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The Demola model as a public policy tool boosting collaboration in innovation: A comparative study between Finland and Spain

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ABSTRACT

The next generation of Science, Technology & Innovation (STI) policies will be defined by mission orientation and co-creation processes and implemented by dynamic public-private partnerships. However, the experience of European countries up to now in attempting to boost cooperation in innovation reveals a very different story. Beyond some contextual factors, the characteristics of the agents involved, the dynamics of their relationships and the design of the collaboration tools also have a critical influence at organisational level. This paper aims to identify these organisational factors in different contexts through the analysis of the Demola model, a university-industry innovation platform created in Finland which has spread to other countries, including Spain. Demola applies a standardised model but it has differences in its functioning depending on the national levels of collaboration in the innovation systems. In our case study, we have compared Finland and Spain, bearing in mind the features of the agents involved and their relationships, through a content analysis of primary and secondary information. The results of the study show that the institutional structure of the collaboration and the organisational culture of each institution are key factors in its functioning. These results can be useful for innovation managers, university leaders, educational experts and policy makers.

1. Introduction

Public intervention is justified in innovation systems by systemic failures that occur as a result of relational dysfunctions between their public and private agents [1,2]. Public policies aimed at solving them are largely based on different Public-Private Partnership (PPP) formulas, which much of the literature considers to be the most appropriate instrument to solve this issue [3,4]. In this paper, PPPs in innovation are considered as formal mid or long-term relationships established between public and private agents within a framework set out by the competent authorities to jointly finance, operate and manage innovation activities, in which risks and benefits are shared between the agents involved [5].

Since 2004, all EU countries have promoted policies to improve public-private collaboration in innovation systems with varying degrees of success [6]. A significant part of the literature agrees on the existence of determining factors that account for this success [7]. Another part is interested in identifying the factors that best account for the innovative performance of the particular collaborations [8,9]. However, there is little evidence about the factors that affect the predisposition of a system to promote such policies, beyond the definition of the “innovation policy mix” patterns of a particular country [6] or region [10], whose variables include the dissemination level of these PPP experiences.

The definition of these clusters suggests that there are contextual factors, related to the territory and the innovation system, that influence the spread of PPPs in an innovation system [10]. Yet, in addition to territorial and sectorial factors, organisational factors (including structural, cultural and behavioural factors) also influence the success of a PPP initiative [11,12], and also affect the system’s predisposition to promote PPPs in innovation. As Borras [1] stated, organisational capacity is an “institutionally determined factor explaining diversity in processes and degrees of policy learning and change”.

Thus, this paper aims to identify the factors related to the organisational and institutional structure of the PPPs themselves, which hinder or facilitate their implementation as a public policy in a given context. To do this, this paper proposes the application of an analytical model [5], which also enables PPPs to be studied via their organisational dimension, and through the revision of a specific PPP instrument, the Demola model. Demola can be considered as a PPP in the framework of the current platform policy trend [13], which has been successfully tested in Finland, since it was created in 2008 [14]. Demola is also
successfully applied in different countries following a globally standardised methodology and a regional site structure similar to the Finnish original one. But Spain, with a poor collaborative innovation system [15], is the main exception. Its four Demola regional sites structures are different from each other and from the Finnish standard, and their contribution to improve the collaborative capacity of the innovation system is uneven. Thus, the proposal is to compare the Demola model functioning in Finland and Spain. So, from the differences identified in the organisational dimension in each case, and keeping in mind their territorial and sectorial characteristics of both national contexts, the paper intends to respond the main research question: which PPPs organisational variables can be decisive for the greater or lesser dissemination of PPPs themselves in a national context?

The outcomes of this paper will thus contribute to academic discussions on PPPs in innovation broadening the knowledge on factors contributing to their dissemination in different innovation contexts. Moreover, this knowledge will be useful for 1) innovation managers interested in learning about an innovative approach to industrial renewal, 2) university leaders and educational experts interested in finding new ways to connect university education to real-life problems and industrial processes, 3) and policymakers to ascertain the success factors that are key to fostering such PPP instruments.

2. A new scenario for university-industry collaboration

2.1. Next generation innovation policies

The Sustainable Development Goals [16] constitute major challenges. How they are tackled and achieved by government will determine the design of different public policies. These include science, technology and innovation policies which, beyond their importance for economic growth, must play a fundamental role in addressing these challenges. Accordingly, this will require new approaches in redefining their design [17,18]. In this context, some of the literature has proposed a transformative innovation policy model leaving behind the policy design frameworks based on the promotion of R&D and the innovation system approach [19,20]. Other authors argue that the transition to new policies must be based on the experience and knowledge accumulated through these frameworks [21], thus emphasising and redefining the role of fundamental actors, such as the public sector [4,22], the business sector [23] and civil society [24]. From this perspective, proposals such as mission-oriented [25] and challenge-oriented [26] STI policies try to give specific answers to the demands of this new scenario.

From a “traditional” systemic perspective [27], collaboration between public and private agents in an innovation system is essential both for the generation and transfer of knowledge [28,29], and for the governance of the system itself [5]. Within this next-generation STI policy framework, public-private interaction becomes the backbone of each policy. It requires governments to embrace a metagovernance perspective that creates conditions for others to self-organise and experiment around societal challenges [30]. In this sense, from a holistic approach, Edquist [31] states that the public sector “should support or supplement the actions of the private sector”. Kuhmann and Rip [22] talk about creative corporatism, a concept in which governments can adopt the crucial role of facilitating broader and more diverse varieties of cooperation. Thus, governments are responsible for organising platforms for collective action through, for example, what the authors themselves call transformative PPPs [22]. In fact, according to Kattel and Mazzucato [4] major challenges can only be solved through dynamic PPPs, in which “public, private, and third sector actors can work together in new ways to co-create and shape the markets of the future” [25]. Other authors even propose a Fourth Sector [32] in which the so-called hybrid organisations “have emerged with new models for addressing societal challenges that blend attributes and strategies from all sectors” [33].

For some authors, this transition to next generation innovation policies also implies evolving from old-fashioned cluster policies to new platform policies in which concepts like co-creation are combined with the paradigm of open innovation [34], the Triple [35], Quadruple and Quintuple Helix models [36], the “knowledge triangle” strategy [13,14,37] or even the responsible innovation approach [38]. Thus, the concept of open innovation platforms (OIP) emerges as “any operating environment, technology, system, company, product or service, whose development and/or content production has been systematically opened up to outside developers and value creation, and whose key aims are the benefit produced by the platform’s users to each other and the network effect brought by participation” [14]. This concept of OIP is directly related to the aforementioned transformative and dynamic PPPs [4,22,25] and also to the idea of facilitating the virtual, social and physical technologies convergence (VSP) as an enabler of public co-creation [39].

2.2. Success factors for university-industry collaboration

University-industry is one of the most studied types of public-private collaboration and has a long tradition in many countries around the world [40]. Yet there are several factors that can influence it. Cottam [41] differentiated between soft barriers, i.e. those which arise as a result of the human aspects of the relationship, and hard barriers, which arise from the technical aspects of the relationship. Since then, other authors have tried to identify the factors that lead to the success of this collaboration [for example [11,42,43,44]], in the case of developing countries).

Rybnicek and Königsgruber [7], based on a systematic and exhaustive review of the literature, proposed a model that synthesised the success factors for university-industry collaboration. They divided success factors into four general groups included in the collaboration framework: agents/organisations (institutional factors), relationships (relationship factors), results (output factors) and context (framework factors). Some factors could be considered as organisational culture factors: “structure”, which is related to bureaucracy, the flexibility of organisations and to decision-making differences; “commitment”, which refers to the issues of how much a person or an organisation identifies with the collaboration and its goals; “trust” between organisations; “willingness to change” which means, “adapting to different circumstances and cultures, being open to listening and managing corporate changes”; and “communication”, which implies regular interaction, continuous feedback, mutual exchange of information and updating partners about incidents and new activities. The authors also identify what they call moderators, which represent collaboration circumstances that can have an impact on the way individual factors affect the partnership: the collaboration phase, the size of the partners, the organisational level and the (scientific) discipline.

Finally, literature is almost unanimous in accepting the influence of national culture on innovative performance. There are several studies analysing the effect of Hofstede’s cultural dimensions on the level of innovation performance in a specific country [45–47]. Recent studies have also examined the influence of national culture on core dimensions of responsible innovation, some of which directly related to co-creation: anticipation, reflexivity, deliberation, responsiveness and participation [24,38].

3. Methodology

The literature proposes a transition to new public innovation policies in which actors, especially the public sector, are expected to take a more active role. In this sense, Rotmans et al. [48] talked about macro, meso and micro levels when analysing transition management in public policy. The analytical framework used in this work [5] proposes an analysis of PPPs from a multidimensional approach, establishing the territorial (macro), sectorial (meso) and organisational (micro) dimensions. From the territorial perspective, the proposed framework analyses PPPs within a specific national historical context influenced by ideologies,
territorial design, economic and financial factors, administrative culture and the presence or not of an institutional framework for PPPs [5]. While from the STI sectoral perspective, PPPs are considered, firstly, as a governance model defined by its legal framework and the structure of the national innovation system; and secondly, as a public policy, defined by its own historical evolution and the current STI policies strategy [5].

Given the scope of this paper, this analytical model has been applied solely to review the organisational dimension of a specific PPP instrument (Table 1). However, as territorial and sectoral dimensions also have a major influence on how an innovation system is structured [5], a brief approximation to these contextual factors (section 4.2) would seem necessary in order to better understand the research results. In that sense, as commented, the comparison between Spain and Finland is interesting given both countries’ experience with Demola yet there are differences regarding collaboration at innovation performance levels.

From a methodological point of view, this paper follows the comparative method with a qualitative approach, which is one of the most used methods in political science and its use has experienced a significant growth in other disciplines [49]. The qualitative comparative method focuses its attention on a few comparable macrosocial units (in this case, the Spanish and Finnish national innovation systems) to achieve the maximum possible knowledge about each of them, something difficult when they are numerous [50].

The data gathered consisted of secondary and primary information and it was collected from different sources to facilitate data triangulation. Regarding the techniques used, part of the information was collected from a critical documentary review of scientific articles, working documents, policy reports, legislation and other official Spanish and Finnish publications. In addition, other data collection techniques were used:

- Direct observation in two Demola work sessions: the kick-off and final sessions of the Demola Helsinki Q1/2019 season, held on 16/01/2019 and 13/03/2019 respectively at Epicenter facilities in Helsinki.
- A focus group session with nine public policy and co-creation experts discussing the Demola model as a PPP, held on 01/03/2019 at the Centre for Consumer Society Research (University of Helsinki) in the framework of the Politics of Co-creation seminars.¹
- Several in-depth semi-structured interviews and informal talks with different Finnish and Spanish actors involved in the Demola model. The interviewed people were the Demola model creators, the current Demola Global and Demola Finland managers and the coordinators of all the Spanish Demola regional sites, given that one of the main goals of the research was to know deeply about the model functioning in both countries. For more details about the interviews and the rest of this fieldwork, see Appendix A. For the interview script, see Appendix B.

The content analysis of the information was carried out through the qualitative analysis software Atlas.ti. This software enables researchers to associate codes with text fragments and is especially useful in certain areas of the social sciences [51]. It enables researchers to identify, organise, analyse and provide patterns from careful reading and rereading of the information collected, identifying numerous cross references, linking several concepts and opinions, and thus inferring results [52]. In general, the coding process followed has been deductive. Thus, the codes defined for this analysis coincided with the organisational dimension variables of the analytical model used. Yet, given the relevance of the aforementioned study about collaboration success factors by Rybnicek and Königsrüger [7], the so-called moderators and factors directly related to organisational culture were also codified in order to check their possible relationships with the model variables. But the coding of the different agents involved and their roles has been done following an inductive approach. This has allowed to identify characteristics of the Finnish standard model and the peculiarities of the Spanish nodes (Section 5.1). Table 2 shows the codes defined for the analysis.

Then, Atlas.ti was used to obtain code-document tables and a concurrency analysis (see Appendix C). Thus, the review of the codes that occurred in the same quote facilitated the establishment of certain relationships between those codes and, therefore, between the variables they represented. The codes with the highest rooting were identified for the Spanish and Finnish cases, depending on the actors involved the Demola model. The detailed review of the citations in which the concurrences occurred indicated in which sense the specific factor influenced the PPP experience. When a specific quotation was cited in the text, textually or to support arguments, the document code (see Appendix A) and the quotation number within this document is indicated in brackets (e.g. D8: 23).

4. Case study

4.1. Demola: an open innovation platform fostering university-industry collaboration

Demola is an initiative based on the OIP concept, born in 2008 within the “Creative Tampere 2006–2011” local economic development programme [53]. In essence, Demola (see Fig. 1) is an innovation platform and university-business collaboration model for the creation of new products and services. Multidisciplinary university student teams, supervised by lecturers, work together with staff from a private, public or third sector organisation on real-life challenges provided by that partner, following a standardised professionally facilitated methodology [54].

These challenges have a duration of eight weeks and there are four events especially designed to facilitate interaction between students, the rest of the agents and some invited experts, which are the kick-off session, jam I, jam II and the final meeting. In between these events, there are three work phases that help teams to organise their project: the discovery phase, the ideation and prototyping phase and the refine and package phase (Fig. 2). All the process is legally controlled with contracts and intellectual property rights (IPR) agreements which grant parallel access rights to the results for corporations and students who also obtain academic credit recognition for their work.

Table 1
Multidimensional analytical framework. Source: adapted from Catalá-Pérez and de-Miguel-Molina (2018).

| DIMENSION VARIABLES | Organisational dimension: PPP as a management tool/PPP as a project | Purpose of the PPP | Scope | Objectives | Service or activity affected | Agents involved, and role assumed |
|---------------------|---------------------------------------------------------------|------------------|------|-----------|-----------------------------|-----------------------------|
| Duration            | Complexity                                                   | Distribution of functions | Public control and supervision | Resources | Costs | Benefits | Risks |
| Shared responsibilities | Formalisation                                                | Type of PPP relationship | Form of formalisation |

¹ https://studies.helsinki.fi/instructions/news/politics-co-creation-semi-nar-yhteisluomisen-politiikat.
Originally, the initiative was funded through the aforementioned local development programme and the regional Centre for Economic Development, Transport and the Environment (ELY Centre). Yet the biggest boost came from the Nokia Research Centre, which was looking for a new open innovation model to take advantage of the talent of the young students in the region. At the beginning, the Demola model was operated by the semi-public technology agency Hermia Oy [54]. The Council of Tampere Region also supported the initiative [53]. Finally, the project also had the necessary collaboration of the three universities in the city of Tampere [53]. Thus, Tampere became the first operational node of Demola, defining a relationship dynamic that has been similarly reproduced in later experiences.

In 2011, with the end of the Creative Tampere programme, Demola joined other regional and national development programmes as a tool to boost innovation, and began a process of expansion and internationalisation [37]. The creation of the New Factory International organisation (later, Demola Global) by some of the individual driving forces of the model, encouraged the setup of different operational nodes nationally and internationally (e.g. in Hungary and Lithuania). Demola is, at the time of writing, an international network that extends to 18 countries and works with more than 50 universities representing at least 750,000 students [56]. According to different authors, Demola offers several benefits for the different agents involved (Table 3).

### 4.2. Brief comparison of the territorial and sectoral dimension of PPPs in Spain and Finland

One of the most important differences between Spain and Finland is their multilevel government structure. Finland has a state and local government level, and a regional administration in which both coexist and are well coordinated through different institutions. While at the national level, Finland had low PPP activity [59], at local level, the so-called lifecycle projects (*elinkaarihanke*), a type of PPP, have been implemented for decades [60]. PPPs are characterised by a pragmatic approach focused on a particular purpose such as environmental protection or the promotion of innovation [59].

Spain is a highly decentralised state with three levels of government and a complex division of powers that has caused conflicts between them in recent state PPP experiences [61]. From the second half of the nineties onwards, Spain became one of the European countries with the largest number of PPP projects implemented both at state and regional levels [62]. However, Spain has been criticised for using PPPs without a strategic perspective, and basing them solely on budgetary objectives [63]. There is no specific legislation on PPPs, either in Spain or in Finland, nor is there a PPP task force or a dedicated PPP unit. In both cases, the main legal framework for PPPs is the public procurement law, but the Finnish one includes the specific figure of innovation partnerships.

Regarding the STI policy sector, Spain has very weak coordination between national and regional levels in terms of the design, application and evaluation of these policies [15], despite the existence of a multi-level coordination body, the STI Public Policies Network. Spain has a specific Science Law that defines the Spanish innovation system and recognises the lack of public-private collaboration in the system. Finland

| Table 2 | List of codes. Source: authors’ own. |
|---|---|
| VARIABLES | CODE NAME | CODE ID |
| Purpose of the PPP | Scope of the PPP | C1.1 |
| Objective of the PPP | C1.2 |
| Service or activity affected by the PPP | C1.3 |
| Agents involved in and role taken in the PPP | Demola Global | C1.4.1 |
| Local operator | C1.4.2 |
| Student teams | C1.4.3 |
| Corporations/companies | C1.4.4 |
| Universities | C1.4.5 |
| Public sector | C1.4.6 |
| Individuals | C1.4.7 |
| Duration of the PPP | C2 |
| Complexity of the PPP | Distribution of functions | C3.1 |
| PPP | Public control and supervision | C3.2 |
| Shared responsibilities | Costs | C4.1 |
| Benefits | C4.2 |
| Risks | C4.3 |
| Formalisation of the PPP | Type of formalisation | C5.1 |
| Type of PPP relationship | C5.2 |
| Moderators | Different disciplines | C6.1 |
| Different organisational levels | C6.2 |
| Different scales | C6.3 |
| Collaboration phase | C6.4 |
| Organisational culture | Commitment | C7.1 |
| Communication | C7.2 |
| Structure | C7.3 |
| Trust | C7.4 |
| Willingness to change | C7.5 |

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In Fig. 1, Demola model. Source: Demola presentation for students [55].
has built one of the leading national innovation systems in the world through ‘co-evolutionary’ dynamic interaction between state and local governments that enables national policies to have a major influence on local development activities but “vice versa, many feasible and successful local initiatives have fed back into the national level policy discourse” [64]. In addition, a Regional Development Law establishes the cooperation conditions between Regional Councils and State authorities for economic, industrial and business development issues.

The structure (in terms of institutional profiles) of Spanish and Finnish innovation systems is quite similar. However, according to the European Innovation Scoreboard 2019 [65], Finland is an Innovation Leader, ranking second among EU countries, while Spain is a Moderate Innovator, standing in 19th place. This difference in innovation performance is reflected in terms of Gross Domestic Expenditure on R&D (GERD) in 2017 as a percentage of GDP: 2.76% in Finland, and 1.2% in Spain. Fig. 3 shows GERD by source of funds in 2016 for both countries and for the EU. In Finland, business sector funding is more than ten points higher than in Spain. The trend is similar in terms of performance sectors (Fig. 4). This is a really important issue because the higher the participation of business sector funding, the better the country’s innovation performance [65].

According to the Innovation Survey for the 2014–2016 period, in Finland, 23.8% of companies with ten or more employees which were involved in product and process innovation activities cooperated with universities and 16% with public research organisations (PRO); while in Spain, these percentages were 9.1% and 7.2% respectively [66, 67]. To summarise, international innovation indexes reflect the differences in innovation performance and in the degree of public-private partnerships between Finland and Spain (Table 4).

In the early 1990s, Finland was one of the few countries to have implemented a consistent approach towards cluster-based industrial policies [68]. Thus, in terms of collaboration, one of the strengths of the Finnish innovation system is the existence of a strong cooperation culture [69]. Similarly, over the last few years, since the discontinuation of some of the most successful policy initiatives (OSKE, SHOK and INKA programmes), there has also been a lack of ambition and a holistic approach to developing new PPP formulas. According to the OECD “public-private collaboration programs should be relaunched, they

Table 3
Demola benefits for each agent. Source: authors’ own based on several sources [13,14,37,56–58].

| ACTORS        | BENEFITS                                                                                       |
|--------------|------------------------------------------------------------------------------------------------|
| Students     | • Real-life work experience in a multidisciplinary and international environment.       |
|              | • Specific training in innovation and new methodologies.                                       |
|              | • Acquisition of professional skills and competencies and personal/social skills.              |
|              | • Professional contacts and recruitment or self-employment opportunities (establishing start-ups based on Demola project results). |
|              | • Academic recognition.                                                                         |
|              | • Revenue from licensed results.                                                                 |
|              | • Development of a new kind of teaching and learning environment as well as new co-operation opportunities. |
|              | • Improvement of the training skills and methods of lecturers.                                    |
|              | • Researchers and lecturers are also given the chance to work in a real-life environment, implementing and validating their ideas and their research outputs. |
|              | • Opportunities to create and maintain contacts with the industry and link scientific research to industrial cases through this cooperation. |
| Universities | • Professional support in a fully facilitated environment for a new innovation model based on co-creation. |
|              | • New knowledge, new fresh perspectives and new ideas. Demola provides insights from outside companies’ own box. A new innovation culture. |
|              | • Less uncertainty and risk in the innovation process.                                           |
|              | • Access to the best young talent through highly-educated university students eager to collaborate in real-life projects. |
|              | • Internationalisation.                                                                          |
|              | • Contacts and possible future co-operation with universities and recruiting opportunities.       |
| Companies    | • Leading a change in the mindset of innovation thinking in local, regional and national environments. |
|              | • Improvement and strengthen of collaboration links between universities and companies.          |
|              | • Increase of the innovation performances of the cities and regions where Demola has been present. |
|              | • Demola works with a variety of companies and organisations that operate in different fields and sectors. |
| Public sector| • Leading a change in the mindset of innovation thinking in local, regional and national environments. |
|              | • Improvement and strengthen of collaboration links between universities and companies.          |
|              | • Increase of the innovation performances of the cities and regions where Demola has been present. |
|              | • Demola works with a variety of companies and organisations that operate in different fields and sectors. |

Fig. 2. Demola challenge structure. Source: Demola presentation for students [55].
require more diverse stakeholder participation and improved governance mechanisms” [69]. In general, the current trend in Finland is to promote skills platforms that facilitate co-creation between different-sized enterprises, education providers, research institutes, third-sector operators, public administration and end users, through new PPP formulas combining the powers of all these stakeholders [70].

These new instruments include the “Six City Strategy 2014–2020”. One of the cornerstones of this instrument is to develop open innovation platforms as functional structures integrated into the community to enhance productive diversification [71]. One of the main financing agents of the Finnish innovation system, Business Finland, has also developed three financing instruments, “Co-creation”, “Co-innovation” and “New business from research ideas (TUTLI)” aimed at promoting collaboration between research organisations and companies to develop solutions for new business needs [72]. The Academy of Finland is also developing programmes aimed at strengthening public-private collaboration to varying degrees. These include programmes funded by the Strategic Research Council (SRC), the Centres of Excellence (CoE) Programme, and the Finnish Flagship Programme [73].

In Spain, the lack of public-private collaboration has been a structural problem for several decades, despite policymakers’ awareness of the need for this type of partnership. The explanatory statement of the former Science Law (1986) already recognised this problem. In 2011, the current Science Law once again included the promotion of public-private collaboration among its objectives. However, the situation has not improved and Spain has been warned on several occasions by the European authorities about its poor performance in this area [the last one by the 15].

In the late 80s and early 90s, the creation of technology transfer offices and the first technology and scientific parks were promoted in Spain. These measures were complemented after 2000 with relatively successful collaborative research programmes, mainly CIBER and CENIT [74]. At present, the CIEN program is trying to recover the space these programmes occupied and the CERVERA Network is the first serious attempt to implement in Spain what were, for example, SHOKs in Finland. In any case, the disconnection between levels of government and large territorial differences makes it difficult to set up robust, well-coordinated state programmes in Spain.
The first analysis focused on knowing the agents involved in the model, their roles and the relationships established between them in the two reviewed contexts. Demola was born “in the context of Triple Helix environment due to the convergence of three main motivations: a business reason, a university reason and a societal reason” (D4:9). Nokia was looking for new fresh ideas and they thought that undergraduate students, “used as a mirror” could help them “to predict the future” (D12:3); for universities, collaborating with a world leader like Nokia was “very attractive” (D12:40); and regional innovation policymakers were looking for new ways to boost cooperation between industry and academia, given that “many players were not fully satisfied with the traditional way of doing collaboration in R&D projects” (D4:9).

Demola swiftly obtained “some very promising results” (D4:13) and the interest of “many delegations, asking how they can copy this model into their home country” (D12:41). Thus, approximately two years after it started, Demola’s creators realised that the model could be developed as a standardised strategic innovation management tool. They understood that Demola was “redefining the role of the public sector, universities and corporations in that Triple Helix collaboration environment” (D4:13).

According to Räisänen, one of the Demola promoters from the public sector, the success and resistance factors for tools like Demola are mainly related to the agents involved, especially represented by individuals (D4:30 to D4:32). Success factors include: (i) commitment of the top management in the innovation community; (ii) the existence of very capable persons included in Demola’s operations; and (iii) involvement of key corporate organisations and businesses to attract other important economic actors and corporations. Whilst resistance factors include: (i) lack of cooperation culture; (ii) lack of trust between the innovation players; and (iii) focusing on a local instead of a global context.

In any case, there is a difference between the agents involved in the Demola model and the role they play in it. In fact, some Finnish interviewees agreed that a key factor for understanding the dissemination of Demola since its creation is that there are well-defined key roles that can be played by different agents (D12). Thus, the role of local operators is essential within the Demola model. Finnish local operators are usually universities and Demola Global itself who co-facilitate milestone events in all Demola Finland locations. In fact, the trend is to establish supraregional and even national nodes as has occurred in Portugal. Demola Global is trying to harmonise the Demola node structure to avoid what happens, for example, in Spain. The role of local operator is played in Spain by four different agents, which creates differences in the relationships with the other agents:

- The Demola Basque Country operator is a private organisation that provides advanced training solutions and has a strong business client portfolio (D9:5) but also finds difficulties in accessing universities due to a lack of involvement and bureaucratic issues (D10). Thus, it incorporates Vocational Education and Training students into their teams, as it has easier access to this type of student profile (D9:6).
- The Demola Canary Islands operator is a public technology centre dealing in the promotion of research and innovation for the manufacturing sector. It has easy access to the region’s two public universities, despite their poor involvement in terms of promoting projects and managing teams (D10:29, D10:31), and it also has easy access to companies (D10:22).
- The Demola Campus Iberus operator is the Campus Iberus of International Excellence, a project launched in 2010 by four public universities from four different Spanish regions: Aragon, Navarre, La Rioja and Catalonia. The need to coordinate the interests of these universities has been a critical challenge for this operator (D7:47, D7:50). The involvement of companies has been irregular (D7:38). The continuity of this operator in the Demola Alliance is not guaranteed due to changes in the organisation’s executive management (D7:73).
- The Demola Southern Catalonia operator is the “Rovira i Virgili University, through its own foundation. This is probably the Spanish node closest to the Demola sites standard structure. It was created as part of a long-term regional development strategy promoted by university and local government based on the Quadruple Helix framework (D8:56). To some extent, Demola Southern Catalonia takes on the role of a regional development agency (D8:62, D8:104).

Demola Global has also a prominent role as the international Demola Alliance coordinator and the Demola model manager. It provides all methods, tools, processes, IPR and the legal management framework and is also responsible for all local facilitators’ training. The Alliance is formed by regional partners that can act as local operators facilitating
their own challenges or just as student providers for globally launched challenges. Sometimes, Demola Global directly runs regional sites, and it is increasingly co-facilitating all key milestone events of the Demola process in all regional locations. In any case, according to the information gleaned from the interviews, when an Alliance partner acts as an operator in a Demola regional site, there are several roles and agents involved (Table 5).

5.2. Analytical model variables as Demola collaboration features

5.2.1. Purpose of the PPP

For companies, Demola has that triple goal: “to change company thinking, to find the best talent and to create next generation products” (D12:12). From a long-term approach, Demola is understood as a “factor of cultural change” (D11:6). Thus, Demola helps organisations to innovate in a new manner. The experience in Finland, where companies usually renew their participation in Demola, shows that this goal is especially significant in that case. However, in Spain, participation in Demola is usually something sporadic and is not systematic (D9:26). Although there are companies that have launched several challenges in the same call (D9:26), there are only cases of companies participating in different calls in Demola Canary Islands (D10:16). Therefore, we can say that medium- and short-term goals are more prominent in Spain. For example, for human resource departments, Demola provides an opportunity to attract and select talent; while for production departments it is a formula to solve specific organisational problems (D7:108).

In any case, many companies in both countries have very high expectations when they participate in Demola and the results do not always match them (D7:108, D10:18). Sometimes they expect “immediate value” (D10:17). Again, the focus is placed on the results, rather than on the process and this leads to the students’ work not being valued to the extent that one would expect (D7:109, D9:22, D9:23, D10:17). Specially in Spain there is criticism over the lack of honesty and opportunism of some companies that take advantage of student work without recognising it (D7:38, D9:34, D10:17). On other occasions, the student teams themselves may not be sufficiently committed (D7:24, D9:37). In any case, the model has evolved to obtain a higher level of commitment from corporations and to value students’ work more fairly (D9:25). In addition, Demola Global is currently working on moderating its discourse regarding the creation of expectations, so that the level of ambition of the participants is realistic and attainable for all of them (D13:26 to D13:29).

Demola also seeks to rethink the role of universities and students while becoming a knowledge-based employment engine, from a multi-disciplinary and international perspective. Thus, universities should consider Demola as a service, whose objective is to offer students new experiences and opportunities and add value to their training (D4:22, D7:86, D8:56). In Finland, most universities “understand their role as a provider, as an enabler” (D4:22), and few of them are still reluctant (D3:8). In Spain, when the local operator is not the university itself, Demola is seen as something external and distant despite existing collaboration agreements (D10:31).

Demola has been included in several public strategies and development plans in local, regional and even at national level in Finland (D13:31). Thus, the public sector is promoting Demola as a new way to work together, as a policy tool in the aforementioned open innovation platform policy framework. In addition, it is usual that Finnish public organisations act as Demola users, proposing several challenges. In other countries such as Portugal, Demola is being promoted by the national government with the aim of “enhancing the education system and changing the current way of working at the universities towards more cooperation with companies” (D13:33). However, in Spain, public sector participation has been scarce, mainly due to the bureaucratic and legal requirements (D10:8). Although in some cases, local and regional governments are considered to initially promote the model (D7:75, D8:56, D9:27), the public sector has only become the main promoter in Demola Canary Islands (D10:4), using it as a public intervention tool, and in Southern Catalonia, where it is specifically referred to as a strategic element of a recently published regional development plan (D8:56, D8:62, D8:65).

Regarding the activities affected by the PPP, as reviewed, Demola focuses on demoing and prototyping. But typically, both in Finland and in Spain, the work of students in companies has been based on internships or traineeships with detailed, clearly defined functions (D4:19, D8:18). Understanding Demola in this way implies a distortion as it focuses on results, since in Demola “results can follow the lines of what is being thought or not” (D9:20). This means that Demola challenges “have a wide spectrum of possible solutions” (D14:2). Demola is based on continuous interaction and co-creation where both parties are learning (D4:19, D2:15). In the Demola context, “students are not working for but with companies” (D13:5). Students and corporation staff are working as equals. In this sense, the Finnish non-hierarchical culture and equality thinking have helped the Demola model to succeed (D4:19). In Spain, although a few companies have accepted this situation (D10:13), many others do not understand it. They feel uncomfortable sharing innovation decisions with students, and sometimes, they even consider it a threat (D9:19). For other companies, Demola is a kind of low-cost outsourcing and consultancy service (D9:19, D9:23).

5.2.2. Duration

The temporary nature of the collaboration refers to its duration. Accordingly, the duration of Demola as a PPP depends on the planned objectives. Demola as a cultural change factor or as a policy tool requires a long-term perspective to obtain results. In this sense, Demola Global offers three-year agreements with local partners that are usually extended. When Demola is implemented with medium-term objectives, local partners can think about continuing with the alliance membership after this time. This is what is now happening in Demola Campus Iberus, where changes in the executive management of Campus Iberus are causing strategy to be redefined (D7:73).

Demola as an innovation model has evolved since its beginnings. For example, the duration of the challenges has gone from three or four months to the current eight weeks (D10:14); in the beginning, the companies’ staff did not work together with the students as they do today (D10:14); and until last year, companies took on no economic commitment for their participation, paying fees only when they wanted to license the results (D9:28).

Demola Basque Country and Demola Canary Islands, the two oldest Spanish nodes, have experienced and adapted to some of the changes in Demola, although they were initially reluctant to do so (D10:14). In this context, both sites presented satisfactory data with licensing rates of approximately 65% (D10:19). Therefore, it can be said that continuity
and following the proposed model whenever possible are factors that encourage the success of Demola.

5.2.3. Complexity

PPP complexity refers to the distribution of functions and the existence of a certain degree of public control. The main functions for each of the roles involved in Demola have already been discussed but it is interesting to delve further into the complex role of the local operator. Regarding facilitating activities, Demola Global is increasingly co-facilitating milestone events in each regional location “taking advantage of their experience in operating almost 4000 projects globally” (D13:35). Some metrics show that Demola’s own facilitation is a critical factor for a site’s success (D13:35 to D13:37) and Demola Global managers state that “it’s a huge relief for the current local facilitators, because this support brings feeling of security and networking and, in addition, when Demola Global brings its own expertise, the attractiveness of the universities in the companies’ eyes increases” (D13:39). Actually, this change could alleviate the lack of human resources in some local Spanish operators because not all local facilitators work full-time in Demola activities (D8:102).

Inviting companies to participate in Demola can be quite difficult in some cases for local operators. Although Finland is looking for new methods to improve university-industry collaboration, there is already a strong tradition in this sense (D4:17, D13:34). The critical role of Nokia in boosting Demola gives a clear idea of this (D3:11, D4:16, D12:16). Yet, in Spain, local operators find it difficult to engage big companies in Demola. Interviewees give some reasons: poor innovation culture and percentage of licences bought or percentage of completed projects licensed (especially R&D companies)

5.2.4. Shared responsibilities

Shared responsibilities refer to shared resources, costs, risks, and benefits. Finnish interviewees focused their discourse on the model’s benefits. In the Spanish case, although this was also the most commented aspect, the references to the costs and risks were significantly higher. Aspects linked to resources were of similar importance in each country. Thus, all agents involved must allocate human resources and time to a different extent, especially those who actively participate in Demola activities. It is obviously a problem if there is a lack of students (D7:87, D9:13) due to university indifference or disinterest in promoting participation in Demola (D10:29). In Spain, not all universities officially recognise students’ work, and this could be related to this issue. Another problem is the high workload in Spanish university curricula, which leaves little room for students to fully engage in Demola if their work is not officially recognised (D7:35 to D7:37). It should be noted that a Demola project requires an approximate dedication of 15 h per week per student. Knowledge creation and sharing is another critical resource for Demola. Therefore, close communication between actors is necessary. The experience in Finland shows that a strong cooperation culture (D13:34), a well-defined IPR framework (D14:8) and the trust that high-skilled facilitators can create (D4:31) are factors that can improve communication levels.

Regarding costs, as some Spanish interviewees stated, Demola cannot imply a disbursement of a university’s own funds (D7:92). Demola partners contribute to partnership activities with an annual fee that involves benefits, such as being invited to Demola annual events and participating in international cooperation (exchange of best practices, connecting researchers with companies, etc.). Yet the aim is to make Demola’s activities sustainable through the service and participation fees paid by the companies. In some cases, as in Demola Canary Islands, regional government support, partly financing Demola, is fundamental to its success (D10:3). In this case, the public funds supporting companies’ participation fees may be a key factor to overcome this possible entry barrier (D10:20).

Regarding risks, issues with demand are especially worrying for local partners and indirectly for Demola Global, given the difficulties involved in getting companies to engage (D8:17). The risk of availability is related to poor quality of the services provided. This risk could be critical for Demola Global and corporations if the local operator does not achieve standards in the service provision (D1:23). In this sense, the recently proposed co-facilitation framework can reduce this risk (D13:12). Availability could also be the most important risk for universities (and students) if expected academic and personal development objectives are not reached. In Finland they are especially concerned about this. Residual value risk refers to the future market value of the asset the project centres on. This could affect corporations and the public promoter (if they exist) if results do not tackle the challenge satisfactorily when the effects of Demola implementation in the system are not as expected. Thus, companies need to show a greater commitment from the start and they must be willing to interiorise Demola’s values (D9:25). The public sector could combine the promotion of Demola with tools like innovation vouchers to partially subsidise companies’ involvement when economic factors may be an entry barrier (D4:21).

The main benefits of Demola correspond basically to those established by the literature (Table 3) but it is interesting to add some comments. Students’ general level of satisfaction is high. In fact, some students repeat the experience (D10:30), others work to promote the model, even internationally (D5:12, D9:38, D10:30, D14:17), and others have gone from being students to being members of the Demola teams
The internationalisation of the Demola challenges is more developed in Finland than in Spain, and this is one of the most important benefits, not only for students (D4:24) in Finland but also for companies there (D4:25). In Spain, this is viewed as a very interesting option but there is not yet much experience (D8:6, D9:15, D10:27). Being hired by corporations is an important benefit for students in both countries (D3:7, D6:5, D10:16) and attracting talent is also beneficial for companies (D7:108, D10:16). In any case, the most immediate value that Demola gives students is contact with real life, working in multidisciplinary teams, and having real decision-making power (D9:36, D10:21). Interestingly, sometimes, extrinsic motivation, that is, academic recognition or benefits for IPRs are not the main motivations for students (D8:44, D8:49). For companies and universities, participating in Demola means being part of a successful internationally recognised programme, which provides them with a new methodology of proven quality (D7:26, D7:91, D8:66). This gives companies especially the chance to adopt a new approach in their innovation model and think about the future of the organisation (D8:13, D8:70, D8:79 D9:42).

5.2.5. Formalisation

The collaboration established through Demola is formalised contractually. The creation of a new regional node does not imply the creation of a new organisation, but the regional partner, whoever it is, takes on a new role (local operator) after signing a contract (D8:30, D12:49). These contracts have evolved as the Demola model itself has done, on many occasions, thanks to the experience, comments and suggestions of the regional partners themselves (D4:27). This has led different types or models of regional sites to coexist. This is especially evident in Spain. Therefore, Demola Global is carrying out a process of harmonisation across locations through a new contractual model (D13:1, D13:38).

Furthermore, another contract formalises the relationship between local operator, partner organisations and students when launching challenges, especially in terms of IPR. In fact, Demola’s IPR legal framework differs from other similar models that emerged later (D7:64, D9:14), even within the universities that initially participated in Demola (D9:35). Demola was conceived as “an agile and multidisciplinary method and as an environment that could provide an easy access point for that kind of players that are not typically part of the innovation clusters of collaboration” (D4:9). From the beginning, it avoided including universities in the legal framework and focused on student-company cooperation, looking to minimise bureaucracy (12:28).

5.3. Results summary

Table 6 shows a summary of some of the main results regarding the Demola model’s features.

6. Discussion

When we talk about Demola we refer to the organisation (Demola Global) that coordinates the international network; to the network itself (Demola Alliance) and the platform that supports it; and to the innovation model that is promoted and the PPP instrument that supports the governance of the Demola model itself. Thus, if Demola is considered as an organisation, it could be considered a hybrid organisation [33] as it combines a business-based operational mode with a social purpose which, in the case of Demola, is making innovation a tool and a right for all students and professionals, regardless of their role or organisation. If the entire Demola environment is considered, this universe fits perfectly with the revised OIP scheme.

Demola brings together university students and organisations to co-
create solutions for real challenges. However, beyond these specific solutions, the scope of Demola challenges the old paradigms of innovation and education experience. In this sense, HEIs are expected to improve students’ innovation capabilities and entrepreneurial skills, and to create cooperation with work-life organisations and provide students with entrepreneurial connections [75]. In terms of innovation, business, academia, government and civil society work together in end-user demand-focused teams, co-creating the future and driving structural changes far beyond the scope of what any single organisation or person could do alone [37]. This is the value that Demola gives to the OIP users, but the “network effect” commented by Raunio et al. [14] can be highly relevant when the public sector promotes its application as a tool for boosting innovation. Thus, Demola reflects the transition to a new generation of innovation policies [21]. As an OIP, Demola is one of those transformative PPPs that Kuhlmann and Rip [22] talk about in the context of mission-oriented [25] and challenge-oriented [26] STI policies. In fact, according to the aforementioned concept of creative corporatism, governmental actors have three main tasks when promoting this next generation STI policies: adopt a meta-governance role facilitating conditions for others to co-create [30,76]; “adopt the role of a coordinating change agent who is trustworthy, nonpartisan, and ready to invest” [22]; and build new capacities and capabilities. We have seen that Demola can help the public sector in these tasks.

Based on solid cluster policies, Demola was originally designed as a specific industry-university collaboration tool which has changed the role of innovation process agents. Demola fits clearly in the Triple Helix framework [35], but from the moment student participation is formalised directly with them and they take on a specific role in the model, they can be said to be the fourth agent in a Quadruple Helix framework, or even Quintuple Helix if environmental issues are considered [36,57].

In this sense, Demola fits into the aforementioned responsible innovation approach that “proposes a set of procedures by which innovation processes become more responsive to societal challenges” [38] and for which stakeholder involvement and participation is regarded as a key factor. In addition, as several studies have proved [28,29], that interaction and cooperation are critical factors for effective knowledge creation and transfer, and Demola, as a OIP, integrates the knowledge triangle approach that “emphasizes the linkages between education, research, and innovation” [37]. Thus, Demola becomes a co-creation process that goes beyond the push and pull approaches to innovation, due to what Fox called VSP latent realities, that “drive down barriers to resources, including specialist knowledge, and greatly reduces transaction costs, in such a way as to open up an ever increasing variety of latent instantiation pathways, association networks, and influence patterns” [39].

All these characteristics reflect that Demola could open up new perspectives in the definition of these OIP. For some of the interviewees, Demola is a “segmented OIP” for students (D12:29). This makes the model work efficiently (D12:30) because roles are clearly defined, always keeping in mind the agents the platform is oriented to. Segmentation for other kind of agents would require another kind of platform design (D12:30). But, in any case, keeping in mind the research question, certain organizational variables of the model affect its degree of dissemination in Spain compared to that of Finland.

The purpose of the PPP was the most commented aspect in both the Finnish and Spanish groups of interviews, mainly referring to the Demola scope and objectives. Interviewees have referred to them interchangeable. In this sense, a long-, medium- and short-term approach can be identified. The lack of strategic vision when applying PPP formulas and defining their objectives, focusing on short-term results, is an important hurdle of Spanish PPPs in general, and it is reflected in the case of Demola. In the Finnish interviews, Demola is related to a long-term vision of the model itself.

Following Räsänen’s definition of Demola’s success factors, the involvement of key corporate organisations is important to attract other important economic actors and corporations. This was the role played by Nokia when Demola started out in Finland (D4:16, D12:48). This is one of the most serious problems in Spain, as it is not easy to get large companies engaged not only in Demola but in PPPs in general. In 2016, less than 2% of companies working on innovative products and processes that were working with HEIs and PROs had 250 or more employees [67]. Few Spanish companies understand Demola as a new innovation model that could help them to redefine their internal innovation dynamics (D8:19, D9:30). This is a cultural issue, and changing culture requires time and effort (D3:10).

In Finland, Demola operators have weekly and even daily discussions with policymakers to help them to succeed in their objectives (D13:31). Thus, several Finnish local and national public programmes are including Demola among the tools they use to reach these programmes’ goals. The strong Finnish collaborative tradition is a key factor in this sense. The idea of co-evolution [54] between local and state government is evident in the case of the Demola model: it was born at the local level, but has been a tool used at regional level and is currently included in national strategies such as the Six City Strategy (D4:15). As mentioned above, in Spain, only the regional Canary Islands government is taking on the metagovernance role. Demola Southern Catalonia also understands the potential of Demola as a public intervention tool, but it needs the support of public agencies in order to create synergies because Spanish universities are reluctant to disburse extra funds for Demola activities, and for operators like this one, with scarce human resources, it is difficult to upscale the Demola model.

In Spanish context it is not easy either to get top management in the innovation community to commit. Analysis has shown that the lack of university commitment and the high bureaucratic burden are some of the biggest concerns of Demola sites in Spain (in fact, the continuity of one of them currently depends on the final decision of its executive director); and access to company CEOs is not easy most of the time. Despite this, there are very capable people involved in Demola, a fact that the interviews have revealed, showcasing the commitment of local Spanish facilitators. This is an interesting issue, because many of the Demola success stories, both in Spain and Finland, are largely based on individual actors:

- The essential role played by Demola’s ideologists in creating, evolving and differentiating the model.
- The importance of having students with the right balance of intrinsic and extrinsic motivation that guarantees their commitment.
- Operators and facilitators with high organisational, coordination, dissemination and negotiating skills.
- Academic coordinators at the university who must be involved and aware of the model’s value.
- Public decision-makers who understand that the momentum of the model may imply a change in the innovation dynamics of a given territory.
- Representatives of corporations who act with honesty and who understand that the model, beyond solving a specific problem, can bring a new business strategy to their companies.

When talking about shared responsibilities we refer to shared resources, costs, risks, and benefits. Finnish interviewees focused their discourse on the model’s benefits. In the Spanish case, although this was also the most commented aspect, the references to the costs and risks were significantly higher. We know that risk sharing is essential in a PPP. The introduction of a company participation fee in Demola has redefined the balance of risks taken on by each agent. Before this change, companies only paid for the results depending on their satisfaction level (D9:24). Accordingly, the companies’ loss was basically time (which, of course, is also valuable) while most of the risks were taken by the local operator and the public promoter (if they exist). This caused some companies not to act honestly especially in Spain (D7:39, D9:23).

Regarding Räsänen’s resistance factors, the lack of a cooperation
culture (not only between public and private agents, but also between government levels) is one of the main structural problems of the Spanish innovation system [15]. Another one is the lack of trust between innovation players, referring to a situation in which there are conflicts between universities, faculties in a university or other innovation agents, who Demola is supposed to bring together. This kind of internal conflicts hinders the functioning of Demola, as has occurred in Demola Campus Iberus (D7:68). Finally, Demola may be most valuable for regions and cities that are actively looking for new partners and new opportunities globally. This is the trend in Finland but in Spain, this perception is not yet well developed (D10:28).

As commented, some of the moderators and cultural factors defined by Rybniček and Königsgruber [7] have been included in our analysis. Regarding moderators, the collaboration phase has no effect in this case, as in Demola projects collaboration always occurs in the same phase of the innovation process. In terms of the specific scientific discipline in which the collaboration occurs, multidisciplinarity is seen to be a key feature of the student teams. The difficulties of Spanish local operators when dealing with corporations and university representatives depending on the department and position they occupy shows that the different organisational levels affect collaboration. In addition, the key role that major companies play as drivers of the Demola model shows that the companies’ size also has an influence.

For Spanish interviewees, “commitment” is a factor of particular concern, mainly in reference to corporations’ response to students’ work and to the students’ work itself. In addition, universities’ commitment must be greater when facilitating access to local operators or recognising students’ contributions in academic terms. For Finnish interviewees, “willingness to change” is one of the key factors for the success of the collaboration. This factor is perhaps the closest one to the idea of collaborative culture in companies. Willingness to change implies “the ability of partners to learn about and understand one another for a successful collaboration” [7]. Thus, “communication” is logically another important factor for collaboration success. “Structure” is related mainly to bureaucracy, and this factor is especially present in Spanish interviews, since as discussed, this affects Demola especially in Spain. Finally, “trust” is another of the key success factors of Demola in Finland. The strong public-private cooperation tradition has contributed to building a climate of trust which is greater in Finland than in Spain.

7. Conclusions

Spanish companies play a discreet role in the financing of R&D activities and there is a lack of innovation culture among them. It is not easy for companies to understand the value of tools like Demola. The difficulty to access large companies’ CEOs may be a determining factor in this regard. When dealing with intermediate managers, either they do not perceive the usefulness of the model due to their partial vision of the business strategy, or they do not have decision-making powers. Accordingly, this makes it difficult to jump start cultural change.

There is a very small percentage of companies working with HEIs and PROs, despite the fact that Spain has been promoting policies to boost this percentage for decades. While Finland has implemented robust programmes that have created a substrate for and a culture of collaboration, Spain has encountered difficulties in establishing this kind of state programmes. The complex Spanish multilevel government system has been a determining factor in this regard, together with the heavy bureaucratic burden and lack of flexibility that characterise the Spanish innovation system.

In general, Spanish universities are less flexible than Finnish ones and have different organisational structures, operating dynamics, and degrees of integration in the territory. They maintain features that impede non-traditional actors from entering. Some procedures are still slow and cumbersome. Some lecturers see models like Demola as a threat to their status quo and they do not promote their dissemination.

Demola’s work is not always officially recognised by Spanish universities. This turns participation in Demola into an extra burden for students. This situation can cause a deficit of students that slows the growth of the model. The positive reading is that, when there is no recognition, the motivation for students’ participation in Demola is intrinsic. In general, the assessment of the model that students make is usually positive. It should be noted that the practical content of the Spanish curricula is not very high and Demola can cover that gap.

All the nodes agreed on the importance of the role the public sector can play in the model, as a driver of the model on one hand and setting challenges and creating projects on the other. In the latter case there are varying experiences. Difficulties usually occur as a result of the high degree of bureaucratisation of Spanish government. Promotion by the public sector, the existence of public funds, full-time dedicated staff and the facilitation of easier access to universities and companies, favours the stability and continuity of the model.

The different structure of Demola nodes in Spain causes differences in their management and functioning. It has not been possible to implement the pure Demola model in all cases. The participation of vocational education and training students in Demola Basque Country is one example of standard model deviations. Another one is the lack of agreement between Demola Campus Iberus universities on academic recognition of the students’ work. What seems obvious is that the nature of each operator has some influence on the main focus of each node. The fluency and degree of coordination between local operators and the rest of the agents also depends on the nature of the operator.

The challenges of Demola in Spain are complex, but interviewees agreed that there are opportunities that can be used to tackle them successfully:

- As it is an international network it can provide a global environment of innovation that opens up major opportunities for participating organisations. The internationalisation of projects is a clear incentive for both organisations and students.
- The model has a consolidated track record and has been able to evolve and adapt as circumstances have changed. Its correct implementation guarantees results.
- Belonging to a network of Finnish origin, with everything this implies in the field of education, and given that the model is recognised by different international organisations, offers guarantees for the universities involved.
- The generational change in the management of Spanish companies could act as a driving factor for their participation in models such as Demola.
- The experience of sites like Demola Canary Islands suggests that, in Spain, the role of the public sector facilitating access to and coordinating with other agents could be a key factor for success.
- The existence of public agencies like the Canary Islands’ Technology Centre in the rest of the Spanish regions could become an opportunity to promote and coordinate a national strategy with instruments such as Demola.

As discussed in this paper, Demola has been quite successful in Finland, and currently 7 polytechnics and an equal number of universities are involved in the activity [56]. Despite the overall positive adoption, there are some challenges worth mentioning here.

Finnish universities are highly committed with the Demola model and give great importance to academic supervision of student teams. In this sense, due to the strong practical orientation of the Demola concept, there is a risk recognised that Demola can remain disconnected from other university studies. This risk has been partly mitigated by the recent changes in some universities revised curricula, in which the prevalence of working life oriented studies have been increased. Also related with the role of the universities, some cultural tensions, especially the traditional distance of humanities and social sciences from business activities may hinder the adoption of Demola in these particular
Balancing between the right number of students and cases or challenges provided by companies has been a continuous operational challenge. Living with such uncertainties can be more typical to companies accustomed to fluctuations in the operational context, but less typical for universities who are more accustomed to operate autonomously, with somewhat steady flows of students. A minor challenge, in some universities, has been the difficulty of recruiting students of IT. Programmers would be very welcome in many cases, but students in related fields seem to be too busy to engage in any additional working life oriented studies.

As commented, Demola operates in 18 countries and this is a huge international potential that has only partly been tapped. And finally, the question of ownership and commitment seems a critical issue. As a concept born in Tampere, this can raise issues and questions of reputation and profit. Demola Global has approached this issue by realigning the concept so that rather than talking about Demola in particular cities or universities, the idea should be of creating “Demola Finland”.

So, in Finland, some efforts should help to address these challenges effectively:

- Further actions might be needed in order to linking the practical Demola course with some more theoretical studies, such as innovation management or futures studies.
- The value of co-creation as a valid strategic approach to societal challenges has become more generally recognised, so the increased interest in testing it with new multi-stakeholder and multi-actor approaches such as Demola, can help to overcome university cultural tensions.
- The introduction of on-line Demola cases (stimulated by the Covid-19 crisis) can mitigate the imbalance between challenges launched and available students. Student groups can be composed more flexibly, involving students from multiple universities, even globally. It seems probable that global on-line cases continue to remain in the provision of Demola challenges.
- In addition to the global on-line cases just introduced, some interesting efforts have been done to connect Demola with, e.g., the Erasmus + exchange programme, as well as linking Demola to bilateral activities of some universities in Finland and China, and linking Demola to on-going research projects with an international dimension.
- The “Demola Finland” concept aims at renewing the Finnish innovation system for the benefit of all partners. So, the issue is partly about Demola’s marketing strategy but also about the potential of co-creating such a strategy that effectively meets various partners’ interests.

This research has enabled us to establish a series of interesting conclusions about the organisational dimension of PPPs in the Spanish and Finnish innovation systems. The analysis of Demola, though carried out following the process tracing method with a comparative approach, should be complemented with the study of other PPP tools to compare these conclusions. The study of the Demola model in other countries could also be an interesting alternative.

Throughout this work, we have observed that some national cultural dimensions, such as power, distance, long-term vision and individualism, are linked to the greater or lesser success of the analysed instrument. Interesting studies such as conducted by Setiawan [38] proved the influence of the national culture on responsible innovation dimensions like the participation, so future lines of research could go in this direction. The analysis of instruments similar to Demola, such as the Microsoft Innovation Centres and the Design Factory could be interesting options to strengthen the dynamics of these types of platforms from the segmentation perspective pointed out in the paper. Finally, an analysis of Demola from the point of view of its impact on the innovation system could help to understand its relevance to improving collaboration.

CRediT authorship contribution statement

Daniel Catalá-Pérez: Conceptualization, Methodology, Formal analysis, Investigation, Writing - original draft, Writing - review & editing, Visualization, Funding acquisition. Mikko Rask: Conceptualization, Validation, Investigation, Resources, Writing - review & editing, Supervision. María de-Miguel-Molina: Validation, Investigation, Resources, Writing - review & editing, Project administration.

Declaration of competing interest

None.

Appendix A

The in-depth semi-structured interviews were conducted, recorded and transcribed between April and September 2019. The average duration of these conversations was 1 h. This appendix collects the data of the interviews carried out and of all the other documents included in the content analysis (Table A.1). All the people interviewed gave their consent to be cited in this paper. D5 and D6 correspond to interviews not conducted by the authors but with relevant content for the research goals.

| ID  | NAME                     | ROLE IN DEMOLA                                      | DOCUMENTS                          | DATE         |
|-----|--------------------------|-----------------------------------------------------|------------------------------------|--------------|
| D1  | Garvey, Bernard          | Director Of Operations at Demola Global             | Seminar presentation (notes)       | 01/03/2019   |
|     |                          |                                                     | Seminar talk (notes)               | 16/01/2019   |
| D2  | Eskola, Jane             | Director Of Corporate Partnerships at Demola Global | Kick-off Demola Session (notes)    | 16/01/2019   |
|     | Nyroos, Erik             | Facilitator at Demola Helsinki (Finland)           | Informal talk (notes)              | 16/01/2019   |
|     | Kairamo, Ville           | CEO of Demola Global                                | In-depth face-to-face interview (notes) | 15/04/2019 |
|     |                          |                                                     | Skype talk (notes)                 | 04/06/2019   |
|     |                          |                                                     | Several e-mails                    | July 2019    |
| D4  | Rasinan, Petri           | Promoter of Demola - Council of Tampere Region     | In-depth Skype interview (transcription) | (continued on next page) |
Table A.1 (continued)

| ID | NAME | ROLE IN DEMOLA | DOCUMENTS | DATE |
|----|------|----------------|-----------|------|
| D5 | Saarinen, Jukka P. | Promoter of Demola - Nokia Research Centre | Published interview on the internet | 29/05/2019 |
| D6 | Silven, Pekka | VP of University Alliance Development at Demola Global | Published interview on the internet | 08/08/2016 |
| D7 | Contiente, Rafa | Campus Iberus of International Excellence - Coordinator of Demola Campus Iberus (Spain) | In-depth face-to-face interview (transcription) | 13/05/2019 |
| D8 | Cartanyà, Jordi | Universitat Rovira i Virgili - Coordinator of Demola Southern Catalonia (Spain) | In-depth face-to-face interview (transcription) | 22/05/2019 |
| D9 | Tovar, Pilar | Fondo Formación Euskadi - Facilitators at Demola Basque Country (Spain) | In-depth face-to-face interview (transcription) | 27/05/2019 |
| D10 | Dobarro, Lucía | Canary Islands Technology Centre - Facilitators at Demola Canary Islands (Spain) | In-depth Skype interview (transcription) | 28/05/2019 |
| D11 | Kairamo, Ville | CEO of Demola Global | In-depth face-to-face interview (notes) | 22/08/2019 |
| D12 | Saarinen, Jukka P. | Promoter of Demola - Nokia Research Centre | In-depth face-to-face interview (notes) | 30/08/2019 |
| D13 | Silven, Pekka | VP of University Alliance Development at Demola Global | In-depth face-to-face interview (notes) | 30/08/2019 |
| D14 | Wessman, Jere | Creative Director at Demola Global | Skype talk (notes) | 17/01/2019 |

Appendix B

To carry out semi-structured interviews, the researcher follows a thematic script with a series of open questions. There is flexibility to direct the conversation to those topics that arouse the researcher’s interest. In our research, the first interview was conducted with Demola Global’s CEO. This appendix includes the script followed in that interview, which was later partially adapted according to the person interviewed, always maintaining the same structure.

DEMOLA INTERVIEW

1) Presentation
   a) Please, indicate your complete name and the role you play in Demola.

2) Evolution of the model
   a) I’ve read about the participation of several actors in the creation of Demola (e.g. Nokia, Hermia Ltd, Tampere Council, New Factory …) but what was the role of these different agents and who was the main promoter? What were the driving factors for creating Demola?
   b) In what aspects has the model changed since its inception? For example, regarding the treatment of IPR?
   c) What factors do you think have conditioned these changes?
   d) Nowadays what is the status of Demola as private/semi-public organization? How is funded Demola?

3) Organizational issues

   Demola is widely considered as an Open Innovation Platform. When promoted by public sector it can be considered as a public policy tool, and in this sense Demola fits on public-private partnership concept. Several agents interact in this scenario: Demola operator/companies/student teams/universities/public organisations/community …

   a) What is the main role played by each agent involved in the model? And the main incentive (related to benefits) to participate in Demola? And the main cost?
   b) What risks assume each agent? What resources do they consume?
   c) How is controlled/supervised the performance of Demola? Is it done by Demola itself, by funders or by some other agent?
   d) How is formalised Demola? I mean, when establishing a Demola node, is there any kind of contractual agreement between Demola as an operator, HEIS and/or local and regional governments?

4) Learned lessons
   a) What do you think have been the resistance/driving factors that Demola has faced in its development in Finland?
   b) And what do you think are the main resistance/driving factors that could influence the development of Demola in other countries?

   We suggest: standardization of the tool, the recognition of the tool itself by international institutions, different style of policy making, business organizational culture, trust/distrust climate, universities’ profile …

5) Plans for the future
   a) Do you think that Demola can be a strategic element for the design of innovation policies at the national level?
   b) What are the most important plans of Demola for the future?
Appendix C

This appendix shows the code concurrence analysis between analytical model variables and agents involved (Table C.1) and code-document tables for moderators (Table C.2) and cultural factors (Table C.3) obtained from Atlas.ti.

Table C.1
Code concurrence analysis between analytical model variables and agents involved.

| CODE ID | SPAIN | FINLAND |
|---------|-------|---------|
| C1.1 + C1.2 | Spain | 14 | 13 | 15 | 21 | 15 | 21 | 4 |
|         | Finland | 22 | 4 | 10 | 20 | 13 | 15 | 3 |
| C1.3 | Spain | 3 | 2 | 2 | 3 | 1 | 1 | 0 |
|         | Finland | 2 | 0 | 2 | 4 | 0 | 0 | 0 |
| C1.4 | Spain | 29 | 51 | 59 | 57 | 56 | 40 | 27 |
|         | Finland | 47 | 28 | 41 | 42 | 41 | 24 | 12 |
| C2 | Spain | 3 | 5 | 6 | 4 | 1 | 0 | 2 |
|         | Finland | 4 | 2 | 1 | 2 | 1 | 1 | 1 |
| C3 | C3.1 | Spain | 2 | 16 | 7 | 9 | 12 | 3 | 2 |
|         | Finland | 24 | 18 | 12 | 13 | 7 | 13 | 4 |
| C3.2 | Spain | 0 | 2 | 0 | 0 | 2 | 7 | 0 |
|         | Finland | 1 | 0 | 0 | 0 | 0 | 2 | 0 |
| C4 | C4.1 | Spain | 12 | 13 | 23 | 11 | 7 | 5 | 3 |
|         | Finland | 13 | 10 | 7 | 13 | 4 | 5 | 0 |
| C4.2 | Spain | 4 | 3 | 3 | 13 | 4 | 5 | 0 |
|         | Finland | 4 | 2 | 1 | 2 | 3 | 1 | 0 |
| C4.3 | Spain | 23 | 14 | 32 | 20 | 20 | 5 | 2 |
|         | Finland | 15 | 5 | 28 | 18 | 20 | 4 | 2 |
| C4.4 | Spain | 5 | 2 | 3 | 8 | 6 | 2 | 0 |
|         | Finland | 5 | 3 | 2 | 2 | 1 | 0 | 0 |
| C5 | C5.1 | Spain | 2 | 7 | 7 | 4 | 3 | 7 | 0 |
|         | Finland | 4 | 1 | 5 | 2 | 2 | 2 | 0 |
| C5.2 | Spain | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
|         | Finland | 2 | 0 | 0 | 0 | 0 | 0 | 0 |

Table C.2
Code-document tables for moderators.

| CODE ID | SPAIN | FINLAND |
|---------|-------|---------|
|         | Abs. | % Row | % Column | Abs. | % Row | % Column | Totals | Abs. | % Row |
| C6.1 | 15 | 57.69% | 21.74% | 11 | 42.31% | 19.30% | 26 | 100.00% |
| C6.2 | 31 | 60.78% | 44.93% | 20 | 39.22% | 35.09% | 51 | 100.00% |
| C6.3 | 19 | 46.34% | 27.54% | 22 | 53.66% | 38.60% | 41 | 100.00% |
| C6.4 | 4 | 50.00% | 5.80% | 4 | 50.00% | 7.02% | 8 | 100.00% |
| Totals | 69 | 54.76% | 100.00% | 57 | 45.24% | 100.00% | 126 | 100.00% |

Table C.3
code-document tables for cultural factors.

| CODE ID | SPAIN | FINLAND |
|---------|-------|---------|
|         | Abs. | % Row | % Column | Abs. | % Row | % Column | Totals | Abs. | % Row |
| C7.1 | 60 | 71.43% | 31.25% | 24 | 28.57% | 21.62% | 84 | 100.00% |
| C7.2 | 23 | 56.10% | 11.98% | 18 | 43.90% | 16.22% | 41 | 100.00% |
| C7.3 | 52 | 71.23% | 27.08% | 21 | 28.77% | 18.92% | 73 | 100.00% |
| C7.4 | 12 | 41.38% | 6.25% | 17 | 58.62% | 15.32% | 29 | 100.00% |
| C7.5 | 45 | 59.21% | 23.44% | 31 | 40.79% | 27.93% | 76 | 100.00% |
| Totals | 192 | 63.37% | 100.00% | 111 | 36.63% | 100.00% | 303 | 100.00% |

Appendix D. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.techsoc.2020.101358.

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