

Contribution to the OECD TIP Knowledge Transfer and Policies project

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Case study on the Policy Mix for science-industry knowledge transfer in Greece: Contribution to the OECD TIP Knowledge Transfer and Policies project

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Executive Summary

Policies to support the establishment and growth of spin off companies were introduced in Greece by 2001. In particular, a scheme providing direct grants to support exclusively academic spin offs from Universities and/or public research centres was initially launched, followed, as the time evolved, by successors targeting, beyond academic spin offs, a broader range of innovative start-ups, such as spin outs and young innovative companies created by individual scientists. In parallel, several attempts to set up a venture capital market in the country, including provision of risk capital to early stage innovative firms, were also undertaken. However, their impact on the economy was limited and no risk- taking, innovation – friendly culture has been established in the country so far. Evidence exists that, despite previous efforts, most of the research results produced by individual researchers or research teams in Universities and research centres, although potentially marketable, remain un-exploitable due to the lack of appropriate intermediaries and funding mechanisms.

The present case study describes the last version of the spin off supporting granting scheme, referred as "Scheme A", that will most probably be launched under the current programming period 2014-20. It also presents a new scheme ("Scheme B") introduced in 2016, entitled the "Innovation Window" of the EquiFund. The Innovation Window is one of the three sub-funds of the newly established Greek Fund of Funds or EquiFund, aiming at boosting innovative entrepreneurship by attracting private funding to all investment stages of the equity market, ranging from entrepreneurship steps even before the early stage start-ups up to the mature expansion of the beneficiary companies. The Innovation Window has two main components: (1) a technology transfer component; and (2) an accelerator component. The former focusses on capitalising on the research results produced in Greece, which can have ample room for commercialisation. The latter, focusses on supporting those start-ups established in or through accelerator programmes, which can benefit from the nurturing and support of an independent fund manager. End target beneficiaries include researchers, professors, postgraduates and graduate students, as well as entrepreneurs willing to pursue their business opportunity. The Innovation Window is operational since April 2018.

The case study illustrates also the main findings of the impact assessments/ evaluations of the previously implemented programmes, while more detailed information on the evaluations of the granting schemes are given in Annex I. As far as the venture capital market is concerned, the study comprises a short description of the JEREMIE activities in Greece in 2010-2016, since the design of EquiFund took advantage of the experiences gained from its implementation in Greece and other European countries.

A general overview of the policy interventions, instruments in use and conditions that influence the creation and development of spin offs and of innovative entrepreneurship in the broader sense, is also presented in the case study. Finally, possible positive/complementary or negative/competitive interactions between the two instruments (Schemes A and B) are discussed as well.

The main lessons learnt from the Greek case study can be summarized as follows:

Public funding, either in the form of grants or equities, played a key role in the creation of new innovative companies (spin offs, spin outs, innovative start-ups).

Assessments demonstrated that many of the beneficiary companies showed interesting dynamics as far as their financial performance is concerned, especially in the case of academic spin offs. The companies succeeded in overcoming the valley of death and resisted the economic crisis, in particular those with intensive exporting activities.

Public support had a very positive impact on creating jobs for young, highly skilled personnel. However, gender issues have been depicted since women seem to be more reluctant in undertaking risky ventures.

Public support beneficiary companies showed an increase of their R&D and patenting activities, as well as of the collaborations with research organizations.

On the contrary, attraction of private investments from Greece or abroad was low.

Despite the promising results of the spin off supporting instruments in Greece, the number and size of companies created were too small to generate a structural effect to the economy.

The simultaneous use of two (or more) different instruments targeting the same population of beneficiaries (spin off, spin out, young innovative companies) may result on distorting the demand, in favour of the effortless ones. Instruments have to be carefully designed and differentiated, according, in the case of spin offs, to the maturity of the technology and/or investment.

A clear, straightforward legislation is a necessary prerequisite for the promotion of entrepreneurial spirit among the researchers and the creation of academic spin offs. Other measures (technology transfer offices, appropriate intermediaries, coaching of young entrepreneurs and the like) can also play a crucial role in this direction.

Further international experiences confirm that the impact of the public funding is mostly influenced by the framework conditions and the overall environment where spin offs are created.

Introduction

The Greek case study describes the current and past policy interventions aiming at supporting the establishment and development of spin offs. During the current Programming Period 2014-20, the relevant policies will be materialized by two main instruments, one offering direct grants (Scheme A) and the other equity funds (Scheme B) for the establishment of spin-offs, spin outs and innovative start-ups.

In Greece, policies aiming at supporting the creation of spin offs date back to 2001. At that time the General Secretariat for Research and Technology (GSRT) launched the Programme "PRAXE", providing direct grants to academic spin offs from Universities and/or public research centres in order to promote the commercialization of research results and the implementation of patents. Under the same scope, further calls were published in 2011, addressing mainly academic spin offs, but also spin outs from private companies and young innovative start – ups established by individual researches. GSRT and its Managing and Implementation Authority for Research, Technological Development and Innovation intend to relaunch the scheme during the current Programming Period 2014-20, with an emphasis on supporting innovative start – ups from young scientists. Key objectives, among others, are to mitigate the brain drain of the young generation that took dramatic dimensions during the crisis period and to enhance innovative entrepreneurship in the country.

The first substantial attempt to provide seed and start-up capital to spin off companies through equities is represented by Scheme B, the so-called "Innovation Window". The Innovation Window is part of a broader Fund of Funds, the "EquiFund", a financial instrument supporting the whole chain of firms' development, including support for growth and international expansion.

The two schemes are described under dedicated Parts of the case study; however, their positioning in the overall policy mix is presented jointly. Thus, our case study consists of three parts:

PART 1: Main features / development of the initiative for the granting scheme (Scheme A)

PART 2: Main features/ development of the initiative for the "Innovation Window" of "EquiFund" (Scheme B)

PART 3: Contextualizing the Policy Mix

Part I. THE GRANTING SCHEME

1. Main features of the policy

1.1. Granting scheme key objectives and main characteristics

As mentioned above, the Managing & Implementation Authority for Research, Technological Development and Innovation (MIA-RTDI), under the auspices of the Secretary General of GSRT, intends to launch in the current Programming Period 2014-20, a new call of a scheme providing direct financial support to spin off and spin out companies, as well as to innovative start – ups. In particular, it will offer grants for the establishment and development of knowledge-intensive start-ups by Universities, Technological Institutes, research centres, enterprises, researchers from the above institutions, as well as from independent private scientists seeking seed capital in order to commercialize mature research results and innovative ideas. The scheme aims to support the creation and development of new, innovative business activities through the exploitation of existing or new commercial patents, the implementation of innovative investment projects and the commercialisation of knowledge generated by researchers and scientists both from academia and the businesses sector. This scheme is expected to contribute to the production of new innovative, sophisticated (improved) products and services of high added value with a view to creating a competitive advantage to the country, as well as to promoting expansion into new markets. The scheme will be eventually launched following an assessment of the participation in EquiFund, with a total public budget of 35 m€. It will provide grants of up to 24 months, amounting from 50k to 700k €. The scheme builds on previous experience gained in Programming Periods 2000-2006 and 2007-2013. Compared to previous similar calls, the new call has the ambition to mobilize a larger number of young scientists in order to establish their own innovative start-ups. In particular, it provides for a more flexible interpretation of the notion of "innovative company" compared to the previous call, where eligible for funding were companies with R&D expenditures representing at least 15% of the total operational expenses.

The scheme will be implemented following a competitive procedure, according to the specific selection criteria summarized below:

- Excellence
- Implementation (Feasibility of the project)
- Impact (Anticipated return on investment)

Alignment with national strategic priorities, according to the national Research and Innovation Strategy for Smart Specialization (RIS3) 2014-20¹ (on / off criterion).

It has to be noted that both horizontal and sectoral priorities of the national RIS3 have been selected following a broad consultation at the national level, in the framework of the entrepreneurial discovery process, based also on different studies, existing evidence and data. They are in line with the general growth strategy of the country. In this context, the European priorities were taken on board as well.

¹ Agrofood, Energy, Environment and Sustainable Development, Transport and Logistics, Materials – Construction, Health – Pharmaceuticals, Information and Communication Technologies, Culture - Tourism - Creative Industries.

The existence of a RIS3 Strategy was ex-ante conditionality for the activation of funding devoted to research and innovation activities under the Operational Programme (OP) "Competitiveness, Entrepreneurship and Innovation" 2014-2020.

The scheme will be run at the national level by MIA-RTDI, a specific body operating under the auspices of the Secretary General of GSRT (Ministry of Education, Research and Religious Affairs). It will be co-financed by the EU at 50% to 80% according to the beneficiary region²) through the Structural and Investment Funds (ERDF-ESIF) allocated to the OP "Entrepreneurship, Competitiveness and Innovation", and by the national matching funds. Aid intensity foreseen is up to 75% of the total budget of the projects.

2. Development of the initiative

2.1. Rationale for the Granting Scheme implementation

In 2014-20, the decision for relaunching the granting scheme for supporting spin offs, spin outs and innovative start-ups, was based on previous implementation experience, during the two past Programming Periods (2007-13 –"PRAXE" Programme and 2000-2006 respectively). Both past initiatives have been evaluated by external auditors and showed positive results. Brief information on the findings of the evaluations is given below:

The Programmes contributed in closing existing gaps in the Greek innovation ecosystem namely the lack of adequate funding mechanisms for risky investments on behalf of small innovative companies, as well as the limited entrepreneurial activity of the Greek academic researchers. In many cases individual researchers undertook ventures without cooperating with established business firms in Greece or abroad.

Many of the companies assessed showed interesting dynamics as far as their financial performance is concerned, especially the academic spin offs. The companies succeeded in overcoming the valley of death and resisted the economic crisis, in particular those with intensive exporting activities.

Synergies have been identified with other type of RTDI Programmes active during the successive Programming Periods 2000-2006 and 2007-13, mainly with business – academia collaborative projects and also with programmes promoting business extroversion. However, according to the respondents, no major overlaps with alternative funding sources or instruments of those periods have been depicted.

The Programmes had a very positive impact on creating jobs for young, highly skilled personnel. However, women seem to be rather reluctant in undertaking risky ventures. Other encouraging aspects are the increase of the R&D and patenting activities in the beneficiary firms as well as collaborations with research organizations.

On the contrary, attraction of private investments from Greece or abroad was low. Participants were reluctant to apply for venture capital; only one company expanded its activities using VCs. It is interesting to notice that very few of the companies recently interviewed (15%) intend to seek support from the newly established EquiFund (see Part II).

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² 50% for the regions of Sterea Ellada and South Aegean; 80% for the rest of the country.

Overall, the Programmes showed promising results; however, the number and size of companies supported were too small to create a structural effect to the economy.

Additionally, evidence from international experiences³ confirms that the impact of the public funding is mostly influenced by the framework conditions and the overall environment where spin offs are created.

A detailed description of the evaluations of the successive Programmes is given in Annex I.

2.2. Granting scheme tailored application

The scheme will be launched at the national level. However, a geographical eligibility criterion imposing funding quotas is in force, according to the ESIF Regulations (1303/2013 and 1301/2013), and in particular the European Regional Development Fund. In line with the above Regulations, the budget is allocated to the regions according (inverse proportionality) to the degree of their economic development (GDP per capita). The relative share of the funding is higher in the less developed regions (GDP per capita <75% of the European average, - Central Macedonia, Eastern Macedonia &Thrace, Epirus, Thessaly, Western Greece), lower in the regions in transition (GDP per capita >75% <90 % of the European average - Western Macedonia, Sterea Ellada, Peloponnese, North Aegean, Ionian Islands, Crete) and significantly lower in the most developed ones (GDP per capita >90% of the European average - Attica, South Aegean). However, such an uneven distribution of funding creates several distortions, since the programme cannot apply excellence criteria at national level and respond efficiently to the demand in regions with high innovation capacity, such as Attica, where most of the country's research and innovative entrepreneurial activities are concentrated. On the other hand, funds remain unexploited in regions with economies based mostly on agriculture and/or tourism.

The scheme has also a specific thematic profile, according to the priorities of the National Research and Innovation Strategy for Smart Specialization 2104-20. These priorities were selected following an entrepreneurial discovery process, carried out by Innovation Platforms. In particular, the scheme addresses the following areas:

- Agrofood
- Energy
- Environment and Sustainable Development
- Transport and logistics
- Materials Construction
- Health Pharmaceuticals
- Information and Communication Technologies

³ In the framework of the evaluation of the 2007-13 predecessor of the current spin off granting scheme, three academic papers focusing on categorization and analysis of spin-off companies from universities and other public research institutes were examined: Sternberg (2014), Bathelt et al. (2010), and Smith and Ho (2006). The first provides valuable information on the evaluation of similar public programmes supporting the development of academic spin offs, in two very different German federal states (länder): 143 spin off companies in Baden-Württemberg and 136 companies in North Rhine-Westphalia. In order to evaluate the impact of the public programmes, performance indicators of the academic spin offs were compared to those of a group of innovative companies not linked to academia, as control. The latter were not publicly funded but supported by business unions through coaching, training, and advisory services for the development of business plans. The two other articles (Smith and Ho, 2006, Bathelt, Kogler and Munro, 2010) provided information on academic spin offs directly or indirectly supported by Universities. The findings of the studies confirmed that the impact of the public funding is mostly influenced by the framework conditions and the overall environment where spin offs are created.

• Culture - Tourism - Cultural & Creative Industries

2.3. Experiences from other countries

Similar initiatives and good practices from the international scene were examined prior to the design and implementation of the granting scheme. However, the general concept and the eligible cost items of the Programme are ruled by the provisions of Article 22 "Aid for Start–Ups" of the Block Exemption Regulation no 651/2014 of the European Union.

The notion of open innovation, as it was elaborated in the context of the TIP project "Open Innovation and Globalization" was also taken on board especially for depicting success stories under the previous calls of the granting scheme.

Part II. EQUIFUND: The "Innovation Window"

3. Main features of the policy

3.1. EquiFund key objectives and main characteristics

The EquiFund (the Greek Fund-of-Funds) is a new initiative for Greece, introduced in 2016, aiming at boosting innovative entrepreneurship and creating a lasting impact on the national and local business sector, by attracting private funding to all investment stages of the equity market, ranging from entrepreneurship steps even before the early stage start-ups up to the mature expansion of the beneficiary companies.

The Fund-of-Funds is managed by the European Investment Fund (EIF) and it is cofinanced by the EU through the European Structural and Investment Funds (ESIF) allocated to the Operational Programme "Competitiveness, Entrepreneurship and Innovation" 2014-2020, the relevant national matching funds and the European Fund for Strategic Investments (EFSI), the heart of the Commission's Investment Plan for Europe. It is also expected to leverage substantial private funding. It is the first time that ESIF Funds and the EFSI are combined in Greece. It is an example of efficient multi-level governance, combining different supra-national and national players.

Under this new Programme, EIF is looking to invest in private sector led, market-driven Venture Capital and Private Equity fund managers across Europe, focusing onto Greek companies. EquiFund comprises 3 investment Windows according to the maturity level of the business proposal or the potential beneficiary company:

- Innovation Window: The so-called "Innovation Window" aims at supporting investments in RTDI through commercialization of research results. It has two main components: (1) a technology transfer component; and (2) an accelerator component. The former focusses on capitalising on the outstanding R&D taking place in Greece, which can have ample room for commercialisation when scrutinised and supported by an independent fund manager. The latter, focusses on supporting those start-ups established in or through accelerator programmes, which again can benefit from the nurturing and support of an independent fund manager. End target beneficiaries include researchers, professors, postgraduates and graduate students, as well as entrepreneurs willing to pursue their business opportunity.
- Early Stage Venture Capital Window: This Window, (which encompasses later stages of seed and start-up) targets SMEs or entrepreneurial activities with high growth potential and in need of funding for product development, initial marketing and/or business development support, including the assessment of the commercialisation potential of an initial concept.
- Growth Window: Finally the Growth Window provides for later early stage, expansion / growth capital and buy-and-build. Under this window, potential beneficiaries are primarily SMEs or entrepreneurial activities with high growth potential and in need of funding for expansion. In dully justified cases, non SMEs can participate as well.

The concept of EquiFund is shown in Figure 1.

F EquiFund EIF € 60m. EIB € 60m. NSRF € 200m. €) (€ 10m. Juncker Plan) (Juncker Plan) Growth Stage Private Equity Funds Windo Early Stage Venture Capital Funds Window Innovation Window More Windows .. SUB Fund SUB Fund SUB FUND SUB FUND SUB SUB FUND **SUB** SUB FUND **FUND FUND FUND** GOAL € 1 billion SMEs, START-UPs, SERVICES, SPIN-OFF, SPIN-OUT etc. to Greek companies

Figure 1. The concept of the EquiFund

Source: PA website (https://www.espa.gr/el/Pages/EquiFund.aspx)

A first estimation of the distribution of funding sources per Window is given in the following Table 1. It has to be noticed that, according to initial plans, the European Investment Bank intended to contribute with further 60 m $\,\epsilon$, accredited to the Junker Plan (EFSI). Finally, the contribution of EIB has not been defined yet, depending upon the fund-raising on behalf of the individual sub-funds managers.

Table 1. Funding sources of EquiFund

ESIF	EIF	Private Investors	
70.000.000	10.000.000	8.888.889	Innovation: Acceleration & Technology Transfer
72.222.222	27.777.778	42.857.143	Early stage
57.777.778	22.222.222	53.333.333	Growth
200.000.000	60.000.000	105.079.365	TOTAL: 365.079.365 €

Source: OP "Entrepreneurship, Competitiveness and Innovation" 2014-20 Managing Authority

Similarly, the totality of the EIF contribution (60m €) will also ascribe to EFSI.

3.1.1. The Innovation Window

As previously mentioned, the "Innovation Window" has 2 sub-funds:

• The Technology Transfer Fund - TT Fund and

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• The Accelerator Fund.

The TT Fund will target projects and/or companies (SMEs) coming from Universities, Research Centres or other organizations with significant research activity. The goal is to implement research results that are at a relatively high level of technological readiness, as well as to support the development of relevant business plans and their commercial exploitation. This may include investment plans by existing business firms; creation of spin offs and spin outs, exploitation of patent rights, licensing etc. The Fund is expected to provide pre-seed, proof-of-concept and seed⁴ funding.

The Accelerator Fund targets teams, projects and /or start-ups that are linked to entrepreneurship support structures such as incubators, technology parks, co-working spaces, technology transfer structures in universities, research centres etc. The aim of the Acceleration Fund is to provide the necessary funding, including activities such as mentoring, coaching and networking among the interested groups in order to strengthen the business, research, and academic ecosystem. The Fund targets start-up founders who foresee a high growth potential for their business. Aid intensity for the Innovation Window can reach 90% of the total investment costs. In particular, enterprises prior to their first commercial sale on any market, at the time of concerned initial or follow-on investment, require minimum 10% private participation, Enterprises that, at the time of concerned initial or follow-on investment, have operated in any market for less than 7 years following their first commercial sale, require minimum 40% private participation.

Overall, the EquiFund will provide direct equity financing (venture capital) to firms of any size especially SMEs, including academic spin offs. In the next 4-5 years, the EquiFund is expected to participate with more than 500 m € in the capital of Greek innovative companies, mostly SMEs, and to act as leverage for substantial private investment from Greek and international sources.

The budget per year is estimated at 20 - 50 m€. Support includes also grants, loans, new infrastructures such as innovation centres, but also "soft instruments" such as training (e.g. interdisciplinary training and soft skills for entrepreneurship), platforms and working groups for the exchange of best practices, mentoring programmes, awareness campaigns, scouting for talent and entrepreneurial ideas, etc.

Currently, the following nine sub-funds have already been selected:

- Elikonos 2 S.C.A. Sicar: Private Equity for micro-, medium sized investments.
- <u>Synergia Hellenic Growth Fund IV</u>: Private Equity for micro-, medium sized investments.
- <u>Marathon Venture Capital Mutual Fund</u>: Venture Capital for Seed investments in ICT.
- <u>Venture Friends 400W Fund</u>: Venture Capital for seed and technology Start-up investments.
- <u>UniFund AKES</u>: Accelerator fund for Pre-Seed and Seed investments to high tech start-ups.
- <u>Metavallon Fund</u>: Accelerator fund for Pre-Seed and Seed investments to ICT start- ups.
- <u>Velocity Partners Fund:</u> Pre-seed and seed acceleration fund that focuses on technology companies in verticals where the Greek economy can provide global validation and real market traction. Targeted sectors include: ICT sector-oriented

⁴ As defined in Invest Europe (previously known as EVCA)

with a horizontal focus on SaaS, IoT, B2B and a sub-vertical focus on tech entrepreneurs wishing to operate in tourism/travel, fintech, logistics, retail, shipping, maritime and e-health and wellness.

- <u>EOS Capital Partners:</u> Growth fund, covering all sectors with a particular focuses on food & beverage, tourism, fintech, retail, energy efficiency and pharmaceuticals.
- <u>BigPi Ventures:</u> focuses on technology transfer assisting both research-based projects and companies, mostly active in the B2B segment. Targeted sectors include software, data analytics, machine learning, SaaS but also electronic-based hardware, including robotics, optics, sensors. The Fund can also invest in materials science, energy-related technologies and clean technologies (cleantech).

The launching event of EquiFund took place in Athens, on April 16, 2018.

4. Development of the initiative

4.1. Rationale for Equifund implementation

EquiFund and the Innovation Window in particular is a new initiative in Greece. Several Venture Capital Funds and Fund of Funds operated in the past, however, according to the European Innovation Scoreboard, the overall performance of the country in venture capital expenditure is extremely poor (Table 2).

Table 2. Venture Capital expenditure in Greece in 2016 and 2010

Greece	Performance ((EU=100)	relative	to	EU	Change 2010- 2016
	2010	2016			
*	1 10.0	1.0			-9.0
expenditures					

Source: European Innovation Scoreboard 2017

In 2010, the European JEREMIE initiative was introduced also in Greece. The initiative was a framework providing access to finance for micro, small and medium-sized enterprises. It was organised with the assistance of the European Investment Fund (EIF), acting through the JEREMIE Holding Fund (JHF). Through the JHF, the EIF managed funds made available from the European Regional Development Fund (through the national Operational Programme 'Digital Convergence', as well as the Regional Operational Programmes) and the related public expenditure granted under the JEREMIE initiative. Private financing came from both institutional (mainly banks) and individual private investors. JEREMIE provided seed and post-seed funds put together under a scheme of public and private co-financing in a 70/30% ratio. JEREMIE supported the major national Greek banks for the creation of four Hybrid Venture Capital Funds that began operations in late 2012. These "JEREMIE Funds" (JEREMIE Openfund II,Piraeus JEREMIE Tech Catalyst Fund, Odyssey JEREMIE Partners were mandated to invest only in Information and Communication Technology (ICT) ventures that were "early stage" and operated in Greece.

According to recent EIF data, approximately 3.200 Greek SMEs (276,8 m €) benefited from the JEREMIE funds during the period from 2010 to 2016⁵. Despite some criticism on JEREMIE funds' modus operandi (deal flow, investment criteria, lack of visibility), mainly by "competitors" in managing ESIF funds, they have generally been regarded as successful by the Greek start-up ecosystem, having provided with capital some promising tech companies in and outside of the capital city of Athens and triggering other 'players' to get involved and expand the start-up and VC ecosystems. It is generally accepted that the JEREMIE Funds have been instrumental in accelerating the creation of start-ups, in attracting additional investment, and in setting the basis for some companies to become global players. Older experiences with previously established Funds of Funds, such as TANEO, showed limited activity in risk financing.

Evidence exists that most of the research results produced by individual researchers or research teams in Universities and research centres, although potentially marketable, remain un-exploitable due to the lack of appropriate intermediaries and lack of risk funding mechanism. The introduction of the EquiFund was based on an ex ante evaluation, depicting the existing funding gaps/ needs of the innovation ecosystem. This evaluation, which has been approved by the European Commission, was also a precondition (ex-ante conditionality) for the allocation of the ESIF funds. The Innovation Window is a novelty, since it contributes to the investment cost with aid intensity up to 90%.

4.2. Equifund tailored application

EquiFund has a national coverage, with no pre-selected specific thematic focus. As mentioned previously (Part A, Programming Period 2000-2006, Evaluation of PRAXE Programme), the establishment of a specific VC targeting the high risk investments for commercialization of research results has been suggested by the Greek academic community. Furthermore, this funding gap appeared also in the ex-ante evaluation of the Funding Instruments to be used in the current Programming Period. Previously, the JEREMIE initiative in 2010-2016 partially responded to this need; however, JEREMIE focused exclusively on the ICT sector. Thus, it has been decided to create a risk Fund able to support all promising, innovative ideas, and allow all flowers to bloom. The Innovation Window fund managers will make investment decisions based on each investment's business plan, which should contain product description, turnover and profitability calculations and forecasts, previous assessment of project viability, as well as each investment's clear and realistic exit strategy. It is expected that most investments will fall under the priority areas of RIS3, since the bulk of research potential, as expressed by the number of highly cited publications, patents, number of researchers and other performance indicators are relevant to these fields.

4.3. Experiences from other countries

The design of EquiFund took advantage of experiences gained during programming period 2007-13 from the implementation of the JEREMIE initiative in Greece and other European countries.

⁵ Press Conference of Mr.Yannis Tsakiris, Head of Head of the Mandate Management/Equity Division of EIF Southeastern Europe - http://www.capital.gr/sunenteuxi/3276805/g-tsakiris-pano-apo-miso-dis-euro-stis-mme-apo-to-equiFund

5. Interactions with the policy mix

5.1. Previous gaps in the policy mix

From 2000 onwards, the policy landscape in Greece was reoriented towards innovation, under the impulse of the DG for Regional Development of the European Commission, which was funding the largest part of the investment budget for RTDI in the country: new concepts adopted included commercialisation of research results of Universities, public research centres and individual researchers (the PRAXE Programme as described in Chapter B "Development of the Initiative") together with the development of private incubation facilities and S&T parks (ELEFTHO Programme).

Previously, substantial funds were devoted to the public research centres for (a) improvement and upgrading of RTD infrastructures through ESIF funding (STRIDE Initiative, 1st and 2nd Operational Programme for Research and Technology), in parallel with (b) competitive funding targeting human research potential, (c) industrial research and (d) collaborative consortia between industry and universities or public research centres (networking public-private RTD entities). However, despite the fact that funding schemes for industrial and collaborative research between industry and academia increased in the 1990s, their impact on the industrial landscape and the economy proved insufficient for creating an innovative wave. All available indicators confirmed that the Greek firms performed very poorly as far as investment in R&D, patenting and other IPRs, own innovation creation (new to market products etc.) and exports of high technology products are concerned, except probably for organisational and marketing innovation.

On the other hand, qualified youngsters with post-graduate degrees were attracted mostly by professional carriers as academics in public universities or research centres, in Greece or abroad. In case they failed to integrate into the academia or a laboratory of a large company, they sought opportunities elsewhere as employees. The labour market was and still remains unable to absorb all such people and needs to create new businesses and enrich the productive network. Actually, the absolute majority of new firms established by young graduates were self-employed attorneys, medical doctors and construction engineers (active in house building and public works) exploiting standard knowledge rather than fresh research results. Most of them invest personal or family funds in the new venture, while the large majority do not use loan schemes from banks or other financial institutions.

In addition to the negative propensity (aversion) of young researchers, PhD holders etc. to create new, knowledge intensive companies, the financing organisations, such as banks, venture capital, business angels and established firms are also risk-averse and extremely reserved in funding inventors or academics, with no entrepreneurial training, to develop a new venture. In particular, Venture Capital Funds in Greece invested mostly in well established companies for growth and further expansion, while seed capital reached just the 5% of their overall VC-related investment activities in 2000-2005, as shown in Figure 2 below. It is the opposite of what happens in the USA or in some northern European countries, where large companies (a) spin out new internally developed activities and mentor/coach their managers in developing a young company or (b) provide for funding to young external inventors with the aim to develop a new venture.

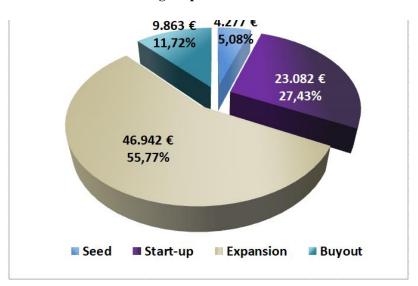


Figure 2. Investment activity in Greece by maturity level during the period 2000-2005

In order to cope with the above "market failures", the Greek government developed policies with the aim to redirect the strategic orientation of traditional industry towards more knowledge intensive activities. To accomplish this rather challenging task, the government included also in the policy agenda the mobilization of the financial markets, including the development of a venture capital fund. Furthermore, RTDI policies addressed as well the commercialisation of research results produced by academic and research organizations. In this context, the PRAXE Programme, launched in 2001 was the first coherent governmental initiative providing pre- and seed capital to the research operators.

Currently, the establishment of a "knowledge-based economy" in Greece, by transforming the production model towards high added value and sustainable competitive advantages, is one of the top priorities of the Greek government. However, as in the most peripheral regions of the European Union (east and south), there are still several inherent difficulties since the economic agents continue to invest on traditional activities, such as low added value agriculture and tourism, overexploiting local natural resources. Policy efforts to reverse the situation have been continuous since 2001, as the challenges presented above have not been appropriately tackled, yet deteriorated due to the recent economic crisis. Thus, policy instruments to foster creation and development of spin offs, spin outs and innovative start-ups through grants were re-launched in programming period 2007-13 and are still in place for 2014-20, complemented by adequate financial instruments.

5.2. Interactions with other policy instruments

Concerns have been expressed about the simultaneous use of both Schemes A and B. Both target the same population of beneficiaries and provide incentives for commercialization of research results. The first offers direct grants and the second private equity. Thus, they present a potential competitive character. One option would be to replace grants by venture capital funding. However, previous experiences depicted a risk-averse behaviour of the venture capital intermediaries (owned by large banks) that could lead to the selection of safer investments (i.e. in tourism, energy) against the risky

ones. Very few spin offs, spin outs or innovative start - ups among those that participated to a recent assessment conducted in 2018 concerning the 2011 call of the Scheme A (see Chapter B1.2), intend to submit proposals to EquiFund (Figure 3).

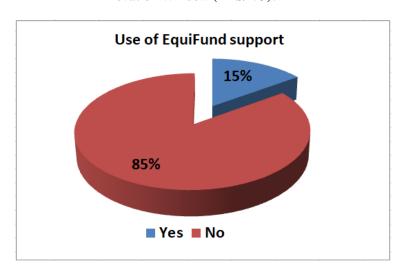


Figure 3. Do you intend to participate to the EquiFund Innovation Window (YES/NO)?

The debate was about to conclude in favour of the parallel running of both instruments, with Scheme A providing the necessary pre-seed capital for the preparation of investments and Scheme B supporting the initial stages of the operation of the innovative start-ups. To better address the existing gaps, the Scheme A will include a proof of concept element as well. The majority of the participants to the 2018 assessment of the 2011 call of Scheme A (see Chapter B1.2) confirmed that the two instruments should continue to co-exist; however they agree that Scheme B would be used for higher TRL products and services.

It seems that the incentive effect of grants is considered stronger than equities among the research community. Yet, there are several disadvantages in the use of Scheme A: lengthy and bureaucratic procedures, evaluation conducted often by academics with no business experience and little understanding of the market dynamics, need of bankguarantee letters in order to receive the funding instalments, exhaustive formal controls focusing on the expenditures rather than on the actual results etc.

Finally, it has been decided to delay the launching of Scheme A, in order to assess the first response to the EquiFund Innovation Window, which is operational since April 2016.

The legal basis for spin off creation was confusing up to 2014. Relevant Articles were scattered in several legal interventions (Law 2741/99- article 23; Law 2843/2000-article 34; Law 2919/2001; Presidential Decree 17/2001; Law 2992/2002 — Article 10) . However, the legislation in force on the operation of the Higher Education Institutions was not providing for spin off creation.

Recently introduced legislation (Law 4310/2014 as modified by Law 4386/2016Art. 21) fully empowers public research organizations (both Universities and public research centres) to commercialize research results through spin off creation, licensing, participation in private or public legal entities (thematic networks, clusters, technology parks and incubators etc.) for know-how transfer and promotion of research and innovation activities.

Professors are offered the possibility to have a second employment, i.e. work in the spin off firm against a part time employment in the university for two years with possible extension for another three years. The IPRs, according to the national legislation, belong to the employer, if the employee has been hired for producing RTD results (dependent invention), to the employer at 40% if the employee produced the RTD results at his own initiative but using the facilities of the employer. In case the employee produces the invention independently from the employer, the invention belongs entirely to the employee. The Greek universities and public research centres until now demonstrate a lack of interest to participate in the exploitation of the RTD results and leave the academics free to exploit or not their inventions. On their side, the academics owing exploitable knowledge prefer move ahead with commercialisation, with no interference of the university administration.

5.3. Aligned policy instruments from other policy areas

EU-SME Instrument

At the European level, the SME Instrument addresses small and medium-size enterprises with a radically new idea underpinned by a business plan for rolling out marketable innovation solutions and with ambitions to scale up. Currently, Greece plans to implement the "Seal of Excellence" concept for the SME Instrument in order to support through ESIF projects of Greek firms that passed the evaluation thresholds in the European competition, but have not been retained for funding under H2020, due to the exhaustion of the available budget. This instrument will offer complementary funding opportunities to dynamic innovative spin offs.

Cluster policies

Cluster policies were developed by GSRT in the past programming period 2007-13, building on the promising results achieved by a pilot experiment in the nano- and microelectronics sector (mi-Cluster). Mi-Cluster, operated by the Corallia Unit of the "Athena" research centre, was the first innovation cluster supported by GSRT; since 2006, it has shown significant development in a number of performance measures.

In 2011, GSRT launched a specific Programme, aiming at developing further innovation clusters in thematic areas/ economic activity sectors. Among others, the Programme provided support to new or existing very small, innovative enterprises to develop prototypes through grants. A recent assessment of the Programme, depicted promising results achieved by the following clusters supported:

The si-Cluster (Space Technologies and Applications Cluster, run by Corallia)

The gi-Cluster (Gaming and Creative Technologies & Applications Cluster, run by Corallia)

The Bionian Cluster (Health and Pharmaceuticals).

Innovative start-ups and spin-off companies participating to the Programme had multiple advantages, beyond the direct funding for prototype development: colocation and coworking spaces facilitating their integration into value chains, coaching and training activities, especially for IPR, increased visibility and exports. Overall, 8 innovative start-ups and spin off companies took advantage of the Programme from 2011 to 2015.

A new similar Programme to support existing and new innovation clusters has been drafted by GSRT and is included in the Operational Programme "Competitiveness, Entrepreneurship and Innovation" 2014-2020, with a public budget of 25 m€.

The relevant call is about to be launched. The scheme shall extend the opportunities of the small innovative firms to find appropriate incubating facilities, coaching, networking and financing opportunities.

Technology Parks, Incubators, colocation and co-working spaces

The first government initiatives to develop S&T parks and incubators were undertaken in 1989, through the funding of public research centres to build incubators for spin off and start- up companies near their laboratory facilities. The above initiatives led to the building of "S&T parks" at various locations throughout the country. Four research centres, in Attica ("Lefkippos)", Thessaloniki, Patras and Crete established such incubator-parks. Three more parks, depending on universities, were added later in the 1990s or later, including Lavrion - Attica, Epirus and Thessaly. They have been supported extensively by public funds (building and equipment expense but also softer projects were allocated on a more competitive basis.

At a later stage (Programming period 2000-2006) specific schemes aiming at developing private S&T incubators were launched at the national (ELEFTHO scheme) and regional levels. Ten (10) private-funded incubators were established five (5) in Athens, four (4) in Central Macedonia and one in N. Aegean. However, currently, only 5 out of the 10 initially established incubators are still operational (1 in N. Aegean, 3 in Central Macedonia and 1 in Attica region). However, as evaluation reports depicted, a limited number of spin offs supported by the granting programme (Scheme A) were located in such facilities.

In Programming periods 2007-13 and 2014-20 no specific schemes supporting S&T Parks and/ or Incubators have been activated at the national level by the OP on Competitiveness. However, several initiatives exist, offering a mix of incentives, guidance and co-working spaces for young innovative firms. In particular:

The EGG (https://www.theegg.gr/en/): "Enter - Grow - Go" programme is a Corporate Social Responsibility initiative by Eurobank designed and implemented in cooperation with Corallia, that aims to boost young innovative entrepreneurship and improve employment opportunities for young people in Greece. At a first stage, "Enter" the programme can engage young aspiring entrepreneurs into action. At the "Grow" Stage, the participating business groups focus on the development of their business idea, building upon the infrastructure, training and mentoring services offered by the Programme. Finally, at the "Go" Stage, the program seeks all business groups that have participated in the grow process to make their business "leap" and capitalise on the value of their idea with their own resources or through leveraging other investment funds.

Orange Grove (https://orangegrove.eu/) is an initiative of the Embassy of the Netherlands in Athens, financially supported by Dutch-Greek businesses and grant-making foundations active in Greece. The initiative provides a flexible co-working space and network community for young entrepreneurs in Greece. Successful start uppers are assisted to search for smart finances on the Netherlands.

The French Embassy in Athens is also promoting entrepreneurship and helps young inventors to develop their ideas and if necessary to search for business opportunities in France and elsewhere in Europe.

Municipalities provide co-working spaces, opportunities for networking and coaching to young star-uppers ("InnovAthens", supported by the Municipality of Athens that operates in a refurbished old facility of City Gas production in downtown Athens; the Municipality of Piraeus established "BlueGrowth" that focuses on industries related to the sea business; the Municipality of Thessaloniki sponsored a similar "incubator-

accelerator" activity). Patras (Region of Western Greece) has been served by the incubator activities of the S&T Park but hosts also an incubator as an annex of the Corallia's mi-Cluster.

Information diffusion, coaching, training, IPR consultancy

Several initiatives offer soft services to start-uppers. Indicatively, some of them are described in the following session:

StartUpGreece (www.startupgreece.gov.gr) is a policy instrument for the implementation of the European and national policy for small and medium-sized enterprises, and especially the Small Business Act for Europe. StartUpGreece is a communication vehicle that combines online and offline tools and actions.

The Hellenic Industrial Property Organization (HIPO) plans to undertake a number of initiatives in order to promote patenting activities in Greece.

Corallia, in its cluster's activity sectors, implemented also several initiatives to stimulate and promote Youth Entrepreneurship, such as Career Days (open to students and graduates who wish to explore the opportunities presented by the Greek high tech industry and learn more about relevant updates on career prospects), Educational workshops (entitled "Carpe Diem", especially addressed to students in secondary education in order to indulge them in entrepreneurship and technology-related issues), Internship Days (that provide information to students on internship opportunities in innovative companies) and Educational Trips. The latter is a programme organized in cooperation with the Student Associations of renowned Universities in the US⁶ and provides each year 24 students from Greece with the opportunity to visit some of the world's most prestigious universities in order to attend lectures and seminars, to visit high-tech companies and research centres in Silicon Valley, San Francisco, Boston, and elsewhere and interact with highly estimated professors, researchers and entrepreneurs. These activities are hopped to boost the entrepreneurial spirit among the students.

5.4. Additional measures taken to ensure the success of the policy instruments

An appropriate legal basis providing for the establishment of academic spin offs is critical for the success of the initiatives in parallel to the introduction of a positive attitude in favour of entrepreneurship. The recently introduced legal framework refocuses the orientation of the universities towards entrepreneurship. Such provisions are included in Article 21 of Law 4310/2014, amended by Law 4386/2016, foreseeing the creation of spin offs, licencing and joint R&D partnership with industry for HEIs and PRIs. Public research bodies of the government sector are given the autonomy for the creation of new legal entities with any legal status and organizational structure, such as thematic networks of advanced research, spin off, knowledge-intensive enterprises, business clusters and science and technology parks with research and technological objectives. However, academic spin offs are created exclusively in the forms of corporations of limited liability and private capital companies.

Furthermore, a new approach concerning the establishment of networks of Technology Transfer Offices in HEIs and PRIs (whose development has been supported twice in the 1990s and 2000s through schemes of limited success) has been adopted, and a relevant scheme is included in the OP "Entrepreneurship, Competitiveness and Innovation"

⁶ Stanford, Berkeley, MIT, Georgia Tech, UC San Diego, Princeton University

2014-20. The scheme will provide for the implementation of an Action Plan submitted by consortia of HEIs and PRIs, including:

Mapping and evaluation of research results with high commercialization potential

Patenting and/ or licensing activities, guidance for creation of new spin-offs

Networking of HEIs and PRIs with funding institutions and VCs, competent governmental authorities at the national and regional levels, as well as private companies.

Collaboration with the business sector, development of knowledge transfer activities through contracts, as well as through the eventual establishment of long- term strategic business – academia agreements.

Collaborative research projects between industry and academia⁷, supported by different schemes substantially funded by the Operational Programme "Entrepreneurship, Competitiveness and Innovation" in 2014-20 and also by pervious O.P.s, are also important instruments for knowledge sharing.

Finally, the Greek government established in 2016 the "Hellenic Foundation for Research and Innovation" (HFRI) that is expected to underpin the knowledge production of the Greek research system, boost the human research potential, and enlarge the basis for innovation to thrive.

5.5. Critical factors from industry, research and policy context

Since 2010, Greece was heavily affected by an unprecedented financial and debt crisis, which resulted in a dramatic loss of GDP, severely worsened unemployment rates, especially for young people (above 50%), aggravated poverty and inequality and threatened social cohesion. In particular:

Unemployment reached nearly 25% in 2015. Today, unemployment is the higher among the Eurozone countries, affecting especially the younger generation,

Greek wages fell nearly 20% from mid-2010 to 2014, resulting in a severe recession,

Since the beginning of the crisis, the country has undergone 12 rounds of tax reforms most of the tax deductions were withdrawn,

Credibility loss combined to capital controls imposed in mid-2015, created further barriers to the firms' extroversion and deteriorated competitiveness.

As far as competitiveness is concerned, Greece is stuck in between knowledge intensive and low cost economies, showing decreasing performance during the crisis time, according to the international benchmarks.

It is ranked at the 87th place among 137 countries according to the World Economic Forum⁸ "Global Competitiveness Report" 2017-18.

A number of structural deficiencies of the production sector, deteriorating during the crisis time, lie at the basis of the competitiveness gap:

⁷ Programme "Research – Create – Innovate", Specific Actions in the fields of Aquaculture, Industrial Materials and Open Innovation in Culture, see OECD STIP Survey 2017, Greece.

⁸ https://www.gemconsortium.org/country-profile/66

5.5.1. Industry context

Low contribution of activities of high added value and ICT penetration, based mostly on "traditional" sectors (i.e. food and beverage, cement and concrete etc.), deindustrialization and re-location of activities abroad were accelerated.

Small size of enterprises and lack of large firms with international exposure and market penetration. In general, the value chains are short and close to the final consumer.

Companies rely mostly on imports of machinery and equipment (embedded technology) as the main form of technological upgrade and productivity improvement.

Institutional and cultural barriers to entrepreneurship, limited use of economies of scale, (lack of B2B services, vertical links and complementarities between companies), restricted personnel mobility, high energy costs, bureaucracy and red tape.

Limited use of Venture Capital, Business Angels, crowdfunding or other similar financial instruments.

"Doing Business" of the World Bank identifies also a series of weaknesses of the national system in launching a new firm and awarding all types of operating licences. Further information is available in the Entrepreneurship index of the Global Entrepreneurship Monitor (GEM). Several deficiencies are depicted also in the 2017 European Innovation Scoreboard, where Greece is included in the group of "moderate innovators". The country is underperforming in most innovation - related indicators, especially in venture capital investments, license and patent revenues, PCT patent applications and business investments in R&D. On the other hand, Greece performs above the EU average on non-technological innovations, international scientific copublications, and innovative SMEs collaborating with others.

Against this background, RTDI policy responses applied so far have a two – fold dimension:

Modernization of the traditional industry by introducing new technology, intensify links to research organizations and also enhance research activities in house.

Restructuring the productive sector by the establishment of new, knowledge – intensive companies capable to create high added value, innovative products and services, to integrate into global value chains and penetrate in international markets.

Towards this direction, spin offs, spin outs and innovative start – ups have a critical role to play, provided that their number, economic volume and growth potential are substantially increased.

5.5.2. Research system context

Research system context, i.e. research base, agencies, institutional set-up of higher education, intermediaries, collaboration patterns, and international linkages.

The education in Greece system is much organized as it is in the rest of Europe. The Higher Education sector comprises 23 public universities and 13 public Technological Education Institutes (TEI). Beyond teaching, public universities have a strong focus on R&D activities, being the strongest R&D performers until recently. Recent reforms in Higher Education (Laws 4009/2011; 4076/2012; 4115/2013, 4485/2017) granted to HEIs greater autonomy.

As far as Public Research Centres are concerned, most of them operate under the auspices of GSRT and the Ministry for Education, Research and Religious Affairs. A lot of them, in particular the newest wave, have strong links with Universities, since many

⁹ http://www.doingbusiness.org/rankings

researchers are also University professors. Different other Ministries supervise a limited number of further research centres, the most important being in the Agro-food sector.

Despite the small size of the Greek research community, it is marked by a number of important strengths: very good performance in scientific publications and citations, a significant participation to the European Framework Programmes, an extensive representation of Greek scientific organisations in international research networks and 'niches' of scientific and technological excellence in the public research institutions and the private sector. The Greek research community benefits also from an increasing networking to an excellent research diaspora. Thus, there is a strong knowledge base for producing new, innovative ideas.

However, the research teams have no critical mass, fragmentation in many small units is dominant, and their links to industry are weak, given the limited demand on behalf of the Greek productive sector. Research in universities and research centres has a more academic character, despite the existence of a legal framework for research results commercialisation. Few universities embedded a "third mission" approach. Research results are more likely to be exploited by foreign companies and/or research organisations that have a stronger focus and related experience in technology transfer and commercialisation.¹⁰ There is also a shortage of dynamic intermediary bodies for technology transfer. On the other side, patenting is a rather unknown activity in most science and engineering departments (data from OBI¹¹).

5.5.3. Policy context (Education and labour market)

The RD&I sector in Greece was particularly affected by the recent economic crisis, especially due to the unprecedented brain drain flows reported (Figure 4).

The chart calculates the difference between profes-sionals seeking to leave the country and professionals seeking to come into the country.

A negative number indicates more people seeking to leave than those seeking entrance.

This dramatic increase of brain drain is considered as the most important threat for the Greek research and innovation society. On the other hand, there is a marked propensity of the Greek society towards tertiary education, as this a way securing until now social upward mobility.

According to the European Innovation Scoreboard 2017, the percentage of the population with tertiary education was above the European average (performance relative to EU = 150.7); close to the European average are the new doctorate graduates (71.2).

-

¹⁰ Study Interview1, 16 June 2016

¹¹ The Greek Patent Office.

Brain Drain in the Crisis Years Greeks depart on Odyssey for jobs Net gain or loss of talent between 2009 and 2014 40,000 30,000 25,000 20,000 10.000 -5,000 -10,000 -15,000 20,000 2000-2005: 2.552 young scientists emigrated 2009-2014: 20.281 young scientists

Figure 4. Brain Drain in the Crisis Years

Source: Bloomberg, 2015

Luckily, new opportunities appear in the post-crisis period. The Greek Foundation for Science and Innovation aims to provide 4.000 doctoral and post-doctoral fellowships for a 3-year period, starting in 2017. The Smart Specialization Strategy of the country, funded mainly by the ERDF, foresees the creation of 9.000 new jobs for young scientists in the context of the RI projects for the current 7-years programming period. The "Knowledge Bridges" a networking Platform with the Greek diaspora, provides information for networking, career and funding opportunities in Greece, coaching for young researchers and entrepreneurs, as well as promotion of success stories in Greece.

Building on this background, creation of innovative start- ups offers promising career opportunities to the young generation of scientists and is expected to limit the massive brain drain experienced in the last years.

6. Impacts

6.1. Instruments' impact evaluation

None of the two instruments (Granting Programme and Equity Fund) has been ex post evaluated yet, since they are about to be implemented. Summary results of evaluations of the predecessors to Scheme A are presented in Annex I ("Development of the initiative").

For Programming Period 2014-20, a National Research and Innovation Strategy for Smart Specialization (RIS3) has been elaborated. The objective of RIS3 is to re-orient the productive sector of the country through research, technological development and innovation, towards higher added value products and services, capable to penetrate into international markets, in order to ensure economic growth, to mitigate regional disparities, to create sustainable employment to the benefit of the people and society, to protect the environment and to promote culture. The Strategy aspires to establish and implement a coherent "policy mix" of interventions to cover the multiple facets of innovation. Under the austerity measures, such policy mix is actually a challenge. The top priorities of the Ministry currently include:

A slight but critical increase of the regular funding of public research institutions, necessary for retaining their research potential and deploy long-term strategies.

A balanced mix of supply and demand - driven funding tools, including different grant schemes, to support the sectors of national priority. Emerging technologies with high innovation potential are considered as well. Relevant activities comprise collaborative and industrial research and innovation projects, creation of spin offs, spin outs and innovative start-ups, support of intermediaries (clusters, competence centres, technology transfer offices), support of research infrastructures, European and international collaboration programmes etc.

Grants aiming at enlarging and deepening the knowledge base of the country, through the support of curiosity – driven research.

Financial instruments to aid start-ups to establish and cross the death - valley, but also existing innovative companies to scale – up.

Tax incentives for R&D and innovation (firms' R&D expenditures and implementation of patents).

Both schemes under scrutiny (A and B) are included in RIS3, which will be constantly monitored through a dedicated Monitoring Mechanism, foreseeing also the revision of the Strategy by 2018.

In depth evaluation and impact assessment of the Strategy is planned by the end of the current Programming Period (2023). A specific action to support the establishment and operation of the above Monitoring Mechanism is in place, elaborated by GSRT. In this context, the whole policy mix included in the Strategy, as well as the relevant individual instruments, will be evaluated. Specific provisions could be introduced in the Mechanism in order to investigate interactions (positive or negative) between the different instruments applied. However, most of the effort is focused on innovation policies and their complementarities, rather than on other components of the governmental policies, which can re-inforce or undermine the innovation ones, and thus play a critical role on their success or failure.

7. Implications

7.1. Initiatives' future implications

A strong evaluation culture of policies and policy instruments has not been established in Greece so far. Most of the ex ante, interim and ex post evaluations of the successive Operational Programmes are rather formal and provide little evidence useful in policy making. A first, thorough evaluation of interventions in the RTDI sector took place only in 2015-16, where the most important national programmes launched during the Programming Period 2007-13 were assessed. Currently, as mentioned previously, the RIS3 Strategy provides for a systematic monitoring and evaluation mechanism, both for the policy mix as a whole and the instruments in use. In this context, the following issues can be considered:

- Set up of a coherent policy mix with clear objectives, not just a combination of multiple, often overlapping or competing instruments. Elaboration and implementation of Strategies (either at the national and/or regional levels), together with the appropriate monitoring and evaluation mechanisms, offer a good opportunity towards this direction.
- Introduce a limited number of clearly defined instruments, each targeting different selected population of beneficiaries.

- Carry out evaluations of the whole policy mix together with the individual instruments.
- A specific part of the evaluation questionnaires should be devoted to investigating possible interaction (synergetic, complementary or competitive) between the several instruments in place.

In this direction, GSRT has already adopted an appropriately structured questionnaire that will be used for the evaluation of the Greek participation to the EUROSTARS initiative. This evaluation is about to be launched. A similar approach will be introduced in the forthcoming evaluations of the policy instruments in use in the current and the previous programming period, as foreseen in the national RIS3 Monitoring Mechanism. Finally, evaluation of the whole RIS3 policy mix, as previously mentioned, is planned by 2023.

7.2. Broader implications useful for other countries

General recommendations based on lessons learnt from the current case study can be summarized as follows:

- Find the right balance of policies and tools for supporting both blue sky and applied research in order, on one hand to enlarge the knowledge base and thus, multiply the opportunities for scientific breakthroughs and, on the other hand, create the appropriate ground for innovation to thrive. The task is tricky, especially in countries strongly affected by the European paradox.
- Introduction of equities with high aid intensity (up to 90% contribution of public budget), in order to support risky ventures for the commercialization of research results, could be considered, especially in countries with low demand on behalf of the local industrial/ productive sector.
- In countries with strong regional inequalities, policy makers have to consider a possible conflicting character between the policies boosting capacity building in the least developed regions and those supporting S&T excellence in regions with higher per capita income and stronger RTDI performance.
- Need to enhance entrepreneurship teaching and motivation in compulsory school and at tertiary education. Teachers are the first target population for raising awareness on the need for enhancing entrepreneurship motivation of youth.
- The role of applied research and reverse engineering is crucial for accelerating the modernisation of the production fabric and the penetration of the most modern technologies to the rather traditional industrial sectors and services. In this sense, the emergence of a B2B robust sector supplying such services to SMEs, in addition to coaching and mentoring, needs to be strongly encouraged.

In general, it has been made clear, once more, that the success of any innovation policy is not an issue for one civil service body nominated "competent" for the appropriate policy. It is a matter of a nexus of policies that converge to the same objectives, adopted jointly by most government units and implemented under coordinated control and assessment.

8. ANNEX I

Evaluation of the granting schemes launched in Programming Periods:

- 2000 2006 (the PRAXE Programme, Phase A & B) and
- 2007-13 ("Spin Offs Spin Outs Creation and Support Programme") successively.

8.1. Programming period 2000-2006: the "PRAXE" Programme

The Programme aimed at supporting the creation of spin off companies for commercialisation of research results developed by research organizations (Universities and public research centres), or by researchers belonging to the academic personnel of public research organizations in Greece or abroad. The Programme was implemented in two phases Phase 1 (Preparatory Phase), covering preparatory activities and Phase 2 (Initial Investment Phase) providing funding for the establishment and initial operation of the spin off company. Participation in Phase 2 was not necessarily linked to the successful implementation of a Phase 1 project. The PRAXE Programme was co-financed by European Structural Funds (ERDF) and National Budget at a share of 70% and 30% respectively.

8.1.1. PRAXE-Phase 1 (Preparatory Phase)

This phase provided pre-seed capital for the implementation of the necessary preparatory activities for the establishment of the spin off company. These activities included final research steps for the implementation of the new product, process or service to commercialise; prototypes, tests, measurements and analyses; demonstration activities; industrial design, preparation of IPR agreements, legal, financial and technical services, business plans and market analyses, promotion and participation to fairs, as well as services for access to finance.

Phase 1 was implemented from 2001 to 2003 and funded 224 proposals with a maximum budget per project up to 15 m drs (approximately $44,000 \in$). Most of the proposals (65%) were submitted by legal entities (research organizations) and 35% by individuals (academic researchers). Universities and Polytechnics participated in 47% of the proposals and public Research Centres in 45%. As far as the thematic content of the proposals is concerned, domination of exact sciences and engineering was recorded (75% of the proposals), and to a lesser extent health sciences (20% of the proposals). More than half of the participants were located in the region of Attica (56.7%), followed by Crete (16%) and Western Greece (12.5%).

In 2008, GSRT delegated to an external auditor¹² the assessment of Phase 1.The response rate on behalf of the beneficiaries was high (78%). According to the findings of the assessment, implementation of Phase 1 was relevant to its initial scope, efficient and

¹² EEO Group – Consultants SA

effective. However, investment readiness of the projects' results was not high: 43.7% of them were reported as high and 40.5% as moderate.

The majority of the participants used the funding in order to prepare existing research results for commercialization, as well as to identify investors. Patenting and prototyping activities were implemented to a lesser extent and in almost all cases the preparation of business plans was outsourced to external consultants. Assessment revealed also that access to financial instruments (VCs) for the participants has proven extremely difficult. Furthermore, in most cases, research organizations did not provide any specific assistance for commercialization of research results.

As far as the broader impacts of PRAXE - Phase 1 are concerned, the assessment depicted that:

The scheme was the first governmental intervention in Greece providing pre-seed capital to the innovation market. Overall, 9 m € were channelled to this market, as a leverage to stimulate private, knowledge – based investment. Synergies are depicted with a parallel Programme¹³, launched by GSRT during the same period, aiming at supporting private innovation infrastructures, incubators in particular. The latter included provisions facilitating the access of spin offs to private incubators.

PRAXE - Phase 1 significantly contributed in changing the mind-sets in the public research institutions towards the establishment of a more innovation friendly environment and attitudes. This has been regarded as the most important achievement of the Programme. It also helped build bridges with the private sector; academic researchers cooperated with firms providing services and with external consultants for the preparation of business plans, business statutes and for legal advice.

In the IPR field, the scheme had a two-fold impact. First, it contributed to the increase of the number of patents, since it provided funding dedicated to patenting activities. In the framework of the 224 funded projects, 104 patents were filed to the National Patent Agency. Second, it stimulated also the dialogue on IPR and licensing issues, sharing of rights and preparation of relevant agreements. Public research institutions initialized discussions in order to introduce specific policies for the commercialization of research results.

However, only a small proportion of the projects funded (16.5%) resulted to a commercialized product, process or service. Only in 13.7 % of the cases a spin off company was finally created, and only 10% of the projects passed to the next phase 2 of the PRAXE Programme (see next chapter). Private investors were involved in 20% of the projects. As a result, PRAXE- Scheme 1 was not relaunched in the following Programming Period 2007-13. Actually, a Programme similar to PRAXE – Phase 2 (Initial Investment Phase), introducing also new elements was re-activated in 2007-13. The latter (Spin Offs – Spin Outs Creation and Support Programme) is described under a dedicated Chapter.

8.1.2. PRAXE-Phase 2 (Initial Investment Phase)

This Phase, which was launched in 2006, supported the initial stages of the investment plans to be implemented by newly established¹⁴ spin off companies and provided seed and start – up capital in the form of direct grants. Participation to this Phase required the

¹³ The "ELEFTHO" Programme

¹⁴ Up to 3 years before the funding contract

existence of a coherent business plan ensuring the technical and financial feasibility of the product/ service to commercialize, as well as the participation of private investors. PRAXE – Phase 2 targeted:

Public Research Organizations (Universities, Public Research Centres and Institutes) under the condition that they hold less than 50% of the share capital of the spin off company,

Individual academic researchers having produced research results in a Public Research Organization in Greece or abroad,

Entities or individuals having successfully implemented a PRAXE - Phase 1 project. However, participation to Phase 1 was not mandatory in order to join Phase 2.

Phase 2 was implemented from 2002 to 2006, in 3 successive cut-off dates (2003-2004, 2004-2005 and 2005-2006 respectively) with a total budget of 76.5 m € and a private contribution around 50%. The maximum public budget per project was up to 1 m €. Yet, the allocation of public contribution was possible only if at least 50% of the company shares were covered by private investment. Maximum duration of projects was 3 years. Grants provided for the initial investment and operational costs of the newly established spin off company, as well as for specialized consultancies. In the 3 cut-off dates of PRAXE-Phase 2, 35 projects were selected for funding with a total budget of 45 m€ (20 m€ public contribution). The budget per project amounted from 0.5 to 2 m€, with most projects having an average of 1 to 1.5 m€. Finally, 33 projects were successfully implemented.

Thematic areas of interest were Energy, Electronics, Medical Technologies, Informatics, Pharmaceuticals, Biotechnologies, Educational technologies and others (Figure 5).

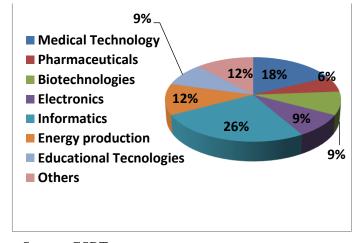


Figure 5. Thematic domains of PRAXE –Phase2 spin off companies (%)

Source: GSRT

PRAXE – Phase 2 was evaluated in 2015, by a consortium of external consultants¹⁵, selected following an international bid. The time lap between the implementation of the Programme and the evaluation of its impact was too long and created several difficulties in identifying and contacting the companies, taking also into account the onset of the economic crisis in 2010. From the 33 companies that implemented successfully the

¹⁵ Atlantis Consultants, Intrasoft International and Agilis Statistics & Informatics

projects, only 23 participated in the evaluation and only 19 completed the questionnaires. The remaining four companies were contacted over the phone and responded orally to some of the questions addressed.

According to the findings of the evaluation, the most important impacts of PRAXE- Phase 2 are summarized below:

Overall, the Programme is evaluated as relevant and successful: it catalysed the creation of 33 spin off companies; among them at least 23 - those that participated to the audits - resisted the economic crisis. However, the initial ambitions were higher, since the target was the creation of 40 spin offs; thus, the above performance indicator was partially met.

Considering the contribution to employment and the qualifications of human resources, the Programme was also quite successful. It led to the creation of more than 150 new jobs, for highly skilled personnel in particular. Here again, the initial objective was the creation of 250 new jobs; however, given the relatively low response rate to the evaluation study, the exact number of the new jobs was not possible to be appraised. However, only a small proportion of the participating researchers (3 out of the 19 who responded to the questionnaire) reported full time employment in the newly created company. The majority kept their academic position in the mother research organization.

The Programme had also a positive impact on the development of domestic know-how and in house capabilities in the participating companies. The majority of the respondents noticed that participation to the Programme offered new career opportunities and also facilitated the training of the companies' staff on new techniques and instrumentations.

Bonds to Universities and research centres were reinforced, and as a side effect, the number of business and academia co-publications increased. Furthermore, research organizations had stronger involvement in close to the market activities, such as prototype construction, costing and preparation of business plans.

Unfortunately, the evaluators did not succeed to collect other critical data such as the number of patents filed, licenses and exports, due to the limited number of the relevant responses that did not allow for statistically correct results.

The main obstacles reported in the evaluation focused on the lack of a clear and coherent legal basis for the creation of spin offs and the participation of the academic research staff to entrepreneurial activities. The Programme was subject to notification to the DG Competition of the European Commission and was based on a specific state aid regime. At the national level, Presidential Decree 17/2001 put the basis for the commercialization of research results produced in public research organizations (PROs). Despite the efforts, according to legal experts, the legal framework of that time remained complex and confusing, hence subsequent legal interventions modified a number of previous Laws, which were not well embedded in the practices of the PROs. On the top of that, an entrepreneurial and risk adverse culture in most of the traditional Universities of the country did not facilitate a broader participation in the Programme. As for PRAXE – Phase 1, the research organizations did not provide any assistance on legal issues for the establishment of the spin off companies, the business plans preparation or the preparation of licensing agreements. On the contrary, IPR agreements between the research organizations and the spin off companies were easily conducted.

Furthermore, participants complained that the attraction of private investors ready to cover 50% of the investment cost was a particularly challenging task. As referred elsewhere, at that time the VCs were reluctant to support risky ventures.

The establishment of a coherent legal framework as well as an entrepreneurial friendly climate in the academic environment was of crucial importance for the success of such policy interventions. The evaluation identified needs for training and coaching of the academic staff on issues such as establishment of firms, patenting and licensing.

The PRAXE Programme was pioneer in that respect as it introduced for the first time incentives for bringing research results to the market. It was the first governmental intervention for enhancing the third mission of Universities that stimulated a change of mind-sets in the academic sector and initiated discussions for the formulation and enforcement of the appropriate legal provisions. Half of the investments (47 %) would not have been implemented without the public support provided by the Programme.

Finally, participants recommended the establishment of a seed/start up VC Fund that could eventually substitute the PRAXE Programme in the future. The VC could build on the experience gained by the JEREMIE Fund and broaden the intervention area beyond the ICT sector. They also proposed the adoption of a "Seal of Excellence" programme for the SME Instrument of the European Framework Programme. It is interesting to note that these two recommendations are taken on board in the current Programming Period, 2014-20, since the evaluation of PRAXE 2 was completed only in 2015.

8.2. Programming Period 2007-13: "Spin Offs – Spin Outs Creation and Support Programme"

8.2.1. General Description

In Programming Period 2007-13, a Programme similar to PRAXE – Phase 2 entitled "Spin Offs – Spin Outs Creation and Support" was included in the OP "Competitiveness", cofunded by the European Structural Funds, ERDF in particular. The relevant call for proposals was issued by mid-2009 by the Managing and Implementation Authority for RTDI projects.

The most important new element of the Programme was the broadening of the type of potential beneficiaries. The new approach targeted not only academic spin offs (created by Universities, public research centres or academic staff of public research organizations) but also spin outs, i.e. new innovative companies established by firms, as well as innovative start – ups created by individual scientists not belonging to the academic sector. Eligible for funding were either existing young (established up to 6 years prior to the funding contract), innovative ¹⁶, small firms (less than 50 employees), spin offs and spin outs or small innovative companies about to be established. Therefore, an additional objective of the Programme was to incentivize the spinning out of innovative ideas created in the business sector by the establishment of new dynamic, independent firms under an open innovation process.

Further objectives were similar to the previous calls (creation of high added value products and services by commercialization of research results, promotion of the third mission of Universities, support to the investment plans of existing innovative start-ups, boosting

¹⁶ According to the definitions of the EU General Block Exemption Regulation in force in the given period (800/2008).

employment of highly skilled personnel, increasing the volume of risky investments, exports, patenting and licensing activities).

The total public budget of the Programme was 25 m€. The maximum public budget per project amounted at 1 m€ with an aid intensity not exceeding 70%. Following evaluation of the submitted proposals, 51 proposals were initially selected for funding; 21 out of the 51 companies were small, innovative start-ups, 10 academic spin offs and 7 business spin outs.

Most of the companies (64%) were already established prior to the launch of the Programme, the rest 36% were created upon the signing of the funding contract (Figure 6).

Newly established company ?

Yes; 36%

Figure 6. Newly established versus existing young companies selected for funding in Programming Period 2007-13

Source: MIA - RTDI

However, 6 contracts were not signed for various reasons (noncompliance with the European definition of SME, of "young" company or other eligi-bility criteria foreseen into the European Regu-lations). 15 further pro-jects were withdrawn during implementation (Figure 7).

Finally, 30 companies participated to the Pro-gramme, with a total budget of 14.29 m \in and a public contribution of 9.36 m \in .

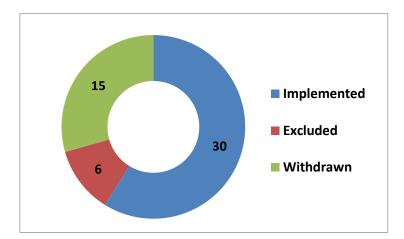


Figure 7. Implemented Projects in Programming Period 2007-13

Source: MIA - RTDI

Concerning the geographical distribution of the projects, here again the dominance of the capital region (Attica) is prominent, as shown in Table 3. Only 7.4 % of the companies were hosted in Technological Parks or Incubators, especially those located in Northern Greece.

Table 3. Geographical distribution of implemented projects in Programming Period 2007-13

	Region	No	Total Budget (€)	Public Contribution (€)
Participating Companies	Eastern Macedonia & Thrace	1	465.062	325.543
	Attica	12	5.535.039	3.538.232
	Western Greece	2	806.601	564.538
	Western Macedonia	1	600.515	420.360
	Thessaly	1	686.267	446.074
	Central Macedonia	7	2.313.251	1.573.132
	Crete	1	176.149	123.305
	South Aegean	1	423.532	296.472
	Peloponnese	2	1.634.450	1.093.410
	Sterea Ellada	2	1.654.318	981.858
TOTAL		30	14.295.184	9.362.924

Source: GSRT

Half of the academic spin offs supported by the Programme were created exclusively by academic staff, without the participation of a private investor. In the remaining cases, the spin off company was co-created by researchers and private business firms. In that case, usually the researcher (s) had already produced the commercially promising results; on the other hand the private firm contributed to the venture by providing know – how on the growth strategy of the company, on marketing and exports issues and also took over the day- to-day management of the spin off.

Examining the thematic areas, Information and Communication Technologies are the principal fields of interest (43.33% of the projects and 37.4% of the budget), followed by Health and Pharmaceuticals (16.67% and 19.91% respectively), Advanced Materials, Nanotechnology & Microelectronics (13.33% and 20.81% respectively) and Energy (13.33% and 7.87% respectively). Other fields include the agro-food sector as well as space and security technologies (Figure 8).

40 37.4 35 30 25 20.81 19.91 20 15 11.32 7.87 10 5 2.68 0 Agro-food ICT Health and Materials. Energy Space, Security Pharmaceuticals Nanotech, Microelectronics

Figure 8. Thematic domains of implemented projects in Programming Period 2007-13 (% of the budget approved)

Source: MIA - RTDI

8.2.2. Main findings of the Evaluation/Assessment

A first evaluation of the Programme was conducted in 2014-15 on behalf of the Managing Authority of the O.P. "Competitiveness" 2007-13 by a consortium of external consultants¹⁷. The response rate was satisfactory (around 50% -15 companies replied to the questionnaire). A further assessment was carried out by GSRT in February 2018, in an effort to update older data and complement the approach with information on the overall policy mix. The response rate was similar (13 responders). Both exercises depicted several interesting findings that are presented below in a cumulative way.

Figure 9. Would you proceed to the establishment of the company without the support from the Programme (YES, NO)?



Source: GSRT

¹⁷ REMACO SA, OMAS SA, EXERGIA Consultants

According to the responses, the Programme played a critical role in the establishment of the new company since 62.5% would not proceed to the investment without the public support (Figure 9).

It is also interesting to notice that approximately 87 % of the respondents declared that they were not able to discover alternative sources of funding or similar instruments to realize their investment upon the launch of the Programme.

8.2.3. Impact on turnover and Profits

The evaluations revealed a positive trend of the financial data (sales, profits and exports) as an average of the 23 companies that participated in total to both assessments (2014-15 and 2018). Data are summarized in Figure 10.

Final data were available up to 2016. Data for 2017 are projections since the companies had not yet issued the respective balance sheets when the 2018 assessment was conducted. Average turnover is small, ranking from approximately $348.000 \in$ to $555.000 \in$ from 2011 to 2017, with a slight downturn in 2012; however it is considered satisfactory given the small size of the companies, the economic crisis that the country was facing and the capital controls imposed in 2015. Projections were also positive, especially for the exporting companies. Exports represent an important part of the companies' overall turn – over; they follow also a similar pattern.



Figure 10. Average turnover, exports and profits of the companies assessed

Source: GSRT

Profitability was also positively evolving, with a very low starting point in 2011, or even losses in 2012, since companies were still at an initial stage. Profits increase from 2013 to 2017, whereas a slight instability appears in 2016.

Furthermore, an in depth analysis of the above data depicted differentiations on performance, according to the type of the beneficiary company (academic spin-off, business spin-out, innovative start-up). In particular, academic spin offs present a greater stability on sales during the whole reference period; on the contrary, sales of business spin outs is declining. Innovative start – ups showed an initial period of instability, followed by a positive trend from 2016 onwards, as shown in Figure 11.

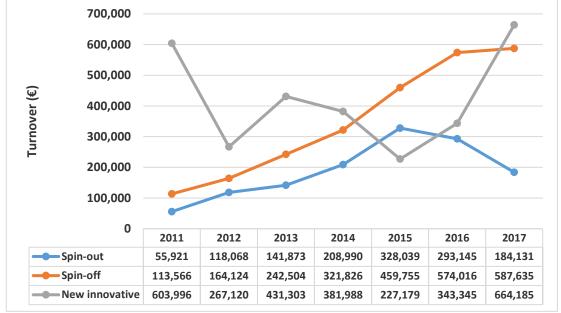


Figure 11. Average turn over by type of company

Source: GSRT

Exports by type of company follow also a similar pattern (Figure 13). Profits showed an increasing trend with a peak on 2015; then they stabilize on lower levels (Figure 12).

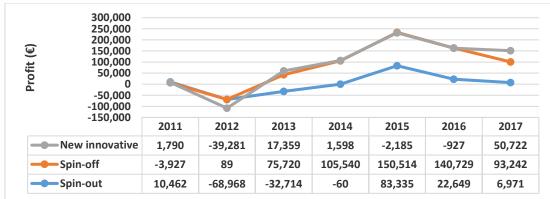


Figure 12. Average profits by type of company

Source: GSRT

8.2.4. Impact on Exports

A 40% of the sample companies already export to international markets. For exports again, the assessments highlighted differentiations according to the type of the company, as for turnover and profits. Spin offs outperformed business spin outs during the whole period under scrutiny. Performance of innovative start-ups increased impressively in the last two years. Trends are shown in Figure 13.

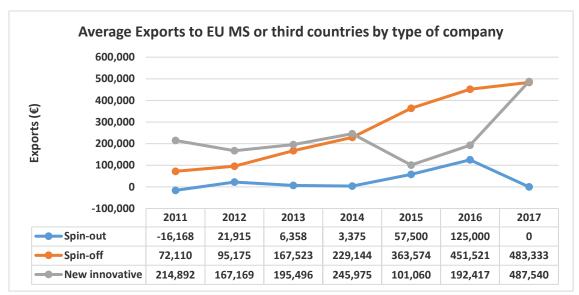


Figure 13. Exports by type of company (spin-off, spin-out, innovative start-ups)

Source: GSRT

8.2.5. Impact on Employment

The beneficiary companies were very small with an average of 16.56 full time equivalents (FTEs) per firm.

However (according to cumulative data of the surveys conducted in 2014-15 and 2018), there is an impressive increase of employment from 2011 to 2018, when FTEs more than doubled, especially in the case of scientific and technical personnel (Figure 14).

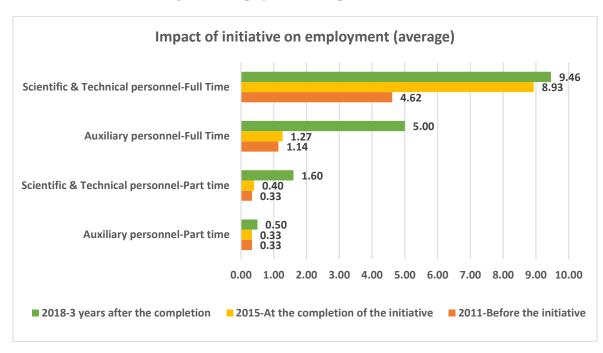


Figure 14. Employment development 2011- 2018 (FTEs)

The level of qualifications of the majority of the employees was high: 67 % is scientific and technical staff versus 33% of auxiliary staff (Figure 15). In general, there is a large proportion of highly skilled personnel, master or PhD holders, in most of the companies of all types.

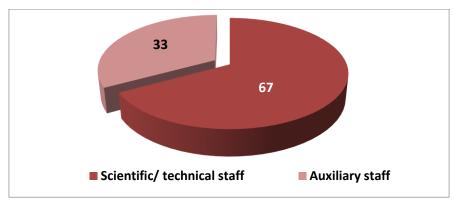


Figure 15. Scientific/technical versus auxiliary staff (%)

Source: GSRT

Another interesting feature is the age of the scientific personnel of the companies: 70% - 90% of the scientists employed are up to 40 years old. Furthermore, most of the staff (87.3%) occupies permanent positions (Figure 10). Concerning the gender dimension, men prevail in the scientific/ technical staff. On the contrary, auxiliary staff (secretaries etc.) is mostly women (Figure 16).

80 **77** 70 69 60 **50** 40 41 30 20 23 10 0 Scientific/ technical staff **Auxiliary Staff** Men Women

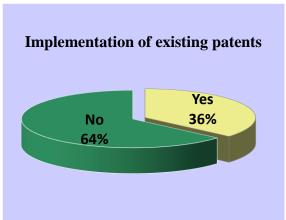
Figure 16. Scientific/technical versus auxiliary staff, by gender (%)

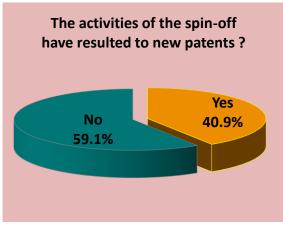
Source: REMACO SA, OMAS SA, EXERGIA Consultants

8.2.6. Impact on Patents

36% of companies assessed exploited existing patents taking advantage of support provided by the Programme, while 40.9% of companies filed at least one new patent during the project (Figure 17). Some of them are international patents.

Figure 17. Percentage of implementation of existing and new filed patents





8.3. Conclusions

The Programme contributed in closing existing gaps in the Greek innovation ecosystem namely the lack of adequate funding mechanisms for risky investments on behalf of small innovative companies, as well as the limited entrepreneurial activity of the Greek academic researchers. In many cases individual researchers undertook ventures without cooperating with established business firms in Greece or abroad.

Many of the companies assessed showed interesting dynamics as far as their financial performance is concerned, especially academic spin offs. The companies succeeded in overcoming the valley of death and in resisting the economic crisis, in particular those with intensive exporting activities.

Synergies have been identified with other type of RTDI Programmes active during the Programming Period 2007-13, mainly with business – academia collaborative projects and also with programmes promoting business extroversion. However, according to the responses, no major overlaps with alternative funding sources or instruments of that period have been depicted.

The Programme had a very positive impact on creating jobs for young, highly skilled personnel. However, women seem to be rather reluctant in undertaking risky ventures. Other encouraging aspects are the increase of the R&D and patenting activities in the firms as well as collaborations with research organizations.

On the contrary, attraction of private investments from Greece or abroad was low. Participants were reluctant to apply for venture capital; only one company expanded its activities using VCs. It is interesting to notice that very few of the companies interviewed (15%) intend to seek support from the newly established EquiFund (see Part 2).

Overall, the Programme showed promising results; however the number and size of companies supported were too small to create a structural effect to the economy.