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ORIGINAL ARTICLE

Smart innovation strategy and innovation performance: An empirical application on the Portuguese small and medium-sized firms

Marisa Cesário | **Sílvia Fernandes**

Research Centre for Spatial and Organizational Dynamics, University of Algarve, Faro, Portugal

Correspondence
Marisa Cesário, Faculty of Economics, University of Algarve, Campus de Gambelas, 8005-139 Faro, Portugal.
Email: mcesario@ualg.pt

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Abstract

Smart Innovation is often considered as the capability of firms to create new opportunities through a dynamic relationship with the main actors in their setting, fostering higher innovation performances and sustainable competitive advantage. However, innovation indicators of Portugal in Europe show that Portuguese firms miss an open innovation strategy to cope quick and easily with complex new challenges. Relying on the results from the Community Innovation Survey (CIS 2014) this paper focuses on the analysis of the relationship between a smart-open innovation approach and firms' innovation performance in the sample. Furthermore, and using the LINEAR (automatic linear modelling) procedure in SPSS 24.0, statistically significant relationships are established between proxies for smart-open innovation and a score for innovation performance. The findings provide relevant conclusions about how Portuguese firms should explore their networking strategies, both in terms of scale (or smart - local/geographically) and scope (or open - a variety of agents) in order to match their innovation to market, toward a continuous business value.

KEYWORDS

innovation performance, LINEAR, open innovation, scale, scope, smart innovation

1 | INTRODUCTION

Smart Innovation is often considered as the capability for firms to create new opportunities through a continuous relationship with the main actors in their setting, fostering higher innovation performances and sustainable competitive advantage (Della Corte, 2014). Smart innovation is part of a smart specialization strategy whose goal is setting priorities in order to build competitive advantage by developing and matching research and innovation strengths to business needs. The goal is to address emerging opportunities (technological, market) (European Commission, 2014a).

The continuous capacity of firms to learn and create new business opportunities from acquired learning is seen by many scholars as the critical solution in order to avoid firms from becoming locked in obsolete technological trajectories. This is common particularly in peripheral areas or economic structures strongly based on small and medium-sized firms (SME), with limited R&D capacities.

On the other hand, open innovation and networks can be channels to overcome the risk that firms may become inflexible. By accessing other markets, ideas and technologies, firms free themselves from their own limitations while knowing the technological trajectories of their competitors. Case studies across Europe give empirical and theoretical perspectives on how firms' innovation outcomes benefit from external relations along the value-chain (Alvarez, Marin, & Fonfria, 2009; Arndt & Sternberg, 2000; Cantner, Conti, & Meder, 2010; Mazzola, Bruccoleri, & Perrone, 2009).

Our main purpose in this work is to analyse the relationship between the use of a smart-open innovation approach and firms' innovative performance. We use data from the Community Innovation Survey (CIS 2014) to analyse to what extent the use of a smart-open or scale-scope innovation approach contributes to innovation performance in the 7,083 sampled Portuguese firms. Using LINEAR (automatic linear modelling) procedure in SPSS 24.0, we analyze and estimate the relationship between proxies for smart-open innovation and a score for innovation performance.

2 | TOWARD SMART-OPEN INNOVATION

2.1 | The diagnosis

The geography of innovation is much more complex than a simple core-periphery model, and the logical pathway toward innovation is much more complex than the linear model of research and development-invention-innovation direct link. Innovation patterns are differentiated among regions according to their regional context conditions (Camagni & Capello, 2013). The identification of specific innovation patterns is necessary to design smart innovation policies and accurate strategies (Pontikakis, Chorafakis, & Kyriakou, 2009). Camagni and Capello (2013) discuss the smart innovation debate and suggest a new taxonomy of European innovative regions based on their innovation patterns.

According to this taxonomy, Portugal presents a "creative application pattern," characterized by the presence of creative economic actors interested to look for knowledge outside the region (given the scarcity of local knowledge) and to apply external knowledge to local innovation needs (Foray, 2009). Other patterns referred by the authors are the "endogenous innovation pattern in a scientific network" where local conditions fully support knowledge creation and the "imitative innovation pattern" where the actors base their innovation capacity on imitative processes through adaptation.

If the knowledge limitation in Portugal could be overcome, it would basically allow the upgrading to the endogenous innovation pattern, where local conditions fully support its creation, diffusion, and transformation into innovation. This is reinforced by rapid circulation, socialization, and recombination of external knowledge enabled by collective learning mechanisms (Caragliu & Lenzi, 2013). Given the complex nature of knowledge creation today, this pattern is expected to show a tight interplay among regions in the form of international scientific networks. This upgrading, towards a sustainable smart innovation strategy, can be reached spreading relations both in scale (smart

—local/geographically) and scope (open—increasing the variety of agents in the network). This is in line with a necessary process called *entrepreneurial discovery* (Foray, 2014), that intends to assemble different actors in order to develop a new activity or product (e.g., between a new technology and a traditional sector) and even structural changes (modernization, diversification). As the regional contexts can be so different, this process of discovering the new domain of opportunities can deploy a variety of innovative ideas. Network scaling and scoping up can help, not only on that needed variation but also on the assessment of the right combination/domain for the future economic value of a possible direction of change.

2.2 | The latest generation of innovation models

The recent literature on innovation has moved from the old technology push (1st generation model) to the extended innovation network (7th generation model—open innovation). Table 1 presents the seven generations of innovation models which express these trends and challenges.

In this table, the term 'push' means that the source of new ideas comes from scientific discovery (supply perspective) and the term 'pull' means that it comes from the market (demand perspective). So, markets can inform

TABLE 1 Generations of innovation models

Model/generation	Characteristics	Strengths	Weaknesses
Technology Push/ 1st generation	Linear sequential process. Emphasis on R&D and science.	Simple Radical innovation	Lack of feedback No market attention No networked interactions No technological instruments
Market Pull/2nd generation	Linear sequential process. Emphasis on marketing: the market is the source of new ideas for R&D.	Simple Incremental innovation	Lack of feedback No technology research No networked interactions No technological instruments
Coupling/3rd generation	Interaction between different elements and feedback loops between them. Emphasis on integrating R&D and marketing.	Simple Radical and incremental innovation Feedback between phases	No networked interactions No technological instruments
Interactive/4th generation	Combination of push and pull models. Integration within firm and emphasis on external linkages.	Actor networking Parallel phases	Complexity, need of reliability No technological instruments
Network/5th generation	Emphasis on knowledge accumulation and external linkages. Systems integration and extensive networking.	Pervasive innovation Use of sophisticated technological instruments Networking to pursue innovation	Complexity, need of reliability
Open/6th generation	Internal and external ideas as well as internal and external paths to market can be combined to advance the development of new technologies.	Internal and external ideas as well as internal and external paths to market can be combined	Assumes capacity and willingness to collaborate and network Risks of external collaboration
Extended innovation network/7th generation	Network models combined with open innovation. Hybrid models are fundamental given the construction of trust and tacit knowledge, exchange needs, physical proximity and personal contact.	To fully exploit all concepts of open innovation, enterprises should develop integrated knowledge networks. Networked or webbed communities are the open and agile vehicles to deploy open innovation concepts	This will however require new ways of collaboration between enterprises whilst also competing concurrently

Source: IPACSO (2014) and Du Preez, Louw, and Essmann (2006).

innovations and the combination of both push and pull models can contribute to a strong innovation portfolio (Mierzwa, 2015). Innovation portfolios are a key result of the entrepreneurial discovery process and so a key to shifting from one potentially declining market or business to a new growing one (Kastelle, 2012).

In contrast to closed innovation, open innovation (OI) processes span across firm boundaries presenting opportunities to reduce risk and commercialize both external ideas and internal ideas externally (ideas' portfolio). The last generation of innovation models suggests that to fully exploit open innovation, enterprises should develop integrated knowledge networks with various stakeholders.

The OI paradigm evolved into the condition in which the organizations actively co-operate to co-develop product or process innovations (Piller & West, 2014). The most committed approach to OI implies active collaboration with other organizations rather than merely importing knowledge, competences, and ideas (Cricelli, Greco, & Grimaldi, 2016). This is increasingly important, such as knowing in which co-investment clusters investors are embedded and how it affects decisions where to invest (Hayat, 2014). This literature refers that firms that do not co-operate and do not exchange knowledge limit their long-term knowledge-base (Hanna & Walsh, 2008; Pittaway, Robertson, Munir, Denyer, & Neely, 2004). This is a relevant issue for Portugal due to its moderate innovation index (EIS, 2017) related to missing an early collective entrepreneurial culture, low incomes and high-risk resistance (Sarkar, 2014).

2.3 | Network scaling and scoping up

Although much of the literature on networks refers to issues such as embeddedness (Granovetter, 1985) and path dependency (Arthur, 1994; Dosi, 1997; Dosi, Freeman, Nelson, Silverberg, & Soete, 1988; Nelson & Winter, 1982) which involve the efficiency of local linkages, our focus is upon the variable coverage scope and spatial scale of firms' networks. These can be important sources of knowledge and processes that contribute to better innovation performances. As the drivers of globalization are removing barriers which segmented the competitive environments of small and large firms, firms of all sizes can join international networks of diverse stakeholders (Dana, 2001). While some sectors often need to internationalize their activities (sales, etc.) at an early stage of their development due to limited domestic markets (Cantwell, 1995; Keeble, Lawson, Smith, Moore, & Wilkinson, 1998), others do it for technical advances. Nachum and Keeble (2003) argue that firms need to identify a successful balance between localized sources and those in wider geographic areas and establish linkages at different scales in order to compete successfully.

3 | PORTUGAL IN EUROPE

Comparing Portugal with other European countries, the main innovation indicators suggest that the Portuguese economy has a long journey ahead.

The co-operation-based innovation levels, for instance, are still low. Portugal has a relatively low level of co-operation either with other enterprises or with R&D institutions, being it inferior in service innovations (Figure 1).

Regarding the types of innovation, Portugal has its product innovation higher than service innovation, however, it still has a low percentage of products that are new to the market (Figure 2). So, this relative 'closure' of Portuguese firms in themselves is still considerable. Regarding the turnover from the innovation, this country presents a low value being it superior from products that are new to the market.

From these charts, we can acknowledge that, though Portugal is not so far from innovation leaders (such as Sweden, Netherlands, Finland and Austria), it has low levels of new goods to the market and of innovation's turnover (Figure 3). Two main factors can be related to these figures: personnel qualifications such as the profile that identifies the emergent technologies/tools, and the right resources/agents.

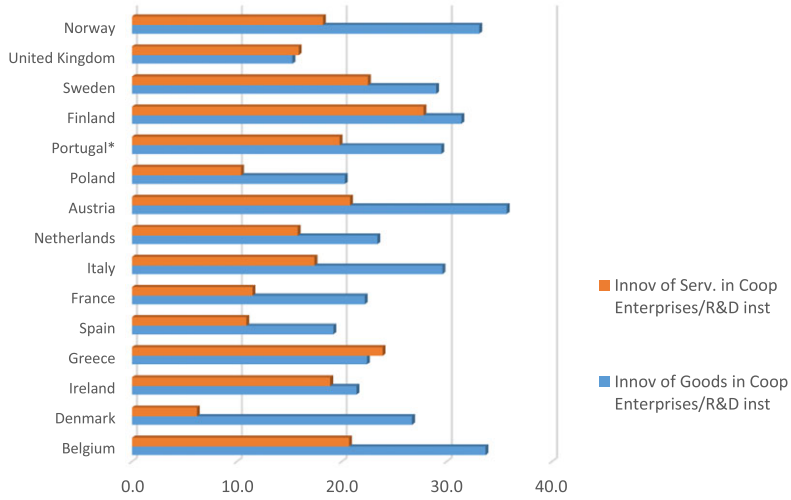

FIGURE 1 Innovation in co-operation with enterprises or R&D institutions

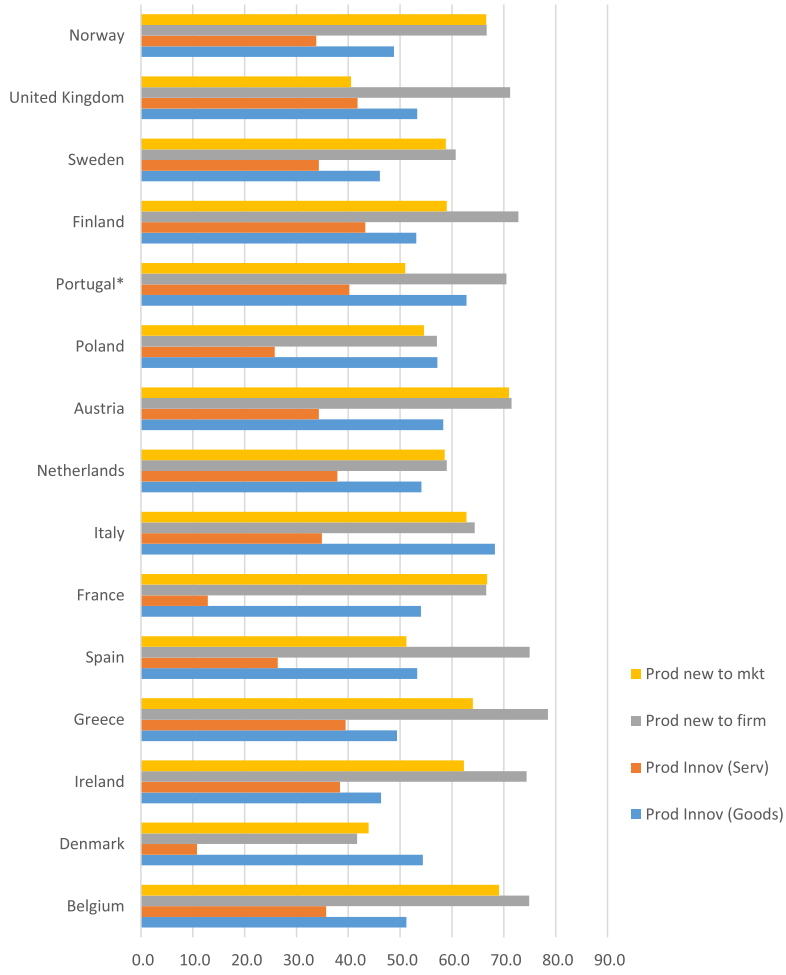

FIGURE 2 Types of innovation

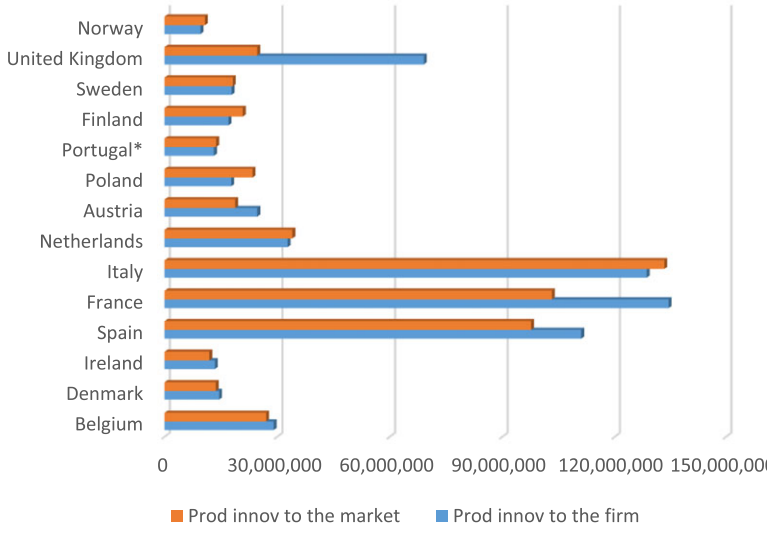

FIGURE 3 Turnover from product innovation

GEM (2017) indicates that, in Portugal, only 8% of the population are entrepreneurs (involved in startups) and one in two is an entrepreneur for necessity. Some reasons are the lack of early collective entrepreneurial culture, difficulties to obtain financing, and poor adherence to risk. This reality is reflected in the moderate maturity level or openness level of innovation in Portugal, which affects its sustainability (European Commission, 2018; Sarkar, 2014). So, more than smart innovation, Portugal misses open innovation which prepares an environment where organizations can actively get involved in the creation of mutually beneficial solutions. It is a bolder, wider approach to innovative problem solving, as it suggests interacting with broader groups of stakeholders and builds collaborative community engagement around specific challenges and issues (Wazoku, 2017). Ideas and input flow into organizations from outside and smart innovative solutions are easily generated. Open innovation is a social way of solving complex issues and improving processes.

The next section develops a methodology aiming to analyze to what extent the use of a smart-open innovation approach contributes to a better innovation performance in the Portuguese firms.

4 | DATA AND METHODOLOGY

4.1 | The CIS instrument

The Community Innovation Survey (CIS) is the main statistical instrument of the European Union (EU) that allows the monitoring of Europe's progress in the area of innovation. The CIS creates a better understanding of the innovation process and analyses the effects of innovation on the economy. In the present work, we used the CIS 2014 version, corresponding to the period 2012–2014, for the 7,083 Portuguese sampled firms.

4.2 | Conceptual framework

In this work, our focus is to investigate the relationship between the use of a smart innovation approach and a better innovation performance. We used data from the Community Innovation Survey (CIS 2014) to analyze to what extent the use of a smart innovation approach contributes to better innovation performance in the Portuguese firms.

4.3 | Smart Innovation proxies

Given the above considerations, we agreed with the concept of smart Innovation as being related to the firms' capacity to create new opportunities through the development of dynamic relations with a variety of stakeholders in their setting, fostering innovation performance (Della Corte, 2014; Du Preez et al., 2006). The increase in the scale and scope of firms' knowledge network is considered crucial by most of the existing literature on knowledge and innovation creation and diffusion. However, the literature lacks analyses that measure the relation between smart innovation and innovation performance using relevant proxies in approaching it. We used the information provided by CIS 2014 on types of firm's co-operation as proxies for knowledge networking. And then we estimated a linear model using the automatic linear modelling technique which is an improvement of the traditional linear regression. With improved data preparation and automatic selection of variables, it allows to specify categorical predictors and to identify outliers. And using the all-possible-subsets approach it allows to conduct an intensive search of a larger model space.

In order to identify firms' co-operation initiatives, aiming product and process innovation activities, the CIS instrument asked firms about their active participation with other enterprises or organizations in innovation activities, where both partners do not need to commercially benefit. These co-operation activities can range in scale (geographically) or scope (different types of partners).

This is what we can call a 'marketless' conception of networking. Although some authors argue that 'marketless' conceptions of social networks are overstated and need to be balanced with a stronger concern for the role of competition in social embeddedness of small firms (Staber, 2011), they are still one of the most important knowledge sources of small firms.

In order to obtain valid information on the geographical scale of co-operation for innovation, a new range of variables was computed by adding the different geographic locations of the co-operation partners. Firms may co-operate with Portuguese partners, with partners from other EU countries, with partners from the USA, with partners from China/India or with partners from other countries.

In order to measure the scope level of the firm's co-operation activities, and to understand to what extent its network is composed by various stakeholders, a new variable labeled COOPSCOPE was computed by adding the number of different partners the firm co-operated with. Firms were considered to co-operate with each one of the listed partners if co-operation occurs in at least one of the possible geographic locations.

4.3.1 | Innovation performance proxies

The innovative performance was assessed using the criteria of Frederiksen and Knudsen (2017): novelty, usefulness and market potential. The approach draws novelty and usefulness insights from the creativity literature and combines these with novelty and market potential insights from the innovation literature. The resulting framework encompasses novelty of a product idea and its usefulness to the intended recipients, but with a distinct focus on the value to the firm that can be created through market potential. This set of criteria makes it possible to couple creative ideas for new products directly to potential innovation performance.

Frederiksen and Knudsen (2017) used an assessment ranging on a scale from 0 to 100, where:

- Novelty: 0 = there is nothing new or original in the product idea/proposal; 100 = the product idea/proposal is entirely new and original.
- Usefulness: 0 = the product idea/proposal does not fit the needs and wishes of the target group(s), (i.e., the potential customers/users); 100 = the product idea/proposal is entirely aligned with the needs and wishes of the target group (s), (i.e., the potential customers/users).
- Market potential: 0 = the product idea/proposal is unlikely to attract sales and be sufficiently profitable to bring onto the market; 100 = the product idea/proposal will likely attract sales and be sufficiently profitable to bring onto the market.

Recognizing the utility of such criteria, we used CIS 2014 to build a similar scale, using the following information from the survey:

1. Novelty: firms were asked if any of their product innovations (goods or services) introduced during the three years (2012 to 2014), were new to the market. To be considered new to the market, the enterprise should have introduced a new or significantly improved product onto its market before its competitors (it may have already been available in other markets). Variable **NEWMKT** has a 1 = yes/0 = no codification.
2. Usefulness: firms were asked if the innovations introduced in the market were developed by customers and/or product' users. Variable **INCLU** has a 1 = yes/0 = no codification.
3. Market potential: firms were asked about the percent of total turnover from world first product innovations introduced between 2012 and 2014. Variable **FWTURN** has a codification ranging from 0 = don't know; 1 = [0%–1%[… 5 = +25%.

The authors suggest that different combinations of novelty, usefulness and market potential of new product proposals will lead to different outcomes. Firms can also choose to stake on imitated products that are known as being both useful and desirable and have market potential because they are cheaper than the original (illustrated as U + MP in Figure 4). Another path to a sales success could be to introduce a novel and immediately desirable product which, however, is not useful but easily commercialized due to an intensive marketing strategy (illustrated as N + MP in Figure 4). The authors emphasize the fact that, neither imitated goods nor one-day wonders can be regarded as product innovation.

A one-day wonder (as the authors call it) "may be novel and immediately interesting and, based on this, lead to a sufficient number of people acquiring it as an impulse buy, but if it is useless it will neither be adopted nor change user behavior. An imitated good may be just as useful as the original (yet cheaper) and therefore be bought by a sufficient number of people, but it is not novel and so it does not qualify as innovation" (Frederiksen & Knudsen, 2017, p. 66).

Given these considerations, we agree that, for innovation to occur, a product has to be novel and useful (N + U). But for innovation performance to be accomplished, a novel and useful product also have to sell well.

Hence, in the present work, a score for innovation performance was built combining these three features: **N**ovelty, **U**sefulness and **M**arket **P**otential [IP = N + U + MP].

4.4 | Methodological framework and research questions

Literature has shown that internationally-based networkers have higher concerns in responding to an international, and more challenging, demand in terms of quality and innovation.

Given the above discussion, it is reasonable to expect that the increase in the scale (geographic) and scope (variety) of the firms' knowledge network is associated with a better innovation performance.

Figure 5 depicts the proposed hypothetical model.

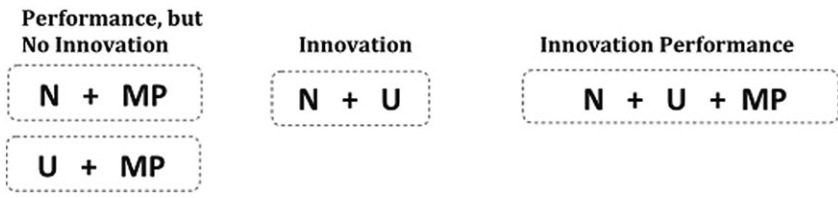

FIGURE 4 Different innovation strategies

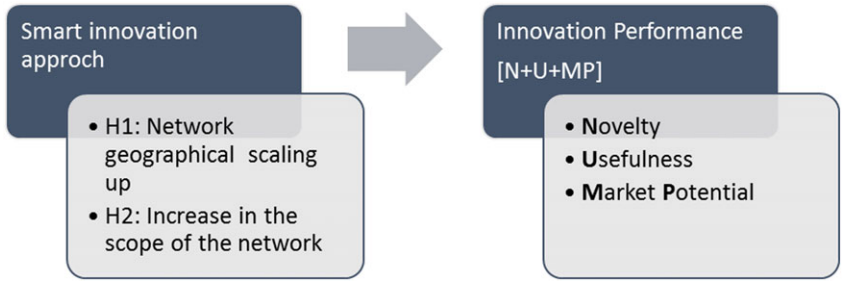

FIGURE 5 Methodological framework

Accordingly, the research hypothesis tested in this paper were:

H1. *The geographical scaling up of firms' networks contributes to a better innovation performance.*

H_{1A}: networks with other firms from the group.

H_{1B}: networks with Suppliers.

H_{1C}: networks with customers (private sector).

H_{1D}: networks with customers (public sector).

H_{1E}: networks with competitors.

H_{1F}: networks with consultants.

H_{1G}: networks with universities.

H_{1H}: networks with R&D institutions.

H2. *The increase in the scope of firms' networks contributes to a better innovation performance.*

5 | RESULTS

5.1 | Characteristics of the sample

The Portuguese subsample of CIS 2014 includes a total number of 7083 firms, with the sectoral distribution presented in Table 2. The majority of firms has up to 49 employees (74.8% of the 6,347 firms with valid size information) and about half of the sample firms (49.96%) affirm that perform product/process or have ongoing innovation activities. Within this group, 25% engaged in co-operation relationships aiming innovation activities.

5.2 | Smart innovation and innovative performance

5.2.1 | The variables

Table 3 lists all the variables used in the database and the respective codification. Variables COOPA, COOPB … COOPH were used as proxies for the geographical scale of co-operation. These variables were computed by adding the different geographic locations of the firm's co-operation partners. Firms may co-operate at five different geographic scales: with Portuguese partners, with partners from other EU countries, with partners from the USA, with partners from China/India or with partners from Other Countries. These variables range from 0 = no co-operation with this partner; to 5 = high level of geographic scaling up.

Variable COOPSCOPE was computed as the sum of the different co-operation partners, ranging from 1 = one co-operation partner; up to 8 = Eight co-operation partners.

TABLE 2 Characterisation of the sample

Variables	No. of Firms	%
NACE code		
Mining and quarrying	111	2%
Food, beverages, tobacco	428	6%
Textiles, wearing, leather, wood, paper, printing	1,137	16%
Coke, chemicals, non-metal, metal products	1,323	19%
Computer, electrical equip	138	2%
Machinery, transport equip, furniture	784	11%
Electricity, gas, water supply, sewearage, waste	278	4%
Construction	29	0%
Wholesale, retail trade, transportation, storage	1,686	24%
Information, communication	347	5%
Financial, insurance, legal, accounting, others	804	11%
Health	18	0%
Total	7,,083	100%
Number of employees		
10–49	4704	74%
49–250	1,311	21%
>250	332	5%
Total	6,347	100%
Product/process/ongoing innovation activities		
No	3,544	50,04%
Yes	3,539	49,96%
Total	7,083	100%
Co-operation towards innovation activities		
No	2,648	75%
Yes	891	25%
Firms with Product/Process/Ongoing innovation activities	3,539	100%

Source: Own elaboration.

5.2.2 | Statistical data analysis procedures

To detect which smart innovation proxies had an influence on innovative performance, a linear model was estimated using the automatic linear modelling procedure in SPSS 24.0 (IBM, Armonk, NY).

The LINEAR procedure represents an improvement on the traditional linear regression procedure with regard to some of the limitations of the latter procedure, namely, data preparation tools and the automatic selection of variables. Before the linear modeling is conducted, the data must be properly prepared. The LINEAR procedure in SPSS 24.0 provides an automatic data preparation (ADP) platform to replace missing values, to specify categorical predictors, and to identify outliers. Also, the all-possible-subsets approach provided by this tool conducts a computationally intensive search of a much larger model space (compared with the stepwise approach) by considering all possible regression models from the pool of potential predictors.

The final explanatory variables appearing in the linear model for each variable were determined based on the optimality of the small-sample-corrected Akaike information criterion over all possible subsets at the 0.05 significance level.

TABLE 3 Variables in the database with codification

Database variables		
Variable	**Description**	**Codification**
Dependent variable		
INNOVPERF	Innovation Performance	0 = Low – 7 = High
Independent variables		
COOP [A … H]	Geographic scale of co-operation for innovation with: A. Other firms from the group B. Suppliers C. Customers (private sector) D. Customers (public sector) E. Competitors F. Consultants G. Universities H. R&D institutions	0 = None; 1 = low level of geographical scaling … 5 = high level of geographical scaling up (ordinal)
COOPSCOPE	Number of different Co-operation Partners	1 = One co-operation partner … 8 = Eight co-operation partners (ordinal)

Source: Own elaboration.

5.2.3 | Discussion of results

Figure 6 summarizes the results obtained using the LINEAR procedure in SPSS. The chart displays the intercept first and then sort the effects from top to bottom by decreasing predictor importance. The connecting lines within each diagram are weighted based on coefficient significance, with thicker lines corresponding to stronger relationships (positive or negative).

We acknowledge that the significant predictors influencing innovation performance (by decreasing predictor importance) are: the geographic scale of co-operation for innovation with Customers (private sector); the number of different co-operation partners and the geographic scale of co-operation for innovation with Universities.

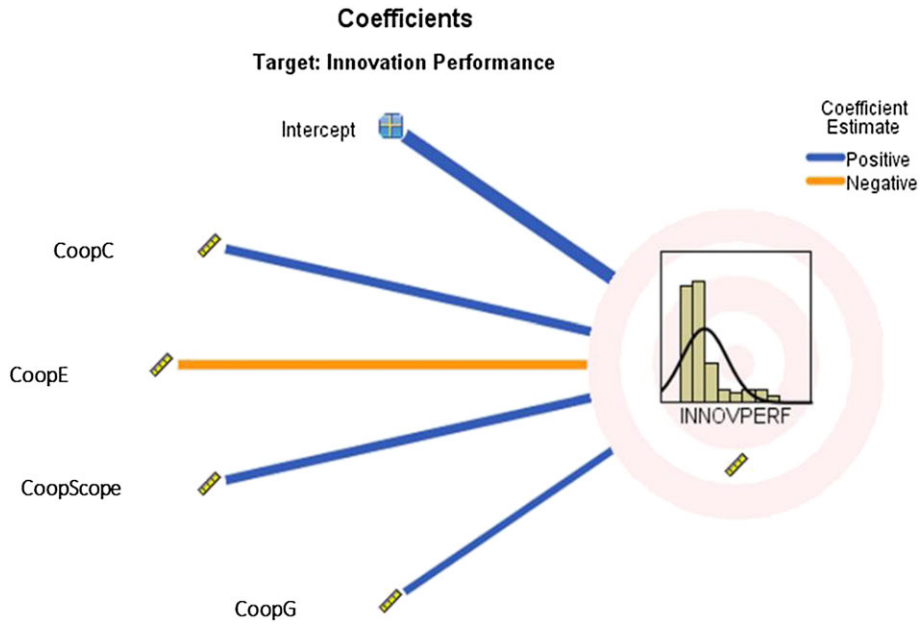

FIGURE 6 Results for automatic linear modelling

The results confirm that the networking scaling up with customers and universities contribute positively to a better innovation performance (as in Dana, 2001) while a negative effect is produced by the networking scaling up efforts with competitors. As proven earlier, internationally-based networkers have higher concerns in responding to an international, and more challenging, demand in terms of quality and innovation, being reasonable to expect that the increase in the scale (geographic) and scope (variety) of the firms' knowledge network is associated with a better innovation performance.

A positive effect is also produced by the increase in the scope of the network. The variety of stakeholders is proven to be associated with a better innovation performance.

Given these results, and regarding the null hypothesis H_1 and H_2, we acknowledge the following:

- The null H_{1C} that the geographical scaling up of the firms' networks with customers contributes to a better innovation performance, was not rejected (coeff. = 0.297; sig. = 0.001).
- The null H_{1E} that the geographical scaling up of the firms' networks with competitors contributes to a better innovation performance, was rejected (coeff. = −0.490; sig. = 0.002).
- The null H_2 that the increase in the scope of the firms' networks contributes to a better innovation performance, was not rejected (coeff. = −0.490; sig. = 0.002).
- The null H_{1G} that the geographical scaling up of the firms' networks with universities contributes to a better innovation performance, was not rejected (coeff. = 0.280; sig. = 0.008).

We can note the negative association between innovation performance and the efforts to develop co-operation activities towards innovation with competitors. But the positive associations obtained (scope/variety of partners and geographical scaling up with customers and with universities) highlight that these issues must be fostered in Portuguese firms. This is in line with the RIS3 (Research and Innovation Strategies for Smart Specialization) from the EU that points out as key success factors for sustainable regional innovation, the crucial role of universities and other regions.

Universities are among the most competitive beneficiaries of EU funds for research and innovation, contributing to regional development to a very large extent. They are an essential element of the "knowledge triangle" (education, research, and innovation). Universities are crucial in developing, attracting and retaining human talent in the regional innovation ecosystem, which is a pre-requisite for long-term innovation (EUA, 2018). Also, this knowledge triangle must be invigorated through open innovation initiatives.

6 | CONCLUSION

Our results are in line with the literature on networking and open innovation. Although many scholars defend the benefits of an 'healthy' competition (co-petition), the truth is that firms always seek benefits for their client and resource base while prudently cooperate with competitors (Shaw, 2006). However, there is still a low propensity in Portuguese firms for open innovation due to their low maturity level of innovation management (Sarkar, 2014). The evolution in innovation models (from its 6th generation onward) reveals that modern open initiatives include co-operate or integrate strategically with competitors (Chaminade & Roberts, 2002). This is relevant for Portugal, where a vertical policy is a priority because it concentrates resources on new activities originating from a decentralized and well-conducted entrepreneurial discovery process (Foray, 2014). The identification of the stakeholders among the firm's network that mostly contributes to a better innovation performance is a relevant information.

The econometric results provide evidence for several significant lessons to territories with innovative behaviors similar to the Portuguese case. The results confirm that a smart-open innovation approach, in order to be effective and contribute to innovation return, needs to involve not only the network's spatial scaling up but also the increase of network's scope, broadening the number of different partners. This reinforces the importance of strengthening the

networks' with universities, customers and even with other regions what can turn Portugal more compatible with RIS3 vision and goals. An emphasis placed on the role of enterprises implies a focus on short-term evolutionary innovation (EUA, 2018). This is relevant for more peripheral countries which lack the institutional concentration and support historically present in the countries called innovation leaders (such as Sweden, Finland, Denmark, Austria, etc.).

Not all the smart people will work for the same firms, but firms must find and tap into the expertise of talent and resources outside them. Either they do not have to originate the research to profit from it. Building a better business model is better than getting to the market first, because companies' business model describes how value can be created from innovations and which elements have to be sourced internally or externally (European Commission, 2014b). Firms should also buy others' IP (intellectual property) whenever it advances their business model. Therefore, stakeholders must be more open, more networked, more collaborative and more absorptive of external ideas.

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ORCID

Marisa Cesário http://orcid.org/0000-0001-7832-6949
Sílvia Fernandes http://orcid.org/0000-0002-1699-5415

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