


Characteristics of scale-ups and the impact of scale-up support programmes

A Literature Review



Nordic
Innovation



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Executive Summary

Objective

The objective of this study is to conduct a review of academic and grey literature on the performance of programmes similar to the Nordic Scalars programme. It is designed to assist Nordic Innovation in contextualizing the performance of their programme by describing the characteristics and impacts of other scale-up programmes, and by providing insights, lessons learned, and benchmarks against which the Nordic Scalars programme can be compared.

Methodology

We took an integrative literature review approach, based on both scientific knowledge and anecdotal evidence. Our report includes more than 100 papers and documents (e.g. white papers, working papers, reports) derived from academic literature and grey literature. These papers and documents provide a thorough description on the prevalence, characteristics, and determinants of HGFs, a discussion on different methodologies to assess programme performance, and implications on best practices in terms of strategies, interventions, and government policies to support and promote HGFs. Our review also considers several prominent scale-up programmes from Canada, the US, Europe, UK, Singapore, Denmark, Sweden, and India and Southeast Asia. We then identified and summarized the visions, target clients, and support services of the programmes.

Prevalence of High-Growth Firms (HGFs)

HGFs are rare, but they contribute disproportionately to the bulk of net new job creation (Birch, 1981). High-growth firms are associated with wealth creation, job creation, role models inspiring peer companies, regional innovation outcomes, and regional economic development (Piazza, 2002; Acs & Armington, 2006; Acs & Mueller, 2008; Henrekson & Johansson, 2010; Haltiwanger et al., 2013). Despite these positive socio-economic outcomes, high growth is difficult to achieve and sustain. A significant share of HGFs grow rapidly only for a short period of time (Delmar et al. 2003). Past theoretical work has highlighted the problems of 'Penrose effects' as the growth process itself may cause dynamic issues that will slow subsequent growth (Penrose, 1959).

Many studies investigated the driving forces of high growth point to a variety of critical factors contributing to the creation of HGFs. To summarize, we identified these driving forces as internal drivers: 1) Firm operation and growth strategies, 2) Entrepreneur characteristics, 3) Human resources management, and 4) R&D

capabilities; and external drivers: 1) Geographical factors, 2) Venture capital, and 3) Institutions and government regulations.

Intervention Programmes (Success Stories and Lessons Learned)

This study further examined the characteristics of programmes and policies that successfully support HGFs – and those that do not. Our findings suggest that successful programmes: 1) have a holistic view aligned with regional economic development, 2) provide timely intervention in a flexible and temporal way, 3) offer multiple rounds of financing to stimulate firm growth, 4) simultaneously provide both financial support and non-financial support to maximize treatment effects, and 5) focus on peer-to-peer support to ensure networking and learning opportunities, and to enhance business linkages within industry. However, unsuccessful programmes are subject to issues such as: 1) Wrong targets, 2) Poor programme design, and 3) Institutional deficiencies.

Best Practices for Programme Evaluation

With the aim to develop a framework that could serve as a basis for identifying best practices for programme evaluation, our review of the programme assessment literature revealed several insights and implications on key metrics, methodology and data, and programme benchmarking.

With respect to best practices for programme evaluation, a multi-dimensional approach is embraced to trace the processes that lead to impact, and to identify suitable metrics to understand causality, ensuring that the results obtained are grounded in a solid representation of programme objectives and processes. Impact on improvements to both capabilities measures (e.g. impact on improvements to business expertise, networks, etc.) and impact on improvements to performance measures (e.g. impact on revenues, employment, etc.) that are aligned with ultimate programme goals, instead of outcome indicators, are preferred for programme evaluation.

Regarding evaluation methodologies, there is a trade-off between rigor and feasibility in identifying impacts and reporting the results of investments in business support programs. For the purpose of this study, we recommend methods that balance rigor and feasibility such as matched sample approaches, and the use of expert judgement to assess attribution.

Furthermore, benchmarking will provide opportunities for learning by comparing the impacts achieved by the focal programme (e.g. Nordic Scalers) against a number of global peer programmes. As a result, such an analysis will provide insights into the relative strengths and weaknesses of each of the programmes (e.g., areas of greater or lesser impact), and will help to identify relevant attributes of the more successful programmes to be used as best practices in the design, deployment, and monitoring of similar programmes in the future.

For programmes in progress, an alternative is comparing programmes based on programme attributes such as programme design, target clients, focused sectors, services, financial support, etc. Such comparisons will provide preliminary insights at early stages for programmes to make sure their goals are aligned with global peer programmes, to re-assess provision of services and funding, and to evaluate selection criterion for potential client companies.

Opportunities for Improvement

This study identified several opportunities for future improvements of business support programmes:

- **Selecting the “right” firms:** The selection criteria for HGFs should be specifically defined and goal oriented. All high-growth firms do not grow in the same way. This implies that programmes should support and measure different forms of growth with different growth metrics, and target the firms that will make the most contribution to regional and national economic development, according to the programme’s vision, consistent with regional or national interests and priorities.
- **Provision of growth investment:** Government programmes and NGOs (Non- Government Organizations) should make efforts to address or mitigate financing gaps. Dynamic financing mechanisms such as venture capital and private equity are required to ensure an effective investment mix and provide essential later-stage capital so that HGFs can continue to grow and reach a significant scale.
- **Evidence of impact:** Data should be made available by government agencies so that local public and private sector organizations can identify, target, evaluate, and benchmark their support to high growth companies. In the same manner, intervention programmes should voluntarily conduct assessments of their performance on a regular basis to evaluate their impact on companies and socio-economic growth.
- **Scale-up ecosystem:** Building an ecosystem that will produce a greater number of scale-ups is more ambitious and challenging than producing a greater number of start-ups or celebrating entrepreneurs. Joint efforts by multiple stakeholders such as governments, universities, research institutes, NGOs, and companies are required to cultivate a successful scale-up ecosystem.

1. Introduction

1.1 Literature Review Objective

This report provides a review of the literature on the performance of programmes similar to the Nordic Scalers programme, especially those outside of the Nordic region. It is designed to assist Nordic Innovation in contextualizing the performance of their programme by describing the characteristics and impacts of other scale-up programmes, and by providing insights, lessons learned, and benchmarks against which the Nordic Scalers programme can be compared.

Nordic Innovation has defined scale-ups as companies that fulfil the Organization for Economic Co-operation and Development (OECD) high-growth firm (HGF) definition¹, but also requires them to be larger than micro companies, which employ under 10 people and have a turnover of less than €2M. Because of the variability in definitions of HGFs and scalers, we have included in this report an exploration of the characteristics of HGFs, so as to assist the Nordic Scalers programme in targeting and supporting them.

In the following sections, we provide answers to the following questions:

1. What is the overall prevalence of HGFs?
2. What are the drivers of growth for HGFs?
3. What are the strategies being employed to increase the number of successful HGFs?
4. Who is doing this well - what are the characteristics of the programmes that are successfully supporting HGFs?
5. What pitfalls in support should be avoided - what lessons can be learned from the characteristics of the programmes that are unsuccessful in supporting HGFs?
6. What are the evaluation best practices - how are HGF support programmes assessed?
7. What can be done to improve support for HGFs?

1.2 Methodology

We took an integrative literature review approach, based on both scientific knowledge and anecdotal evidence. Our report includes more than 100 papers and documents (e.g. white papers, working papers, reports) derived from academic

¹ Enterprises with average annualized growth in the number of employees greater than 20% per year, over a three-year period, and with 10 or more employees at the beginning of the observation period.

literature and grey literature. These papers and documents provide a thorough description on the prevalence, characteristics, and determinants of HGFs, a discussion on different methodologies to assess programme performance, and implications on best practices in terms of strategies, interventions, and government policies to support and promote HGFs.

To identify pertinent papers on HGFs, we searched key words in library databases and limited ourselves to the years 2000 to 2019 to include more recent papers. Key words such as 'high growth firms', 'high-impact', 'rapid-growth' and 'gazelle' were included in search terms. For the purposes of this exploratory study, our review included relevant papers from a diverse range of countries and regions (e.g., US, Canada, UK, Netherlands, Sweden, Finland, African countries, Korea, China, etc.), provided that those papers are empirical, written in English, published in peer reviewed journals, and focused specifically on HGFs. A similar review of policy programmes was also conducted, which focused on interventions and frameworks specifically targeting HGFs.

Our review also considers several prominent scale-up programmes from Canada, the US, Europe, UK, Singapore, Denmark, Sweden, India, and Southeast Asia. We identified and summarized the visions, target clients, and services of these programmes.

1.3 Key Definitions

Since the focus of this review is to deepen the understanding of HGFs, we have assembled a matrix of definitions of high-growth firms. To provide a holistic view of HGF definitions, we also include some broader discussion on startups and scaleups (i.e. high-growth firms) to illustrate different phases in a business life cycle. As shown in Figure 1.1, a startup is a venture that is initiated by its founders around an idea or a problem with a potential for significant business opportunity and impact. A scaleup is a market validated firm with high growth ambitions and potential for scalable business. They both exhibit high growth potential, but a startup is in its early stage while a scaleup has already validated its product in the market and has proven its sustainability.

A Startup

A Scaleup

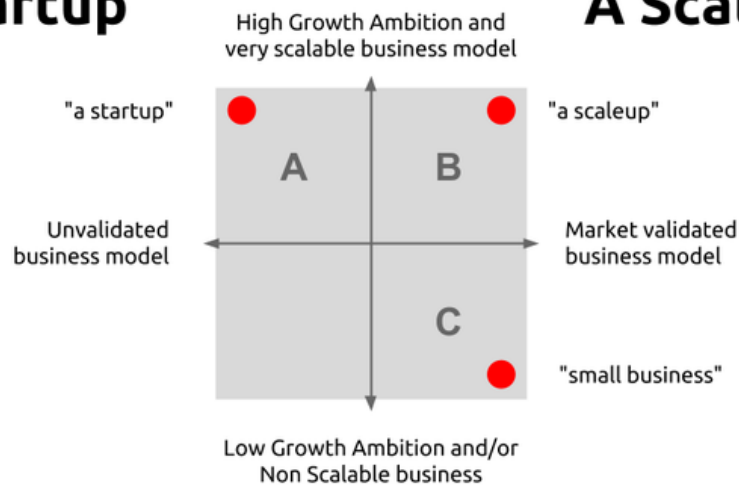


Figure 1.1 Definition on Startups versus Scaleups²

With regard to HGFs, it should be noted that most definitions are derived from the OECD and are based on a minimum required growth rates beforehand, which has been criticized by some researchers as impossible to assess *a priori*, that is before the growth actually takes place. Halvarsson (2013) indicated that it is possible to characterize high growth by looking at the statistical properties of the growth rate distribution across firms, which is characterized by heavy tails and a high singular peak.

Table 1.1 presents characteristics and several key definitions offered by different organizations or authors.

² Source: <https://www.startupcommons.org/what-is-a-startup.html>

Table 1.1 Characteristics of High Growth Firms

Key Terms	Source	Minimum No. of Employees	Minimum Revenues	Growth Rate
Scale-ups	Nordic Innovation ³	10	€2M	20% annualized growth in employment or in revenues in the preceding 1-3 years
	Kauffman Foundation (2017)	No requirement	€2M	20% annualized growth in employment or in revenues in the preceding 1-3 years
High-growth firms	OECD (2007)	10	No requirement	20% annualized growth in employment, over a three-year period
	European Union (2017)	10	No requirement	10% annualized growth in employment, over a three-year period
	US Bureau of Labor Statistics (2013)	No requirement	No requirement	8 or more employees (if employment <10) 20% annualized growth in employment over a three-year period (if employment ≥10)
	Kauffman Foundation (2017)	50	No requirement	grow to at least 50 employees by tenth year of operation
Gazelles	Birch ⁴ (1995)	No requirement	\$100K	20% annualized growth in sales over the interval
	OECD ⁵ (2007)	10	No requirement	20% annualized growth in the employment over a three-year period
Unicorn ⁶	Lee (2013)			Privately held startup company valued at over \$1 billion

³The definition is a modified version of the original OECD/Eurostat definition of high growth enterprises using more strict criteria for growth. Nordic Innovation has chosen this definition in order to focus on the fastest growing established enterprises, the so-called scale-ups.

⁴ The term “Gazelle” was introduced by Birch some twenty years ago (Landström 2005, p. 170) to denote a small group of high-growth firms that according to him generated most of the new net jobs in the economy.

⁵OECD proposed that the term Gazelle should only apply to young high-growth firms, or more specifically to enterprises less than five years old.

⁶ The term was coined in 2013 by venture capitalist Aileen Lee, choosing the mythical animal to represent the statistical rarity of such successful ventures.

There is no consensus on a standardized definition for high-growth firms. From Table 1 above, however, a number of definitions require an annualized growth of 20% in either employment or revenues over a three-year period, with a minimum requirement of 10 employees. Nordic Innovation used the Kauffman Foundation⁷ definition of scale-ups as an inspiration to develop its own definition and added a minimum requirement of 10 employees. Scale-ups, gazelles, and unicorns are a subset of high-growth firms respectively, in that scale-ups achieve much higher revenues, unicorns are start-ups with a stock market value (or estimated value) of at least \$1 billion, and gazelles are younger compared with other high-growth firms. For this purpose of analysis, the terms such as scale-ups, high-growth firms, gazelles, and unicorns are interchangeable. This report will use high-growth firms (HGFs) as the general term for all firms that exhibit high growth.

1.4 Report Structure

The report is organized as follows. Section 2 introduces the overall prevalence of HGFs, driving factors of high growth, and strategies being employed to successfully target and foster a select number of HGFs. In Section 3, we identify the programmes that support HGFs, identify characteristics of those programmes, and further discuss success stories and lessons learned. In particular, we look into academic studies and reports that evaluate programme performance to examine how to improve global business support ecosystems. Section 4 discusses the best practices of programme evaluation in terms of key metrics, methodology, benchmarking of performance measures, and comparison among peer programmes. In Section 5, we propose perspectives for improvements to programme.

⁷ Kauffman Foundation developed the Growth Entrepreneurship Index, a composite measure of entrepreneurial business growth in the United States that captures growth entrepreneurship in all industries and measures business growth from both revenue and job perspectives. It includes three component measures of business growth: 1) Rate of startup growth, 2) Share of scaleups, and 3) High-growth company density.

2. Prevalence of High-Growth Firms

This section introduces the importance of HGFs, internal and external drivers of high growth, and strategies to support and promote HGFs. The academic papers of this review are shown in Appendix A and pertinent results are summarized below.

2.1 Importance of HGFs

The phenomenon of “high growth” was first identified by the American economist David Birch, who found that a small number of firms - “gazelles” – contributed disproportionately to the bulk of net new job creation (Birch, 1981). High-growth firms are associated with wealth creation, job creation, role models inspiring peer companies, regional innovation outcomes, and regional economic development (Piazza, 2002; Acs & Armington, 2006; Acs & Mueller 2008; Henrekson & Johansson, 2010; Haltiwanger et al., 2013).

A Disproportionate Contribution to Job Creation and Economic Benefits

HGFs are considered an important means for economic growth (Coad, 2009; Coad et al., 2014; Segarra & Teruel, 2014, Moreno & Coad, 2015). A recent empirical study further demonstrated not just a simple correlation between high-growth firms and high-growth regions, but a causal linkage from high-growth firms to high-growth regions (Bos & Stam, 2013).

An empirical study by Halvarsson (2013) indicated that HGFs comprise a smaller share of all firms than was previously thought, often as small as a fraction of a percent. But these high growth businesses make a disproportionate contribution to economic development and are critical to the growth of the economy (Mason & Brown, 2010). Rivard (2017) measured total net employment change for HGFs in Canada from 2009 to 2012 and reported that HGFs contribute disproportionately to the total net employment change. It is indicated that HGFs were responsible for 63 percent of the total net employment change, but made up only one percent of firms with at least one employee. Stangler (2010) studied the importance of HGFs to job creation, and therefore to the US economy, and found that the top-performing one percent of young firms generate roughly 40 percent of new jobs created. In a same manner, gazelles are found to be outstanding job creators (Henrekson & Johansson, 2010). A study by Choi et al. (2013), based on longitudinal data from 1989 to 2009, demonstrated that only a small fraction of firms satisfied the high-growth employment criteria in any year, but these rapidly growing firms made a disproportionately large contribution to overall job creation in Georgia (US).

High Growth is not Persistent

Despite these positive socio-economic outcomes, high growth is difficult to achieve and sustain. A significant share of HGFs grow rapidly only for a short period of time (Delmar et al. 2003). Past theoretical work has highlighted the problems of 'Penrose effects' as the growth process itself may cause dynamic issues that will slow subsequent growth (Penrose, 1959). Each of these problems seems to become increasingly acute as firms grow more rapidly, providing explanations for why high growth can be 'fragile' (Parker et al. 2010: 223).

High-growth firms may have higher death rates than stable firms. Data on New Zealand firms showed death rates for HGFs of up to four times greater than other contemporary firms (Satterthwaite & Hamilton, 2017). Hölzl (2011) discovered that being a HGF does not improve the likelihood of survival in future periods in excess of the size effect induced by a high growth event. It is also found that average growth rate after the high growth episode is quite modest. One problem is that extraordinary high growth - in terms of sales and number of employees - was not related to firm profitability (Markman & Gartner, 2002). Another problem is that HGFs do not grow in the same way, that is, the phenomenon of the high-growth firm is heterogeneous (Decker et al., 2016). The growth of these firms is not a uniform or linear process. Rather, growth tends to be sporadic and uneven and is often achieved through acquisition (Mason & Brown, 2010).

Some researchers examined persistence of high growth, but the evidence is still mixed and complex. Daunfeldt & Halvarsson (2015) claimed that HGFs are essentially 'one-hit wonders', because based on their research, HGFs had declining growth rates in the previous three-year period, and their probability of repeating high growth rates was very low. A study by Moschella et al. (2017) investigated effects of firm characteristics on persistence of high-growth and found that structural characteristics of firms do not display any statistically significant association with the probability to produce high-growth over time. Similarly, Satterthwaite & Hamilton (2017) indicated that the ability to sustain high growth is independent of pre-growth age and employment size. However, empirical research by Lopez-Garcia & Puente (2012), using longitudinal data of Spanish firms, indicated that past extreme growth episodes increase the probability of current fast growth, which is in contrast to the findings of others.

Characteristics of HGFs

Recently, some empirical facts about HGFs have emerged.

First, HGFs tend to be smaller in size and younger than their normal growing peers (Audretsch, 2012; Segarra & Teruel, 2014; Rivard, 2017; Satterthwaite & Hamilton, 2017). On average, gazelles are younger and smaller than other firms, but their young age more than their small size is associated with rapid growth (Henrekson & Johansson, 2010). Capasso et al. (2009) reported that the existence of persistent outperformers is especially pronounced in micro firms. However, emerging new evidence indicated that HGFs are not 'necessarily small and young' (Henrekson and

Johansson, 2010). Research in the US found that HGFs are on average 25 years old, with even small firms (1-19 employees) exhibiting a more advanced average age of 17 years (Acs et al, 2008).

Second, HGFs are present in different industries (Arrighetti & Lasagni, 2013). They tend not to be concentrated within any particular type of industry or sector (Audretsch, 2012). Specifically, HGFs are not concentrated in the high-technology sector (Autio et al., 2000; Li et al., 2016; Rivard, 2017); an exclusive focus upon technology-based sectors would exclude the vast bulk of HGFs (Acs & Mueller, 2008).

Third, HGFs obtained a greater share of their revenues from overseas than non-HGFs (Mohr & Garnsey, 2011) and they are more often exporters (Moschella et al., 2017).

Fourth, HGFs tend to drive improved productivity. HGFs, on average, are characterized by high productivity when growth is measured in terms of sales (Arrighetti & Lasagni, 2013, Moschella et al., 2017). It is also found that firms in both the manufacturing and services sectors are more likely to become HGFs when they exhibit higher Total Factor Productivity (TFP) growth (Du & Temouri, 2014), and firms that have had HGF experience tend to enjoy faster TFP growth following high-growth episodes.

Fifth, there is a positive relationship between growth and profitability among gazelle firms, and such a relationship is stronger for firms pursuing a broad market strategy rather than a niche strategy (Senderovitz et al., 2016). Moschella et al. (2017) also found that HGFs outperform other firms, showing higher profitability, higher sales from product innovation, and lower interest expenses. However, profitability is not a condition for growth (Andersson, 2003).

2.2 Driving Forces of High Growth

Many studies investigated the driving forces of high growth pointing to a variety of critical factors contributing to the creation of HGFs. To summarize, we categorized driving forces of high growth into two categories: internal drivers, and external drivers. Internal drivers include: 1) Firm operation and growth strategies, 2) Entrepreneur characteristics, 3) Human resources management, and 4) R&D capabilities. External drivers include: 1) Geographical factors, 2) Venture capital, and 3) Institutions and government regulations.

Internal Drivers

Firm Operation and Growth Strategies

Piazza (2002) reported that antecedents to HGFs include firms' strategic resources, and firms' structural characteristics. A literature review by Demir et al. (2017) investigates the strategic drivers of high growth and reports that firms' strategy, innovation, and capabilities for growth are associated with higher growth. A study of firms in Sub-Saharan Africa reports that firms that engage in product innovation, have their own means of transport, and are connected to the internet through their own website are more likely to be high growth (Goedhuys & Sleuwaegen, 2010).

Entrepreneur Characteristics

A number of studies have linked entrepreneur-specific characteristics to the performance of firms, and in particular to firm growth. Similarly, a study by Piazza (2002) reported that the entrepreneurial mindset is one of the antecedents to HGFs. Andersson (2003) observed that entrepreneurs' intentions influence firms' growth. Wennberg (2013) reported that HGFs are more often founded and/or managed by a larger management team than other firms. Furthermore, managers of HGFs seem to more often be highly educated and exhibit prior industry and leadership experience.

Human Resources Management

A large amount of literature has identified the importance of human resources management and human capital to high growth. One key type of resource found predominantly in the literature on the resource-based theory of the firm is human capital. Goedhuys & Sleuwaegen (2016) demonstrated that human capital increases the likelihood that a firm will be a high-growth firm in the industry. An empirical study by Motoyama (2014) examined the importance of the human capital-related factors and indicated that a skilled labor force (e.g. science and engineering college graduates) is important for high-growth firms. Arrighetti & Lasagni (2013) investigated factors that affect the probability of being a HGF, and reported that the concentration of ownership is important for rapid growth in sales, while the quality of human capital is important for rapid employment growth. Barringer et al. (2005) found that rapid-growth firms emphasize training, employee development, financial incentives, and stock options. There is also empirical evidence that human resource practices, such as employing qualified personnel, or the mix of contracts offered, are important determinants of fast growth (Lopez-Garcia & Puente, 2012).

R&D Capabilities

Many studies have highlighted the role of research and development (R&D) in propelling firms towards high growth. Goedhuys & Sleuwaegen (2016) reported that R&D increases the likelihood that a firm will be a high-growth firm in the industry. Similarly, R&D investments positively affect the probability of becoming a HGF (Segarra & Teruel, 2014). A study by Kang et al. (2018) found that R&D investment and R&D collaboration increase the probability of achieving large jumps in growth and becoming a HGF. Hözl (2009) indicated that R&D is more important to high-growth SMEs in countries that are closer to the technological frontier (e.g. Austria, Germany, Belgium, Sweden, and Finland).

External Factors

Geographical Factors

According to Porter (1998), a concentration of industry activity in a geographic region affects firm performance because it introduces local competition that requires firms to innovate in order to remain competitive. Andersson (2003) observed that industry structure and networks, and national cultures are factors that influence firms' growth. Li et al. (2016) investigated location determinants of high growth and found that HGFs exist in counties with larger average establishment size, higher educational attainment, and more natural amenities. Similarly, Teruel & De Wit (2011) demonstrated that the size of the domestic market influences high growth positively.

Based on analysis of which US states produce the greatest number of firms on the Inc 500 list of the fastest growing firms, Motoyama (2014) shows that geographic factors for high-growth firms differ substantially from knowledge spillover theory⁸, as academic and government research activities, venture capital investment, and patents are unrelated to the concentration of high-growth firms. Bos & Stam (2014) found that an increase in the prevalence of gazelles in an industry appears to have a positive effect on subsequent industry growth, however, there are no long-term positive effects of increases in industry growth on the prevalence of gazelles. In other words, prevalence of HGFs contribute to industry and regional growth, but not vice versa.

Venture Capital

Venture capital is important for high-performing and high-growth entrepreneurial firms (OECD 1998). In addition to providing capital, venture capitalists supply

⁸ According to knowledge spillover theory, the proximity of firms within a common industry often affects how well knowledge travels among firms to facilitate innovation and growth.

management skills, industry-specific knowledge, and access to business networks (Henrekson et al., 2010). Long (2019) stated that firms that are able to access formal finance are more likely to become a HGF when compared to firms that do not use external finance or use only informal finance. Moreover, firms that can utilize both formal finance and informal finance (i.e., co-funding mode of external finance) have the highest chance of becoming a HGF, and these firms also perform much better than their counterparts. It has also been demonstrated that HGFs are more likely to receive venture capital investment (Mohr & Garnsey, 2011).

Institutions and Government Regulations

Understanding why HGFs are more prevalent in some regions, but less in others, is an important question for scholars and has significant implications for policymakers. Davidsson & Henrekson (2002) observed that institutional arrangements are important determinants of entrepreneurial activity and therefore firm growth. It is shown that high and/or distortive taxes and heavy labor market regulations impinge on the creation and functioning of competence blocs, thereby reducing high-impact entrepreneurship (Henrekson et al., 2010). A comparison of 17 nations showed that entrepreneurship has a positive influence on the number of high growth firms in a country (Teruel & De Wit, 2011). Teruel & De Wit (2011) also found that Institutional obstacles play a negative role.

2.3 Targeting, Supporting, and Promoting HGFs

There is an emerging consensus across the academic, business, and government sectors that HGFs are worthy of attention. Remaining questions include: what strategies can be effectively employed to increase and promote HGFs? and how can business support ecosystems facilitate the scale-up process?

Some researchers take a pessimistic view on developing public policy to foster HGFs. While HGFs are important for understanding the economy and developing public policy, they are unlikely to be useful vehicles for public policy given the difficulties involved in predicting which firms will grow, the lack of persistence in high growth levels, and the complex and often indirect relationship between firm capability, high growth, and macro-economic performance (Coad et al., 2014). As mentioned earlier, Daunfeldt & Halvarsson (2015) stated that HGFs are essentially 'one-hit wonders', and it is doubtful whether policymakers can improve economic outcomes by targeting them. A study by Holzl & Janger (2013) surprisingly found that the perception of innovation barriers by high growth firms is quite heterogeneous. Although HGFs frequently need assistance to tackle key barriers and sustain their growth, it is difficult to determine appropriate policy initiatives, given their idiosyncratic and unpredictable requirements (Fischer & Reuber, 2002).

Nonetheless, other researchers have provided some optimistic perspectives that may encourage policymakers to better target and support HGFs. Audretsch (2012) observed that HGFs tend to benefit from being located in geographic clusters and

agglomerations. This is consistent with the findings from the study by Malizia & Motoyama (2019) that there are significant correlations between location-based vibrancy indicators and high-growth firm concentrations. It is also recognized that HGFs place a greater emphasis on external drivers such as strategic orientation, their operating environment, and the use of e-commerce, compared with firms having static or declining sales (O'Regan et al., 2006). Furthermore, Mohr & Garnsey (2011) indicated that HGFs make earlier and more intensive use of alliances than non-HGFs. These studies point to the importance of location characteristics and strategic alliances, which is consistent with proliferation of HGFs in Silicon Valley.

Some jurisdictions aim to nurture HGFs, in which case greater attention should be given towards developing more effective ways of targeting, supporting, and promoting HGFs. The rationale for this focus within public policy focus primarily owes to HGFs' considerable ability to create new jobs (Anyadike-Danes et al, 2009). Targeting HGFs may be riskier than promoting new start-ups, but the reward will be much higher from the perspective of greater-good. It is recognized that getting economic growth and jobs creation from entrepreneurs is not a numbers game, it is about encouraging the formation of high quality, high growth companies (Shane, 2009). Moreover, according to knowledge spillover theory, knowledge spillovers in specialized, geographically concentrated industries stimulate growth (Porter, 1990). In the creation of additional HGFs, there will be increased economic activities through role model effects. It is understood that a significant number of firms do not want to scale up until they see their peers scaling up (Deloitte, 2014). In addition, HGFs were thought to have a dynamic 'Schumpeterian' effect on economies, by stimulating competition for incumbents leading to market exits, increasing the innovative capacity within industries, and creating new market opportunities for other new entrants as suppliers or competitors (Nesta, 2014).

3. Intervention Programmes

In this section, we explore the characteristics of programmes and policies that successfully support HGFs – and those that do not. The academic papers of the review are shown in Appendix B and pertinent results are summarized below.

3.1 Success Stories – What are the characteristics of programmes successfully supporting HGFs?

Holistic Goal

Successful intervention programmes (e.g. Small Business Innovation Research (SBIR)⁹, Young Innovative Company funding programme (YIC)¹⁰, Yozma¹¹) are aligned with regional or national goals to facilitate scaling up, innovation, and therefore long-term economic development by focusing greater support on HGFs, young and innovative firms, and those with high-growth potential. It is critical that programmes have a clear goal to build a strong regional and national economy. As an example, Yozma effectively created the Israeli venture capital market in 1993 and its venture capital funds constitute the backbone of the Israeli venture market. Furthermore, SBIR has stimulated high-tech innovation in the United States, while allowing government departments to meet specific research and development needs.

Timely Intervention

The timing of interventions is a critical consideration. Given that many firms encounter ‘trigger points’ that instigate a period of organizational change (Brown and Mawson 2013), successful intervention programmes need to be responsive to time-sensitive company needs. Timely intervention is more people intensive, which requires deeper engagement with business advisors and mentors to ensure effective assistance at varying temporal episodes. Therefore, rather than supporting a large number of high potential SMEs, short periods of in-depth engagement with a small number of firms on the cusp of significant growth could be more effective for business support programmes (Brown et al., 2017).

Multiple Rounds of Financing

⁹ Sources from <https://www.sbir.gov/about/about-sbir>

¹⁰ Sources from <https://www.businessfinland.fi/en/for-finnish-customers/services/funding/young-innovative-company-funding/>

¹¹ Sources from <http://www.yozma.com/overview/>

The nature of scale-ups requires investors to be willing to make long-term investments. Duruflé et al., (2016) indicated that scale-up investors need to satisfy four important criteria: 'deep pockets', 'smart money', networks', and 'patient money'. In other words, intervention programmes should provide larger funding rounds, have access to financing resources that are beyond the reach of the company, and make longer-term investments. For example, with the backing of prominent American, European and Israeli investors, Yozma continuously made direct investments in start-up companies and played a significant role as a value added investor by recruiting senior managers, formulating business strategies, raising additional capital rounds, and attracting strategic and financial investors to its portfolio companies (Avnimelech, 2009). Given that the fund required involvement of reputable foreign financial institutions (generally a VC company), this also triggered effective learning processes and know-how within the local Israeli start-up community whilst spawning more indigenous sources of VC (Wonglimpiyarat, 2016). In addition, SBIR¹² is structured in three phases with varied objectives, with increasing and different sources of funding. A study by Autio et al. (2014) observed that client firms from the Young and Innovative Companies funding programme (YIC) and the VIGO accelerator programme (VIGO) have been able to attract substantial amounts of new equity capital, and these investments have helped fuel sales growth.

Venture capital is undeniably an important part of the funding ecosystem for many firms with growth intentions, but the evidence indicates that only a small minority of HGFs are backed by venture capital (Nesta, 2014). Some HGFs are much more reliant on traditional sources of debt financing for growth (Brown and Lee, 2014). Intervention programmes should leverage alternative sources of funding such as crowdfunding, peer-to-peer lending, and invoice financing to spur HGFs.

A Mix of Non-Financial and Financial Support

Intervention programmes will benefit client firms most when providing non-financial and financial support simultaneously. It was found that start-ups and young and innovative firms that received both financial and non-financial support attribute greater average impact to Tekes programmes, compared to companies that received only financial support (Business Finland, 2018). Importantly, this finding holds true for both impact on companies' capabilities and impact on companies' performance.

Relational or Peer-Based Support

¹² Sources from <https://www.sbir.gov/about/about-sbir>.

HGFs would benefit from intervention programmes with a stronger focus on 'relational' support, which is through developing external linkages with peer companies within industry. Such interventions should avoid transactional support (grants, tax incentives, soft loans etc.) and instead offer softer forms of relational support via peer-based networks (Brown & Mawson, 2019). A valuable way of facilitating this external orientation is through peer-to-peer experiential learning between entrepreneurs, which research has shown to be a highly valued form of support by firms (Fischer and Reuber, 2003; Van Cauwenberge et al., 2013). Peer-to-peer support promotes networking and business linkages, knowledge transfer, and learning opportunities. It is beneficial to use highly experienced entrepreneurs to help 'peer review' certain skills and competencies of other growing firms, and implant successful entrepreneurs in high potential businesses to provide strategic guidance, peer-to-peer mentoring programmes, and other networking activities (Nesta, 2014). For example, the Nordica Scalers programme has a alumni system to enable client companies to share their learnings and ideas.

3.2 Lessons Learned – What pitfalls should be avoided?

Wrong Targets

Historically, intervention has been targeted at SMEs and start-ups without specific emphasis on supporting established firms that have the ambition and potential to scale-up. One issue is the risk of supporting 'losers' - companies that cannot scale, or companies that do not want to scale. Another relevant issue is the risk of supporting 'natural successes', essentially those firms that will become HGFs regardless of whether business support is provided or not. Programmes should be cautious to this self-selection effect and consider where intervention should be targeted, and whether the support programmes create additional value. Additionally, an issue is that the selection criteria utilized are often heavily skewed towards supporting science-based firms and manufacturing firms, which may preclude HGFs in other sectors from receiving support (Brown & Mason, 2015). Finally, a focus on past rates of growth for inclusion in intervention programmes also seems inflexible, particularly given the fact that past growth is rarely a good predictor for future growth (Hölzl, 2014).

Poor Programme Design

In the absence of a well-structured research base and a well-designed policy framework, policy directions might be completely wrong and targeted at the wrong people. Hinde et al., (2011) analyzed Australian entrepreneurship policy for high-growth firms and found that neither policies designed to pick winners nor policies that address market failure fully support or facilitate high-growth ventures. Government supported programmes are often isolated initiatives focused within specific industry and innovation segments, disconnected from holistic policy frameworks necessary to facilitate the growth of ventures.

Moreover, it is found that very few programmes are specifically customized to the needs of their local entrepreneurial or situational context (Brown & Mason, 2015). As we are gaining a better understanding of the nature of HGFs, intervention programmes will need to evolve accordingly, based on the specific capabilities, needs and preferences of client firms.

Institutional Deficiencies

Quality economic institutions are of particular importance for the emergence of HGFs, both because of their sensitivity to competencies of good institutions and because of the high social return in terms of growth and job creation. Institutional deficiencies hinder entrepreneurship and high growth. As mentioned earlier, Henrekson et al. (2010) indicated that high and/or distortive taxes and heavy labour market regulations impinge on the creation and functioning of competence blocs, thereby reducing high-impact entrepreneurship.

Bureaucratic interventions will also affect firm and program outcomes. Wang et al. (2017) found that firms possessing observable merits and political connections are more likely to receive Innofund grants, but found no evidence that receiving a grant boosts survival, patenting, or venture funding. Their study presented evidence of bureaucratic intervention, as some applicants' evaluation scores were nonrandomly missing and that some firms whose scores did not meet funding standards nonetheless received grants. Similarly, Estrin et al. (2012) found that growth aspirations of entrepreneurs will be constrained by corruption.

4. Best Practices for Programme Evaluation

This section aims to develop a framework that could serve as a basis for identifying best practices for programme evaluation. We identified eight academic studies and evaluation reports that focus on evaluating support programmes. Our review of the programme assessment literature revealed several insights and implications on key metrics, methodology and data, and programme benchmarking. In addition, we included several prominent programmes identified as peer programmes to Nordic Scalars and provide insights on comparing programmes attributes such as programme design, target clients, and support services among peers.

The review of academic literature and grey literature is shown in Appendix C, and Appendix D, respectively. Pertinent results are summarized below.

4.1 Key Metrics

Programme evaluation should focus on measuring specific performance measures, which correspond to programme goals. A vast number of studies have used firm performance indicators such as revenues, sales, patents, investments received, and firm survival (Audretsch et al., 2002; Autio & Ranniko, 2016; Howell, 2017; Wang et al., 2017). But improved firm performance does not prove program performance. For example, Isenberg & Onyemah (2016) explored outcomes of the Manizales-Mas scale-up programme in Colombia, but they only used outcome indicators such as social progress, and community engagement and failed to claim causality between intervention and company growth.

In addition to medium/long-term performance measures, short-term measures such as impact on improvements to firms' resources and capabilities are direct and reliable metrics that should also be considered as key indicators for programme evaluation. Based on a logic model developed by Dalziel and Parjanen (2012), direct impact on resources and capabilities that occurs in the short-term leads to indirect impact on performance in the longer term. This addresses the issue of causality and can also accommodate situations where stakeholders benefit from multiple types of support. It also allows impacts to be identified even in cases when the lag between intervention and impact on stakeholder performance is pronounced, in which case impacts on standard performance measures, such as revenues or employment, are unlikely.

As for best practices of programme evaluation, a multi-dimensional approach is embraced to trace the processes that lead to impact, and to identify suitable metrics to understand causality, ensuring that the results obtained are grounded in a solid representation of programme objectives and processes.

4.2 Methodology

Approaches to assessing the results of investments in business support programs range from state-of-the-art evaluation methodologies to substitutes for evaluations such as 'success stories'.

State of the art evaluation methodologies are highly rigorous but are very demanding in terms of data requirements. As a consequence, they are rarely feasible and are used infrequently outside of academia. However, when data are available, researchers have applied regression discontinuity design (Howell, 2017; Wang et al., 2017) to distinguish treatment from selection effects.

The most frequently used approaches to reporting on the results of investments are not evaluations, but are often used in place of evaluations. These include success stories, the presentation of firm performance data (Isenberg & Onyemah, 2016), the presentation of client satisfaction data, and economic impact analyses (Cumming, 2005), which are attempts to estimate the total impact of interventions on the gross domestic product (GDP) of a region.

In the middle ground between these two extremes are methodologies that are both reliable and feasible. Such approaches include matched sample approaches that seek to identify differences in the performance of treated and untreated firms (Autio & Ranniko, 2016), and approaches that rely on the judgement of survey respondents to distinguish between differences in performance that are attributable to interventions, and differences in performance that would have happened in the absence of interventions (Dalziel, 2016).

There is a trade-off between rigor and feasibility in reporting the results of investments in business support programs. Highly rigorous approaches include experimental and quasi-experimental designs that are constructed to address the issue of causality. However, these approaches have high requirements in terms of longitudinal data and instrumental variables, which are rarely applicable in practical programme evaluation. Easily implemented approaches include biased-by-design success stories, presentations of data that make no attempt to address causality, and economic impact analyses. For the purpose of this study, we recommend methods that balance rigor and feasibility such as matched sample approaches, and the use of expert judgement to assess attribution.

4.3 Benchmarking

Benchmarking will provide opportunities for learning by comparing the impacts achieved by the focal programme (e.g. Nordic Scalpers) against a number of global

peer programmes. As a result, such an analysis will provide insights into the relative strengths and weaknesses of each of the programmes (e.g., areas of greater or lesser impact), and will help to identify relevant attributes of the more successful programmes to be used as best practices in the design, deployment, and monitoring of similar programmes in the future. This benchmarking analysis will draw from both the shorter-term impacts on capabilities, as well as from the longer-term impacts on performance.

An example resulting from an earlier report developed by The Evidence Network Inc. (2016), which demonstrated how The Evidence Network’s methodology can be used to benchmark comparable support programmes, is shown in the diagram below. While each column represents a programme, the colours indicate different types of programmes (e.g., programmes that accelerate versus programmes that incubate). This example demonstrates the average impact of each of the programmes on improvements to the business expertise across their participants. Impact on improvements to performance measures (e.g. revenues, employment) using this methodology are also demonstrated in their report.

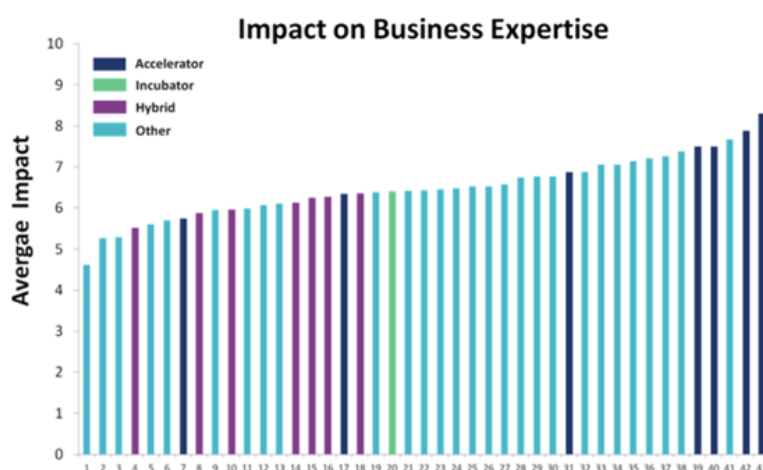


Figure 4.1 Impact on Business Expertise

A report¹³ by Business Finland provided a guide for benchmarking accelerators and other business support programs. In the report, the authors compared eight approaches used to assess and benchmark incubator and accelerator programs:

¹³ The evaluation was conducted by 4FRONT Oy, Etlatieto Ltd., The Evidence Network Inc., Boro Oy, and Imperial College London Business School.

- **Accelerator Assembly¹⁴ Benchmarking**: evaluated 20 accelerators using multiple sources of data (i.e. secondary data on venture performance, data collected from the accelerators themselves, and satisfaction data (primary data) collected directly from supported ventures).

- **EBN¹⁵ Benchmarking**: concentrated on incubators in the EU Business and Innovation Centre (BIC) network using venture performance data collected from comprehensive self-assessment questionnaires

- **InBIA¹⁶ IMPACT Survey**: focused on economic impact of incubators, accelerators, co-working spaces and entrepreneurship centers across the US using Venture performance data collected from self-assessment questionnaires

- **Initiative for a Competitive Inner City (ICIC)¹⁷ – Matched Sample Report**: benchmarked incubators and accelerators across the US using primary data and matching approach to compare treated and control group companies on a range of measures

- **Seed Accelerator Ranking¹⁸**: provided a ranking approach that benchmarks US-based accelerators on five metrics using multiple sources of data (i.e. secondary data on venture performance, data collected from the accelerators themselves, and satisfaction data (primary data) collected directly from supported ventures).

- **The Evidence Network Inc. (TEN)¹⁹ – Judgment of Attribution**: used survey respondent judgment of attribution to isolate treatment and selection effects based on primary data elicited directly from supported ventures

- **UBI²⁰ Index**: focused on ranking business incubators and accelerators affiliated with universities using venture performance data collected from incubators themselves

- **Venionaire Capital²¹ – Top 20 European Accelerators of 2017**: reported on the performance and quality of the top 20 European accelerators using multiple sources of data (i.e. secondary data on venture performance, data collected from narrative surveys and interviews with accelerator managers and venture founders).

These approaches provide broad descriptions of the support programmes and the companies that participate, but typically do not tackle the distinction between programme performance and company performance (Business Finland, 2018). The

¹⁴ <http://www.acceleratorassembly.eu/>

¹⁵ <https://ebn.eu/>

¹⁶ <https://inbia.org/>

¹⁷ <http://icic.org/>

¹⁸ <http://www.seedrankings.com/>

¹⁹ <http://www.theevidencenetwork.com/>

²⁰ <https://ubi-global.com/>

²¹ <https://www.venionaire.com/>

major difficulty in achieving reliable assessments of the performance of programmes is demonstrating causality, that is, the linkage between program interventions and change in company performance. Propensity score matching (PSM) and respondent judgement of attribution (JoA) differentiate between treatment and selection effects to address the issue of causality, and have reasonable data requirements. Therefore, it is recommended that programmes are evaluated and ranked annually or bi-annually using the JoA approach, and after sufficient longitudinal data are collected and control group firms identified, these programmes can be evaluated and ranked using PSM to confirm and elaborate on previous findings (Business Finland, 2018).

4.4 Comparing Programme Attributes

As described above, benchmarking is usually based on company performance measures, and infrequently on program performance measures (The Evidence Network Inc. (2016)). An alternative is to compare programmes based on programme attributes such as programme design, target clients, focused sectors, services, financial support, etc.

Such comparisons provide preliminary insights at an early stage for programmes to make sure their goals are aligned with global peer programmes, to re-assess provision of services and funding, and to evaluate selection criteria for potential client companies. From our grey literature as presented in Appendix D, we found several common features among scale-up programmes or programmes with a focus on supporting high-growth firms. Table 4.1 presents programme attributes by Nordic Scalers and peer programmes.

Among the peer programmes, some programmes are prominent in terms of their intensive mentorship such as Techstars (provision of a three-month mentorship), ScaleUp Academy (provision of twelve business modules for twelve months), and Innovation Norway (provision of FRAM programme which lasts for 10-24 months). A few programmes act as accelerators and directly offer seed funding such as Y Combinator, Surge, 500 Startups, and Techstars.

Table 4.1 Programme Attributes

Programme Attributes	Number of Peer Programmes	Nordic Scalers
Strict selection of high-growth firms	8 (out of 19)	Yes
Provision of funding	6	No
Facilitation of financial linkages	19	Yes

Mentorship	17	Yes
Global connections	4	Yes
Networking	19	Yes
Peer-to peer support	5	Yes
Leadership development	5	Yes
Market intelligence	13	Yes

As for networking opportunities, programmes such as the Global Scale-up Programme, Born global, and Surge offer opportunities for global connections and international market linkages, while programmes such as Microsoft ScaleUp, Scale-up SG, and ScaleUpNation are efforts to build up a peer-supported community and an influential alumni network. Scale-Up Denmark also helps client firms to create research linkages with leading universities, research institutes, and science parks. With regard to target clients, several programmes (e.g. Scale-up SG, Spark2Scale, Scale-Up Denmark, ScaleUp Academy, Microsoft ScaleUp, etc.) make specific requirements on firm size, growth rate, or industry sectors.

It should be noted that Nordic Scalers, compared to other peer programmes, provides a full package in terms of facilitation of financial linkages (e.g. pitching, matchmaking, investor sessions), and support services (e.g. mentorship, networking, peer-to-peer support, leadership development, and internalization). In particular, the Nordic Scalers programme has a strict selection criterion for identifying potential client firms, therefore, better chances of targeting the right firms and distinguishing itself from other support programmes. Most other peer programmes select Series A start-ups with potential and ambition for growth as their target clients. However, their selection criteria are more general as they do not precisely indicate a specific growth rate within a certain period as a requirement for target clients.

5. Opportunities for Improvement

In this section, we propose several opportunities for future improvements of business support programmes such as the Nordic Scalers programme. It is important for intervention programmes to identify and target the right firms, provide long-term financial support to HGFs, and evaluate themselves on a regular basis to assess impact. Moreover, joint efforts by multiple stakeholders such as

governments, universities, research institutes, NGOs, and companies are required to cultivate a successful scale-up ecosystem.

5.1 Selecting the 'Right' Firms

The selection criteria for HGFs should be specifically defined and goal oriented. When selecting HGFs, we believe the goal of a 'one best way' of measuring growth has diverted programmes from acknowledging that firm growth is fundamentally a multidimensional rather than unidimensional phenomenon. Srhoj et al. (2018) explained that different indicators indeed select different high-growth firms, which is especially evident when comparing employment- and revenue-based selected firms. All high-growth firms do not grow in the same way. This implies that programmes should measure different forms of growth with different growth metrics, and target the firms that will make the most contribution to regional and national economic development, according to the programme's vision, consistent with regional or national interests and priorities.

For example, the Nordic Scalars programme is exclusively for scale-ups; companies with a minimum turnover of €2M, have been generating revenue in the preceding three years, have a minimum staff complement of 10 people, and have been growing at least 20% in the preceding one to three years. These selection criteria are consistent with Autio et al.,(2014)'s proposition that good high-growth policies are highly selective and emphasize strong growth motivation as a key selection criterion.

However, programmes should be aware that past financial performance and growth does not necessarily translate into future growth in the short term; HGFs are only modestly likely to experience consecutive periods of high growth (Hölzl, 2014). Thus, relying on historic turnover figures and future growth projections may be relatively limiting, as firms without a 'track record' of growth may be omitted despite having significant (unrealized) growth potential (Brown & Mason, 2015).

5.2 Providing Evidence of Impact

On the whole, quantitative evaluation evidence assessing the effectiveness of ecosystem-related interventions is extremely rare (Brown & Mawson, 2019). Where hard evaluation evidence exists, it shows that public sector interventions supporting ecosystems are broadly effective in catalysing start-ups through loans, funding, and mentoring, but are less successful promoting networks and interconnections across the ecosystem (Business Finland, 2018).

Better data would allow a more sophisticated assessment, ex-ante, of impact. Data should be made available by government agencies so that local public and private sector organizations can identify, target, evaluate, and benchmark their support to high growth companies. In the same manner, intervention programmes should voluntarily conduct assessments of their performance on a regular basis (e.g., annually or every two years) to evaluate their impact on companies and socio-economic growth. Public and private funding organizations should be directed towards collaborative initiatives based on evidence that demonstrates impact on both improvements to capabilities measures (e.g. impact on business linkages, networks, etc.) and impact on performance measures (e.g. impact on employment, revenues, and investments received). Policy makers should develop dedicated monitoring systems to identify milestone achievements and requisite conditions for progressively more substantial and hands-on support for the achievement of specific forward-looking milestones (Autio et al., 2014).

5.3 Accessing Growth Capital

HGFs are sometimes confronted with insufficient follow-on financing to match their scale-up needs. Investors often have short-term goals that do not match the long-term growth goals of the firms, while banks are considered to be disinterested in financing expansion (Coutu, 2014). Therefore, for high-growth firms with aspirations to scale, finding the right investors can be a real challenge. Government programmes and NGOs (Non-Government Organizations) should make efforts to address or mitigate such financing gaps. Dynamic financing mechanisms such as venture capital and private equity are required to ensure an effective investment mix and provide essential later-stage capital so that HGFs can continue to grow and reach a significant scale.

5.4 Building a Scale-up Ecosystem

Building an ecosystem that will produce a greater number of scale-ups is more ambitious and challenging than producing a greater number of start-ups or celebrating entrepreneurs. Abundant evidence from countries around the world shows that collaborative initiatives can 'super-charge' an economy to increase the ability of companies to scale-up and to make superior contributions to the economy (Coutu, 2014). To build a better scale-up ecosystem, policy makers should rely on public-private partnerships for hands-on, capacity-boosting support (Autio et al., 2014), and promote a multi-participant system to involve research institutes, universities, and anchor companies. Kalafsky & Rice (2017) examined top HGF cities and highlighted the crucial importance of universities and research institutions, often associated with governments in establishing an environment that is conducive to firm generation and rapid business scale-up.

6. Conclusion

The objective of this study was to conduct a review of academic and grey literature on the performance of programmes similar to the Nordic Scalers programme. It is designed to assist Nordic Innovation in contextualizing the performance of their programme by describing the characteristics and impacts of other scale-up programmes, and by providing insights, lessons learned, and benchmarks against which the Nordic Scalers programme can be compared.

For the purpose of gaining a better understanding of HGFs, we explored the prevalence and characteristics of HGFs to assist the Nordic Scalers programme to more effectively target the 'right' firms with high growth characteristics and provide more tailored-to-circumstances business support.

It is revealed that HGFs tend to be smaller in size, younger, present in different industries (Arrighetti & Lasagni, 2013), improving productivity, and with a focus on international markets. Our conclusion is that HGFs are rare, but they have contributed disproportionately to the bulk of net new job creation (Birch, 1981). High-growth firms are associated with wealth creation, job creation, role models inspiring peer companies, regional innovation outcomes, and regional economic development (Piazza, 2002; Acs & Armington, 2006; Acs & Mueller, 2008; Henrekson & Johansson, 2010; Haltiwanger et al., 2013). Despite these positive socio-economic outcomes, high growth is difficult to achieve and sustain. A significant share of HGFs grow rapidly only for a short period of time (Delmar et al. 2003). Since high growth is not persistent, we identified some jurisdictions nurturing HGFs, in which case greater attention should be given to developing more effective ways of targeting, supporting, and promoting HGFs.

There are internal and external drivers for high growth. Internal drivers include: 1) Firm operation and growth strategies, 2) Entrepreneur characteristics, 3) Human resources management, and 4) R&D capabilities. External drivers include: 1) Geographical factors, 2) Venture capital, and 3) Institutions and government regulations. It is understood that internal drivers and external drivers jointly play a role in creation and sustainability of high growth.

This study further examined the characteristics of programmes and policies that successfully support HGFs – and those that do not. Our findings indicate that successful programmes: 1) have a holistic view, 2) provide timely intervention, 3) offer multiple rounds of financing, 4) simultaneously provide both financial support and non-financial support to maximize treatment effect, and 5) focus on peer-to-peer networking, while unsuccessful programmes are subject to issues such as: 1) Wrong targets, 2) Poor programme design, and 3) Institutional deficiencies.

With the aim to develop a framework that could serve as a basis for identifying best practices for programme evaluation, our review of the programme assessment

literature revealed several insights and implications on key metrics, methodology and data, and programme benchmarking.

With respect to best practices of programme evaluation, a multi-dimensional approach is encouraged to trace the processes that lead to impact, and to identify suitable metrics to understand causality, ensuring that the results obtained are grounded in a solid representation of programme objectives and processes.

With regard to evaluation methodology, there is a trade-off between rigor and feasibility in reporting the results of investments in business support programs. For the purpose of this study, we recommend methods that balance rigor and feasibility such as matched sample approaches, and the use of expert judgement to assess attribution.

Furthermore, benchmarking will provide opportunities for learning by comparing the impacts achieved by the focal programme (e.g. Nordic Scalers) against a number of global peer programmes. As a result, such analyses will provide insights into the relative strengths and weaknesses of each of the programmes (e.g., areas of greater or lesser impact), and will help to identify relevant attributes of the more successful programmes to be used as best practices in the design, deployment, and monitoring of similar programmes in the future. For programmes in progress, an alternative is to compare programmes based on programme attributes such as programme design, target clients, focused sectors, services, financial support, etc. Such comparisons will provide preliminary insights at an early stage for programmes to make sure their goals are aligned with global peer programmes, to re-assess provision of services and funding, and to evaluate selection criteria for potential client companies.

Finally, this study identified several opportunities for future improvements to business support programmes such as Nordic Scalers. It is important for intervention programmes to identify and target the right firms, provide long-term financial support to HGFs, and evaluate themselves on a regular basis to assess impact, and to assess what's working and what's not working. Moreover, joint efforts by multiple stakeholders such as governments, universities, research institutes, NPOs, and companies are required to cultivate successful scale-up ecosystems.

7. A Note of Caution

In this review we have described characteristics of high-growth firms (HGFs), which are relatively rare, yet contribute disproportionately to creating jobs. But this review, and the literature in general, falls short in terms of identifying and understanding *a priori*, the factors that lead to high growth – a pre-requisite for selection of entrepreneurs and companies that most merit support to ensure their early and disproportionate contribution to wealth and job creation. In this respect, Aldrich and Ruef, 2018 explore ‘selection biases’ in the entrepreneurship literature that favour high growth firms, which they argue misses understandings of ‘the process by which new organizations with innovative routines and competencies set in motion the genesis of new populations’, such as the rare high-growth firms.

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Appendix A – Academic Papers on High-Growth Firms

Papers	Research Questions	Data/Sample	Methodology	Findings
Andersson (2003)	- Why are firms in a young and growing industry growing?	- 3 Swedish super grower companies in the business system industry, IBS, IFS, and Intenia - Personal interviews and secondary data	- Case study	- Entrepreneurs' intentions, international growth strategies, organic organizations, industry structure and networks, and national cultures are factors that influence firms' growth. - Profitability is not a condition for growth.
Anyadike-Danes et al. (2015)	- What types of firms create the most jobs in the UK economy? - What are the implications for policy choices?	- A firm-level database from the Business Structure Database (BSD; compiled by the Office for National Statistics in 2008) which records annual data on employees for the entire population of firms in the United Kingdom	- Descriptive statistics	- A small number of job-creating firms (mostly small firms) are responsible for a significant amount of net job creation in the United Kingdom. - The majority of jobs in the United Kingdom are created by small firms (notably micro-enterprises) and that these new small firms also exhibit the greatest rates of churn.
Arrighetti & Lasagni (2013)	- What factors affect the probability of being a high-growth firm in Italy?	- Original data set obtained by matching and merging data from the VIII and IX waves of the Survey on Manufacturing Firms collected by Capitalia. The data span the 1998–2003 period.	- Probit regressions	- HGFs are, on average, young firms and are present in different industries, but the role of demand is important to understanding their performance at the sectoral level. - Financial constraints and profitability are not associated with the probability of being a HGF.

		<ul style="list-style-type: none"> - More than 770 observations of Italian firms 		<ul style="list-style-type: none"> - HGFs, on average, are characterised by high productivity, but only when growth is measured in terms of sales. - The concentration of ownership is important for HGFs that experience rapid growth in their sales. - The quality of human capital is a strong point for firms experiencing rapid employment growth.
Audretsch (2012)	<ul style="list-style-type: none"> - What has been learned in the literature concerning the determinants of high-growth firms? 	<ul style="list-style-type: none"> - Academic papers concerning the determinants of high-growth firms. Two specific types of determinants are considered: 1) determinants that are specific to the firm, and 2) determinants that are specific to the location. 	<ul style="list-style-type: none"> - Literature review 	<ul style="list-style-type: none"> - Small firms, young and new firms, and firms in knowledge-based and technology-based industries tend to exhibit higher rates of growth. - However, high-growth firms accounting for most of the employment growth tend to be larger and more mature. In addition, they tend not to be concentrated within any particular type of industry or sector. - HGFs tend to benefit from being located in geographic clusters and agglomerations.
Autio et al. (2000)	<ul style="list-style-type: none"> - What is the real contribution of small firms to economic growth and employment generation? - Which business sectors produce the 	<ul style="list-style-type: none"> - All Finnish single-establishment firms that have increased their annual sales by >50% during each of the consecutive years from 1994 to 1997, from Statistics Finland database 	<ul style="list-style-type: none"> - Descriptive analysis 	<ul style="list-style-type: none"> - High-technology firms are not over-represented in the gazelle population. - A surprisingly high number of firms, 16% were able to achieve a greater than 50% sales growth rate during the fourth year. - 60% of the gazelle firms were able to maintain a positive sales growth rate

	<p>greatest numbers of gazelles?</p> <p>- Are gazelles over- or under-represented in some business sectors?</p>			<p>during 1998, the fourth year of the cohort study.</p> <p>- The ultra-rapid growth rate does not appear to have increased the mortality rate of the gazelle firms.</p>
Barringer et al. (2005)	<p>-What are the growth-related attributes that are associated with rapid-growth firms?</p>	<p>- A sample of 50 rapid-growth and 50 slow-growth firms randomly selected from a set of narrative case studies provided by the Ewing Marion Kauffman Foundation</p>	<p>- Quantitative comparative case study</p>	<p>- Founder characteristics: the founders of the rapid-growth firms are better educated, have a more compelling 'entrepreneurial story', and have a higher incidence of prior industry experience.</p> <p>- Firm attributes: the rapid-growth firms have a stronger commitment to growth, are more involved in interorganizational relationships, and utilize a growth-oriented mission statement to a greater extent.</p> <p>- Business practices: the rapid-growth firms add more unique value and have a deeper level of customer knowledge.</p> <p>- HRM practices: the rapid-growth firms emphasize training, employee development, financial incentives, and stock options.</p>
Bos & Stam (2014)	<p>- The extent to which and how the presence of gazelles, young high-impact firms, is related to the</p>	<p>- Based on a data set comprising the full population of gazelles in The Netherlands, and a data set including annual employment per two-digit industry in</p>	<p>- Panel vector autoregressive model</p> <p>- Granger causality</p>	<p>- An increase in the prevalence of gazelles in an industry appears to have a positive effect on subsequent industry growth.</p>

	growth of industries over time.	The Netherlands, both covering the 12-year period 1997–2008.		<ul style="list-style-type: none"> - There are no long-run positive effects of increases in industry growth on the prevalence of gazelles. - There is also no relationship between overrepresentation of gazelles and subsequent industry growth.
Boston & Boston (2007)	- What are the differences between high-growth and low-growth business owned by African American entrepreneurs?	<ul style="list-style-type: none"> - A national survey of 350 African American business owners whose companies had ten to one hundred employees. Each quarter of 2002 and 2003, owners were randomly selected and interviewed. - Companies were classified into three groups according to their annual employment growth over five years: gazelles (20 percent or greater rate of growth), growth-oriented firms (1 to 19 percent), and no-growth firms (less than 1 percent or negative). 	<ul style="list-style-type: none"> - Descriptive statistics - Logistic regression - Chi-square test 	<ul style="list-style-type: none"> - In comparison to no-growth firms, gazelles were more likely to market to the government sector, less likely to compete on the basis of price, more likely to serve regional and national markets, and more likely to have fewer African Americans workers. - CEOs of no-growth companies were more likely to have entered business because they lost a previous job. - No statistically significant differences appeared in thirty-nine other variables that defined owner attributes, firm characteristics, and business strategies of gazelles and no-growth firms
Capasso et al. (2009)	- Do some firms persistently outperform?	- Whole population of manufacturing firms in the Netherlands, in the period 1994 to 2004	<ul style="list-style-type: none"> - Parametric and non-parametric methods - Graphical analysis 	- Bouncing firms co-exist with persistent outperformers. This result is shown to be robust once firms who

	<ul style="list-style-type: none"> - Whether there is persistence in growth rates in terms of firms that persistently outperform or underperform? 	<ul style="list-style-type: none"> - Panel data collected by the Centraal Bureau voor de Statistiek (CBS) and stem from the Business Register of enterprises 	<ul style="list-style-type: none"> - Quantile regression 	<ul style="list-style-type: none"> experienced acquisitions or spin-off are excluded. - The existence of persistent outperformers is especially pronounced in micro firms.
Chan et al. (2006)	<ul style="list-style-type: none"> - Are sustainable high-growth small businesses homogeneous? - What are the relationships between different organizational characteristics and the key management challenges? 	<ul style="list-style-type: none"> - Data gathered from a survey of the high-growth, entrepreneurial companies that recently received the "Best 50 Managed Companies in Canada" award 	<ul style="list-style-type: none"> - X² methods - Content analysis 	<ul style="list-style-type: none"> - Controlling for location and performance, the high-growth small firms in our population experience similar management challenges regardless of the specific firm size, revenue level, or industry. - Successful small firms, having attained high and sustainable economic growth, were indeed largely homogenous with respect to their key management challenges.
Choi et al. (2013)	<ul style="list-style-type: none"> - What are the characteristics and direct employment impact of high-growth firms operating in Georgia? 	<ul style="list-style-type: none"> - Longitudinal data used in this study are from the National Establishment Time-Series (NETS) database from 1989 to 2009 	<ul style="list-style-type: none"> - Comparison - Descriptive statistics 	<ul style="list-style-type: none"> - Only a small fraction of firms satisfied the high-growth employment criteria in any year, but these rapidly growing firms made a disproportionately large contribution to overall job creation in the state. - As has been found for the United States as a whole, the number of high-growth firms and their average job creation has declined during last decade. - Incidence of high growth and the resulting job creation differ significantly

				<p>according to size, age, industry, type of organizational structure, and ownership as well as location.</p> <p>- Firms with fast-growing revenue- are not necessarily firms with fast-growing employment.</p>
Coad et al. (2014) ²²	<p>- What are the reasons for this increased interest in high-growth firms?</p> <p>- What are the methodological considerations that constrain and bias research on HGFs?</p>	- Seven self-contained papers on HGFs that reflect a broad spectrum of current research on HGFs	<p>- Literature review</p> <p>- Special section review</p>	- While HGFs are important for understanding the economy and developing public policy, they are unlikely to be useful vehicles for public policy given the difficulties involved in predicting which firms will grow, the lack of persistence in high growth levels, and the complex and often indirect relationship between firm capability, high growth, and macro-economic performance.
Daunfeldt & Halvarsson (2015)	<p>- Does high-growth tend to persist?</p> <p>- Do firms with high growth rates in one period have a higher probability of outperforming again in the next period?</p>	- Firm-level data from Sweden during 1997–2008 from IFDB database, constructed by the Swedish Agency for Growth Policy Analysis	<p>- Descriptive statistics</p> <p>- Standard Gibrat model</p> <p>- 1st difference least squares estimator</p> <p>- Standard Gibrat model</p>	- High-growth firms had declining growth rates in the previous 3-year period, and their probability of repeating high growth rates was very low. Thus, these are essentially “one-hit wonders,” and it is doubtful whether policymakers can improve economic outcomes by targeting them.
Davidsson & Henrekson (2002)	- What are the key institutional determinants of	- Empirical evidence from Sweden including an analysis of the	- Exploratory analysis	- Institutional arrangements are important determinants of entrepreneurial activity.

²² A literature review on 7 selected papers on HGFs.

	firm emergence and growth?	pertinent institutions and policies	- Descriptive statistics	- Aspects dealt with include: missing arenas for entrepreneurship in the care sectors and for household-related services, taxation of entrepreneurial income, incentives for wealth accumulation, wage-setting institutions and labor market regulations.
Decker et al. (2016)	- What are the characters of business dynamism and entrepreneurship in the U.S. over recent decades?	- Data from Census Bureau's longitudinal business database from 1976 to 2011	- Descriptive statistics - Visualization	- The shape of the firm employment growth distribution changes substantially in the post-2000 period. By 2007, the 90-50 differential was only 4% larger than the 50-10, and it continued to exhibit a trend decline through 2011. - The overall decline reflects a sharp drop in the 90 th percentile of the growth rate distribution accounted for by the declining share of young firms and the declining propensity for young firms to be HGFs.
Delmar et al. (2003)	- How do organizations grow? - What are firm growth patterns? - How firms have achieved high growth?	- All firms in Sweden with more than 20 employees in existence in 1996 (N=11,748) from year 1987 to 1996 - A sample of high-growth firms (n=1501) defined using 19 different measures of firm growth	- Cluster analysis	- High-growth firms do not grow in the same way. - A "high-growth firm" is, conceptually and operationally, very dependent on the growth measure used. - The phenomenon of the high-growth firm is heterogeneous.

Demir et al. (2017) ²³	<ul style="list-style-type: none"> - What are the drivers, in terms of strategic aspects, of high growth? 	<ul style="list-style-type: none"> - 39 articles concerning high-growth firms with a focus on the strategic aspects contributing to growth 	<ul style="list-style-type: none"> - Systematic review of the empirical literature 	<ul style="list-style-type: none"> - Strategic management of HGFs is based on five drivers: the ways founders and employees leverage 1) human capital, 2) firm HRM practices, 3) firm strategy, 4) firm's innovation, and 5) firm capabilities for growth.
Du & Temouri (2014)	<ul style="list-style-type: none"> - Does higher total factor productivity (TFP) growth lead to HGF status? - Does HGF experience help firms achieve faster TFP growth? 	<ul style="list-style-type: none"> - 183,024 firm-year observations for 26,313 firms - Industry-level data for 12 OECD countries over the period 2002-2005 	<ul style="list-style-type: none"> - Descriptive statistics - Quantile regression - Parametric, Semi-parametric and GMM - Spearman's rank correlation 	<ul style="list-style-type: none"> - Firms in both the manufacturing and services sectors are more likely to become HGFs when they exhibit higher TFP growth. - Firms that have had HGF experience tend to enjoy faster TFP growth following the high-growth episodes.
Goedhuys & Sleuwaegen (2010)	<ul style="list-style-type: none"> - To what extent certain co-variables may affect the conditional distribution of firm growth rates more fundamentally, by changing its location, scale and shape? - What factors tend to generate a significant number 	<ul style="list-style-type: none"> - Firm-level data from the World Bank Investment Climate Survey (2006) - Unique firm-level dataset of 947 entrepreneurial firms with five to 500 employees active in several manufacturing industries from the 11 African countries 	<ul style="list-style-type: none"> - Quantile regression - Least squares assuming homoscedastic normal conditional growth distributions 	<ul style="list-style-type: none"> - Firms that engage in product innovation, have their own transport means and are connected to the internet through their own website are especially characterized by higher growth rates and also display a distribution of growth rates skewed to the right, hosting a higher number of high-growth firms. The effect of the last two variables, which relate to distance-bridging modes of infrastructure, points to the self-reinforcing growth effects they

²³ Literature review

	of high-growth firms?			<p>generate in creating wider input and output markets.</p> <p>- Education raises growth opportunities by affecting the lower quantiles, but it does not appear to influence the upper quantiles.</p>
Goedhuys & Sleuwaegen (2016)	- What is the differential role played by R&D and human capital in relation to the occurrence of both HGFs and SDFs (strongly declined firms)?	<p>- Sample consists of 21 372 firms located in the Flemish and Brussels-Capital Regions of Belgium.</p> <p>- The data are drawn from the financial statements that all incorporated firms submit to the Central Balance Sheet Office of the National Bank of Belgium and cover the period 2008–2011.</p>	<p>- Probit estimation</p> <p>- Quantile regression</p>	<p>- Both human capital and R&D increase the likelihood that a firm will be a high-growth firm in the industry.</p> <p>- Different from human capital, being an R&D active firm also increases the probability of substantial decline or failure, underscoring the risky nature of innovation.</p> <p>- Different from R&D, human capital is growth enhancing for all firms, hence also those located in the lower quantiles of the distribution of growth rates across firms.</p>
Halvarsson (2013) ²⁴	- What is the role(s) of high-growth firms (HGFs) in the robust growth-rate distribution?	<p>- Swedish data for incorporated firms covering the period 1995-2010.</p> <p>- The data set comes from the Swedish Patent and registration office (PRV) and contains information on a number of accounting</p>	<p>- Descriptive statistics</p> <p>- Kernel density</p> <p>- Power law</p>	<p>- By looking at statistical properties of the growth-rate distribution, it is possible to characterize high growth without the need for determining relevant percentage shares or required growth rates beforehand.</p> <p>- HGFs comprise a smaller share than was previously thought, often as small as a fraction of a percent.</p>

²⁴ Using growth rate distribution, not arbitrary definitions by OECD.

		variables, such as the number of employees, registration dates, sales, R&D expenditures, and profits.		
Henrekson & Johansson (2010)	<ul style="list-style-type: none"> - Whether net employment growth rather is generated by a few rapidly growing firm - so-called Gazelles - that are not necessarily small and young? - Whether Gazelles are overrepresented in high-technology industries? 	<ul style="list-style-type: none"> - 20 studies on Gazelles 	<ul style="list-style-type: none"> - Meta-analysis 	<ul style="list-style-type: none"> - Gazelles are found to be outstanding job creators. - On average, Gazelles are younger and smaller than other firms, but it is young age more than small size that is associated with rapid growth. - Gazelles exist in all industries. They seem not to be overrepresented in high-technology industries, but there is some evidence that they are overrepresented in services.
Hölzl & Janger (2013)	<ul style="list-style-type: none"> - Do high growth firms face specific innovation barriers which are relevant for innovation policy? 	<ul style="list-style-type: none"> - Firm-level data from the European community innovation survey (CIS) data for 18 countries 	<ul style="list-style-type: none"> - Regressions 	<ul style="list-style-type: none"> - The perception of innovation barriers by high growth firms is quite heterogeneous for the two CIS samples. For CIS 4 the main message would be: Yes, high growth firms perceive in general higher innovation barriers, while for the CIS 2006 we obtain in general the opposite result.
Hölzl (2009)	<ul style="list-style-type: none"> - Are the R&D strategies of rapidly growing firms similar across countries close or far away from the 	<ul style="list-style-type: none"> - Sample consists of manufacturing firms in 16 countries [numbers in parentheses indicate the number of observations in our final sample: 	<ul style="list-style-type: none"> - Descriptive statistics - Comparison - Quantile regression 	<ul style="list-style-type: none"> - R&D is more important to high-growth SMEs in countries that are closer to the technological frontier. - High-growth SMEs are only more innovative than non-high-growth SMEs

	<p>technological frontier?</p> <ul style="list-style-type: none"> - Are high-growth SMEs more R&D active than comparable firms which do not grow as fast? And if so, are there differences across countries with a different technological position? 	<p>Austria(321),Belgium(472),Czech Republic(1,320), Germany (1,326), Estonia (687), Spain (3,955), Finland (644), Greece (693), Hungary (912), Italy (5,325), Latvia (730), Lithuania (599), Portugal (862), Sweden (710), Slovenia (955) and Slovakia (900)] over the period 1998–2000.</p> <ul style="list-style-type: none"> - Community Innovation Survey (CIS) Data for 16 countries 		<p>in countries close to the technological frontier.</p> <ul style="list-style-type: none"> - We find (relatively speaking) a much lower number of high-growth SMEs in the old member states (more developed) than in the new member states.
Hölzl (2011)	<ul style="list-style-type: none"> - Are high growth firms more likely to be high growth firms at some future point in time compared to non-high growth firms? - Is the average future growth performance of high growth firms higher compared to non-high growth firms? - Are high growth firms less likely to exit from the 	<ul style="list-style-type: none"> - Social security data for the years 1985 to 2007 in Austria - Eurostat-OECD definition is used to identify high growth firms (HGFs) and a modified Birch Index to identify high impact firms (HIFs) 	<ul style="list-style-type: none"> - Descriptive statistics - Distributions - Matching - Econometric analysis - Parametric analysis 	<ul style="list-style-type: none"> - Being an HGF does not improve the likelihood of survival in future periods in excess of the size effect induced by the high growth event. - For persistence and high-growth we find an HGF treatment effect. - For HIFs we find a significant treatment effect for survival, persistence and growth. - HIFs show a much higher persistence than HGFs. - The average growth rate after the high growth episode is quite modest for both HIFs and HGFs.

	market than non-high growth firms at some future point in time?			
Kalafsky & Rice (2017)	<ul style="list-style-type: none"> - How do Southern HGFs compare with the U.S. at-large, in terms of size and economic performance? - At the state level, are there differences in the geographical patterns of HGFs across the South? - What is the ownership status of Southern HGFs, how does this compare with the rest of the U.S., and why is this important? - Where are Southern HGFs and do some metropolitan areas emerge as potential centers for these firms? 	-3,274 unique firms from Inc. 500 high-growth firm database, an annual compilation of the top 500 U.S. based, privately-owned firms ranked on the basis of their three-year revenue growth, for the year 2000-2008	<ul style="list-style-type: none"> - Descriptive statistics - Chi-squared tests 	<ul style="list-style-type: none"> - The South does not differ from the rest of the country in terms of HGF performance, industrial mix, and even long-term viability within the firms' home regions. - HGFs are perhaps a group of firms rather than specific industries that merit additional attention from policymakers in terms of their potential contributions to sustainable, long-range growth. - Observations regarding top HGF cities highlight the crucial importance of universities and research institutions often government-associated in establishing an environment that is conducive to firm generation and rapid business scale-up.

Kang et al. (2018)	<ul style="list-style-type: none"> - How low-growth firms achieve large jumps and how such firms become high-growth firms by sustaining their growth momentum thereafter? 	<ul style="list-style-type: none"> - Unique panel dataset from 2002 to 2009 on 2,025 Korean manufacturing firms, constructed by merging two firm-level databases: Survey of Research and Development in Korea and KIS-value. - The former, surveyed by the Ministry of Science, ICT and Future Planning following the OECD Frascati Manual, covers all Korean universities, institutes, and firms that own R&D units. 	<ul style="list-style-type: none"> - Probit model - Regression model that use the Cox proportional hazards model - Descriptive statistics - Correlations - Kernel densities 	<ul style="list-style-type: none"> - 24% of low-growth firms achieved large jumps and 27.4% of these maintained their growth momentum, becoming high-growth firms. - R&D investment and R&D collaboration increase the probability of achieving large jumps. - However, becoming a high-growth firm by sustaining the growth momentum after large jumps requires persistency of R&D investment and internal capabilities instead of collaboration.
Krasniqi & Desai (2016)	<ul style="list-style-type: none"> - What is the influence of formal and informal institutions on HGF prevalence in countries? 	<ul style="list-style-type: none"> - A long panel of 78 observations over three time periods (1998–2002; 2002–2005; 2005–2008/9) across 26 transition economies - Data from multiple sources: The Business Environment and Enterprise Performance Survey (BEEPS) dataset from the World Bank/European Bank for Reconstruction and 	<ul style="list-style-type: none"> - Principal component analysis - GLS estimation 	<ul style="list-style-type: none"> - Formal and informal institutions each do not alone influence HGFs and that the interaction between informal and formal institutions positively influences HGF. - Despite problematic informal institutional environments, firms are still able to find ways to cope and even thrive in terms of growth. - In fast-reforming transition economies, more burdensome formal institutions discourage HGFs but in

		Development (EBRD), World Bank Data, and EBRD Transition Report.		slow-reforming transition economies, informal institutions encourage HGFs.
Lee (2014)	<ul style="list-style-type: none"> - What are the barriers faced by firms achieving high growth and those with the potential to do so? - Do rapidly growing firms, and firms with the potential to experience rapid growth, perceive different obstacles to success than other firms? 	<ul style="list-style-type: none"> - Data for 4,858 UK SMEs - Annual Small Business Survey (ASBS) 2007/2008 and the SBS 2010, data sets of small and medium-sized enterprises (SMEs, with between 10 and 250 employees) across the UK 	<ul style="list-style-type: none"> - Propensity score matching - Probit regressions 	<ul style="list-style-type: none"> - High growth firms perceive problems in six areas: recruitment, skill shortages, obtaining finance, cash flow, management skills and finding suitable premises. Potential high growth firms feel held back by the economy, obtaining finance, cash flow and their management skills, but are less likely to perceive regulation as a problem.
Li et al. (2016)	<ul style="list-style-type: none"> - What are the location determinants of high-growth firms? 	<ul style="list-style-type: none"> - INC Magazine's 5,000 fastest-growing firms in terms of revenues 	<ul style="list-style-type: none"> - Zero-inflated negative binomial regressions 	<ul style="list-style-type: none"> - Rapidly growing firms are found in many sectors, not just high-technology. - Although a growing concentration of such firms is evident in urban areas over time, high-growth firms are also found in smaller and more rural counties. - High-growth firms exist in counties with larger average establishment size, higher educational attainment and more natural amenities. - Income growth, a mix of higher paying industries, and more banks per capita are associated with a smaller

				presence of these types of firms, all else equal.
Long (2019)	<ul style="list-style-type: none"> - What is the role of external finance in making an HGF? - Whether access to both formal and informal sources of finance could cause a small firm to become an HGF? 	<ul style="list-style-type: none"> - A sample of about 8300 firms, data has been jointly collected by the Department of Economics at the University of Copenhagen (Denmark) and two Vietnamese institutes every two years from 2005 through 2013 in 10 Vietnamese provinces 	<ul style="list-style-type: none"> - Descriptive statistics - Random-effects probit methods - Panel quantile regression 	<ul style="list-style-type: none"> - Firms that are able to access formal finance are more likely to become an HGF when compared to firms that do not use external finance or use only informal finance. - However, firms that can utilize both formal finance and informal finance (i.e., co-funding mode of external finance) have the highest chance of becoming an HGF. These firms also perform much better than their counterparts.
Lopez-Garcia & Puente (2012)	<ul style="list-style-type: none"> - What makes a high growth firm? - What are the determinants of the probability of extreme growth? 	<ul style="list-style-type: none"> - Longitudinal firm-level information on a sample of Spanish firms operating in all sectors of activity obtained from the provincial firm registries and the National Institute of Statistics (INE) - An unbalanced panel of about 1,400 firms, including new and established surviving and non-surviving firms, active at any point between 1996 and 2003. 	<ul style="list-style-type: none"> - Probit models with correlated random effects 	<ul style="list-style-type: none"> - Past extreme growth episodes increase the probability of current fast growth, which is in contrast to previous findings on the topic. - Human resource practices, such as employing qualified personnel or the mix of contracts offered, are important determinants of fast growth. - Newness and access to credit are found to be important to explain firm growth, but they are not significant determinants of fast or extreme employment growth.

Malizia & Motoyama (2019)	<ul style="list-style-type: none"> - What kinds of places have high entrepreneurial activities? 	<ul style="list-style-type: none"> - Inc. magazine annually lists the 5,000 fastest growing privately held firms in the US that have at least \$2 million in annual revenue. - 1,051 DC-area firms and 5,901 in all thirty metropolitan areas, from 2007 to 2015. 	<ul style="list-style-type: none"> - Multivariate analysis - Density distribution - Spatial distribution - Descriptive statistics - Generalized least squares model 	<ul style="list-style-type: none"> - The concentration of high-growth firms in specific employment nodes in both urban and suburban parts of each metropolitan area. - Significant correlations exist between place-based vibrancy indicators and high-growth firm concentrations.
Markman & Gartner (2002)	<ul style="list-style-type: none"> - Is extraordinary high growth (e.g., sales growth rates of 500 percent to 31,000 percent over five years) correlated to firm profitability? - Are firms likely to be unprofitable as they attempt to overcome the hurdles of change while achieving significant size? 	<ul style="list-style-type: none"> - Inc. 500 is a longitudinal dataset of privately held, high-growth companies from around the nation. - The data used in this study traced the growth of three cohorts of firms. These include firms on the 1997 Inc. 500 list (from 1992 to 1996); the 1998 Inc. 500 list (from 1993 to 1997); and the 1999 Inc. 500 list (from 1994 to 1998). We also used an aggregated dataset based on all three cohorts combined (1997, 1998, and 1999). 	<ul style="list-style-type: none"> - Correlations - Stepwise hierarchical regressions 	<ul style="list-style-type: none"> - Extraordinary high growth - in terms of sales and number of employees - was not related to firm profitability. - Firm age, however, was significantly, and inversely, related to profitability; younger firms experience slightly higher profitability rates.
Mason & Brown (2010)	<ul style="list-style-type: none"> - How about HGFs (e.g. characteristics) 	<ul style="list-style-type: none"> - Identified high growth firms in Scotland from 	<ul style="list-style-type: none"> - Literature review 	<ul style="list-style-type: none"> - HGFs comprise a small proportion of the overall business stock in Scotland

	in Scotland from both quantitative and qualitative perspectives?	<p>the commercial business database FAME (Financial Analysis Made Easy) using the turnover-based OECD definition of high growth</p> <ul style="list-style-type: none"> - A review of secondary empirical information on a sample of around 100 HGFs identified from the analysis of the FAME database, about 12% of the overall population of HGFs in Scotland - In-depth interviews were undertaken with senior managers (mainly Managing Directors/Chief Executives) of more than 20 high growth firms 	<ul style="list-style-type: none"> - Aggregate analysis of Scottish HGFs - Secondary information analysis - Firm interviews 	<p>employing more than 10 employees (4.1%).</p> <ul style="list-style-type: none"> - These high growth businesses make a disproportionate contribution to economic development and are critical to the growth of the Scottish economy. - The growth of these firms is not a uniform or linear process. Rather, growth tends to be sporadic and uneven and is often achieved through acquisition. - HGFs are diverse and heterogeneous collection of organizations. - Scottish HGFs tend to be older and larger than the archetypal HGF and a large proportion have been pre-incubated in existing businesses.
Mohr & Garnsey (2011)	- What are the attributes of high growth firms in the wider context of the population of tech firms in a high-tech cluster?	<ul style="list-style-type: none"> - Data from the Cambridge Technology Enterprise Dataset - 3099 technology companies from 12 sectors active in the Cambridge cluster between 1988 and 2009 	<ul style="list-style-type: none"> - Quartile regression - Between-group differences - Odds analysis 	<ul style="list-style-type: none"> - HGFs are more likely to have received venture capital investment. - HGFs make more intensive use of alliances than non-HGFs. - HGFs make earlier use of alliances than non-HGFs.

				<ul style="list-style-type: none"> - HGFs pursue a different alliance pattern than non-HGFs. - HGFs obtained a greater share of their revenues from overseas than non-HGFs.
Moreno & Casillas (2007)	<ul style="list-style-type: none"> - What are the main variables that allow one to distinguish between high-growth firms and non-high-growth firms? 	<ul style="list-style-type: none"> - A sample of 6814 SMEs, selected after refining a homogeneous database of firms from Andalusia (Spain). - This database includes economic and financial information for the years 1998, 1999, 2000 and 2001. 	<ul style="list-style-type: none"> - Discriminant analysis with dichotomic dependent variable 	<ul style="list-style-type: none"> - High-growth firms are different from moderate-growth firms or declining firms because of their smaller size (which is contrary to Gibrat's Law), their higher availability of idle resources (consistent with the theory of resources and capabilities), and in some cases, their lower availability of financial resources (consistent with the existing literature on entrepreneurship). - Firm age does not seem to be a good variable for distinguishing between high-growth and non-high-growth firms.
Moschella et al. (2017)	<ul style="list-style-type: none"> - What are the characteristics of high-growth (HG) firms in Chinese manufacturing? - What the effects of firm characteristics on the persistence of high-growth? 	<ul style="list-style-type: none"> - A balanced panel that includes all continuing incumbents during the period, consisting of 22,988 manufacturing firms - Data collected by the Chinese National Bureau of Statistics (NBS). It is a largely used database which includes all industrial firms with sales above 5 	<ul style="list-style-type: none"> - Regression analysis - Linear probability (OLS) estimates - Kernel densities 	<ul style="list-style-type: none"> - HG firms outperform other firms, showing higher productivity, higher profitability, larger investment intensity, higher sales from product innovation, lower interest expenses and lower leverage. - HG firms are also relatively young, larger in size, more often exporters and more concentrated in non-State-controlled companies. - Structural characteristics of firms do not display any statistically significant

		million RMB (around \$US 600,000) covering the period 1998-2007.		association with the probability to replicate high-growth over time.
Motoyama (2014)	- What are the macroeconomic factors related to high-growth firms?	- Inc. 500 firms, which is collected by the Inc. magazine - 51 observations for regression models	- Descriptive analysis - Regressions	- Geographic factors for high-growth firms differ substantially from the knowledge spillover theory, as academic and government research activities, venture capital investment, and patents are unrelated to the concentration of high-growth firms. - The model in this paper argues for the importance of the human capital related factor, specifically science and engineering college graduates
O'Regan et al. (2006)	- Does innovation, ownership, organizational capabilities, strategic orientation, perception of operating environment, e-commerce, respectively, influence/impact high growth in manufacturing SMEs?	- A survey sample of 207 manufacturing SMEs in UK	- Focus group interviews - Descriptive statistics	- High growth firms place a greater emphasis on external drivers such as strategic orientation, their operating environment and the use of e-commerce compared with firms having static or declining sales. - High growth firms compete largely on the basis on price.
Piazza (2002)	- What are the antecedents and outputs of HGFs? How can these	- A sample of 26,104 firms in the state of Ohio from the Quarterly	- Path analysis	- Antecedents to HGFs include an entrepreneurial mindset, firm strategic resources, and firm structural characteristics, while outputs of HGFs

	<p>antecedents and outputs be assembled into a system model?</p> <ul style="list-style-type: none"> - What are the direct and indirect effects of HGFs on regional economic outcomes? - How do HGFs grow, knowing that their growth is heterogeneous? What variables and mechanisms are drivers of high growth? 	Census of Employment and Wages	<ul style="list-style-type: none"> - Cluster-discriminate analysis 	<p>include regional innovation outcomes and regional economic outcomes.</p> <ul style="list-style-type: none"> - There is a strong positive association between most antecedents (human capital, startup capital, and business costs) and HGFs, a positive relationship between most antecedents and outcomes (employment and per capita income), and an association between HGFs and employment. - Only a small portion of HGFs display high-growth characteristics described in the literature.
Rice et al. (2018)	<ul style="list-style-type: none"> - What happens to U.S. HGFs after they achieve their highest growth rates? - Which metropolitan business communities are the most successful in terms of seeing their HGFs continue in operation and mature following 	<ul style="list-style-type: none"> - Assembly of the initial business database from the Inc. 500 for 2000 through 2008, encompassing 4,501 HGFs to be tracked - Identification of the tracking outcomes associated with each HGF started with a partial tracking database provided by the Ewing Marion Kauffman Foundation (EMKF) 	<ul style="list-style-type: none"> - Descriptive statistics - Visualization 	<ul style="list-style-type: none"> - Most HGFs have an extended record as independent businesses, with firm failure rates falling far lower than those associated with business continuation. - HGF acquisition activity varies greatly among U.S. Metropolitan Statistical Areas (MSAs), with Boston and Austin leading as hosts to HGFs that became acquisition targets. - Phoenix and Indianapolis lead all others in hosting HGFs with extended growth periods.

	<p>their high-growth phase?</p> <p>- As potential markers of newly developing centers of corporate activity, is it possible to identify metropolitan clusters of HGFs that achieve extended periods of high growth?</p>	<p>- Twenty-four MSAs that host at least forty Inc. 500 business appearances across the cumulative 2000 through 2008 period</p>		
Rivard (2017)	<p>- What is the total net employment change for high-growth firms (HGFs) in Canada over the 2009–2012 period in relation to dimensions such as firm age, firm size and industry sector?</p>	<p>- New database provided by Statistics Canada, the National Accounts Longitudinal Microdata File (NALMF). It was created by linking multiple administrative files: the Corporation Income Tax Return (T2), Goods and Services Tax (GST), Payroll Account Deductions (PD7), and Statements of Remuneration Paid (T4 slips).</p>	<p>- Descriptive statistics</p>	<p>- HGFs contribute disproportionately to the total net employment change. They were responsible for 63 percent of the total net employment change, but made up only 1 percent of firms with at least one employee.</p> <p>- HGFs tended to be young, as 64 percent of them were under 10 years old; HGFs under 10 years old accounted for 37 percent of the total net employment change.</p> <p>- 43 percent of HGFs were in the following industry sectors: construction; accommodation and food services; professional, scientific and technical services; and manufacturing. Therefore, HGFs were not concentrated in the high-technology sector.</p>

Satterthwaite & Hamilton (2017)	<ul style="list-style-type: none"> - Does firm age or size characterise HGFs and explain the persistence of their initial high-growth phase? - Are there major structural differences between HGFs and non-HGFs? - What happens to HGFs and the jobs their growth created? 	<ul style="list-style-type: none"> - Complete 2005 and 2008 cohorts of HGFs in New Zealand, comprising 1125 and 1067 HGFs, respectively, tracking the individual firms through to 2014, that is, nine years for the 2005 cohort and six years for the 2008 cohort 	<ul style="list-style-type: none"> - Descriptive statistics - Chi-square test 	<ul style="list-style-type: none"> - High-growth firms are smaller, more likely to emerge in service industries and grow through the creation of multiple separate establishments. - The ability to sustain high-growth is independent of pre-growth age and employment size. - High-growth firms have death rates up to four times greater than other contemporary firms, but the survivors do retain their employment size, continuing to contribute disproportionately to employment for some years beyond their initial high-growth phase.
Segarra & Teruel (2014)	<ul style="list-style-type: none"> - What makes a firm an HGF? - What is the effect of R&D investment on firm growth? 	<ul style="list-style-type: none"> - Data from the Technological Innovation Panel (PITEC) that incorporates data from some waves of Spanish Community Innovation Survey over the period 2004–2008 - Sample comprises an extensive sample with 3,807 Spanish firms 	<ul style="list-style-type: none"> - Descriptive statistics - Probit model - Quantile regression technique 	<ul style="list-style-type: none"> - R&D investments positively affect the probability of becoming a HGF. However, differences appear between manufacturing and service firms. - Internal R&D presents a significant positive impact for the upper quantiles, while external R&D shows a significant positive impact up to the median. - Small and young firms are more prone to be an HGF.
Senderovitz et al. (2016)	<ul style="list-style-type: none"> - How the level of growth affects future profitability and how this 	<ul style="list-style-type: none"> - A longitudinal study of a large sample of Danish gazelle firms. 	<ul style="list-style-type: none"> - Descriptive statistics - Correlations 	<ul style="list-style-type: none"> - A positive relationship between growth and profitability among gazelle firms. This relationship is moderated, however, by market strategy; it is

	relationship is moderated by firm strategy?	- Data derived from legislated financial reporting requirements were used to identify the population of 2475 Danish gazelle firms over the period 2004–2007.	- Hierarchical linear regression - Robustness test	stronger for firms pursuing a broad market strategy rather than a niche strategy.
Srhoj et al. (2018)	- Is the Slovenian firm-level dataset for two three-year periods (2007–2010; 2011–2014) consistent with the four stylised facts about high-growth firms?	- A total of 85,179 unique firms in Slovenia for the period 2007–2014, creating a balanced panel with 681,432 observations, from AJPES database	- Kernel density - Subbotin density - Descriptive statistics	- The growth-rate distributions to be heavy-tailed, but also somewhat asymmetric and thicker than the Laplace tails. - Different indicators indeed select different high-growth firms, which is especially evident when comparing employment- and revenue-based selected firms. - Slovenia has a smaller share of high-growth firms compared to more developed countries like the United Kingdom and Sweden; however, this smaller share of firms does contribute to a large share of jobs created, but the effect is not as large as in more developed countries. - Only a small portion of high-growth firms can be found in high-tech sectors in Slovenia.
Stangler (2010)	- What is the importance of high-growth firms, despite their	- A new set of data, a special tabulation conducted by the US Census Bureau at the	- Descriptive statistics	- In any given year, the top-performing 1 percent of young firms generate roughly 40 percent of new job creation.

	relatively small numbers, to a disproportionate share of job creation, and therefore to the US economy?	request of the Ewing Marion Kauffman Foundation, calculated from the Business Dynamics Statistics (BDS) database.		- Fast-growing young firms, comprising less than 1 percent of all companies, generate roughly 10 percent of new jobs in any given year.
Teruel & De Wit (2011)	<ul style="list-style-type: none"> - What are the determinants of the percentage of high-growth firms at the country level? - Why have some countries more high-growth firms than others? 	<ul style="list-style-type: none"> - 112 observations from a database that contains 17 different countries over a time period of 7 years (1999-2005) with information from the Amadeus data set, the Global Entrepreneurship Monitor, and others 	<ul style="list-style-type: none"> - Descriptive statistics - Regressions 	<ul style="list-style-type: none"> - There are three driving forces of high growth: 1) entrepreneurship, 2) institutional settings, and 3) opportunities for growth. - Entrepreneurship has a positive influence on high growth. - Institutional obstacles play a negative role on high growth. - Size of the domestic market influences high growth positively.
Wennberg (2013)	<ul style="list-style-type: none"> - How to manage HGFs? - What are the characteristics of managers in HGFs? 	<ul style="list-style-type: none"> - Last 30 years of academic papers and reports published on HGFs, looking specifically at empirical research on the leaders - Review of 134 published studies between 1985 and 2013 reveals only 30 empirical studies with data on the founding entrepreneurs or top 	- Comprehensive literature review	<ul style="list-style-type: none"> - HGFs are more often founded and/or managed by a larger management team than more general firm samples. Further, managers of HGFs seem to more often be highly educated and exhibit prior industry and leadership experience but not necessarily prior entrepreneurial experience. - Different types of innovativeness may be differentially related to rapid growth.

		management teams of HGFs.		
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Appendix B – Academic Papers on Intervention Programmes and Policies

Paper	Research Question	Data/Sample	Methodology	Findings
Brown & Mawson (2013)	- What are the growth trigger points for high-growth firms?	- 40 firms in Scotland	- Intensive case study	<p>- Growth trigger points are extremely diverse and play a major role in shaping the growth trajectory of firms.</p> <p>- While trigger points can fundamentally reconfigure organisations, providing a catalyst for a business to undertake a period of rapid, transformative growth, these events can conversely cause severe organisational turbulence or even decline.</p>
Brown & Mawson (2015)	- What is the rationale of public sector growth accelerator programmes and how effective are these in facilitating rapid firm growth?	- 50 Scottish HGFs	- Interviews	- Offering early stage firms intensive levels of resources may have important (and detrimental) unintended consequences previously overlooked by policy makers.
Brown et al., (2017)	- How false perceptions of HGFs translate into inappropriate policy interventions?	- Academic papers	- Literature review	- Policy makers have selectively utilized and/or misinterpreted the evolving high growth literature, resulting in myths and misconceptions about these firms becoming deeply embedded within policy frameworks.
Colombo et al. (2012)	- What is the impact of public subsidies on the employment growth of new technology-based firms (NTBFs)	- A sample composed of 536 Italian independent NTBFs observed during a 10-year period (1994–2003)	- Gibrat law-type dynamic panel data models using different techniques aimed at controlling for the potentially endogenous nature of public financing	<p>- Selective support schemes had a larger impact on employment growth than automatic ones, but only if they were awarded in the very early period of the recipient firms' lives.</p> <p>- However, selective subsidies awarded to young NTBFs are rare in Italy, calling into question the capability of the Italian</p>

				industrial policy to sustain the growth of the high-tech entrepreneurial sector.
Duruflé et al., (2016)	<ul style="list-style-type: none"> - What are the alternative options of funding scale-ups, and what are underlying challenges associated with each of those options? - What are the differences in the way that scale-up companies are currently financed in the US, Europe and Canada, and what explains these differences? - What is the possible role of government and public policies in supporting the financing of scale-ups? 	<ul style="list-style-type: none"> - Data from PREQIN Venture Capital database - Data taken from VentureSource - Data on unicorns is taken from CrunchBase and CB Insights 	- Review of descriptive data	<ul style="list-style-type: none"> - Europe and Canada have started to catch up to the US in early stage financing, but continue to lag behind at the scale-up stage. - Scale-up investors need to satisfy four important criteria: 'deep pockets', 'smart money', networks', and 'patient money'. - There are six challenges that Europe and Canada face in terms of catching up to the US, related to the overall market size of scale-up funding, the creation of larger venture funds, the challenge of avoiding selling companies too early, the creation of a venture debt market, finding ways of reinvigorating tech IPOs, and designing better markets for secondary shares.
Henrekson et al., (2010)	- What are the effects of tax policy and labor market policy on HGFs?	- Not applicable	- Literature review	- High and/or distortive taxes and heavy labor market regulations impinge on the creation and functioning of competence blocs, thereby reducing high-impact entrepreneurship.
Hindle et al., (2011)	- What should be an effective entrepreneurship policy framework for high-growth firms?	- Australian entrepreneurship policy, during the period of 2001 to 2006	- Mini cases	<ul style="list-style-type: none"> - Neither policy designed to pick winners or policy that addresses market failure fully support or facilitate high-growth ventures. - The Australian Howard Government seemed only to operate at the level of stimulating broad participation in business ownership and supporting technological innovation, knowledge transfer and commercialization of R&D. These worthwhile programs, when viewed through

				the lens of the policy framework developed in this paper, are isolated initiatives focused within the industry and innovation segments of the framework and are disconnected from the broader, holistic policy framework necessary to facilitate the growth of ventures rich in technology-based innovation.
Mason & Brown (2011)	- How to create appropriate policies for high-growth firms (HGFs)?	- HGFs in Scotland	<ul style="list-style-type: none"> - Quantitative assessment - Interviews - Back-ground secondary analyses - Workshops 	<ul style="list-style-type: none"> - Policymakers are looking for HGFs in the wrong places. The heterogeneous nature of HGFs in terms of sector, age, size and origins makes it impractical to target support on particular sectors, technologies or types of firms (e.g., new or R&D intensive). - Public policy also needs to focus on the retention of HGFs which are acquired by non-local businesses. - Policymakers need to properly reflect upon the specificities of their entrepreneurial environment when devising appropriate policy interventions.
Vanacker & Manigart (2008)	- What are the incremental financing decisions within high-growth businesses?	- 32,754 Belgian companies, as provided in the Bel-first database (Bureau Van Dijk), year between 1997 and 2004	- Regressions	<ul style="list-style-type: none"> - Profitable businesses prefer to finance investments with retained earnings, even if they have unused debt capacity. - External equity is particularly important for unprofitable businesses with high debt levels, limited cash flows, high risk of failure or significant investments in intangible assets.

Appendix C – Literature Review on Programme Evaluation

Paper	Program (Country)	Research Question	Performance Measures	Data/Methodology	Findings
Audretsch et al. (2002)	DoD SBIR (US)	What is the effect of DoD's SBIR program?	- Actual sales realized to date from the technology developed during the Phase II project, measured in dollars	- Survey data of 112 SBIR companies that received a Phase II award since 1992 - Case studies - Tobit models	- DoD's SBIR Program is stimulating R&D as well as efforts to commercialize that would not otherwise have taken place. - SBIR R&D does lead to commercialization, and the net social benefits associated with the program's sponsored research are substantial.
Autio & Ranniko (2016)	YIC (Finland)	What is the effect of YIC?	- Revenues	- 88 firms, 42 treated, 46 untreated. 2007 to 2013 - Propensity score matching and difference-in-difference estimation	- The two-year average treatment effect on revenues is 1.20, and three-year effect is 1.30.

Cumming (2005)	Innovation Investment Fund (Australia)	What is the impact/performance of the IIF program?	<ul style="list-style-type: none"> - Propensity of IIFs to take on risk by investing in early stage and high-tech investments - Propensity of IIF managers to screen, monitor and add value to investee companies through staging, syndication, and portfolio size per fund manager - IIF exit success and share price returns performance of IIF-backed IPO 	<ul style="list-style-type: none"> - Secondary data - 280 Australian venture capital and private equity funds and their investments in 845 entrepreneurial firms - Econometric regression analyses 	- IIF program has facilitated investment in start-up, early stage and high tech firms as well as the provision of monitoring and value-added advice to investees.
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Howell (2017)	SBIR (US)	What is the effect of SBIR?	<ul style="list-style-type: none"> - Patents - VC financing - Revenues - Successful exit and survival 	<ul style="list-style-type: none"> - Secondary data and survey data - 5,000 applicants to the program between 1983 and 2013 - Regression discontinuity design 	<ul style="list-style-type: none"> - A Phase I award increases the average number of patents awarded to a company by at least 30%, increases the company's chance of receiving VC financing by 9% (as well as increasing the amount of money raised and the number of deals), and doubles the likelihood of positive revenues. - For those companies that have positive revenues, a Phase I award results in a 30% increase in revenues. - Finally, a Phase I award increases the probability of survival, and successful IPO (initial public offering), and acquisition. - These effects are more pronounced for young companies and for companies in emerging sectors.
Isenberg & Onyemah (2016)	- Manizales-Mas (Colombia)	- What are the outcomes of Manizales-Mas?	<ul style="list-style-type: none"> - Social progress - Company growth 	<ul style="list-style-type: none"> - Qualitative interviews - Descriptive statistics 	<ul style="list-style-type: none"> - The data are consistent with the hypothesis that Manizales-Mas plays a causal role, as the social progress indicators in

			- Community and academic engagement		<p>Manizales have increased since 2010.</p> <p>- Qualitative interviews suggest that participants tie growth outcomes to specific lessons and exercises in the program.</p> <p>- The Manizales-Mas formal programs appear to have had a broad effect.</p>
The Evidence Network (2013)	YIC (Finland)	- What is the impact of YIC programme?	<p>- Impact on resources and capabilities measures (e.g. business capabilities)</p> <p>- Impact on performance measures (e.g. revenues, employment, international markets)</p>	- 108 YIC client companies	<p>- The YIC Program is achieving significant impact on companies' acquisition of new international customers, increases in employment, and time to market. Companies that used the non-financial NIY support initiatives to a greater degree attribute the greatest impact on company performance to the YIC programme.</p> <p>- The YIC Program is achieving significant impact on strengthening the resources and capabilities of companies, in particular, improvements to their leadership or governance, business planning, selling into new markets, and</p>

					strategic knowledge capabilities.
Wang et al. (2017)	InnoFund (China)	What explains selection into the InnoFund program? What is the effect of InnoFund?	<ul style="list-style-type: none"> - Firm survival - Patent applications - Equity investment 	<ul style="list-style-type: none"> - 974 firms that applied to InnoFund between 2005 and 2010, inclusive. Applications and evaluations of applicants, both successful and unsuccessful. - Regression discontinuity design 	<ul style="list-style-type: none"> - Innovative firms and firms with financing more likely to receive a grant. - Firms with political connections more likely to receive funding. - Receiving a grant has no effect on survival, patenting, or venture capital financing
Wonglimpiyarat (2016)	Yozma (Israeli)	- How the innovation financing policies/programs can help support the growth of high-tech industries, leading Israel to become a high-tech powerhouse?	- Not applicable	- Cluster model	- Thriving high-tech clusters are the result of government-led policies in creating the VC industry with the impacts of Yozma program.

Appendix D – Grey Literature Review on Scale-up Programmes

Program	About	Region	Target Clients	Services
500 Startups	<ul style="list-style-type: none"> - 500 Startups is a venture capital firm on a mission to discover and back the world's most talented entrepreneurs, help them create successful companies at scale, and build thriving global ecosystems. - Since its inception in Silicon Valley, 500 Startups has invested in over 2,200 companies via its 4 global funds and 15 thematic funds dedicated to either specific geographic markets or verticals. 	US	- Startups and Series A companies	<ul style="list-style-type: none"> - Seed Accelerator Programs which emphasize digital marketing, customer acquisition, lean startup practices, and fundraising for pre-Seed companies. - Supporting startups and investors through educational programs, events, conferences, and partnerships with corporations and governments around the world.
Born Global	<ul style="list-style-type: none"> - Born Global is an accelerator program for ambitious Swedish startups that aspire to go global. Selected startups are guided towards a verified and scalable business model. The program is run by Chalmers University of Technology and financed by Vinnova. 	Sweden	- Ambitious startups	<ul style="list-style-type: none"> - Program Start and Pitch Exercise - Silicon Valley Field Trip (California, USA) - Sales and business relationships - Marketing strategy - Business Review and Venture Financing
Business West Scale-up Hub	<ul style="list-style-type: none"> - The Business West Scale-up Hub has been designed to help ambitious West of England businesses get easy 	West of England (UK)	- West of England businesses	<ul style="list-style-type: none"> - Supporting to develop leadership skills, gain access to

	access to the support they need to scale.			mentors and non-exec directors - Helping to access talent and kick start recruitment - Supporting to gain access to markets; local and international - Helping to find work space that suits your needs - Supporting to find business finance that suits your needs and situation
CEE Scaleup Challenge	- Biggest online scaleup competition in the region - Launched by Vestbee, the leading matching platform that connects global VC funds, corporates, accelerators and business angels with startups and scaleups from Central & Eastern Europe	Central & Eastern Europe	- Innovative, fast-growing companies from Central & Eastern Europe - Regional scaleups raising Pre-Series A, Series A and beyond	- 1M EUR investment from Next Road Ventures - Nomination to Boostway individual scale-up program for selected Team - Online Media Package - Fast Track To weXelerate
FedDev Ontario's Business Scale-up and	- To help businesses adopt, adapt, and commercialize innovative technologies that have a significant impact on productivity.	Southern Ontario (Canada)	- Have profitable operations in Southern Ontario for the previous two consecutive years;	- Offsets upfront project costs and helps Southern Ontario

Productivity (BSP) ²⁵	<ul style="list-style-type: none"> - The equipment funding incentive places a direct focus on using technology to grow Southern Ontario businesses so that they can compete more effectively with international firms. 		<ul style="list-style-type: none"> - Maintain a minimum of five full-time employees; - Have financial capacity to complete the project, provide a minimum 35% contribution, and repay the government contribution in full 	<p>businesses grow more quickly.</p> <ul style="list-style-type: none"> - Provides no-interest repayable contributions (government loans) with repayment beginning within a year of project completion.
Global Scale-up Programme ²⁶	<ul style="list-style-type: none"> - The Global Scale-up Programme enables companies across the whole of Greater Manchester to rapidly expand into multiple markets. - Successful applicants who gain a place on the programme will have access to a set of global experts, the latest international growth tools, global market opportunities and an exclusive peer to peer network of companies who have scaled their businesses globally. 	Greater Manchester (UK)	<ul style="list-style-type: none"> - Greater Manchester companies focusing on international growth markets and global scaling 	<ul style="list-style-type: none"> - Build a peer to peer network, refine business plan and get practical advice from Greater Manchester companies. - International growth sprint: work with trained coaches to agree priorities and identify target market - International visit - Bootcamp sessions
Innovation Norway	Innovation Norway is the Norwegian Government's most important instrument for innovation and development of Norwegian enterprises and industry.	Norway	<ul style="list-style-type: none"> - Growth companies and clusters - Startups 	<ul style="list-style-type: none"> - FRAM is a program offering small and medium-sized enterprises an opportunity to upgrade

²⁵ <https://www.mentorworks.ca/what-we-offer/government-funding/business-expansion/business-scaleup-productivity-ontario/#overview>

²⁶ <https://www.businessgrowthhub.com/global-scale-up-programme>

	<ul style="list-style-type: none"> - Support companies in developing their competitive advantage and to enhance innovation. 			<p>their business and management skills.</p> <ul style="list-style-type: none"> - Strategic Positioning - Design services - InnovFin – EU Finance for Innovators
Microsoft ScaleUp	<ul style="list-style-type: none"> - The Microsoft ScaleUp program (previously known as Microsoft Accelerator) is designed for Series A startups and offers access to sales, marketing and technical support. Eligible startups partake in the immersive program at one of our eight global locations followed by ongoing support from a dedicated team of success managers. - ScaleUp helps startups grow across the globe with an intensive Microsoft-led program in eight global offices in Bangalore, Beijing, Berlin, London, Seattle, Shanghai, Sydney, and Tel Aviv. 	US	- Series A startups	<ul style="list-style-type: none"> - Connections: Accelerate your sales success with access to top Microsoft partners and customers. Microsoft ScaleUp is designed to accelerate your growth with a streamlined path into Microsoft Partner Network. - Learn from proven leaders: From Microsoft sales leaders who provide insights on how to sell into enterprise, to industry experts who workshop how to build a durable culture - Alumni Network: With over 730 graduates, Microsoft Scaleup startups join a vibrant alumni network which fosters peer

				support and networking as well as ongoing access to Microsoft industry and customer events.
ScaleIT	- platform developed by ScaleIT Capital, advisory firm specialized in supporting the scaling and internationalization of the best scaleups from Italy and Southeast Europe	Italy and Southeast Europe	- best digital and software scaleups from Italy and Southeast Europe	- A scaleups program that annually selects, prepares, and presents the best digital and software scaleups from Italy and Southeast Europe to international VC funds, with the purpose of raising 3-30 million € to expand globally
ScaleUp Academy	- ScaleUp Academy is a powerful growth program tailored for small and medium-sized businesses. The program is based on proven methodology and best practice from successful growth companies worldwide.	Sweden	Growth companies in all industries that have a proven business model, at least SEK 15 million in sales or 20-120 employees, have a high ambition to develop and are prepared to invest in taking the company to the next phase.	- The program consists of twelve modules and has physical meetings each month to ensure that you receive the right support to implement your action plan. - For twelve months, you will work with strategy, action plan, organization and cash flow. You are coached by experienced entrepreneurs and experts in strategy, leadership, sales,

				digitization, marketing and recruitment.
Scale-Up Denmark	<ul style="list-style-type: none"> - An ambitious training concept for entrepreneurs and small enterprises. - As founded as a cross regional initiative. Its foundation is the regional business development strategies, and some of Europe's most competitive eco systems. 	Denmark	<ul style="list-style-type: none"> - Entrepreneurs and small enterprises - High growth companies in Denmark 	<ul style="list-style-type: none"> - Danish hotbed for scale-ups: <ol style="list-style-type: none"> 1) provide access to seed capital and venture capital 2) engage market leading firms from the regional eco system 3) involve leading universities, research institutions and science parks provide easy access to the services of the entire Danish business support system - Partnership approach - Advisory board
Scale-Up Platform	- Leverage the unique skills from Invest Ottawa, Communitel, and MaRS Discovery District to help 30 tech companies in southern Ontario grow and reach revenues of \$100M by 2024 and contribute to the creation of 18,000 high-quality, skilled jobs. Over 900 businesses overall will benefit through the innovation hubs.	Southern Ontario (Canada)	- Tech areas: advanced manufacturing and robotics, financial technology, life sciences, and artificial intelligence and big data	<ul style="list-style-type: none"> - Invest Ottawa, Ottawa (\$16,900,000) delivers economic development programs and initiatives that support entrepreneurs, wealth, and jobs in the City of

	<p>- It will also strengthen partnerships with post-secondary institutions, giving students a chance to prepare for the next generation of jobs in the tech industry.</p>			<p>Ottawa and the surrounding region.</p> <p>- Communitech, Kitchener/Waterloo</p> <p>(\$18,000,000) a public-private innovation hub that supports tech businesses as they start, grow, and prosper and has supported over 1,400 companies.</p> <p>- MaRS Discovery District, Toronto</p> <p>(\$17,500,000) works with startups and partners in four main sectors including enterprise, cleantech, fintech, and health. To date they have supported over 1,200 companies across Canada.</p>
Scale-up SG	<p>- Scale-up SG is a 2.5-year* programme that helps selected high-growth local companies scale rapidly, become leaders in their fields and be groomed into future</p>	Singapore	<p>- Singapore companies demonstrate a strong track record of growth as well as high potential and ambition</p>	<p>- Peer learning and collaboration between a close-knit community of CEOs and founders. Some may even</p>

	global champions. - The programme aims to accelerate the companies' growth so that they are able to contribute significantly to Singapore's economy and create good jobs for Singaporeans.		to scale even further and faster	partner up to grow their business, and serve as mentors to future cohorts of participating companies - Development of leadership team and succession planning through strengthening the competencies of next-generation leaders - Access to expertise and networks of Enterprise Singapore and our programme partners, to support their growth objectives
ScaleUpNation	- ScaleUpNation programs for ventures are built to empower the venture founder through the transition from start-up to scale- up. Through transformational experiences in the Runway and ScaleUpFood and comprehensive leadership coaching and content sprints in the Flight Program, ventures maximize their chances to scale.	The Netherlands	- scale young, innovative ventures in Food and Agriculture, Mobility, and Healthtech	- Scaling programs (The Practice) - Peer community, - Research (The Lab) - Growth financing (The Fund)

Spark2Scale ²⁷	- Dynamic cohort-led support programme, created by the GC Business Growth Hub, which aims to tackle the barriers faced by scale-ups that are keen to grow, but lack the experience or confidence to take their business forward.	Greater Manchester (UK)	- B2B businesses that have been trading for less than three years, and have already demonstrated 20 percent year-on-year growth or able to demonstrate realistic projections to do so.	<p>- Comprehensive workshop developing the right strategy to help you identify what's holding your business back from greater heights.</p> <p>- Follow-up bespoke one-to-one support which will ensure you personally achieve a comprehensive strategic plan.</p> <p>- Industry specialists in finance, sales, digital marketing and growth hacking will lead a series of five inspirational peer-to-peer workshops.</p>
Startup Europe Partnership (SEP)	- Established by the European Commission in January 2014 at the World Economic Forum in Davos, SEP is the first pan-European platform dedicated to transforming European startups into scaleups by	Europe	- European startups that have been able to break the "early-stage barrier" and are a candidate to become large global companies and real job creators.	- Offering an integrated pan-European platform to help the best startups emerge from these local ecosystems and scale-up.

²⁷ <https://www.businessgrowthhub.com/spark2scale-from-business-growth-hub>

	<p>linking them with global corporations and stock exchanges.</p> <p>- SEP is led by Mind the Bridge, an organization based in Italy and United States connecting European entrepreneurial ecosystems to Silicon Valley, with ELITE – London Stock Exchange, Nesta, European Startup Network, Scaleup Institute, and Bisite Accelerator.</p>			<p>- Connecting top European startups to established Corporates and Stock Markets/Investors to provide them with financing to encourage growth and business development, and expose them early to concrete strategic options.</p>
Surge	<p>- Surge, initiative by Sequoia India, which takes place twice a year, is open to companies who are based in, or building for, the India and Southeast Asian markets.</p> <p>- Each Surge wave includes 10 to 20 companies and runs for 16 weeks.</p>	India and Southeast Asia	- A rapid scale-up program for startups in India and Southeast Asia	<p>- Capital: Companies selected to join will get a 'Surge' round of \$1M to \$2M at the start of the program</p> <p>- Community: mentors from the global founder community and subject experts to make tangible progress towards building your startup</p> <p>- Company building support: Participants will go through AMP, a curriculum designed to accelerate the growth of early-stage companies that draws on Sequoia's knowledge on key</p>

				<p>aspects of company building.</p> <ul style="list-style-type: none"> - Cross-border experience: Surge founders will attend five weeks of global immersion sessions on the frontlines of innovation in Silicon Valley, China, Singapore and India
Techstars	<p>- Techstars is an American seed accelerator, founded in Boulder, Colorado in 2006. As of 2019, the company had accepted over 1,600 companies into its programs with a combined market capitalization of \$18.2bn USD.</p>	US	- Startups	<ul style="list-style-type: none"> - Three-month mentorship-driven accelerator, investing \$120K and providing hands-on mentorship and access to the Techstars Network for life. - Alongside the VC and Angel communities, we co-invest in companies built by Techstars accelerator companies and alumni.
Y Combinator	<p>- Y Combinator is an American seed accelerator which was launched in March 2005. Y Combinator is consistently ranked at the top of U.S. accelerators.</p>	US	- Startups	<ul style="list-style-type: none"> - Work with startups on their ideas - Help founders deal with investors and acquirers

				<ul style="list-style-type: none"> - Y Combinator provides seed funding for startups - Make small investments in return for small stakes in the companies we fund.
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