



Evaluation of the Contribution of the European Structural and Investment Funds (ESI Funds) for Doctoral and PostDoctoral Training

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EXECUTIVE SUMMARY

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1. Objectives and scope of the Evaluation

The present evaluation study is part of the General Evaluation Plan of the Portugal 2020 Partnership Agreement [PT2020] and the Human Capital Operational Program [POCH] Evaluation Plan. Its main objectives are (a) to evaluate the effectiveness and impact of ESI Funds' support to Doctoral and Postdoctoral Training, (b) to explain the logic of effects associated with the interventions supported, and (c) to assess to what extent the strategy implemented in the PT2020 is adequate considering the impacts already achieved. The evaluation study is guided by criteria of relevance, efficacy, efficiency, impact and European added value [VAE] of the interventions supported by the National Strategic Reference Framework QREN (through the Human Potential Operational Program [POPH]) and PT2020 (through the POCH and the Operacional Regional Programmes - NORTE2020, CENTRO2020 and ALENTEJO2020), through the response to a set of evaluation questions.

2. Framework and context of the evaluation study's object

The evaluation study's object are the Doctoral and Postdoctoral training grants supported under the QREN and PT2020, covering the whole period of the QREN (2007-2013) and the PT2020 until June 2018. This support has a long tradition in Portugal within the framework of the National Science and Technology Policy and, in particular, the activity of the Foundation for Science and Technology [FCT], public agency responsible for its execution.

Under the QREN, support for Doctoral and Postdoctoral training through European funding was fully implemented through Priority Axis 4 of the POPH (with the exception of the Autonomous Regions of the Azores and Madeira), covering the North, Center and Alentejo convergence regions. Until 2013 this support was exclusively materialized through PhD Grants [BD] and Post-Doctoral Grants [BPD], awarded individually in a competitive environment; the POPH also financed Industrial and Business PhD Grants [BDE] and from 2013 onwards the regulation began to distinguish this typology, which previously existed integrated in the other BD. Also from 2013 on, and already incorporating those that would become PT2020 options (at that time in an advanced stage of preparation), POPH also financed PhD Programs (including BD and Research Grants [BI]), in line with the international best practices in doctoral education within the European Research Area.

In spite of maintaining the traditional model of individual scholarships (*ie* BD, BDE and BPD), the PT2020 gave particular importance to BD attribution in the framework of thematic Doctoral Programs, stipulating that at least 2/3 of the ESI Funds amount should be assigned for PhD Programs. Among the innovations introduced are:

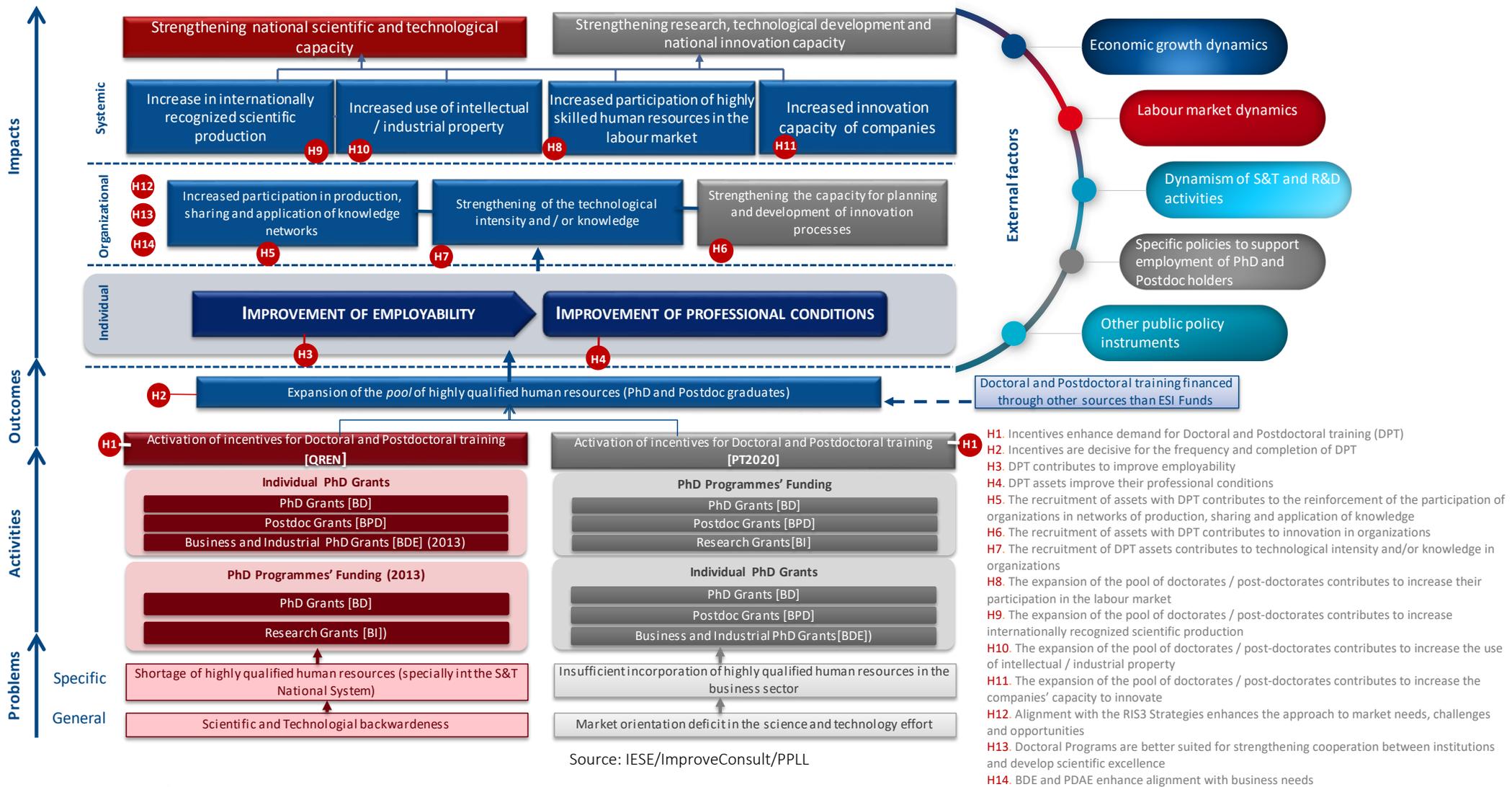
- i) alignment requirement of at least 2/3 of the support with the priorities of the National and Regional Strategies for Research and Innovation for Smart Specialization [RIS3] or other national political priorities, in order to approach market needs more effectively;
- ii) distribution of support by different Operational Programmes, namely: a) the POCH, which concentrates support for all individual BD (*ie* BID and BDE), as well as for the PhD Programs and Postdoc grants aligned with the national and/or multi-regional RIS3 priorities; b) the North, Central and Alentejo Regional Operational Programs, which concentrate support for PhD Programs and Postdoc grants in line with the priorities of regional RIS3, located in their intervention territories.

3. Methodology

The methodological roadmap is based on a Theory Based Evaluation approach, with the Theory of Change [TdM] as a pivot method, combined with the Contribution Analysis. The selection of methods was intended to be integrated and pluralistic, anchored in a diverse range of information collection, treatment and analysis techniques, with emphasis on two cycles of interviews, regional case studies and focus groups, as well as on extensive inquiries of supported PhD and Postdoc students and PhD and Postdoc holders, as well as potential employers. This strong informational base allowed the evaluation study to benefit from the critical vision of a relevant range of actors of the Doctoral and Postdoctoral training system in Portugal. The cross-reference between DGEEC databases (RENATES and CDH2015 Doctoral Survey) and the ESI Funds-supported grantee registries was essential to broaden the knowledge spectrum produced by the evaluation study and to substantiate its results. The following figure summarizes the TdM that underlies the intervention under study, including the assumptions that were tested and validated during the evaluation study, which refer to the different levels of the results and impacts chain, and whose explanation is detailed in the Final Report.

Evaluation of the Contribution of the European Structural and Investment Funds (ESI Funds) for Doctoral and Postdoctoral Training

Logical model of the Theory of Change in Doctoral and Postdoctoral Training support in QREN and PT2020



- H1. Incentives enhance demand for Doctoral and Postdoctoral training (DPT)
- H2. Incentives are decisive for the frequency and completion of DPT
- H3. DPT contributes to improve employability
- H4. DPT assets improve their professional conditions
- H5. The recruitment of assets with DPT contributes to the reinforcement of the participation of organizations in networks of production, sharing and application of knowledge
- H6. The recruitment of assets with DPT contributes to innovation in organizations
- H7. The recruitment of DPT assets contributes to technological intensity and/or knowledge in organizations
- H8. The expansion of the pool of doctorates / post-doctorates contributes to increase their participation in the labour market
- H9. The expansion of the pool of doctorates / post-doctorates contributes to increase internationally recognized scientific production
- H10. The expansion of the pool of doctorates / post-doctorates contributes to increase the use of intellectual / industrial property
- H11. The expansion of the pool of doctorates / post-doctorates contributes to increase the companies' capacity to innovate
- H12. Alignment with the RIS3 Strategies enhances the approach to market needs, challenges and opportunities
- H13. Doctoral Programs are better suited for strengthening cooperation between institutions and develop scientific excellence
- H14. BDE and PDAE enhance alignment with business needs

4. Main conclusions and recommendations of the evaluation study

Doctoral and Postdoctoral training support instruments financed through ESI Funds resulted mainly in individual PhD grants, selected by national calls. These grants were decisive to the access and completion of Doctoral and Postdoctoral training courses and have contributed significantly to reducing the country's scientific and technological backwardness (*catching up effort*) in the European context: the doctoral grant holders represented 59% of the expansion of the pool of highly qualified assets, 58% of which were ESI Funds grant holders.

The analysis of the outputs and results achieved through the financing by the ESI Funds of doctoral and postdoctoral training shows a very positive performance in terms of relevance, effectiveness, efficiency, impacts and Community added value. Notwithstanding this overall assessment, this evaluation study also confirms the persistence of expressive difficulties in the transition between the long cycle that characterized the implementation of this type of support over the last decades and the incorporation of the new priorities introduced by the PT2020's programming. Being this the case of the focus on increasing the potential for economic and social value of the knowledge produced (*ie* promotion of a market-driven approach to these processes) and the promotion of a greater adjustment between the professional profile of the human resources benefiting from ESI Funds support and the labour market needs, which are increasingly broad and diversified (with a clear focus on the so-called non-academic labour markets). In the Evaluation Team perspective, it is precisely these priorities that should be given particular prominence in the future allocation decisions of the ESI Funds, both in the current programming period and in the period between 2021 and 2027, which is already under preparation. At a public policy level, it will be appropriate to strategically consider the new equilibrium relations that arises from these priorities, being important to ensure that they do not invalidate the pursuit of other equally relevant orientations to the country's scientific and technological development, which should have other funding resources than the ESI Funds.

Despite the apparent paradox that the reaffirmation of the relevance of the priorities already included in the PT2020's programming instruments may suggest, they are still not sufficiently internalized in the public policy that supports them, nor in the corresponding operationalization process, thus limiting the extent to which the ESI Funds may have contributed and/or still contribute to its fulfilment.

Essentially, the 10 recommendations of the evaluation study points to creating/strengthening the necessary conditions to amplify the contribution of the ESIF funded Doctoral and Postdoctoral training, in order to increase the economic and social value of the produced knowledge and the promotion of a greater adjustment of the doctorates professional profile to the needs of the non-academic labour market. It should be noted that the adoption of these recommendations is strongly dependent on changes upstream their programming (*ie* in the design and implementation of the public policy itself).

Rec. 1. Ensure that the public policy in support of Doctoral and Postdoctoral training has a clear and valid strategic reference framework when defining priorities and that it is effectively observed and valued in the process's design and implementation

Rationale:

The support provided in the QREN and PT2020 was relevant for the strengthening of the nuclear institutions of the National Scientific and Technological System [SCTN]. Between 2008-2016, the ESI Funds accounted for about 1/3 of the total public investment to support Doctoral and Postdoctoral training processes in Portugal (in a ratio of €2 of national public investment for every €1 of European funding), covering approximately half the number of grants allocated for this purpose, showing a decisive contribution of the ESI Funds to the catching up effort undertaken by the country in the context of its Scientific and Technological Policy.

The programmatic changes introduced by the PT2020 [(i) the need to align total support for Doctoral and Postdoctoral training via Regional Operational Programmes with the thematic priorities of RIS3 and at least 2/3 of POCH support with the National Strategy for Smart Specialization or other political priorities (ii) concentration of at least 2/3 of the scholarship funding in thematic Doctoral Programs, inspired by the experience started at the end of the QREN with the FCT Doctoral Programs] embody the difference between the theoretical rationale of PT2020 and the one from QREN (and from previous programming periods) by emphasizing a clearly market-driven orientation for ESI Funds support.

There is a need to focus on key areas of economic and social relevance, positioning the RIS3 Strategies as a valid and pertinent benchmark to achieve this matching and fostering a closer approximation of the profile of PhD and Postdoc holders to market needs, challenges and opportunities. However, there is a risk that the full potential of the RIS3 strategies will not be fully acknowledged (either in terms of the selection of strategic priorities and areas of specialization and of the scarce integration of policy instruments - policy mix), and above all, due to the lack of evidence of their integration into the operationalization mechanisms of the public policy under evaluation, reflecting a weak internalization of their guidelines in the National Science and Technology Policy. In fact, there are no references to the RIS3 Strategies in the national calls launched by FCT, which shows the lack of integration of these strategies (and therefore of PT2020 programming options) in the practice of granting this type of support, using them only to determine ex-post eligibility for European co-financing.

Operationalization:

Without prejudice regarding the relevance that can be recognized to other benchmarks, the RIS3 must play a fundamental role in this process, especially when aiming at a greater economic and social valorization of the knowledge produced in Doctoral and Postdoctoral training (*ie* market-driven orientation), and especially when using the ESI Funds.

The mandatory alignment of at least 2/3 of the support granted through the PT2020 with the national and regional Intelligent Specialization Strategies, or other national political priorities, may likely to be progressively expanded in the next programming period. However, this should not constitute a single criterion for the allocation of public support to Doctoral and Postdoctoral training (under penalty of limiting scientific progress to exclusively utilitarian purposes), safeguarding the role that public policy should play in promoting a balanced scientific development (through other financing instruments other than the ESI Funds).

Rec. 2. Ensure the existence of a minimum level of financial resources to support Doctoral and Postdoctoral training through the centralized model for the granting of individual scholarships, with a primary focus on enabling scientific areas and research topics that do not fit the strategic referential adopted (eg RIS3 Strategies) and which, by their nature and specificity, do not find adequate support in other financing models.

Rationale:

Between 2010 and 2016 there were substantial changes in the PhD frequency paradigm since the PhD grants were no longer a nearly exclusive condition for access to these courses. On the other hand, at the end of the QREN, began to appear signs of stagnation of the traditional labour markets of PhD and Postdoc holders, as well as fragilities in the conditions of their integration in that market.

However, the mobilization of national and european resources continues to be essential both to promote the demand for Doctoral and Postdoctoral training in strategic areas of knowledge valorization and to ensure the formation of resources covering the transversality of knowledge areas (namely in exact sciences, natural sciences, some scientific areas of engineering and agrarian sciences, where support is essential to finance PhD). In addition, there are scientific and technological areas (namely computer engineering and other technological areas) where difficulties arise to attract PhD demand, due to competition with the conditions offered by the labour market (1st job).

This context change justifies a greater selectivity in the allocation of support, particularly on individual PhD grants.

Operationalization:

This recommendation should be pursued mainly with support of national resources from the State Budget.

Rec. 3. Reduce substantially the amount of financial resources (with or without ESI Funds contribution) allocated to postdoctoral fellowships, breaking with abusive practices of this instrument as a form of work contracts and restricting its use to processes duly substantiated of knowledge deepening and/or research competences improvement.

Rationale:

Faced with the dynamics of the scientific employment market in Portugal, the post-doctoral programs (financed almost exclusively through scholarships) are a natural option for those who finish their PhD and intend to continue research activities. This constitutes, in most cases, a framework of scientific employment and not a continuity of the training process, and is therefore a precarious situation of professional integration.

The Scientific Employment Stimulus Program introduces a new instrument for hiring researchers and for development of scientific employment plans and of scientific careers by public and private institutions, aiming to reduce precarious work in scientific research and adjust professional insertion conditions of PhD holders. In this context, there is a consistent decrease in post-doctoral fellowships co-financed during the PT2020, compared to the QREN.

Operationalization:

The relevance and usefulness of postdoctoral processes to deepen research knowledge and competences in specific areas is not disputed. However, the evaluation study considers that within the ESI Funds framework, its funding should be residual and restricted to areas with an effective contribution to RIS3 Strategies or other national policy priorities.

Rec. 4. Increase progressively the share of financial support allocated to Doctoral and Postdoctoral training in structured models of collective organization of the R&D effort, in particular through a new generation of «FCT PhD Programs», deepening and perfecting the model rehearsed in 2012 and 2013, in line with European and extra-European best practices.

Rationale:

There is no evidence to question the relevance of the different support instruments, namely individual scholarships, selected by national calls, and scholarships integrated in PhD Programs (recognized in 2012 and launched as FCT PhD Programs).

The FCT PhD Programs (aligned with EU guidelines and trends under the EU 2020 “Innovation Union” Initiative) translated a paradigm shift from a grant model based on candidates individual scientific merit assessment and their research projects to a decentralized scholarship model (because the institutions responsible for the selected Programs are responsible for the candidate selection) with a merit evaluation focused on the PhD Program as a whole, based on scientific excellence parameters and institutional cooperation.

Although the adequacy of this model is far from being a consensual matter, the evaluation study recognizes its added value and reiterates the conclusions of the FCT’s external evaluation study and the recent OECD review that it is more appropriate (versus individual scholarships) to promote the strengthening of cooperation between higher education institutions, R&D institutions and companies as well as scientific excellence of Doctoral and Postdoctoral training.

The reprogramming proposal foresees support for scholarships in PhD programs, highlighting (with at least half of the funding to be awarded) doctorates in PhD programs associated with R&D Units, and concludes that the model tested through the FCT PhD Programs (which allowed the support of PhD grants integrated in PhD Programs previously recognized in an international merit evaluation process of the Program) will not have continuity. However, there is no reason why this model should not be considered as a complementary alternative (and likely to be pursued simultaneously) with doctoral funding in PhD programs associated with R&D units recommended in the reprogramming proposal.

Operationalization:

The support to Doctoral and Postdoctoral training inserted in models of collective organization of the R&D effort should represent at least 2/3 of the financing through ESI Funds, resuming the initial spirit of the PT2020 programming. In view of the specificities of this model, it is also considered appropriate to establish criteria for the selection of PhD candidates to prevent eventual inbreeding phenomena.

Rec. 5. Extend the scope of the current PhD Grants in Companies [BDE] to the broader concept of Non-Academic PhD Grants [BDANA], enabling the development of research activities in relevant topics to companies and other organizations (public and private) of non-academic nature, through the establishment of protocols with Higher Education Institutions and / or R&D Units.

Rationale:

The strategic reorientation of Doctoral and Postdoctoral training support in the PT2020 was not accompanied by coherent operational conditions, since the model of grant awarding remained unchanged thus unable to embrace a more market-driven approach with the speed and efficiency implicit in the PT2020' programming. The evaluation study considers that a more consistent model of implementation of the support to Doctoral and Postdoctoral training, in order to meet the PT2020 strategic reorientation, should have clearly stated the role to be played by the key instruments available (or to be developed), such as the PDAE and the BDE, involving - by way of example - the definition of specific targets or minimum quotas. Its total omission (as happened in the POPH/QREN) can not fail to be mentioned.

Both BDE and PDAE objectively favor the contact with companies and the approximation of knowledge production processes in the Doctoral and Postdoctoral training to the real needs (current and future) of companies. The BDE and the PDAE therefore enhance economic valuation of knowledge and diversification of the traditional labour markets for PhD and Postdoc holders, since its contribution to the entrance of doctorates in the business labour market is proven: the BDE attract PhD students motivated to work in a business context, in a restricted spectrum of scientific areas (77% of the BDE awarded in the QREN focused on engineering and technology sciences; 84% of PhD holders working in engineering and technology companies have had BDE).

However, the difficulty of absorbing PhD and Postdoc holders by national companies is also proven, so it would have been desirable the adoption of a broader understanding of the non-academic labour market, comprising not only the companies but also the relevant institutional entities for the interaction and intermediation between companies and the academic environment (as currently advocated through the Interface Program), as well as the Public Administration itself and the entities of the so-called Third Sector (not for profit organizations).

Operationalization:

In addition to broadening the scope of the concept of non-academic labour market (in order to include enterprises and other non-academic organizations), the evaluation study proposes that the future BDANA be 100% financed with public resources (ESI Funds and others) and that the host institution pay out a minimum increase of 25% of that amount (in accordance with Article 25 of Regulation of Research Grants of the FCT and nº 4 of article 13 of the Statute of the Research Fellow), thus increasing the attractiveness of this support and the co-responsibilization of the host institutions.

Rec. 6. Differentiate the calls for granting scholarships in non-academic environment, both for the new generation of «FCT PhD Programs» and the centralized model of individual scholarships, stipulating dedicated budget allocations for each situation**Rationale:**

The modalities of support to Doctoral and Postdoctoral training in business environment represent a residual part of the support for PhD studies, proving unattractive to candidates and companies.

Notwithstanding the relevance/usefulness of both modalities, the PDAE are evaluated as a broader and more consistent approach than the BDE, in particular because PDAE manage to bring together a relevant critical mass of HEI and R&D companies in the design and implementation of the Program itself; in the case of the BDE, the definition of a good «company-advisor-student» combination is tendentially more diffuse and difficult to operationalize.

Specific calls for awarding this type of scholarship, with selection criteria more adjusted to the specifics of supply and demand, are decisive to increase the enrollment of PhD candidates in these modalities and to give them greater visibility.

Operationalization:

Along with the scholarships value increase, it is expected that the launching of specific calls with relevant budgetary allocations can contribute in a decisive way to progressively increase the attractiveness of the sub-market of supply and demand of Doctoral and Postdoctoral training in a non-academic environment, involving necessarily companies and other organizations (public and private) of a non-academic nature (practically non-existent today). At the same time, it would be desirable for funding agencies to adopt indicators that would allow them to set minimum targets for achievement, results and/or allocation of financial resources for this type of scholarship.

Rec. 7. Encourage the design of Doctoral and Postdoctoral training offerings that explicitly contemplate training components intended to equip students with skills and competences in cross-cutting areas valued by the labour market and, as such, facilitate their professional integration in more diverse contexts.

Rationale:

The materialization of the support instruments resulted mainly in individual PhD grants awarded to students whose main motivation for attending Doctoral and Postdoctoral training was the prospect of a research career. The PhD fellows (supported by ESI Funds or others) are predominant in the universe of PhD holders residing in Portugal, representing 59% of this universe. PhD holders that were accorded grants distinguish themselves from those that did not had grants awarded (characterized in the «Professors» and «Other PhD Holders» profiles), and can be regarded as a «learning generation»: they finish their PhD at a younger age and have less professional experience previous to the doctorate, while among the «Professors» and «Other PhD Holders» predominate individuals who already had professional experience when they entered Doctoral or Postdoctoral training courses.

In fact, there is an obvious relation between the frequency and completion of Doctoral and Postdoctoral training processes and employability (91% of PhD/Postdocs holders are working or in post-doctoral training, 90% for ESI Funds supported fellows) and the vast majority of PhDs and postdoctoral students pursues teaching and/or research activities in Higher Education institutions.

It is evident the lack of attractiveness of Doctoral and Postdoctoral training in business environment among PhD students, mainly justified by the incipient promotion of this type of offer and the perception of its "alternative" character. On the other hand, there is no obvious perception of the added value that PhD and Postdoctoral holders could represent for companies and there is a persistent lack of interaction between the SCTN and its external environment.

Operationalization:

In line with the provisions of the new Legal Regime for Degrees and Diplomas of Higher Education, it is fundamental to enrich the training experience traditionally provided in Doctoral and Postdoctoral training (focused on acquiring scientific research skills) with training in complementary skills of a transversal nature. In practical terms, the evaluation study recommends that this training component become a compulsory eligibility requirement for the recognition of the new generation of «FCT Doctoral Programs» (without prejudice to the evaluation of the quality of this training component) and as an evaluation sub-criterion on the merit of the applications for scholarships, outside the scope of these Programs (to be included in the criterion «Reception Conditions Merit» in the FCT individual applications evaluation model).

Rec. 8. Consider the extension of support to Doctoral and Postdoctoral training with the use of ESI Funds to all regions of the country, thus reinforcing the strategic contribution of this type of intervention to achieve the ambitious development goals assumed by the Portuguese Government in the PT2020 and in the preparation of the next ESI Funds programming period.

Rationale:

The concentration of support for Doctoral and Postdoctoral training exclusively in the Regional Operational Programs proposed in the PT2020 reprogramming (since the POCH will no longer intervene in this area) changes the initial logic of complementarity between national and regional support. This complementarity was globally valued by regional actors, and the proposed change can increase the constraints associated with the dispersion of supports, particularly the risk of limiting cooperation with institutions located outside the convergence regions, as well as inducing financial and operational constraints on PhD courses promoted by institutions belonging to more than one region (artificially breaking existing or potential functional networks).

Operationalization:

In view of the selectivity required to define the types of investment eligible for co-financing by ESI Funds in these territories, the Evaluation study considers that the financing should enhance cooperation initiatives with entities in the convergence regions.

Rec. 9. Ensure the availability and effectiveness of policy instruments to make full use of the investments made in Doctoral and Postdoctoral training, particularly regarding the promotion of their professional insertion in diversified labour markets and the economic and social valorization of the knowledge produced.

Rationale:

The organizational impact dimensions associated with the recruitment of PhDs and Postdocs, are mainly related with the qualification of the SCTN, Higher Education Institutions in particular, where PhDs and Postdocs concentrate their professional activity.

There is evidence of contributions to organizations, resulting from the recruitment of PhDs and Postdoc, such as the strengthening of its participation in networks of production, sharing and application of knowledge and the dissemination of the knowledge produced within these organizations, namely through scientific production. There is also evidence of that contribution in what concerns the reinforcement of technological and knowledge intensity in the activity of these organizations, in particular the specialization of their human resources (teachers and researchers) and the growing internationalization of national research activities. However, there aren't enough robust evidences to link the effective contribution of PhDs and Postdoc to strengthening the planning and development capacity of innovative processes in the organizations employing them.

The non-academic labour market, in particular the entrepreneurial one, has little weight in the insertion pattern of PhD and Postdoc holders and there is no obvious recognition of the added value of these resources by the business sector. In this logic, the challenge of diversifying the standard of employability of doctorates depends on the capacity to generate a greater interaction between the entities of the SCTN and other organizations, on the development of research and technology activities, as well as on the capacity to circumvent external conditionalities which penalize the consistent materialization of the chain of organizational impacts resulting from the recruitment of PhD/Postdoc holders in the non-academic labour market.

Despite the difficulty in isolating the specific contribution of Doctoral and Postdoctoral training to more global transformations (systemic impact), the triangulation of the evidence of the individual and organizational impacts with the analysis of the evolution trend of macro indicators allows establishing a contribution relation of Doctoral and Postdoctoral training to (i) an increase in participation of doctorates in the labour market and (ii) an increase in internationally recognized scientific production. In contrast, there is insufficient evidence to establish a contributory relationship to (iii) an increase in the use of intellectual/ industrial property, or (iv) an increase in the capacity for innovation in enterprises, in a context where both dimensions did not register relevant progress at national level.

Operationalization:

It is essential to ensure the availability of new policy instruments and/or to improve the effectiveness of existing instruments to minimize the constraints identified, either in the strict framework of support for contracting PhD and Postdoc holders (both from the point of view of scientific employment and of the non-academic labour market) or in the broader scope - which may or may not include the contracting of this type of assets - of promoting the economic and social valorization of the knowledge produced in the Doctoral and Postdoctoral training processes (see Program Interface, SAICT, SII & DT, SIFIDE, etc.).

Rec. 10. Develop stable and regular mechanisms for monitoring human resources production flows by the Doctoral and Postdoctoral training system and professional trajectories of PhD holders, allowing the competent and interested entities the use of information (generated by regular monitoring mechanisms) in decision-making processes.

Rationale:

The experience of processing and analysing the information obtained within the scope of the evaluation study makes it possible to signal margins of improvement of the information gathering processes, including in the Information Systems and Monitoring of the ESI Funds.

The weak valorization of the potential of PhD and Postdoc holders by business and industrial companies is related to the lack of alignment between the research activities and the economic and social valorization of the produced knowledge, but also with some ignorance of their skills and lack of visibility of the results of scientific research and technological development.

Operationalization:

On the basis of the experience already accumulated by the entities with responsibilities in this matter, it is considered desirable to establish new routines for collecting information on the issues under consideration and to develop communication products with relevant information, ideally with annual periodicity. At the same time, it is also considered appropriate to carry out studies and specific evaluation exercises on subjects with recognized relevance, including the analysis of the critical dimensions associated with the professional insertion of this type of assets in different working environments (namely in business and industrial environments). So, for a better knowledge and visibility of this reality, it would be useful to have more information on the contribution of the doctoral/postdoctoral recruitment to organizational change (through detailed studies about the insertion and professional development of these human resources, based on a broad set of case studies), as well as on perceptions of employers about the «value» of this resource, *eg* through the Scientific and Technological Potential Survey.

In what concerns the ESI Funds monitoring system, results indicators (or additional indicators to be set up) should reflect the diversity of the modalities covered, and should not be limited to the immediate outcome, but should cover the different objectives of the support to Doctoral and Postdoctoral training (*eg*, «professional enrollment rate of doctorates by type of insertion market» or «rate of attainment of the degree in the expected time of 5 years»).