



**Submission to the Interdepartmental Committee on
Science, Technology and Innovation
on Pillar 3 of the**

***Consultation Paper on Successor for Strategy for Science,
Technology and Innovation***

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1. Introduction

1. This submission contributes evidence-based views for consideration in the development of a new Strategy for Science, Technology and Innovation in Ireland. We focus on strengthening Ireland's *enterprise-level Research, Development and Innovation (RD&I) performance* (Pillar 3) in the Consultation Paper on *Successor for Strategy for Science, Technology and Innovation*. The views are based on our knowledge of and research relevant to business innovation in Ireland, and our knowledge of developments in innovation within the European Union and more widely in the global economy.

2. Before addressing the Key Questions under Pillar 3, we suggest that the conceptual framework to be used requires three elements at its core:

- (i) The context for considering enterprise-level RD&I should be the national research and innovation system and its links with the European and global research and innovation systems;
- (ii) A clear distinction needs to be made between multinational enterprises (MNEs) and small and medium-sized enterprises (SMEs), which translates for the most part into the distinction between foreign and indigenous enterprises;
- (iii) In the current global and technological context, there is a vital connection between innovation and exporting at the enterprise level.

3. Since this submission relates to SSTI, we concentrate on innovation linked to R&D, recognising that there are also important non-R&D elements in the innovation process. In line with our view that, in the current context of global fragmentation and integration of production, services and innovation, the traditional distinctions between the manufacturing and service sectors are no longer meaningful, we make no distinction between the two broad sectors in this submission.

4. The structure of the submission is as follows: in the remainder of this Introduction, we consider briefly each of the three elements above that we believe are essential in any framework for exploring RD&I in the enterprise sector. In the following three sections we consider how the innovation performance of the MNE and SME sectors might be strengthened, and the benefits of a consolidated approach to enterprise support programmes. Section 5 contains some concluding comments.

5. **A strong research and innovation system** is vital for a vibrant enterprise RD&I performance. Given its small economic size, integrating Ireland's research and innovation system with the emerging European and global research and innovation systems is crucial for improving its performance. Today's innovation systems run from national to regional (e.g., European) to global.

6. According to the most recent available data on the performance of research and innovation systems in the EU countries,¹ Ireland ranks the 9th, being in the group of countries classified as *innovation followers*. Sweden has the best performing research and innovation system in the EU, followed by Denmark, Germany and Finland. These *innovation leaders* have a balanced research and

¹ *Innovation Union Scoreboard 2014*, European Commission, Directorate-General for Enterprise and Industry, 2014. http://ec.europa.eu/enterprise/policies/innovation/files/ius/ius-2014_en.pdf.

innovation system, with very good performance on all dimensions evaluated (research and innovation inputs; business innovation activities; innovation outputs; and economic effects). In the group of *innovation followers*, Ireland is ahead of France and Austria but lags behind Luxembourg, the Netherlands, Belgium and the United Kingdom. Relative to the average EU performance and other small open economies, Ireland lags behind particularly in respect to the following:

- finance and support for innovation (R&D expenditure in the public sector; venture capital investment);
- firm investment (R&D expenditure in the business sector; non-R&D innovation expenditure); and
- intellectual assets (such as patent applications², community designs).

7. To put these international comparisons into perspective, three important factors should be recognised: (a) Ireland's research and innovation policy has only really developed strongly in the past 15 years, while the other EU countries have had implemented research and innovation policies for a longer time³; (b) Ireland committed exceptionally very low levels of resources to R&D in the higher education sector (HERD) until the early 2000s, so this element of the national system of innovation was very undeveloped up to that time⁴; and (c) Ireland's low corporate tax rate, while favourable to production in Ireland, created little incentive for enterprises to undertake company research – invest in Business Expenditure on Research and Development (BERD).⁵

8. The most recent EU Member States' Competitiveness Report,⁶ points out that Ireland's innovation performance has increased over time but at a lower growth rate than the average for the EU. The Report identifies the decline in both the number of SMEs innovators and the number of SMEs engaging with others (enterprises/institutions (e.g., HEIs)) in cooperative innovation activities as current challenges for RD&I in Ireland.

9. Enterprise RD&I activities are increasingly integrated in global production and innovation networks. MNEs are the main drivers of this internationalisation of R&D and innovation. The international evidence indicates that MNEs differ systematically from domestic-owned enterprises: they are larger, more productive, more capital-intensive, more skills-intensive, more R&D intensive and they have a higher innovation output.

² It is recognised that the lower number of patent applications is related to the scale of ICT industries in Ireland which have a low patenting propensity.

³ For example, Ireland only began to recognise the existence of the concept of the national system of innovation in the mid 1990s.

⁴ Up to that period, for most areas of research, the only serious source of funding was through EU grants and framework programmes. This resulted in many Irish researchers being completely dependent on EU sources for research funds and there being little cooperation between research groups within Ireland since a feature of the EU funding was to create research synergies across and not within country boundaries. The creation of SFI, IRCSET and IRCHSS and the increased funding for the HRB and for HEIs through the PRTL supports signalled the major change in relation to funding of HERD in Ireland.

⁵ This situation changed in the early 2000s when the government granted increased tax allowances for expenditure on research and development.

⁶ *Reindustrialising Europe. Member States' Competitiveness Report 2014*, European Commission, Directorate-General for Enterprise and Industry, 2014.

10. **The MNE/SME distinction** is not simply one of scale – and it is very much that – it is also one that reflects their different relationships to Ireland and the Irish policy process. Irish policy is likely to have little impact on whether or not MNEs become RD&I intensive, but may have some potential to impact on whether such activities take place in Ireland. This is likely to be the case where Ireland has a comparative advantage as a base for such RD&I – see Section 2 below. A clear example of where Ireland has comparative advantage is the food sector, where there have been substantial investments in research by government (GERD) over the past five decades. Given scale, such enterprises are likely to be in a strong position to find their own innovation partners, whether in Ireland or elsewhere. By contrast, Irish policy has much greater potential to have a major impact on whether Irish SMEs invest in RD&I – to be able to identify potential and to support the enterprises in finding their innovation partners, whether in HEIs or elsewhere in the business sector (e.g. along the value chain). Where SMEs undertake RD&I investments, such activities are most likely to occur in Ireland. Consequently, it makes sense for Ireland to continue to maintain separate policy approaches in relation to RD&I for MNEs and SMEs.

11. **The connection between innovation and exporting is fundamental.** Evidence suggests that it is critical that all policies in relation to exploring and building innovation potential of enterprises are linked directly with developments in their exporting potential. This evidence particularly applies to Ireland because of its exceptional openness, which applies to both MNEs and SMEs. In Ireland’s case the sequencing for SMEs may work in both directions – exporting enhanced by innovation and innovation enhanced by exporting. In the case of foreign MNEs, Ireland is chosen first as an export base, so exporting naturally predates any innovation activities that might take place in Ireland. However, the pattern of exporting by MNEs will likely be connected with any innovation they undertake in Ireland, so in both cases, this suggests that there should be focus on the exporting-RD&I link.

2. Strengthening the Innovation Performance in the Multinational Sector

12. In this section we explore the first of the four key questions identified in relation to Pillar 3, namely, MNE innovation performers. While the focus of the question asked relates to the number of performers, we believe it is important to take a wider view of innovation performers, namely, to look both at the number and intensity of the innovation performers and of the sectoral context.

Key Question 1: What actions should be taken to strengthen the number of innovation performers in the multinational sector?

13. To adjust to rapid technological change and intensified competition, RD&I activities of MNEs are increasingly integrated in global production and innovation networks. There are three aspects to strengthening the innovation performance of MNEs in Ireland:

- (i) attracting production of MNEs which are in relatively RD&I intensive sectors;
- (ii) attracting the RD&I units of MNEs, whose production may or may not be based in Ireland; and
- (iii) fostering increased RD&I intensity of those already engaged in innovation in Ireland.⁷

⁷ Aspects (ii) and (iii) are referred to in the economics literature as the extensive and intensive margins.

14. The international evidence⁸ indicates that the location choice of newly-established R&D activities by MNEs is determined by a combination of *demand-driven* factors (related to adapting products and services to local (national and regional) market conditions)) and *supply-driven* factors (related to knowledge-sourcing, tapping into knowledge sources in centres of scientific excellence located world-wide).

15. *Demand-driven* factors for the location choice of RD&I activities by MNEs depend very much on the MNE itself and include primarily market size and market potential (including market access). These are not factors which are readily subject to influence by national policy, in contrast to *supply driven* factors.

16. *Supply-driven* factors include:

- favourable framework conditions⁹
- availability of high-quality R&D personnel
- proximity to centres of research excellence
- technological strengths
- quality of research-industry links
- knowledge spillovers from other foreign R&D activities operating in the location
- cost-efficiency of R&D activities

17. These determining factors provide policy makers, who are actively engaging with MNEs in relation to RD&I, with a clear framework in which such engagements are likely to be productive. The factors are not independent of each other – the attractiveness of the environment for RD&I on the combination of these factors. Attempts to persuade MNEs to locate RD&I functions in Ireland will not succeed or be sustainable if there are not sound objective reasons for these enterprises to undertake such activities in Ireland. Consequently, the policy approach must include measures to strengthen the efficiency of the national RD&I system and facilitate its links with the European and global RD&I systems.

18. Furthermore, those implementing policy should be conscious at all times of the relationship between RD&I and exporting in the case of the individual MNE and the capacity of that MNE to expand its markets. Specifically, one needs to consider:

- whether the global export market for the MNE's products/service is growing relatively rapidly?
- whether the geographic region(s) into which the MNE is exporting has GDP growth which is rising relatively rapidly?

⁸ Recent reviews of this international evidence are Moncada-Paternò-Castello et al. (2011); Siedschlag et al. (2013); and Hervás et al. (2014).

⁹ Key enabling framework conditions include: a stable macroeconomic policy environment; openness to international flows of goods, services, capital and knowledge; appropriate levels of competition and regulation; a developed and well functioning financial system; flexible labour markets; a coherent intellectual property system; a well performing education system; high quality infrastructure.

3. Strengthening the Innovation Performance of the Indigenous Sector

19. In this section we examine the second key question which relates to what might be done to broaden the RD&I activity of enterprises in the indigenous sector. Our focus is on the need for such enterprises to be able to absorb new knowledge in order to be capable of succeeding on a sustainable RD&I path.

Key Question 2: What actions should be taken to broaden RD&I activity in the indigenous sector and increase absorptive capacity?

20. In the context of global value chains and massive intra-industry trade, absorptive capacity is crucial for indigenous SMEs to have any possibility of engaging effectively in RD&I. If the enterprise lacks a capacity to acquire, absorb, and transform knowledge into innovation outputs, it is unlikely to be able to enter/maintain export markets effectively or begin/continue to innovate successfully. Increasing SMEs' absorptive capacity should be linked to adopting an open innovation approach in order to share innovation-related risks and rewards.

21. The empirical evidence suggests that SMEs need to have high productivity to be able to sell into export markets – this higher productivity helps them to overcome the additional costs of trading internationally. The biggest challenge for an SME is to start to export for the first time, but there are additional risks and costs from expanding into further countries and regions. For example, Irish enterprises that sell into the UK market only do not need their productivity levels to be as high as those selling into the EU or US markets or still more into the BRICS or the ASEAN region.

22. The empirical evidence suggests a strong relationship between innovation and exporting but the relationship is not a simple one.¹⁰ The Irish evidence¹¹ suggests that SMEs are less engaged in product innovation than in other types of innovation. Ultimately successful product innovation is crucial for rapid export market growth.

23. There could be considerable benefits in Enterprise Ireland (EI) bringing together the schemes for exporting and innovation – in effect taking a holistic approach to enterprise supports. While EI staff have information in relation to the various schemes that enterprises are accessing, this falls short of supporting enterprises by way of creating integrated thinking in relation to investments in exporting and RD&I. Given differences in innovation rates and export patterns, it may make sense to organise integrated supports for groups of enterprises that are similar, e.g., in terms of stage of development, RD&I-intensity, skills intensity or potential export intensity, rather than to have individual (and potentially silo-type) supports for different objectives, such as exporting, R&D investments, skills development, etc. See Section 4.

¹⁰ A recent review of this evidence is available in Siedschlag and Zhang (2015).

¹¹ This evidence is discussed by Ruane and Siedschlag (2013).

4. An Integrated Consolidated Approach to Enterprise Support Programmes

24. In this section we explore the benefits that would arise if Enterprise Ireland were to take a more consolidated approach to the development of programmes to support indigenous enterprises engaging successfully in RD&I and exporting. This covers the remaining two related key questions under Pillar 3 in the Consultation Paper.

Key Question 3: Do we need to enhance the suite of enterprise support programmes to further drive innovation in industry and/or is there scope for consolidation of the existing range of support programmes?

25. As noted in the previous paragraph, there would seem to be advantages in delivering assistance by way of an integrated rather than a series of separate programmes approach. From our knowledge of what has happened in EI, there has been a tendency to add further schemes and to leave existing ones in place.¹² This puts a heavy burden both on EI and on the enterprises. The more holistic approach would suggest that consolidation would be preferable but this does not necessarily exclude enhancement of the offering but rather a more integrated approach to the process.

26. Consolidating research and innovation funding in a smaller number of government agencies and programmes has been recommended by the latest OECD *Economic Survey of Ireland 2013*. The study noted over 170 budget lines and 11 major government agencies involved in funding RD&I. These numbers were assessed by the OECD as being large by international standards given the relatively small size of Ireland's RD&I budget. There has been some consolidation of support programmes for innovation into a "one-stop-shop" in a number of small countries such as Austria, Finland and the Netherlands. This consolidation would enhance building linkages between multinational and domestic enterprises and strengthening cooperation with higher education institutions (HEIs). In the Irish context, such a consolidation would require independent evaluations of the current support programmes.

Key Question 4: How can we incentivise firms that are R&D active to scale up their research efforts?

27. As noted above, the approach taken to MNEs and SMEs needs to be different. Decisions by existing MNEs to scale up what they are doing by way of RD&I activity in Ireland will be influenced by the key national policies (tax, IP, quality of nation research in their area, etc) and how these compare with those in other countries where they have existing production and/or RD&I activities.

28. In the case of SMEs, the scale of RD&I investment will depend crucially on the nature of the enterprise activity and its age. More RD&I activity is only desirable if it translates into strengthening the enterprise's sustainability and profitability – it may be able to innovate more successfully through cooperation in innovation than through scaling up its own RD&I investment.

¹² We understand that Enterprise Ireland runs currently over 100 support programmes for indigenous enterprises.

5. Concluding Remarks

29. A stable enabling business environment and consistent long-term RD&I policies are essential for improving enterprise innovation and growth performance. Research and innovation capacities take time to build and significant impacts of RD&I policies can only be expected in the medium to long-term. Therefore, minimising uncertainty in relation to enterprise RD&I support programmes and to funding of relevant R&D in HEI institutions is crucially important.¹³ As with all investment environments, greater certainty creates a greater volume of higher quality and more sustainable investment.¹⁴

30. Innovation is a complex process and interacts with many enterprise dimensions/activities such as scale, absorptive capacity, internationalisation, and engagement in cooperation with others. This reality requires an integrated policy approach that encompasses all relevant enterprise dimensions and interdependencies. The age-old metaphor - ‘the chain is as strong as the weakest link’ – is very applicable here both in relation to RD&I policies and HERD.

31. At the same time, to improve effectiveness and cost-efficiency, enterprise RD&I support programmes need to be consolidated in a smaller number. Such a consolidation would avoid duplication, reduce overheads, and would enhance innovation networking and cooperation between enterprises and with higher education institutions.

32. Consolidating enterprise RD&I support programmes requires better/more rigorous independent evaluations to identify those successful programmes and those which do not work. In addition, appropriate methodologies are needed to evaluate the effectiveness of multiple interventions.

33. As enterprise innovation and engagement in international economic activities become mainstreamed, there is a need to review and improve the data collection systems to reflect this reality and provide evidence for developing RD&I policies and evaluating their effectiveness. Specifically, it would be desirable that all relevant enterprise data can be linked or collected within a single survey.

¹³ While funding programmes and policies to support BERD and HERD must evolve over time, changes need to be strategically driven and well signalled to ensure that they do not create unnecessary uncertainty. Such unnecessary changes can inhibit investment and undermine reputation, both nationally and internationally.

¹⁴ It is well recognised that the consistency in Ireland’s corporate tax policy over five decades has contributed significantly to the creation of our exceptionally strong export platform.

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