HOW UNIVERSITIES SHAPE ENTREPRENEURIAL ECOSYSTEMS: EXAMPLES FROM ACROSS EUROPE

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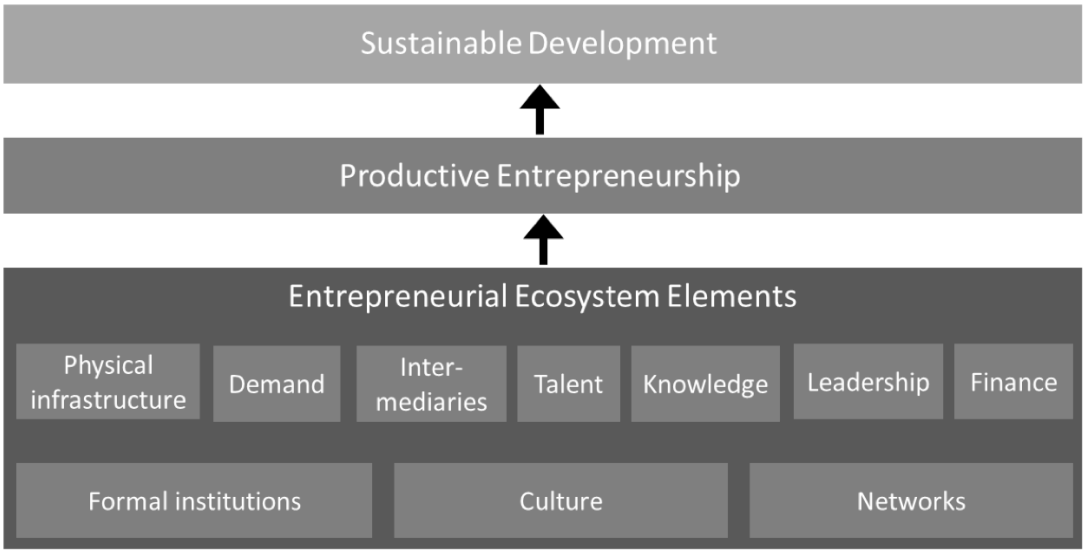
Universities play an important role in stimulating entrepreneurship. In this article, we discuss how universities can influence entrepreneurship based on four cases from different contexts. We focus on the interactions between university-industry and university-government and explain how these interactions stimulate entrepreneurship in the context of the four cases.

Stimulating entrepreneurship is important because entrepreneurs introduce new technologies and business models. These, in turn, play an important role in creating economic growth and in addressing societal challenges, such as climate change. However, entrepreneurs do not innovate in isolation, they depend on their environment. The surrounding environment for entrepreneurs is the core focus in the entrepreneurial ecosystem (EE) framework. This framework describes how entrepreneurs depend on other actors (universities, incubators, governments, investors etc.) for resources and how their behaviour is shaped by institutions (rules, regulations, and culture) (Stam, 2015).

The entrepreneurial ecosystem framework can be summarised in a Figure 1. In this figure you see ten elements which drive the presence of productive entrepreneurship, which in turn influence the sustainable development in society.

Universities influence several of these components. Their role is most evident in the creation of knowledge and the development of talent. They create new knowledge by doing research and they develop talent by educating students. However, universities can also play a more proactive role in the development of entrepreneurial ecosystems. For example, some universities use entrepreneurship education to create a more positive attitude towards entrepreneurship in the student population. This means that they improve the entrepreneurial culture. Other universities play a role in facilitating entrepreneurial support organizations (e.g. incubators and accelerators) and thereby influence the quality of intermediaries. Some universities play an active leadership role in networks by connecting private and public actors in joined projects. Finally, a select few universities

FIGURE 1
THE ENTREPRENEURIAL ECOSYSTEM FRAMEWORK, ADAPTED FROM LEENDERTSE ET AL. (2022)



Source: Adapted from Leendertse et al. (2022)

have their own investment funds which they use to provide finance to start-ups.

In many of these cases, the universities do not fulfil their role alone. They often do so in collaboration with industry, government or both. In this paper we discuss how university-industry and university-government interactions influence the entrepreneurial ecosystem. To structure our analysis, we link our cases to the results of previous research by Leendertse et al. (2022). They developed a methodology to measure the quality of regional entrepreneurial ecosystems in Europe. Their results are shown in Figure 2.

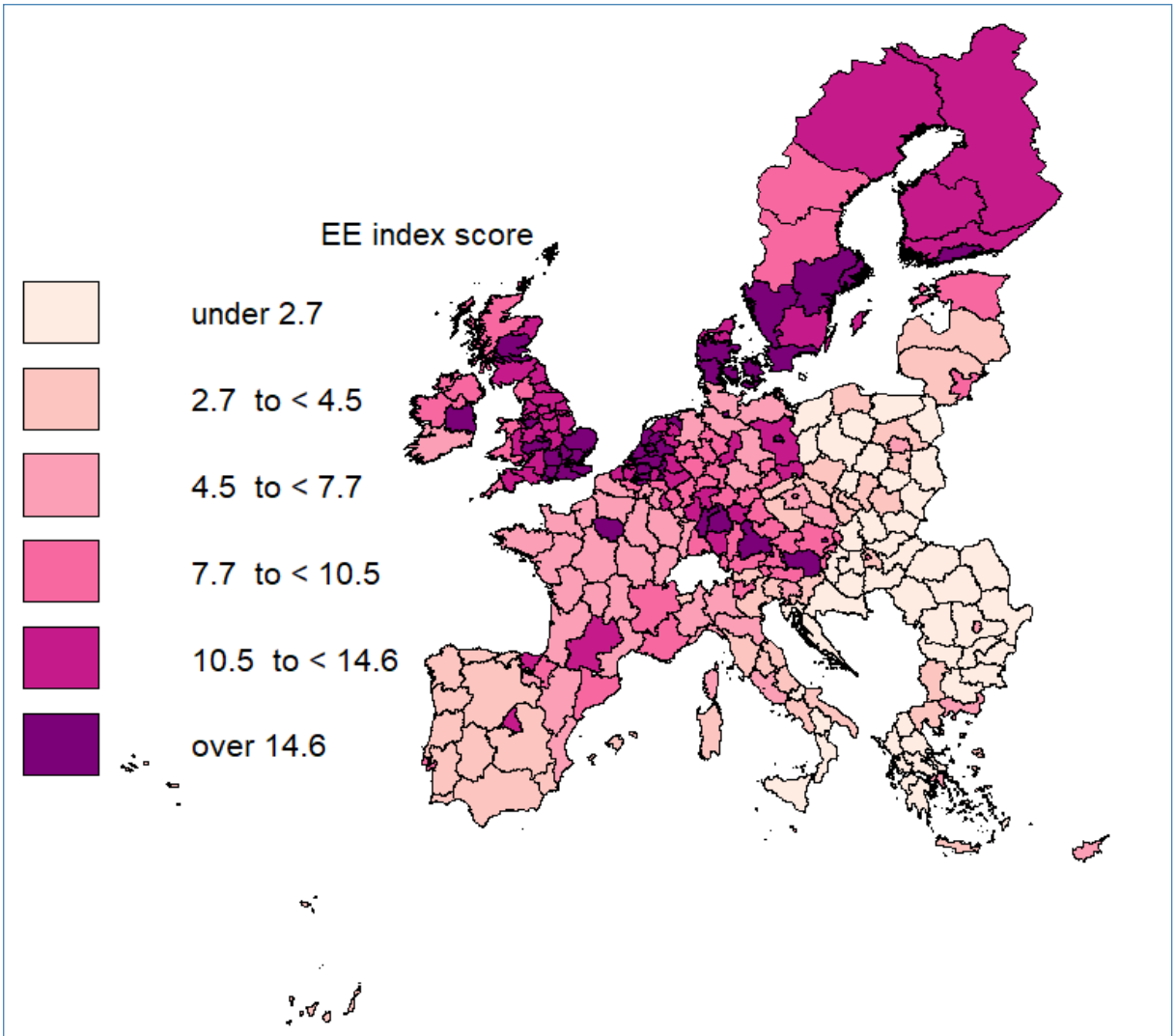
We discuss the role of universities in four entrepreneurial ecosystems from France, Ireland, the Netherlands, and Spain. This way we show different approaches from different national contexts. In Figure 3 we show the quality of the four regional entrepreneurial ecosystems which form our cases. The results show that the Eastern & Midland region, which includes Dublin, in Ireland is most prolific regarding the entrepreneurial output followed by Madrid in Spain and Zuid Holland in the Netherlands. While Zuid Holland is the entrepreneurial ecosystem of the highest quality followed by Eastern & Midland and Madrid. For each entrepreneurial ecosystem we will use some of the elements to structure our discussion on the role of universities.

In our analysis, we will delve into specific aspects from each country. In France, we will focus on talent development, networking capabilities, and leadership. For Ireland, we will examine knowledge and the agency of state institutions. In the Netherlands, we will explore intermediate services, demand factors, finance, and entrepreneurial culture. Lastly, for Spain, we will concentrate on leadership, formal institutions and physical infrastructure.

FRANCE

In France we zoom in on the 'Pays de la Loire' region, which includes Nantes, Angers, and Le Mans as important cities. In this section we cover several local initiatives to improve elements of the entrepreneurial ecosystem and we explain why these initiatives target specific areas of improvements. We specifically focus on three elements of the entrepreneurial ecosystem: talent, net-

FIGURE 2
MAP OF NUTS-2 REGIONS SHOWING ENTREPRENEURIAL ECOSYSTEM INDEX (273 REGIONS ARE DIVIDED AMONG GROUPS OF EQUAL SIZE)



Source: Leendertse et al. (2022)

works, and leadership. We cover talent, as this is the strong point of the region. We focus on initiatives regarding networks and leadership because these are the focus areas of initiatives that try to improve the translation of talent into entrepreneurial output. In these initiatives the local universities play a central role.

Building on talents: Pepite initiative

In 2017, the French government launched policies to become a "start-up" nation. A wide range of actions to support innovators-bearers in their entrepreneurial journey accompanied this political announcement. One of the flagship actions, at the national level, is the creation in 2021 of a student-entrepreneur status. Similar to top athletes, young student entrepreneurs can have access to arranged education: adapted schedules, possibilities to gain ECTS for entrepreneurial actions: classes outside the classical syllabus, professional fairs, etc). This initiative is aimed at facilitating talent, in the form of student-entrepreneurs, in their entrepreneurial journey. In 2023, 30,000 students had benefited from the national student-entrepreneur status.

FIGURE 3
THE QUALITY OF THE FOUR ENTREPRENEURIAL ECOSYSTEMS. NOTE: FOR EACH ELEMENT A SCORE OF 1 ILLUSTRATES AN AVERAGE PERFORMANCE, WHILE A 0 IS THE MINIMUM SCORE AND A 5 THE MAXIMUM SCORE

NUTS2 region	Pays de la Loire	Eastern and Midland	Zuid Holland	Madrid
Country	France	Ireland	The Netherlands	Spain
University	Nantes	Trinity College	Delft	UPM
Entrepreneurial output	0.47	5.00	1.80	2.18
Entrepreneurial Ecosystem Index	6.56	15.28	21.43	14.45
Formal institutions	0.72	1.60	1.05	0.37
Culture	0.89	0.79	4.50	0.92
Networks	0.64	0.68	1.15	0.26
Physical infrastructure	0.50	0.88	3.02	3.21
Finance	0.85	1.95	2.09	1.90
Leadership	0.22	3.97	2.62	2.11
Talent	1.44	0.89	1.43	1.19
Knowledge	0.32	0.30	0.75	0.49
Demand	0.68	0.66	2.03	2.05
Intermediate	0.32	3.58	2.78	1.97

Source: Own elaboration

Within universities, the challenge is about the acculturation of the students to entrepreneurship. For example, the CTI (body of French Higher education ministry that accredit engineer diploma) mandates that French universities and Grandes Ecoles organise operations to raise awareness of innovation, transfer and entrepreneurship in collaboration with specialised structures.

Facilitating, rather than developing, talent is a core element of the strategy to strengthen the entrepreneurial ecosystem because the availability of talent is the strong point in the Pays de la Loire region (figure 3). However, as also shown in Figure 3 n° 1 this does not translate into entrepreneurial outputs. To build on those existing talents, a local initiative has been launched which targets students. The pépite (i.e. gold nugget) initiative (Pépite des Pays de la Loire, n.d.) selects local students from student-entrepreneur programs and provides them with many of the components identified in figure 1:

- Access to physical infrastructure is provided through coworking spaces and personalised access to the universities' Fablabs.
- Connections to Intermediaries and finance are facilitated through events with business angels and regional funding organizations.
- Connection with demand, potential customers, is created through crash test sessions followed by a debriefing done together with mentors.

The program provides access to mentors, workshops, and networking opportunities with industry professionals and experienced entrepreneurs. In Pays de la Loire, this initiative is supported by local universities, business schools, and higher education institutions (HEIs), which work together in

a collaborative network. These centres provide students with the tools, infrastructure, and coaching needed to succeed in their entrepreneurial ventures. In addition, start-up weekends, pitch competitions, and innovation challenges are organised locally to showcase the local ideas. The pépite initiative thus aims to facilitate local talent by providing targeted support to help them overcome some of the challenges they face in a relatively less developed entrepreneurial ecosystem.

Network and leadership: the SME pitfall

The second element that we discuss for France, networks, is very much connected to the French business composition at the national level. As illustrated by figure 4, French companies are mainly very small enterprises. French policies, such as the auto-entrepreneur status (which refers to very early and new entrepreneurs), have been designed to encourage the creation of micro-enterprises by simplifying administrative processes and lowering tax burdens for small business owners. This has led to a significant increase in the number of small firms. However, it is worth mentioning that even though there is an increase of micro-entreprises, it has been observed that these companies may not reach more competitive sizes, as shown in figure 4. This is because the micro-enterprises perceived the same benefits as larger companies, culminating in a situation where many micro-enterprises are not interested in growing.

Yet, small businesses may work more independently rather than forming collaborative ecosystems that are crucial for growth and innovation. This hinders the creation of clusters or networks, limiting opportunities for knowledge exchange and collective scaling. At the local level in the Pays de la Loire region, this leads to weak networks as indicated in figure 3.

The weak networks for small businesses are also a problem when it comes to university-industry collaboration. In France, the links between universities and industry varies tremendously depending on the size of the companies. Big companies collaborate closely with universities, taking advantage of the numerous existing public support. For instance, 50 big companies get half of the 6 billion € CIR (Crédit Impôt Recherche-research tax credit), a tax refund based on the research activities of the company as indicated in Figure 5 (Inspection générale des finances, 2021). Those policies are quite ancient yet SME do not use them as they could, indeed as stressed by Figure 5 the companies that entered the programme early are still the ones that most benefit from it. Furthermore, industrial PhDs, for which the French State sponsored 30% of the salary, are in majority hosted by large companies as indicated in Figure 6 (Guillouzouic et al., 2020).

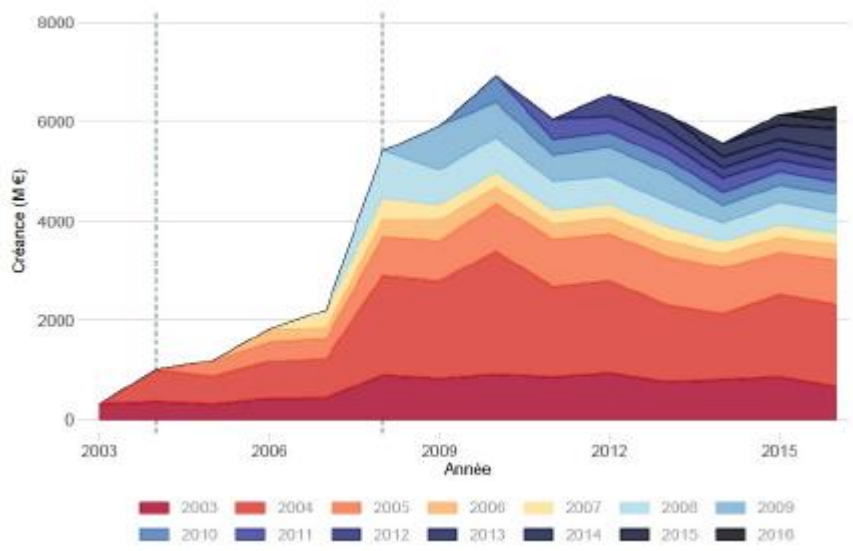
There are thus several national barriers that influence the regional quality of networks. The local CCI (Chambre de Commerce et de L'Industrie) in Pays de la Loire is working to take a leadership role to set up initiatives to overcome these barriers. At the local level, the ambition is to create a network fostering innovation and entrepre-

FIGURE 4
FRENCH REPARTITION OF COMPANIES (INSEE 2018)

	Large companies	Intermediate-size Entreprise	SME	Micro entreprise
# employees		<5000	<250	<10
Turnover (million €)		<1500	<50	<2
Ratio in France	0,01%	0,15%	3,66%	96,18%

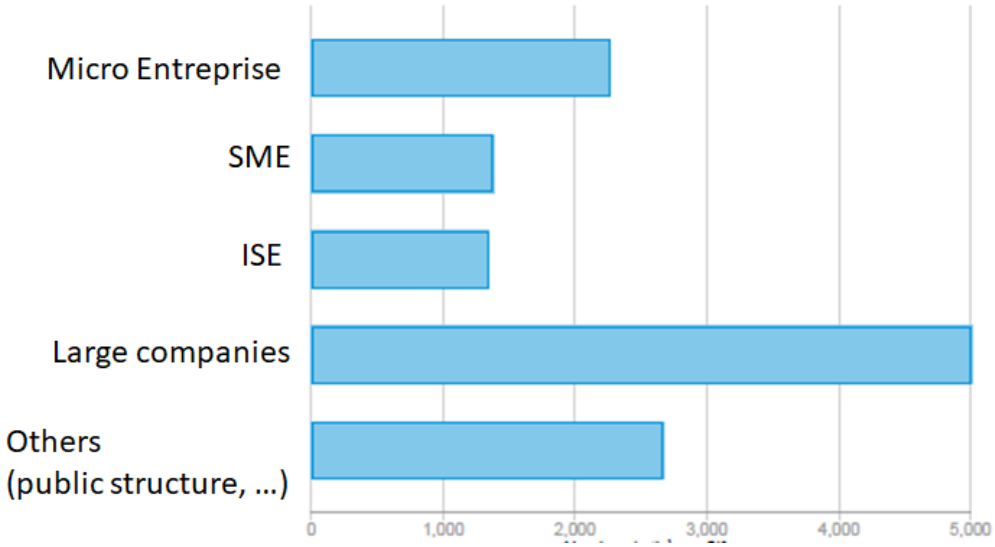
Source:(INSEE 2018)

FIGURE 5
EVOLUTION OF THE CIR AMOUNT RECEIVED IN REGARD TO THE DATE OF THE FIRST USE OF THE TOOL (INSPECTION GÉNÉRALE DES FINANCES, 2021)



Source: INSPECTION GÉNÉRALE DES FINANCES, 2021

FIGURE 6
SIZE OF THE COMPANIES HOSTING INDUSTRIAL PHD (GUILLOUZOUIC ET AL.,. 2020)



Source: GUILLOUZOUIC ET AL.,. 2020

neurship. The CCI promote themselves as "1er accelerator of enterprises". One of their missions is to help companies navigate the administrative formalities: setting up companies, handling regulatory obligations, advertising the available fundings, etc. This is particularly important for new entrepreneurs unfamiliar with the complex French administrative landscape. They also have a major role linking enterprise and high-

er education, indeed many CCIs manage business schools, training centres, and apprenticeships, contributing to the development of skilled workers and entrepreneurs. These organisations provide education tailored to the needs of local industries and businesses.

Leadership: business succession

Regarding leadership, France will soon be faced with a massive challenge: business succession. The French Senate estimates that 700.000 companies will require new leadership. This is a big share of all companies as 26% of the current CEOs are over 60 (Canevet et al, 2022). This is not just a risk for individual companies. There is also the risk of a loss of sovereignty risk: a part of those companies may close, and a part could be bought out by foreign investors. To address this, laws were passed to facilitate the transmission within families. A confounding factor is that the share of ownership transmissions within families is only 14%, which is much lower than in other countries (e.g. Germany with 53 %, IFM 2021). The objective of these new laws is to increase the share of family business transmissions in France towards 50%.

IRELAND

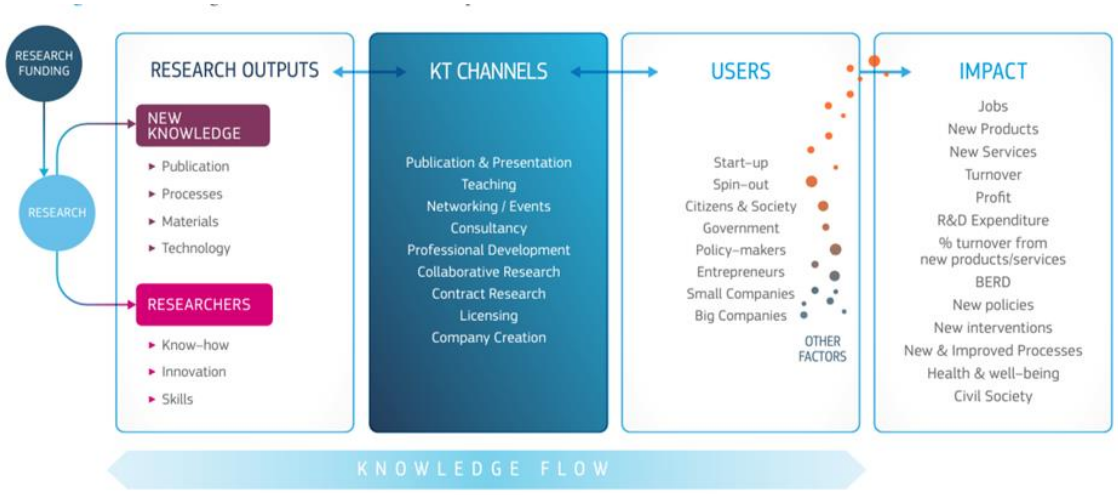
In Ireland we focus on the 'Eastern and Midland' region, which includes Dublin as its most important city. The Irish entrepreneurial ecosystem is, as befits a small open economy, relatively small in scale compared to its larger European peers. However, it is no less vibrant and innovative, perhaps because of its size. The 'Eastern and Midland' region in particular is among the top 10 European regions in terms of the number of active of start-ups (Leendertse et al., 2022). If it takes a village to raise as child, as the adage goes, Ireland's entrepreneurial village has been consistently and successfully raising young entrepreneurs for many decades, reflecting Feldman's (2001) idea that it is very much a 'regional activity'. Its relatively small and intimate scale has led to the creation of a closely knit mosaic and cluster of supports and interconnections that underpin an effective and performative triple helix framework. At the heart of this framework lie universities and Research Performing Organisations (RPOs). In this region we focus on two well-developed elements of the entrepreneurial ecosystem: knowledge and the role of intermediaries, as well as initiatives that positively impact the entrepreneurial and knowledge transfer ecosystem.

Intermediaries

Entrepreneurship requires a range of skills and attitudes, aspirations, activities, supports and networks. In Ireland, there is a strong focus on the transfer of knowledge into entrepreneurial output and the critical intermediaries that facilitate this process. Universities and RPOs in Ireland that engage in intense technology transfer and research commercialisation activities have access to support from agencies like 'Knowledge Transfer Ireland' (KTI), a statutory body with a mission to support the country's research base "to maximise innovation from State funded research by getting technology, ideas and expertise into the hands of business, swiftly and easily for the benefit of the public and the economy"(Knowledge Transfer Ireland, n.d.). In organisational theory, 'knowledge transfer' aims to maximise the two–way flow of technology, IP and ideas in " a process through which one unit is affected by the experience of another" (Argote et al., 2000). In turn this enables entrepreneurs, companies (existing and new), or other non–academic organisations, to drive innovation leading to economic and social benefits. KTI was established as a part of the "third mission" (Cesaroni et al., 2016) alongside teaching and research by many RPOs and universities across Europe. Its route to impact by necessity requires researchers to develop an entrepreneurial mindset to expedite the translation of their new knowledge into impactful new products, services and jobs as suggested in Figure 7.

In Ireland, KTI is a central point of reference for industry-academia partnership with government funding. It is also responsible for the National IP Protocol, which describes

FIGURE 7
KNOWLEDGE TRANSFER – FROM RESEARCH TO IMPACT (KTI REPORT)



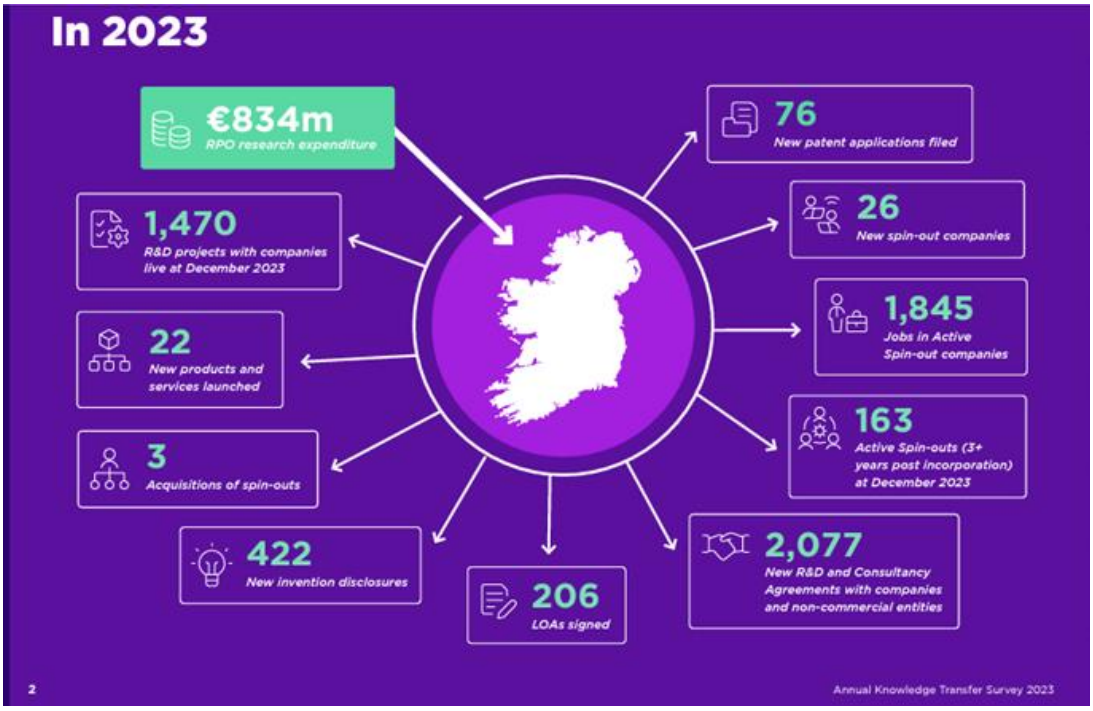
Source: KTI REPORT

the practical framework that underpins how industry can benefit from state-funded research and development and related government policy. The KTI 'Gateway' accelerates academic linkages between triple helix stakeholders and facilitates entrepreneurial activity by introducing pathways to industry collaboration, financial support and innovation partnerships.

Leadership: The role of Agencies of State

The newly established 'Taighde Éireann / Research Ireland' (Science Foundation Ireland, n.d.) agency is a competitive research and innovation funding agency, amalgamating the activities of Science Foundation Ireland (SFI) and the Irish Research Council. SFI was first established in 2000 with the objective of funding oriented basic and applied research in the areas of science, technology, engineering and mathematics. Since its inception, its applied research focus has enabled the outcome of oriented basic research funded by SFI to be taken closer to market, which in turn has significantly increased the potential of research to yield commercial opportunities and jobs as well as other societal benefits. Reflecting Porter's (1998) thinking around clusters that enduring competitive advantages in a global economy lie increasingly in local things — knowledge, relationships, motivation, SFI has to date funded the establishment of 6 National Research Training Centres (Science Foundation Ireland, n.d.). Their remit is to build on research excellence and to provide cohorts of academically outstanding future research leaders with the entrepreneurial and commercial skills and knowledge required to address the future challenges of an ever-changing work environment. These centres focus on disciplines such as, inter alia, Machine Learning, AI, Genomic Data Science. Each centre has a host university with partner universities involved and relevant industry members as critical protagonists. SFI also provides funding for 13 collaborative research centres which combine the expertise of researchers at seven higher education institutions with that of industry partners to produce ground-breaking innovation across multiple, ground-breaking disciplines. These centres generate important scientific advances, enhancing enterprise and industry, training students with critical, in-demand skills (e.g. entrepreneurial mindsets) augmenting regional development, and enhancing Ireland's international reputation. Figure 8 shows that in 2023, there were 1,470 R&D collaborations with companies ongoing and 26 new spin outs created.

FIGURE 8
ANNUAL KNOWLEDGE TRANSFER SURVEY IRELAND 2023 (KTI REPORT)

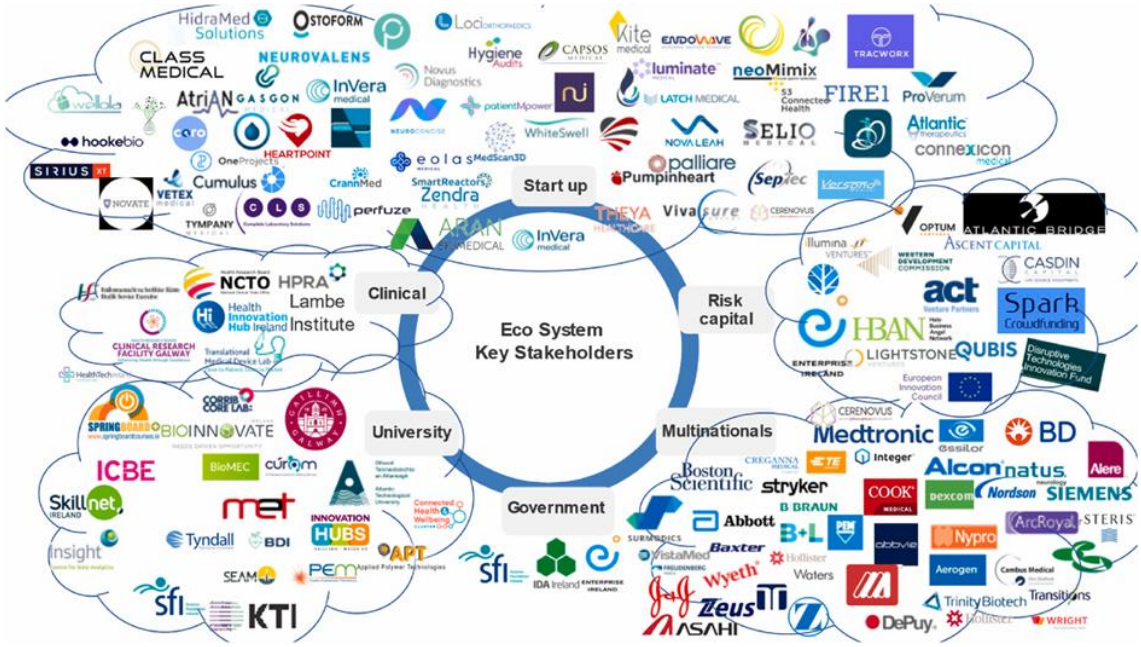


Source: KTI REPORT

A critical pillar of funding for the commercialisation of third level research comes from another public body, Enterprise Ireland (EI), which is the agency responsible for the development and growth of Irish enterprises in world markets. EI provides commercialisation funding to universities that develop spin-out pipelines, which enables technology transfer offices and entrepreneurship trainers to collaborate on building market-ready, IP-driven, commercial enterprises based upon disruptive academic research.

In recent years, a keystone initiative launched in Ireland to augment commercialisation activity was the Disruptive Technologies Innovation Fund (DTIF). The DTIF is a 500€ million fund established under the National Development Plan under Project Ireland 2040 (Government of Ireland, n.d.) and was initiated in order to develop the national strategic objective of "a strong economy, supported by Enterprise, Innovation and Skills" (Government of Ireland, 2017). As an integral part of a broader national economic roadmap, the DTIF was created to drive collaboration between the research, education and enterprise sectors and thus boost regional growth potential via cluster networks, increasing levels of research, development and innovation, and greater investment in higher education and further education and training. Irish businesses understand the need to remain innovative, relevant and competitive, an acknowledgement of the advances being made in international markets. Where the presence of clusters in regions is correlated with stronger innovation behaviour, economic performance and employment outcomes, the collaboration between Ireland's research base and industry, in support of the development and adoption of new technologies and applications, remains essential. DTIF funding is suitable for combinations of SMEs, MNCs and RPOs that are engaging in collaborative 'industrial research' and/or 'experimental development' towards a common objective (e.g. Ireland's MedTech cluster illustrated in Figure 9). Pan-european collaboration via EU funding mechanisms is encouraged.

FIGURE 9
INDUSTRIAL CLUSTERS, CREATING A STRATEGY FOR CONTINUED SUCCESS (MCKERNAN ET AL., 2024)



Source: Mckernan et al, 2004

At least one SME, one other Enterprise partner and one RPO must be involved in a funding proposal. This strategy is attractive to both the indigenous SME sector and to the powerful multinational corporations (MNCs) that are based in Ireland. It incentivises cross-pollination of innovation and research within the triple helix, improving the twin transitions of digital and green capacity with targeted investment and acts as a primer for growing commercial expertise in at least one of National Research Priority Areas (Department of Enterprise, n.d.): ICT, health and wellbeing, food, energy, climate action and sustainability, manufacturing and materials, and services and business processes, sectors in which both the SME and MNC community are highly productive. It also seeks to address the imbalances a small indigenous business experiences when attempting to access and exploit research in contrast to the relative ease the more resourceful MNC has when collaborating with an RPO. All aforementioned funding mechanisms are by their nature competitive, leaning on Porter's (1998) insistence that "without vigorous competition, a cluster will fail". It is this spirit of competition that gives rise to collaboration, thus bringing these upstream and downstream actors closer together and helping to augment the spirit of entrepreneurship and critical valorisation for the knowledge community's research.

Despite the matrix of existing support, actually building a successful business in Ireland remains challenging due to resource constraints, capital limitations, talent shortages and limited partnership opportunities. Ireland is fundamentally a small open economy, exposed to the vagaries of international trade policies and geographically disconnected from its main continental European peers, customer base and capital markets. It lacks the potential economies of scale and predictable input costs that European counterparts might otherwise have. Energy costs in Ireland are on average 15%-30% higher[1] than the EU aver-

1 https://www.irishtimes.com/ireland/2024/10/30/ireland-has-the-most-expensive-net-electricity-prices-in-the-eu/

age, hampering SMEs growth ambitions. A victim of its economic success in recovering from the 2010 financial crisis so rapidly, Ireland now has a critical shortage of housing (the population has increased by 9% since 2011[2]), which, allied to the elevated global inflation levels we experienced from 2022-24, has risked making business uncompetitive because it costs more to retain talent. Start-ups in particular struggle to attract young local and international talent to Dublin because rents are prohibitively high. Wage demands reflect the increased cost of living. To add to the pressure, start-up founders are also competing with MNCs for highly trained engineers, scientists and developers. All of these issues impose an attritional impact on commercial viability.

When shaping national economic and trade policy, there has traditionally been a choice to be made by 'Ireland Inc.' "between Berlin or Boston", reflecting the metaphorical tension that exists between the strong cultural ties Ireland has with the United States and its contemporary political and economic ties with the European Union. The powerful and resilient presence of US multinationals in Ireland has proven to be a huge economic success story as has the country's socio-economic evolution as a member of the EU. This success is symbiotic and policy-makers must continue to thread a careful path between managing growth, retaining competitiveness and ensuring that public support instruments evolve to meet the current and future needs of our innovation and entrepreneurial community.

THE NETHERLANDS

In the Netherlands we zoom in on the 'Zuid-Holland' region, which includes Rotterdam, The Hague, and Delft as important cities. This region is among the top 10 European regions in terms of the presence of sustainable start-ups (Leendertse & van Rijnsoever, forthcoming). In this region we focus on three, well-developed, elements of the entrepreneurial ecosystem: intermediaries, demand, and entrepreneurial culture. We discuss initiatives that contribute to this element of the entrepreneurial ecosystem and cover the role of universities in this.

Intermediate services and entrepreneurial culture

Entrepreneurial Support Organizations (ESOs), such as incubators, accelerators, and co-working spaces, are an important provider of intermediate services. These organizations are important for start-ups as they provide several services such as cheap office space, business coaching, resources, access to networks, and legitimacy. Research (van Weele et al., 2018) has shown that the access to relevant networks is an especially crucial component. Such networks can be with other entrepreneurs (to share experiences), with relevant people from industry (to find clients and suppliers), or with investors (to find investments). Having ESOs that are able to connect entrepreneurs to relevant partners is thus an important component for a thriving regional entrepreneurial ecosystem.

In the Netherlands, universities play an important role regarding ESOs. Most universities divide their activities in two roles. In the first role they operate a Centre for Entrepreneurship that aims to stimulate students and staff to become entrepreneurs. In the second role they are one of the founders and funders of a university incubator as an ESO. Renowned examples are Yes!Delft, UtrechtInc, StartLife, and Novel-T.

Universities split these activities because teaching and stimulating entrepreneurship are fundamentally different from supporting entrepreneurship. Splitting up these two roles in different organizational structures thus makes sense.

Furthermore, the first role, a Centre of Entrepreneurship, is often embedded in the university itself. Besides helping aspiring entrepreneurs, Centres of Entrepreneurs also help change the perspective of students and staff about entrepreneurship. Thereby they also help to improve the entrepreneurial culture in a region. The sec-

2 https://www.cso.ie/en/releasesandpublications/ep/p-cpsr/censusofpopulation2022-summaryresults/populationchanges/

ond role, university incubators as ESOs, are often an example of a university-government collaboration. The university and local government established these incubators together and provided the funding together. The benefits of this structure are not only that universities and the government can split the costs. This also enables the establishment of public ESOs that do not require a share of the start-ups in exchange for their support. This makes them distinctly different from private ESOs.

In an entrepreneurial ecosystem there are two additional benefits to having both private and public ESOs. First, Public and Private ESOs help start-ups connect to different types of networks. Public ESOs that are connected to both the university and the local government have a strong network position in relation to these organizations. A better network position can help to connect start-ups to relevant partners and is therefore an important benefit of establishing an entrepreneurial support organization through a university-government collaboration. Private ESOs are often funded by industry partners or investors and thereby can connect start-ups to actors in these networks. One particularly interesting example is Blue City which built a community and office hub for start-ups working on the circular economy inside a former swimming pool.

Second, research (Leendertse, 2024) reveals another important but less direct benefit. Public ESOs use their network position to change institutions (regulations, norms, and culture) to improve the quality of the entrepreneurial ecosystem. They engage much more in behaviour related to changing institutions than their private counterparts. This role is an important reason why entrepreneurial ecosystems benefit from having public ESOs with ties to universities and (local) government. A part of these activities addresses informal institutions and thereby helps to improve the entrepreneurial culture in the region.

We observe three potential pitfalls that come with the system observed in the Netherlands. The first pitfall relates to the alignment between the Centre of Entrepreneurship and the ESO. In several cases in the Netherlands we see that these developed too much as separate organizations. This has required new initiatives to realign and connect the two roles. While it makes sense to have them as separate organizational structures, it is important that these organizations are closely connected. This can be done by having joint staff, frequent meetings or by having both organizations co-located.

The second pitfall is related to the reasons (local) government and universities are active in entrepreneurial ecosystems. This is not just because they want to help start-ups. For governments this is also because they hope these start-ups will contribute to regional development. While universities hope to be able to earn money from the intellectual property that these start-ups use. Both aims make sense and are valid. Furthermore, most of the time these aims align with the development of the start-up. However, research (Leendertse, J., Baggen, Y., Mahdad, M., & Dolmans, S. (2025). Logics at play: How logics shape interactions across entrepreneurial ecosystems. Small Business Economics, 1-25) shows that sometimes these values can conflict with the development of start-ups. An example of this is when local governments and universities prevent or discourage the incubators they fund from working together with other incubators from different regions or universities. For universities and local governments it is thus important to be aware that their interests can sometimes contradict with the development of the entrepreneurial ecosystem. In these cases, it is important to realize that a strong entrepreneurial ecosystem also contributes to their initial goals.

Third, the importance of ESOs in entrepreneurial ecosystems has been recognized by many actors and this has led to a boom in their numbers. Recent estimates are that there are well over 100 ESOs in the Netherlands. As a result, there is the risk of inefficiency, redundancy, and negative competition between ESOs linked to different regions. This is particularly the case if these initiatives are not connected and aligned. Similar to the second pitfall, there can be a conflict between what is actually beneficial for the entrepreneurial ecosystem and the

start-up and what the different ESOs (and their funders) aim to achieve. In the Netherlands, we observe some challenges as a result of a scattered entrepreneurial support landscape. This has led to some recent initiatives to better coordinate different activities and more collaboration.

In the Netherlands we see some challenges arise as a result and this has led to several initiatives to better align and connect the different initiatives.

Demand

One of the crucial challenges for start-ups is to find clients. The availability of clients is dependent on the amount of people and companies that are present in a region, or can be connected to outside the region, which is hard to influence for universities. In addition, start-ups do not just need to find potential clients. They also need to convince them to use the start-ups product/service. This is often hard because start-ups encounter a liability of novelty. Their innovative product/service is still unproven, and as a new business the company itself is also still unproven. As such, helping start-ups decrease the liability of newness is an important stimulator for demand. Here, universities can play an active role. Particularly, by providing them with opportunities to test innovations in practice in a safe environment. An interesting initiative in this regard is the Green Village in Delft. The Green Village is both an organization and a part of the university campus. It was established by the TU Delft and a foundation and is funded in collaboration with local government and industry partners.

The Green Village provides a dedicated physical place to test new innovations that can contribute to a more sustainable society. This location is special as it has been deregulated, the building decree is turned off. This allows more experimentation and physical testing. Besides as a physical location the organization also aims to support start-ups by linking them with potential clients, thereby trying to directly increase the demand for innovations.

SPAIN

In Spain, entrepreneurship is currently on the rise across various sectors and regions. Over the last decades, the increase of entrepreneurship in this Southern European country is the result of systemic changes regarding culture, availability of finance, and targeted initiatives to help catalyse the Spanish entrepreneurial ecosystem. In Spain, there are significant differences between the regions regarding the quality of the entrepreneurial ecosystem (Leendertse et al., 2022). According to the Spanish committee from the Global Entrepreneurship Monitor (GEM) report for the last year (Calvo et al., 2024), the Balearic Islands, Valencia, Madrid and Catalonia are emerging as the autonomous communities with the greatest recent and consolidated entrepreneurial capacity. It is not surprising that places with more population are better at fostering the entrepreneurial mindset, in order to start their own businesses. In this section we focus on Madrid which is becoming one of the hot spots for entrepreneurs in the future. According to Leendertse et al. (2022) Madrid is the leading Spanish region regarding both the quality of the entrepreneurial ecosystem and its entrepreneurial output. Within this section, we will dive into the Madrilean case and how it involves the different actors involved from a triple-helix perspective. We focus particularly on the leadership, formal institutions, and physical infrastructure elements.

Leadership

According to the data provided in Figure 3, leadership is one of the key EE factors that performs well in the entrepreneurial ecosystem in Madrid.

In the Spanish context, the interaction between industry and universities has been occurring since decades. On the one hand, the industry sector perceived the Spanish universities as a niche of talent and research needed to incorporate within their pipelines, workforce and services. On the other hand, universities were (and are) willing to collaborate with key corporations in order

to position themselves as educational institutes closer to the market rather than stay in their ivory tower. However, it is important to highlight how these interactions and different relationships have evolved according to the different goals each institute has.

These relationships have evolved from early-stage official agreements between industry and academia, progressing through targeted funding initiatives to full-scale participation in innovation and entrepreneurial programs.

Focusing on the Madrilean case, we have a total of twelve universities where six are public and the other six are private. In the last decades there has been a boost in initiatives led by the university and totally or partially funded by corporates. This special type of collaboration has become central in stimulating entrepreneurship. We discuss several initiatives aimed at firms in different phases of their development:

– Concentrating on the pre-incubation and incubation stage, there are multiple initiatives such as actúaupm from the Universidad Politécnica de Madrid, Universidad Complutense de Madrid-Santander Incentive Program, Universidad Autónoma de Madrid Emprende Idea in collaboration with Santander X among others. This focus on boosting incubation stages has the goal to catalyse the entrepreneurial fields within the universities. By doing so, private entities identify quite interesting businesses in quite early stages.

– For the last five years, more mature start-ups have been the focus of acceleration programmes format where corporates support these programmes economically, in-kind services, events or all indicated before. An example is the acceleration programme led by the Universidad Politécnica de Madrid named Clean Cities Spain ClimAccelerator where different corporates and other types of stakeholders, co-created and collaborated together by supporting the start-ups (Moreno-Romero et al., 2022; Horta-Bellido et al., 2023). The focus on sustainable entrepreneurship has had clear results as Madrid is one of the top 10 regions in Europe when it comes to the presence of sustainable start-ups (Leendertse & van Rijnsoever, forthcoming).

– Last but not least, the collaboration between corporates and researchers under the university framework has increased. The reason behind this is due to the interest in the different technologies resulting from the university laboratories. That's why the number of official collaborations between key corporates from different fields such as mining, aerospace, construction and transport, has increased.

We can see that there is a strong correlation between HEIs and the government's goals. This is because objectives such as catalyzing the EEs locally, talent attraction strategies, high development and growth of research and innovation are key for each ecosystem. As a result, this collaboration is both actively pursued and fostered, while also arising organically.

However, their strategies, governance and regulations may significantly differ depending on the level within the ecosystem you're targeting. A university has different impact levels, geographically speaking, as the first one is locally, being the last one in an international scene. As a result, the interaction level rises when the proximity is higher. An example of this is the current collaboration from the City Hall of Madrid with some public Madrilean universities where they boosted the organization of events and specific actions focusing on early acceleration services.

While proximity generally facilitates interactions, there is also a clear exception in the Madrid's case. This concerns the previously mentioned Universidad Politécnica de Madrid led, Clean Cities Spain ClimAccelerator. This program has an international focus, and as such bridges different city halls around Spain and Europe, giving space to combine regional governmental institutions from different locations.

The Community of Madrid's leadership factor is significantly over most of the additional factors analyzed for this ecosystem.

Additionally, these interactions from the triple-helix show how embedded are these actors in this ecosystem and how well they do perform. These interactions help to understand the leadership factor from a multi-actor perspective.

Formal institutions

In the Spanish context, and based on the EE Index previously indicated, we can describe that one of the weakest points of the Madrilean ecosystem is related to the influence of Formal Institutions. The research of Leendertse et al. (2022) highlights governance quality as a key determinant of economic entrepreneurial activity within formal institutions analysis (Leendertse et al., 2022).

Regarding formal institutions, the public organisations take a clear lead in the dynamic between government, universities, and industry. Based on this we will define the different formal institutions that are affecting the Madrid region.

From the corporates or private sector, there have always been stronger bonds between the industry and the government. In this sense, frameworks such as CEOE (which represents and defends Spanish companies and entrepreneurs), CEPYME (SMEs representative) and CEIM (representative for companies and entrepreneurs from Madrid region) brings the opportunity to offer spaces to discuss and foster key conversations related to entrepreneurship.

Higher education institutions are welcome in the conversation when the multi-actor focus is applied. In Spain, discussions regarding higher education policy often take place within the framework of public institutions like CRUE, the primary representative of Spanish universities to the central government. CRUE plays a pivotal role in shaping regulations affecting higher education and actively fosters collaborations with other institutions and stakeholders both domestically and internationally.

Last but not least, the governmental entities such as the national or regional administrations directly affect the EE performance from this region. From a national perspective, in recent years we have seen how the startups law (Ley 28/2022, from December 21st) was approved in the Congress of Deputies which aims to establish a specific regulatory framework to support the creation and growth of emerging companies in Spain. And from a regional level, the administration from Madrid has promoted the collaboration towards a more competitive territory. These public institutions should boost the ecosystem itself assuring the most favourable EE factors for emerging entrepreneurs and start-ups. However, this sometimes leads to different results than expected. Funding opportunities provided by governmental organizations could attract some actors from the ecosystems that are looking to absorb resources rather than provide impact in the EE. Additionally, an increase of bureaucracy, which is a well-known obstacle in order to catalyze ecosystem performance, is ineffective.

This ecosystem presents a 0,36 where the other three ecosystems analysed in this article score way higher. This challenging situation could lead to a couple of potential solutions. Firstly, a more dynamic conversation led by governmental institutions towards each one of the key agents in Madrid. Secondly, a boost on fostering this network (the weakest point EE speaking) by implementing different activities according to the Madrilean EE' demands. By doing this, it could better identify the specific nodes in the network to support financially and therefore, provide a more positive impact in the ecosystem. Lastly, a decrease of bureaucracy for better attraction of entrepreneurs is key.

Physical infrastructure

We distinguish two different types of infrastructure. This is in line with the study of Leendertse et al. (2022) which indicates the physical and digital infrastructure required for a better EE performance.

According to the information provided in Figure 3, the Madrid region performs very well on this indicator, it is the highest scor-

ing of the four regions included in this article. This indicates Madrid's high level when it comes to accessibility and transport to the region.

When it comes to talk about digital infrastructure, Spain has shown a strong interest to boost this digitalization era as a main goal to achieve as they created in 2023 the Ministry for the Digital Transformation and Civil Service. Within this ministry, they have recently created the ''Plan for Connectivity and Digital Infrastructures'' where their main focus is to assure digital connectivity to the 100% of the population living in Spain in order to remove the digital gap currently existing between the urban and rural areas of the country.

More specifically in the Madrid region, the regional government approved back in 2022 a digitalization strategy ready to be implemented through 64 defined actions for the following years from 2023 to 2026. As it is mentioned in this strategy, they want to focus on four main strategic goals such as persons, companies, infrastructure and digital governance (Comunidad de Madrid, 2023).

On the other hand, accessibility and transportation has been one of the biggest advances that the Madrid region has implemented in the last years. Due to their strategic location (quite in the middle from the whole Peninsula) and their political position (Spain's capital), makes the physical infrastructure key due to the amount of population that it brings and attracts. In addition, the connections to other national and international regions play a major role here.

Modernization and digitalization have been key in order to integrate new tools in the different transports that this city offers to the citizens (plane, train, bus, metro, taxi, electric scooter and bicycles).

Promoting the physical and digital infrastructure, results in a more attractive place for entrepreneurs and businesses to visit, and possibly permanent stay, in Madrid.

CONCLUSIONS

The interest in studying entrepreneurial ecosystems has grown over the last years. The analysis and measuring of key indicators has attracted the attention of all the entrepreneurial agents involved. These actors are interested in entrepreneurial ecosystems due to different drivers. Their motivations could range between the internal analysis per region or country in order to identify their strongest and weakest points to external comparison between regions or countries so as to define the most and less prolific areas. Learning from other regions can help understand paths to improve an entrepreneurial ecosystem.

In this article, we introduced and discussed four different entrepreneurial ecosystems from France, Ireland, The Netherlands, and Spain. Each of these countries has different strengths and weaknesses related to the relevant elements of the EE index. For each country, and more specifically region, we discussed the strongest elements that contribute to a well-developed entrepreneurial ecosystem and the weaker elements where there is still room for improvement. In this we also discussed initiatives aimed at both the strong and weak points. These can serve as inspiration for regions aiming to improve their entrepreneurial ecosystem. Nevertheless, it is important to consider that each country has their own uniqueness due to their historical, political and cultural contexts. Initiatives thus should not be copied without consideration of the context. This article shows that what can be a successful mark for one ecosystem, doesn't necessarily be a mandatory term in the entrepreneurial ecosystem successful equation applied to the rest.

Additionally, we used the relation between universities-industry and university-government to structure our actions. We thus use the triple-helix approach to structure the different actions implemented for each actor and their contribution to the society as national or regional strategies, programmes and collaboration frameworks among others.

For every EE, it is crucial to identify both strengths and weaknesses. By focusing on factors of strength, it becomes possible to enhance economic development and administrative quality, gaining a competitive edge. Conversely, by adopting a more comprehensive and creative approach to areas of weakness, we can improve their performance. However, it is important to always perceive the entrepreneurial ecosystem as it is, a sequence of interactions between different agents and levels that are within the same space and time.

This article offers academics, entrepreneurs, policy makers, and other practitioners insight into how to analyse entrepreneurial ecosystems in order to understand the different dynamics and strategies employed in different regions. Furthermore we highlight examples of interventions that can be used to improve the entrepreneurial ecosystem. In this we pay particular attention to the key role that universities can play as an enabler of entrepreneurial ecosystems.

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