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Innovating in Ireland: Can We Fail Better?

Cork University Business School

Innovating in Ireland:

Can We Fail Better?

June 2022

Jane Bourke, Conor O'Driscoll, Josh O'Driscoll &

Paidi O'Reilly



IRISH RESEARCH COUNCIL
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Executive Summary

This report explores the extent to which the Irish innovation ecosystem allows space to fail at innovation and to learn from such failures.

To this end, a small roundtable took place with a diverse group of key stakeholders with considerable and varied experience of the Irish and global innovation ecosystems. Topics of discussion centered on the individual characteristics of innovators, the attitude of firms towards innovation and failure, the institutional and policymaking framework which support innovation, as well as inefficiencies in the Irish innovation ecosystem.

This report provides an overview of a sample of key stakeholders' perception of innovation failure and what failure means for individuals and businesses in an Irish context. It is a first step in understanding innovation failure in Ireland, and how to support learning from innovation failure at the individual, firm and national level.

Key findings from this report include:

- A move away from typically binary definitions of innovation success is needed to foster a healthy innovation ecosystem.

- A fear of failure can lead to an emphasis on marginal improvements to the detriment of radical innovations.

- Tenacity and perseverance are key to success for start-ups

- Female innovators and entrepreneurs face specific challenges (e.g. childcare), suggesting that the available talent pool for innovation is under-utilised.

- As expected, scaling up and business development was identified as challenging for start-ups. A simple shared service model to support start-ups in terms of business development was suggested.

- Job creation metrics can hinder radical innovation. Alternative metrics to measure success need to be also considered, particularly with respect to disruptive innovation and societal challenges (e.g. climate change).

- Institutionally, funding and procurement frameworks that favour short-term, incremental gains are at the expense of radical, disruptive technologies. Corporate culture in large firms can be risk-averse, in contrast with SMEs and start-ups. Directing a proportion of funding budgets to SMEs and start-ups would support radical innovation.

1. Introduction

Innovation is an important driver for firm productivity and growth and is recognised as a vitally important social and economic phenomenon (Fagerberg, Martin, and Andersen 2014). While successful innovations understandably warrant praise and recognition, innovation failures or abandoned projects receive less attention. However, learning from failure has been shown to be far more valuable than learning from success, and the magnitude of failure significantly determines how well lessons will be learned (Madsen and Desai, 2010).

In terms of the national innovation ecosystem, Ireland compares well internationally on a variety of metrics (European Commission, 2021; Enterprise Ireland, 2022) and innovation success stories are regularly publicised. However, we know very little about innovation failure in the Irish context. The overall aim of this study was to explore to what extent the Irish innovation ecosystem allows space to fail at innovation, and to learn from such failures.

In December 2021, a small roundtable took place with key stakeholders from the Irish innovation ecosystem. The purpose of this roundtable was to explore their experience and perceptions of innovation failure and/or abandonment; to identify national barriers to innovation success; and explore how failure can be a learning experience.

Section 2 reviews key literature on learning from innovation failure. Section 3 provides some background to the Irish innovation ecosystem. Section 4 describes the research design and participant recruitment. Section 5 presents the findings from the roundtable discussion. Section 6 concludes.

2. Prior Research on Learning from Innovation Failures

An innovation can be perceived as any activity which aims to enhance contemporary theoretical, procedural, or technological standards from an economic, logistical, and/or social perspective (Meissner and Kotsemir, 2016). Further refinement of definitions can be problematic, reflecting a discipline-wide preference to keep definitions broad and open-ended. Innovations can occur at individual, organisational, regional, or national levels and can generally be divided into two categories. Radical innovations characterise those ideas which supplant, or sometimes destroy, existing standards and models in what could be referred to as a 'fast development' because the results attached to such innovations are obvious, usually resulting in a rapid overhaul (Kahneman, 2011). On the other hand, incremental innovation is characterized as a change that implies small adaptions to the status quo (Tushman and Romanelli, 1985), and it is often described as a step-by-step process (Engen and Holen, 2014). These developments can be quite 'slow', because the results and benefits attached are often allusive at first, occasionally only becoming apparent after a series of marginal improvements over time (Kahneman, 2011). Naturally, incremental innovations of this nature are much more common than radical initiatives, however, both are required to render an innovation ecosystem successful.

Similar to above, defining an innovation ecosystem is far from straightforward. Stemming from the 1980s, countless attempts at defining the characteristics of the agents involved in, and the institutional framework surrounding national innovation ecosystems have been made. While the specific wording of these definitions has changed, there has always been an emphasis placed on ensuring whatever definition is used be broad and have an open-ended nature (OECD, 1997). Similarly, these definitions have consistently emphasized (either explicitly or implicitly), the unifying importance of the overarching institutional framework in which innovation takes place (Freeman, 1987; Nelson, 1993; Patel and Pavitt, 1994; Metcalfe, 1995). Again, while the wording has generally changed, these sentiments, which highlight not only the role of the innovators, their firm, their respective industries, and their wider polity, but also the institutional framework which binds these elements together are still reflected in definitions of national innovation ecosystems (Lundvall, 1992; OECD, 1997; Komorowski, 2019).

Traditionally, academic and practitioner focus lay in analysing successful innovations, and the practices involved in attaining these successes (Coskun Samli and Weber, 2000; Rhaiem and Amara, 2021). Over time, points of interest within the innovation sphere have shifted, to broader innovation ecosystems and the role they play in nurturing success, and more recently to the analysis of failure within innovation contexts (Love, Roper and Vahter, 2020; Rhaiem and Amara, 2021). Theoretically, this shift in emphasis makes sense because omnipresent within the innovating process is the occurrence of failure. Therefore, addressing innovation failure, and ensuring its occurrence does not hinder future initiative taking, is fundamentally important. Despite the potential pitfalls attached to defining failure in an innovation context (both conceptually and quantitatively)[1], our broad understanding of how best to address innovation failure is improving (Madsen and Desai, 2010; Rhaiem and Amara, 2021). The aim of this report is to highlight the role the wider Irish innovation ecosystem could play in helping nurture a culture of innovative success, and constructive learning from failure, in line with current (Enterprise Ireland, 2022) strategy directions.

Innovations tend to stem from employees conceptualising independently of work, and because of this it is common for these innovations to develop into passion projects. Consequently, should a passion project fail, the initiator may be personally affected. This can stifle firm-level innovation if managers adopt an approach which berates and punishes those behind failed ideas; these employees may not try to innovate again, given the negative experiences and risks attached (Todt, Weiss and Hoegl, 2018). Subsequently, this may spill-over across employees, resulting in the development of a risk averse culture within the firm, potentially suppressing growth and industry-level competitiveness (Rhaiem and Amara, 2021).

Existing evidence primarily offers one prescription to ensure the occurrence of failure does not inhibit nor discourage future innovators: Create a supportive innovation environment for

[1] Conceptually, a failed innovation is typically treated as an idea which fails to benefit individuals/firms/industries/nations, either economically, logistically, and/or socially. Quantitatively, failed innovations are usually measured through the proxy of 'abandoned innovations', a self-reported measure by firms. For more information see: (Love, Roper and Vahter, 2020; Rhaiem and Amara, 2021).

human capital (Carmeli, 2007; Rhaiem and Amara, 2021). This prescription relates to human psychology, so internal work-environment characteristics, such as worker-manager trust, clear project direction, and good leadership, all implemented from the top-down within organisations, are shown to be significant determinants of a firm's ability to develop and nurture successful innovation strategies (Rhaiem and Amara, 2021). Being more failure tolerant can induce entrepreneurs to engage in experimentation (Nanda and Rhodes-Kropf, 2013). Thus, over time, the adoption of *failure-tolerant* and encouragement-centred strategies have become associated with the development of *sensible* risk-taking cultures within organisations, ultimately enhancing tacit knowledge pools at the firm level, boosting relative competitiveness at the industry level (Rhaiem and Amara, 2021). Strengthening these assertions further are findings which highlight that the individual propensity to engage in future initiative taking increases when the individuals have failed in an innovative context previously, indicative that these innovators may be partially driven by having a point to prove (Deichmann and van den Ende, 2014; Love, Roper and Vahter, 2020).

Naturally, firms and individuals do not aspire to fail. With each failure comes more money and time spent, and while not all of these resources will be wasted *per se*, a balance between encouragement and objective scrutiny is clearly needed (Royer, 2003). Interestingly, despite evidence suggesting that past-failures may push innovators into future initiative taking, they are generally no more likely to succeed than last time, **but** involving previously successful innovators in forthcoming projects has been shown to boost the likelihood of future innovative success (Deichmann and van den Ende, 2014; Love, Roper and Vahter, 2020). Importantly, there are important psychological nuances attached to this evidence.

Firstly, psychology has long dictated that people will likely repeat behaviour that has previously led to success. In an innovation context, this apparent copy-and-pasting of behaviour may bring the demise of innovation projects, despite its surface-level appeal (Deichmann and van den Ende, 2014). This is because the primary role of initiative taking is to improve upon existing practices/procedures through the adoption and implementation of *new* techniques and ideas, improvements which generally cannot be conceived within an

operative status quo. As a result, an innovation incubator which becomes comfortable in its methods and procedures may find itself on thin ice (Royer, 2003).

Secondly, within innovation teams, a type of pack mentality can emerge whereby teams develop blind, widespread beliefs that particular innovations will *inevitably* succeed (Royer, 2003). This collective belief can lead to previously rational teams becoming irrational by advancing clearly failed ideas and projects. The emergence of this pack mentality is particularly dangerous because dissent will typically be met with irrational hostility, until it ceases entirely, creating feedback loops which strengthen the internal dogma that 'all is well' (Royer, 2003).

At the individual level, dealing with failure is primarily a problem of psychology and firm-level managerial practices. Authoritarian style leadership practices within firms will paralyse any healthy in-house innovation ecosystem (Todt, Weiss and Hoegl, 2018; Rhaiem and Amara, 2021). This is also the case for national institutions and incentive structures, as appropriate incentives need to be in place that encourage innovation, if innovation is to take place (Freeman, 1987; Lundvall, 1992; Nelson, 1993; Patel and Pavitt, 1994; Metcalfe, 1995). Furthermore, it is also evident that a criticism-free approach to innovation could prove problematic (Royer, 2003). Implicit in this evidence is the importance of *rational* scepticism and its incorporation into, but not overwhelming of, innovation projects and ecosystems. Ensuring that the pursuit of ideas is encouraged while always monitoring progress, and ensuring relative success is gauged by objective measures, theoretically acts as a breaking mechanism, preventing the emergence of money sinks by (appropriately) halting the advancement of failed ideas (Royer, 2003). This marrying of firm- and national-level incentives further creates positive feedback loops by strengthening tacit knowledge pools and the willingness to innovate across firms and industries, boosting regional and national competitiveness (Rhaiem and Amara, 2021).

Regardless of the psychological approach to dealing with failure, there are other frameworks worth considering. Evidence suggests that failed innovations tend to ask the wrong questions, rather than provide the wrong answer to the right question (Rhaiem and Amara, 2021). Therefore, how these issues are addressed is important. Do firms and industries adopt preventative measures attempting to curb the emergence of failure by learning from past mistakes? Or do they deal with failures in an *ad-hoc*, trial-and-error nature? At national and industry levels, researchers are unsure. Most research on innovation failures focuses on firm-level case studies, seldom analysing industry-level data[2] (Deichmann and van den Ende, 2014; Todt, Weiss and Hoegl, 2018). Furthermore, these studies are primarily based in America, with European- and Asian-based studies less numerous (Rhaiem and Amara, 2021). However, these case studies do reveal a tendency to only incorporate preventative measures as a result of past failures, implying that a *laissez faire* type strategy may be in place whereby firms generally only worry about failure when necessary, further suggesting that firm-level practices generally manifest at the industry-level (Madsen and Desai, 2010; Deichmann and van den Ende, 2014; Todt, Weiss and Hoegl, 2018; Love, Roper and Vahter, 2020).

Similarly, evidence suggests learning from failure is far more valuable than learning from success, and the magnitude of failure significantly determines how well lessons will be learned (Love, Roper and Vahter, 2020). Intuitively, there's logic behind this. When a project is successful, firms do not intensely reflect on the minor problems which emerged in production. They celebrate their successful innovation. This may accumulate over time, resulting in minor problems from previously successful innovations accumulating to form significant roadblocks in future projects (Madsen and Desai, 2010). Conversely, when firms fail whilst innovating, the priority will naturally be to analyse the process and search for ways to prevent a similar incident from occurring in the future (Madsen and Desai, 2010). This analytical approach generally becomes more prominent as the degree of failure increases, perhaps reflecting the economic, social, and logistical costs attached to such failures (Madsen and Desai, 2010). Consequently, minor failures warrant less attention than major failures, potentially creating these negative feedback loops.

[2] For exceptions, see: (Madsen and Desai, 2010; Love, Roper and Vahter, 2020).

3. Background to Irish Innovation Eco-system

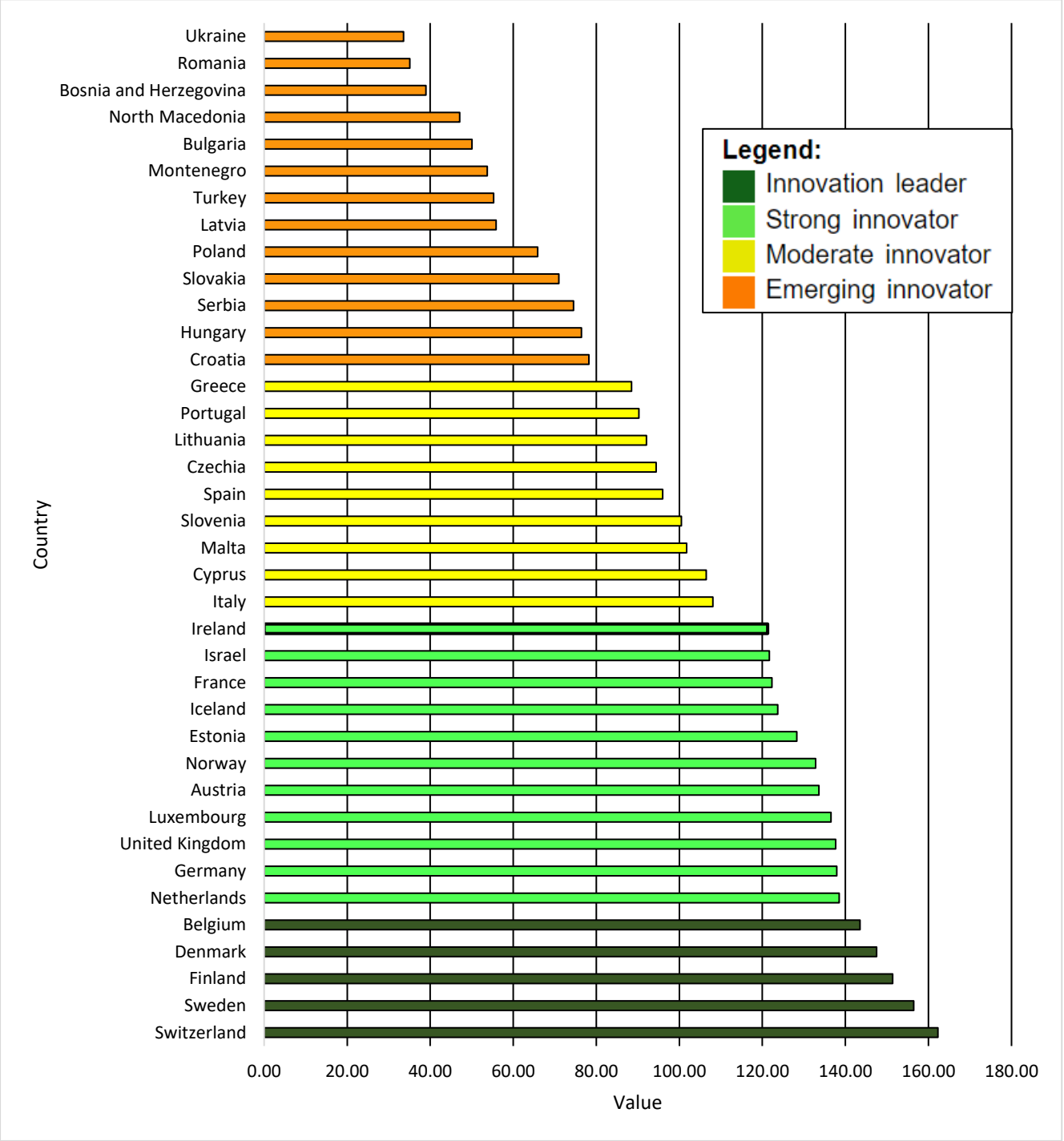
In Innovation 2020, the Irish government outlined a goal of developing a "coherent, joined-up innovation ecosystem, responsive to emerging opportunities, delivering enhanced impact through the creation and application of knowledge" (Government of Ireland, 2015; pg. 13). There are many different definitions of an innovation ecosystem. The International Development Innovation Alliance say "an innovation ecosystem is made up of enabling policies and regulations, accessibility of finance, informed human capital, supportive markets, energy, transport and communications infrastructure, a culture supportive of innovation and entrepreneurship, and networking assets, which together support productive relationships between different actors and other parts of the ecosystem" (IDIA and the Ecosystem Strengthening Working Group, 2021). Within existing literature, an innovation ecosystem is defined as "the evolving set of actors, activities, and artifacts, and the institutions and relations, including complementary and substitute relations, that are important for the innovative performance of an actor or a population of actors" (Granstrand and Holgersson, 2020: 1). A study conducted by imec – SMIT – VUB defined innovation ecosystems as the structures that are formed between actors that pursue technology development and innovation as one of their objectives. This can include any kind of organised or unorganised connected group of individuals, firms, governmental and academic organisations. The definition is intentionally kept broad as innovation ecosystems are dynamic structures with multiple and changing actors and actions meaning they are highly complex systems (Komorowski, 2019). Given the emphasis placed on the global competitiveness of Irish firms in current, nationally coordinated, strategies (Enterprise Ireland, 2022), and given that a key driver of competitiveness is the flourishing of innovation activities, the importance of a functioning innovation eco-system in Ireland is critical.

3.1 Ireland's Innovation Performance

In the European and Regional Innovation Scoreboard, the European Commission categorised countries into four groups based on their innovation performance. These categories consist of Emerging Innovator, Moderate Innovator, Strong Innovator, and Innovation Leader. According to the European Innovation Scoreboard 2021, Ireland is categorised as a strong innovator, along with countries such as Austria, Estonia, France, Germany, Luxembourg, and

the Netherlands. These countries have innovation performances which are above the EU average. Ireland's strengths are in Linkages, Human Resources, and Attractive Research Systems. Ireland's top-3 indicators include Population with Tertiary Education, Innovative SMEs Collaborating with Others, and Employment in Knowledge-Intensive Activities.

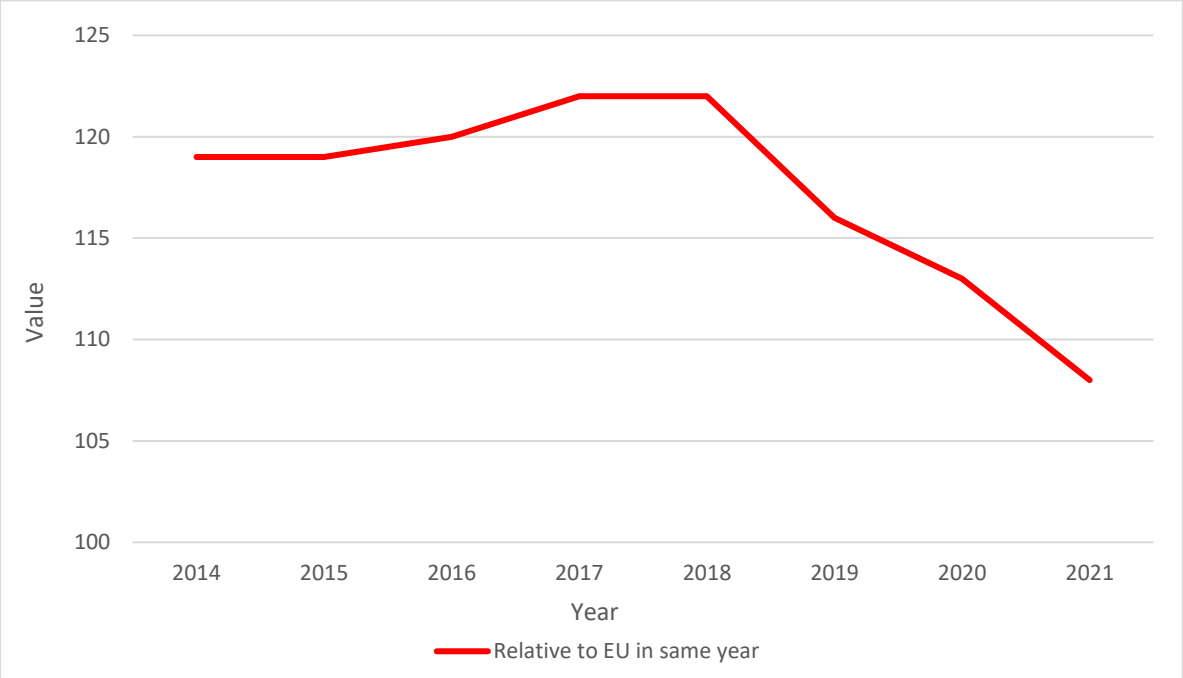
Figure 1: Summary Innovation index – Performance of European and neighbouring countries' systems of innovation



Source: (European Innovation Scoreboard, 2021)

Ireland's innovation performance compared to the EU average has declined slightly in the last two years, as shown in Figure 2. The decline in innovation performance is due to reduced performance on Government support for Business R&D, Business R&D Expenditures, Employment in Innovative Enterprises, Sales of Innovative Products, and Environment-Related Technologies (European Commission, 2021).

Figure 2: Ireland's Innovation Performance compared to EU



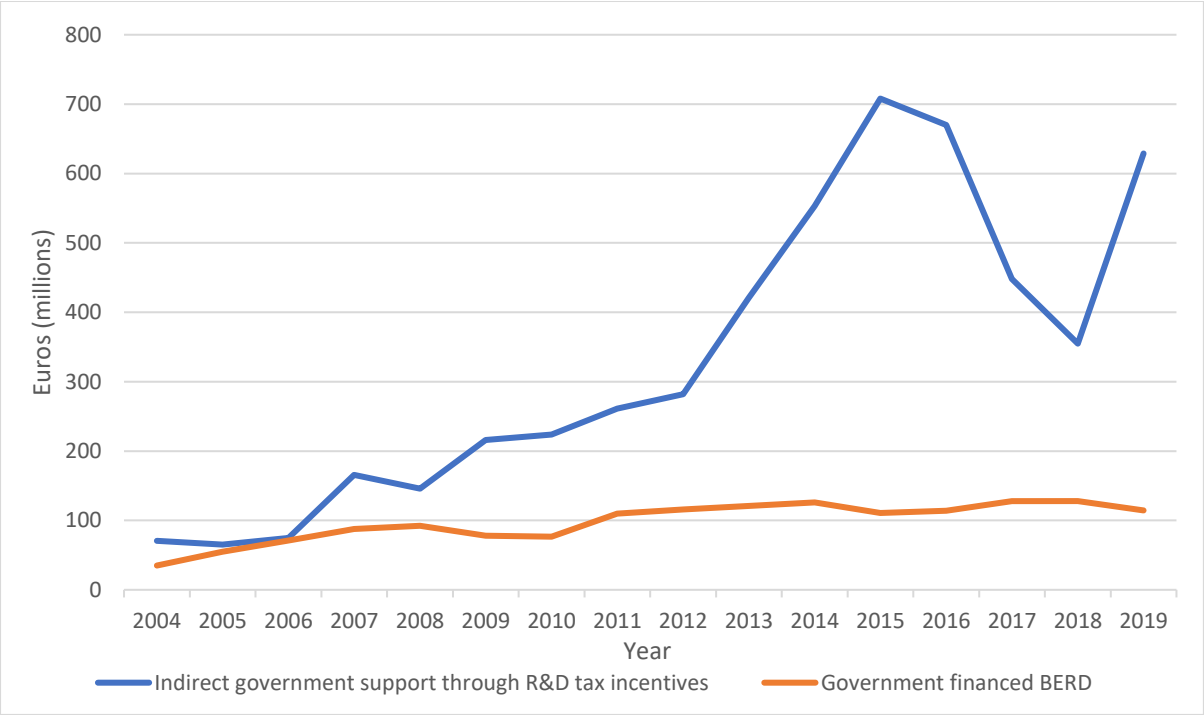
Source: (European Commission, 2021)

3.2 Ireland's Expenditure on Innovation

Government Expenditure

Figure 3 shows the levels of support from 2004 to 2019. The orange line outlines the direct government support for innovation, while the blue line shows indirect supports for Business Expenditure for Research & Development (BERD). A higher amount of innovation is indirectly supported through measures such as the R&D tax incentives. Indirect government support has risen from 2004 (€70.4 million) to 2019 (€629 million). This figure has fluctuated during the 15-years, noticeably dropping from €708 million in 2014 to €355 million in 2018. There is still a strong level of government financed BERD, peaking at €127.6 million and €127.9 million in 2017 and 2018 respectively.

Figure 3: R&D tax expenditure and direct government funding of BERD



Source: (OECD, 2021).

Business Expenditure

The Irish Community Innovation Survey 2018 (published as Innovation in Irish Enterprises) outlines specific patterns within innovation expenditure of firms, as shown in Table 1. In total €5.5 billion was spent by firms in Ireland on innovation. Most of this expenditure went to in-house R&D (€3 billion), while €853.3 million was spent on the purchase of external R&D. €1.1 billion was spent acquiring machinery, equipment, and software.

Total spend on innovation activities in Ireland was almost €5.5bn in 2018, an increase of 18.2% on the 2016 figure of €4.6bn. The main driver for this increase was a 39.4% rise in expenditure for in-house Research and Development (R&D) from €2.2bn in 2016 to €3.0bn in 2018. This was the highest share of spend and accounted for 55.6% of all innovative expenditure (Central Statistics Office [CSO], 2020).

Table 1: Innovation expenditure by nationality of ownership, sector and size class, 2018

	Nationality of ownership		**Sector of activity**		**Size class**			
	Irish (€m)	Foreign (€m)	Industry (€m)	Services (€m)	Small (€m) (10-49 employees)	Medium (€m) (50-249 employees)	Large (€m) (250 employees)	**All enterprises (€m)**
In-house R&D	1,121.0	1,910.1	796.2	2,234.9	439.2	544.8	2,047.1	**3,031.1**
Purchase of External R&D	350.6	502.7	640.6	212.7	113.0	270.2	470.0	**853.3**
Acquisition of machinery, equipment, and software	351.7	774.9	857.0	269.5	223.4	261.1	642.0	**1,126.5**
Acquisition of other external knowledge	18.3	166.7	36.4	148.6	21.7	134.8	28.5	**185.0**
Other expenditure	160.1	98.7	66.5	192.4	72.7	80.4	105.8	**258.9**
Total innovation expenditure	**2,001.8**	**3,453.0**	**2,396.7**	**3,058.2**	**869.9**	**1,291.4**	**3,293.5**	**5,454.8**

Source: (Central Statistics Office [CSO], 2020)

Foreign firms spent €3.5 billion compared to €2 billion for Irish firms, with most of the expenditure allocated to in-house R&D. When examining the expenditure by sector of activity, the services sector spent more on innovation than the industry sector. As a proportion of overall spend, the services industry predominately spends on in-house R&D (€2,234.9 million), while the industry sector spends a larger proportion of overall spend on the acquisition of machinery, equipment and software (€857 million).

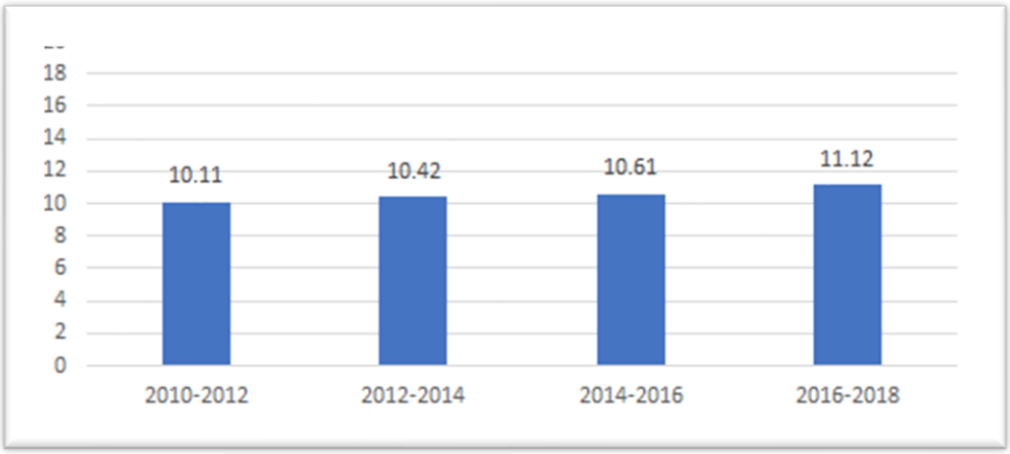
As expected, large firms (€3,293.5 million) spend more on innovation than medium firms (€1.2914 billion) and small firms (€869.9 million). Regardless of firm size, most of the innovation expenditure goes to in-house R&D. Large firms spend more money on all aspects of innovation, except for the acquisition of other external knowledge. Medium-sized firms spent €134.8 million on acquiring external knowledge compared to €28.5 million by large firms.

3.3 Firm level abandonment of innovation in Ireland

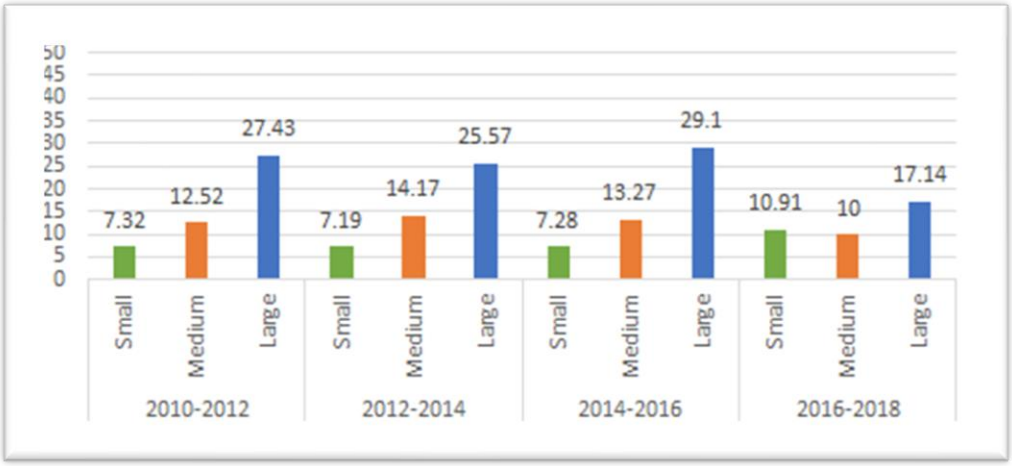
Approximately one in ten Irish businesses abandon or suspend an innovation project, and this figure increases with firm size (see Figure 1). However, whether these innovations are incremental or radical in nature is unknown, as is their stage of development.

Figure 4: Abandoned or Suspended Innovation By Firms in Ireland: 2010-2018

(a) Percentage of firms reporting innovation abandoned/ suspended before completion



(b) Percentage of firms reporting innovation abandoned/suspended before completion by Firm Size



Source: Innovation in Irish Enterprises, Email Correspondence with CSO, 30th Nov 2011.

4. Methodology

A multi-stakeholder roundtable took place on the 7th of December 2021 between 10:00 and 12:00 via Zoom. The purpose of the roundtable was to explore stakeholders' experience of innovation failure and/or abandonment; to identify national barriers to innovation success: and explore how failure can be a learning experience. Nine participants took part in the roundtable, from organisations such incubators, business groups, Irish start-ups, large multinationals and the public sector.

A convenience sampling method was adopted for this study. Participants from the Irish innovation eco-system were invited by email to attend the focus group and a skilled facilitator was employed to structure the roundtable, ask prompting questions, and provide each participant with an equal chance to contribute their opinion. Participants were purposefully selected to ensure diverse representation of different stakeholders (e.g., start-ups vs. large multinationals; private vs. public sector), and gender balance was ensured with four female and five male participants. The session commenced with a keynote talk from Mr. Tim Harford (www.timharford.com), which centred on innovation success and failure, followed by the facilitated roundtable. Two dedicated research assistants were present to record the views and personal experiences of participants with their permission. In addition, the Zoom session was recorded. Table 2 provides descriptive information for the roundtable participants.

Table 2: Roundtable Participants

Participant	Role	Gender
P1	Foreign Multinational Executive	Male
P2	CEO Co-Working Space	Female
P3	Research, Technology, and Innovation (RTI) Lead, Public sector	Male
P4	CEO / Founder Healthcare start-up	Female
P5	Incubator Manager	Female
P6	Irish Multinational Executive	Male
P7	Public Sector Incubator	Male
P8	Business Representation Group	Female
P9	CEO / Founder Digital Software Company	Female
KS	Keynote Speaker	Male

Participation for this study was entirely voluntary and followed an informed consent process. Anonymity and confidentiality were ensured through the use of unique identifier numbers and careful reporting of the findings. All ethical obligations regarding autonomy, beneficence, justice, non-maleficence, fidelity, anonymity, and confidentiality were upheld. The UCC Code of Research Conduct (2018) guided the research process throughout this study. Ethical approval was granted by the Social Research and Ethics Committee, University College Cork.

5. Round Table Discussion

The roundtable commenced with a keynote talk from Tim Harford, which was followed by a Q&A, and then a 60-minute facilitated discussion with participants from diverse entrepreneurial, innovation, and business backgrounds. To maintain the authenticity of the discussion, participants were not interrupted when speaking and were encouraged to share their experiences and perspectives in the broadest sense.

5.1 Defining Innovation Success and Failure

Initially, the discussion centred on defining or categorising innovation, as well as defining innovation through the lens of success or failure. The keynote speaker noted:

> *We think about innovation and we tend to lump it all together. We say well innovation is innovation, but there are very different kinds […] You need different people, different characters, different performance metrics, different funding structures, different management, everything.* [KS]

Next, the discussion moved to the philosophy of *"marginal improvements, [which involves] analys[ing] every process and seeing how each step can be improved"*. The keynote speaker went on to explain that marginal improvements work incredibly well in areas where *"tightly drawn rules"* govern the sphere.

> *[When you take this philosophy to the rest of the economy], the scope of innovation is much broader [because it becomes a matter of what has never been done before], and that means that the marginal improvements, although they are still useful, they are not necessarily as useful.* [KS]

Then came the recognition of the importance of thinking about other types of innovations. Participants observed how not all innovations are marginal improvements, how not all innovations are good, and how not all marginal improvements are worthwhile in any tangible sense. Furthermore, participants observed that marginal improvements are beneficial to an extent, but some advised that nurturing an environment dedicated to marginal improvements can create an environment dictated by comfort and short-term gains. The keynote speaker

cautioned that while marginal improvements have a place, in the long-term they will probably only result in wasteful innovations, whereas one longshot could equate to a hundred marginal improvements. It was also observed how

> *[When comparing radical innovations with marginal improvements, evidence illustrates] that you get what you pay for. [Marginal Improvements] have a much higher success rate [as judged by traditional metrics]. But, if you redefine what it is you're looking for, [the perspective changes].* [KS]

In these alternative definitions, longshots are shown to be far superior. New fields are created, more Nobel prizes are won etc. All innovations must involve a basic strategy/vision for success. Participant 1 compared the somewhat stereotypical American graduate in financially precarious circumstances upon graduating from University to Irish graduates who typically do not face these same pressures, and how a conservatism tends to manifest in the American case, thwarting radical innovation. Contrasting this, was participant 2's anecdotal observation that the US were motivated by defence considerations when they created the internet, implying that external challenge, alongside personal incentives, inspires innovation, resulting in our keynote speaker concluding

> *Top quality people. A big budget. A willingness to fail. And a focus on delivering important projects, rather than something a little more amorphous, [is what's needed to create a thriving innovation ecosystem whereby longshots and marginal improvements work together].* [KS]

Ultimately, participants acknowledged the need for a shared understanding of innovation, and a shared approach to navigating away from the binary categorisation of innovation success and failure.

5.2 Innovators: Failing Better

During the roundtable, participants spoke about how cultural differences, career aspirations and a fear of failure impact decision-making and the innovation process at the individual level.

In the context of specific innovations, and those behind them, there was clear agreement that personal constraints matter. Cultural differences were discussed in terms of the stereotypical American 'risk-taker' compared to a more cautious Irish culture. However, contrasting perspectives were evident here.

> *They [US-based counterparts in innovation roles] were innately very conservative […] In Ireland, we just go through college, and you can get pretty much your start in life and well set up educationally and so on for a fairly low base [cost]. But if you're talking about [Americans making careers in finance] with an Ivy League education and all of these kind of things, they were starting out with a crippling amount of debt. Having to start from day-one in their first job with a really serious financial game plan, brought this kind of innate conservatism of "Oh I don't know. What does my director think? What do my managers think? What kind of trouble am I going to get in for signing off on this slightly loopy thing?". We found it was much easier to generate crazier ideas but not get them listened to because there was [a huge personal pressure attached].* [P1]

Similarly, the Irish were noted to be stereotypically "*great at cynicism*" [P3], with another participant observing how:

> *I think your back needs to be against the wall to trigger that line of thinking [supports for radical innovations]. Unless you're an Elon Musk, for example, the safe bet of the marginal improvements seems to be what everybody is pursuing […] I do think, we [Ireland] are more conservative in that regard, as a function of our heritage. It's only really in the last 10-15 years that this "island of innovation" mantra is bursting forth. And I think we still have shackles holding us back to have that individual who's a little off-piste, [and] to support those guys. They're deemed to be rogue traders, as opposed to be something to be valued and nurtured.* [P2]

By way of illustration, participant 3 explained [some] straight line corporates will not take risks "*even if fire were created in front of them*" [P3]. This was in line with another participants' experience of the Irish and US market:

It was funny. We had two business plans depending [on] who we were talking to. One was Irish-, one was US-based. But personally, I think it always go back to who can afford to fail. I think we don't have that culture in Ireland of inter-generational wealth, and I think that's a huge issue. So, I think this is where people are going, with the marginal gains, rather than with the moon-shots. It's either people who have nothing […] or those who can afford to fail [referring to those with huge financial cushions] [that take on radical ideas]. [P4]

Participant 1 discussed how long-term problems, like climate change, require long-term solutions. While these solutions may hinder performances in an accounting sense, they clearly need to be addressed. He went on to reflect on the underappreciated role of the public sector in the restructuring of incentives around radical problems, such as climate change. In the realms where *"the building blocks of society"* need to be rearranged, the public sector appears to be much more progressive than their corporate counterparts, who have personal pressures and incentives within firms.

Furthermore, participants agreed that establishing what failure is matters. The facilitator asked, "*is a failure only a failure when we don't learn from it?*"

successful innovations don't happen overnight in business terms. [A firm the speaker is involved in supporting] is a 10-year overnight success. The ability of the organisation to back those ambitious goals over time is critical […] [As head innovator] the last thing I wanted to be known for was the head loser [sic]. That binary approach between success and failure did not sit too well with me. We tried to position it differently in terms of [a] learning journey and that has helped us significantly in terms of newer ventures. [P6]

[Relating to the commonly used SMART acronym associated with goal setting]. There's an interesting exercise that when you get people to set some achievable goals, and they start to talk about what they can do to achieve that, it tends to be incremental. Whereas if you ask them to set awesome goals, first of all they're kind of knocked back by [the overwhelming possibilities], but then you get them to [work through it]. What

that shift of mindset has done, is that they've recognised "I can't achieve these goals within the rules, [so] I'm just going to disregard the rules", and then you get this hugely creative, innovative, discussion about how we can achieve an awesome goal […] And just that shift in definition of A from Achievable, which will tend to influence marginal thinking, to [A for] Awesome, which will tend to influence innovative thinking. [P7]

5.3 Firm Innovation: Success and Failure

Innovating for many firms is akin to exploring an open ocean, and many participants stressed the importance of firms being able to make sense of the innovation itself, and the direction the firm can take it; that is, navigate the ocean. Intuitively, this emphasis on clarity is a natural mechanism to make the garnering of support easier. That is, people are more likely to get behind projects they understand, with participant 6 noting that "*having a shared understanding of what the innovation ambition is about is quite important*."

If there is alignment across the firm regarding innovation objectives, this clarity can be easily achieved. If a firm has two different innovation teams, the team focusing on incremental enhancements are fundamentally different, and have different needs, to the teams focusing on longshots. For radical innovation, you need rule breakers, operating outside the norm, something which may not come naturally to more established organisations, which typically provide a safe, risk averse environment working towards more incremental innovation. On this topic, participant 3 commented that there are situations:

where you're told to just go and do it, but [succeeding in situations like] that can only be built on trust. That can only be built on trust in an innovation team. I think to have some of those little incremental [improvements], before you start looking at the long horizon [helps build this trust] […] because people invariably become uncomfortable around longshots because it's not something they're used to. It's not something they're happy to sit with. [P3]

Consequently, this puts radical innovations at an immediate disadvantage across firms as people appear to instinctively gravitate away from disruptive ideas. Building on this, participant 1 noted that, somewhat counterintuitively,

> *[M]ore often, it feels as though large organisations struggle to fund these radically different things, and if they do fund these radically different things […], they struggle to incorporate them. And the longshots tend to come from smaller organisations*. [P1]

Participants explained that larger firms are generally less willing to radically innovate than smaller, emerging firms, suggesting that larger firms favour paths paved by marginal improvements. Many small emerging firms will fail. Yet, those that do succeed through radically innovating have been shown to emerge as market leaders over time, such as Instagram, who reached unicorn status with ~30 employees, perhaps balancing the risk in this winner-takes-all game.

However, the importance of barriers to entry was stressed to filter out those not aligned for pure innovation. Subsequently, while participants agreed these institutional barriers have a place, their current efficacy was questioned. Additionally, whilst only briefly touched upon, gender and cultural barriers are evident in the Irish innovation space, something evidenced by the facilitator's observation that the Irish innovation space has historically been characterised by "The Pale Male Stale". Reflecting upon these observations, participant 4 observed

> *Coming at it from a start-up lens, and my perspective [as a mother of] three children, doesn't necessarily lend itself to stability. Whether that's around childcare […] Certainly at the early stages even just having that income to buy-in the childcare. So, there's certainly barriers there in terms of representation of females to some extent. I know that at the very early stage without having had a husband with a stable, good, salaried position, I couldn't have taken the risks I've taken*. [P4]

However, despite restrictive barriers, this participant stressed the importance of tenacity and perseverance

> *An entrepreneur who has a vision and really wants to do it will find a way to do it […] In many ways I've been like a cockroach – [I] just couldn't be killed. And I think start-ups and entrepreneurs nearly need to have that.* [P4]

That mentality of perseverance at the firm and individual level aligns with previously discussed individual constraints. For instance, radical innovations were noted by some participants to generally come from people with nothing to lose. Similarly, senior officials of major firms are not operating at the same stakes temporally or financially as SMEs. For a start-up, a CEO may translate to a one-woman managerial team committing their life to a project, whereas a major corporation is a well-oiled, multifaceted machine, to whom senior officials may commit a few years of their time. In light of this, participant 1 observed how

> *'[While the "raison d'être" of start-ups is often the innovation itself], when you get to growth, enterprise, and multinational level, it becomes more political. It's [the innovation process] may be more pure when it's a start-up [sic].* [P1]

In other words, these established senior officials do not *need* to take these risks, whereas start-ups do, and this may result in a seemingly counterintuitive risk averse culture emerging in major firms. As participant 6 put it, nobody wants their career to be defined by as being "*Head Loser*" and risk their already established financial security.

5.4 Innovation and Ireland's Institutional Context

Participants highlighted that many of the disadvantages for SMEs highlighted above are exacerbated by the tendency for contracts to flow disproportionately towards major companies. Participants suggested that at the industry level, a proportion of contracts should be specifically partitioned for SMEs and start-ups, allowing these arguably more radical firms to pursue projects with *quasi* safety-nets.

> *For us, what I see is a lot of our founders are so busy trying to operate on the day-to-day, and keep the day-to-day running, that they almost forget what the longshot is, and they forget about what the idea was on day-one […] They're so busy trying to fill out the grants and applications and funding that they're almost adapting their own innovation to suit a grant application as opposed to what's needed for the market.* [P5]

Just looking at a start-up, a scaling organisation. They are trying to pitch their idea; they are trying to perfect the minimum viable product. But then they're overwhelmed with the marketing, with the procurement, with the filling out of the [funding] forms […] A simple shared service model that does some of that groundwork for the start-up to allow them focus on their dream, on that longshot, on their product; and it just frees up capacity and operational overheads and allows them focus on delivering that product. For me, that is so simple an idea, that doesn't seem to be done. [P2]

Participant 9 went on to suggest dedicating specific amounts of funding for SMEs specifically, e.g., putting into contracts that 25% of their funding allocations should be given to SMEs. In addition, the sometimes-overbearing consequences post-innovation can weigh companies down, such as marketing and sales concerns. A solution of a shared-service model whereby smaller firms can avail of assistance in dealing with the business side of successful innovations was proposed. For national innovation policy, possible future policy directions and policy initiatives were discussed.

We need commitments to multi-annual funding for research capital and research infrastructure, because as we see that degrading, we see our ability to innovate also degrading as well. So, I think there's quite foundational elements around funding commitments which need to be resolved, and especially looking at how we actually allocate funding as well because, I think, looking to the past and looking internationally, sometimes there's a risk that when we actually set up funding instruments for moon-shot projects or very disruptive technologies they can be captured by perhaps less disruptive research projects, which may themselves be beneficial but don't have the ambition of the particular instrument because we don't have those foundational elements resolved […] If we look internationally, I think one of the interesting trends that's happening now is this whole idea around "missions". We've seen this sort of like creeping up on us for a number of years, and now we've seen with "Horizon Europe", they've launched these five missions […] and now in our national research and innovation strategy, this is likely to be a key element of that as well. So, I think there's probably a conversation that needs to be had in there around

> *where does this real disruption, and where do moon-shots sit within that mission framework.* [P8]

At the institutional level, participants agreed that Ireland faced serious challenges. Not only in the way innovation ecosystems were conceptualised, but also how success was measured.

> *I think we have a real challenge at a national level in terms of […] [in] so much of our entrepreneurship and innovation activities success is measured on job creation […] There's a real risk that we undermine innovation by overly focusing on metrics and measuring the stuff that's easy to measure, not the stuff that we need to measure.* [P7]

Towards the end of the roundtable, the conversation turned to the Irish innovation ecosystem being ill-equipped to deal with innovation at the SME level because of a too-narrow approach to the problem, begging questions such as:

> *What is innovation? There's a lot of people here with different lenses […] Is innovation around improvements to society? Is innovation around seeing a big idea that you've had come to fruition? Is innovation around creating an enormous amount of wealth? […] We need to define what innovation is and what it means to the different stakeholders, and how you facilitate that for all the different stakeholders is going to look completely different. I would argue […] I've had the supports I've needed […] [but] there can be a bit more tyre-kicking in Ireland [referring to the extremely risk averse nature of publicly funded institutions].* [P4]

Furthermore, a lack of provision of adequate safety nets for those SMEs who fail to secure support from the finite funding pool was highlighted as an issue. In addition, this problem is compounded by large Irish companies and the public sector being unwilling to fund proof of concept.

People want proof of concept and we have found where we did a proof of concept in Ireland, it was actually less likely to be adopted, [be]cause nobody had paid anything for it. It wasn't taken seriously. [P4]

6. Discussion

This project explored the concept of innovation failure, focusing on the extent to which there is space to fail at innovation and to learn from such failures within the Irish innovation ecosystem. Key insights from the roundtable discussion are presented below:

6.1 Fear of failure and an emphasis on marginal improvements is detrimental to radical innovations

Marginal improvements capture the subtle increases in efficiencies which capture short-term improvements in performance. Many participants raised concerns that an environment that over-emphasises the importance of these marginal improvements can hinder more radical and innovative ideas, ideas which are foundational to disruptive, radical, far-reaching longshots. Success can be seen and measured more easily for marginal improvements, as their impact is generally immediate and obvious, while there can be a legitimate fear of longshots failing due to their uncertain horizons, scope, and potential. Moreover, innovation by its nature can be a long and non-linear process, with success generally being unlikely, exacerbating the uncertainties attached to radical, new-to-market innovations.

This fear of failure can manifest itself at the individual innovator level with innovators who are afraid to take risks, an effect which can aggregate to firm levels. As expressed anecdotally by some participants, very few Irish entrepreneurs having the financial cushion of large intergenerational wealth may be a barrier-to-entry absent to counterparts in the United States. On the other hand, the opportunity to complete third level education in Ireland without accumulating huge personal debt was viewed as an advantage for would-be Irish entrepreneurs, an opportunity generally absent for American graduates, illustrating potential cultural pressure points within innovation ecosystems.

Some participants spoke about how the fear of failure is also evident in procurement decisions by large Irish public organisations who are more likely to purchase new products from a large multinational rather than an Irish SME. This preference for large established firms is also evident when pursuing funding. Specifically, some Irish businesses have fallen into

habits of creating two different business plans, one for the Irish market and one for US markets, with the Irish plan marketed towards more conservative procurement decision-makers. This may be indicative of a national innovation ecosystem grounded in marginal improvements.

6.2 Tenacity and perseverance are key to the success of start-ups

As expected, participants spoke about the inter-connectedness of the entrepreneur, the business, and the idea/product, with the founder passionately dedicating their time and energy to the business. The need to believe in the 'vision' at an individual level is key to persevering for start-ups and entrepreneurs to succeed. However, in Ireland, the heritage and culture does not necessarily lend itself to risk-taking. Specifically, it was recognised that the relative lack of a risk-taking culture in Ireland could be attributable to the fact that innovation is something that has only really taken off on this *"island of innovation"* in the last 10-15 years, alongside the absence of a culture of inter-generational wealth.

6.3 Female entrepreneurs and innovators face specific challenges

Difficulties for female entrepreneurs were also highlighted. Specifically, the ability to avail of child-care services, as well as the benefit of a supportive spouse (ideally) with a stable job, was highlighted as potentially significant barriers to entry for women. In fact, the national childcare crisis is likely an obstacle to female entrepreneurs. For female entrepreneurs and innovators, there may have less space for risk-taking, less space to learn from failures, and, therefore, fewer opportunities to succeed in an innovation context.

The proportion of women in innovation and research has direct positive effects on economic growth. This effect arises primarily by making greater use of the available talent pool to increase the relevance and quality of innovation outputs for society. Gender equality across society increases the collective intelligence when neither males nor females dominate, whereas gender inequality raises questions about the validity of scientific, technological and innovative advancements.

6.4 Scaling up and business development is challenging

Unsurprisingly, the difficulties start-ups experience when scaling up struck a chord with participants. The day-to-day running of a business often takes an entrepreneur/innovator away from where their strength or inherent skills lie. In addition, it was noted that given the constraints of funding application processes and forms, entrepreneurs sometimes adapt their innovations to fit the funding process. In doing so, the innovativeness of the product may be lost or may no longer meet the needs of the market, highlighting further inefficiencies in the institutional framework of the Irish innovation ecosystem.

A simple shared service model to support start-ups terms of business development was suggested as a mechanism to aid SMEs and start-ups transition from the innovation space to marketplace.

6.5 Job creation metrics can hinder radical innovation

At a national level, job creation tends to be a key metric of success. This is expected given the importance of economic growth, as well as it being a relatively easy metric to measure. Participants recognised the importance of incorporating numerous alternative metrics to measure success. For example, job creation is a poor metric of success with respect to *unicorn* start-ups. Furthermore, it was highlighted how a relentless focus on job creation may thwart radical innovation by potentially incentivizing the pursuit of relatively low-hanging fruit (i.e., marginal improvements), as well as potentially disadvantaging start-ups where job creation is not necessarily a primary objective.

Additionally, participants noted how major societal issues, such as climate change, will require radical, disruptive technologies, potentially from start-ups and SMEs. Specifically, it was agreed that a focus on marginal improvements and short-term gains will not suffice to tackle large societal issues, leading to calls for more diverse measures of innovation success. Participants highlighted the important, and often underappreciated, role of the public sector in the restructuring of incentives around radical problems in this regard by highlighting their role in shaping the frameworks of innovation ecosystems.

6.6 Funding and procurement frameworks must support disruptive innovations

Concerns were expressed around national and international funding strategies focusing on research prioritisation areas and 'missions'. These frameworks, while very successful, do not necessarily lend themselves to funding disruptive innovations due to their inherent structure entailing incremental plans. In addition, there is a perception that longshot projects are being captured by established large companies and less ambitious research projects. While these projects may be beneficial in themselves, they may not meet the ambition of the original funding instrument, highlighting potential infrastructural deficiencies.

The corporate culture in large firms was generally perceived as being risk-averse, in contrast with SMEs and start-ups. Directing a proportion of funding budgets to SMEs and start-ups was proposed as a mechanism for supporting radical innovation.

Institutionally, funding and procurement frameworks were perceived to favour short-term gains at the expense of radical, disruptive technologies.

7. Conclusion

This report sought to explore innovation failure within the Irish innovation ecosystem, specifically focusing on the extent to which there is space to fail at innovation and to learn from such failures. To this end, a small roundtable took place with a diverse group of key stakeholders in the Irish innovation system. These participants have considerable and varied experience of Irish and global innovation systems in both public and private sectors across multiple industries. However, it is important to note that given the small sample size there is potential for self-selection bias.

Whilst the report provides an overview of a sample of key stakeholders' perception of innovation failure and what failure means for individuals and businesses in an Irish context, it does not aim to be a comprehensive survey of innovation failure in the Irish innovation ecosystem.

More research and detailed analysis are needed for a fuller representation of innovation failure in Ireland, and to understand how best to support learning from innovation failure at the individual, firm and national level. In the words of Samuel Beckett, "*Ever tried. Ever failed. No matter. Try again. Fail again. Fail better*."

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Appendix 1: Irish Innovation Agencies

Several different governmental departments and agencies support innovation in Ireland. While these organisations were not part of the roundtable, several of them were mentioned by participants. To give some background information on the organisations, we have offered a quick description of their roles and purposes.

The Department of Enterprise, Trade and Employment

The Department of Enterprise, Trade and Employment (DETE) leads in advising and implementing the Government's policies which are aimed at stimulating the productive capacity of the economy and creating an environment which enables employment creation and sustainability (The Department of Enterprise Trade and Employment [DETE], 2022). The Department is also charged with promoting fair competition in the marketplace, protecting consumers and safeguarding workers. The Department funds and promotes enterprise-led innovation through a range of programmes and supports delivered for the most part through Enterprise Ireland and IDA Ireland (The Department of Enterprise Trade and Employment [DETE], 2022).

IDA Ireland

IDA Ireland is an autonomous Statutory Agency which operates under the Minister for Business, Enterprise and Innovation (IDA Ireland, 2022). IDA Ireland has national responsibility for securing new investment from overseas in manufacturing and international services and for encouraging foreign enterprises already located in Ireland to expand their businesses. IDA focuses on R&D-intensive sectors, such as ICT, life sciences and industrial technologies, and on sectors such as financial services, where R&D is becoming increasingly important (Government of Ireland, 2015).

Enterprise Ireland

Enterprise Ireland (EI) is the State agency responsible for supporting the start-up and growth of Irish companies targeting global markets. Their mission is to deliver a major improvement

in the international strength of Irish enterprise across all regions by transforming the innovation and competitive capabilities of Irish companies (Enterprise Ireland, 2020). Enterprise Ireland works collaboratively with the Department of Enterprise, Trade and Employment and the wider enterprise policy ecosystem across government, investors, research and educational institutions, industry associations and the private sector with the aim of meeting the needs of all enterprises, from nascent entrepreneurs to large Irish multinationals (Enterprise Ireland, 2022).

Local Enterprise Offices (LEOs)

Local Enterprise Offices (LEOs) are local access branches of Enterprise Ireland, the government organisation responsible for the development and growth of Irish enterprises in world markets (Eurofund, 2020). Established in 2014, LEOs had the objective of creating an enhanced national enterprise support model, delivered by Local Authorities, on behalf of Enterprise Ireland (Local Enterprise Office, 2018). The LEOs promote entrepreneurship, foster start-ups, and develop existing micro and small enterprises at a local level, delivering advisory and funding assistance (e.g., Start Your Own Business, online trading, innovation, competitiveness, and employment measures), and providing referral services for other state supports (Enterprise Ireland, 2022).