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# Review

## Innovation Public Policy: The Case of Portugal

*Sousa et al.*

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### Abstract

Innovation public policy has an essential role in influencing the competitive capacity of companies and is strongly associated with their ability to innovate and the way they are organized. As important as the technological organization of work is the social dimension, namely, involvement, participation, and commitment of the workforce, as these are, par excellence, factors that contribute to creating added value and differentiation for companies. In this sense, the concept of innovation depends on an integrated vision between the human dimension and the other multiple dimensions that innovation can assume. Public policies, besides the goal of creating a more modern and competitive business and industrial context, also are focused on the development of the workforce, not only in digital competences but also in soft skills. This type of skill contributes to creating a more innovative context and a culture of innovation. This article's goal is to make a global overview of innovation and the public policies to promote the modernization of companies and influence the way they contribute to economic growth.

**Keywords:** Innovation; Public policy; Companies; Culture of innovation.

## 1. LITERATURE REVIEW ON THE CONCEPT OF INNOVATION

Innovation refers to something new, original, or improved. Rogers and Shoemaker (1971) state that innovation can be a new idea, a new practice, or a new material to be used in a process.

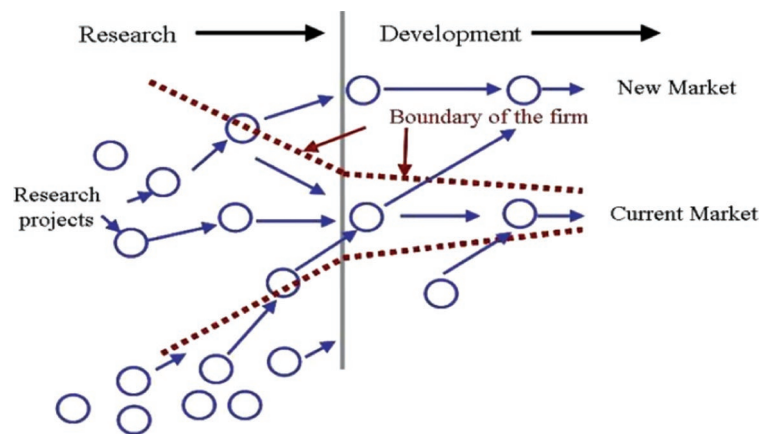
According to Schumpeter (1934, 1976), innovation is the capacity to adapt to the context of adopting product innovation, process innovation, new market, a new way to organize business, and new strategies.

Innovation is considered an essential driver of the firms' operations, competitiveness (Bessant and Tidd, 2007; den Hertog, 2000), and critical for growth (Cainelli *et al.*, 2006; Kunttu, 2013). Moreover, innovations have been described as the processes of implementing problem-solving ideas into use (Sousa, 2014), to sustainable value creation outcomes (Porter, 2000). Van der Aa and Elfring (2002) posited that innovations consist of ideas, practices, or objects that are new to the firm and the relevant market.

In a more institutional perspective, the concept of innovation can be translated as "the successful production, assimilation, and exploitation of novelty," according to the Green Paper on Innovation from the European Commission (1996). The concept is structured around three pillars: the renovation and enlargement of the range of products and services and the associated markets; the creation of new methods of production, supply, and distribution; and the introduction of changes in management, work organization, and skills of the workforce—organizational innovation.

According to Kovács (1989), organizational innovation means applying new principles to the production of goods and services, new structures and processes, new kind of relationship between people, and role models (values, attitudes, and mindsets). Researchers, such as Lorenz and Valeyre (2004), Kovács (2002), Hague (2000), and Pettigrew and Fenton (2000), consider that it integrates concepts such as restructuring of work, extension of tasks, enrichment of tasks, semiautonomous groups, teamwork, quality of life at work,

Figure 1. Open Innovation Process.



Source: Chesbrough (2003).

organizational development, progress, workgroups, and quality circles. In a more macro view, organizational innovation does not refer only to “new” management models, “new” forms of work organization (e.g., e-work), and “new” organizational forms (e.g., network structures), but also to the development of skills as well as knowledge creation and transfer processes.

Regarding organizational innovation, Kovács (2002) states that the main objectives of its implementation in companies are increasing effectiveness and efficiency of work, increased cooperation and coordination within the company, and the company’s ability to adapt to changes.

On the other hand, there are some factors (Kovács, 2002), which can be more favorable to innovations: training and development of employees, organization of work, the involvement of people in the innovation process, and how the company learns and shares knowledge.

Innovation is then supported on tacit knowledge (rooted in people’s experiences and insights), whose costs and benefits are harder to quantify, and also on explicit knowledge (enclosed in documents, reports, memos, and databases).

Beside systems theory, other approaches such as complexity theory (Stacey, 2001) has contributed to open new dimensions for innovation concept. However the main idea remains, innovation refers to something new. Another central idea is that innovation should be something useful (Cooper, 1998; Gjerding, 1996; Tidd *et al.*, 2005); this assumption differs from innovations of inventions that may not have a practical application (Gronhaug and Kaufmann, 1988; Padmore *et al.*, 1998).

Innovation is, however, a concept that is still under construction and delimitation and new concepts are emerging as collaborative innovation, open innovation, green innovation, and others that bring even more complexity, but also more possibilities of creating a culture of innovation not only for companies but also for a country itself.

Open innovation and collaborative innovation (Chesbrough, 2003) refer to companies’ active search for new technologies and ideas outside of the company’s boundaries, but also through cooperation with suppliers and competitors, to create customer value. Figure 1 represents the open innovation process, being the research phase considered as the moment of creation of all types of ideas and research projects with the support of a diversity of actors (workers, suppliers, clients, competitors, and others), and the development phase represents the moment where the ideas and projects become to be a reality. However, not all of them are developed within the company.

The main benefits of this type of innovation are that when companies collaborate in innovation, they share the risks but also the successes (profits) or the failures (losses). The resources available in these processes are almost unlimited, the knowledge and the competencies are diverse, and also the time to market is much faster; moreover, all the participants share the investment and the cost of all process.

Another emergent concept is green innovation, and it can be defined as “hardware or software innovation in technology that is related to green products or process, consists of the innovation in technology like energy saving, waste recycling, green product designs or corporate environmental management. From the

various definition of green innovation existing in the previous literature, this paper then concludes it as a new environmental approach, idea, product, and process or services that concern minimizing negative environmental impact and also creates differentiation of developed product among competitors. Green innovation is categorized into four types of innovations, including (i) product innovation, (ii) process innovation, (iii) managerial innovation, and (iv) marketing innovation” (Chen *et al.*, 2006).

In a resume, it is possible to say that in a complex environment as economies face currently, it is challenging to establish a boundary among the concepts, and it is also challenging to define a very rigid profile of innovation for organizations. Depending on the situations and on the characteristics of the market (Baker and Sinkula, 2002) and also on the openness of the management (Van de Ven, 1986) and the workforce competencies (Sousa and Martins, 2018), companies approach to innovation reveals a mix of types, and innovation is becoming a strategy to increase their competitive capacity.

**2. INNOVATION OVERVIEW IN PORTUGAL**

Analyzing Portugal performance in terms of innovation in the past four decades, it is possible to say that there has been an increase in expenditure of R&D activities, from 2.2585 (Euros-Million) in 2013 to 2.5851 (Euros-Million) in 2017, as shown in Graph 1:

Graph 2 presents 1.3% of the GDP in expenditure on research and development activities, in 2017:

Regarding people R&D Staff (ETI) in R&D activities, Graph 3 shows an increase from 46.711 (2013) to 54.995 (2017), representing an increase of 8.284 persons allocated to R&D activities.

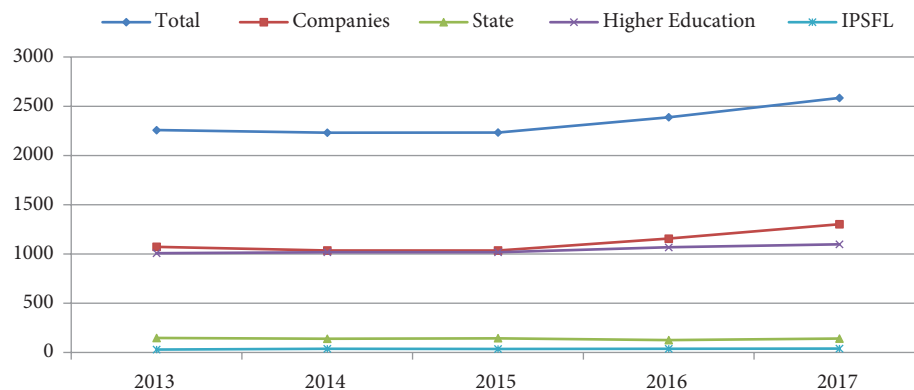
In comparative terms, Portugal is a moderate innovator according to the Global Competitiveness Report (2018), being in the 32nd position of the Rank (of 140 countries) (Graph 4 and Table 1):

Analyzing the R&D intensity in Portugal, it was 1.27% of GDP, according to Eurostat (2016), below the EU-28 average (2.03%), but with a similar performance to the countries of southern Europe (Graph 5).

R&D activities are mainly supported by four institutional sectors: business, state, higher education, and private nonprofit institutions (IPSFL). From the analysis of the data for the intensity of R&D, by sector of execution, it is possible to verify that companies and higher education are the sectors that invest most in R&D in Portugal (Graph 6).

In 2016, companies and the public sector (state and higher education) had an R&D intensity of 0.61% and 0.64% of GDP, respectively, that is, 1.25% as a whole. This figure is still far below the target of 3.0% for 2020, which requires Portugal to make adequate efforts to encourage investment in R&D, especially by companies.

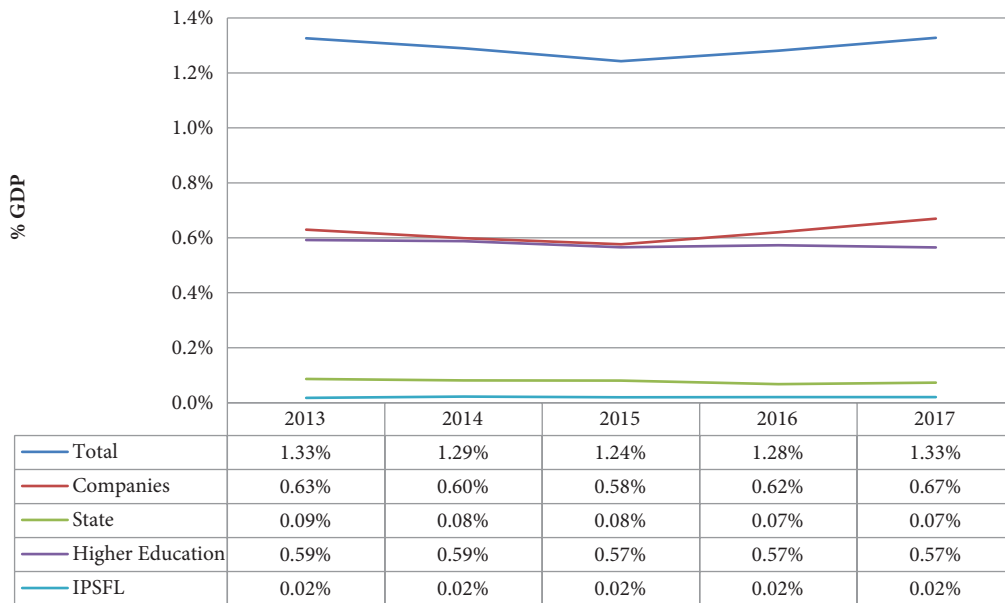
**Graph 1. Expenditure on R&D by Sector (2013-2017). (Euros-Million).**



Notes: The totals presented may not correspond to the sum of the installments for reasons of automatic rounding. IPSFL—private nonprofit institutions.

Source: INE, DGEEC, IPCTN 2017.

**Graph 2. Expenditure on Research and Development Activities (R&D) in % GDP.**

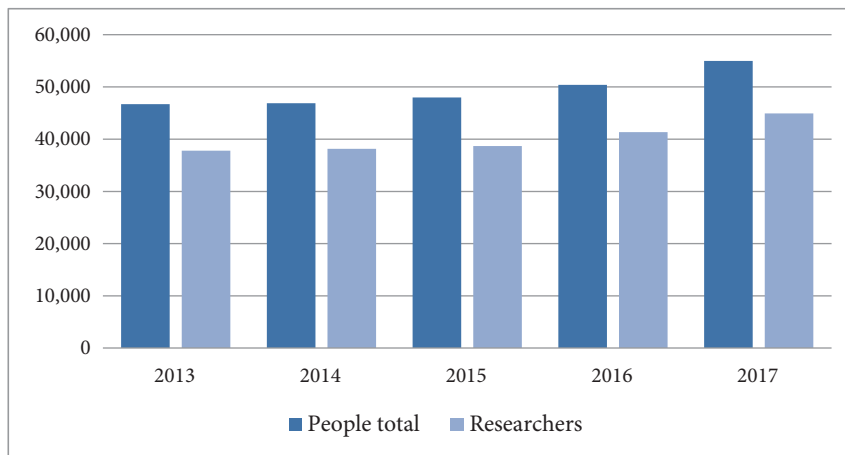


**Notes:**

- 1 Value of GDP at current prices (Base 2011—€), updated as of November 30, 2018.
- 2 The totals presented may not correspond to the sum of the installments for reasons of rounding.
- 3 IPSFL—private nonprofit institutions.

Source: INE, DGEEC, IPCTN 2017.

**Graph 3. People (ETI) in R&D Activities.**



Source: DGEEC, IPCTN 2017.

Although in Portugal it is in the companies and institutions of higher education where the highest intensity of R&D is concentrated, its purposes are different: companies invest more in experimental development (accounting for 64% of total R&D expenditure performed by companies, in 2015) and institutions of higher education in fundamental and applied research (44% and 43%, respectively).

The state has a small share of total R&D expenditure (6.5%) and invests mainly in applied research (67% of total R&D expenditure by the state sector in 2015), which is mostly the responsibility of state laboratories and hospitals.

**Graph 4. Evolution of Portugal Performance in the Innovation Pillar of Global Competitiveness Report—2018.**



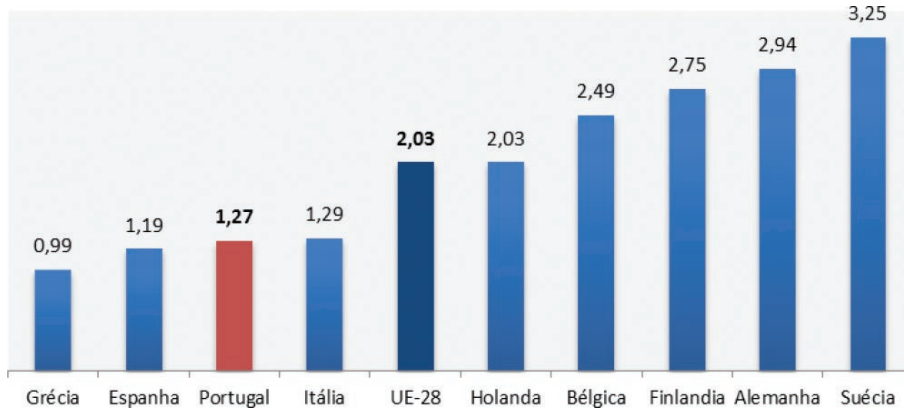
Source: Science, Technology and Innovation Outlook, 2018; OECD.

**Table 1. Evolution of Portugal Performance in the Innovation Pillar of Global Competitiveness Report—2018.**

	(0-100 (best))	Value	Score * Rank/140		Best performer
			53.1	32	
Diversity of workforce	1-7 (best)	4.8	63.0	41	Canada
State of cluster development	1-7 (best)	4.3	54.4	38	United States
International co-inventions	Applications/million pop.	1.34	26.1	37	Multiple (7)
Multi-stakeholder collaboration	1-7 (best)	4.0	50.5	41	United States
Scientific publications	H Index	391.3	88.4	31	Multiple (7)
Patent applications	Applications/million pop.	10.89	45.5	35	Multiple (8)
R&D expenditures	% GDP	1.3	42.6	30	Multiple (7)
Quality of research institutions	Index	0.08	20.7	26	Multiple (7)
Buyer sophistication	1-7 (best)	3.8	46.5	43	United States
Trademark applications	Applications/million pop.	5,617.63	92.9	20	Multiple (7)

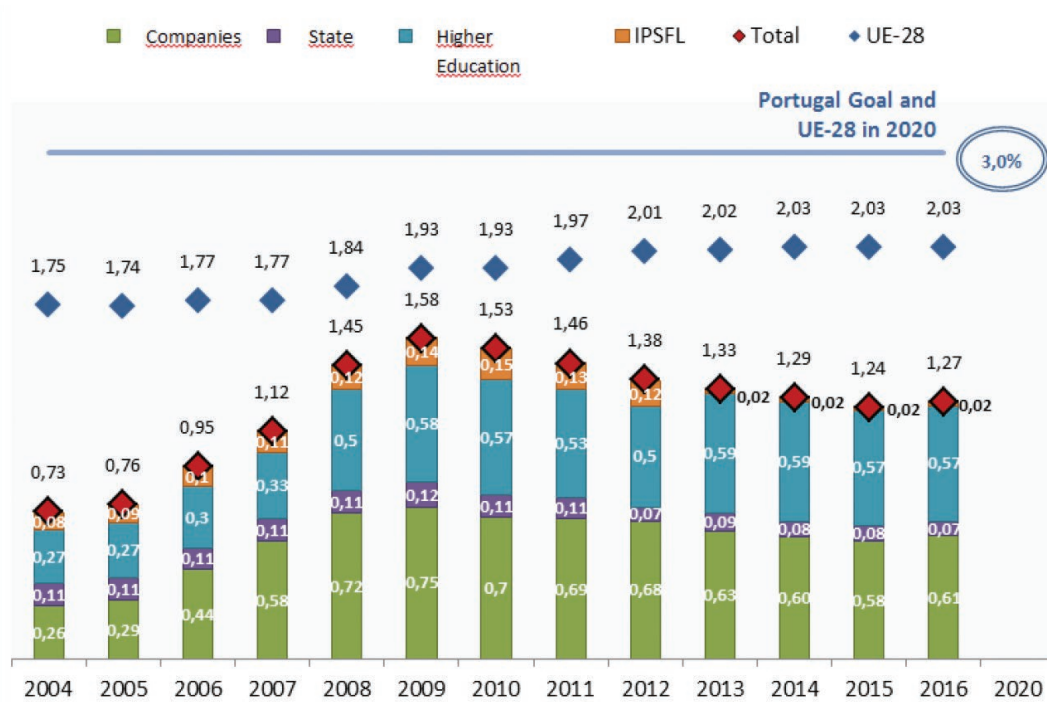
Source: Science, Technology, and Innovation Outlook, 2018; OECD.

**Graph 5. R&D Intensity (% of GDP)—2016.**



Source: Eurostat (data codes: re\_e\_gerdact); Update date: 09.11.2018.

**Graph 6. Evolution of R&D Intensity (% of GDP), by Sector of Execution, 2004-2016.**



Source: Eurostat (data codes: rd\_e\_gerdact); Update date: 09.11.2018.

### 3. ORGANIZATIONAL INNOVATION OVERVIEW

In Portugal, as in other European countries, there has been a smaller diffusion of organizational innovation. However, there are some sectors of activity where several firms (especially larger and more structured ones and some multinationals), due to the international competition context of the same, have adopted new forms of work organization, such as the introduction of quality management systems or production management.

Several policies were created related to the promotion of innovation. These included programs that were mainly aimed at the technological modernization of companies, but also to the modernization of the organizational practices and processes.

One of the most significant examples was the development generated by the entry of OEM Autoeuropa in Portugal. This led to some changes in the organization of work in Portugal, especially in its network of suppliers, through the fulfillment of the rules imposed by it. There were introduced new forms of work organization: organization of production based on the “teamwork”; greater flexibility and versatility; new techniques of organization and management (“just in time,” integrated production by computer); total quality systems (i.e., ensuring total product quality through strict control of the production process)—continuous improvement processes; new methods of organizing work and production (circular assembly lines, reorganization of layouts).

The technological modernization of the industry, promoted by the various innovation support programs, has been a strategic choice of organizational change in the last decade. The political, economic, and social context that has been experienced in recent years led to a commitment to innovation in a concerted and integrated way—not only technologically but also at the organizational level.

In this context, public policies can play an important role by promoting programs that contribute to improving the way companies invest in their capacity for innovation. However, the central role rests with the companies themselves. They must take the initiative by using their skills and investing in the skills of the people, as they are the ones that determine their competitive ability. A focus on organizational change was realized through the promotion of some initiatives carried out by QREN and Compete 2020.

The main goals of those programs have been the following:

- Encourage the emergence of new forms of organization, new processes, and work practices
- Increase the development of the technical dimension of human resources and the human potential of organizations
- Empower social and environmental responsibility
- Promoting communication and dialogue within organizations.

#### 4. INNOVATION PUBLIC POLICIES

In Portugal, several incentive measures have been created to stimulate innovation, as presented in Figure 2:

The Agenda Portugal Digital is a strategic tool for promoting the digital economy at the national level, aligned with the priorities set out in the Digital Agenda for Europe and the Europe 2020 Strategy, to ensure convergence with the implementation period of the Partnership Agreement, Portugal 2020.

The Estratégia de Fomento Industrial para o Crescimento e o Emprego (EFICE) has helped to relaunch the country in a path of sustainable growth, especially in the sectors of production of tradable and internationalize goods and services, and in particular concerning transversal incentive policies to the industrialization of the Portuguese economy.

Concerning Capacitação das Empresas para a Internacionalização, Axis II of the COMPETE Program—reinforcing the competitiveness of SMEs and reducing public costs in context—aims to promote increased exports through direct support for the internationalization of SMEs, namely, qualification processes for internationalization: promotion of successful international presence of SMEs: international promotion and marketing actions and actions aimed at knowledge and access to new markets, including the use of digital channels and privileging nontraditional markets/segments.

Within the scope of the COMPETE 2020, a set of collective actions, upstream and downstream, of the incentive system are supported: exploration, knowledge, and access to new markets; collaborative processes of internationalization, knowledge sharing and training for internationalization (e.g., development of knowledge platforms on external markets); international promotion (e.g., promotional campaigns) of the Portuguese supply of goods and services.

In 2015, the Regulamento Específico do Domínio da Competitividade e Internacionalização (RECI) lays down the rules applicable to the cofinancing by the European Regional Development Fund (ERDF) and the European Social Fund (ESF) of operations in the field of competitiveness and internationalization, both within the scope of the business incentive system and within the support system for the modernization



**Figure 2. Incentive Measures to Stimulate Innovation.**

and training of the Public Administration, as well as within the framework of the support system for scientific and technological research, in the 2014-2020 programming period. To this extent, the Vales Portugal 2020 is a measure aimed at enhancing entrepreneurship training for SMEs by supporting knowledge of external markets to attract new ones, and simplified internationalization projects aimed at the knowledge and prospect of international markets. SMEs that have not started their internationalization process or, having already started, did not register export activity in the last 12 months concerning the date of the application.

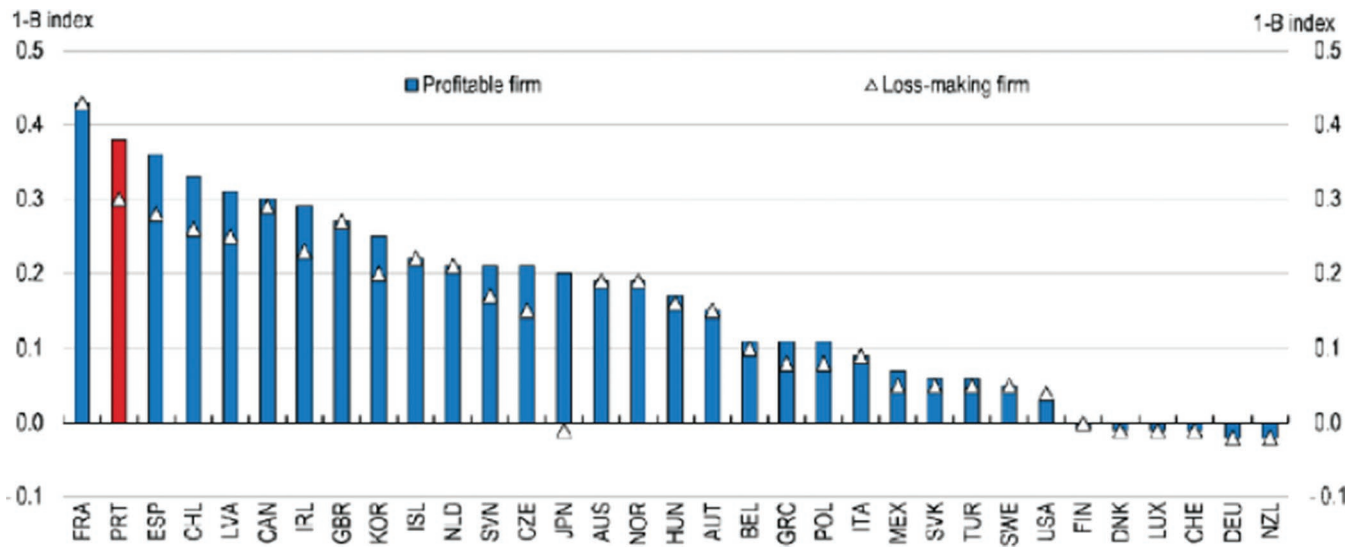
SIMPLEX + 2016 highlights the status of the online exporter, which consists of an electronic form where companies can request the status of authorized exporter to issue proof of origin, replacing the current paper form and the Export Portal, which is a web application that aggregates the offer of products and services of the partners that intervene in the value chain of the process of internationalization or export of each company.

SIMPLEX + 2018 has introduced new export support features; simplifying, supporting, and creating synergies in the export sector are the principal axes of the company actions in Simplex 2018. Therefore, several actions contribute to the objective of improving the support to the exporting entities, being the platform Business matchmaking (expected to start operating in the last quarter of 2019), as it has deserved more considerable notoriety. In this platform, it will be possible to expose products for export online and share experiences between companies.

Programa Capitalizar is composed of five strategic areas of intervention: administrative simplification and systemic framework; taxation; business restructuring; leverage of financing and investment; dynamization of the capital market. The Capitalizar + line of credit has €1 billion to strengthen the competitiveness of SMEs in the export sector. (Graph 7)

The main objective of the Programa Internacionalizar is to increase exports of services, as well as the number of exporters, increase the number of export markets, increase levels of foreign direct investment as well as those of Portuguese direct investment abroad, and increase the national added value. The strategic development of the Programa Internacionalizar is based on two interdependent lines of action: international trade and Investimento Directo Português no Estrangeiro (IDPE) (outbound internationalization) and investment (and reinvestment) in Portugal, namely foreign direct investment (FDI).

Graph 7. Tax Subsidy Rates on R&D Expenditures—SMEs (2017).



Note: (1-B-index) increases in the generosity of R&D tax incentives. Accurately, the B-index represents the pretax income needed for a representative corporation to break even on a marginal monetary unit of R&D outlay taking account of both R&D tax incentives and the corporate income tax rate.

Source: Economic Review of Portugal, 2018, OECD.

Financiamento Competitivo a Laboratórios Colaborativos (COLABS) concerns the launching of a new generation of Laboratórios Colaborativos whose ultimate goal is to promote collaboration between the scientific and technological system and companies as a way to promote the employment of qualified human resources and the development of new areas of competence with a strong potential to export goods and services with higher added value.

The STARTUP PORTUGAL + program includes the Digital Hackathons in the areas of trade, tourism, and industry (area + internationalization under the Startup Portugal +), which promotes thematic Hackathons to accelerate digital transformation in the trade, tourism, and industry sectors. It will be a measure open to the international community, and that can also contribute to the internationalization of the sectors in question. The creation of a ThinkTank to support the Digital Single Market for Europe (area + internationalization under the Startup Portugal +) aims to analyze and design measures to help startups to climb within the European market, significantly accelerate the creation of the Digital Single Market (DSM), and affirm Portugal in the leadership of an innovative policy for digital entrepreneurship in Europe.

Another significant public policy incentive for promoting innovation is the R&D rate credits; although Portuguese tax incentives for R&D are more beneficial for profitable companies, this measure can support business innovation further by allowing refunds of R&D tax credits and allowing a period for R&D expenditures (following the eighth year).

### 5. PRIMARY CHALLENGES TO INNOVATION PUBLIC POLICIES IMPLEMENTATION

The implementation of innovation in organizations can be conditioned by a company’s internal factors (Peyravi, 2015). The size of the company, the workforce knowledge, and the structure of the company, and they can assume two different perspectives. As far as the dimension factor is concerned, it is verified that SME, on the one hand, have a lack of resources (financial, technological, and capacity to attract and retain a qualified workforce), on the other hand, they have a set of characteristics that allow them to respond to the requirements of the innovation process:

- (a) Communication among the members of the organization, which allows the involvement of workers from different areas;
- (b) Flexible organizational structures; and
- (c) Openness of company management to innovation.

The workforce factor is related to intangibles as participation, commitment, identification, collaboration, and all of them are essential not only to the strategy definition and goal setting but also for the success of the innovation and change process.

On the other hand, the workforce have some elements that need to be taken into account when regarding an innovation process implementation, that is, fear to lose their position or of not having the skills to develop the activities according to the changes made, either at the level of introduction of new forms of work organization or of a new technology. As for the structure of the company, this can be an obstacle if it is very hierarchical and characterized by a centralized decision-making process, focused exclusively on the figure of the owner/manager. Moreover, if it has a flexible structure, it can contribute to greater informality, communication, and participation among the members of the organization, which theoretically creates a more innovation-friendly culture.

From a more exceptional analysis of the obstacles that may arise from the different actors, it is possible to identify the following measures:

#### **Public Policies**

Measure 1: Consider technological and organizational innovation as a priority within the strategy defined for the country.

Measure 2: Define specific public policies that promote organizational innovation.

Measure 3: Creation of information and communication activities and devices about the innovation programs.

Measure 4: Develop specialized skills at the level of consultants/technicians of innovation in public administration to help the companies to access funding and implement the projects.

#### **Companies**

Concern 1: Little involvement and motivation of the management for innovation processes, which can result from a reduced experience of management in that kind of process.

Concern 2: The reduced financial capacity of SMEs.

Concern 3: Small structure of businesses.

Concern 4: Perception of associated economic/financial risks.

Concern 5: A low-skilled workforce structure.

Concern 6: The lack of internal technical support.

#### **Social actors**

Role 1: Social actors, especially trade unions, present, usually, arguments and show resistance to the introduction of new forms of work organization.

Role 2: Concern about wage negotiations and working conditions, which are very important, especially in a subcontracting economy, but other aspects should also be brought to the negotiating table: that is, the development of workers' competences and business management models, among others.

## **6. INNOVATION POLICY MAIN QUESTIONS**

The implementation of innovation implies that the surplus value that may come from it is perceived by all so that potential resistances can be eliminated. In this context, it is essential only to contribute to improving working conditions, the development of workers, and the competitive capacity of companies. For these reasons, several questions need some detailed analysis, and that, when answered, can contribute to providing contexts where innovation flourishes. These issues gravitate in the sphere of the workforce, companies, and, in a more macro register, public policies.

**Workforce—Creating potential for development and learning***(a) New forms of work organization*

Innovation leads to changes in the content of work; workers need to perceive it as necessary to their professional development. In addition, if work becomes more diversified, there is a need for developing and integrating new skills, for example, participating in new/innovative projects.

*(b) Opportunities for learning*

Will the implementation of innovation enable new learning or lead to the routinization of work and more excellent isolation of the worker? For example, introducing teamwork does not always mean that teamwork is effectively achieved. A group of people to develop an activity in the same physical space but without physical and intellectual interaction cannot be considered teamwork, although it often ends up being considered as such.

*(c) Opportunity to be autonomous and participate in the decisions*

Does innovation lead to greater autonomy and participation? Is there space for people to participate and put their ideas into practice (as long as they are valid for the company's development) or management continues to govern by models where authority, control, and management by authority prevail.

*(d) Professional recognition*

There are several questions regarding the recognition of people's performance by the companies and also if there is a will to create a culture where people can be more autonomous and responsible for their work.

**Company/Organization: Creating potential for competitiveness***(a) Increasing competitiveness through innovation*

Innovation must represent high levels of productivity and competitiveness, and companies are not always able to see the benefits of implementing innovation. In most cases, SMEs work based on short-term survival due to their financial structure, which conditions on a large scale the willingness to opt for any change at a more structural level. Long-term investments sometimes become unfeasible, and only when pressured by external factors firms choose to change.

*(b) Increasing competitiveness through certification*

Certification has been a driver to the implementation of organizational innovation/changes at various levels, and in particular, to the new forms of work organization. This is an external factor that has forced companies to rethink their way of organizing and maintain their position on the market.

*(c) Promote quality in products and services*

How can innovation contribute to increasing the quality of products and services?  
Will the innovation in products and services be a success in the market?

**Public Policy: Creating potential for innovation.***(a) Create a culture open to new initiatives*

The role of public policies is, first of all, a driver to create a culture of innovation through the implementation of measures that can promote the enhancement of workers' qualifications and the retention of researchers.

It involves the creation of research and development-oriented programs, including organizational innovation, not only technology-driven.

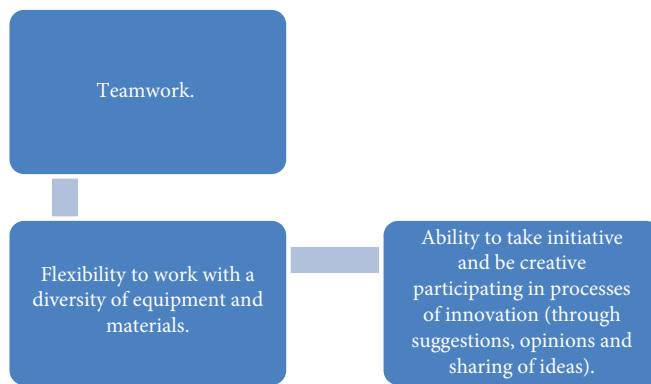
*(b) Develop competencies to promote innovation*

Identify skills and create the conditions to develop them in specialists, consultants, workers, and company managers. The following competencies are a proposal for the promotion of innovation.

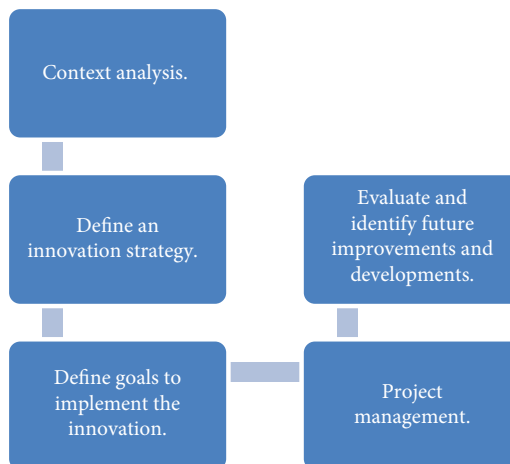
Managers and specialists/consultants can develop the following competencies:



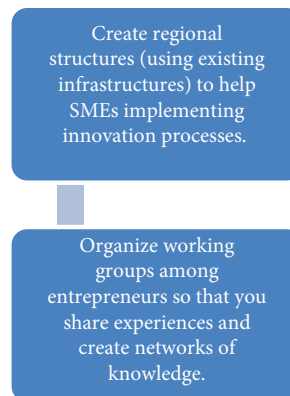
The Workforce plays an important role, especially in the implementation phase, so they must develop competencies such as the following:



The role of employers is more strategic, so they should develop competencies such as the following:



(c) *Create support structures that guide SMEs in defining their strategies and management processes*



## 7. CONCLUSION

The creation of a business environment conducive to innovation necessarily involves a culturally open environment to receive new initiatives, based on technological innovation and in the development of new skills. This is a scenario that has to be built by all economic and social stakeholders.

Innovation needs to be seen in a comprehensive perspective and as a necessary condition to increase the competitiveness of companies. Moreover, it should contribute to job creation, but considering factors such as working conditions and individual and organizational development opportunities.

In short, it is possible to point out that innovation is influenced by the organization dimension, ownership, structure, and top management style; however, it is also influenced by the public policies defined and implemented.

### Conflict of Interest

None.

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