitive salaries and state-of-the-art infrastructure. It does so, also, by offering structured programs, especially for early career researchers. An example for this is the International Max Planck Research Schools (Max Planck Society, 2024).

FORTH, while it is recognized for its scientific achievements, it struggles with limitations in salaries, in permanent positions and in geographical attractiveness. The limitation about its geographical attractiveness, more specifically, comes by taking into account its location, that is outside the Greece's central hubs (FORTH, 2023). Here, the lesson, that needs to be learned, is that building a strong talent pipeline requires research excellence. Except of the research excellence, it also requires competitive working conditions, professional development opportunities and targeted strategies that are targeted in international visibility.

One more significant lesson relates to technology transfer and innovation environments in both the compared organizations. The Max Planck Society has institutionalized commercialization and it had done this through its subsidiary Max Planck Innovation GmbH. This, more analytically, provides systematic support for patents, licensing and spin-offs (Sakmann & Stahnisch, 2023; Schmaltz et al., 2023).

As about FORTH, it has made pioneering efforts in Greece through the PRAXI Network and through the Science and Technology Park of Crete (STEP-C). Although, these these initiatives face constraints in staffing, funding and outreach capacity (Sachini et al., 2024). Therefore, the lesson that needs to be learned that is that professionalizing and at thje same time expanding technology transfer mechanisms, are both necessary.

Even more, internationalization also offers an instructive lesson. More analytically, the Max Planck Society structured global programs, such as for example its Partner Groups and International Max Planck Research Schools, have made this organization as a hub for international collaboration and for talent mobility, too (Max Planck Society, 2024). FORTH, even more, has already presented strong participation in EU consortia. It has also created high-profile collaborations (Radioval Consortium, 2025). But, at the same time, FORTH, despite its effotrts, can further strengthen its international profile. It can do so, by institutionalizing mobility schemes. It can also succeed it by creating sustainable long-term partnerships, that go beyond the project-based cooperation.

Finally, the cultural dimension is one element that give another lesson. The Max Planck Society tradition of developing an organizational culture of excellence and scientific freedom, is integrated in a supportive governance environment. This environment minimizes bureaucracy and at the same time, it empowers researchers. In the Greece’s case, however, research institutions face burdensome administrative requirements. These barriers slow down innovation. They also limit organizational agility (OECD, 2016). Therefore, the lesson for FORTH’s case is that reducing administrative barriers and creating a culture of trust and meritocracy are essential steps. Through these steps, FORTH will be able to sustain its excellence.

6.4 Implications for FORTH's Future Management Strategy

At first, an implication concerns the reconfiguration of funding strategies. More specifically, the Max Planck Society's ability to sustain long-term and high-risk research, is based on the organization's secure baseline state funding. This, after all, complements its external project-based income (Toribio-Flórez et al., 2021). FORTH, on the contrary, remains highly dependent on competitive European and international funding (FORTH, 2025).

This high dependence, on the one hand develops adaptability and excellence. On the other hand, it introduces vulnerability to funding cycles. A future management strategy for FORTH, taking this into account, should focus on lobbying for stronger baseline funding from the Greek state, alongside diversifying income streams through partnerships with industry and philanthropic contributions. This shift is able to offer higher greater financial resilience. It will also allow FORTH to commit to long-term strategic priorities. So, FORTH will stop being driven only by project opportunities (Stamatakis et al., 2024).

One more implication is the need to strengthen evaluation and accountability mechanisms. The Max Planck Society demonstrates the way through which institutional autonomy is able to coexist with systematic and peer-reviewd evaluations of the research institutes (Sachse, 2025). FORTH is following a decentralized model, that similarly increases and supports autonomy to its institutes. On the contrary to the Max Planck Society, FORTH lacks the same level of structured evaluation. The implication for management is clear and taking this into account, we mention that FORTH should institutionalize periodic international evaluations of its institutes. This is going to ensure transparency and to lead FORTH to a continuous improvement. This practice would also align FORTH more closely with European best practices.

The talent recruitment and retention represent one further critical area. the Max Planck Society's international appeal is underpinned by competitive salaries, facilities and career development programs (Max Planck Society, 2024). FORTH, on the contrary, is characterized by low remuneration and a limited number of permanent positions, except of its geographical barriers (FORTH, 2023).

FORTH's management strategy must, therefore, prioritize policies, that increase its attractiveness to researchers. This might include lobbying for flexibility in salary schemes. It might also include expanding non-monetary benefits, such as for example childcare and housing support. It might also include developing structured career pathways for young researchers. Additionally, international mobility programs should be strengthened, in order for them to to integrate FORTH more deeply the the global scientific networks.

Furthermore, a further implication lies in innovation and technology transfer. The Max Planck Society's dedicated commercialization arm, that is Max Planck Innovation GmbH, gives a structured framework for patenting and licensing (Sakmann & Stahnisch, 2023; Schmaltz et al., 2023). FORTH, on the other hand, already possesses important innovation structures. These structures, for example, include the PRAXI Network and STEP-C. Although, these structures remain under-resourced and fragmented (Sachini et al., 2024).

Taking the above mentioned difficult conditions, into account, we end up supporting the fact that FORTH's management strategy should focus on consolidating and professionalizing these units. By doing so, FORTH is going to ensure that technology transfer activities are systematically supported by specialized staff in legal, marketing and business development fields.

As for the internationalization, it also has a strong strategic implication. The Max Planck Society's model demonstrates how structured global initiatives are able to secure a permanent international footprint. This footprint also gows beyond project-based collaborations (Max Planck Society, 2024).

FORTH's management, taking this into consideration, should therefore seek to institutionalize long-term mobility schemes. It might also seek to institutionalize joint research schools and strategic alliances with the top international institutions. This would not only increase and improve the FORTH's global visibility. It would provide its researchers with opportunities to engage in frontier research.

Finally, cultural and administrative reforms are also important and necessary. The comparison that had been conducted between these two institutions, reveals that the Max Planck Society supports a governance culture that minimizes bureaucracy and increases scientific freedom. At the same time, the Greek research institutions often

face administrative burdens that slow decision-making (OECD, 2016) and these barriers also concern the FORTH's case. Therefore, FORTH's management strategy must prioritize digitalization and process simplification. It must also set lobbying for regulatory reforms at the national level, as one further priority. So, the bureaucratic obstacles are going to be reduced.

CHAPTER 7. FINDINGS AND CHALLENGES

7.1 Evaluation of FORTH's Management Effectiveness

The evaluation of the management effectiveness of the FORTH needs a consideration of its organizational structure, leadership and financial strategies. It also requires for us to take into consideration the organization's capacity for innovation and collaboration.

At this point, it is mentioned that one of the main indicators of management effectiveness, at FORTH, is its ability to hold up to high levels of research output and competitiveness, in European funding schemes. Even more, it has to be mentioned that over the past decade, FORTH has participated in thousands of research projects at the national, European and international levels, as it was also mentioned, in the context of the previous chapters of this dissertation. By doing so, FORTH had succeeded attracting substantial funding. This includes competitive European Research Council (ERC) grants (GSRI, 2025).

Also, this fact, shows on the one hand the existence of scientific productivity. On the other hand, it shows an effective financial and administrative mechanisms, for supporting grant applications and project management. If we compare FORTH with the rest other Greek research centers, FORTH has established a stronger capacity to integrate external resources in its long-term strategy. There is no doubt that it shows a level of financial agility. This is after all essential in a resource-constrained environment (OECD, 2016).

Furthermore, the leadership effectiveness is one more central dimension. In more analysis, FORTH's Board of Directors offers overarching governance. At the same time, while individual institutes retain autonomy, in order for them to define their research agendas. By doing so, they also pursue funding opportunities. This semi-decentralized structure has increases flexibility and responsiveness, is it was also said before, in the context of the previous chapters. This enables institutes to specialize in niche domains. It also enables them to develop international collaborations that are specialized to their fields (FORTH, 2025).

However, the above-mentioned autonomy promotes creativity and innovation. But at the same time, it also requires strong coordination mechanisms. The fact that FORTH continues to hold its coherence across ten research institutes spread across Greece

shows that its leadership has been successful. At least, its leadership succeeds in balancing autonomy with institutional unity.

As for the human resource management, this field offers further evidence of both effectiveness and structural limitations. More specifically, FORTH has succeeded in building a strong scientific reputation. Its reputation attracts talented researchers, both nationally and internationally (Karnesis et al., 2024).

However, its ability to retain these talents is constrained by multiple factors that they have already been mentioned before in the context of this dissertation. These factors, more analytically, include structural elements. These, for example, concern limited permanent positions and low salaries (Psychogios & Wood, 2010).

Management has mitigated these challenges. It has done so, through flexible contracts that are funded by external grants and career support structures. These measures have allowed FORTH to be still competitive. On the other hand, it has to be taken into account the fact that these actions do not fully overcome the systemic barriers of the Greek academic system.

Even more, in terms of innovation and knowledge transfer, FORTH's management has also showed high levels of effectiveness. It has done so, by establishing support structures, as it was also mentioned above. These structures promote commercialization of research outputs and they foster spin-off companies and they are able to connect research with industry (Sachini et al., 2024). Although there are resource limitations, that prevent them from fully meeting the growing needs of researchers.

Finally, FORTH's management effectiveness has to be mentioned, in its capacity for internationalization. It includes actions like participating in European consortia, building strategic collaborations and producing high-impact research. Through these strategies, FORTH has positioned itself as a recognized actor, beyond the sticter Greece's borders (Radioval Consortium, 2025).

Critically evaluate, think the above analysis, end up, concluding that the strengths of the FORTH's Management Model are the following onesQ

- It is consistently ranked as the leading Greek research center in national evaluations (FORTH, 2023).

- It is highly successful in attracting competitive European and international funding, including ERC grants (GSRI, 2025).
- It has a semi-decentralized governance model, that increases flexibility and specialization.
- It has established support structures for innovation and technology transfer (PRAXI Network, STEP-C).
- It has gains a strong international reputation through EU consortia and strategic collaborations.
- It has shown financial agility in integrating external funding streams into long-term strategies.

Even more, some areas for improvement have been indicated, and they are specifically the following ones:

- There are limited permanent researcher positions and lower salaries compared to EU averages (Psychogios & Wood, 2010).
- There is heavy reliance on external competitive funding creates vulnerability to fluctuations.
- There are coordination challenges, due to decentralized structure across multiple institutes.
- There is insufficient professionalization and resourcing of technology transfer and commercialization units.
- There are administrative and bureaucratic inefficiencies that slow down decision-making.
- There is a need for stronger institutionalized mechanisms of systematic evaluation and accountability.

7.2 Key Challenges in Managing Greek Research Centers

At first, it is mentioned that one of the most pressing challenges is the issue of limited and unstable funding. While the leading European research organizations, like the Max Planck Society, that was compared with FORTH's context before, have consistent baseline state support, the Greek research centers rely on competitive project-based financing that they mainly come from the European Union (OECD, 2016). Although FORTH has excelled in securing international funds. This dependence creates

significant vulnerability to fluctuations in the European research policy. It also offers funding availability. Also, it has to be taken into account that the national public funding is comparatively scarce and often subject to political shifts. This difficulty negatively affects the long-term planning (Stamatakis et al., 2024).

FORTH, also faces administrative and bureaucratic burdens. These burdens constitute one further persistent obstacle. More analytically, all of the research institutions, which operate in Greece, are subject to complex regulatory frameworks and rigid public-sector procedures. This makes efficiency even more difficult and at the same time, it delays decision-making (Psychogios & Wood, 2010).

Talent recruitment and retention, even more, present significant challenges. In that context, the salaries for researchers and staff, in the Greek research centers' context, are lower than the ones in the rest European research centers. Even more, the opportunities for permanent positions are also less (FORTH, 2023). Therefore, there is a structural disadvantage, which contributes to the phenomenon of brain drain (Karnesis et al., 2024).

Furthermore, geographical and infrastructural constraints have also to be mentioned. More specifically, many of Greece's leading research centers, including FORTH, are located in peripheral regions. Characteristic examples are Crete, Patras and Ioannina. This means that they are geographically far from the main metropolitan hubs of Athens and Thessaloniki. This distribution supports regional development, but at the same time, it reduces accessibility to international talent audience and industry networks (GSRI, 2025).

Even more, the research outcomes' commercialization is one further notable challenge. Although FORTH has pioneered technology transfer, as we saw in the above analysis of the previous chapters, most of the rest Greek research centers, taken into account as a whole, facer difficulties to institutionalize innovation and commercialization. The reason is that there are cultural, legal and financial barriers. These barriers are also combined with limited support structures. This creates an environment, that constrains the ability of research outputs to transition into viable products and services (Sachini et al., 2024).

Finally, political instability and weak policy continuity in Greece's research governance environment makes the above-mentioned barriers and difficulties even

more intensive. In that context, the Greek research centers face shifting priorities, depending government changes. This affects the funding strategies and the already existing regulatory frameworks. It also negativelly affects the institutional autonomy of the Greek research centers (Toribio-Flórez et al., 2021).

7.3 Opportunities for Enhancing FORTH's Management Practices

At first, a major opportunity is in expanding international collaborations. FORTH has already showed success in securing high-profile participation in European consortia (GSRI, 2025).

Therefore, this means that FORTH, building on this experience, it could further institutionalize international research schools and joint laboratories. It might also develop long-term partnerships with universities and research centers across the world. These initiatives would increase FORTH's global visibility. Additionally, they are going to create the existence of more sustainable collaboration structures (Max Planck Society, 2024).

One further opportunity is the further development of technology transfer and innovation ecosystems. More specifically, FORTH has pioneered commercialization structures in Greece, as we already mentioned before. Taking this into consideration, recruiting specialized staff in intellectual property management and venture funding, will make FORTH increase the commercialization success of its research results (Sachini et al., 2024).

Even more, the digital transformation presents another area of opportunity. It is a fact that the recent COVID-19 pandemic accelerated digitalization in research administration (OECD, 2020). Taken this into account, FORTH can capitalize on this trend. It might do so, by implementing advanced digital management systems and automating administrative processes. It can also adopt automatic and data-driven decision-making tools. These actions would reduce bureaucratic inefficiencies.

Continuing, human resource management also creates opportunities. Although salary constraints are still existing, FORTH is able to strengthen its presence by emphasizing non-monetary benefits. For example, these might include flexible working conditions or family-friendly policies. At this point, initiatives, such as for example mentoring

schemes and mobility opportunities, could be even more helpful for FORTH to attract and hold young researchers, despite the existing systemic financial limitations (Karnesis et al., 2024).

At this point, the policy developments at the European level, are worth mentioning and we believe that they offer additional opportunities. In further analysis, European Union emphases even more, on cross-border collaboration and on interdisciplinary research. This emphasis creates new opportunities for FORTH, so as foe the institution to be able to expand its role in shaping European research agendas (European Commission, 2021).

Finally, FORTH has the opportunity to be positioned as a leader in the address of the major societal challenges. These include, for instance, climate change, digital transformation and public health. It might do so, by aligning its research portfolio with the United Nations Sustainable Development Goals (SDGs) and the European Green Deal (Stamatakis et al., 2024).

7.4 Impact of Management on Research and Innovation at FORTH

Firstly, we have to mention that, through the effective support structures and strategic alignment with European research priorities, FORTH has become a leader in attracting highly competitive projects (FORTH, 2023). This shows the existence of a financial adaptability. In its turn, this financial adaptability reflects management's capacity to equip researchers. In that point, the administrative tools and institutional support are both necessary (GSRI, 2025).

Even more, the leadership structures have also had a significant influence on the current institution's innovation capacity. In more analysis, FORTH's decentralized model holds the high autonomy to its institutes. This, in turn, enables them to manage their research agendas. It also gives them the opportunity to develop specialized expertise, by their own (FORTH, 2025).

There is no doubt that the above mentioned autonomy is helpful for the innovation. More analytically, it is helpful because it encourages creativity and flexibility. At the same time, the Board of Directors has there the role to ensure the overall strategic coherence. The direct outcome of this situation is the existence of a balance between

independence and central coordination. This balance has been proven to be effective in the interdisciplinary excellence (Sachse, 2025).

Continuing, proceeding in the area of technology transfer, the management decisions have been important, because they affect the establishment of the organizational structures, that that help commercialization. For example, it is mentioned that the development of the PRAXI Network means of the existence of a proactive strategy. The aim of this strategy is the connection between the research environment with the industrial world (Sachini et al., 2024), is it has already been mentioned in the above analysis, in the context of the previous chapters of this dissertation.

One additional section, that have been already mentioned before in this dissertation, and that we think that it has to be also mentioned in this section analysis, is the human resource management. This dimension is essential to be mentioned in this section, due to the fact that it affects directly both the research and innovation outcomes. Before, we already mentioned the existence of some indicated systemic challenges, that they include limited permanent positions for example (Psychogios & Wood, 2010). Despite thses, FORTH's management has attempted to counterbalance these difficulties, with non-monetary incentives and collaborative environments. It has also tried to enter to even more wider and innovative infrastructure. These measures have helped FORTH to a productive research culture and to decrease the negative phenomenon of brain drain.

Finally, one further dimension that has been mentioned in this context, are the international collaborations. They reflect a dimension, that further presents the impact that the management has on the levels of the innovation. In that case, FORTH has cultivated networks through European consortia and also, through bilateral agreements. This, leads to the expansion of the opportunities that are given for interdisciplinary projects. It also means the expansion of the opportunities about knowledge exchange (Radioval Consortium, 2025). Undoubtedly, these collaborations increase FORTH's international visibility and enrich its research portfolio.

CHAPTER 8. RECOMMENDATIONS FOR IMPROVEMENT

8.1 Suggested Reforms for Organizational Structure and Leadership

At first, a main priority is the balance between decentralization and central coordination. Is it has already been understood by the analysis that has been made in the context of the previous chapters of these dissertation, FORTH's current structure, grants considerable autonomy to its individual institutes. This structure has supported specialization and scientific creativity (FORTH, 2025).

However, this structural model has also created coordination challenges. It has also caused administrative duplication. This means that reforms should aim to maintain institute-level autonomy. At the same time, they should aim to increase the organization's strategic coherence, at least at the central level. This is able to be achieved through the establishment of a strengthened central strategic planning unit. This unit might be responsible for setting long-term priorities and for monitoring performance. The same unit should have the responsibility of ensuring the alignment with national and European research agendas (Sachse, 2025).

Secondly, the FORTH's leadership model should be further professionalized. At the time when the Board of Directors offers broad oversight, its effectiveness could be improved. This improvement might be achieved through the adoption of international best practices. Indicating examples of such best practices are the external advisory boards, that are composed of internationally recognized scientists and industry representatives. These bodies would be able to offer independent evaluations. They would also be able to offer strategic advice. Finally, these bodies could ensure accountability in the overall process of the decision-making (Toribio-Flórez et al., 2021).

Even more, one further key reform is about improving human resource leadership. It is about the fact that both the talent recruitment and their retention is still constrained by systemic issues. These issues were already been mentioned before, and they concerned, for example the non-competitive salaries (Psychogios & Wood, 2010). In that point, leadership have to set as its main priority, the development of policies, that improve career development opportunities for the researchers. These might also include structured mentoring programs. They should also include transparent criteria, that

concerning the overall procedure for promotion. Finally, they should also include a variety of incentives about interdisciplinary collaboration.

Then, the financial governance requires organizational reforms, at the leadership level. More analytically, FORTH's reliance on external competitive funding increases the existence of the need for leaders to adopt more proactive strategies, in the context of the followed financial policy of the organization. At this point, we mean the creation of a dedicated office for strategic partnerships and fundraising. This office could diversify income sources through industry collaborations. It might also do so, through philanthropic donations and international endowments, too (Stamatakis et al., 2024).

In addition, reforms might also address bureaucratic inefficiencies. In further analysis, FORTH's management need to prioritize digital transformation, in the context of the following administrative processes. It might do so, by implementing centralized platforms for project management, for reporting and for communication, too. This would reduce administrative burdens. It could also improve the existing coordination between the institutes, that are located in different regions across Greece (OECD, 2016).

Finally, organizational reforms should strengthen the FORTH's leadership role, on a global perspective. In more analysis, the alignment of the FORTH's structure with the global best practices, might set this organization as a regional hub for excellence, that concern both research and innovation at the same time. In the context of this policy, the creation of international joint centers is proposed. This purpose, might also be succeeded by developing cross-border doctoral programs and by formalizing long-term partnerships with leading European institutions. All of these actions, are going to increase FORTH's global standing. They are also going to increase the organization's ability to attract talented researchers and finally face the burden of the brain drain phenomenon (Max Planck Society, 2024).

8.2 Recommendations for Enhancing Collaboration and Networking

Taking into account the above analysis that has already been made in the context of this dissertation, a first recommendation is the establishment of long-term strategic partnerships with other European and international research centers. At the time when

FORTH participates in competitive consortia, many of these collaborations are project-specific and short-lived (GSRI, 2025).

Even more, FORTH's Management should prioritize the development of sustainable institutional alliances. It might do so, through memoranda of understanding (MoUs) and through the creation of joint research laboratories. Even more, the development of international research schools might be also effective and helpful. All of these actions, represent a long-term framework, that would ensure continuity of collaboration and support the shared infrastructure projects. These actions, could set FORTH in a similar direction as the one that is followed by the International Max Planck Research Schools that have proven successful in Germany (Max Planck Society, 2024).

Furthermore, FORTH should expand its role in interdisciplinary networks. It is a fact that many of today's most pressing challenges, including, for example, the climate change, need the existence of solutions, that cut across scientific disciplines (European Commission, 2021). FORTH is positioned to lead such efforts. This is due to its multidisciplinary structure. Its structure, as it is already understood, encompasses fields that range from natural sciences and engineering to life sciences and humanities. By supporting stronger cross-institute collaboration, FORTH could be set in a position to increase its international visibility.

In addition, it has to be mentioned that the industry collaborations are one further significant opportunity. In that context, FORTH has developed mechanisms for technology transfer, as it was already mentioned before, including the STEP-C. On the contrary, its collaborations with industry are still limited (Sachini et al., 2024). This is why, a recommended reform is the establishment of structured industry liaison offices. These offices, would be dedicated to building long-term partnerships with strategic sectors. For instance, these sectors include biotechnology, digital technologies, energy and health sciences. Even more, these proposed offices could facilitate joint research and development projects and patent licensing. They could also facilitate that spin-off development and overall, they are going to be able to ensure that scientific results might become practical and real innovations.

Furthermore, networking might also extend to policy engagement. It might also be extended to science diplomacy. FORTH's leadership has to intensify its participation in European and international policy forums and in research councils and strategic

advisory boards (Toribio-Flórez et al., 2021). It is about an action, that is going to position FORTH as a trusted policy advisor. By doing so, FORTH is able to have higher recognition in both fields of science and innovation.

As about the national level, FORTH might increase and further support the collaboration with other Greek research centers and universities. Despite the fact that the competition for limited funding often dominates, the higher cooperation in the shared infrastructure and in the context of joint doctoral programs, would be able to increase the general organizational performance of the Greece's research sector (Stamatakis et al., 2024).

Finally, it is mentioned that in order for this organization to increase its networking, further investments in digital platforms and communication strategies are necessary. In that context, the expanded use of the use of online collaboration tools and open science repositories, could improve research visibility. It could also facilitate the global partnerships (OECD, 2020).

8.3 Policy Recommendations for National and International Stakeholders

As about the strengthening of the FORTH's long-term performance, we believe that it requires policy action beyond the strict organizational level. In any case, it has to be considered as the fact that the national and international stakeholders frame the regulatory and collaborative environments. In these environments, Greek research centers operate. Therefore, targeted policy interventions are able to amplify any institutional reforms. They are also able to effectively unlock any system-level gains. Observing this situation from a national perspective, we propose that the foremost recommendation is to increase predictable and multi-annual core funding for public research organizations. More analytically, the stable baseline appropriations, such as complementing competitive grants, enable high-risk research and, the same time, they are able to reduce over-dependence on short project cycles (OECD, 2016).

Especially, for the case of the Greek state, the adoption of medium-term budgetary frameworks with performance-linked tranches could be able to align the available resources with outcomes. At the same time, the research autonomy will be going to be preserved (Stamatakis et al., 2024).

Further, we need to emphasize on the regulatory simplification. In that context, for instance, the research centers face layered administrative rules. These administrative rules slow procurement. They also slow down the hiring process and the project execution (Psychogios & Wood, 2010).

Taking the above described negative situation into account, we can conclude that the government should implement "*research-fit*" procedures. For example, these procedures include the implementation of the digital procurement. They might also include the development of a framework that is specialized in the research contracts. Even more, they might include the accelerated hiring tracks for externally funded positions. These actions, are going to reduce the already existing transaction costs (OECD, 2016).

At this point, we need to mention that if these measures will be implemented, they will lead to horizontal public-administration reforms. This means that the ad hoc derogations, coming from these measures, is not equally possible. Even more, these measures, would secure durability and scale. Further, through a parallel investment in interoperable, national research information systems could be able to further support evidence-based planning.

Furthermore, human capital policies are equally crucial. In order to stop the brain drain and improve talent pipelines, Greece should expand tenure-track researcher posts, in public research centers. It should allow flexible remuneration top-ups, that are financed from competitive and private sources (Stamatakis et al., 2024). Even more, the national doctoral and postdoctoral fellowships, which are tied to international co-supervision and mobility, could be able to raise training quality. So, they are able to integrate the Greek researchers in the frontier networks (European Commission, 2021).

In addition, or the case of international stakeholders the priority is to sustain instruments, which widen excellence. The actions of the Horizon Europe, for example, that support capacity building and twinning, together with teaming, and ERA Chairs should keep focus on structural reforms. They should continue focusing on the leadership development, especially in the widening countries, in which Greece is also included (European Commission, 2021).

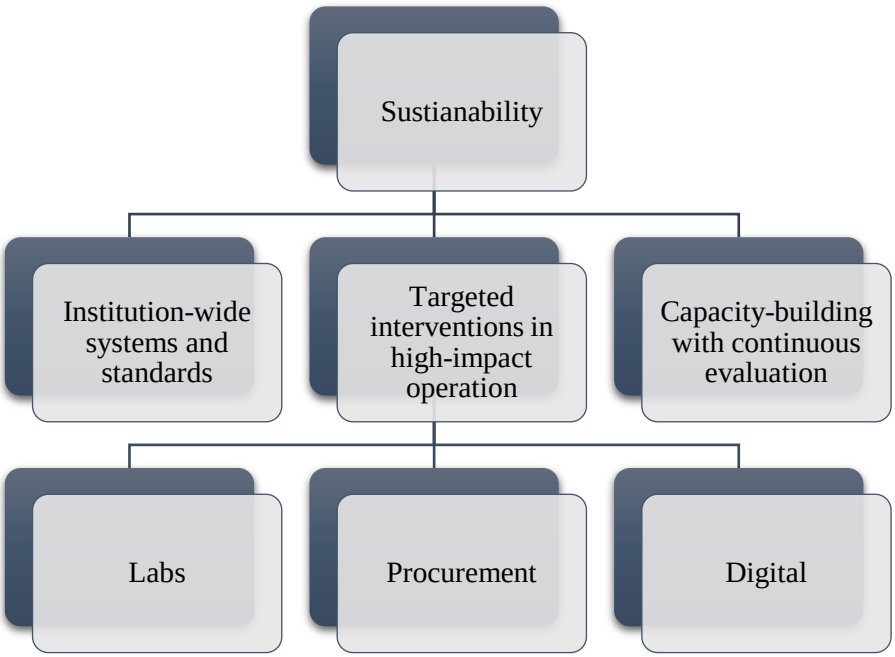
At the same time, we consider ERC and Marie Skłodowska-Curie instruments as still vital. The reason is the fact that their role is still important, in order to effectively align the investigator-driven excellence and the talent circulation (GSRI, 2025).

8.4 Implementation of Sustainable Management Practices in Greek Research Centers

The implementation of sustainable management, in the context of Greek research centers, by using FORTH as the main case study, requires the existence of roadmap, that integrates governance, together with environmental stewardship, financial resilience, human capital and open science. Here, the sustainability must not be taken into account only is an ecological element. Beyond its ecological perspective, sustainability is also an organizational and strategical one. This ensures the fact that research excellence might be maintained over time, even if under the existence of resource and policy constraints (Lozano, 2011).

At this point, a practicable approach to sustainability, as it is proposed in the context of this dissertation, combines the following:

Diagram 2. Proposed approach to sustainability



In more analysis, the first step is the adoption of an institution-wide sustainability management system. This system needs to have clear governance and KPIs. Towards that dimension, we propose the establishment of the central Sustainability & Resilience Office. This office might be mandated to coordinate across institutes. By doing so, it might integrate goals on energy, waste, mobility, procurement and open science in the annual performance plans.

Also, environmental management systems, that are aligned with ISO 14001, are going to be further helpful. Their help is going to be prioritized to formalize processes, responsibilities and audit cycles in higher-education and research contexts. This means the existence of a further improvement of boss, compliance and performance (Amaral et al., 2015).

Even more, project-level and portfolio-level maturity models might also be leveraged. By doing so, the sustainability risks and its costs and benefits, might be considered at gate reviews. This means that they might not be treated as afterthoughts (Kerzner, 2019).

Continuing, it has to be taken into account, the fact that the laboratories are energy-intensive. This means that targeted measures, to sustainability, are necessary to be taken. These measures include fume-hood optimization, cold-storage consolidation, right-sizing HVAC and equipment scheduling. These measures, not only are going to make the laboratories even more sustainable, but at the same time they are going to decrease their operating expenses, without ending up compromising the science (Masanet et al., 2020).

At this point, we propose a rolling "*Green Labs*" program. This program shall include institute champions, small grants and behavioral nudges. Its implementation could institutionalize a best practice (Lozano, 2011).

Then, professionalize sustainable procurement and circularity is also essential. In that context the public-sector purchasers might lead to an upstream change. They might so do, especially, by integrating environmental and social criteria in tenders. They might also do so, by consolidating demand across institutes, in order to shift the market offerings (Walker & Brammer, 2009).

Even more, the data centers and digital services should follow energy-efficient architectures (Masanet et al., 2020). In more analysis, we refer to the adoption of a lusty research data management (RDM) policies. These, more analytically, might include FAIR data, data management plans, institutional repositories and they finally, might increase reproducibility and reduce duplication (Tenopir et al., 2015).

Even more, open-science practices have to be promoted as well. More specifically, they include open access, open methods and preprints, in the cases in which they are considered as appropriate. These actions might expand societal impact (Fecher & Friesike, 2014).

At this point, it has to be taken into serious consideration, the fact that sustainability depends on people's skills and incentives. This is the reason why we propose specialized human resources training. For example, the procurement officers should be trained on green criteria. At the same time, the lab managers should be trained on energy and waste. Then, PIs should be trained on RDM and open-science compliance (Leal Filho et al., 2018).

Finally, align research portfolios with SDG-relevant missions and measure outcomes, are also suggested. More specifically, in the context of this suggestion we propose the mapping of the already existing projects to SDG targets. This is going to reveal the strengths and the already existing gaps. It is also going to guide strategic hiring and infrastructure investments (Lozano, 2011; Leal Filho et al., 2018).

CHAPTER 9. CONCLUSION

9.1 Summary of Key Findings

The current dissertation analyzed the management of Greek research centers. In the context of this analysis, we focused on the case study of FORTH. At the same time, we conducted a comparative benchmarking analysis with the Germany's Max Planck Society.

Finally, the main conclusions that we draw, show that FORTH achieves sustained scientific excellence. At the same time, it is about an organization that also achieves international visibility. It succeeds that, through a semi-decentralized model. FORTYH's model, more analytically, grants institutes autonomy in a framework of a central coordination.

Even more, we conclude that its strengths are:

- Strategic leadership
- High competitiveness in European funding
- Presence of innovation support structures

At the same time, we analyzed some systemic constraints. These constraints are the following ones:

- Limited baseline state funding
- Rigid public-sector procedures
- Salary ceilings
- Uneven evaluation mechanisms

Even more, we conclude that, through the benchmarking exercise, the value of predictable core funding, structured peer review and also the one of the professionalized technology transfer, are exemplified by the Max Planck model. Conceptually, the FORTH's trajectory shows the existence of an organizational ambidexterity. This is because it balances a curiosity-driven science with the application and commercialization, despite the existing resource constraints.

Overall, the findings of this dissertation, through its holistic methodological approach, frame a dual message, that FORTH's management is effective and adaptive, but it yet further gains depend on reforms, which stabilize the funding, lead to the reduction of

the bureaucracy, institutionalize the procedure of the evaluation, strengthen the existing talent policies and scale the innovation's support. These are necessary, in order for FORTH to be able to convert research excellence in a socio-economic impact, that might be holistically characterized as sustained.

9.2 Implications for the Management of Greek Research Centers

Generalizing from the FORTH's case, the Greek research centers could receive useful benefits, that come from a governance compact, which couples higher levels of institutional autonomy with transparent and cyclical evaluation, that might be done by international peers. Even more, the comparative analysis that was done in the context of this dissertation, leads us to the suggestion that autonomy, when it is combined and paired with accountability and performance-linked funding, it leads to an improvement of on the one hand, research quality and, on the other hand, strategic agility.

Furthermore, the policy and managerial priorities include the establishment of multi-annual core appropriations, alongside competitive grants. This might streamline procurement and hiring for research-funded posts. At the same time, it is going to facilitate the digitalization of the administrative workflows. A direct result will be the curbing of the transaction costs.

Then, human-resources reforms are also proposed. In that context, we propose the existence of flexible remuneration top-ups. We also suggest tenure-track pathways and mobility schemes. Even more, we suggest the development of further doctoral training with international co-supervision. These measures, we believe that are essential, in order for the Greek research centers to be able to counter brain drain.

Furthermore, in the context of the research–innovation interface, the Greek research centers might professionalize the technology transfer. This might be succeeded by shared IP services in combination with proof-of-concept funds, standardized agreements and industry liaison units. This might build on the mapping of current TTO gaps in Greece.

Finally, we consider as necessary the alignment of the institutional strategies with the European missions and at the same time with the open-science requirements. This alignment is essential, in order for the Greek research institutes, to expand their access

to transnational infrastructures. At the same time, by doing so, they are going to be able to increase their reproducibility.

All of these implications, together, might form a coherent agenda. They are able to strengthen the Greek research centers' managerial capacity and their resilience, too.

9.3 Contribution to Academic Knowledge and Practical Insights

At first, evaluating from an academic perspective, this dissertation integrates strands from organizational theory and science policy. In more analysis, it mentions professional bureaucracy, resource dependence, new public management, the Triple Helix and organizational ambidexterity. All of these theoretical bases, where are used in order to explain how public research centers cope with the competing demands for increasing and retaining their autonomy, accountability, excellence and impact.

Methodologically, this dissertation operationalizes benchmarking for research management. It combines primary qualitative research data with a structured comparison to an international leader. By doing so, we achieve clarifying how practices travel across contexts. By doing so, we also succeeded to clarify when selective adaptation is preferable to imitation.

Practically, the dissertation distills implementable information, that can be used by managers and policymakers, too. More analytically, we included institutionalize periodic international evaluation, secure performance-aware core funding, professionalize TTOs and industry engagement, and invest in people through clearer career directions, mobility and mentoring. We also foregrounded the centrality of administrative simplification and digitalization. We proved them both as enablers of scientific productivity.

Overall, through the creation of a link between the managerial levers to measurable outcomes, including funding success, collaboration depth, technology-transfer outputs and reputational indicators, we offered framework, that can be considered as a decision-oriented. This framework might be used by stakeholders, so as for them to be helped to prioritize reforms and monitor the progress over time.

9.4 Future Research Directions

Taking in to consideration the conclusions of this dissertation, future research should extend this study in a comparative, longitudinal one, that can concern multiple Greek research centers, so as to be identified which causal mechanisms might be linked ad correlated to governance choices to performance, in the context of varying policy regimes. In more analysis, we propose the following ones:

- Mixed-methods research designs are proposed, in order to integrate interview-based process tracing with panel indicators on funding composition, normalized citation impact, ERC success rates, doctoral outcomes and industry income, while guarding against metric distortions documented in assessment debates.
- Network-analytic future work is proposed, due to the fact that it could be able to map collaboration structures, such as domestic, European, and global, in order to test how position in co-authorship and consortium networks might play the role of the mediator between the scientific impact and the innovation outcomes.
- Future ethnographic and survey studies of researchers, administrators and technology-transfer staff are also proposed. These researches could examine incentive alignment, time allocation and the transaction costs of collaboration and IP negotiation.
- Policy-evaluation research is also proposed, because it might assess the effects of specific reforms, such as for instance core-funding compacts, fast-track hiring or shared TTO services, through the use of quasi-experimental designs.
- Future work is proposed to analyze equity and inclusion in research careers and commercialization pipelines, by exploring how diversity policies intersect, on the one hand with excellence and on the other hand with the impact goals.

LIST OF REFERENCES

Aghion, P., Dewatripont, M., Hoxby, C., Mas-Colell, A., & Sapir, A. (2010). The governance and performance of universities: Evidence from Europe and the US. *Economic Policy, 25*(61), 7–59. https://doi.org/10.1111/j.1468-0327.2009.00238.x

Amaral, L. P., Martins, N., & Gouveia, J. B. (2015). Quest for a sustainable university: A review. *Journal of Cleaner Production, 106*, 1–14. https://doi.org/10.1108/IJSHE-02-2013-0017

Bounce Project. (2025). *Official Website*. https://www.bounce-project.eu/consortium/forth/.

Bozeman, B. (2000). Technology transfer and public policy: A review of research and theory. *Research Policy, 29*(4–5), 627–655. https://doi.org/10.1016/S0048-7333(99)00093-1

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology, 3*(2), 77–101. https://doi.org/10.1191/1478088706qp063oa

Toribio-Flórez, D., Anneser, L., deOliveira-Lopes, F. N., Pallandt, M., Tunn, I., Windel, H., & Max Planck PhDnet Open Science Group. (2021). Where do early career researchers stand on open science practices? A survey within the Max Planck Society. *Frontiers in Research Metrics and analytics, 5*, 586992. https://doi.org/10.3389/frma.2020.586992

Camp, R. C. (1989). *Benchmarking: The search for industry best practices that lead to superior performance*. NY: ASQC Quality Press.

Chesbrough, H. (2006). *Open innovation: The new imperative for creating and profiting from technology*. NY: Harvard Business Press.

Creswell, J. W., & Poth, C. N. (2018). *Qualitative inquiry and research design: Choosing among five approaches* (4th ed.). NY: SAGE Publications.

De Boer, H. F., Enders, J., & Schimank, U. (2007). On the Way towards New Public Management? The Governance of University Systems in England, the Netherlands, Austria, and Germany. In D. Jansen (Eds.), *New Forms of Governance in Research Organizations. Disciplinary Approaches, Interfaces and Integration* (pp. 137-152). NY: Springer.

Dill, D. D., & Soo, M. (2005). Academic quality, league tables, and public policy: A cross-national analysis of university ranking systems. *Higher Education, 49*(4), 495–533. https://doi.org/10.1007/s10734-004-1746-8

DiMaggio, P. J., & Powell, W. W. (1983). The iron cage revisited: Institutional isomorphism and collective rationality in organizational fields. *American Sociological Review, 48*(2), 147–160. https://doi.org/10.2307/2095101

Etikan, I., Musa, S. A., & Alkassim, R. S. (2016). Comparison of convenience sampling and purposive sampling. *American Journal of Theoretical and Applied Statistics, 5*(1), 1–4. https://doi.org/10.11648/j.ajtas.20160501.11

Etzkowitz, H., & Leydesdorff, L. (2000). The dynamics of innovation: From National Systems and "Mode 2" to a Triple Helix of university–industry–government

relations. *Research Policy, 29*(2), 109–123. https://doi.org/10.1016/S0048-7333(99)00055-4

European Commission. (2021). *Horizon Europe strategic plan 2021–2024*. Publications Office of the European Union. https://doi.org/10.2777/083753

Fecher, B., & Friesike, S. (2014). Open science: One term, five schools of thought. In S. Bartling & S. Friesike (Eds.), *Opening Science* (pp. 17–47). NY: Springer. https://doi.org/10.1007/978-3-319-00026-8_2

FORTH. (2023). *A Research Center of Excellence*. Foundation for Research & Technology – Hellas. https://www.forth.gr/files/ITE_FORTH%20Brochure_FINAL_ENGLISH_13.10.23.pdf

FORTH. (2023). *New study reveals the mechanisms that drive neural tumor progression to malignancy*. https://medicalxpress.com/news/2023-08-reveals-mechanisms-neural-tumor-malignancy.html

FORTH. (2025). *Official Website*. https://www.forth.gr/en/home/

FORTH. (n.d.). *BoD Members*. https://www.forth.gr/en/content/BoD-Members.30/

FORTH. (n.d.). *Central Administration*. https://www.forth.gr/en/content/Central-Administration.34/

FORTH. (n.d.). *Former Presidents*. https://www.forth.gr/en/content/Former-Presidents.31/

FORTH. (n.d.). *FORTH's excellence*. https://www.forth.gr/en/content/FORTHs-Excellence.111/

FORTH. (n.d.). *History*. https://www.forth.gr/en/content/History.26/

FORTH. (n.d.). *Organizational Structure*. https://www.forth.gr/en/content/Organisational-Structure.33/

FORTH. (n.d.). *Research Projects*. https://www.forth.gr/en/content/Research-Projects.48/

FORTH. (n.d.). *The vision of FORTH*. https://www.forth.gr/en/content/The-vision-of-FORTH.25/

Geuna, A., & Martin, B. R. (2003). University research evaluation and funding: An international comparison. *Minerva, 41*(4), 277–304. https://doi.org/10.1023/B:MINE.0000005155.70870.bd

GSRI. (2025). *FORTH*. https://gsri.gov.gr/en/foreas/foundation-for-research-and-tecnology-hellas/

Gulbrandsen, M., & Smeby, J. C. (2005). Industry funding and university professors' research performance. *Research Policy, 34*(6), 932–950. https://doi.org/10.1016/j.respol.2005.05.004

Hicks, D. (2012). Performance-based university research funding systems. *Research Policy, 41*(2), 251–261. https://doi.org/10.1016/j.respol.2011.09.007

Schmaltz, F., Stahnisch, F. W., & Topp, S. (2023). On the history of neuroscience research in the Max Planck Society, 1948–2002—German, European, and transatlantic

perspectives: Introduction. *Journal of the History of the Neurosciences*, *32*(2), 71-80. https://doi.org/10.1080/0964704X.2023.2179779

Sakmann, B., & Stahnisch, F. W. (2023). Neuroscience history interview with Professor Bert Sakmann, Nobel Laureate in Physiology or Medicine (1991), Max Planck Society, Germany. *Journal of the History of the Neurosciences*, *32*(2), 198-217. https://doi.org/10.1080/0964704X.2021.1898903

IMBB. (2024). *Greek researchers from FORTH, NKUA and Harvard University reveal a new mechanism that regulates intestinal stem cells.* https://imbb.forth.gr/en/news/show/&tid=560&cat=4&devmode=01092025

Kallio, H., Pietilä, A. M., Johnson, M., & Kangasniemi, M. (2016). Systematic methodological review: Developing a framework for a qualitative semi-structured interview guide. *Journal of Advanced Nursing*, *72*(12), 2954–2965. https://doi.org/10.1111/jan.13031

Karnesis, N., Stergioulas, N., Pappas, G., Anastopoulos, C., Antoniadis, J., Apostolatos, T., ... & von Klitzing, W. (2024). The laser interferometer space antenna mission in greece white paper. *International Journal of Modern Physics D*, *33*(07n08), 2450027. https://doi.org/10.1142/S0218271824500275

Kerzner, H. (2019). *Using the project management maturity model* (3rd ed.). NY: Wiley.

Leal Filho, W., Shiel, C., & Paço, A. (2018). Implementing and operationalising integrative approaches to sustainability in higher education: The role of project-oriented learning. *Sustainability*, *10*(9), 2953. https://doi.org/10.1016/j.jclepro.2016.05.079

Sachse, C. (2025). *Science and Diplomacy: The Max Planck Society in International Politics (1945–2000)*. NY: Brill.

Lozano, R. (2011). The state of sustainability reporting in universities. *International Journal of Sustainability in Higher Education*, *12*(1), 67–78. https://doi.org/10.1108/14676371111098311

Masanet, E., Shehabi, A., Lei, N., Smith, S., & Koomey, J. (2020). Recalibrating global data center energy-use estimates. *Science*, *367*(6481), 984–986. https://doi.org/10.1126/science.aba3758

Max Planck Society. (2024). *Facts and figures*. https://www.mpg.de/facts-and-figures

Mintzberg, H. (1993). *Structure in fives: Designing effective organizations*. NY: Prentice Hall.

O'Reilly, C. A., & Tushman, M. L. (2013). Organizational ambidexterity: Past, present, and future. *Academy of Management Perspectives*, *27*(4), 324–338. https://doi.org/10.5465/amp.2013.0025

OECD. (2016). *Knowledge Triangle Project. Report on Greece*. Organisation for Economic Co-operation and Development. https://stip.oecd.org/assets/TKKT/CaseStudies/26.pdf

OECD. (2016). *Governance of Public Research – Towards better practices*. https://www.oecd.org/content/dam/oecd/en/publications/reports/2003/09/governance-of-public-research_g1gh383a/9789264103764-en.pdf

OECD. (2020). *Science, technology and innovation outlook 2021: Times of crisis and opportunity*. Organisation for Economic Co-operation and Development. https://doi.org/10.1787/75f79015-en

OpenAIRE. (2024). *Research in Greece is carried out primarily by Higher Education Institutions (HEIs) and Research Centers (RC).* http://www.openaire.eu/os-greece

Perkmann, M., Tartari, V., McKelvey, M., et al. (2013). Academic engagement and commercialisation: A review of the literature on university–industry relations. *Research Policy*, *42*(2), 423–442. https://doi.org/10.1016/j.respol.2012.09.007

Pfeffer, J., & Salancik, G. R. (2003). *The external control of organizations: A resource dependence perspective*. Stanford: Stanford University Press.

Psychogios, A. G., & Wood, G. (2010). Human resource management in Greece in comparative perspective: Alternative institutionalist perspectives and empirical realities. *The International Journal of Human Resource Management, 21*(14), 2614–2630. https://doi.org/10.1080/09585192.2010.523578

Radioval Consortium. (2025). *List of partners.* https://radioval.eu/consortium/

Sachini, E., Sioumalas-Christodoulou, K., Chrysomallidis, C., Siganos, G., Megas, G., Androutsopoulou, M., Tympas, A., & Karampekios, N. (2024). Mapping the Technology Transfer Offices in Greece: Initial outcomes concerning medical and health technologies and next steps. *Journal of the Knowledge Economy, 15*(4), 16060–16095. https://doi.org/10.1007/s13132-023-01715-w

Siegel, D. S., & Wright, M. (2015). Academic entrepreneurship: Time for a rethink? *British Journal of Management, 26*(4), 582–595. https://doi.org/10.1111/1467-8551.12116

Sifakis, G. M. (2001). EN Economou's contribution to the establishment and development of the University of Crete and the Foundation for Research and Technology–Hellas. *Physica B: Condensed Matter*, *296*(1-3), 1-6. https://doi.org/10.1016/S0921-4526(00)00754-7

Spendolini, M. J. (1992). *The benchmarking book*. NY: AMACOM.

Stamatakis, A., Tsakalides, P., & Tamiolaki, M. (2024). Necessary reforms in the Greek academic system. *Frontiers in Political Science*, *6*, 1471002. https://doi.org/10.3389/fpos.2024.1471002

Tenopir, C., Dalton, E. D., Allard, S., Frame, M., Pjesivac, I., Birch, B., Pollock, D., & Dorsett, K. (2015). Changes in data sharing and data reuse practices and perceptions among scientists worldwide. *PLOS ONE*, *10*(8), e0134826. https://doi.org/10.1371/journal.pone.0134826

Tsitaris, G. & Siddiqi, A. (2018). Images of collaboration in energy-related Greek research networks. *arXiv (Cornell University).*

Walker, H., & Brammer, S. (2009). Sustainable procurement in the United Kingdom public sector. *Journal of Purchasing and Supply Management, 15*(3), 127–138. https://doi.org/10.1108/13598540910941993

Whitley, R. (2014). *The intellectual and social organization of the sciences* (2nd ed.). Oxford: Oxford University Press.

Whitley, R., Gläser, J., & Engwall, L. (2010). *Reconfiguring knowledge production: Changing authority relationships in the sciences and their consequences for intellectual innovation*. Oxford: Oxford University Press.

Wilsdon, J., Allen, L., Belfiore, E., Campbell, P., Curry, S., Hill, S., ... & Johnson, B. (2015). *The Metric Tide: Report of the Independent Review of the Role of Metrics in Research Assessment and Management*. Higher Education Funding Council for England. https://doi.org/10.4135/9781473978782

Yin, R. K. (2018). *Case study research and applications: Design and methods* (6th ed.). NY: SAGE Publications.

ANNEX I. INTERVIEW GUIDE

Management of Greek Research Centers: FORTH's case study (Foundation for Research and Technology – Hellas)

Questionnaire survey

(Please provide a brief response of 3-4 sentences for each question. Your concise answers will help ensure clarity and efficiency in reviewing the responses.)

1. Strategic Leadership and Vision

How would you describe FORTH's overall strategic vision for the next 5-10 years, particularly in terms of maintaining its research leadership both in Greece and internationally?

2. Organizational Structure and Decision-Making

How does FORTH's decentralized structure, with semi-autonomous research institutes, impact decision-making processes and overall operational efficiency?

3. Talent Recruitment and Development

What are the key challenges FORTH faces in recruiting and retaining top research talent, and what strategies are in place to support the professional development of researchers and staff?

4. Financial Management and Sustainability

How does FORTH manage financial resources, particularly in the context of securing external funding from the EU, private industry, and other sources? Are there any financial sustainability challenges the institution faces?

5. Innovation and Technology Transfer

What mechanisms does FORTH have in place to support innovation and technology transfer, and how successful has the institution been in commercializing research outcomes?

6. Collaboration and International Partnerships

How does FORTH foster collaboration both within its research units and with external partners, such as other research institutions, universities, or private industry?

7. Challenges and Opportunities in Research Management

What are the most significant challenges FORTH faces in managing its operations and maintaining its research competitiveness, and what opportunities do you see for the institution to further strengthen its position in the research landscape?

Thank you for your time!

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