Innovation in Agency-Supported High Growth Firms in Ireland

Acknowledgments

This report is substantially based on research carried out by SQW Ltd. and Aston University on behalf of Forfás. Forfás would like to fully acknowledge the quality of their work.

Many people and organisations contributed to the production of this report. Particular thanks are due to the Central Statistics Office, private sector contributors who agreed to be interviewed, to topic experts, and to others in the public sector who participated in one-to-one or roundtable discussions.

Project Management and Research & Analysis

Dr Elizabeth Harvey, Forfás, elizabeth.harvey@forfas.ie
Karen Hynes, Forfás, karen.hynes@forfas.ie

Table of Contents

Executive Summary

ES1. Introduction

High Growth Firms (HGFs), defined as achieving 20 per cent annualised growth over three years, have gained attention in many countries due to their disproportionate contribution to job and wealth creation[1]. This has led to a shift in the policy debate in countries across Europe from supporting SMEs more widely to focusing support on the small proportion of firms that are considered as HGFs. As country level knowledge of the performance and characteristics of HGFs has advanced, focus is now shifting towards identifying and implementing appropriate measures for supporting HGFs[2].

However, to date, there is little research on the performance of HGFs in Ireland and the purpose of this study is to go some way towards addressing this deficit in knowledge. The research finds that among agency-supported firms[3], across all sectors, age and firm nationality, over the period 2002-2011, while HGFs accounted for only between 4.5 per cent and 6.3 per cent of agency firms, they generated between 33 per cent and 45 per cent of new jobs. This study focuses on the innovation behaviour of these agency-supported HGFs. This focus reflects commentary identifying innovation as the principal driver of high growth in economies operating at the technological frontier[4].

ES2. Definition of 'High Growth Firms'

The definition of an HGF has been subject to much variation and debate as the field has developed. In 2013, a consensus has been reached, with a majority of commentators applying the definition put forward in the OECD-Eurostat Manual on Business Demography Statistics (2007). The OECD defines a high growth enterprise as[5]:

---

[1] Studies include: Measuring Business Growth, High growth firms and their contribution to employment in the UK, Anyadike-Danes M., Bonner K.,Hart M., Mason C., NESTA, 2009; Business Growth And Innovation, The wider impact of rapidly-growing firms in UK city-regions, Mason G., Bishop K. and Robinson C., NESTA 2009; Small Business Economics, 35:227-244, 2010, Springer, Henrekson M. and Johansson D.; High Growth Firms and the Future of the American Economy, Kauffman Foundation Research Series, 2010, Stangler D.; High Growth Enterprises, What Governments Can Do To Make A Difference, OECD 2010

[2] Policies in Support of High Growth Innovative Enterprises Deliverable 3-2: Policy measures to improve the conditions for the growth of innovative enterprises, Version 1.5 November 2013, empirica Gesellschaft für Kommunikations- und Technologieforschung mbH (co-ordinator), Dialogic, University of Applied Sciences Northwestern Switzerland

[3] Agency-supported firms covers the client base of Enterprise Ireland, IDA Ireland, Shannon Development and Údarás na Gaeltachta and comprises all Manufacturing and Information, Communication and Other Services, client firms in Ireland with 10 or more employees.

[4] Holz W. and Friesenbichler. K, Economics Bulletin. 30, 2, pg1016-1024, 2010

[5] OECD-Eurostat. 2007. 'Manual on Business Demography Statistics'. http://ec.europa.eu/eurostat/ramon/statmanuals/files/KS-RA-07-010-EN.pdf

An enterprise with average annualized growth greater than twenty percent per annum, over a three-year period, and with ten or more employees at the beginning of the observation period. Growth is thus measured by the number of employees or by turnover.

Importantly, studies have found that the two definitions of HGF, employment or turnover, result in two largely distinct populations of firms with limited overlap. Therefore, two types of HGF must be considered[6]. However, it is noted that in the case of agency-supported firms in Ireland, a substantial overlap for turnover-based and employment-based HGFs was found.

Unless otherwise stated, this study applied the OECD's standard definition of HGFs throughout. Furthermore, this study has primarily focused on HGFs in terms of employment growth.

ES3. Employment Impact, and, Firm Size, Age and Sector Characteristics of the HGF Population

A recent study of agency-supported firms, carried out by Forfás, observed that, based on the metric of employment, agency-supported HGFs accounted for 6.3 per cent of active agency firms in 2005 and 4.5 per cent of active agency firms in 2011[7].

The current profile of HGFs in economic strategy debates is explained by their disproportionately high economic impact (and particularly their capacity for job creation). This impact is captured by the previously mentioned Forfás study, which observed that agency-supported HGFs accounted for:

- 6.3 per cent of active agency-supported firms in 2005, and contributed 40 per cent of the new jobs created by agency-supported firms in the 2002-2005 period;
- 4.9 per cent of active agency-supported firms in 2008, and contributed 45 per cent of the new jobs created by agency-supported firms in the 2005-2008 period;
- 4.5 per cent of active agency-supported firms in 2011, and contributed 33 per cent of the new jobs created by agency-supported firms in the 2008-2011 period.

This relationship is further illustrated by the analysis performed by Forfás, summarised in Figure ES1.

This performance by agency-supported firms in Ireland is within international norms: across OECD nations, HGFs typically account for between 3 per cent and 10 per cent[8] of business firm stock in an economy or sector, with variation explained by differences in the operating conditions of the economies or sectors being compared. Furthermore, HGFs have accounted

[6] Daunfeldt S.O., Elert N., Johansson D.. 'The economic contribution of high growth firms: Do definitions matter?'. http://ratio.se/media/45160/sod_ne_dj_contribution.pdf

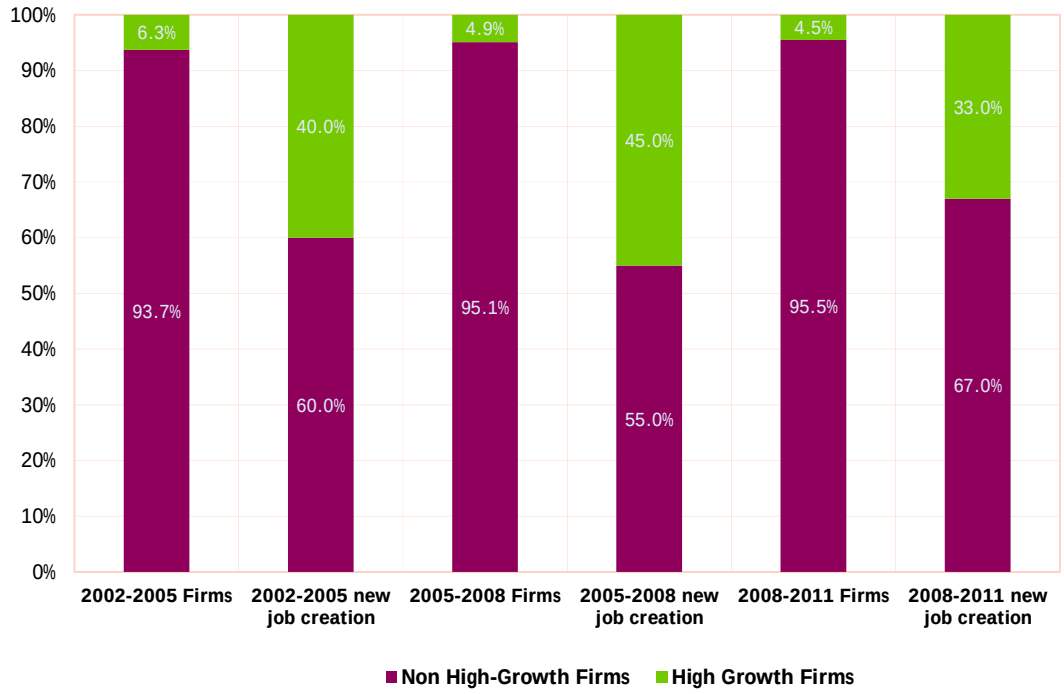
[7] Working Paper: 'Performance and Characteristics of Agency-supported High Growth Firms in Ireland', E. Harvey, Forfás, 2013

[8] At the upper end of the scale HGF activity tends to be associated with emerging economies, where innovation strategies are not the driver for the emergence of HGFs. For example, EU new member states that are further away from the technological frontier modify available blueprints and base their competitive edge on other comparative advantages such as low-cost labour rather than on innovation. Holzl W. and Friesenbichler K., Economics Bulletin, 30, 2, pg1016-1024, 2010

for between approximately 25 per cent and 60 per cent of new job creation in other countries[9].

Whilst all HGFs make disproportionately positive contributions to economic growth, the specific contribution made by different types of HGF varies. Employment-based HGFs make a larger contribution to employment growth than turnover-based HGFs whose contribution is more pronounced in sales and productivity growth[10].

Figure ES1: Share and Employment Impact of agency-supported HGFs in Ireland, 2002-2011



Source: Forfás, 2013

International studies reveal that HGFs are complex in nature, with high growth resulting from the interplay of multiple factors inside, and outside, the firm. Importantly, there is little consistent evidence upon which to propose a single, predictive 'standard model' for a high growth firm that is distinct from the wider business base. However, a number of characteristic tendencies have been derived for cohorts of HGFs including:

- Small firms tend to make up the majority of the stock of HGFs;
- Firms younger than five years are more likely to achieve high growth but the majority of HGFs are five years and older. As such, younger firms are over-represented in the HGF population, but remain a minority; and

[9] Bravo-Biosca A.,Criscuolo C. and Menon C.,'What Drives the Dynamics of Business Growth?', Science, Technology and Industry Policy Papers, No. 1, OECD 2013

[10] Daunfeldt S.O., Elert N., Johansson D.. 'The economic contribution of high growth firms: Do definitions matter?'. http://ratio.se/media/45160/sod_ne_dj_contribution.pdf

- HGFs can be found across all sectors of the economy.

The Forfás research indicates that size, age and sector characteristics of the cohort of agency-supported HGFs in Ireland are broadly similar to those reported for cohorts of HGFs in other jurisdictions. Agency-supported HGFs in Ireland are found across all firm sizes (but are more likely to be small firms), all sectors and are of all ages, not just start-ups.

ES4. Principal Findings

This study focuses on the innovation behaviour of agency-supported HGFs, and the principle findings reflect evidence developed based on data analysis, interviews with Irish-based firms, inputs from national stakeholders and national and international experts, and review of the international literature.

ES4.1 Innovation Behaviours within HGFs

The research indicates that innovation behaviour within HGFs is typically:

- Market-facing and client-need orientated, underpinned by strong client relationships;
- Focused on differentiation in quality and value for comparative advantage, often incorporating the development of 'value-added service' propositions;
- Focused, albeit not exclusively, on 'existing products to new markets' model
- Heavily networked through the value chain, with extensive use of 'co-creation' for comparative advantage; and
- Not simply focused on single investments in formalised R&D processes.

In many ways, such headlines are shared by HGFs and successfully innovating non-HGFs.

ES4.2 Traits of Innovation-Led HGFs

The international research reveals no single 'standard' HGF innovation model that is distinct from that of non-HGFs. But, in seeking to identify pragmatically the factors distinguishing the innovation-led HGF in particular, the following traits of firms do appear critical to the achievement of high growth:

- Pervasive innovation, implemented 'by routine' across operations (i.e. 'innovativeness' in the round appears to be a significant feature);
- A high degree of entrepreneurialism amongst the management team, extending to the workforce as a whole, enabling strong capabilities for spotting and responding to opportunity;
- Capability to access resources that includes conventional financial sources and novel measures such as 'shared-risk' partnerships;
- Positioning in a market capable of hosting high growth (i.e. a market in growth, or flux).

In the round, a key message emerging from the study is that HGFs are 'innovative', rendered distinct by virtue of an 'innovativeness' that permeates systems, processes, and attitudes, as opposed to simply focusing on the establishment of 'discrete' innovation projects. As a result,

innovation cannot be considered an isolatable dimension of an HGF that is distinct from that firm's wider operations and strategies.

ES4.3 Innovation Barriers within HGFs

A key finding emerging from the study regarding innovation and HGFs is that innovation does not appear to exist as a 'department' or isolated activity within the HGF. Rather, HGFs are innovative in culture, with innovation pervading the functions and mind-sets of the firm 'by routine'. As a result, it is difficult, if not impossible to isolate the barriers to innovation within an HGF. Consequently, when considering constraints to innovation, barriers to high growth more broadly should be in view.

This study's research indicates that the principal barriers to achieving high growth in firms include typically:

- Low demand for innovative products from new businesses amongst consumers;
- Shortcomings in the motivations, aspirations, and risk-responses of owners and management teams;
- Limited ability to identify, appraise, and respond to those opportunities that offer real growth prospects for the firm;
- Limited access to finance or key resources from internal and external sources;
- Failure to pair technological innovation with a 'delivery system' aiding its exploitation and commercialisation (including IPR, marketing, business strategy, finance, etc.);
- Weaknesses in the firm's capability to penetrate networks and build relationships with clients or partners.

As such, the innovation barriers encountered by the potential-HGF are, again, not different fundamentally to those encountered by any firm seeking to innovate. Nuance comes by virtue of the innovation objectives being pursued, and the resourcefulness and resilience with which innovation barriers are overcome.

ES4.4 Potential Support to the Innovation-Led HGF

The research for this study has highlighted the following series of key principles for guiding pro-HGF support initiatives:

- Adopt a 'whole of enterprise' approach, seeking to support innovativeness in the round, as opposed to simply focusing on the establishment of 'discrete' innovation projects;
- Avoid seeking to instil a single, standard model of innovation within the potential HGF. Reflecting the diversity of HGFs, innovation solutions and capacity building being offered must be context and firm specific;
- Recognise, and be able to accommodate, the non-linear nature of HGF growth over the long-term;
- Provide training, advice and decision support that is tuned to the developmental stage of the firm and focused on aiding the targeting, plotting and realisation of innovation-led growth strategies;

- Support the timing, selection, and utilisation of resources from the public and private sector (including finance, core skills, partners etc.) in response to market opportunity;
- Have a defined set of criteria for formal exit from the support, with transfer on to commercial provision from the market.

An examination of the support measures in other countries to promote and support innovation-led HGFs was undertaken and the research identified that direct support measures are focused on the combination of:

- HGF Coaching – emphasising tailored packages of training, advice, and decision support that is tuned to the developmental stage of the firm and focused on aiding the targeting, plotting, and realisation of innovation-led growth strategies[11]. Components deemed critical within the coaching provision include:

  Entrepreneurialism – skills and tools focused on the management team supporting 'opportunity spotting', 'horizon scanning', network building, and 'innovativeness' in the navigation of markets and steerage of firm strategy;

  Management systems – skills and tools enabling management teams to manage resources, financial, human, or material, and coordinate operations in a manner facilitating continuous cycle of operational improvement, product or service development, and opportunity response.
- Access to Finance Packages – incorporating risk-finance (equity, grant, and loan), investment- and credit-readiness interventions;
- Core Skills Packages – providing support in key management domains such as internationalisation, IPR, HR, legal, and regulation.

The study also determines that direct support to potential and existing innovation-led HGFs needs to be underpinned with wider interventions across the enterprise base to encourage and support the types of innovation behaviours identified as more typical of innovation-led HGFs.

ES5. Study Conclusions

This is the first detailed analysis focused on HGFs in Ireland. A number of conclusions were developed in this study and they act as the first learnings on the topic of HGFs in Ireland upon which the policy system in Ireland can reflect and which provide a platform on which future research can build. The key conclusions drawn from the evidence are provided below.

(i) In the cohort of agency-supported firms in Ireland, there exists a set of HGFs that play a significant role in new job creation within the population of agency-supported firms. In the current environment, sustainable job creation is a key priority for Ireland, and thus the study supports the use of employment as the appropriate metric and focus for potential and existing HGFs. However, it is acknowledged that for firms to grow in a sustainable manner, they also need to achieve and sustain profitability as they grow.

[11] Love, J. Rope, S., SME Innovation, Exporting and Growth, http://enterpriseresearch.ac.uk/default/assets/File/ERC%20White%20Paper%20No_5%20Innovation%20final.pdf, 2013

The proportion of agency-supported HGFs in Ireland has decreased over the past decade[12], and this leads us to consider whether there is potential for Ireland to reverse this trend and focus on increasing the proportion of agency-supported HGFs (from the base of 4.5 per cent) through appropriate targeting of supports to HGFs. This would require that **appropriate policy attention and profile be put on innovation-led HGFs.** The study findings indicate that this attention should not be limited to one category of firms but rather should be focused on innovation-led firms of all age, size and from all sectors, including start-ups and established firms in Ireland and potential start-ups and emerging businesses attracted to Ireland from abroad.

(ii) In order to grow the cohort of agency-supported innovation-led HGFs there is a need to:

- **Actively target potential and existing innovation-led HGFs for State supports;**
- **Support the development of the quality of potential and existing innovation-led HGFs.**

(iii) However targeting potential and existing innovation-led HGFs is challenging as the findings from this study indicate that in line with the heterogeneity of HGFs there is no predictive set of firm characteristics or innovation behaviours that can be used for identifying potential innovation-led HGFs through 'conventional' probing of firm characteristics or innovation behaviour. Ultimately, there appears to be no simple way through conventional business data held by governments and its agencies to target support to potential HGFs. However, the study finds that **a number of new approaches towards targeting actual and potential HGFs are emerging internationally, including the use of novel metrics and data analytic techniques. The usefulness of these mechanisms could be explored for targeting potential and existing innovation-led HGFs, and generating further insights into the stock of HGFs in Ireland.**

Furthermore, this study has focused on analysis of the agency-supported HGFs; however, **there is further opportunity to widen the focus on HGFs by identifying the non-agency HGFs in Ireland for which support could be targeted, with the goal of helping these firms to evolve in a sustainable manner.**

(iv) With regard to support for potential or existing innovation-led HGFs, international evidence indicates that there is no 'silver bullet' approach for providing direct supports to these firms. However, this study has identified a series of innovation-led HGF traits that are critical in the achievement of high growth and these traits should be utilised to guide how potential and existing innovation-led-HGFs may be supported. In particular, the study finds that HGFs are rendered distinct from the wider business base by virtue of an 'innovativeness' that permeates systems, processes, and attitudes, as opposed to simply focusing on the establishment of 'discrete' innovation projects. Thus, 'innovativeness' can be viewed as the organisation-wide innovation capability which provides the strategic and competitive orientation of a firm, and innovation is the instrument through which it strives to achieve its competitive advantage. This finding indicates that **innovativeness needs to be embedded and developed within growth aspirational firms to support the quality of potential HGFs and to support actual HGFs to develop in a sustainable manner.**

[12] Such decline in HGFs has also been reported across many other countries in recent years. Entrepreneurship at a Glance, OECD 2013

Furthermore, the research also indicates that **HGFs are more resilient to innovation barriers than their non-HGF counterparts are, and that they tend to be more effective in utilising and deploying resources**.

Together, **the findings on innovation behaviour and traits, and barriers to innovation for HGFs highlight a number of key principles which should be reflected in any direct pro-HGF support initiative.**

(v) International review of pro-HGF supports highlights the provision of HGF coaching as a potential future support to HGFs in Ireland. Entry criteria to such a 'HGF Coaching Provision' could be used as a mechanism for implementing a policy focus on innovation-led HGFs. In this regard, access criteria could be tailored to prioritise access to firms with:

- Innovation-led growth strategies with either:

  The ambition and potential to grow employment at a fast rate; or

  The ambition of existing HGFs to grow in a sustainable manner.

(vi) In relation to start-ups, the research indicates a strong correlation between high growth and the experience of a start-up team. On this basis **the quality of the pipeline for potential innovation-led HGFs could be enhanced by capitalising on opportunities to stimulate and support:**

- **Spin-outs from established businesses;**
- **Start-ups amongst experienced professionals;**
- **Serial entrepreneurialism.**

(vii) Encouraging the wider firm base to emulate the types of innovation behaviours more typical of innovation-led HGFs should support **the emergence of higher quality potential innovation-led HGFs in the future** as well as improved firm growth and competitiveness more generally across the firm population. To this end, **the study highlights a number of specific areas of potential focus for State support, which include:**

- **Embedding innovativeness at firm-level through enhanced workforce skills in innovation, including creativity, horizon scanning, and entrepreneurialism;**
- **Supporting innovation in services and business processes;**
- **Leveraging institutional knowledge capabilities in public research organisations to generate new businesses, or enhance the competitiveness of existing businesses;**
- **Encouraging and facilitating network behaviours emphasising productive business-to-business and business-to-university links;**
- **Supporting commercialisation of research and enhanced focus on supporting IP management capacity and activities at firm level.**

Chapter 1 Introduction

1.1 Context

Over time it has become widely accepted that an innovation ecosystem is made up of many elements[13], all of which need to interact effectively in order to ensure that knowledge is developed, transferred and applied in productive ways. In 2010, the Report of The Innovation Task Force highlighted the central role that enterprise and entrepreneurship play in such an innovation system[14], and it supported the need for a dynamic system of firm formation, firm growth, and firm closure for driving productivity, job creation, and economic growth in Ireland. Such aspirations are based on evidence that suggests that productivity grows faster in competitive environments where firms continuously expand and shrink, as this speeds up the reallocation of resources (both labour and capital) to their most productive use[15].

A number of studies of firm dynamics have recently highlighted that not only is entry and exit of firms of interest, but so also is the growth performance of firms[16]. The recent improvements in the availability of micro-level data has allowed for the uncovering of the key role played by a particular cohort of exceptional firms, termed 'high growth firms' (HGFs), in many countries.

HGFs have gained attention in many countries due to their disproportionate contribution to job and wealth creation[17]. Furthermore, attention is now being turned towards differences in the number of HGFs in order to explain the productivity performance between the US and Europe[18]. This has led to a shift in the policy debate in countries across Europe from supporting SMEs more widely to focusing support on the small proportion of firms that are considered as HGFs.

The increased importance that HGFs have achieved within Europe is illustrated by the fact that the Europe 2020 strategy directly mentions the support of high growth SMEs as a political objective. Consequently, the new innovation indicator-focused on innovation outputs- that has been launched by the European Commission includes employment in fast growing firms in innovative sectors as one of its four components.

---

[13] Including R&D, education, finance, public policy, institutions, tax and regulatory affairs, enterprise and entrepreneurism.

[14] Innovation Ireland, Report of the Innovation Task Force, Department of An Taoiseach, 2010.

[15] Growth Dynamics: Exploring Business Growth and Contraction in Europe and the US, Biosca A.B., NESTA,Fora, 2010, and references therein.

[16] Kauffman Foundation Research Series: Firm Formation and Economic Growth; High Growth Firms and the Future of the American Economy, 2010, Stangler D.

[17] Studies include: Measuring Business Growth, High growth firms and their contribution to employment in the UK, Anyadike-Danes M., Bonner K., Hart M., Mason C., NESTA 2009; Business Growth And Innovation, The wider impact of rapidly-growing firms in UK city-regions, Mason G., Bishop K. and Robinson C., NESTA 2009; Small Business Economics, 35:227-244, 2010, Springer, Henrekson M. and Johansson D.; High Growth Firms and the Future of the American Economy, Kauffman Foundation Research Series, 2010, Stangler D.; High Growth Enterprises, What Governments Can Do To Make A Difference, OECD 2010

[18] Growth Dynamics Exploring Business Growth and Contraction in Europe and the US, Biosca A.B., NESTA,Fora, 2010.

However, to date, little is known about the performance of HGFs in Ireland and it is the purpose of this study to go some way towards addressing this deficit in knowledge.

1.2 This Study

This study focuses on the innovation behaviour of agency-supported HGFs[19]. This focus reflects commentary identifying innovation as the principal driver of high growth in economies operating at the technological frontier[20,21].

Objectives of Study

The study sought to develop insights as to how support of HGFs and potential HGFs by the innovation policy mix in Ireland could be enhanced. To this end, the principal objectives of the study were to:

- Determine the innovation behaviour of HGFs;
- Identify the barriers to that innovation behaviour for potential HGFs;
- Identify opportunities for the support of innovation-led high growth.

In practice, research and analysis focused on answering the following questions:

- What is the innovation behaviour of an HGF, how does it differ from that of non-HGFs, and what are its principal barriers?
- What is the role of (public) innovation policy and associated interventions in supporting the achievement of high growth, and what practical support can be provided to:

  Encourage and enable potential HGFs to achieve high growth status?

  Enhance the quality and size of the potential HGF population?

  Enable HGFs to sustain their employment levels over the long term?

  Encourage non-HGFs to engage in types of innovation behaviour demonstrated by HGFs?

  Mitigate the barriers to innovation for existing HGFs and potential HGFs?

Approach to Study

In order to answer the research questions, the study undertook the following research and analysis activities:

- An analysis of a dataset linking Annual Business Survey on Economic Impact (ABSEI) and Community Innovation Survey (CIS) entries for agency-supported firms spanning the 2002-11 period (sections 3.1, 4.1 and 5.1);

[19] Agency-supported firms covers the client base of Enterprise Ireland, IDA Ireland, Shannon Development and Údarás na Gaeltachta and comprises all Manufacturing and Information, Communication and Other Services, client firms in Ireland with 10 or more employees.

[20] Economies in which leading edge technologies are developed, made, and utilised.

[21] Holzl W. and Friesenbichler K., Economics Bulletin, 30, 2, pg1016-1024, 2010.

- A survey of a sample of agency-supported HGFs and non-HGFs, focusing on the topics of the determinants of growth, innovation behaviour and its barriers, and potentially valuable support interventions. Twenty eight firms were engaged, with 26 of these providing the necessary quantitative data for formal numeric analysis (sections 3.2, 4.2 and 5.2);
- A review of published literature and commentaries focused on the characterisation of HGFs and their innovation behaviour, barriers to innovation and proposed pro-HGF support frameworks (sections 2.3, 3.3, 4.3 and 5.3);
- Consultation with representatives of topic experts and exemplar pro-HGF initiatives in places outside Ireland;
- A formal calibration workshop with stakeholders from the Department of Jobs, Enterprise and Innovation (DJEI) and its agencies, to test and develop the study's findings;
- Consultation with the workshop stakeholder group on the draft report developed.

A detailed review of work done during this study is provided in Annex A.

Throughout, the employment and value[22] aspects of high growth are referred to. It is important from the outset that the reader is clear on the difference and frequently mutually exclusive nature of these metrics. In a world where the price of labour is increasingly the key determinant of competitiveness, Gross Value-added (GVA) at enterprise level is often secured actively by reducing employment levels and costs.

1.3 Report Structure

This Report is structured as follows:

- Chapter 2 reviews the nature and behaviour of HGFs, providing a grounding for the subsequent discussion;
- Chapters 3, 4, and 5 review the findings of the data analysis, survey, and literature review from the perspective of the study's three central themes, namely: 'behaviour and traits', 'barriers', and 'support';
- Chapter 6 considers the implications of Chapters 2-5 for the potential enhancement of support for existing and potential HGFs in the Irish innovation policy mix;

Key Messages and Section Conclusions are presented at the end of sections throughout each chapter.

- Finally, Chapter 7 sets out a set of synthesised Principle Findings and Study Conclusions emerging from the study, responding to the research questions posed at the outset of this work.

Annexes containing supporting information are referenced throughout the Report.

[22] Denominated as Gross Value Added (GVA)

Chapter 2 An Introduction to High Growth Firms

The context for this study is the substantial body of work produced by stakeholders in modern Western economies (notably, in the European Union, and the OECD areas in particular), which has sought to understand the nature of HGFs. Based on this work, this chapter profiles the HGF, setting a context for the subsequent research findings, which are set out progressively in the report.

2.1 Definition of 'High Growth Firms'

The definition of an HGF has been subject to much variation and debate as the field has developed. In 2013, a consensus has been reached, with a majority of commentators applying the definition put forward in the OECD-Eurostat Manual on Business Demography Statistics (2007). The OECD defines a high growth enterprise as[23]:

An enterprise with average annualized growth greater than twenty percent per annum, over a three-year period, and with ten or more employees at the beginning of the observation period. Growth is thus measured by the number of employees or by turnover.

Importantly, studies have found that the two definitions of HGF, employment or turnover, result in two largely distinct populations of firms with limited overlap. Therefore, two types of HGF must be considered[24].

Despite the consensus on this 'standard' definition, alternative metrics are discussed, examples include the isolation of 'Gazelles', HGFs that are five years old or younger at the end of the chosen observation period[25], and use of indexed growth rates to reveal relative performance[26]. Indeed, there is a growing acceptance that the choice of arbitrarily selected periods (i.e. three years in the case of the OECD metric) is problematic and that there should be a focus on the growth trajectory of cohorts of start-ups[27]. The notion of 'exceptional job creating firms' (EJCFs) within cohorts of start-ups has been the matter of recent analysis and

[23] OECD-Eurostat. 2007. 'Manual on Business Demography Statistics'. http://ec.europa.eu/eurostat/ramon/statmanuals/files/KS-RA-07-010-EN.pdf

[24] Daunfeldt S.O., Elert N., Johansson D., 'The economic contribution of high growth firms: Do definitions matter?'. http://ratio.se/media/45160/sod_ne_dj_contribution.pdf

[25] Mason C. and Brown R., 2010, http://www.scottish-enterprise.com/~/media/SE/Resources/Documents/GHI/High growth-firms-in-scotland.ashx

[26] Mitusch K., Schimke A.,Europe Innova. 2011. 'Gazelles High Growth Companies' A. Schimke http://ec.europa.eu/enterprise/policies/innovation/files/proinno/gazelles-final-report_en.pdf

[27] Anyadike-Danes, M; Bonner, K; Hart, M and Mason, C, 2009, 'Measuring Business Growth: High growth firms and their contribution to employment in the UK, NESTA Research Report; Anyadike-Danes, M; Hart, M and Du, J, 2013, 'Firm Dynamics and Job Creation in the UK: Taking Stock and Developing New Perspectives', Enterprise Research Centre White Paper No. 6, http://enterpriseresearch.ac.uk/default/assets//File/ERC%20White%20Paper%20No_6%20Firm%20Dynamics%20final.pdf; Anyadike-Danes, M; Bonner, K and Hart, M, 2012, 'Exploring the incidence and spatial distribution of high growth firms in the UK and their contribution to job creation'. NESTA Working Paper 13/05, http://www.nesta.org.uk/publications/working_papers/assets/features/exploring_the_incidence_and_spatial_distribution_of_high_growth_firms_in_the_uk_and_their_contribution_to_job_creation

discussion and the analysis and subsequent conclusions has the benefit of being uncontaminated by the effects of differences in age[28].

Unless otherwise stated, this study applied the OECD's standard definition of HGFs throughout. However, the merits of alternative metrics are considered in later stages of this Report.

Section Key Messages: 'Definition of high growth'

The study adopted the 'standard' definition of HGFs: an enterprise with average annualized growth greater than 20 per cent per annum over a three-year period, measured by jobs or turnover.

Section Conclusions

C1: The OECD's 'standard' definition of HGFs should be utilised in order to maximise opportunities to benchmark performance with comparator nations.

C2: Despite wide use of this 'standard' definition, alternative metrics may present an opportunity to develop a better understanding of high growth in specific contexts. The potential application of complementary 'high growth' metrics to extend, or deepen, insight into Ireland's HGF stock could be explored.

2.2 Size and Employment Impact of the HGF Population

The current profile of HGFs in economic strategy debates is explained by their disproportionately high economic impact (and particularly their capacity for job creation). This impact is captured by a Forfás study[29], which observed agency-supported HGFs accounted for:

- 6.3 per cent of active agency-supported firms in 2005, and contributed 40 per cent of the new jobs created by agency-supported firms in the 2002-2005 period;
- 4.9 per cent of active agency-supported firms in 2008, and contributed 45 per cent of the new jobs created by agency-supported firms in the 2005-2008 period;
- 4.5 per cent of active agency-supported firms in 2011, and contributed 33 per cent of the new jobs created by agency-supported firms in the 2008-2011 period.

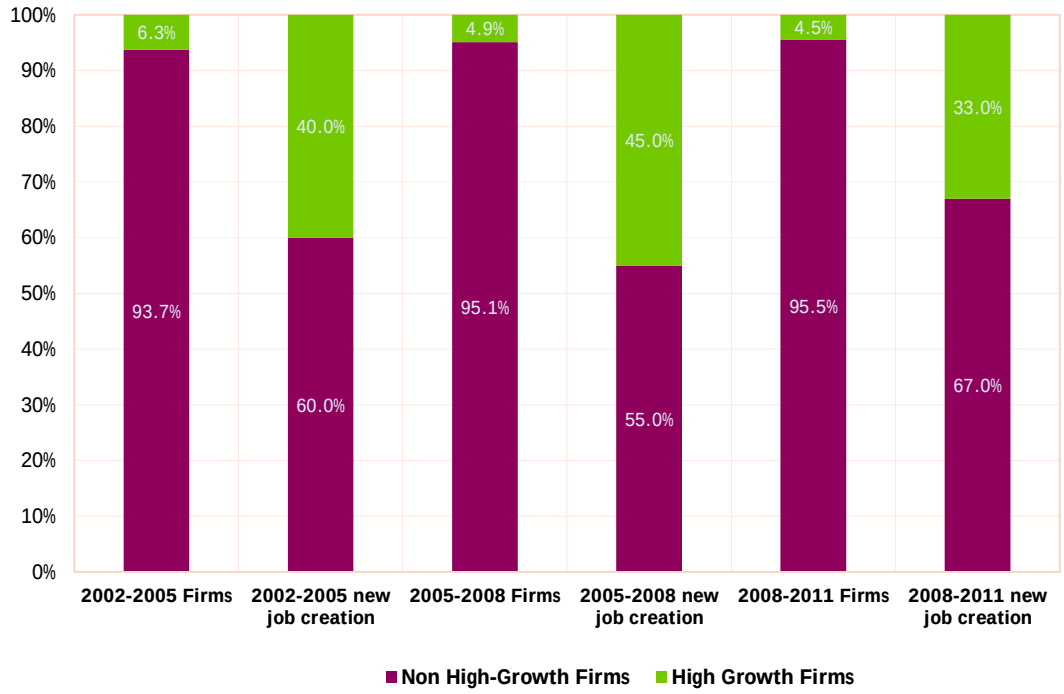
This relationship is further illustrated by the analysis performed by Forfás, summarised in Figure 1.

[28] Anyadike-Danes et. al., 2013, 'Accounting for job growth: disentangling size and age effects in an international cohort comparison' Enterprise Research Centre Research Paper No. 2, http://enterpriseresearch.ac.uk/default/assets//File/ERC%20RP2%20Anadike%20et%20al%20Job%20growth.pdf

[29] Working Paper:' Performance and Characteristics of Agency-Supported High Growth Firms in Ireland', E. Harvey, Forfás, 2013.

This performance by agency-supported HGFs in Ireland is within international norms: across OECD nations, HGFs typically account for between 3 per cent and 10 per cent[30] of business firm stock in an economy or sector, with variation explained by differences in the operating conditions of the economies or sectors being compared. Furthermore, HGFs have accounted for between approximately 25 per cent and 60 per cent of new job creation in other countries[31].

Figure 1: Share and Employment Impact of agency-supported HGFs in Ireland



Source: Forfás, 2013

Whilst all HGFs make disproportionately positive contributions to economic growth, the specific contribution made by different types of HGF varies. Employment-based HGFs make a larger contribution to employment growth than turnover-based HGFs. Conversely, the contribution of turnover-based HGFs is more pronounced in sales and productivity growth[32]. Again, the importance of definitions is highlighted when studying HGFs.

Reflecting the strong political commitment to growing employment opportunities in Ireland, employment-based HGFs are a particular focus for this study.

[30] At the upper end of the scale HGF activity tends to be associated with emerging economies, where innovation strategies are not the driver for the emergence of HGFs. For example, EU new member states that are further away from the technological frontier modify available blueprints and base their competitive edge on other comparative advantages such as low-cost labour rather than on innovation. Holzl W. and Friesenbichler K., Economics Bulletin, 30, 2, pg1016-1024, 2010

[31] Bravo-Biosca A.,Crisculo C. and Menon C.,'What Drives the Dynamics of Business Growth?', Science, Technology and Industry Policy Papers, No. 1, OECD 2013

[32] Daunfeldt S.O., Elert N., Johansson D., 'The economic contribution of high growth firms: Do definitions matter?'. http://ratio.se/media/45160/sod_ne_dj_contribution.pdf

Section Key Messages: 'Size and impact of the HGF population'

HGFs typically account for between 3 per cent and 10 per cent of business stock in an economy or sector. Research focused on agency-supported HGFs in Ireland broadly confirms this range, finding that employment-based HGFs represent between 4.5 per cent and 6.3 per cent of the active firms in the final year of observation in the studied samples.

Whilst all HGFs make disproportionately positive contributions to economic growth, the contribution to employment growth is pronounced particularly for employment-based HGFs (whilst the contribution of turnover-based HGFs is more significant in terms of sales and productivity measures of growth).

Section Conclusions

C3: Based on the disproportionately high contribution of HGFs to economic growth, a specific policy ambition to nurture HGFs in Ireland should be adopted.

C4: Reflecting the strong political commitment to growing employment opportunities in Ireland, employment-based HGFs should be a principal focus for future HGF programmes. This however should not be to the detriment of value-based HGFs.

2.3 Characteristics of HGFs

Preceding studies reveal the HGF to be complex in nature, with high growth resulting from the interplay of multiple factors inside, and outside, the firm. Importantly, there is little consistent evidence upon which to propose a single, predictive 'standard model' for high growth that is distinct from the wider business base.

In this context, few fundamental necessities for high growth are apparent, other than an 'entrepreneurial motivation' and 'opportunity alertness' of the management team, paired with a market sufficiently dynamic to support high growth[33].

Beyond these necessities, traits common to the majority of HGFs, but not essential for high growth, are apparent in the literature (see Table 1).

Table 1: Characteristics of the High Growth Firm

Theme	HGF Characteristic
Sector	HGFs can be found in all sectors of the economy. A significant portion of work seeks to specifically refute any argument that 'high-tech', 'knowledge-based', or 'creative' sectors are predisposed to the generation of HGFs.
Size	The literature reveals limited variation in the proportion of HGFs present in

[33] Ministry of Trade and Industry (2007) High Growth SME Support Initiatives in Nine Countries: Analysis, Categorization, and Recommendations

Theme	HGF Characteristic
	each size category of the business stock (ordered by employment number). As a result, small firms form the majority of the HGF stock.
Age	Enterprises younger than five years are more likely to achieve high growth but the majority of HGFs are five years and older. As such, younger firms are over-represented in the HGF population, but remain a minority. In 2009, a NESTA report estimated 70 per cent of HGFs were at least five years old.
Internationalisation	A strong association between HGFs and engagement in international trade is asserted by a majority of papers; proposing that HGFs are more likely to be engaged in distributed, globalised supply chains and export orientated. The underlying mechanism for this relationship may include: ▪ Exposure to the unique stresses of globalised commerce forces operational developments that result in high growth; i.e. 'internationalisation builds HGFs'; ▪ Globalised supply chains can only be successfully penetrated by enterprises with a threshold level of fitness; i.e. 'internationalisation filters HGFs in'.
Market Positioning	Proximity to, or connectivity with, end-markets does appear to be a factor in the achievement of high growth. As a result, HGFs are typically located close to major urban agglomerations and sector clusters.
Ownership	A series of commentaries suggest correlation between high growth and corporate groups (or spinouts from group subsidiaries). A significant minority of HGFs become subsidiaries of large global companies through acquisition (typically in pursuit of resources to fuel exploitation).
Trend	High growth is not a linear process and is difficult to sustain; firms grow, fall-back, cease to exist, or are absorbed. As a result, HGF rarely demonstrate a smooth ramping-up of scale; rather, a 'lumpy' process is typical, with significant rates of failure after the HGF threshold has been passed. High growth is often stepped, particularly where the growth is derived from acquisition or merger.
Public Support	There is little evidence to indicate HGFs seek, or benefit from, government business support other than in the context of 'access to finance support' and support for overseas market entry.
Relationships	Engagement with networks (formal or informal) appears to be a strong correlate to high growth. HGF business models are based around building long-term relationships with customers, which generate recurring revenue rather than one-off transactions. In addition, it is observed that most HGFs

Theme	HGF Characteristic
	sell to other businesses, not to consumers. Further to the vision of 'networking', partnering, and collaboration is identified by a number of papers to represent a core solution for HGFs seeking to access resources not readily maintained in-house. The model of 'Open Innovation' is routinely cited with regard to HGF partnering behaviours; co-creation of knowledge across the value chain representing key feature of HGF innovation strategies.
Origin	HGFs have varied origins spanning de novo start-ups, enterprises 'pre-incubated' in established organisations, or simply established firms entering a planned growth phase.
Senior Team Competences	HGFs initiated by serial entrepreneurs represent a significant proportion of the HGF population, but there is no consistently repeated association between previous entrepreneurial experience and high growth. This may be explained by the 'Optimism and Chance' thesis forwarded by David Storey (Sussex University, 2005) in which successful entrepreneurship is a function of the number of times the entrepreneur wants to, and is allowed to, initiate a venture. Team-based starts are more likely to grow than firms started by solo entrepreneurs, and the collective experience of management teams has a direct effect on success rates. NESTA (2008) observed that the management team's prior experience of initiating or operating enterprises appears critical to start-up survival: Director-teams incorporating diverse age groups and featuring sector experience are more successful in start-up than solo entrepreneurs.
Technical Competences	HGFs' core competences include those most commonly associated with the quality of their employees, innovative products, and services and technical, market and customer knowledge. Observations regarding the commercial competences of HGFs include: ▪ Few HGFs are technology-based, but most are knowledge-based and innovative; ▪ HGF business propositions are as much based around selling knowledge and 'solutions' as they are selling tangible products and services; ▪ HGFs are typically market-driven, rather than production-led.
Management Culture	HGFs are associated with specific managerial styles, in which flexibility, reconfiguration, and responsiveness appear critical. HGFs are characterised by distinctive Human Resources (HR) practices, particularly with regard to the quality of recruitment and degree of employee empowerment. Early stage enterprises entering high growth are credited for management

Theme	HGF Characteristic
	styles that are Decentralised, Participatory, Team-Based, Adaptive, and Unconventional. However, it is also noted that over-endurance of these management styles can represent a barrier to later-stage growth. Further investigations of HGFs reveal an emphasis on workforce as a source of competitiveness; talent identification, investment in training, an open culture, and incentives being prevalent in the HR strategy.
Finance	There is a correlation between HGFs and the willingness to bear financial risk. In addition, the following observations have been made with regard to the financial culture of HGFs: ▪ HGFs are more likely to seek finance than the average business; ▪ HGFs borrow more than the average business; ▪ HGFs are more likely to operate with higher levels of debt than the average business; ▪ HGFs are more likely to operate with considerably lower levels of liquidity than the average business; ▪ HGFs have lower levels of solvency than the average business.

Source: Various, compiled by SQW

Complementing this overview, the previously-mentioned Forfás study identifies the size, age, ownership and sectoral characteristics of agency-supported HGFs in Ireland as follows:

- HGFs are of all sizes, but are more likely to be small firms;
- HGFs are found to be of all ages: firms of age 5 years or less are more likely to be a HGF than firms in other age brackets, however the majority of firms are older than 5 years;
- HGFs are both Irish and foreign owned, but the majority are Irish-owned;
- HGFs exist across all sectors, but they represent a greater share of the services category relative to manufacturing;
- HGFs are more prevalent in the Computer Programming, Consultancy, and Related Activities, Food, and Financial Services sectors;
- The Computer Programming, Consultancy, and Related Activities accounted for the largest number of HGFs in each of the three observation periods studied.

Thus, it can be concluded with some confidence that the profile of the cohort of agency-supported HGFs in Ireland broadly matches that established in the international commentaries.

Innovation and HGFs

The relationship between innovation and HGFs is covered in detail in subsequent chapters of this report. At this stage, however, it should be noted that preceding studies have highlighted

a strong correlation between innovation and high growth. For example, NESTA (2011) finds innovative firms grow twice as fast as non-innovative firms do[34]. The research showed that innovation actually drives business growth, and this effect is more marked the faster a company is growing.

The analysis also suggests that the relationship also works the other way around, that is, faster-growing firms are more likely to continue to innovate. This is one of the key reasons why high growth firms contribute disproportionately to innovative activity in the economy. This correlation between growth and innovation is pronounced particularly in economies operating at the technological frontier[35].

This relationship introduces a key challenge at the heart of this study, namely that of separating-out 'innovation' from the 'wider operations' of the HGF, without generating unhelpful artefacts in so doing. At the same time, as discussed in more detail in section 4.3, the barriers to growth and those to innovation are often blurred, if not the same.

In the round, and as this report argues more fully later, the observation that HGFs are rendered distinct from the wider business base by an 'innovativeness' that pervades the operations and strategies of the firm, rather than simply a 'doing' of isolated innovation projects, is a key early finding of the study. Linked to this, the reality that most HGFs close to the technological frontier are, by necessity, innovative means that firms in these positions can be used to provide useful learning to apply to enterprises with the potential for innovation-led growth.

Implications for this Study

Importantly, the preceding analysis does not provide a blueprint for high growth: the performance of a firm matching this set of characteristics in full will still depend on the external operating environment (typically requiring the market to be in a state of growth or flux). Therefore, the study cannot propose simply a process of retrofitting all firms with each of these traits.

In addition, these characteristics of growth reflect 'tendencies' within the HGF population as a whole: individual HGFs will rarely conform to the full complement of characteristics. The resulting diversity in the HGF population has been termed 'pervasive heterogeneity' by some commentators. Again, when considering pro-HGF support measures, a more context-aware understanding of this richness of variety and the development of necessary capabilities will be required.

Finally, the nature of this profile and the diversity of its manifestation present significant challenges to those seeking to identify an HGF during high growth: few robust datasets allow specific features of the profile to be monitored at firm-level in real time, and the potential for businesses to look like HGFs in all but their growth performance is high. As a result, there is no simple way through conventional business data held by governments and its agencies to target mechanistically support to HGFs, actual or potential. These issues will be returned to in later chapters.

[34] Vital Growth:The importance of high growth businesses to the recovery, NESTA, 2011

[35] Holzl W. and Friesenbichler K., Economics Bulletin, 30, 2, pg1016-1024, 2010

Section Key Messages: 'Characteristics of the HGF'

HGFs are diverse in nature, spanning the sector, age, and size segments of the business base. Although HGFs can only be identified definitively after the high growth period, a series of characteristic attributes and behaviours can be resolved, key elements include:

- Innovativeness and novelty in the proposition;
- Adaptability and resilience in the business model;
- High performance management teams with growth ambition;
- Deep and broad connectivity with knowledge networks;
- Functional, productive collaborations spanning value chains and markets;
- Fitness for globalised competition;
- Focus on customer needs and market opportunities;
- Dynamic understanding of the competitive landscape.

However, this profile reflects 'tendency' in the HGF population, and cannot be taken as a definitive identifying 'blueprint': no single HGF can be expected to abide by this characterisation in full, and a firm that does will not automatically achieve high growth. Ultimately, there is no simple way through conventional business data held by governments and its agencies to target support to HGFs, actual or potential. Finally, commentators emphasise the fact that high growth is not a linear process and few HGFs sustain high growth consistently over the long-term.

Importantly, research indicates that the firm size, firm age and industry sector characteristics of the cohort of agency-supported HGFs in Ireland is broadly similar to those reported for cohorts of HGFs in other jurisdictions.

Section Conclusions

C5: The application of 'unconventional datasets' to help detect HGFs and potential-HGFs during, or preceding, their growth phases could be explored.

C6: The use of data analytics techniques such as cluster analysis of HGF characteristics could be explored to resolve a family of simple HGF profiles, typical of the Irish economy and which can be applied to targeting, and identifying, actual and potential HGFs.

C7: Any pro-HGF support initiative must recognise, and be able to accommodate, the non-linear nature of HGF growth over the long-term.

Chapter 3 Findings – Innovation Behaviour

This chapter is the first of three exploring in detail the nature and implications of findings emerging from the study's data analysis, survey, and literature review workstreams. Fuller treatments of the data analysis and survey are provided in Annexes B and C respectively.

The specific focus of this chapter is the innovation behaviour of agency-supported HGFs and its contrasts with the non-HGF business base.

3.1 Innovation Behaviour – Key Messages from the CIS Data Analysis

The following sections review patterns in the responses of agency-supported HGFs and non-HGFs in Ireland to elements of the Community Innovation Survey (CIS) that provide an insight into 'innovation behaviour'. The implications of the dataset's focus on 'agency-supported' firms are discussed in detail in Annex B, alongside a fuller commentary of the data findings.

Reflecting the strategic context of the study, focus in the analysis and conclusions is placed on the behaviour of employment based agency-supported HGFs, and reference to turnover-based HGFs is made only when the two populations appear to adopt contrasting behaviours. The fuller analysis of turnover-based HGFs is provided in Annex B.

It is important to note that the dataset presents a substantially larger population of turnover-based HGFs than employment-based HGFs (see Table 2)[36].

Table 2: High Growth Firm Population

Metric	2002-05	2005-08	2008-11
Number of employment-based HGFs[37]	40	20	37
Employment-based HGFs as a per cent of Survivor Firms	8.8%	5.2%	5.6%
Number of turnover-based HGFs[38]	86	46	68
Turnover-based HGFs as a per cent of Survivor Firms	23.8%	14.1%	11.6%

Source: SQW

[36] The proportion of HGFs is represented as a percentage of survivor firms in Table 2. When HGFs are represented as a proportion of active firms in the final year of the observation period (which is the approach adopted by the OECD) as reported in Chapter 1, smaller values are realised. The data presented in Table 2 is based on the number of agency-supported HGFs and survivor firms for which CIS data was available, rather than the absolute number of agency-supported HGFs and survivor firms in each observation period.

[37] Employment-based HGFs are firms which have demonstrated 20 per cent or more average annualised growth in employment over a three year period, and for which there were more than 10 employees at the start of the three year period.

[38] Turnover-based HGFs are firms which have demonstrated 20 per cent or more average annualised growth in turnover over a three year period, and for which there were more than 10 employees at the start of the three year period.

Although a substantial number of employment-based HGFs are also turnover-based HGFs, not all employment-based HGFs fit into the turnover-based group. As a result, two distinct groups of HGFs exist in the study's sample.

The following sections refer to three groups of firms:

- HGFs – employment-based OECD definition (unless the turnover-based definition is specified);
- Positive-growth – all firms with employment growth over 0 per cent per annum (including HGFs);
- Negative growth – all firms with employment growth less than 0 per cent per annum.

Please refer to Annex B for a fuller treatment of the data analysis

Innovation Rates

The CIS data available for the survivor firms indicates that between 80 per cent and 93 per cent of HGFs across the observation periods were found to be innovating, while between 74 per cent and 86 per cent of non-HGFs indicated engagement in innovation.

Objectives of Innovation Activity

The CIS probed engagement with the following innovation activities:

- Increased ranges of goods or services;
- Outdated products or processes replaced;
- New markets entered, or increased market share;
- Improved quality of goods or services;
- Improved flexibility for producing goods or services;
- Increased capacity for producing goods or services;
- Reduced labour costs per unit output;
- Reduced material and energy costs per unit output;
- Reduced environmental impacts;
- Improved health and safety of employees.

Each of the innovation objectives were identified as important by a majority of the HGF group, with the exception of those concerned with an improvement in environmental, health, and safety performance. Particularly prominent objectives, in terms of the proportion of the HGF group that considered them important, were: 'increase the range of goods and services', 'enter new markets or increase market share', and 'improve the quality of goods and services'.

Overall, the HGF group's engagement with each innovation objective was largely aligned with that of non-HGFs. However, there is some evidence to suggest a relatively stronger emphasis, amongst the HGF group as a whole, on market-facing innovation as opposed to internal developments (such as process and systems innovations).

Nature of Innovation Activity

The CIS probed engagement with the following innovation activities:

- In-house research and development;
- Purchase of external research and development;
- Acquisition of machinery, equipment and software;
- Acquisition of other external knowledge.

Substantial proportions of the HGF group were engaged in each type of innovation activity. However, only in the case of 'in-house research and development' and 'acquisition of machinery, equipment, and software' did a majority of HGFs engage.

Overall, it is apparent that larger populations of the positive growth groups, including HGFs, are engaged in each type of R&D activity than is the case for the negative growth group. Although a larger population of HGFs acquire machinery, equipment, or software than non-HGFs, it is impossible to divine from this dataset whether this is a cause or effect of HGF status. It is worth noting that all firms in the sample were agency-supported firms and, as such, R&D activity is higher than would be the case for the wider population of firms in Ireland[39].

Type of Product/Process Innovation Activity undertaken

The CIS probed engagement with the following forms of product and process innovation:

- Introduction of new or significantly improved goods;
- Introduction of new or significantly improved services;
- Introduction of new or significantly improved methods of manufacturing or producing goods or services;
- Introduction of new or significantly improved logistics, delivery, or distribution methods for inputs, goods, or services;
- Introduction of new or significantly improved supporting activities for processes, such as maintenance systems or operations for purchasing, accounting, or computing.

Substantial numbers of HGFs were engaged in each type of innovation, with a majority engaging in each of the introduction of 'new or improved goods' and 'new or significantly improved methods of manufacturing or producing goods or services'.

Overall, there is some evidence to suggest a higher proportion of HGFs pursue service innovation than is the case for non-HGFs. However, as less than half of the HGF group engaged in this form of innovation, this activity cannot be considered a defining characteristic of an HGF. Furthermore, observations regarding service innovation may be skewed by an over-representation of service sector firms in the HGF samples being analysed.

[39] Based on the survivor firms for which CIS data was available, between 73% and 74% of the firms were found to be R&D active.

Novelty of Goods/Service Innovations

The CIS probed the novelty of goods and service innovations with the following question:

- Were any of your product innovations:

  New to your market?

  New to your firm?

Approximately half of the HGFs that engaged in product innovation introduced 'new to market' innovations. Overall, it is apparent that broadly equal numbers of HGFs introduced 'new to market' and 'new to firm' innovations, a pattern largely matched by the non-HGF groups (albeit with some suggestion that higher proportions of non-HGFs introduced 'new to market' innovations). Therefore, the extent to which HGFs demonstrate a distinct behaviour with regard to the novelty of innovations, again, appears to be limited.

Proportion of Turnover due to Goods/Service Innovations

The CIS probed the proportion of turnover due to goods and service innovations with the following question:

- Please estimate how your total turnover was distributed between the following categories:

  New or significantly improved goods and service innovations introduced that were new to your market;

  New or significantly improved goods and service innovations introduced that were new to your enterprise but not new to the market.

The large majority of HGFs attributed 0-25 per cent of turnover to 'new to market' or 'new to firm' goods and service innovations, with less than 5 per cent attributing over 75 per cent. This finding appears to conflict with the presentation of HGFs as 'innovative'. However, this observation is subject to interpretation; specifically, a firm may be culturally 'innovative', innovating by routine, but engaging in no formally designated 'innovation projects' and therefore attributing no turnover increase to such activity.

Overall, it is apparent that, as a group, HGFs attribute higher levels of turnover to 'new to market' and 'new to firm' goods and service innovations than non-HGFs. However, individually, a substantial number of HGFs attribute no turnover effect to innovation at all. Again, the extent to which an underlying 'innovativeness' of any HGF would appear in such explicit scoring should be considered when interpreting these results.

Types of Organisational Innovation

The CIS probed firms' engagement with the following forms of organisational innovation[40]:

- Introduction of new business practices for organising procedures;
- Introduction of new methods of organising work responsibilities and decision-making;

[40] NB: due to variation in the phrasing of this question in different CISs, this question has been simplified in analysis to enable combination of CIS responses across the 2002-11 period.

- Introduction of new methods of organising external relationships with other firms or public institutions.

Substantial numbers of the HGF group were engaged in each form of organisational innovation, with the highest proportion associated with internally orientated improvements to the organisation. However, no single form of organisation innovation was engaged in consistently by a majority of the HGF group.

Overall, there is evidence to suggest that HGFs engage in all forms of organisational innovation to a greater extent than lower growth rate groups. However, the level of HGF engagement in organisational innovation is not high enough to suggest that this activity is definitive or characteristic of HGF status.

Types of Marketing Innovation

The CIS probed engagement with the following forms of marketing innovation:

- Introduction of significant changes to the aesthetic design or packaging of a good or service;
- Introduction of new media techniques for product promotion;
- Introduction of new methods for product placement or sales channels;
- Introduction of new methods of pricing goods and services.

Although substantial numbers of HGFs engaged in marketing innovation, no single type of marketing innovation was engaged in by more than half of the HGF group. The type of marketing innovation that was engaged in by the highest proportion of the HGF group was 'new media techniques for product promotion'. Each of the remaining types of marketing innovation were engaged in by approximately a third of the HGF group.

Overall, despite evidence to suggest a higher level of engagement in marketing innovation amongst HGFs than non-HGFs, the fact that no single form of marketing innovation is engaged in by a majority of the HGF group limits the extent to which this dimension of innovation can be considered characteristic of HGFs.

The responses of the employment- and turnover-based HGFs-to this question were broadly aligned in terms of the comparison of HGF and non-HGF responses for each option. However, a smaller proportion of turnover-based HGFs were engaged in each form of marketing innovation than the employment-based HGF group. This pattern was most pronounced in the cases of ‘new media or techniques for product promotion’ and ‘new methods for product placement’, observations that appear to be significant statistically.

Types of Cooperation Partner involved

The CIS reveals that approximately a quarter of the HGF group cooperated on innovation activities. This figure is substantially below that of the non-HGF groups, with some indication that this observation is statistically significant. Cooperation is a pursuit of the minority across the sample, with no more than a third of any growth rate group engaging in such activity.

The CIS probed cooperation with the following types of partner:

- Other businesses within the firm’s enterprise group;

- Suppliers of equipment, materials, components, or software;
- Clients or customers;
- Competitors or other businesses in the firm's sector;
- Consultants, commercial labs, or private R&D institutes;
- Universities or other higher education institutions;
- Government or public research institutes.

Substantial numbers of HGFs that do collaborate did so with each type of partner. However, 'consultants, commercial labs, or private R&D institutes' were the only partner-type with which a majority of the HGF group collaborated. Conversely, the data reveal only a small proportion of the collaborating HGF group collaborated with 'competitors' or 'universities or other higher education institutions'.

Overall, there is some evidence to suggest that a lower proportion of the HGF group is engaged in collaborative innovation activities than is the case for non-HGFs. Those HGFs that do collaborate appear more inclined to partnership with 'consultants, commercial labs, or private R&D institutes' than non-HGFs.

This conclusion would appear to conflict with wider commentary in the literature regarding the networking behaviour of HGFs. However, whilst HGFs are considered to be typically more 'networked' than their competitors, they may be less inclined to the formality of cooperation intimated by the line of inquiry adopted by the CIS.

Entity Responsible for Developing Product/Process Innovations

Further to the investigation of collaboration activity, the CIS probed the entity responsible for developing product and process innovations with the following questions:

- Were these (products/processes) developed mainly by:

  Your enterprise or enterprise group?

  Your enterprise with other enterprises or organisations?

  Other enterprises or organisations?

The majority of HGFs originated their product innovations themselves, with a small minority (<20 per cent) identifying partners as the co-originator or sole originator. This is the case for both product and process innovations.

Overall, there is no strong case to propose a distinct characteristic behaviour amongst HGFs with regard to the parties responsible for originating product or process innovations, with the large majority originating innovation themselves.

Although there is evidence to suggest higher levels of engagement amongst the HGF group as a whole in innovation occurring outside firm boundaries when compared with non-HGFs, the size of the population was so small that caution should be taken when seeking to derive firm conclusions from this observation.

Detailed Data Analysis

The above analyses of the linked ABSEI and CIS datasets provided some insights into the innovation behaviour of high growth and non-high growth firms. The results were not

conclusive as to specific innovation behaviours undertaken by HGFs only; in addition, the results represented correlation effects rather than causation.

In order to uncover further the relationships between innovation and employment growth within firms, regression analysis was undertaken. The purpose of this analysis was to determine the causal link, if any, between past innovation behaviour and subsequent employment growth in firms. Analysis was also undertaken to establish whether past employment growth had an effect on innovation activity.

The results of the regression analysis provided limited evidence for a strong causal link between innovation activity and growth. This was partly due to a low number of observations, and within that, small numbers of firms actually growing, particularly in the latter period.

The results showed that growth was associated with previous product and organisational innovation, but only when the entire 2002-11 period was considered. Innovation activity was found to be associated with similar innovation behaviour in previous years, and was also found to be negatively associated with previous growth, suggesting that firms with low or declining growth were more likely to make changes to their process, organisational or marketing practices in the future.

A full review of the regression analysis is provided in Annex F.

Section Key Messages: 'Innovation behaviour – key messages from the CIS data analysis'

The data analysis provides no examples of 'stark' contrasts between the proportion of HGFs and non-HGFs engaging in specific behaviours. Furthermore, a lack of extreme 'highs' and 'lows' in the proportions of HGFs engaging in specific behaviours limits the extent to which definitive or characteristic behaviours can be identified.

As a result, the data presents a picture of 'tendency' in the HGF population, which, for any one behaviour, is opposed by substantial numbers of HGFs. The data does not reveal a specific blueprint for the innovation behaviours of HGFs.

In headline terms, the following observations concerning the innovation behaviour of HGFs may be drawn from the analysis of CIS data:

- The HGF group's engagement with each innovation objective was largely aligned with that of non-HGFs. However, there is some evidence to suggest a relatively stronger emphasis, amongst the HGF group as a whole, on market-facing innovation, as opposed to internal developments (such as process and systems innovations);
- Larger populations of the positive growth groups, including HGFs, were engaged in each type of R&D activity than was the case for the negative growth group. Although a larger population of HGFs acquired machinery, equipment, or software than non-HGFs, it was not possible to divine whether this was a cause, or effect, of HGF status from this dataset;
- There was some evidence to suggest a higher proportion of HGFs pursue service innovation than is the case for non-HGFs. However, as less than half of the HGF group engaged in this form of innovation, this activity

cannot be considered a defining characteristic of an HGF;

- Broadly equal numbers of HGFs introduced 'new to market' and ‘new to firm’ innovations, a pattern largely matched by the non-HGF groups (albeit with some suggestion that higher proportions of non-HGFs introduced 'new to market' innovations);
- As a group, HGFs attributed higher levels of turnover to ‘new to market’ and ‘new to firm’ goods and service innovations than non-HGFs. However, individually, a substantial number of HGFs attributed no turnover effect to innovation;
- There is evidence to suggest that HGFs engage in all forms of organisational innovation to a greater extent than lower growth rate groups. However, the level of HGF engagement in organisational innovation was not high enough to suggest that this activity is definitive or characteristic of HGF status;
- Despite evidence to suggest a higher level of engagement in marketing innovation amongst HGFs than non-HGFs, no single form of marketing innovation was engaged in by a majority of the HGF group;
- A lower proportion of the HGF group was engaged in cooperative innovation activities than is the case for non-HGFs. Those HGFs that did cooperate appear more inclined to partnership with 'consultants, commercial labs, or private R&D institutes' than non-HGFs;
- Finally, it is important to recognise that these observations are largely qualitative in nature: statistical significance in the differences between HGF and non-HGF groups is limited.

Section Conclusions

C8: A pro-HGF support initiative should not seek to instil a single, standard model of innovation within the potential HGF. Rather, any innovation solution must be context-specific.

C9: Although a single model for innovation in the HGF, distinct from the non-HGF, is not apparent, key traits amongst HGFs that may form foci for support provision include market orientation, networking, operational flexibility, and business model flexibility.

C10: Not all firms displaying the innovation traits of an HGF will necessarily achieve high growth: allowance, and filtering, for this needs to be a feature of any pro-HGF support initiative.

3.2 Innovation Behaviour – Key Messages from the Survey of Enterprises

The following sections review patterns in the responses of HGFs and non-HGFs to elements of the survey that provide an insight into 'innovation behaviour'. Highlights are provided below, with a fuller commentary provided in Annex C.

Headline Indicators of Innovation Behaviour

The survey provided an opportunity to consider differences between HGF and non-HGF groups on the following themes pertaining to 'innovation behaviour':

Nature of Innovation

Applying the OECD's five 'modes' of innovation (see Annex D) to probe the nature of innovation, it is apparent that substantial numbers of HGFs pursue each mode of innovation. 'Technology innovating',' Process Modernising' and 'Wider Innovating' activities were pursued by a majority of surveyed HGFs.

The survey did indicate some differences in the types of innovation pursued by HGFs and non-HGFs: a higher proportion of the HGF sample engaged in marketing based innovating and wider innovating than the non-HGF sample.

Frequency of Innovation

No simple, consistent pattern is apparent in the comparison of innovation rates presented by HGFs and non-HGFs. Discussion of cues for innovation efforts by HGFs indicates a strong role being played by market patterns outside the firm, principally demand signals. As a result, inconsistency in the rate of innovation may be considered to reflect the complexities of market 'pull' as opposed to firm 'push'.

A further issue to consider when seeking explanations for the pattern of innovation in HGFs is the often informal, universal nature of innovation processes within these firms. In this regard, innovation is not switched on, or off, within an HGF, making the rate difficult to estimate.

Relationship between Innovation and Growth

Exploration of the linkage between innovation and growth in HGFs reveals less than a third considered the relationship 'very close'. This is a smaller proportion than that of the non-HGF group. Therefore, innovation-led growth cannot be considered a trait universal or specific to HGFs. This point is reinforced by data indicating that 77 per cent of the HGF sample identified growth as the primary objective for their innovation activity, the same (77 per cent) as for the non-HGF sample.

Again, when seeking an interpretation of this information, the extent to which innovation is a discrete, explicit process must be considered. Put simply, a culturally 'innovative' firm may not classify routine activities as 'innovation'.

Collaboration

Exploration of collaboration with universities, suppliers, clients, competitors, and service providers revealed generally higher levels of collaboration amongst HGFs than non-HGFs, with a higher proportion of the HGF sample engaged in collaboration with clients and universities.

This observation appears to conflict with findings of the CIS data analysis, which indicated that a lower proportion of the HGF group engaged in cooperative innovation activities than non-HGFs. To some extent, the basis of this conflict may be found in the definition of

'collaboration': whilst HGFs may be 'in productive dialogue' with partners, they may not be formally collaborating.

Overall, the data provides some support for the characterisation of HGFs as 'market facing' or 'market orientated' in their business model. Furthermore, the 'networked' model of innovation, highlighted as being prevalent amongst HGFs in the literature, finds some support from this aspect of the survey. These findings provide a complex picture with regard to collaboration: where HGFs engage in collaboration, clients feature strongly, but the survey, nor the CIS data analysis, indicates that collaboration is definitive or characteristic of HGFs.

Key Themes in the Stories of High Growth

In complement to the preceding comparison of HGF and non-HGFs, the survey provided an opportunity to establish the drivers and actions driving high growth from the perspective of each HGF. This section collates key themes emerging from these conversations.

Survey Sample - High Growth Exemplar 1

An established design-led food-packaging manufacturer achieved high growth by employment in 2005-08.

- The firm was originally founded to exploit design-IP.
- The business has enjoyed rapid growth due to its novel product offer. Continued development and update of the product is a key emphasis in business strategy. This is complemented by investments in process and systems capacities in order to effectively serve international markets.
- High growth followed investment in manufacturing facility, followed by opening of new geographic markets, and introduction of new products, leading to growing traction of product range, a number of significant contract orders, and investment in production capacity.
- The firm has invested heavily in existing product development, new product development, manufacturing capabilities, materials, distribution, supply chain collaboration, and systems.
- Key themes in the innovation programme include: revenue growth, increased market share, penetration of new markets, productivity and efficiency, and regulatory compliance.
- The firm maintains an internal design team, with development informed by client, supplier, and broader market feedback, together with regulatory change.
- The core strategic focus is product innovation: with growth, the firm has increasingly invested in processes and systems, together with service and delivery capabilities focused on supporting scale. As a result, the firm has reduced turnaround times, enhanced supply chain integration, and improved process efficiency whilst introducing new products.
- The principal barrier to growth has been the capacity to transfer new designs to commercial product offers. Reflecting this, the firm has

targeted extension of its production capacity (and flexibility) in order to limit 'time to market' for new products.

- The firm has found that the private finance market will serve commercially sound propositions; however, higher risk, longer-return investments are harder to fund.

Wide Variety of Market Strategies

The consulted HGFs in the survey work presented a variety of market strategies, with employment growth attributed to a series of acquisitions, territorial expansions, new products or service launches, new contracts, or responses to emerging market opportunities. Naturally, the specific market strategy driving growth appears to be influenced strongly by the specific market context. These conversations suggest that, rather than adopting a 'standard model' in market strategy, HGFs select and implement the market strategy most appropriate to the market context.

Existing Products or Services to New Markets

The majority of consulted HGFs pursue a set of market strategies in parallel, typically including activities focused on consolidation of existing market positions, expansion of market territory, and extension of product or service ranges.

In this context, activity focused on delivering existing products or services to new markets represents a particular focus for a majority of the HGFs consulted. This activity included efforts to access new markets through network building and developing the client-facing proposition through tailoring of the services accompanying goods or the services themselves.

Differentiation for Comparative Advantage

A majority of consulted HGFs considered differentiation of their proposition as a dominant factor of their comparative advantage. In these cases, differentiation efforts appear to focus on 'quality' and the 'value-added' service. In dynamic markets, the maintenance of a differentiated proposition emerges as a key focus of the innovation effort.

The use of value-added services to differentiate the core proposition is a common feature of the competitive strategy employed by the consulted HGFs. This behaviour suggests a degree of efficiency in the innovation model, directing investment into the delivery and packaging of propositions as opposed to the larger, 'riskier' investments in new product or service R&D.

'Innovativeness' versus 'Innovation Projects'

Few of the HGFs consulted operated formalised, labelled 'innovation projects', but all demonstrated activity falling into one or more of the OECD's 'modes of innovation' categories (see Annex D). Based on these conversations, it is apparent that the HGFs innovated 'by routine' across the business, rather than simply investing in discrete 'innovation projects' considered distinct from 'normal' operations.

In essence, the HGFs consulted during this survey demonstrate a high level of 'innovativeness' that pervades the business, with few explicitly labelling their activity 'innovation'. These findings present two important implications for the study:

- Innovation may be difficult, if not impossible, to dissect from an HGFs wider business model;

- Support may have to be broad in scope, with a capacity to enable multiple forms of innovation: pervasive 'innovativeness' rather than specific innovation projects.

Market Awareness and Understanding

The large majority of consulted HGFs presented strong connectivity with their clients, whether it be the end-user or a mediating party. In each case, the HGF had invested in nurturing this connectivity, developing a stream of feedback from clients that informed the development of products and services, as well as the broader business strategy.

Opportunity-Spotting and Responsiveness

Enforcing the vision of strong 'market awareness' provided through client relationships, the management teams of consulted HGFs demonstrated extensive capability for tracking market trends, spotting opportunities, and coordinating rapid responses. A number of the HGFs appeared to be engaged in a continuous cycle of spotting and sifting opportunities emerging in the market, a behaviour that places emphasis on a firm's ability to appraise opportunities and coordinate a timely and effective response.

In this regard, the innovation model prevalent amongst HGFs appears to favour 'market pull' rather than 'technology push' factors.

Agility in Responding to Opportunity

The preceding paragraphs highlight the necessity of an HGF's capacity and capability for response to emerging opportunities. Responses observed amongst consulted HGFs span tailoring of products and services to meet new demands, investments in regulatory compliance to access new clients, engagement of third parties to extend market reach to new territories, and short-term increases in output to match demand patterns.

Three traits, common to the majority of consulted HGFs, appear key to engineering such responses. These are:

- A broad skill-base, experience, and adaptive capacity within the management team and wider workforce;
- Fluid operational procedures that are readily reconfigured or reoriented;
- A capacity amongst the management team to leverage financial and material resources for the development activity (through conventional sources or novel partnerships with clients);
- A wide network of partners able to support or facilitate market access or attenuation of the product/service offer.

Importantly, these consultations indicate limited speculative investment in innovation, with rapid response to known, or even secured, opportunities with a higher degree of certainty clearly favoured.

Section Key Messages: 'Innovation behaviour – key messages from the survey of enterprises'

The survey reveals the following with regards to the distinction between surveyed HGF and non-HGF populations:

- A higher proportion of the HGF sample engaged in marketing based

innovating and wider innovating than the non-HGF sample;

- No simple, consistent pattern was apparent in the comparison of innovation rates presented by HGFs and non-HGFs;
- Less than a third of surveyed HGFs considered the linkage between innovation and growth to be 'very close', a smaller proportion than that of the non-HGF group. Furthermore, 77 per cent of the HGF sample identified growth as the primary objective for their innovation activity, compared with 77 per cent of the non-HGF sample.

Exploration of collaboration with universities, suppliers, clients, competitors, and service providers revealed generally higher levels of collaboration amongst HGFs than non-HGFs, with a substantially higher proportion of the HGF sample engaged in collaboration with clients and universities. Key themes emerging from conversations with HGFs reveal the following behaviours to be common broadly:

- Use of a wide variety of market strategies for growth, incorporating acquisition, territorial expansions, new products or service launches, new contracts, or responses to emerging market opportunities;
- Widespread use of an 'existing products or services to new markets' model of innovation;
- Use of differentiation and 'niche-building' for comparative advantage, typically utilising service innovations accompanying the core proposition to re-profile or reposition the 'offer';
- The prevalence of 'innovativeness' by routine, permeating the business as a whole, as opposed to simply focusing on 'discrete' innovation activity, isolated from the wider operation;
- Strong market tracking capability, including client connectivity and feedback, informing the development of products and services, as well as the broader business strategy;
- Extensive capability for tracking market trends, spotting opportunities, and coordinating rapid responses within management teams;
- Agility in responding to opportunity, including the leverage and coordination of internal and external resources.

Section Conclusions

C11: Complementing the CIS data analysis, the survey of enterprises highlights traits common to substantial numbers of HGFs. These include cultural 'innovativeness', flexible business models, growth ambition, and market orientation. Understanding of, and alertness to, these facets associated with 'growth success' should be a feature of any innovation-led pro-HGF initiative.

C12: The diversity of the HGF innovation model indicated in the study's survey of enterprises emphasises the need for context-specific approaches in any support intervention.

3.3 Innovation Behaviour – Key Messages from the Literature

Preceding studies have highlighted a strong correlation between innovation and high growth: for example, NESTA (2011) finds innovative firms grow twice as fast as non-innovative ones[41]. However, whilst some certainty surrounds the relationship between innovation and high growth, the nature of innovation within HGFs is less clear.

All innovation does not lead to high growth and innovation can often be a necessity for survival, rather than growth.

The Work Foundation has found that HGFs are primarily concerned with product or service innovation (often incorporating Intellectual Property Rights (IPR)), together with novel approaches to market entry, and the evolution of business models[42]. Complementary studies propose HGFs specialise in the development and commercialisation of new niche ideas, technologies, and products[43]. In this context, formalised R&D is of less importance: an HGF's innovation model is believed to be concentrated more on service innovation as opposed to the exploitation of R&D-driven invention and discovery[44]. However, Hölzl argues that the importance of R&D to high growth potential is more pronounced in technologically advanced countries[45].

Completing this overview, a majority of commentators highlight the importance of 'co-creation' in partner networks to the HGF innovation model: in this vein, NESTA observes a process of 'hidden innovation' performed in partnership with clients and focusing on customisation, packaging, and the delivery of existing products/services.

Building on this overview, preceding studies make the following observations of HGF innovation traits:

- There is frequently emphasis on product innovation and business model innovation (relative to other modes such as process innovation);
- Leverage of co-creation and networked knowledge production, as opposed to simply focusing on formalised R&D expenditure, is a key behaviour;
- There is utilisation of Intellectual Property Rights (IPR) to a higher degree than the general business stock (e.g. brand names and copyrights);
- The capacity to evolve business models rapidly in response to emerging opportunities is a notable feature;
- There is emphasis on customer engagement and business-to-business partnerships, which when fully developed gives rise to full-blown open innovation activity;
- Service innovation is used as a means to develop, enhance, or position the core product or service proposition;
- There is focus on innovative market strategy, specifically positioning and differentiation, as a source of competitive advantage.

---

[41] Vital Growth:The importance of high growth businesses to the recovery, NESTA, 2011

[42] Ready, Steady, Grow? How the government can support the development of more high growth firms, The Work Foundation, 2011

[43] Internationalisation of Innovative and High Growth SMEs, BIS, 2011

[44] Mason C., Brown R., Small Business Economics, 40,2, pp 211-225, 2013

[45] Hölzl W., Small Business Economics, 33:59-75, 2009

Reflecting the combination of these traits, HGFs are characterised as 'prospectors', continually looking for new opportunities, generating multiple income streams, and de-emphasising defensive strategies.

However, as with the preceding discussion of characteristics, no fixed, 'standard innovation model' can be assumed for HGFs: the same approach may yield different results in different contexts and failure to evolve the innovation model may explain the routine failure of HGFs to sustain high growth over the long-term. As a result, activity must fit the internal and external context (and their evolution over time).

Section Key Messages: 'Innovation behaviour – messages from the literature'

Expert commentary includes the following observations regarding the innovation behaviour of HGFs:

- An emphasis on product innovation and business model innovation amongst HGFs (relative to other modes such as process innovation);
- Leverage of co-creation and networked knowledge production, as opposed to simply focusing on formalised R&D expenditure, amongst HGFs;
- Higher levels of engagement in IP protection than the general business stock (e.g. brand names and copyrights);
- Emphasis of customer engagement and business-to-business partnerships in the networked innovation model adopted by HGFs;
- Emphasis on market strategy, specifically positioning and differentiation, as a source of competitive advantage.

Overall, a key message emerging from the literature is that HGFs are 'innovative', rendered distinct by virtue of an 'innovativeness' that permeates systems, processes, and attitudes, as opposed to simply focusing on discrete innovation projects. As a result, innovation cannot be considered a dimension of an HGF that is distinct from its wider operations and strategies.

Section Conclusions

C13: Any innovation-orientated, pro-HGF initiative must adopt a 'whole of enterprise' approach, seeking to support 'innovativeness' in the round, as opposed to simply focusing on the establishment of 'discrete' innovation projects.

C14: Set in the context of support for 'innovativeness', building innovation capabilities should be a critical theme in any pro-HGF support initiative. The key foci here should be market orientation, opportunity spotting, and networking.

Chapter 4 Findings – Innovation Barriers

This chapter is the second of three exploring the implication of findings emerging from the study's data analysis, survey, and literature review workstreams. Fuller treatments of the data analysis and survey are provided in Annexes B and C, respectively.

The specific focus of this chapter is the barriers to an innovation model typical to HGFs.

4.1 Innovation Barriers – Key Messages from the CIS Data Analysis

The data used to inform this commentary are subject to the same conditions highlighted in the introduction to the preceding chapter's treatment of innovation behaviours. This is that the dataset under review is composed entirely of agency-supported firms, with commentary focusing on the employment-based HGF (referencing distinct turnover-based HGF issues as appropriate). A detailed review of the data analysis is provided in Annex B.

The CIS data available for the survivor firms indicates that between 80 per cent and 93 per cent of HGFs across the observation periods were found to be innovating, while between 74 per cent and 86 per cent of non-HGFs indicated engagement in innovation.

The CIS does indicate that circa 35 per cent of all HGFs abandoned some innovation activities during the observation period, indicating a substantial impact of barriers to innovation acting upon HGFs. Qualitatively, a higher proportion of HGFs abandoned some innovation activities than non-HGFs. Although there is no indication that this difference is statistically significant, this observation may signal a higher degree of flexibility in response to context within the innovation programmes of HGFs.

The CIS probed the barriers to innovation with the following question:

- How important were the following factors in preventing your enterprise from innovating or in hampering your innovation activities:

  Lack of funds within your enterprise or group?

  Lack of finance from sources outside your enterprise?

  Innovation costs too high?

  Lack of qualified personnel?

  Lack of information on technology?

  Lack of information on markets?

  Difficulty in finding cooperation partners for innovation?

  Market dominated by established businesses?

  Uncertain demand for innovative goods or services?

  No need due to prior innovations by your enterprise?

  No need because of no demand for innovations?

The most common barrier to innovation identified by the HGF group was a 'lack of funds within the enterprise', a factor echoed by another barrier commonly cited by the group, namely the 'costs of innovation'. However, no single barrier was selected by a majority of the HGF group, with roughly 20 per cent-40 per cent selecting each option.

HGFs and non-HGFs were broadly aligned in terms of the proportions of each group identifying each barrier to innovation. Qualitatively, a lower proportion of HGFs identified each barrier than the non-HGF groups. This pattern was most pronounced when considering the costs of innovation, the sufficiency of information available on technology and markets, and the dominance of established enterprises. However, the extent to which these observations appear to be statistically significant is limited.

Overall, it is apparent that the profile of barriers cited by HGFs is similar to that of non-HGFs. However, as a group, a lower proportion of HGFs identify each barrier to innovation than non-HGF groups. Acknowledging limited indication of statistical significance in these observations, it is possible to propose that HGFs, as a group, are more resilient when faced with obstacles to innovation.

Section Key Messages: 'Innovation barriers – messages from the CIS data analysis'

The most common barriers to innovation identified by the HGF group were a 'lack of funds within the enterprise' and 'costs of innovation'. No single barrier was selected by a majority of the HGF group, with roughly 20 per cent-40 per cent selecting each option.

HGFs and non-HGFs were broadly aligned in terms of the proportions of each group identifying each barrier to innovation. Qualitatively, a lower proportion of HGFs identified each barrier than the non-HGF groups. This pattern was most pronounced when considering the costs of innovation, the sufficiency of information available on technology and markets, and the dominance of established enterprises.

As with the preceding analysis of 'innovation behaviour', it is important to recognise that these observations are largely qualitative in nature: statistical significance in the differences between HGF and non-HGF groups is limited. Furthermore, a lack of extreme 'highs' and 'lows' in the proportions of HGFs engaging in specific behaviours limits the extent to which definitive or characteristic behaviours can be identified.

Section Conclusions

C15: Any future pro-HGF support programme must incorporate an 'access to finance' component.

C16: Whilst HGFs and non-HGFs largely face the same barriers, the distinction between the two appears to come with the responses that are made to these barriers. Any future support provision must incorporate a strategic aspect focused on the development of effective and firm-specific growth planning (risk-balanced, opportunity spotting, and problem-solving).

4.2 Innovation Barriers – Key Messages from the Survey of Enterprises

The survey revealed a lack of resources, principally financial, and a lack of skills in the labour market to be the barriers cited most commonly by HGFs, although neither are cited by a majority of those surveyed. Alongside resources and skills, a small minority of surveyed HGFs cited lack of knowledge on technology or markets and a lack of strategic drivers as a barrier to innovation.

This pattern is largely replicated by non-HGFs, although a higher proportion of the non-HGFs cited lack of resources and lack of skills as a barrier to innovation (when compared with HGFs). A majority of non-HGFs referred to each of these barriers when discussing obstacles to innovation.

Survey Sample: High Growth Exemplar 2

An established R&D-intensive medical technology firm achieved high growth by employment in 2002-05.

- To date, the firm's strategy has focused on the development and exploitation of IP.
- Inputs into the innovation strategy have been various, particular effort is focused on the aggregation of information from across the value chain: supply chain partners, clients, and academics have all been important. The firm also maintains a strong internal ideas generation process lead by the CEO and CTO.
- In 2002-05, the firm did not have the resources or market presence required to effectively commercialise its IP.
- In order to develop a commercial proposition, the firm engaged a series of major corporates in the sector, leveraging academic and professional network relationships.
- The firm subsequently engaged in collaborative research and development ventures that have successfully reached the market, without losing IP rights (as may have been the case in contract research, VC investment, or academic collaboration).
- Academia's pursuit of patents and publications is considered to limit the value that can be derived from collaboration for SMEs, with firms typically exiting a partnership with no ownership of IP, restricted licence conditions, and limited opportunity to attract subsequent rounds of investment as a result. As a result, relationships with academic partners carry high risk. Further, licencing carries high-bureaucratic weight.
- Finance is considered the fundamental determinant of the shape and size of the R&D programme. Although finance is readily available in the market, it often carries restrictive terms.
- In the future, the firm aims to develop its own commercialisation infrastructure in order to capture a larger share of revenues derived from IP exploitation and minimise exposure to collaborators.

The data indicate a level of similarity between the HGF and non-HGF samples, with lack of finance and lack of skills in the labour market dominant for each group. However, there was some evidence to suggest a smaller proportion of HGFs feel these pressures than non-HGFs, an observation that may suggest HGFs are more resourceful when seeking to innovate.

Overall, finance emerged as the key concern for HGFs from conversations on the theme of barriers to innovation. However, a smaller proportion of HGFs considered the availability of finance to be an obstacle to innovation than that of non-HGFs. Again, there was some indication of efficiency and/or resourcefulness in the HGF innovation model.

Section Key Messages: 'Innovation barriers – key messages from the survey of enterprises'

The survey reveals a lack of resources, principally financial, and a lack of skills in the labour market to be the barriers cited most commonly by HGFs, although neither are cited by a majority of those surveyed.

This pattern is largely replicated by non-HGFs, although a higher proportion of the non-HGFs cite lack of resources and lack of skills as a barrier to innovation (when compared with HGFs).

Overall, there is some evidence to suggest HGFs are more resourceful, or resilient, when overcoming barriers to innovation.

Section Conclusions

C17: Any future pro-HGF support initiative must incorporate an 'access to resources' component, providing access inter alia to finance, knowledge, and skills capacities that includes development of 'resourcefulness' in the management team, strategy, and operational model.

4.3 Innovation Barriers – Key Messages from the Literature

It is important to emphasise, at this point, a key finding emerging from the study regarding innovation and HGFs is that innovation does not appear to exist as a 'department' or isolated activity within the HGFs generally. Rather, HGFs are innovative in culture, with innovation pervading the functions and mind-sets of the firm 'by routine'. As a result, it is difficult, if not impossible to isolate the innovation within an HGF. Consequently, when considering constraints to innovation, barriers to high growth more broadly should be in view.

The following sections summarise commentary regarding each of the following three perspectives:

- Barriers to the achievement of high growth;
- Barriers to sustaining high growth;
- Barriers to innovating like HGFs.

Barriers to the Achievement of High Growth

Commentary regarding barriers to the achievement of high growth typically presents an inverted version of the HGF profile discussed in Chapter 2: attributing failures to achieve high growth to weaknesses in firms' competences. This commentary is complemented by discussion of the factors inhibiting growth in the external operating environment. Ultimately, evidence suggests a holistic approach to the discussion of barriers is required, integrating factors internal and external to the firm.

The table below provides a summary of those internal and external barriers prominent in commentaries of factors impeding the achievement of high growth.

Table 3: Factors impeding the achievement of high growth

Internal	External
▪ Failures to identify and exploit the firm's core source of comparative advantage ▪ Limited capacity for the management of finance, marketing, and workforce ▪ Conservatism in the growth motivation and aspiration of management teams derived from risk and uncertainty ▪ Limited ability to identify, appraise, and respond to growth opportunities ▪ Weaknesses in the firm's capability to build productive relationships with clients or partners ▪ Inexperience in the management team, undermining the plotting of investments in growth ▪ Failure to pair technological innovation with an effective 'delivery system' enabling its translation to market	▪ Limited access to finance (loans and equity investment) ▪ Acquisition-orientated growth strategies within established competitors ▪ Economic and market trend ▪ Suppression of high potential spin-outs by non-compete agreements between employer and former employee ▪ Weaknesses in the capacity of Universities to engage in knowledge transfer with businesses and entrepreneurs (in part derived from the constraints of HEI IPR) ▪ Low demand for innovative products from new businesses amongst consumers ▪ Costs and complexity of regulatory compliance in innovation-intensive sectors

Source: SQW, compiled from various literature sources.[46,47,48,49]

[46] Bosma N., Stam E., Local Policies for High-Employment Growth Enterprises (2012)

[47] Lilischkis S., Policies in support of high growth innovative SMEs , INNO-Grips – Global Review of Innovation Policy Studies, 2011

[48] Love J., Rope S., SME Innovation, Exporting and Growth, http://enterpriseresearch.ac.uk/default/assets/File/ERC%20White%20Paper%20No_5%20Innovation%20final.pdf, 2013

[49] Vital Growth:The importance of high growth businesses to the recovery, NESTA, 2011

Importantly, failure to achieve high growth is often attributed to multiple, context-specific factors and not a result of one critical failure common to all. In this regard, the 'pervasive heterogeneity' of HGFs is, again, an important consideration

Challenges in the Operating Environment

In reviews of factors determining the potential to achieve high growth, the importance of the external operating environment is emphasised. Factors commonly cited include market trends such as demand and competition, macroeconomic conditions, SME banking cultures, and regulatory constraints (principally the costs and investment risks associated with regulatory compliance)[50]. In addition to these 'structural' conditions, a significant portion of the literature highlights the cultural inhibitors of entrepreneurialism, such as societal risk aversion, the social stigma of bankruptcy or business failure, and consumer preference for large brands as barriers to the achievement of high growth (on the basis that higher numbers of HGFs will result from higher numbers of 'chances' being taken by entrepreneurs)[51].

Management Capability and Motivation

Previous chapters have highlighted management capabilities as a principal determinant of HGF status, focusing on the 'opportunity alertness' and 'entrepreneurial motivation' of the start-up team (and their ability to evolve managerial skills to meet the demands of a growing firm)[52].

Specifically, attention focuses on weaknesses in a firm's capability to identify and target opportunities to attain comparative advantage, disregard strategic 'dead-ends', plot an efficient and effective development trajectory, and leverage and coordinate the resources, human, financial, and material, necessary to exploit those opportunities.

In addition, although high growth is known to be based on multiple internal and external factors, the necessity of a sustained strategic ambition and vision within the management team is considered one quality that cannot be done without[53].

Access to Finance

Access to finance is a ubiquitous feature of the commentary regarding obstacles to the achievement of HGF status; amplified in the post-2008 environment[54]. The issue has two dimensions, the first concerns the financial capability of the firm, and the second concerns the capacity of financial markets.

The following issues are raised routinely with regards to the capabilities of those seeking finance:

- Lack of understanding with regards to sources of investment;
- Lack of understanding with regards to the staging of investment rounds;
- Lack of capacity with regards to formulation of business planning and investment propositions.

---

[50] Mason C., Brown R., Small Business Economics, 40, 2, pp. 211-225, 2013

[51] Storey. 2011. 'Optimism and chance: the elephants in the entrepreneurship room'. http://sro.sussex.ac.uk/40076/

[52] Ministry of Trade and Industry (2007) High Growth SME Support Initiatives in Nine Countries: Analysis, Categorization, and Recommendations

[53] Mason C. and Brown R., 'High Growth Firms in Scotland', Scottish Enterprise, 2010

[54] High Growth Enterprises: What Governments Can Do to Make a Difference, OECD, 2010

In essence, potential-HGFs may be stifled simply by a lack of investment-readiness' as opposed to weaknesses in the proposition. These issues are paired with commentary highlighting failures in the investment market outside the financial centres, including:

- Limits to the Venture Capital and Business Angel investment pool;
- Risk aversion amongst investors;
- Limits to SME banking terms.

When considering 'access to finance' as a barrier, the purpose of finance within potential HGFs is important. A weight of commentary proposes that finance is too readily directed to R&D within a firm that has limited capacity to exploit the product of that activity, as a result, the necessity of investments in networks and marketing is emphasised.

Challenges to Sustaining High Growth

The preceding section bears an implicit emphasis on the achievement of high growth for the first time (typically by young firms). In part, this reflects the higher rates of young firms achieving high growth and the focus on start-ups in the 'enterprise and entrepreneurialism' field. However, as has been established in preceding chapters, HGFs face substantial challenges in sustaining high growth.

The principal explanation for this feature of HGFs, as put forward in the literature, is a failure to update and evolve a firm's business model and growth strategy following a period of high growth. As firms grow, shifts in the internal and external context, such as the complexity of operations and the firm's competitive position, erode the efficacy of routines responsible for the initial phase of high growth.

Allied to this deterioration of performance resulting from an adherence to 'old' routines, the high number of small, younger HGFs that are acquired further hints at a plateau being reached in the firm's capacity to drive further growth. The underlying reasons may include insufficient resources or market platform for exploitation, pressure from investors seeking short-term 'exits', or a limited capacity to develop the management systems required in the larger business.

Ultimately, the implication of this pattern when thinking about support is that the challenges facing a firm with future high growth potential will reflect its developmental stage and recent history. Therefore, support cannot be standardised: crucially, from a different delivery perspective, one size will not fit all.

This point is illustrated by a framework developed by the Finnish Ministry of Trade and Industry (2010) which plots principal challenges and potential interventions corresponding to key growth stages of an enterprise (see Table 4).

Table 4: Challenges and potential interventions corresponding to key growth stages of an enterprise

Phase	Threshold	Critical factors contributing to threshold achievement	Policy implications
Pre-Launch	Launching platform	▪ Business planning ▪ Resource mobilization and access (facilities, management team, finance, technology, complementary assets, business services) ▪ Pre-acceptance by supply chain and customers	▪ Facilitate resource provision, seed finance ▪ Provide business infrastructure ▪ Provide advice ▪ Facilitate social capital, networks ▪ Facilitate small-large firm relationships ▪ Facilitate market entry
Market Launch	Legitimacy	▪ Firm launch ▪ Establishment of business relationships ▪ Testing and consolidating a business model ▪ Creating administrative and fiscal routines ▪ Building momentum and market share	▪ Reduce compliance costs ▪ Trim, streamline regulatory framework ▪ Provide advice, consulting service
Market Proof	Concept Validation	▪ Local search, experimentation, business model adjustment ▪ Customer commitment ▪ Sustainable cash-flow ▪ Business model acceptance ▪ Going concern status	▪ Reduce compliance costs ▪ Regulatory simplification ▪ Enhance resource flexibility (flexible job relationships) ▪ Provide mentoring support ▪ Reduce cost of exit, bankruptcy cost

Phase	Threshold	Critical factors contributing to threshold achievement	Policy implications
Growth Framing	Growth platform	▪ Growth opportunity framing ▪ Identification of market and customer growth trajectory ▪ Identification of product service development trajectory ▪ Identification of asset scale-up trajectory ▪ Identification, quantification of scale-up resources	▪ Strengthen business opportunity evaluation skills, strategic planning competence ▪ Remove regulatory barriers to growth ▪ Solicit private-sector growth resources and business services
Scale-Up	Growth	▪ Growth resource mobilisation and access (management team succession, board expertise, venture finance, workforce) ▪ International market access ▪ Building up organizational systems and resources	▪ Smoothen compliance requirements ▪ Provide support for internationalization ▪ Facilitate experience exchange ▪ Facilitate private equity market
Consolidation	Sustainability	▪ Organisational consolidation ▪ Regulatory compliance ▪ International market positioning	▪ Facilitate IPO markets

Source: Finnish Ministry of Trade and Industry, 2010

Barriers to HGF-Type Innovation Behaviours

Preceding sections have focused on barriers to high growth rather than barriers to the forms of innovation prevalent within HGFs.

In part, this reflects the difficulty of isolating the innovation within an HGF: as discussed in preceding chapters, an HGF is rendered distinct from the wider business stock largely by virtue of an 'innovativeness' that permeates the business rather than specific innovation

behaviours. This challenge is amplified by a tendency to cast any growth-orientated changes to the structure or behaviour of a firm as 'innovation'.

Ultimately, few commentators seek to disentangle barriers to innovation from the wider treatment of barriers to growth for HGFs. However, the commentary regarding barriers to innovation for all firms provides insight of value to this study, from two key perspectives:

- Failures in the innovation capabilities and capacities of the firm – internal factors;
- Shortfalls in the effectiveness of the innovation ecosystem – external factors.

Each is considered in turn below.

Internal Factors

Complementing the preceding review of challenges facing HGFs, studies such as that by InterTradeIreland (2012)[55]: have sought to identify strengths and weaknesses in the innovation attributes of the general business stock.Table 5 presents the average level of capability in the Irish business stock for specific innovation attributes (for each attribute, surveyed firms were asked to rate their own capability).

[55] 'Leveraging the Innovation Ecosystem for Business Advantage: A Cross-Border Study'. www.intertradeireland.com/media/intertradeirelandcom/researchandstatistics/5350%20ITI%20Innovation%20Ecosystem%20Report%20FINAL%20FOR%20WEB.pdf, InterTradeIreland. 2012.

Table 5: InterTradeIreland's Analysis of Innovation Attributes

Innovation Attribute	Average Level of Capability in the Business Stock		
	Low	Medium	High
Willingness to change		■	
Willingness to take calculated risks	■		
Willingness to collaborate with others on new developments	■		
Problem solving			■
Responding to changes in your market or sector		■	
Implementing new developments and ideas		■	
Project management skills	■		
Launching new or improved products or services	■		
Coming up with creative ideas		■	
Networking within the sector	■		
Finding external support for new ideas and developments	■		

Source: InterTradeIreland Business Monitor, 2011

Such work provides a simple blueprint for targeting support for key innovation capabilities across the business stock as a whole, which can be combined with responses to the general obstacles highlighted earlier in this chapter. Specifically, the InterTradeIreland study focused attention on:

- Management of risk;
- Networking and collaboration;
- Project management, including resourcing;
- Market entry and new product.

A deeper reading indicates weakness may be weighted towards the coordination, implementation, and market realisation of innovation as opposed to a failure in the ideation process. Again, this emphasis on the machinery within a firm that connects innovative ideas

to the market shifts the perspective away from innovation in isolation and towards the broader treatment of barriers to high growth.

External Factors

Alongside the firm-focused perspective on barriers to innovation, a significant portion of the commentary directs attention towards the quality of the innovation ecosystem of the sector, market, or economy in question.

The innovation systems view is well established, drawing together key concepts such as the 'Triple Helix', 'Mode 2 Knowledge Production', the 'Knowledge Economy', and 'Open Innovation'. The principal message emerging from this work is that the quality and extent of innovation occurring in an economy is a function of the quality of connections between all the actors and resources that can add value to, or facilitate, innovation; in a real sense, excellence in the round requires excellence from all the component parts. In this context, connectivity between industry, research institutions, and governments are viewed as critical, as is the availability of investment finance, skills, knowledge resources, and entrepreneurial talent.

This ecosystem perspective was applied by SQW in its study of the 'Cambridge Phenomenon' between 1984 and 2002[56]. These studies sought to establish the drivers of growth within the Cambridge high-tech cluster, resolving a complex mesh of relationships between commercial, institutional, environmental, and social domains. This network is summarised in Figure 2.

A perspective on the Irish innovation ecosystem is provided by the aforementioned InterTradeIreland study[57], which probed perspectives on the utility and effectiveness of relationships from the perspective of innovating firms. Their analysis indicates that a majority of innovative firms placed most importance and valued the effectiveness of their connections with clients and suppliers within their own value chains. Other innovation partners, such as higher education institutes, financial service organisations, innovation support agencies, and intermediary bodies, are regarded as less important and effective partners. The relative weakness in the service of this set of actors to firm-level innovation provides some direction to the targeting of ecosystem-building interventions.

Insight into the innovation ecosystem is extended by review of Ireland's performance on key innovation indicators relative to the UK and EU (see Table 6).

[56] 'The Cambridge Phenomenon: Changing Perspectives'. www.sqw.co.uk/file_download/370, SQW. 2011.

[57] 'Leveraging the Innovation Ecosystem for Business Advantage: A Cross-Border Study'. www.intertradeireland.com/media/intertradeirelandcom/researchandstatistics/5350%20ITI%20Innovation%20Ecosystem%20Report%20FINAL%20FOR%20WEB.pdf, InterTradeIreland. 2012.

Table 6: Comparisons of innovation indicators - Ireland, the UK, and the EU

Innovation Indicator	Comparison with Ireland's Score	
	UK	EU
Patent Applications	Higher	Higher
Venture Capital	Higher	Higher
International Scientific Co-Publications	Lower	Lower
Sales of new to Market and new to Firm Innovations	Lower	Higher
SMEs Introducing Marketing/Organisational Innovations	Lower	Lower
SMEs Introducing Product or Process Innovations	Lower	Higher
Innovative SMEs Collaborating with others	Higher	Higher
SMEs Innovating In-House	No Data	Lower
Population Completed Tertiary Education	Equal	Lower
Employment in Knowledge-Intensive Activities	Lower	Lower
Business R&D Expenditure	Lower	Higher
Public R&D Expenditure	Higher	Higher

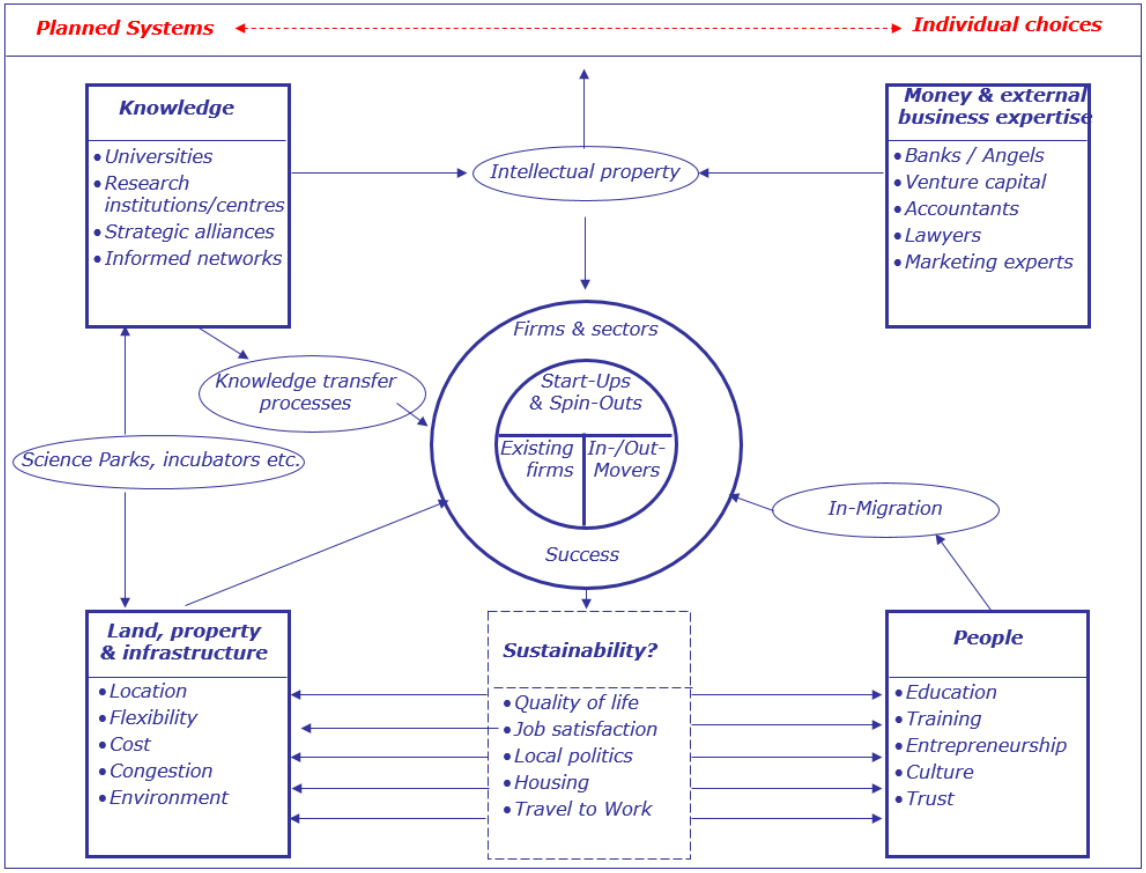
Source: Innovation Union Scorecard, 2011

Overall, these indicators indicate some competitiveness with the performance of UK and EU, albeit with deficits apparent in the following areas:

- Extent of IPR activity;
- Availability of venture capital;
- Size of sales of new to market and new to firm innovations;
- Number of SMEs introducing product or process innovations;
- Number of innovative SMEs collaborating with others;
- R&D expenditure (public and commercial).

Again, such findings inform the analysis of barriers within the Irish innovation ecosystem and, by extension, the targeting of ecosystem-building interventions.

Figure 2: Lessons from the Cambridge Phenomenon – SQW's depiction of the ecosystem



Source: SQW,2011[58]

[58] 'The Cambridge Phenomenon: Changing Perspectives', SQW, 2011

Section Key Messages: 'Innovation barriers – messages from the literature'

The literature on barriers to innovation within HGFs is less extensive than that focused on the internal and external factors determining high growth more broadly. Further, much of the literature that there is focuses on generic barriers to growth or innovation experienced by all firms.

A key obstacle facing the treatment of the barriers to innovation within HGFs is the pervasive nature of innovation within such firms, and the role that 'innovativeness' plays in driving growth. The distinction between the barriers to growth and those to innovation is often blurred.

In this context, key barriers to an innovation-intensive model of high growth evident in the literature include:

- Management capabilities, principally on the basis of limited capacity with regards to finance, marketing, and HR;
- Owners' motivations, aspirations, and responses to perceived risks;
- Access to finance, and in particular the need to focus finance on skills, networks, and marketing as opposed to R&D to promote high growth potential;
- Limited capacity to independently exploit innovation, trapping firms in an unsustainable cycle of invention and reinvention;
- A tendency toward acquisition as a preferred next-stage growth model exhibited by smaller, younger HGFs;
- A failure to adapt the strategic and operational model in response to evolution in the scale and market position of a rapidly growing firm.

On this last point, it is important to emphasise that barriers appear to be at their most intense at points in the lifecycle of an HGF, where the evolution of strategic and operational models is required to maintain growth.

Alongside the firm-focused perspective on barriers to innovation, a significant portion of the expert commentary directs attention towards the quality of the innovation ecosystem of the sector, market, or economy in question. Analysis of performance indicators for the Irish innovation ecosystem highlight the following areas of weakness (relative to the UK and EU):

- Extent of IPR activity;
- Availability of venture capital;
- Size of sales of new to market and new to firm innovations;
- Number of SMEs introducing product or process innovations;
- Number of innovative SMEs collaborating with others;
- R&D expenditure (public and commercial)

Section Conclusions

C18: Pro-HGF support need to be based on the following themes: management capabilities, ambition, resourcefulness (including financial management and investment readiness), commercialisation of research and IP, and adaptation/evolution of the operational model.

C19: If the depth and quality of the pipeline for potential innovation-led HGFs is to be optimised, direct support to potential-HGFs needs to be underpinned with indirect interventions in the wider innovation ecosystem.

Chapter 5 Findings – Innovation Support

This chapter is the third of three exploring the implication of findings emerging from the study's data analysis, survey, and literature review workstreams. Fuller treatments of the data analysis and survey are provided in Annexes B and C, respectively.

The specific focus of this chapter is the nature of interventions for supporting innovation-led high growth.

5.1 Innovation Support – Key Messages from the CIS Data Analysis

The data used to inform this commentary are subject to the same conditions highlighted in the introduction to the preceding chapter's treatment of innovation behaviours; that is, the dataset is composed entirely of agency-supported firms, with commentary focusing on the employment-based HGF (referencing distinct turnover-based HGF issues as appropriate). A detailed review of the data analysis is provided in Annex B.

The preceding data analysis focused on 'innovation barriers' and highlighted 'lack of funds within the enterprise' and 'costs of innovation' as the principal obstacles faced by innovating HGFs. However, neither barrier was encountered by a majority of the HGF group. In addition, analyses of collaboration have observed a higher tendency amongst HGFs towards partnership with 'consultants, commercial labs, or private R&D institutes' than non-HGFs, and a client-orientation to network building. Together, these observations provide an insight into the nature of external support required by HGFs.

Further insight is provided by the CIS's treatment of the sources of information used for innovation; firms were asked to indicate which of the following sources were important to their innovation process:

- The firm's enterprise or enterprise group;
- Suppliers of equipment, materials, services, or software;
- Clients or customers;
- Competitors or other businesses in the firm's industry;
- Consultants, commercial labs, or private R&D institutes;
- Universities or other higher education institutions;
- Government or public research institutes;
- Conferences, trade fairs, exhibitions;
- Scientific journals and trade/technical publications;
- Professional and industry associations;
- Technical, industry or service standards.

Substantial proportions of the HGF group consulted each source of information for the purposes of innovation, with a majority consulting each of internal sources and clients and customers. The source of information consulted by the smallest proportion of HGFs was 'universities or other higher education institutions'.

Overall, it is apparent that, as a group, HGFs appear to consult predominantly internal sources of innovation information for the purposes of innovation, albeit with higher proportions consulting clients than non-HGF groups. To some extent, this information supports the portrayal of HGFs engaged in a 'market-facing' innovation model. However, this orientation is not clearly a pursuit of the majority of HGFs and therefore cannot be considered characteristic of the group as a whole.

Section Key Messages: 'Innovation support – messages from the CIS data analysis'

The data analysis provides limited insight into the support needs of innovating HGFs and potential-HGFs, beyond highlighting access to finance as a principal barrier to innovation faced by HGFs and the higher proportion of HGFs sourcing knowledge from 'consultants, commercial labs, or private R&D institutes' and clients (this behaviour provides some insight into the knowledge gaps within HGFs).

Section Conclusions:

C20: Any future pro-HGF support programme must incorporate an 'access to finance' component.

5.2 Innovation Support – Key Messages from the Survey of Enterprises

In the paragraphs below, the key messages from the study's survey are set out. In reviewing this material, it should be remembered that the survey sample was drawn entirely from an 'agency-supported' database. By their nature, such firms will already be familiar with agency activities and support regimes. In presenting this material, therefore, the emphasis is on providing generalizable messages of application to both existing agency-supported firms, and those that might be identified in the future.

As with the data analysis, the preceding survey analysis focused on 'barriers to innovation' providing an insight into the support required by HGFs: the survey reveals a lack of resources, principally financial, and a lack of skills in the labour market to be the barriers cited most commonly by HGFs, although neither are cited by a majority of those surveyed. This focus on external finance was echoed in conversations with HGFs, with 'risk investment' emerging as a particular focus.

Survey Sample: High Growth Exemplar 3

A young software development business achieved high growth by employment in 2005-08.

- The firm emerged from a sole-trader IT consultancy started by CEO whilst at university.
- The firm operates in a sector that requires a constant high-intensity

innovation effort focused on the product. However, with growth, the business has extended its services, market, and systems innovation activities. These developments have been targeted in order to maintain the firm's ongoing capacity for growth (without plateau). The firm introduces multiple product updates per year.

- The firm has rapidly developed market share in new geographic markets because of the innovative nature of its product offer. Through investment in differentiation and tailoring, the firm rapidly secured share in US and Australian niches. Future strategy focuses on consolidation of these market positions and further geographic expansions. High growth reflects investment in capacity following US market expansion.
- The firm has benefitted from long-standing support from Enterprise Ireland, including finance (funding and signposting to VC capital) and managerial/strategic capacity building (mentoring). Mentoring has been invaluable and finance has addressed a local market failure.
- The emphasis for innovation has been on the development of the products and product range. Emphasis has been placed on the development of differentiated 'solutions' configured to meet specific client needs. Flexibility and configurability is a point of emphasis, enabling the firm to develop a tailored solution for different clients. In addition, market expansion has been a recent emphasis, with launches in the US and Australia.
- The firm has recently established a high performance team tasked with developing the business and its systems for effectiveness and efficiency. The ultimate goal is to found a robust platform for growth.
- The firm’s development trajectory is largely customer-driven: the business emphasises understanding of client needs in its development process. Significant effort is focused on engineering feedback from current and potential clients.
- A further emphasis is placed on market research, enabling the firm to keep pace with competitor offers, parallel/complementary developments, and potential areas for differentiation.
- The firm’s workforce is encouraged to integrate multiple pieces of market and technological information into the development process, recombination is a key focus.
- The firm has sought to leverage third party vendors when opening new markets. These relationships have become an important aspect of the firm's service innovation activity. In addition, the vendor's sector knowledge has been integrated back into the development programme.
- Principal innovation barriers include: limited access to finance in Ireland (fast enough to respond to short-term opportunities, without restrictive exit terms), difficulty of forging university relationships, low availability of skills, and the complexity of IPR.
- Finance is a fundamental of the innovation process, all investments are 'at

risk', currently, there are few sources of 'risk finance' available to the firm (within Ireland).

Chapter threes exploration of collaboration with universities, suppliers, clients, competitors, and service providers revealed generally higher levels of collaboration amongst HGFs than non-HGFs, with a substantially higher proportion of the HGF sample engaged in collaboration with clients and universities as determined in the survey. Again, this apparent pursuit of relationships facilitating access to markets and access to knowledge informs thinking regarding the support requirements of HGFs.

Extending the collaboration theme, the survey provides an insight into the use of support from the private sector: the data reveals that a higher proportion of the HGF group used such support for the purposes of innovation than was the case for the non-HGF sample.

Overall, few HGFs indicated a strong role being played by public sector support, other than the provision of funding. In this regard, surveyed HGFs demonstrate a degree of self-reliance and resourcefulness in respect of their ability to overcome barriers.

However, the survey did reveal a small number of HGFs to be benefitting from a long-standing 'coaching' provision that was credited with supporting the firm in plotting its growth trajectory, ordering development activities, refining its proposition, accessing markets, and accessing resources. Notably, these positive coaching experiences were predominantly voiced by young firms and start-ups with limited experience of business management within their management teams.

Section Key Messages: 'Innovation support –messages from the survey of enterprises'

The survey revealed that HGFs demonstrate a degree of self-reliance and resourcefulness in respect of their ability to overcome barriers. Again, access to finance emerges as a principal barrier to innovation for HGFs and non-HGFs alike, and network behaviour provides some insight into the knowledge barriers faced by HGFs.

The survey did reveal a small number of HGFs to be benefitting from a long-standing 'coaching' provision that was credited with supporting the firm in plotting its growth trajectory, ordering development activities, refining its proposition, accessing markets, and accessing resources.

Section Conclusions

C21: Any future pro-HGF support programme needs to incorporate an 'access to resources' component, providing access inter alia to finance, knowledge, and skills capacities that includes development of 'resourcefulness' in the management team, strategy, and operational model.

5.3 Innovation Support – Key Messages from the Literature

Literature messages in preceding chapters have observed the following barriers to innovation-led growth for HGFs and potential-HGFs:

- Management capabilities, principally on the basis of limited capacity with regards to finance, marketing, and HR;
- Owners' motivations, aspirations, and responses to perceived risks;
- Access to finance, and in particular the need to focus finance on skills, networks, and marketing as opposed to R&D to promote high growth potential;
- Limited capacity to independently exploit innovation, trapping firms in an unsustainable cycle of invention and reinvention;
- A tendency toward acquisition as a preferred next-stage growth model exhibited by smaller, younger HGFs;
- A failure to adapt the strategic and operational model in response to evolution in the scale and market position of a rapidly growing firm.

Building on this foundation, recommendations for the support of HGFs put forward in existing studies can be considered, incorporating reference to exemplar HGF-specific support interventions currently in operation outside Ireland.

The central core of these recommendations is a pairing of 'direct' support, taking the form of tailored strategic and material support provided to the firm, with a broader programme of 'indirect' support, focused on development of the operating environment and ecosystem to favour and facilitate growth and innovation[59].

As has been the case in the preceding discussion of 'barriers', the literature consulted is focused on support for HGFs as opposed to support for adoption of the innovation behaviours typical in HGFs. The orientation of support is raised here and developed further in the following chapter.

Direct Support

Within the literature, proposals for the direct support of HGFs and potential-HGFs in EU/OECD countries focus on a combination of the following elements:

- HGF Coaching – emphasising tailored packages of training, advice, and decision support that is tuned to the developmental stage of the firm and focused on aiding the targeting, plotting, and realisation of innovation-led growth strategies[60]. Components deemed critical within the coaching provision include:

  Entrepreneurialism – skills and tools focused on the management team supporting 'opportunity spotting', 'horizon scanning', network building, and 'innovativeness' in the navigation of markets and steerage of firm strategy;

[59] Napier et al (2012) The Nordic Growth Entrepreneurship Review 2012. Nordic Innovation Publication 2012:15

[60] Love, J. Rope, S., SME Innovation, Exporting and Growth, http://enterpriseresearch.ac.uk/default/assets/File/ERC%20White%20Paper%20No_5%20Innovation%20final.pdf, 2013

Management systems – skills and tools enabling management teams to manage resources, financial, human, or material, and coordinate operations in a manner facilitating continuous cycle of operational improvement, product or service development, and opportunity response.

- Tailored Access to Finance Packages –emphasising the availability of risk-finance (equity, grant, and loan) alongside support for investment readiness and credit readiness[61];
- Core Skills Packages –providing standardised support in key management domains such as internationalisation, IPR, HR, legal, and regulatory.

Such proposals highlight the fact that novel 'silver-bullet' interventions seeking growth in the HGF population are absent in the literature. Furthermore, the proposed 'solution' includes elements that are familiar in the business support landscape. As a result, attention is drawn towards the quality and configuration of support, and its positioning within the wider support landscape, and away from the type of support. Internationally measures for supporting growth SMEs vary widely including systemic, holistic, and thematic measures[62].

Design Features of Direct pro-HGF Support

A review of initiatives supporting high growth entrepreneurship in Australia, Brazil, Finland, Hong Kong, Hungary, Italy, Netherlands, Spain, and UK[63] concluded that pro-HGF support should:

- Be highly selective, particularly when addressing later stages of venture development;
- Require strong growth motivation from participants;
- Be proactive in inviting prospective growth firms;
- Consistently address managerial motivation and skills;
- Involve close collaboration with private-sector service providers;
- Nurture an image of professionalism, competence, and a certain degree of exclusivity;
- Implement sustained and focused development efforts;
- Involve highly customised and tailored management development activities that involve experience sharing and apply an interactive approach
- Link grants and participation to growth aspiration and achievement of milestones;
- Be prepared to accept casualties;
- Involve seasoned managers who have experience in rapid growth.

Echoing the preceding review, the nature of support typically blends a tailored coaching provision, orientated around devising and implementing an innovation-led growth plan, with

[61] High Growth Enterprises: What Governments Can Do to Make a Difference, OECD, 2010

[62] Roper S., Hart M., 'Supporting sustained growth among SMEs – policy models and guidelines', Enterprise Research Centre Working Paper No. 7, 2013 http://enterpriseresearch.ac.uk/default/assets//File/ERC%20White%20Paper%20No%20%207%20Roper%20%20Hart%20Supporting%20sustained%20growth%202.pdf

[63] Autio E., Kronlund M., and Kovalainen A., High Growth SME Support Initiatives in Nine Countries: Analysis, Categorization, and Recommendations. Report of the Finnish Ministry of Trade and Industry, 2007

support for targeting and accessing critical resources for the firm, such as finance, knowledge, and skills.

GrowthAccelerator – England's High Growth Support Programme[64]

A £200m programme launched in May 2012, GrowthAccelerator aims to deliver 55,000 high-value jobs through the provision of specialist support to 26,000 high growth potential firms in England[65].

Backed by Government, the programme will be delivered by the private sector, specifically: Grant Thornton, Pera, Oxford Innovation, and Winning Pitch. These partners will build and maintain a network of Growth Coaches and Growth Managers tasked with recruiting and supporting candidate firms with high growth potential.

Central to the offer is a coaching provision, delivered by 'proven business experts', focusing on four themes: 'securing finance', 'commercialising innovation', 'developing leadership', and 'management capability'.

The support provision is individually tailored: a bespoke package spanning access to finance, business development, innovation, and leadership capabilities. Components of each include:

- Access to Finance: investment readiness, investor identification/targeting, investment timing;
- Innovation: opportunity spotting, problem solving, developing a more innovative culture, new and differentiated ideas for products and services, commercialisation;
- Business Development: strategy development, objectives, operations, planned growth;
- Leadership Capabilities: company-wide review and improvement processes, people management, and financial control.

In addition to the GrowthAccelerator portfolio, the programme will integrate support from partners including the Technology Strategy Board, Catapult Centres, UK Trade and Investment, professional advisers, and networks such as Angel Investors.

GrowthAccelerator forms part of a package of support for SMEs that includes the 'Business in You' enterprise and entrepreneurship campaign, the 'Business Link' online resource, and the 'Mentor SME' mentoring portal.

Process:

Pitched at SMEs, fewer than 250 employees, less than £40m turnover, GrowthAccelerator operates strict eligibility criteria that includes ambition and potential: explicitly targeting high growth businesses who want to enter their

[64] GrowthAccelerator. www.growthaccelerator.com

[65] BIS. 2012. 'GrowthAccelerator Launch'. http://news.bis.gov.uk/Press-Releases/-200-million-programme-delivers-growth-support-to-ambitious-SMEs-67a65.aspx

next growth phase.

The programme is structured around four stages:

- Step 1: qualification and diagnosis, ambition and potential probed through the dedicated 'GROWTHmapper' assessment tool;
- Step 2: growth plan, development of the package of support, incorporating 'Access to Finance', 'Business Development', 'Growth through Innovation', and/or 'Leadership and Management skills' bundles;
- Step 3: implementation, coaching delivery;
- Step 4: graduation, exit (a typical coaching schedule lasts around three to nine months).

GrowthAccelerator is pay-to-access: £600 for firms with 1-4 employees, £1,500 for firms with 5-49 employees, and £3,000 for firms with 50-249 employees (each requiring an additional £700 VAT, based on 20 per cent of the nominal value of the service, £3,500).

Support is tuned to the age of the firm, foci for the 1-3 year-old firm include:

- Attracting the right funding for your business;
- Getting your business ready for investment;
- Finding, winning and growing profitable customers;
- Planning and developing an effective organisation;
- Developing new products and services;
- Understanding, protecting and exploiting my IP;
- Finding and winning grants for innovation;
- Making your personal brand a business brand;
- Leading your business to succeed;
- Collaborating and partnering for business innovation.

For the 3-7 year-old firm, foci include:

- Differentiating from the competition;
- Bringing scale to your business;
- Retaining and developing customers;
- Leveraging working capital;
- Accessing finance for expansion;
- Creating a more efficient business operation;
- Retaining and developing customers;
- Creating a pipeline of new products and services;
- Finding and winning grants for innovation;

- Understanding, protecting and exploiting my IP;
- Embedding a culture of innovation;
- Building a high performance team.

And for the 7+ year old firm, foci include:

- Managing change in order to deliver a high growth strategy;
- Entering new markets;
- Continuing to deliver innovative products and services;
- Finding and winning grants for innovation;
- Developing an IP portfolio and a more sophisticated IP strategy;
- Accessing finance for acquisitions;
- Transforming your workforce into a high growth team;
- Developing the leaders of tomorrow;
- Succession planning;
- Sustaining growth and continuous improvement.

Practicalities:

In the early phases of the GrowthAccelerator programme, identification of candidate firms has emerged as a key challenge: With conventional metrics unable to detect high growth potential in 'real time', partners have sought to employ unconventional indicators such as social media coverage and country court judgements, paired with the leverage of wider partner networks in the business support landscape to flag high potential firms.

In this format, there is little novelty in the pro-HGF support framework, components of which have been present in business support programmes routinely over time. This said, in the commentary, pro-HGF support does stand out because of its emphasis on 'quality' and 'targeting', rather than 'generality' and 'volume' achievement.

Concerning 'quality', commentary forwards a model of support that is intensive, long-term, tailored, and 'full spectrum' in its coverage of firm and market. Ultimately, the quality of such a provision is defined by its capacity to instil the qualities and behaviours of HGFs resolved in Chapter 2 within a supported firm. The sophistication necessary to achieve this outcome justifies the focus on 'HGF coaching' within the literature.

Concerning 'targeting', commentary proposes that support is restricted to those firms with potential to achieve high growth. This proposal is based on two core arguments, they are:

- The quality of an intensive coaching support programme discussed above could not be maintained if operated on an 'access to all model' for reasons of cost and complexity;
- The quality of an intensive coaching support programme must be matched by that of the firm if the value of that support is to be fully realised.

The implication is that the provision of specialist innovation-led high growth support must follow an initial appraisal of the potential and motivation of a firm. An example of such a

selection process in operation is from the well-regarded Korea Eximbank 'Global Stars' programme, which is outlined in Table 7.

Table 7: Korea's criteria for selecting 'Global Stars'

Theme	Components	Weighting in the Selection Process
Technological Capability	▪ Investment in Technological Development ▪ Patent Ownership ▪ Technological Capability ▪ Innovativeness	40%
Growth Potential	▪ World Market Share ▪ Market Growth Potential ▪ Globalisation Capability ▪ Long-Term Business Plan	30%
CEO's Capability	▪ Tech Knowledge ▪ Growth Motivation ▪ Business Experience ▪ Managerial Capability	10%
Financial Stability	▪ Evaluated by the Exim Bank Credit Evaluation System	20%

Source: Korea Eximbank

A similar qualification procedure is embedded within the early phases of the UK's GrowthAccelerator Programme (in the form of the GROWTHmapper tool)[66].

Indirect Support

Alongside direct support, indirect supports focused on structural obstacles are frequently identified. These include:

- Market-orientated funding of institutional research combined with support for network collaboration[67];

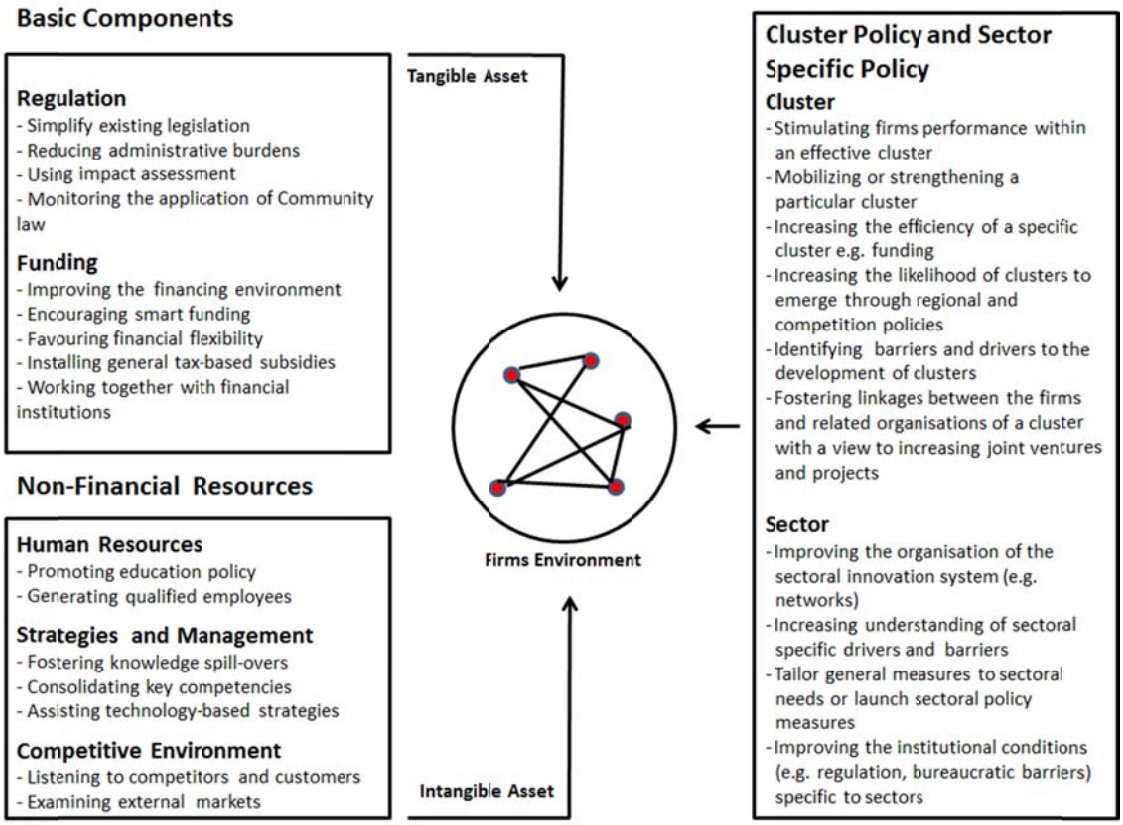
[66] www.growthaccelerator.com

[67] Mason C., Brown R., Small Business Economics, 40, 2, pp. 211-225, 2013

- Enhanced investment in workforce skills, including: creativity, horizon scanning, and entrepreneurialism;
- Incentivisation of internal R&D and innovation expenditure through the tax system, paired with grant schemes[68].

Such proposals are extended by broader calls for deregulation of closed markets, tax reform to encourage entrepreneurship, and simplification of regulatory regimes (to promote labour market flexibility, reduce the risks and costs of compliance, or ease the challenge of market entry). An example of these broader-reaching proposals is presented in Figure 3.

Figure 3: Interrelated support aspects that affect strongly the growth process of firms



Source: Mitusch and Schimke[69], 2011, reproduced with permission.

Key Principles for pro-HGF support

The UK's Enterprise Research Centre (ERC) is currently developing proposals for improving the support for sustained SME growth. During this programme of work,

[68] Segarra A., Teruel M.,High Growth Firms and Innovation: an empirical analysis for Spanish firms, http://www.recercat.cat/bitstream/handle/2072/179669/201132.pdf?sequence=1, 2011

[69] Mitusch K., Schimke A.,Europe Innova. 2011. 'Gazelles High Growth Companies' A. Schimke http://ec.europa.eu/enterprise/policies/innovation/files/proinno/gazelles-final-report_en.pdf

the team has published research focusing on the core features of support for SME growth. A key output is the paper *Supporting Sustained Growth Among SMEs – Policy Models and Guidelines: ERC White Paper No.7, September 2013, Stephen Roper and Mark Hart*

The paper proposes three main types of growth-support for SMEs:

- Systemic measures which focus on informational or strategic market failures and aim to remedy perceived weaknesses or blockages in innovation and/or entrepreneurship systems;
- Holistic approaches, which combine business development and leadership development. These schemes are either place-based or based on a long-term and intensive relationships between support scheme staff and SMEs;
- Functional or thematic approaches, which focus more narrowly on financial support, on management and leadership development or technology adoption or use.

The paper's review of examples for each of these types of scheme results in seven design, or implementation, guidelines for measures aiming to support sustained growth. These are:

1. Enabling effective self-selection – a strong element of self-selection is inevitable in the provision of support for sustained growth. Enabling effective self-selection by firms requires a clear proposition from the scheme as well as a clear statement of required commitments. The scheme's proposition needs to be both ambitious and emotionally engaging and participating in the scheme needs to carry a certain cachet;
2. Selecting participants – a strong element of selectivity by the scheme itself is also necessary as these programmes are typically intensive and often involve peer-group and shared-learning activities;
3. Recognising spill-overs – selectivity should include the notion of 'national benefits', positive spill-overs which may be stronger from some SMEs than others;
4. Sustained engagement – schemes to support sustained growth are likely to involve continued engagement with a business over a period of years;
5. Holistic approaches – supporting sustained growth is likely to require a holistic rather than thematic support model, with a dual focus on the development of the business and the capabilities of the firm's leadership team;
6. Partnership based – measures to support sustained growth should be partnership based drawing on the expertise and networks of a range of support organisations;
7. Delivery is likely to be regionally organised – a regional model has proved valuable in facilitating attendance by firms at scheme events and sessions and making face-to-face mentoring and peer group sessions more feasible.

Source: SQW

Aspects for Consideration in Developing Potential Approaches for pro-HGF Support

Beyond the detail covered above, the review of commentary focused on pro-HGF support raises the following issues of relevance to this study:

i. There is some doubt as to whether support for an HGF-type innovation model can, and should, be detached from broader high growth support programmes. As has been discussed in relation to barriers to innovation, the market realisation of innovation requires a whole of enterprise approach. Therefore, innovation cannot be optimised if weaknesses remain in the broader operations of the firm.

ii. The difficulty in unpicking causality in each high growth story limits the extent to which the efficacy of current policy instruments for innovative HGFs can be judged[70]. Furthermore, this study's survey indicates that high growth is attributed to a broad range of internal and external factors.

iii. Innovation does not always result in jobs growth: the two cannot be assumed to be correlated positively. This is particularly the case for innovation seeking to deliver productivity gains.

iv. HGFs are, by their very nature, inherently unstable, and as such can be perceived as risky propositions for the economic development process. Whilst this should be recognised, the churn and turnover that such instability creates can often be highly energising for economies; the well-researched process of 'creative destruction' in the high growth segment in the United States is often cited as one of the key reasons why that country's long-running productivity is in excess of that of the European Union. From this flows the implication that maintaining a cohort of innovation-led HGFs in Ireland at a volume in line with competitor norms should be a key consideration tactically.

Section Key Messages: 'Innovation support – key messages from the literature'

Proposals for pro-HGF support include the following:

- Direct support to HGFs that incorporates:

  HGF Coaching - tailored packages of training, advice, and decision support that is tuned to the developmental stage of the firm and focused on aiding the targeting, plotting, and realisation of innovation-led growth strategies;

  Access to Finance - incorporating investment readiness interventions, this as part of a wider approach to developing the 'resourcefulness' of firms;

  Core Skills Packages - providing standardised support in key management domains such as internationalisation, IPR, HR, legal, and regulatory).

- Indirect supports focused on structural obstacles that include:

  Market-orientated funding of institutional research, combined with

[70] Lilischkis S., Policies in support of high growth innovative SMEs , INNO-Grips – Global Review of Innovation Policy Studies, 2011

support for network collaboration;

Enhanced investment in workforce skills, including creativity, horizon scanning, and entrepreneurialism;

Incentivisation of internal R&D and innovation expenditure through the tax system, paired with grant schemes.

Section Key Messages: 'Aspects for Consideration in Developing Potential Approaches for pro-HGF Support'

Pro-HGF support programmes need to consider a 'whole of enterprise' approach, inclusive of the innovation aspect.

There is still a lack of knowledge internationally as to what the optimum level of HGFs in any firm population should be. However, there is agreement that a cohort of HGFs is a very positive attribute within a firm population.

Section Conclusions

C22: Alongside an 'Access to Finance' component, any future pro-HGF support programme should incorporate 'Core Skills Package' and 'HGF Coaching' elements.

C23: Any future programme of support to HGFs needs to be underpinned with actions to ensure a healthy and effective wider innovation ecosystem, enabling a quality and scale of pipeline of potential-HGFs to be realised. Investment in workforce skills, the commercialisation of research and IP, building private-institutional networks, and developing entrepreneurial cultures are recommended as key components for attention.

C24: Ireland should seek to maintain a cohort of innovation-led HGFs at a volume in line with competitor norms.

Chapter 6 Discussion: Pro-HGF Support

This chapter considers the implications of the study's findings for pro-HGF support in Ireland. In so doing, the focus is placed principally on (i) 'direct' support interventions (although the need for 'indirect' framework conditions as set out in Chapter 5 is also recognised) and (ii) innovation-led HGFs, with the ambition and potential to grow employment at high rates, or for existing HGFs with ambition to grow in a sustainable manner.

The chapter begins by establishing some key principles for pro-HGF support initiatives, followed by the proposal of a simple support structure informed by the international best practice, study survey, and study data analyses. Based on this, the potential 'fit' of such a support structure in the existing landscape of supports in Ireland is then considered.

6.1 Key Principles for Pro-HGF Support Initiatives

Based on the research carried out in this study, for innovation-led employment based agency-supported HGFs, it is determined that pro-HGF support initiatives are best guided by the following key principles:

- Adopt a 'whole of enterprise' approach, seeking to support innovativeness in the round, as opposed to simply focusing on the establishment of 'discrete' innovation projects;
- Avoid seeking to instil a single, standard model of innovation within the potential HGF. Reflecting the diversity of HGFs, innovation solutions and capacity building being offered must be context and firm specific;
- Recognise, and be able to accommodate, the non-linear nature of HGF growth over the long-term;
- Provide training, advice and decision support that is tuned to the developmental stage of the firm and focused on aiding the targeting, plotting and realisation of innovation-led growth strategies;
- Support the timing, selection, and utilisation of resources from the public and private sector (including finance, core skills, partners etc.) in response to market opportunity;
- Have a defined set of criteria for formal exit from the initiative, with transfer on to commercial provision from the market.

6.2 Proposed Model Framework for Pro-HGF Support

The discussion of pro-HGF support in Chapter 5 highlighted the key components of any pro-HGF support framework. To reiterate, these are:

- Access to Finance Packages – incorporating risk-finance (equity, grant, and loan), investment readiness, and credit readiness interventions;
- Core Skills Packages – providing support in key management domains, such as internationalisation, IPR, HR, legal, and regulation;
- HGF Coaching – a restricted access, tailored package of training, advice, and decision support that is tuned to the developmental stage of the firm and focused on aiding the targeting, plotting, and realisation of innovation-led growth strategies.

Importantly, there is no clear evidence emerging from the literature, survey, or data analysis to indicate HGFs (actual or potential) require fundamentally different outcomes from access to finance and/or core skill packages. However, an 'HGF-specific' offer is needed for actively pairing 'screened' firms with high growth potential to expert coaching provision that guides the timing, selection, and utilisation of resources, including finance or core skill packages, in response to market opportunities.

Within the 'HGF Coaching Provision' component, developing two skillsets are highlighted consistently. These are:

- Entrepreneurialism – focused on developing the cultures and mind-sets that management teams need to drive 'opportunity spotting', 'horizon scanning', network building, and 'innovativeness' in the navigation of markets and steerage of strategy;
- Management systems – equipping management teams with the skills and tools to manage resources (financial, human, or material), and coordinate operations in a manner facilitating a continuous cycle of operational improvement, product or service development, and opportunity response.

The sophistication of this coaching provision is critical: commentators and practitioners emphasise the need for an intensive, long-term coaching activity and access to this 'HGF Coaching Provision' should be limited by:

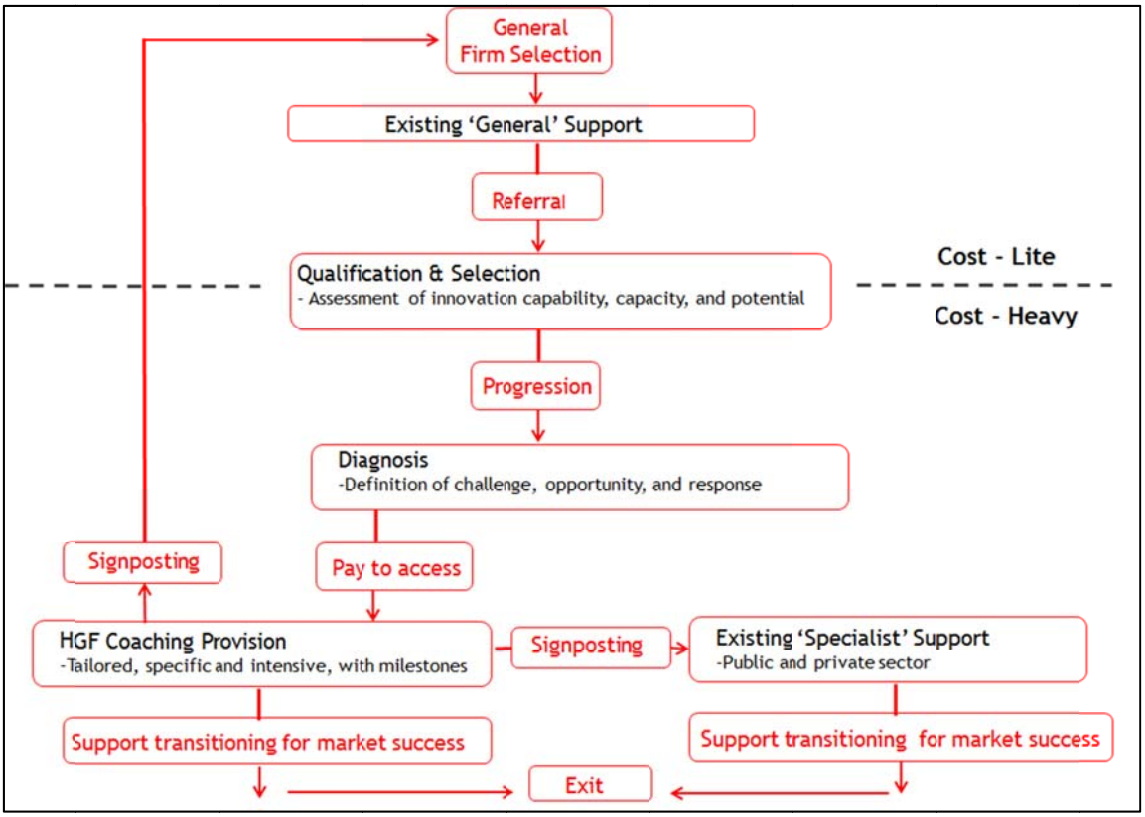
- Selecting, or 'screening' only those firms with credible innovation-based high growth potential (i.e. ambition, market potential, etc.);
- Selecting, or 'screening' only those firms with an ambition, and genuine potential, to grow employment quickly or those existing HGFs looking to grow in a sustainable manner.

An implied support framework for innovation-led HGFs can be visualised in the form of the process flow shown in Figure 4.

The schematic of the model presents a simple flow through 'Existing General Support', 'Existing Specialist Support', and 'HGF Coaching Provision', mediated by a process of qualification, selection and diagnosis, and through which existing or potential HGFs can access tailored support. In this model 'Existing General Support' and 'Existing Specialist Support' for finance, skills, partnerships, internationalisation etc. are accessed via, or signposted by, the 'HGF Coaching Provision'.

Critically, the schematic includes a defined 'exit' to the market, at which point agency support and development are 'complete', and firms are readied, attitudinally and operationally, to access subsequent provision from commercial sources.

Figure 4: Pro-HGF Support - a model framework for supporting innovation-led HGFs.



Source: SQW

In response to the study's core research questions, such a framework would have the potential to:

- Filter and capture existing and potential innovation-led HGFs, from the wider population of supported firms;
- Address failures to achieve high growth rate, or development of sustainable employment by HGFs;
- Be alert fully to the market, so that the culture of support is working to fledge firms, over time, on to commercial support provision from the market.

The model proposed is based primarily on the evidence in Chapters 2 to 5; the relevance and 'fit' of such activity to and in the existing innovation support landscape is discussed below.

6.3 Addressing the Wider Context of Support

Preceding chapters have indicated the need to pair 'direct' support, taking the form of tailored strategic and material support provided to the firm, with broader programmes of 'indirect' support, focused on development of the operating environment and ecosystem to favour and facilitate growth and innovation[71].

The model presented above posits a 'direct' support solution, but its efficacy will be largely dependent on the support it receives from a programme of 'indirect' supports deployed in the wider ecosystem. Blending 'direct' and 'indirect' activity represents a complex challenge. However, the research reveals clear areas for potential, or continued, treatment in the 'indirect' arena. These include:

- Efforts to stimulate and support spin-out from established businesses, and start-up amongst experienced professionals, on the basis of the strong correlation between high growth and the experience of a start-up team;
- Encouragement and facilitation of serial entrepreneurialism, on the basis that the chances of achieving high growth improve with the frequency of start-up (and, as highlighted above, the experience of start-up teams);
- Continued work to leverage institutional knowledge capabilities to generate new businesses, or enhance the competitiveness of existing businesses;
- Encouragement and facilitation of network behaviours in and between value chains, emphasising productive business-to-business and business-to-university ties;
- Enhanced investment in workforce skills, including creativity, horizon scanning, and entrepreneurialism;
- Commercialisation of research and IP within the firm base.

Such 'indirect' measures must be considered as integral parts of any pro-HGF support effort, if full benefit is to be derived from 'direct' support initiatives.

Section Key Messages: 'Proposed Model Framework for Pro-HGF Support and the wider context of Support'

Based on the research undertaken in this study, it is determined that pro-HGF support initiatives are best guided by a series of key key principles as outlined in the main body of the report.

International best practice highlights the key components of any pro-HGF support initiative should comprise:

- Access to Finance Packages – incorporating risk-finance (equity, grant, and loan) and investment readiness and credit readiness interventions;
- Core Skills Packages – providing support in key management domains such

[71] Napier et al (2012) The Nordic Growth Entrepreneurship Review 2012. Nordic Innovation Publication 2012:15

as internationalisation, IPR, HR, legal, and regulation;

- HGF Coaching – a restricted access, tailored package of support.

In response, a model for a framework for pro-HGF support is presented for consideration within the Irish context. This presents a simple flow through 'Existing General Support', 'Existing Specialist Support', and a 'HGF Coaching Provision', mediated by a process of qualification, selection, and diagnosis, through which firms with high growth potential may access tailored support.

The schematic presents a 'direct' support solution. However, its efficacy will be largely dependent on the support which it itself receives from a programme of 'indirect' supports deployed in the wider ecosystem. On this theme, the study indicates a need for complimentary indirect supports in the wider ecosystem.

Section Conclusions

C25: The study concludes that there are a number of key principles that should be encompassed in any pro-HGF support initiative for existing and potential innovation-led HGFs.

C26: The study finds that any pro-HGF support initiative should seek to combine 'Access to Finance', 'Core Skills' and 'HGF Coaching' elements in an economically viable delivery model, underpinned with appropriate mediation, and with exit to market provision.

C27: If the depth and quality of the pipeline for potential innovation-led HGFs is to be optimised, direct support to potential-HGFs needs to be underpinned with indirect interventions in the wider innovation ecosystem.

6.4 Considering 'Fit' with the Existing Innovation Support Landscape

Building on the preceding discussion, this section explores the extent to which the model for pro-HGF support introduced is already represented in the Irish support landscape, under the three headings of 'Existing General Provision', 'Existing Specialist Provision', and 'HGF Coaching Provision'.

Existing General Support

A depiction of the wider 'Existing General Support' for enterprise, outlined in detail in Annex E, includes coverage of the following support themes:

- Job creation
- Capability building
- Management development
- Mentoring
- Productivity
- Internationalisation

- Environmental aid
- RD&I
- Start-up support
- Capacity building.

This support provision incorporates over 100 individual interventions, blending strategic and material supports, spanning key domains including access to finance, network collaboration, management capabilities, and targeted interventions such as IPR, regulatory, and legal advice.

Furthermore, a substantial number of the supports detailed in Annex E seek to address the 'wider ecosystem' factors, such as the stimulation/facilitation of enterprise or entrepreneurialism and network-knitting interventions.

Overall, this suite of supports has developed progressively over time to provide a comprehensive range of services to the business base. In principle, this spectrum of support represents an effective response to the 'Existing General Provision' component highlighted in the model above, and as such could be integrated and accessed quickly, if the model was to to be adopted as a route forward.

Existing Specialist Support

The proposed model argues that 'Existing General Support' is complemented by 'Existing Specialist Support'. In Ireland's context, examples of some such 'Existing Specialist Support' are summarised in Table 8 and Table 9.

Table 8: Examples of RD&I Existing Specialist Support

Programme Name	Primary Focus
EI RTI Scheme	Assistance to Irish owned firms for investment in R&D as part of a company's strategic development.
Commercialisation Fund (EI)	Supports academic researchers to bring research with commercial potential to a point of technology transfer to industry (via licensing or spinout).
SFI CSETS	Funding of joint academic-industry research centres located within Universities focused on longer-term user-oriented basic research.
SFI SRCs	Funding of research clusters to support multi-disciplinary internationally leading investigations with industry engagement.
New SFI Centres	SFI are currently developing a new set of centres. *SFI Research Centres* will link scientists and engineers in partnerships across academia and industry to address crucial research questions, foster the development of new and existing Irish-based technology companies, attract industry that could make

Programme Name	Primary Focus
	an important contribution to Ireland and its economy, and expand educational and career opportunities in Ireland in science and engineering.
Innovation Partnerships (EI)	Aimed at harnessing the strengths of the third level sector to work in partnership with companies on specific R&D projects.
Business Partners (EI)	Facilitates entrepreneurs to identify research with commercial potential and to connect with research groups, in order to speed up the process of company creation.
Technology Gateways (EI)	Funding of manager and up to three researchers. Governed by industry, Gateways provide technology solutions for the close-to-market needs of Irish industry.
Technology Centres (EI)	The Technology Centre programme was developed to achieve competitive advantage for industry in Ireland by accessing the innovative capacity of the research community. These centres are collaborative entities established and led by industry and focus on undertaking market focused strategic R&D with a direct benefit to industry.
Innovation Vouchers (EI)	Support small companies to engage with HEI researchers in order explore a business opportunity or solve problems.

Source: Forfás

Table 9: Examples of Enterprise Existing Specialist Support – with a focus on supports for firm growth

Start-Ups/HPSU Package (EI)	HPSU Feasibility Grant: Used to support the development of an innovative/high potential start-up and the development of an Investor Ready Business Plan. Eligible costs include; Salaries and Overheads, Consultancy Fees, Foreign Travel and Subsistence, EI approved Business Accelerator Fees, Trade Fair costs and Prototype costs. Competitive Start Fund (CSF): A €50k equity investment designed to accelerate the development of high potential start-up companies by supporting them to achieve commercial and technical milestones such as evaluating international market opportunities or building a prototype. In addition specific calls to support the development of female led high potential start-ups are also run under the Female Entrepreneurship initiative. Innovative HPSU Fund (Equity): The Innovative HPSU Fund allows Enterprise Ireland to offer equity investment to HPSU clients, on a co-funded basis to support the implementation of a company's business plans. First time and follow-on equity investments in HPSUs are supported under this offer.

Improving Ecosystem for Start-Ups (EI)	Seed & Venture Capital Scheme: The scheme aims to improve access to finance for small and medium sized enterprises and to develop further the seed and venture capital industry in Ireland.
Company Growth (EI)	Job Expansion Fund: The aim of the Job Expansion Fund is to assist Enterprise Ireland client companies achieve enhanced growth through increased employment. The fund provides grant support up to a maximum of €150,000 towards the recruitment of new employees. Management 4 Growth (M4G) Programme: Supports participating SME CEOs and their management teams to further develop, implement and manage strategy, operations and people to drive sales and export growth through a mix of executive education, Business Coaching and Peer Networking. Leadership 4 Growth (L4G) Programme: Delivered in conjunction with Stanford University this flagship programme is designed to develop and enhance the leadership ambition, mindset and capability of Irish CEOs and their senior management teams to lead innovative, scalable companies, capable of achieving sustained international growth.
Pre-Start-up Supports (CEBs/LEOs)	Start Your Own Business: The CEBs/LEOs provide grants, repayable loans and soft supports to 'micro-enterprises' (firms with 10 or less employees)
Pre Start-Up Supports (EI)	New Frontiers Entrepreneur Development Programme: New Frontiers is Ireland's national entrepreneur development programme run in partnership with the Institutes of Technology. The programme is designed to support entrepreneurs with innovative business ideas who are planning to establish and run their own company. A range of supports including mentoring, incubation space and a €15,000 scholarship payment are provided to help accelerate the development of the business and to equip the promoter(s) with the skills and contacts needed to successfully start and grow a company. Competitive Feasibility Fund: Feasibility funds to assist a new start-up company or individual entrepreneur to investigate the viability of a new significant growth orientated business or proposition are run throughout the year in specific regions i.e. outside of greater Dublin area. In addition competitive feasibility funds for female entrepreneurs are also run under the Female Entrepreneurship initiative. Ideagen: Initiative which brings together researchers, sectoral experts and entrepreneurs to spark ideas for innovative new businesses and research projects with high growth potential

Source: Forfás

Recent evaluations undertaken by Forfás[72], paired with feedback from stakeholders provided during this study's consultations and workshop phases, indicate that the suite of RD&I and Company Growth Schemes are largely effective (in terms of performance against Programme Objectives), in delivering specialist support. Crucially, this provision features two of the core elements required in a pro-HGF support as highlighted in Chapter 5 - 'Access to Finance Packages' and 'Core Skills Packages' spanning management capabilities, and strategic support (including innovation and commercialisation). As such, the second component of the model, 'Existing Specialist Support', can be considered to be in place largely as an infrastructure.

HGF Coaching Provision

Whilst the 'Existing General Support' and 'Existing Specialist Support' components of the proposed pro-HGF model are represented in the existing landscape of supports, 'HGF Coaching Provision' tuned to the innovation-led HGF is not immediately apparent. However, coaching provision is currently provided within programmes focused on management development for firm growth[73]. However, to implement the proposed pro-HGF support model would require a more prominent positioning of 'HGF Coaching Provision' in the landscape of supports. In effect the 'HGF Coaching Provision' is the core element that would differentiate support for HGFs over firms more generally: it's role being to provide a tailored package of support to firms, including signposting firms to 'Existing General Support' and 'Existing Specialist Support' as required and adhering to the key principles for a pro-HGF support initiative highlighted from the research in this study. Recent international studies have highlighted coaching as a special means of accessing knowledge in the course of running and growing a business–a way to provide managerial competence[74]. As HGFs have the special condition of a fast rate of growth, they need support to achieve growth in a timely and efficient fashion, and it is considered that providing 'HGF Coaching' as an independent support to firms may expedite appropriate action within the firm to realise their potential.

With a view to developing a policy focus on HGFs, firms with either the ambition or potential to grow employment at a fast rate, or existing HGFs seeking to develop sustainable growth, could be given priority access to this 'HGF Coaching Provision'. Moreover, such firms could be actively sought out and encouraged to engage in the 'HGF Coaching Provision'.

Section Key Messages: 'Considering 'fit' in the innovation support landscape'

When considering the extent to which the existing landscape of innovation and enterprise supports overlays upon the framework proposed in the preceding section, there is not strong evidence of the need for the introduction of a de-novo set of pro-HGF interventions.

To implement the proposed pro-HGF support model would require a more prominent positioning of 'HGF Coaching Provision' in the landscape of supports. In effect the 'HGF Coaching' acting as the core element that differentiates

[72] Forfás evaluations not yet published.

[73] Enterprise Ireland's Leadership for Growth Programme, and Management 4 Growth (M4G) Programme.

[74] Policies for High Growth Innovative Enterprises, Discussion paper for the 2013 ERAC mutual learning seminar on research and innovation policies, - SESSION III, Brussels, March 21, 2013, and references within.

support for HGFs over firms more generally.

To enhance the policy priority on HGFs, access to 'HGF Coaching Provision' could be prioritised for:

- innovation-led firms with either:
  - the ambition and potential to grow employment at a fast rate; or
  - existing HGFs seeking to develop in a sustainable manner.

Such firms could be actively sought out and encouraged to engage in the 'HGF Coaching Provision'.

Section Conclusions

C28: There is not a strong case for wholesale de-novo set of interventions to support innovation-led high growth firms, specifically.

C29: The development of a 'HGF Coaching Provision' with the key principles outlined for a pro-HGF initiative would be required in order to implement the pro-HGF model developed in this study.

C30: To enhance the policy priority on generating HGFs, firms with innovation-led strategies and the ambition and potential to grow employment at a fast rate, or the ambition of existing HGFs to grow in a sustainable manner could be actively targeted and given priority access to any 'HGF Coaching Provision' developed.

Chapter 7 Principal Findings and Conclusions

This final section summarises the principal findings from the research, and develops overall study conclusions based on those section-level key messages and conclusions set out across the preceding chapters.

7.1 Principal Findings

This study focuses on the innovation behaviour of agency-supported HGFs, and the principle findings reflect evidence developed based on data analysis, interviews with Irish-based firms, inputs from national stakeholders and national and international experts, and review of the international literature.

Innovation Behaviours within HGFs

The research indicates that innovation behaviour within HGFs is typically:

- Market-facing and client-need orientated, underpinned by strong client relationships;
- Focused on differentiation in quality and value for comparative advantage, often incorporating the development of 'value-added service' propositions;
- Focused, albeit not exclusively, on 'existing products to new markets' model
- Heavily networked through the value chain, with extensive use of 'co-creation' for comparative advantage; and
- Not simply focused on single investments in formalised R&D processes.

In many ways, such headlines are shared by HGFs and successfully innovating non-HGFs.

Traits of Innovation-Led HGFs

The international research reveals no single 'standard' HGF innovation model that is distinct from that of non-HGFs. But, in seeking to identify pragmatically the factors distinguishing the innovation-led HGF in particular, the following traits of firms do appear critical to the achievement of high growth:

- Pervasive innovation, implemented 'by routine' across operations (i.e. 'innovativeness' in the round appears to be a significant feature);
- A high degree of entrepreneurialism amongst the management team, extending to the workforce as a whole, enabling strong capabilities for spotting and responding to opportunity;
- Capability to access resources that includes conventional financial sources and novel measures such as 'shared-risk' partnerships;
- Positioning in a market capable of hosting high growth (i.e. a market in growth, or flux).

In the round, a key message emerging from the study is that HGFs are 'innovative', rendered distinct by virtue of an 'innovativeness' that permeates systems, processes, and attitudes, as opposed to simply focusing on the establishment of 'discrete' innovation projects. As a result,

innovation cannot be considered an isolatable dimension of an HGF that is distinct from that firm's wider operations and strategies.

Innovation Barriers within HGFs

A key finding emerging from the study regarding innovation and HGFs is that innovation does not appear to exist as a 'department' or isolated activity within the HGF. Rather, HGFs are innovative in culture, with innovation pervading the functions and mind-sets of the firm 'by routine'. As a result, it is difficult, if not impossible to isolate the barriers to innovation within an HGF. Consequently, when considering constraints to innovation, barriers to high growth more broadly should be in view. This study's research indicates that the principal barriers to achieving high growth in firms include typically:

- Low demand for innovative products from new businesses amongst consumers;
- Shortcomings in the motivations, aspirations, and risk-responses of owners and management teams;
- Limited ability to identify, appraise, and respond to those opportunities that offer real growth prospects for the firm;
- Limited access to finance or key resources from internal and external sources;
- Failure to pair technological innovation with a 'delivery system' aiding its exploitation and commercialisation (including IPR, marketing, business strategy, finance, etc.);
- Weaknesses in the firm's capability to penetrate networks and build relationships with clients or partners.

As such, the innovation barriers encountered by the potential-HGF are, again, not different fundamentally to those encountered by any firm seeking to innovate. Nuance comes by virtue of the innovation objectives being pursued, and the resourcefulness and resilience with which innovation barriers are overcome.

Potential Support to the Innovation-Led HGF

The research for this study has highlighted the following series of key principles for guiding pro-HGF support initiatives:

- Adopt a 'whole of enterprise' approach, seeking to support innovativeness in the round, as opposed to simply focusing on the establishment of 'discrete' innovation projects;
- Avoid seeking to instil a single, standard model of innovation within the potential HGF. Reflecting the diversity of HGFs, innovation solutions and capacity building being offered must be context and firm specific;
- Recognise, and be able to accommodate, the non-linear nature of HGF growth over the long-term;
- Provide training, advice and decision support that is tuned to the developmental stage of the firm and focused on aiding the targeting, plotting and realisation of innovation-led growth strategies;
- Support the timing, selection, and utilisation of resources from the public and private sector (including finance, core skills, partners etc.) in response to market opportunity;

- Have a defined set of criteria for formal exit from the support, with transfer on to commercial provision from the market.

An examination of the support measures in other countries to promote and support innovation-led HGFs was undertaken and the research identified that direct support measures are focused on the combination of:

- HGF Coaching – emphasising tailored packages of training, advice, and decision support that is tuned to the developmental stage of the firm and focused on aiding the targeting, plotting, and realisation of innovation-led growth strategies[75]. Components deemed critical within the coaching provision include:

  Entrepreneurialism – skills and tools focused on the management team supporting 'opportunity spotting', 'horizon scanning', network building, and 'innovativeness' in the navigation of markets and steerage of firm strategy;

  Management systems – skills and tools enabling management teams to manage resources, financial, human, or material, and coordinate operations in a manner facilitating continuous cycle of operational improvement, product or service development, and opportunity response.

- Access to Finance Packages – incorporating risk-finance (equity, grant, and loan), investment- and credit-readiness interventions;
- Core Skills Packages – providing support in key management domains such as internationalisation, IPR, HR, legal, and regulation.

The study also determines that **direct support to potential and existing innovation-led HGFs needs to be underpinned with wider interventions across the enterprise base** to encourage and support the types of innovation behaviours identified as more typical of innovation-led HGFs.

7.2 Study Conclusions

This is the first detailed analysis focused on HGFs in Ireland. A number of conclusions were developed in this study and they act as the first learnings on the topic of HGFs in Ireland upon which the policy system in Ireland can reflect and which provide a platform on which future research can build. The key conclusions drawn from the evidence are provided below.

(i) In the cohort of agency-supported firms in Ireland, there exists a set of HGFs that play a significant role in new job creation within the population of agency-supported firms. In the current environment, sustainable job creation is a key priority for Ireland, and thus the study supports the use of employment as the appropriate metric and focus for potential and existing HGFs. However, it is acknowledged that for firms to grow in a sustainable manner, they also need to achieve and sustain profitability as they grow.

[75] Love, J. Rope, S., SME Innovation, Exporting and Growth, http://enterpriseresearch.ac.uk/default/assets/File/ERC%20White%20Paper%20No_5%20Innovation%20final.pdf, 2013

The proportion of agency-supported HGFs in Ireland has decreased over the past decade[76], and this leads us to consider whether there is potential for Ireland to reverse this trend and focus on increasing the proportion of agency-supported HGFs (from the base of 4.5 per cent) through appropriate targeting of supports to HGFs. This would require that **appropriate policy attention and profile be put on innovation-led HGFs.** The study findings indicate that this attention should not be limited to one category of firms but rather should be focused on innovation-led firms of all age, size and from all sectors, including start-ups and established firms in Ireland and potential start-ups and emerging businesses attracted to Ireland from abroad.

(ii) In order to grow the cohort of agency-supported innovation-led HGFs, there would be a need to:

- **Actively target potential and existing innovation-led HGFs for State supports;**
- **Support the development of the quality of potential and existing innovation-led HGFs.**

(iii) The findings from this study indicate that in line with the heterogeneity of HGFs there is no predictive set of firm characteristics or innovation behaviours that can be used for identifying potential innovation-led HGFs through 'conventional' probing of firm characteristics or innovation behaviour. Ultimately, there appears to be no simple way through conventional business data held by governments and its agencies to target support to potential HGFs. However, the study finds that **a number of new approaches towards targeting actual and potential HGFs are emerging internationally, including the use of novel metrics and data analytic techniques. The usefulness of these mechanisms could be explored for targeting potential and existing innovation-led HGFs, and generating further insights into the stock of HGFs in Ireland.**

Furthermore, this study has focused on analysis of the agency-supported HGFs; however, **there is further opportunity to widen the focus on HGFs by identifying the non-agency HGFs in Ireland for which support could be targeted, with the goal of helping these firms to evolve in a sustainable manner.**

(iv) With regard to support for potential or existing innovation-led HGFs, international evidence indicates that there is no 'silver bullet' approach for providing direct supports to these firms. However, this study has identified a series of innovation-led HGF traits that are critical in the achievement of high growth and these traits should be utilised to guide how potential and existing innovation-led-HGFs may be supported. In particular, the study finds that HGFs are rendered distinct from the wider business base by virtue of an 'innovativeness' that permeates systems, processes, and attitudes, as opposed to simply focusing on the establishment of 'discrete' innovation projects. Thus, 'innovativeness' can be viewed as the organisation-wide innovation capability which provides the strategic and competitive orientation of a firm, and innovation is the instrument through which it strives to achieve its competitive advantage. This finding indicates that **innovativeness needs to be embedded and developed within growth aspirational firms to support the quality of potential HGFs and to support actual HGFs to develop in a sustainable manner.**

[76] Such decline in HGFs has also been reported across many other countries in recent years. Entrepreneurship at a Glance, OECD 2013

Furthermore, the research also indicates that **HGFs are more resilient to innovation barriers than their non-HGF counterparts are, and that they tend to be more effective in utilising and deploying resources**.

Together, **the findings on innovation behaviour and traits, and barriers to innovation for HGFs highlight a number of key principles which should be reflected in any direct pro-HGF support initiative.**

(v) International review of pro-HGF supports highlights the provision of HGF coaching as a potential future support to HGFs in Ireland. Entry criteria to such a 'HGF Coaching Provision' could be used as a mechanism for implementing a policy focus on innovation-led HGFs. In this regard, access criteria could be tailored to prioritise access to firms with:

- Innovation-led growth strategies with either:

  The ambition and potential to grow employment at a fast rate; or

  The ambition of existing HGFs to grow in a sustainable manner.

(vi) In relation to start-ups, the research indicates a strong correlation between high growth and the experience of a start-up team. On this basis **the quality of the pipeline for potential innovation-led HGFs could be enhanced by capitalising on opportunities to stimulate and support:**

- **Spin-outs from established businesses;**
- **Start-ups amongst experienced professionals;**
- **Serial entrepreneurialism.**

(vii) Encouraging the wider firm base to emulate the types of innovation behaviours more typical of innovation-led HGFs should support **the emergence of higher quality potential innovation-led HGFs in the future** as well as improved firm growth and competitiveness more generally across the firm population. To this end, **the study highlights a number of specific areas of potential focus for State support, which include:**

- **Embedding innovativeness at firm-level through enhanced workforce skills in innovation, including creativity, horizon scanning, and entrepreneurialism;**
- **Supporting innovation in services and business processes;**
- **Leveraging institutional knowledge capabilities in public research organisations to generate new businesses, or enhance the competitiveness of existing businesses;**
- **Encouraging and facilitating network behaviours emphasising productive business-to-business and business-to-university links;**
- **Supporting commercialisation of research and enhanced focus on supporting IP management capacity and activities at firm level.**

Annex A: Outline of Work Done

The study incorporated five research strands, they were:

- A review of published literature and commentaries focused on the characterisation of HGFs, particularly their innovation behaviour, and proposed pro-HGF support frameworks;
- Consultation with topic experts and representatives of exemplar pro-HGF initiatives in places outside Ireland;
- An analysis of a dataset linking Annual Business Survey on Economic Impact (ABSEI) and Community Innovation Survey (CIS) entries for agency-supported firms spanning the 2002-11 period;
- A survey of a sample of agency-supported HGFs and non-HGFs, focusing on the topics of the determinants of growth, innovation behaviour and its barriers, and potentially valuable support interventions. Twenty eight firms were engaged, with 26 of these providing the necessary quantitative data for formal numeric analysis;
- A formal calibration workshop with stakeholders from the Department of Jobs, Enterprise and Innovation and its Agencies, to test and develop the study's findings;
- Consultation with the workshop stakeholder group on the draft conclusions developed.

Key details for each element are outlined below.

Literature Review

Literature consulted during the literature review includes:

Table 10: Literature consulted

Topic Commentary	Añón Higón, D. Driffield, N. (2011) "Exporting and innovation performance: analysis of the annual Small Business Survey in the UK", IN International Small Business Journal, 29:1, pp4-24 BIS (2011) Internationalisation of Innovative and High Growth SMEs Bosma, N. Stam, E. (2012) Local Policies for High-Employment Growth Enterprises Hansen, B. Hamilton, R.T. (2011) "Factors distinguishing small firm growers and non-growers", IN International Small Business Journal, 29:3, pp278-294 Hölzl, W. (2008) Is the R&D Behaviour of Fast Growing SMEs Different? Hölzl, W. Friesenbichler, K. (2010) "High growth firms, innovation and the distance to the frontier' 'Economics Bulletin, Vol. 30:2, pp. 1016-1024 Hölzl, W. Janger, J. (2013) "Does the analysis of innovation barriers perceived by high growth firms provide information on innovation policy priorities?", IN Technological Forecasting and Social Change Lee, N. (2011) Free to grow? Assessing the obstacles faced by actual and potential high growth firms

	Lilischkis, S. (2011) Policies in support of high growth innovative SMEs Lilischkis, S. (2013) Policies for high growth innovative enterprises Love, J. Rope, S. (2013) SME Innovation, Exporting and Growth Mason, C. (2011) Creating Good Public Policy to Support High Growth Firms Ministry of Trade and Industry (2007) High Growth SME Support Initiatives in Nine Countries: Analysis, Categorization, and Recommendations Moreno, A.M. Casillas, J.C. (2007) "High growth SMEs versus non-high growth SMEs: a discriminant analysis", IN Entrepreneurship and Regional Development, 19:1, pp69-88 NESTA (2011) Vital growth OECD (2010) High Growth Enterprises: What Governments Can Do to Make a Difference O'Malley, O. Hewitt-Dundas, N. Roper, S. (2008) High growth and innovation with low R&D: Ireland, IN Small Country Innovation Systems: Globalization, Change and Policy in Asia and Europe edited by Edquist, C. Hommen, L. O'Regan, N. Ghobadian, A. Gallear, D. (2006) "In search of the drivers of high growth in manufacturing SMEs", IN Technovation, 26:1, pp30-41 Pro Inno Europe (2007) Exploratory Team Report on High Growth Innovative SMEs Segarra, A. Teruel, M. (2011) High Growth Firms and Innovation: an empirical analysis for Spanish firms The Ratio Institute (2011) High growth firms and economic development? The Work Foundation (2011) Ready, Steady, Grow? How the government can support the development of more high growth firms
Other Contextual Literature	Forfás, Review of R&D Programmes Forfás. Assessment of Publicly Funded RD&I Supports for Innovation in Services and Business Processes Forfás. Evaluation of Enterprise Supports for RD&I Forfás. Evaluation of Enterprise Supports for Start-ups & Entrepreneurship Forfás. IE input to ERAC survey on governmental activities in support of HG Innovative Enterprises Forfás. Objectives of IDA Grants Forfás. Programmes by Thematic Area and Agency Forfás. Review of FDI Policy Forfás. Working Paper: Performance/Characteristics of Agency Support HGFs OECD. Mixed Modes of Innovation

Source: SQW

Stakeholder Consultations

Stakeholders and topic-experts that provided national and international background context are detailed in Table 11:

Table 11: Background Context Consultations

Group	Name
Internal Stakeholders	Celine McHugh, Forfás Ian Hughes, Forfás Maria Ginnity, Forfás Maurice Dagg, Forfás
Topic Experts	Alison Munro, Senior Manager, Policy Development, Scottish Enterprise Bernadette McGahon, Science and Technology Manager, Intertrade Ireland Stefan Lilischkis, Senior Consultant, empirica GmbH Stephen Roper, Prof. Enterprise and Entrepreneurship, Warwick Business School Terttu Luukkonen, Chief Research Scientist The Research Institute of the Finnish Economy (ETLA) Thomas Cooney, Prof. Enterprise and Entrepreneurship, Dublin Institute of Technology Treve Willis, MD, Enterprise Coaching, Oxford Innovation Ltd

Source: SQW

Data Analysis

The dataset analysed by this study links entries from the Annual Business Survey on Economic Impact (ABSEI) with those of the Community Innovation Survey (CIS) for the period spanning the 2002-11[77]. This linkage enabled answers to the CIS to be segmented by firm growth rate, either employment or turnover, thereby revealing differences in CIS responses between HGF and non-HGF populations. Throughout, the statistical significance of differences has been established using the Chi^2 test[78].

The following notes and caveats are important to bear in mind when reviewing the subsequent analysis:

- The dataset contains only 'agency-supported' firms and therefore cannot be assumed to represent the wider business stock in Ireland. The distinct profile of this sample is apparent in the high proportion of firms engaged in R&D and export;

[77] The specific CIS surveys used were: 2002-04; 2004-06 and 2008-10

[78] The statistical significance of differences between 11 growth rate bands spanning <20% and >20% per annum for three years has been tested throughout the analysis.

- The analysis has sought to segment responses to the CIS by 11 growth-rate bands. However, in cases where less than 10 firms form the growth rate band, non-disclosure protections require these data to be removed (or aggregated with neighbouring growth-rate band);
- The analysis has returned relatively few findings that are statistically significant. The importance of these statistical tests cannot be dismissed; however, the small sample sizes involved in many of these tests does limit their reliability. Responding to this limitation, a 'qualitative' commentary is included within the discussion.

Survey

The purpose of the survey was to provide a qualitative complement to the preceding CIS data analysis, deepening the insight into HGF behaviour and the differences between HGFs and non-HGFs.

Due to the small sample size and manner of its recruitment, no statistical analysis is appropriate and findings cannot be assumed to be representative of the wider HGF population. Therefore, the principal output from this analysis is a set of observations regarding the survey sample that may be employed as 'weak signals' informing hypotheses for further study.

In summary, 28 firms were consulted in total, of which 15 were HGFs and 13 were non-HGFs (using the employment-based growth metric). Conversations focused on the determinants of growth, features of the innovation model, and barriers to innovation of each firm. In addition, firms were invited to venture proposals for the Government support of innovation.

Workshop Details

The workshop was held at Forfás (Wilton Park House) on the 30 October 2013. In attendance were:

Table 12: List of Workshop Attendees

Study Team	Attending Stakeholders
Dr Karen Bonner – Aston University Elizabeth Harvey – Forfás Karen Hynes – Forfás Sam Cammiss – SQW Ltd Simon Pringle – SQW Ltd	Alexa Toomey – Enterprise Ireland Gearoid Mooney – Enterprise Ireland Vanessa Barcroft – Enterprise Ireland Ian Hughes – Forfás Michael Davitt – DJEI Pauline Mulligan – DJEI Stephen Curran – DJEI Ciara Cotter – SFI

Source: SQW

The workshop centred on a discussion of findings emerging from each of the study's three research themes, namely:

- The innovation behaviour of HGFs;
- The barriers facing firms seeking to innovate, particularly those seeking to adopt a high growth innovation model;
- The practical support can be provided to:

    Encourage and enable potential HGFs to achieve high growth status;

    Enhance the quality and size of the potential HGF population;

    Enable HGFs to sustain their performance over the long term;

    Encourage non-HGFs to engage in types of innovation behaviour demonstrated by HGFs;

    Mitigate the barriers to innovation for existing HGFs and potential HGFs.

In each case, feedback was sought on key findings, integrating learning from experience in Ireland.

Helpful follow-up inputs were subsequently provided by DJEI's agencies, for which the study authors are grateful.

Stakeholder Consultation on Draft Report

A draft report was provided to the stakeholders that attended the workshop and inputs received were reflected upon in developing the final report.

Annex B: Full Findings of the Data Analysis

The following sections review headlines and highlights from the data analysis process. Each section considers a specific innovation theme from the CIS, covering the following topics in each case:

- The behaviour of employment-based, agency-supported HGFs in the sample, as revealed by the CIS;
- How the HGF behaviour differs to the behaviour of agency-supported non-HGFs in the sample;
- How the HGF-behaviour differs to the behaviour of all firms responding to the CIS;
- How the employment-based, agency-supported HGF-behaviour compares to the pattern revealed for turnover-based analysis.

The following notes and caveats are important to bear in mind when reviewing the analysis:

- The dataset contains only 'agency-supported' firms, benefitting from some type of support from EI or IDA in the past (this may be financial or provision of expertise, not just for innovation):

  EI supports focus on firms with export potential resulting in a bias towards exporting in the sample;

  As a group, agency-supported firms are responsible for the majority of BERD in Ireland, and as such this agency population of firms represents a higher proportion of R&D active firms then would be found in the firm population as a whole in Ireland;

- The analysis has sought to segment responses to the CIS by 11 growth-rate bands. However, in cases where less than 10 firms form the growth rate band, non-disclosure protections require these data to be removed (or aggregated with neighbouring growth-rate band);
- The analysis has returned relatively few findings that are statistically significant. The importance of these statistical tests cannot be dismissed; however, the small sample sizes involved in many of these tests does limit their reliability. Responding to this limitation, a 'qualitative' commentary is included within the discussion.

Specific CIS themes are reviewed in turn and form the basis of the summaries presented in the main body of the report.

Objectives of Innovation Activity

The CIS probed the innovation objectives with the following question:

- How important were each of the following objectives for your activities to develop product (good or service) or process innovations?:

  Increase range of goods or services;

  Replace outdated products or processes;

  Enter new markets or increase market share;

Improve quality of goods or services;

Improve flexibility for producing goods or services;

Increase capacity for producing goods or services;

Reduce labour costs per unit output;

Reduce material and energy costs per unit output;

Reduce environmental impacts;

Improve health and safety of employees.

The behaviour of employment-based HGFs in the sample

Each of the innovation objectives were identified as important by a majority of the HGF group, with the exception of those concerned with an improvement in environmental, health, and safety performance. Particularly prominent objectives, in terms of the proportion of the HGF group that considered them important, are: 'increase the range of goods and services', 'enter new markets or increase market share', and 'improve the quality of goods and services'.

How the employment-based HGF behaviour differs to the behaviour of non-HGFs in the sample

HGFs and non-HGFs are broadly aligned in terms of the proportions of each group identifying each of the innovation objectives as important. Qualitatively, a higher proportion of the HGF group appears to have pursued the three objectives highlighted above than is the case for the lower growth rate groups. However, only in the cases of 'increase the range of goods and services' and 'improve the quality of goods and services' do these observations appear to be statistically significant.

How the employment-based HGF-behaviour differs to the behaviour of all firms responding to the CIS

No CIS comparison available.

How the employment-based HGF-behaviour compares to the pattern revealed for turnover-based analysis.

The responses of the employment and turnover based HGFs to this question are broadly aligned in terms of the proportions of each group identifying each objective as important and the comparison of HGF and non-HGF responses for each option.

Higher proportions of the turnover-based HGF group did identify 'improve flexibility for producing goods or services', 'reduce environmental impacts', and 'improve health and safety' as important objectives than the employment-based HGF group. However, these observations are not statistically significant.

Summary – Objectives of Innovation Activity

Overall, the HGF group presents a set of innovation objectives that is largely aligned with that of non-HGFs. However, there is some evidence to suggest a relatively stronger emphasis, amongst the HGF group as a whole, on market-facing innovation as opposed to internal developments (such as process and systems innovations).

Nature of Innovation Activity

The CIS probed the nature of innovation activity with the following question:

- Did your enterprise engage in the following innovation related activities:

  In-house research and development?

  Purchase of external research and development?

  Acquisition of machinery, equipment and software?

  Acquisition of other external knowledge?

The behaviour of employment-based HGFs in the sample

Substantial proportions of the HGF group engaged in each type of innovation activity. Only in the case of 'in-house research and development' and 'acquisition of machinery, equipment, and software' did a majority of HGFs engage.

How the employment-based HGF behaviour differs to the behaviour of non-HGFs in the sample

HGFs and non-HGFs were closely aligned in terms of the proportions of each group engaged in types of research and development activity. This pattern should be expected, as firms engaged in R&D are known to be overrepresented in this sample. Qualitatively, a larger proportion of HGFs engaged in the 'acquisition of machinery, equipment, or software' than non-HGFs, an observation that appears to be statistically significant.

How the employment-based HGF-behaviour differs to the behaviour of all firms responding to the CIS

In total around three quarters of HGFs in the 2008-10 period had innovation related expenditure, which is substantially higher than that found for all firms on the CIS; 36 per cent of which had expenditure on the above types of innovation related activities. More than half of HGFs (57 per cent) purchased machinery, equipment, and software, and spent on in-house R&D (51 per cent), again shares that were more than twice as high as that for all firms on the CIS, where 21 per cent of firms spent on in-house R&D and 23 per cent of firms purchased machinery, equipment, and software.

Almost one third (30 per cent) of HGFs purchased external R&D compared to just 10 per cent of all firms on the CIS. The acquisition of other external knowledge was the only expenditure whereby the shares of HGFs were lower than for all firms, at 5 per cent compared to 6 per cent overall for the CIS.

How the employment-based HGF-behaviour compares to the pattern revealed for turnover-based analysis

The responses of the employment and turnover based HGFs to this question are well aligned in terms of the proportions that engaged in each type of activity and the comparison of HGF and non-HGF responses for each option. Qualitatively, a substantially lower proportion of turnover-based HGFs engaged in the 'acquisition of machinery, equipment, or software' than employment-based HGFs. Conversely, a substantially higher proportion of turnover-based HGFs engaged in the 'acquisition of research and development' than employment-based HGFs. This observation appears to be statistically significant only in the case of the former.

Summary – Nature of Innovation Activity

Overall, it is apparent that larger shares of the positive growth groups, including HGFs, are engaged in each type of R&D activity. Although a larger share of HGFs acquire machinery, equipment, or software than non-HGFs, it is impossible to divine whether this is a cause or effect of HGF status from this dataset. Caution is required in the interpretation of this information due to the known overrepresentation of firms engaged in R&D in the sample.

Type of Product/Process Innovation Activity Undertaken

The CIS probed the type of product and process innovation activity undertaken with the following questions:

- Did your enterprise introduce…

  New or significantly improved goods?

  New or significantly improved services?

  New or significantly improved methods of manufacturing or producing goods or services?

  New or significantly improved logistics, delivery, or distribution methods for your inputs, goods, or services?

  New or significantly improved supporting activities for your processes, such as maintenance systems or operations for purchasing, accounting, or computing?

The behaviour of employment-based HGFs in the sample

Substantial numbers of HGFs engaged in each type of innovation, with a majority engaging in each of the introduction of 'new or improved goods' and 'new or significantly improved methods of manufacturing or producing goods or services'.

How the employment-based HGF behaviour differs to the behaviour of non-HGFs in the sample

HGFs and non-HGFs are broadly aligned in terms of the pattern of engagement in each type of innovation. Qualitatively, a higher proportion of the HGF group introduced 'new or improved services', 'new or significantly improved methods of manufacturing or producing goods or services', and 'new or significantly improved supporting activities for processes'.

The difference is particularly stark in the case of service innovation, with a far higher proportion of HGFs engaging in this activity than is the case for non-HGFs. Furthermore, this observation does appear to be statistically significant.

How the employment-based HGF-behaviour differs to the behaviour of all firms responding to the CIS

In total, 78 per cent of all HGFs undertook some form of product innovation in 2008-10 compared to 28 per cent of enterprises on the CIS. Similarly 65 per cent of HGFs were engaged in some type of process innovation, whilst the share of all firms doing this, as per the CIS, was around half this at 33 per cent.

A substantially higher share of HGFs were involved in developing new or significantly improved goods than all firms on the CIS; 60 per cent of HGFs undertook this activity in 2008-

10 compared to 21 per cent of all firms. Likewise the share engaged in developing new or significantly improved services was also higher at 43 per cent compared to just 15 per cent of all CIS firms. In fact, a greater share of HGFs were involved in all types of product and process innovations than for all CIS firms, with the exception of the introduction of new or significantly improved logistics, delivery or distribution methods, in which the shares were identical at 14 per cent each.

How the employment-based HGF-behaviour compares to the pattern revealed for turnover-based analysis.

The responses of the employment and turnover based HGFs-to this question are broadly aligned in terms of the proportions of each group engaging in each type of innovation and the comparison of HGF and non-HGF responses for each option. However, a lower proportion of turnover-based HGFs appear to have engaged in service innovation than the employment-based HGF group, with the data suggesting this observation is statistically significant.

Summary – Type of Product/Process Innovation Activity Undertaken

Overall, there is some evidence to suggest a higher proportion of HGFs pursue service innovation than is the case amongst non-HGFs. However, as less than half of the two HGF groups engaged in this form of innovation, this activity cannot be considered a defining characteristic of an HGF.

Novelty of Goods/Service Innovations

The CIS probed the novelty of goods and service innovations with the following question:

- Were any of your product innovations…

  New to your market?

  Only new to your firm?

The behaviour of employment-based HGFs in the sample

Approximately half of the HGFs that engaged in product innovation introduced 'new to market' innovations.

How the employment-based HGF behaviour differs to the behaviour of non-HGFs in the sample

The even balance between 'new to market' or 'new to firm' innovations seen with the HGF group is largely matched by the non-HGF group. Qualitatively, slightly higher proportions of the non-HGF groups introduced 'new to market' innovations than the HGF group. However, the statistical significance of this observation appears to be limited.

How the employment-based HGF-behaviour differs to the behaviour of all firms responding to the CIS

More than half of HGFs (54 per cent) had product innovations that were new to market over the 2008-10 period, whilst the same share had product innovations that were new to the firm. These shares were substantially higher than for all firms on the CIS, of which 21 per cent had new to firm and just 16 per cent new to market product innovations.

How the employment-based HGF-behaviour compares to the pattern revealed for turnover-based analysis

The responses of the employment and turnover based HGFs-to this question are broadly aligned in terms of the proportions of each group introducing 'new to market' and 'new to firm' innovations and the comparison of HGF and non-HGF responses for each option.

Summary – Novelty of Goods/Service Innovations

Overall, it is apparent that broadly equal numbers of HGFs introduced 'new to market' and 'new to firm' innovations, a pattern largely matched by the non-HGF groups (albeit with some suggestion that higher proportions of non-HGFs introduced 'new to market' innovations). Therefore, the extent to which HGFs demonstrate a distinct behaviour with regard to the novelty of innovations appears to be limited.

Proportion of Turnover due to Goods/Service Innovations

The CIS probed the proportion of turnover due to goods and service innovations with the following question:

- Please estimate how your total turnover was distributed between the following categories…

  New or significantly improved goods and service innovations introduced that were new to your market?

  New or significantly improved goods and service innovations introduced that were new to your enterprise but not new to the market?

The behaviour of employment-based HGFs in the sample

The large majority of HGFs attributed 0-25 per cent of turnover to 'new to market' or 'new to firm' goods and service innovations, with less than 5 per cent attributing over 75 per cent. This finding appears to conflict with the presentation of HGFs as 'innovative'. However, this observation is subject to interpretation, specifically: a firm may be culturally innovative, innovating by routine, but engaging in no formally designated 'innovation projects' and therefore attribute no turnover increase to such activity.

How the employment-based HGF behaviour differs to the behaviour of non-HGFs in the sample

HGFs and non-HGFs are closely aligned in terms of the proportions of each group attributing turnover to 'new to market' and 'new to firm' goods and service innovations. Qualitatively, smaller proportions of the HGF group attributed no turnover impact than the non-HGF groups. This was balanced by higher proportions of the HGF group attributing higher levels of turnover to such innovation compared with the non-HGF group. This pattern held for 'new to market' and 'new to firm' innovations. However, analysis of underlying data reveals no statistical significance in these observations.

How the employment-based HGF-behaviour differs to the behaviour of all firms responding to the CIS

The share of turnover attributed to new to firm and new to market product innovation by HGFs was higher than that for all firms on the CIS, although followed a similar pattern, with the majority attributed to unchanged activities. The share attributed to new to firm activities in 2008-10 was 18 per cent compared to 5 per cent for firms on the CIS, and the share attributed to new to market activities was 16 per cent compared to 5 per cent on the CIS.

How the employment-based HGF-behaviour compares to the pattern revealed for turnover-based analysis

The responses of the employment and turnover based HGFs-to this question are well aligned in terms of the proportions attributing turnover effects to 'new to market' and 'new to firm' and the comparison of HGF and non-HGF responses for each option.

Summary – Proportion of Turnover due to Goods/Service Innovations

Overall, it is apparent that, as a group, HGFs attribute higher levels of turnover to 'new to market' and 'new to firm' goods and service innovations than non-HGFs. However, individually, a substantial number of HGFs attribute no turnover effect to innovation at all. Again, the extent to which an underlying 'innovativeness' of any HGF would appear in such explicit scoring should be considered when interpreting these results.

Types of Organisational Innovation

The CIS probed the type of organisational innovation activity undertaken with the following questions[79]:

- Did your enterprise introduce…

  New business practices for organising procedures?

  New methods of organising work responsibilities and decision-making?

  New methods of organising external relationships with other firms or public institutions?

The behaviour of employment-based HGFs in the sample

Substantial numbers of the HGF group engaged in each form of organisational innovation, with the highest proportion seen with internally orientated improvements to the organisation. However, a no single form of organisation innovation was engaged in by a majority of the HGF group.

How the employment-based HGF behaviour differs to the behaviour of non-HGFs in the sample

HGFs and non-HGFs were broadly aligned in terms of the levels of engagement in each form of organisational innovation. Qualitatively, higher proportions of the HGF group were

[79] NB: due to variation in the phrasing of this question in different CISs, this question has been simplified in analysis to enable combination of CIS responses across the 2002-11 period.

engaged in all forms of organisational innovation than was the case for the lower growth rate groups. However, the statistical significance of these observations appears to be limited.

How the employment-based HGF-behaviour differs to the behaviour of all firms responding to the CIS

Overall, 65 per cent of HGFs undertook some form of organisational innovation in 2008-10, which was almost double that for all firms recorded on the CIS, at 36 per cent.

A greater share of HGFs undertook each type of organisational innovation activity than all firms on the CIS. Over the 2008-10 period 39 per cent of HGFs undertook new business practises, compared to 30 per cent of all firms; 44 per cent of HGFs engaged in new methods of organising work responsibilities and decision-making , compared to 30 per cent of all firms; and 31 per cent had new methods of organising external relations compared to 16 per cent of all firms.

How the employment-based HGF-behaviour compares to the pattern revealed for turnover-based analysis.

The responses of the employment and turnover based HGFs-to this question are broadly aligned in terms of the proportions of each group engaging in each type of organisational innovation and the comparison of HGF and non-HGF responses for each option.

Summary – Types of Organisational Innovation

Overall, there is evidence to suggest that HGFs engage in all forms of organisational innovation to a greater extent than lower growth rate groups. However, the level of HGF engagement in organisational innovation is not high enough to suggest that this activity is definitive or characteristic of HGF status.

Types of Marketing Innovation

The CIS probed the type of marketing innovation activity undertaken with the following questions:

- Did your enterprise introduce…
  - Significant changes to the aesthetic design or packaging of a good or service?
  - New media techniques for product promotion?
  - New methods for product placement or sales channels?
  - New methods of pricing goods and services?

The behaviour of employment-based HGFs in the sample

Although substantial numbers of HGFs engaged in marketing innovation, no single type of marketing innovation is engaged in by more than half of the HGF group. The type of marketing innovation that is engaged in by the highest proportion of the HGF group is 'new media techniques for product promotion'. Each of the remaining types of marketing innovation is engaged in by approximately a third of the HGF group.

How the employment-based HGF behaviour differs to the behaviour of non-HGFs in the sample

When compared with the non-HGF groups, a substantially higher proportion of the HGF group is engaged in each form of marketing innovation. However, only in the cases of 'new media techniques for product promotion' and 'new methods for product placement' are these differences deemed to be statistically significant.

How the employment-based HGF-behaviour differs to the behaviour of all firms responding to the CIS

In total, just over half of HGFs (54 per cent) in 2008-10 undertook some form of marketing innovation compared to 30 per cent of firms on the CIS.

The share of HGFs undertaking the various individual types of marketing innovation were around twice as high as for all firms as recorded on the CIS. During the 2008-10 period 42 per cent of HGFs used new media or techniques for product promotion compared to 20 per cent of all firms. Exactly one third of HGFs made significant changes to the aesthetic design or packaging; the same share had new methods of pricing whilst just 15 per cent of all firms undertook each of these activities. Finally 31 per cent of HGFs had new methods for product placement or sales channels compared to only 13 per cent of all firms.

How the employment-based HGF-behaviour compares to the pattern revealed for turnover-based analysis

The responses of the employment and turnover based HGFs-to this question are broadly aligned in terms of the comparison of HGF and non-HGF responses for each option. However, a smaller proportion of turnover-based HGFs are engaged in each form of marketing innovation than the employment-based HGF group. This pattern is most pronounced in the cases of 'new media or techniques for product promotion' and 'new methods for product placement', observations that appear to be statistically significant.

Summary – Types of Marketing Innovation

Overall, despite evidence to propose a higher level of engagement in marketing innovation amongst HGFs, the fact that no single form of marketing innovation is engaged in by a majority of the HGF group limits the extent to which this dimension of innovation can be considered characteristic of HGFs.

Types of Cooperation Partner Involved

The CIS reveals that approximately a quarter of the HGF group, employment and turnover, cooperate on innovation activities. This figure is substantially below that of the non-HGF groups, with some indication that this observation is statistically significant. Cooperation is a pursuit of the minority across the sample, with no more than a third of any growth rate group engaging in such activity.

The CIS probed the type of cooperation partner with the following question:

- Did your business co-operate on any innovation activities with any of the following:

  Other businesses within your enterprise group?

Suppliers of equipment, materials, components, or software?

Clients or customers?

Competitors or other businesses in your sector?

Consultants, commercial labs, or private R&D institutes?

Universities or other higher education institutions?

Government or public research institutes?

The behaviour of employment-based HGFs in the sample

A number of cooperating HGFs cooperated with each type of partner. However, 'consultants, commercial labs, or private R&D institutes' were the only partner-type with which a majority of the HGF group cooperated. Conversely, the data reveal only a small proportion of the HGF group cooperated with 'competitors' or 'universities or other higher education institutions'.

How the employment-based HGF behaviour differs to the behaviour of non-HGFs in the sample

HGFs and non-HGFs were broadly aligned in terms of the proportions of each group that cooperated with each partner-type. However, the proportion of the HGF group cooperating with each of the partner-types was below that of the non-HGF group in all cases but 'consultants, commercial labs, or private R&D institutes'.

The proportion of the HGF group that cooperated with group siblings and 'suppliers of equipment, materials, components, or software' was substantially below that of the non-HGF groups. However, only in the case of 'suppliers of equipment, materials, components, or software' do these observations appear to be statistically significant.

How the employment-based HGF-behaviour differs to the behaviour of all firms responding to the CIS

A lower share of HGFs engaged in some type of co-operation activity than did all firms over the 2008-10 period; just 22 per cent of HGFs co-operated with others compared to 29 per cent of all firms on the CIS. Of the types of co-operation partner HGFs favoured consultants and commercial labs/private R&D institutes, with 63 per cent of co-operating HGFs engaging with this type of partner, in contrast just 11 per cent of all co-operating firms co-operated with these partners. The least favoured partners for both HGFs and all firms were competitors, and government/ public research institutes; HGFs were least likely to co-operate with the latter, whilst all firms were least likely to co-operate with the former. (Note that just eight HGFs co-operated overall so the shares of each individual co-operation partner are quite large despite the small actual numbers).

How the employment-based HGF-behaviour compares to the pattern revealed for turnover-based analysis

The responses of the employment and turnover based HGFs-to this question are not well aligned in terms of the proportions of each group cooperating with each type of partner, but are broadly aligned in terms of the comparison of HGF and non-HGF responses for each option.

Specifically, substantially higher proportions of the turnover-based HGF group cooperated with group siblings, 'suppliers of equipment, materials, components, or software', ‘clients or customers’, and ‘government or public research institutes’ than was the case for

employment-based HGFs. However, the extent to which these observations can be considered statistically significant is very limited.

Summary – Types of Cooperation Partner Involved

Overall, there is some evidence to suggest that a lower proportion of the HGF group is engaged in cooperative innovation activities. Those who are appear to be more inclined to partner with 'consultants, commercial labs, or private R&D institutes' than non-HGFs.

This conclusion would appear to conflict with wider commentary regarding the HGF. However, whilst HGFs are considered to be typically more 'networked' than their competitors, they may be less inclined to the formality of cooperation intimated by the line of inquiry adopted by the CIS.

Entity Responsible for Developing Product/Process Innovations

The CIS probed the entity responsible for developing product and process innovations with the following questions:

- Were these (products/processes) developed mainly by…

  Your enterprise or enterprise group?

  Your enterprise with other enterprises or organisations?

  Other enterprises or organisations?

The behaviour of employment-based HGFs in the sample

The majority of HGFs originated their product innovations themselves, with a small minority (<20 per cent) identifying partners as the co-originator or sole originator. This is the case for both product and process innovations.

How the employment-based HGF behaviour differs to the behaviour of non-HGFs in the sample

HGFs and non-HGFs were broadly aligned in terms of the proportions of each group locating the origination of product or process innovations inside and outside the enterprise. Qualitatively, it is apparent that a higher proportion of the HGF group originates product and process innovations in partnership, or outsources product innovation entirely, when compared with the non-HGF groups. As a result, a lower proportion of the HGF group originate product or process innovations alone than is the case for the non-HGF groups. However, the statistical significance of these observations is in doubt.

How the employment-based HGF-behaviour differs to the behaviour of all firms responding to the CIS

Just over two thirds of HGFs that undertook product innovation in 2004-06 developed these innovations within their own enterprise or enterprise group, a share that was lower than that for all product innovating firms on the CIS, at 74 per cent. The proportion developed by other enterprises or institutions was also lower for HGFs than all innovating CIS firms, at just 8 per cent compared to 11 per cent for CIS innovators. However, HGFs were more likely to develop their product innovations in conjunction with other enterprises or institutions, with a quarter doing so, compared to 16 per cent of all product innovators as per the CIS.

How the employment-based HGF-behaviour compares to the pattern revealed for turnover-based analysis

The responses of the employment and turnover based HGFs-to this question are well aligned in terms of the proportions identifying each origin of their innovations and the comparison of HGF and non-HGF responses for each option. Qualitatively, a smaller proportion of the turnover-based HGFs originate innovations themselves, with a higher proportion identifying partners as the co-originator or sole originator in each case. However, there is no indication of statistical significance in these observations.

Summary – Entity Responsible for Developing Product/Process Innovations

Overall, there is no strong case to propose a distinct characteristic behaviour amongst HGFs with regard to the parties responsible for originating product or process innovations. However, there is evidence to suggest higher levels of engagement amongst the HGF group as a whole in innovation positioned outside firm boundaries, when compared with non-HGFs.

Sources of Information Used to Enable Innovation

The CIS probed the sources of information used for innovation with the following question:

- How important to this enterprise's innovation related activities were each of the following information sources…

  Your enterprise or enterprise group?

  Suppliers of equipment, materials, services, or software?

  Clients or customers?

  Competitors or other businesses in your industry?

  Consultants, commercial labs, or private R&D institutes?

  Universities or other higher education institutions?

  Government or public research institutes?

  Conferences, trade fairs, exhibitions?

  Scientific journals and trade/technical publications?

  Professional and industry associations?

  Technical, industry or service standards?

The behaviour of employment-based HGFs in the sample

Substantial proportions of the HGF group consulted each source of information for the purposes of innovation, with a majority consulting each of internal sources and clients and customers. The source of information consulted by the smallest proportion of HGFs was 'universities or other higher education institutions'.

How the employment-based HGF behaviour differs to the behaviour of non-HGFs in the sample

HGFs and non-HGFs are closely aligned in terms of the proportions of each group that consulted each source of information for the purposes of innovation. Qualitatively, a smaller proportion of the HGF group consulted 'suppliers of equipment, materials, services, or software', 'competitors or other businesses in your industry', and 'universities or other higher education institutions' than non-HGF groups. Conversely, a higher proportion of HGFs consulted 'clients or customers' as a source of innovation information than the non-HGFs. However, analysis of underlying data reveals no statistical significance in these observations.

How the employment-based HGF-behaviour differs to the behaviour of all firms responding to the CIS

No CIS comparison available.

How the employment-based HGF-behaviour compares to the pattern revealed for turnover-based analysis

The responses of the employment and turnover based HGFs-to this question are well aligned in terms of the proportions that consulted each source of information and the comparison of HGF and non-HGF responses for each option.

However, a smaller proportion of turnover-based HGFs consulted 'clients or customers' than employment-based HGFs. Furthermore, higher proportions of turnover-based HGFs consulted 'suppliers of equipment, materials, services, or software' and 'competitors or other businesses in your industry'. However, none of these observations appears to be statistically significant.

Summary – Sources of Information Used to Enable Innovation

Overall, it is apparent that, as a group, HGFs appear to consult predominantly internal sources of innovation information for the purposes of innovation, albeit with higher proportions consulting clients than non-HGF groups. To some extent, this information supports the portrayal of HGFs engaged in a 'market-facing' innovation model. However, this orientation is not clearly a pursuit of the majority of HGFs and therefore cannot be considered characteristic of the group as a whole.

Barriers to Innovation

The CIS probed the barriers to innovation with the following question:

- How important were the following factors in preventing your enterprise from innovating or in hampering your innovation activities…

  Lack of funds within your enterprise or group?

  Lack of finance from sources outside your enterprise?

  Innovation costs too high?

  Lack of qualified personnel?

  Lack of information on technology?

Lack of information on markets?

Difficulty in finding cooperation partners for innovation?

Market dominated by established businesses?

Uncertain demand for innovative goods or services?

No need due to prior innovations by your enterprise?

No need because of no demand for innovations?

The behaviour of employment-based HGFs in the sample

The most common barrier to innovation identified by the HGF group was a 'lack of funds within the enterprise'. Reinforcing this position, the 'costs of innovation' was also a commonly cited issue in this group. However, no single barrier was selected by a majority of the HGF group, with roughly 20 per cent-40 per cent selecting each option.

How the employment-based HGF behaviour differs to the behaviour of non-HGFs in the sample

HGFs and non-HGFs were broadly aligned in terms of the proportions of each group identifying each barrier to innovation. Qualitatively, a lower proportion of HGFs identified each barrier than the non-HGF groups. This pattern was most pronounced when considering the cost of innovation, the sufficiency of information available on technology and markets, and the dominance of established enterprises. However, the extent to which these observations appear to be statistically significant is limited.

How the employment-based HGF-behaviour differs to the behaviour of all firms responding to the CIS

The main barrier to innovation for all firms over the 2008-10 period was lack of funds, which was cited by around one quarter of innovative firms and one fifth of non-innovative firms on the CIS. HGFs also rated this as the joint highest barrier, with 42 per cent citing lack of funds, and an equal share citing the costs of innovation as being too high. Lack of external finance was also a key barrier, with 36 per cent of HGFs citing this as a high/medium barrier to innovation and 20 per cent of all innovative firms citing is as highly important. Factors that were less likely to hamper innovation were lack of information on technology and lack of information on markets and difficulty in finding co-operation partners; less than 6 per cent of all firms on the CIS recorded these as highly important factors hampering innovation and just 11 per cent of HGFs cited each of these respectively.

How the employment-based HGF-behaviour compares to the pattern revealed for turnover-based analysis

The responses of the employment and turnover based HGFs to this question are well aligned in terms of the proportions that identified each barrier and the comparison of HGF and non-HGF responses for each option. Qualitatively, substantially higher proportions of turnover-based HGFs identified innovation costs, a lack of information available on technology and markets, and an uncertain demand for innovative products as barriers than employment-based HGFs. However, no statistical significance is apparent in these observations.

Summary – Barriers to Innovation

Overall, it is apparent that, as a group, a lower proportion of HGFs identify each barrier to innovation than non-HGF groups. Acknowledging limited indication of statistical significance in these observations, it is possible to propose that HGFs, as a group, are more resilient when faced with obstacles to innovation.

However, the CIS does indicate that a higher proportion, roughly 40 per cent, of employment and turnover based HGFs abandoned innovation activities during the observation period than non-HGF groups. Although the proportion abandoning innovation was less than half of each group, this information does indicate a substantial impact of barriers to innovation acting upon HGFs. In addition, figures for abandonment may suggest that innovation within the HGF group is more flexible, selective, and responsive.

Annex C: Full Findings of the Enterprise Survey Analysis

This Annex chapter reviews the findings of the survey of High Growth Firms (HGF) and non-HGFs. Twenty-eight firms were engaged and are reported on qualitatively later in this Annex, with 26 of these providing the necessary quantitative data for formal numeric analysis, depicted immediately below.

HGFs versus non-HGFs

The sector, size, and ownership profile of the HGF and non-HGF samples surveyed have been broadly matched in order to enable their comparison. The following sections compare responses to key themes from the HGF and non-HGF samples.

Innovation Behaviour

The nature of innovation undertaken by surveyed firms was approached from the perspective of the OECD's five 'modes' of innovation (see Annex D). Through this line of inquiry, the survey indicates that all firms pursued at least one mode of innovation, a high level of activity that may reflect the manner by which the sample was recruited. Table 13 collates the results:

Table 13: Firm specific types of innovation

Type of Innovation	% of HGF Sample	% of non-HGF Sample
IP/Technology Innovating	77	85
Marketing Based Innovating	46	8
Process Modernising	62	62
Wider Innovating	54	15
Networked Innovating	38	31

Source: SQW

The data indicate some differences in the types of innovation pursued by HGFs and non-HGFs: specifically, a higher proportion of the non-HGF sample engaged in technology innovating than the HGF sample. Conversely, a higher proportion of the HGF sample engaged in marketing based innovating and wider innovating than the non-HGF sample.

These data provide some basis upon which to conclude HGFs and non-HGFs tend towards distinct innovation behaviours.

Frequency of Innovation

Developing the picture of innovation within the survey sample, the frequency of innovation was probed, and is reported in Table 14.

Table 14: Frequency of new products, processes, or systems introductions

Frequency	% of HGF Sample	% of non-HGF Sample
Less than every 2 years	8	0
Once every 1 to 2 years	23	0
Once a year	23	8
More than once a year	23	54
Inconsistent Pattern	23	38

Source: SQW

Responses to this line of inquiry present no simple pattern with regard to the rates of innovation within the HGF and non-HGF sample. This may indicate that the rate of innovation is influenced by factors outside the firm, such as market demand.

Relationships between innovation and growth, and growth and ownership

With regard to the linkage between innovation and growth, the survey indicates some difference between non-HGF and HGF samples (see Table 15):

Table 15: Degree of correlation between growth and innovation

Degree of Correlation	% of HGF Sample	% of non-HGF Sample
Very Close	31	46
Close	54	38
Not Close	8	0
Uncertain	8	15

Source: SQW

Specifically, a higher proportion of the non-HGF sample considered the correlation between growth and innovation to be 'very close'. Therefore, innovation-based growth cannot be considered an HGF-specific trait. This point is reinforced by data indicating that 77 per cent of the HGF sample identified growth as the primary objective for their innovation activity, the same (77 per cent) as for the non-HGF sample.

Four of the sampled firms were foreign-owned. There was no evidence that these firms demonstrated faster rates of growth than indigenous ones.

Collaboration

Table 16 illustrates the level and nature of collaboration in the innovation activities of HGFs and non-HGFs:

Table 16: Partners in the innovation process

Partner	Level of Connectivity - % of HGF Sample			Level of Connectivity - % of non-HGF Sample		
	None	Some	Significant	None	Some	Significant
Universities	31	54	15	77	23	0
Suppliers	69	23	8	85	15	0
Clients	23	31	46	69	31	0
Competitors	62	38	0	92	8	0
Service Providers	62	38	0	85	15	0

Source: SQW

The data suggest higher levels of collaboration amongst HGFs than non-HGFs, with a higher proportion of the HGF sample engaged in collaboration with clients and universities.

Use of support

A final theme of innovation behaviour probed in the survey concerns the use of external support for innovation processes derived from the private sector (see Table 17):

Table 17: Use of private sector support for innovation activities

Level of Use	% of HGF Sample	% of non-HGF Sample
None	62	92
Some	38	8
Significant	0	0

Source: SQW

The data indicate a higher level of use of private sector support for innovation amongst the HGF sample than the non-HGF sample. A complementary analysis of public sector support was not undertaken as firms surveyed were recruited from an 'agency-supported' database.

Barriers to Innovation

Table 18 collates survey responses concerning the barriers to innovation encountered by HGFs and non-HGFs:

Table 18: Factors limiting innovation within the firm

Factor	High Growth	non-High Growth
Lack of Knowledge (Technology or Markets)	8	0
Lack of Skills in the Labour Market	46	54
Lack of Strategic Drivers (Competition or Demand)	8	8
Lack of Resources (Financial, Human, or Material)	46	69
Other (i.e. specific technical issues)	23	15

Source: SQW

The data indicate a level of similarity between the HGF and non-HGF samples, with lack of finance and lack of skills in the labour market dominant for each group. However, there is some evidence to suggest a smaller proportion of HGFs feel these pressures than non-HGFs, an observation that may suggest HGFs are more resourceful when seeking to innovate.

Suggested Support

Finally, the survey sought to gather suggestions regarding the provision of support for innovation activities and responses are collated in Table 19:

Table 19: Suggestions for support to overcome innovation barriers

Support	% of HGF Sample	% of non-HGF Sample
Finance & Funding	62	54
Market Access & Export	38	8
Network Generation & Penetration	15	8
Skills & Knowledge Development	69	31
Other	31	15

Source: SQW

The responses highlight 'access to finance' and associated support such as investor readiness as principal concerns for HGFs and non-HGFs, with little evidence to suggest fundamentally different outlooks on this issue amongst the two groups. Support for skills and knowledge was

the highest requirement amongst HGFs. However, a substantially larger population of HGFs sought support for accessing markets, attaining skills, and developing market information than non-HGFs.

Key Themes in the Stories of High Growth

The survey provided an opportunity to establish the drivers and actions driving high growth from the perspective of each HGF. This section collates the key qualitative themes emerging from the conversations with the 28 surveyed firms.

Wide Variety of Market Strategies

The consulted HGFs present a variety of market strategies, with employment growth attributed to a series of acquisitions, territorial expansions, new products or service launches, new contracts, or responses to emerging market opportunities. Naturally, the specific market strategy driving growth appears to be influenced strongly by the specific market context. These conversations suggest that, rather than adopting a 'standard model' in market strategy, HGFs select and implement the market strategy most appropriate to the market context.

Existing products or services to new markets

The majority of consulted HGFs pursue a set of market strategies in parallel, typically including activities focused on consolidation of existing market positions, expansion of market territory, and extension of product or service ranges.

In this context, activity focused on delivering existing products or services to new markets represents a particular focus for a majority of the HGFs consulted. This activity included efforts to access new markets through network building and developing the client-facing proposition through tailoring of the services accompanying goods or the services themselves.

Differentiation for comparative advantage

A majority of consulted HGFs considered differentiation of their proposition as a dominant factor of their comparative advantage. In these cases, differentiation efforts appear to focus on 'quality' and the 'value-added' service. In dynamic markets, the maintenance of a differentiated proposition emerges as a key focus of the innovation effort.

The use of value-added services to differentiate the core proposition is a common feature of the competitive strategy employed by the consulted HGFs. This behaviour suggests a degree of efficiency in the innovation model, directing investment into the delivery and packaging of propositions as opposed to the larger, 'riskier' investments in new product or service R&D.

Innovativeness versus Innovation Projects

Few of the HGFs consulted operated formalised, labelled 'innovation projects', but all demonstrated activity falling into one or more of the OECD's 'modes of innovation categories (see Annex D). Based on these conversations, it is apparent that the HGFs innovated 'by routine' across the business, rather than investing in discrete 'innovation projects' considered distinct from 'normal' operations.

In essence, the HGFs consulted during this survey demonstrate a high level of 'innovativeness' that pervades the business, with few explicitly labelling their activity 'innovation'. These findings present two important implications for the study:

- Innovation may be difficult, if not impossible, to dissect from an HGFs wider business model;
- Support may have to be broad in scope, with a capacity to enable multiple forms of innovation: pervasive 'innovativeness' rather than specific innovation projects.

Market Awareness and Understanding

The large majority of consulted HGFs present strong connectivity with their clients, whether it be the end-user or a mediating party. In each case, the HGF had invested in nurturing this connectivity, developing a stream of feedback from clients that informed the development of products and services, as well as the broader business strategy.

Opportunity spotting & responsiveness

Enforcing the vision of strong 'market awareness' provided through client relationships, the management teams of consulted HGFs demonstrate extensive capability for tracking market trends, spotting opportunities, and coordinating rapid responses. A number of the HGFs appear to be engaged in a continuous cycle of spotting and sifting opportunities emerging in the market, a behaviour that places emphasis on a firm's ability to appraise opportunities and coordinate a timely and effective response.

In this regard, the innovation model prevalent amongst HGFs appears to favour 'market pull' rather than 'technology push' factors.

Agility in responding to opportunity

The preceding sections highlight the necessity of an HGF's capacity and capability for response to emerging opportunities. Responses observed amongst consulted HGFs span tailoring of products and services to meet new demands, investments in regulatory compliance to access new clients, engagement of third parties to extend market reach to new territories, and short-term increases in output to match demand patterns.

Three traits, common to the majority of consulted HGFs, appear key to engineering such responses, they are:

- A broad skill-base, experience, and adaptive capacity within the management team and wider workforce;
- Fluid operational procedures that are readily reconfigured or reoriented;
- A capacity amongst the management team to leverage financial and material resources for the development activity (through conventional sources or novel partnerships with clients);
- A wide network of partners able to support or facilitate market access or attenuation of the product/service offer.

Importantly, these consultations indicate limited speculative investment in innovation, with rapid response to known, or even secured, opportunities with a higher degree of certainty clearly favoured.

Summary – Findings of the Survey Analysis

The survey does not provide a statistically significant or wholly representative perspective on HGFs as a whole. However, broad themes are apparent in the behaviour of consulted HGFs, they include:

- A high degree of entrepreneurialism amongst the management team, extending to the workforce as a whole, enabling strong capabilities for spotting and responding to opportunity;
- Market-facing, client-orientated relationship building activity, employed as a means to 'lock-in' clients and develop a market-orientated feedback loop informing their development activities;
- A focus on differentiation in quality and value for comparative advantage, often incorporating focus on the development of 'value-added service' propositions;
- A commitment to accessing new markets in growth strategies, extending existing products to new markets through leverage of network relationships and tailoring of the delivery and packaging of the core proposition;
- A capability to access resources for development activity that includes conventional financial sources, together with novel partnership, 'shared-risk' arrangements with clients.

Annex D: Modes of Innovation

The OECD's definition of 'modes of innovation' employed throughout this study[80]:

Table 20: OECD Modes of Innovation

Mode		Description	Associated CIS-2006-Based Indicators
1	IP/Technology Innovating	IPR-based innovation, typically complemented by in-house R&D and new-to-market activities	Enterprise carried out in-house R&D. Enterprise applied for a patent. Enterprise applied for a design right. Enterprise claimed copy right.
2	Marketing Based Innovating	Includes forms of product innovation, imitating and new-to-market, with expenditures related to the market introduction of innovations. Marketing based innovating is in its core also a strategy that leans towards sourcing information from other businesses.	Enterprise introduced a good or service only new to the firm. Enterprise introduced a good or service that was new to the firms' market. Enterprise spent on market launch of new goods or services.
3	Process Modernising	Typically links process innovations with equipment spending and training of personnel.	Enterprise introduced a new process. Enterprise bought new machinery. Enterprise had expenditures related to training for innovation processes. New goods, services or processes were mainly developed externally.

[80] Frenz and Lambert. 2012. 'Mixed Modes of Innovation: an Empiric Approach to Capturing Firms' Innovation Behaviour'. STI Working Paper 2012/6. OECD.

Mode		Description	Associated CIS-2006-Based Indicators
4	Wider Innovating	Shows strong combinations of types of management and business strategy changes, including new sales and distribution methods. It represents what might be a classic non-technological innovation.	Enterprise introduced new knowledge management system. Enterprise introduced new workplace organisation. Enterprise introduced new relations with other firms. Enterprise introduced a significant change to design or packaging. Enterprise introduced new sales or distribution methods.
5	Networked Innovating	Involves external knowledge sourcing in the form of bought-in R&D, licences or other knowhow and formal collaboration on innovation projects. It also leans towards accessing information from the knowledge base – universities and research organisations – pointing towards the relevance of the national infrastructure supporting innovation in a national system.	Enterprise carried out in-house R&D. Enterprise bought in R&D or other knowledge, e.g. licensing-in. Medium or high importance of research organisations. Enterprise co-operated on innovation with external partner.

Source: OECD

Annex E: Portfolios of Enterprise Support Offers

Table 21 details the portfolio of enterprise support offered by Enterprise Ireland over the past decade.

Table 21: Portfolio of Enterprise Support Offers

Category	Components
Job Creation and capacity building	Commercial Terms Company Expansions (April 2008 - Jan 2009) Company Expansions De Minimis Company Expansions excluding R&D Company Expansions including R&D Company Expansions pre 2008 Employment Subsidy Scheme 1 Employment Subsidy Scheme 2 GCEE Automotive Business Development Programme Growth Fund International Services (Pre 2005) Investment De Minimis Established Job Expansion Fund Job Expansion Fund (May 2010 - Jun 2011) Market Development Support (Pre 2005) Market Research for SMEs (Pre 2005) New Industry (Pre 2005) Pilot Clustering Programme Pre-Productivity Fund Consultancy Productivity Improvement Fund Recruitment of Key Manager Employment Grant for SMEs Scaling excluding R&D Scaling excluding R&D (January 2009 - June 2012) Scaling including R&D Scaling including R&D (January 2009 - June 2012) Small Industry (Pre 2005) Strategic Consultancy

Category	Components
	Workplace Innovation Fund
Capability building and management development	Acumen Key Manager Acumen Key Manager Employment Grant for SMEs Capability (Pre 2005) Community Enterprise Centre Consumer Foods Graduate Programme EI Management Development Group Programmes European Orientation Programme (Pre 2005) Expansion against a Business plan Graduates 4 International Growth Group Management Development Support - De Minimis Group Management Development Support - Standard Key Manager Non-Executive Director Standalone Training Strategic Consultancy Assignment Supplier Development Phase 1 Telecoms Standards Scheme Telecoms Standards Scheme II Wireless Standards
Mentoring	Acumen Consultancy Acumen Market Graduate Acumen Prospector Mentor Mentor (Pre 2005) ATS Standard Mentor Assignment
Productivity	Competitiveness Fund (Pre 2005) E Business (Pre 2005) E-Business Initiative eMarketing Improvement Assignment

Category	Components
	Enterprise Innovation Network Innovation Fund Ireland Lean Plus Assignment Lean Plus Programme Lean Start Lean Start Programme Supply Chain Management
Internationalisation	Business Accelerator Competitive Feasibility Fund - Female Entrepreneurs Competitive Feasibility Fund - Midlands Region Competitive Feasibility Fund - Northwest Region Competitive Feasibility Fund – South East Region Competitive Feasibility Fund - West Region Feasibility (Pre 2005) FoodWorks Feasibility Going Global (Jan 2009 - Jun 2011) Going Global Fund Internationalisation Grant Market Research Market Research Programme Technical Feasibility Trade Fair Participation
Environmental aid	Environmental Improvement Assignment Environmental Management Environmental Management (Pre 2005) Environmental Superior Products Greentech Offer
Other	Beef & Sheepmeat Fund Community Enterprise Centres (Pre 2005) Construction Services Market Development Diary Process Investment Initiative

Category	Components
	Enterprise Stabilisation Fund
	Food Industry Strategy Assessment Grant
	Internet and Games Fund
	Sustaining Jobs Equity Fund
	Webworks
	Webworks (Pre 2005)
	World Class Manufacturing Phase 1
RD&I	EU 6th Framework
	EU 7th Framework
	FP7 Feasibility
	Incubation Centres
	Incubation Centres (Pre 2005)
	Industry Led Networks
	IP Assistance Scheme
	Mobile Projects including R&D (Jan 2005 - Jan 2009)
	R & D Stimulation
	R&D Fund
	R&D Fund (March 2008 - Jan 2009)
	Research & Development (Pre 2005)
	RTI (Pre 2005)
	RTI Fund
	Strategic R & D
Start-ups	Competitive Start Fund
	Competitive Start Fund Lifesciences
	CORD
	Export Orientation Programme
	Export Orientation Programme (Pre 2005) ATS
	HPSU Feasibility & HPSU FP7 Feasibility
	HPSU Package
	HPSU Package (May 2008 - Jan 2009)
	HPSU Package (Pre 2008)

Category	Components
	iHPSU Grant Innovative HPSU Seed & Venture Capital (2007 - 2012)

Source: Forfás, 2013

Annex F: Detailed Data Analysis

The above analysis of the linked ABSEI and CIS datasets provided some insights into the innovation behaviour of high growth and non-high growth firms. The results were not conclusive as to specific innovation behaviours undertaken by HGFs only; in addition the results represented correlation effects rather than causation. In order to further uncover the relationships between innovation and employment growth within firms, regression analysis was undertaken. The purpose of this analysis was to determine the causal link, if any, between past innovation behaviour and subsequent employment growth in firms. Analysis was also undertaken to establish whether past employment growth had an effect on innovation activity.

In order to look for a causal link, we needed historical innovation and employment data for each firm. We thus combined all three CIS waves into one dataset, keeping only those firms that appeared on all three; this resulted in a panel dataset of just 81 firms. Due to the low number of observations, we also created a second panel dataset that combined just the latter two CIS datasets, that of the 2004-06 and 2008-10 waves. This second dataset contained information on 220 firms.

The aim of the regression work was to determine if past innovation had an impact on the fast/high growth of firms. However, due to the low number of observations it was impossible to run the regressions on HGFs only. We thus generated a 1/0 dummy variable equal to 1 if the firm had positive growth in a three year period and 0 otherwise, and looked at the impact of innovation on overall growth[81], using Logit regression.

The first regression, based on the panel of 81 firms, looked at how innovation activity in the previous period impacted on subsequent growth, after controlling for other firm-level characteristics such as size, age, ownership, sector and previous growth. Year dummies were also included to take account of the differing periods. Table 22 tabulates the results for the analysis of this first panel (Employment Growth column), with the significant marginal effects shown and the standard errors in parentheses. The results showed that growth in employment over the 2005-08 and 2008-11 periods was associated with smaller firms; those with a higher export intensity (exports as a share of sales); and with previously doing product or organisational innovation.

This was repeated on the panel of 220 firms, and the results from the analysis are shown in Figure 23 (Employment Growth column). However, the results were not consistent between the two panel datasets. The analysis based on the 220 firm panel showing that employment growth over the 2008-11 period was associated with just smaller and younger firms and that there was no impact from previous innovation activity.

[81] It must be caveated that there was a relatively low number of observations with positive growth, particularly in the latter period; for example only 24 firms of the 81 on the first panel had positive growth over the 2008-11 period and just 87 of the 220 firms in the second panel.

Table 22: Logit Regressions on Employment Growth and Innovation 2002-2011 (based on 81 firm panel)

		Dependent Variables				
		Employment Growth	**Product Innovation**	**Process Innovation**	**Marketing Innovation**	**Organisational Innovation**
Size	Marginal effects	-0.512***		0.461**		0.523*
	Standard errors	(-0.195)		(-0.223)		(-0.303)
Foreign-owned	Marginal effects				-1.065*	
	Standard errors				(-0.605)	
Export Intensity	Marginal effects	1.139**				
	Standard errors	(-0.557)				
R&D (lag)	Marginal effects		1.213**			
	Standard errors		(-0.579)			
Product Innovation (lag)	Marginal effects	0.924*	1.512***		1.401*	
	Standard errors	(-0.553)	(-0.55)		(-0.761)	
Process Innovation (lag)	Marginal effects					
	Standard errors					
Organ Innovation	Marginal effects	1.103**			1.347**	1.322**

(lag)	Standard errors	(-0.476)			(-0.686)	(-0.575)
Market Innovation (lag)	Marginal effects		1.034*			
	Standard errors		(-0.625)			
Co-operation (lag)	Marginal effects			0.857*	1.419**	1.124*
	Standard errors			(-0.486)	(-0.615)	(-0.591)
Observations [82]		152	152	152	152	152
Number of firms[83]		76	76	76	76	76
Wald Chi		21.49	27.95	19.91	16.86	21.26
Prob Chi2		0.0897	0.0092	0.0975	0.2056	0.0679
Log L		-88.2405	-68.9686	-81.8817	-55.0712	-80.1655

Marginal effects reported, standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 23: Logit Regressions on Employment Growth and Innovation 2004-2011 (based on 220 firm panel)

		Dependent Variables				
		Employment Growth	**Product Innovation**	**Process Innovation**	**Marketing Innovation**	**Organisational Innovation**
Size	Marginal effects	-0.274*		0.446**	0.278*	

[82] For each firm there were two data points available – one from each of the previous two periods.

[83] Only 76 of the 81 firms had all variables available.

	Standard errors	(-0.155)		(-0.182)	(-0.159)	
Age	Marginal effects	-0.0208*				
	Standard errors	(-0.0113)				
Export Intensity	Marginal effects		1.574***			
	Standard errors		(-0.565)			
R&D (lag)	Marginal effects				-0.759	
	Standard errors				(-0.447)	
Product Innovation (lag)	Marginal effects		1.464***			
	Standard errors		(-0.398)			
Process Innovation (lag)	Marginal effects			0.740**		
	Standard errors			(-0.372)		
Organ Innovation (lag)	Marginal effects			0.612*		1.220***
	Standard errors			(-0.366)		(-0.371)
Co-operation (lag)	Marginal effects		0.745*		0.844**	
	Standard errors		(-0.436)		(-0.373)	
Previous	Marginal			-3.593***	-1.701**	-3.335***

Employment Growth	effects					
	Standard errors			(-0.905)	(-0.795)	(-0.859)
Observations [84]		207	207	207	207	207
Wald Chi		11.46	40.2	43.95	22.42	44.68
Prob Chi2		0.4903	0.0001	0.1581	0.0331	0.1557
Log L		-133.069	-106.557	117.005	-125.409	-121.084

Marginal effects reported, standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

The second set of regressions looked at whether previous growth impacted on innovation activity, with each of the innovation activities (see columns product, process, organisational and marketing innovation in Tables 22 and 23) considered separately. The results from the panel based on 81 firms are presented in Table 22 and indicate that no effect from growth on subsequent innovation behaviour is evident; however the panel based on 220 firms did find a negative relationship between previous growth and subsequent innovation, particularly process, marketing and organisational innovation (see Table 23). This suggests that those firms with lower growth in the 2005-08 period were more likely to do these types of innovation in the 2008-11 period.

Other notable results from these regressions were that a firm was more likely to undertake an innovation behaviour if it had done so previously; for example firms were more likely to be product innovators if they had undertaken product innovation in the previous period. This also held for organisational innovation. Those more likely to be process innovators were found to have previously done process or organisational innovation. Those more likely to be marketing innovators had done product or organisational innovation in the previous period. Previous co-operation was also found to be important for all types of innovative behaviour, with those who co-operated with others in the past more likely to be innovative in the future.

The results of the regression analysis, provided limited evidence for a strong causal link between innovation activity and growth. This was partly due to a low number of observations, and within that, small numbers of firms actually growing, particularly in the latter period. The results showed that growth was associated with previous product and organisational innovation, but only when the entire 2002-11 period was considered. Innovation activity was

[84] For each firm there were one data points available – one from the previous period. It is noted that while 220 firms were highlighted for the panel, only 207 firms had details for the full set of information required.

found to be associated with similar innovation behaviour in previous years and was found to be negatively associated with previous growth, suggesting that firms with low or declining growth were more likely to make changes to their process, organisational or marketing practices in the future.

Annex G: Forfás Board Members

Eoin O'Driscoll (Chairman) Chairman, Southwestern
Martin Shanahan Chief Executive, Forfás
Mark Ferguson Director General, Science Foundation Ireland
John Murphy Secretary General, Department of Jobs, Enterprise and Innovation
Barry O'Leary Chief Executive, IDA Ireland
Frank Ryan Chief Executive Officer, Enterprise Ireland
Michael O'Leary Secretary to the Board, Forfás

Annex H: Recent Forfás Publications

Annual Business Survey of Economic Impact Forfás	March 2014
Regional Labour Markets Bulletin 2013 EGFSN	March 2014
Action Plan for Jobs 2014 Forfás, DJEI	February 2014
Consumer Costs and Inflation Forfás	February 2014
State Investment In Research and Development 2012 - 2013 Forfás	December 2013
Survey of Research and Development in the Higher Education Sector 2010/2011 Forfás	December 2013
NCC Submission to the Action Plan for Jobs 2014 NCC	December 2013
Addressing Future Demand for High-Level ICT Skills EGFSN	November 2013
Joint Response by Forfás/Enterprise Ireland/ IDA Ireland/ Science Foundation Ireland to the Department of Finance Public Consultation on the Review of the Research and Development Tax Credit Forfás, Enterprise Ireland, IDA Ireland, Science Foundation Ireland	October 2013
Business Expenditure on Research & Development (BERD) 2011/2012 Forfás, CSO	August 2013
State Investment in Research & Development 2011 - 2012 Forfás	August 2013
Social Enterprise in Ireland: Sectoral Opportunities and Policy Issues Forfás	July 2013
Ireland's Construction Sector: Outlook and Strategic Plan to 2015 Forfás	July 2013

Forfás Annual Report 2012 Forfás	July 2013
Research Prioritisation: Framework for Monitoring Public Investment in Science, Technology and Innovation and 14 Action Plans Forfás	July 2013
Monitoring Ireland's Skills Supply – Trends in Education and Training Outputs 2013 EGFSN	July 2013
National Skills Bulletin 2013 EGFSN	July 2013
Annual Business Survey of Economic Impact 2011 Forfás	July 2013
Global Entrepreneurship Monitor (GEM) 2012 Global Entrepreneurship Monitor	July 2013
Annual Employment Survey 2012 Forfás	July 2013
Ireland's Competitiveness Performance 2013 Forfás	May 2013
Making it in Ireland: Manufacturing 2020 Forfás	April 2013
Future Skills Requirements of the Manufacturing Sector to 2020 EGFSN	April 2013
Sectoral Regulation Forfás	April 2013
EGFSN Statement of Activity EGFSN	March 2013
Costs of Doing Business in Ireland 2012 Forfás	March 2013
Vacancy Overview 2012 EGFSN	February 2013
Action Plan for Jobs 2013 Forfás, DJEI	February 2013

The publications of Forfás and the advisory groups to which it provides research support are available at www.forfas.ie

To sign up for our email alerts contact us at info@forfas.ie or through the website.

March 2014

Forfás

Wilton Park House
Wilton Place
Dublin 2

Tel: +353 1 607 3000
Fax: +353 1 607 3030

www.forfas.ie