

Analyses on the Finnish High-Growth Entrepreneurship Ecosystem

Erkko Autio, Heikki Rannikko,
Jari Handelberg, Pertti Kiuru

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Analyses on the Finnish High-Growth Entrepreneurship Ecosystem

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Currently there is wide interest in entrepreneurship as a way to solve emerging societal challenges such as unemployment. Consequently, various policy measures have been implemented in Finland and elsewhere to support the early development of new innovative firms.

This report presents various analyses of the Finnish high-growth entrepreneurship ecosystem from policy viewpoint. The aim is to provide empirical data to support the design and implementation of high-growth entrepreneurship policy in Finland.

From the Finnish entrepreneurship policy interventions we consider the 'NIY Programme' of the Finnish Funding Agency for Innovation and Development and the 'VIGO Programme' of the Ministry of Labour and Economy' as well as the 'Bridge Programme' of Nokia Corporation. Additionally, a theoretical framing of the relationship between high-growth entrepreneurship and its national context through the conceptual lens of 'National System of Entrepreneurship' is provided.

The results of our analyses provide support for the efficiency of the interventions analysed. It seems that the NIY Programme and VIGO Programme have helped new innovative and growth oriented firms to strengthen their early development in comparison to their unsupported counterparts. Moreover, the Bridge Programme can be seen as a useful model for any company facing a need to lay off employees and seeking to implement the layoffs consistent with its commitment to corporate social responsibility.

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Tekijä

Erkko Autio, Heikki Rannikko, Jari Handelberg, Pertti Kiuru

Julkaisun nimi

Analyysejä Suomen kasvuyrittäjyyskosysteemistä

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Yrittäjyys nähdään tällä hetkellä usein mahdollisena ratkaisuna työttömyyden kaltaisiin yhteiskunnallisiin haasteisiin. Tämän vuoksi uusien yritysten synnyttämiseksi ja uusien kasvuhakuisten yritysten kehittymisen edistämiseksi tehdään Suomessa ja muualla maailmassa monenlaisia julkisen vallan toimenpiteitä.

Tässä raportissa tarkastellaan Suomen kasvuyrittäjyyskosysteemiä julkisen vallan harjoittaman politiikan näkökulmasta. Tavoitteena on tarjota ajankohtaista tietoa politiikan suunnittelun ja päätöksenteon tueksi.

Tarkastelun kohteena ovat erityisesti Tekesin Nuorten Innovatiivisten Yritysten ohjelma (NIY) ja Työ- ja elinkeinoministeriön VIGO -yrityskiihdyttämö ohjelma sekä Nokia Oyj:n toteuttaman Bridge -ohjelman yrittäjyyspolku. Näiden lisäksi raportissa esitetään teoreettinen viitekehys kasvuyrittäjyyden ja kontekstin välisestä suhteesta käyttäen käsitettä 'kansallinen yrittäjyysjärjestelmä' (National System of Entrepreneurship).

Analyyysin tulokset osoittavat, että tarkastellut toimenpiteet (NIY -ohjelma ja VIGO -ohjelma) ovat auttaneet kohdeyrityksiä kehittymään suotuisammin kuin vertailujoukkoon kuuluvat yritykset. Bridge -ohjelman yrittäjyyspolusta voidaan puolestaan todeta, että se toimii hyvänä yhteiskunnallisen vastuun kantamisen mallina sellaisille yrityksille joilla on tarve vähentää henkilöstöään.

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Contents

1 INTRODUCTION	4
2 INNOVATIVE NEW FIRMS IN FINLAND	6
3 ENTREPRENEURSHIP ECOSYSTEMS AND SYSTEMS OF ENTREPRENEURSHIP: POLICY IMPLICATIONS AND APPLICATIONS	24
4 SUPPORTING THE GROWTH OF NEW INNOVATIVE FIRMS – CASE NIY PROGRAMME AND VIGO PROGRAMME.....	38
5 THE IMPACT OF STARTUP SERVICES OFFERED FOR EMPLOYEES – CASE NOKIA’S BRIDGE PROGRAMME	66

Executive Summary

This report presents various analyses of the Finnish high-growth entrepreneurship ecosystem. The aim is to provide empirical data to support the design and implementation of high-growth entrepreneurship policy in Finland. The first question relates to the number innovative new firms in Finland in recent years. We estimate that in each year (2011, 2012 and 2013) there were approximately 12 000 innovative new firms in Finland – i.e., firms that are under six years old and operate in technology sectors, as defined by Eurostat. Most of the innovative new firms can be found in Southern Finland (56%). For knowledge-intensive services, Southern Finland's share of innovative new firms is almost 70%. While most innovative new firms do not do seek external funding, finance may be a challenging constraint for high growth firms. Broadly, it was estimated that there are over 2 500 innovative new firms in Finland that exhibit a strong or very strong preference for rapid growth. When a narrow definition is used (high-technology manufacturing and knowledge-intensive high-technology services sectors), there should be over 1 200 innovative new firms exhibiting strong preference for rapid growth.

The second question relates to examining entrepreneurship policy at the national level. In summary, it is found out that the Global Entrepreneurship Development Index (GEDI) provides a helpful platform for implementing a systemic approach to entrepreneurship policy analysis, design, and implementation, one that focuses on improving the performance of National Systems of Entrepreneurship. The following heuristic describes the use of 'the Penalty for Bottleneck approach': Identify bottleneck factors in the country's National System of Entrepreneurship and compare these against relevant peers; examine the bottleneck factors more closely, complementing GEDI indicators with alternative proxies; conduct policy comparisons in bottleneck areas against relevant peers; design and implement policy programmes designed to alleviate bottleneck factors in the country, using GEDI to help set targets for performance improvement.

The third question relates to the impact of entrepreneurship support programmes on the success of their participating firms. To address this, the NIY Programme of the Finnish Funding Agency for Technology and Innovation Tekes and the VIGO Accelerator Programme of the Ministry of Employment and the Economy were analysed. The main conclusion from analysing sales and employment time series of NIY participating firms is that NIY firms' sales and employment have grown more strongly than in the comparison group. The Propensity Score Matching analysis strongly suggests that the NIY Programme has produced a genuine and substantial, positive effect on the sales growth of its participating firms. Concerning external finance, the balance sheet analysis shows that the NIY and VIGO firms have been able to attract more new equity funding than the control group during 2009-2011. The increase in equity has been driven by an increase in reserves, and they have offset the impact of early losses resulting from upfront investment in growth.

Finally, concerning another public-private policy intervention, namely the entrepreneurship track in Nokia's Bridge Programme, it is found out that it has succeeded well in its task. It has encouraged entrepreneurship and facilitated successful new ventures. It was designed for a large firm context, but as such, it offers a useful model for any company facing a need to lay off employees and seeking to implement the layoffs consistent with its commitment to corporate social responsibility.

1 Introduction

During the past few years, high-growth entrepreneurship has received much positive attention in Finland. In the public press, we see success stories of prominent high-growth new firms such as Rovio, Supercell and Zenrobotics. While it is the individual effort that makes such entrepreneurial ventures possible, also context matters: if the national system of entrepreneurship fails to support high-growth new ventures, the growth performance of even highly capable entrepreneurial teams may suffer.

The purpose of this report is to shed light on the development of the Finnish high-growth entrepreneurship ecosystem from a contextual perspective. We specifically highlight the role of policy interventions in facilitating a high-growth entrepreneurship ecosystem. By so doing we seek to further increase the understanding of the entrepreneurial dynamic in the Finnish economy and provide new evidence to support further enhancement of this dynamic.

This report contains four sections that provide different perspectives upon the Finnish high-growth entrepreneurship ecosystem. The first section explores the boundaries for the high-growth entrepreneurship phenomenon by estimating the size and regional distribution of the innovative new firm population. The second section provides a theoretical framing of the relationship between high-growth entrepreneurship and its national context through the conceptual lens of 'National System of Entrepreneurship'. This lens provides a new angle to open the black box of the national entrepreneurial dynamic and can be to find and iron out bottlenecks in national systems of entrepreneurship. The third section takes a look at two Finnish entrepreneurship policy interventions that have promoted high-growth entrepreneurial ventures in recent years: the 'NIY Programme' of the Finnish Funding Agency for Innovation and Development and the 'VIGO Programme' of the Ministry of Labour and Economy'. These interventions have been designed in close co-operation with the entrepreneurship community and concentrate on enhancing the quality of entrepreneurship and not so much its quantity. The fourth section presents the evaluation results of another public-private policy intervention, namely the 'Bridge Programme' of Nokia Corporation. In this programme, new entrepreneurial careers have been facilitated for those employees of Nokia that have had to leave the organisation during its recent restructuring. The paper summarises findings from the larger scale evaluation of the Bridge Programme. Those specifically interested in the Bridge Programme may find the full report at the web site of Aalto Small Business Centre¹.

¹ See <http://pienyrittyskeskus.aalto.fi/en/growth/>

2 Innovative New Firms in Finland

Introduction

This paper studies innovative new firms in Finland in years 2011, 2012 and 2013. The study is motivated by the observation that although innovative new firms are frequently discussed in public press and academia, only few studies have sought to determine the extent of the phenomenon in Finland. Understanding the magnitude of the phenomenon is important if one is to study and understand the potential and real impact of this category of firms in the Finnish economy. For example, Maula, Murray and Jääskeläinen (2007) point out that in order to accurately assess the demand for financing of young innovative firms, it is important to have clear indicators of their number and implied financing needs. Consequently, this article aims to shed light on the phenomenon by searching answers to the following three research questions: (1) How many innovative new firms are there in Finland? (2) Which regions of the country are innovative new firms located in? (3) In what industries can innovative new firms be found? In the analysis of two publicly available databases of Statistics Finland are used, and some statistics are compared against data available from a longitudinal study of the participating firms of the Tekes NIY Programme (“Young Innovative Firms”) collected by Aalto University’s research team. In what follows, we first discuss the concept of innovative new firms. Thereafter the three research questions are addressed in the light of available data.

Newness and Innovativeness

The concept of innovative new firms is somewhat elastic. It is therefore important to pin down the operational definition of this concept and highlight its compatibility with other similar concepts used in the received literature. A look into the received literature reveals a variety of concepts that are applied in discussing addressing new and innovative firms. For example, Rickne and Jacobsson (1999) identified the following concepts in the literature: ‘science-based new technology firms’, ‘attractive small companies’, ‘new enterprises in high-tech industry’, ‘new ventures’, ‘new technology-based firms’, ‘technology-based small and medium-sized firms’, ‘new technology-based small firms’, ‘small technology-based firms’ and ‘new high-technology firms’. Surprisingly, they also found that most of the authors have refrained from explicitly defining their objects of study; that some concepts have been given varying definitions by different authors; and, furthermore, that the same definitions may be linked to different concepts (Rickne et al., 1999). This proliferation makes comparisons across studies challenging. Broadly speaking, most studies are interested in the sub-section of new firms that are considered to offer promising potential for innovation and growth. While the outcome of interest is clear, however, the means for achieving those outcomes are usually given less explicit attention. Therefore, before presenting our analyses we discuss what we mean by the notion of “innovative new firms” – i.e., the concept adopted in this study – and what kinds of characterisations are attached to this special group of firms.

Often, the concept of 'new technology-based firms' is used in the literature. However, this concept is vague since we do not know whether the term 'new' refers to novelty of technology, or the young age of the firm, or both. The concept of 'new, technology-based firm' is a little better, as it is now clearer that the novelty of the firm is emphasized. For even greater clarity, we use the terms: 'technology-based new firms' and 'innovative new firms' throughout this study (Autio et al., 1997; Oakey, 2010, Groen, 2012; Rannikko, 2012). These concepts delineate our interest in new firm creation and hint of the sources of distinctive advantage sought by the firm, be it based on technology ('technology-based new firms') or more broadly on product and service innovation, whether driven by technology or not ('innovative new firms').

Even with this approach, some conceptual vagueness remains. There are differing views in the literature about how a firm must deal with technology and what is considered as "technology". Concerning newness, newness does not necessarily mean the actual age (in terms of years); it may also refer to the development stage of a firm or technology (Bergek and Normann, 2010); Storey and Tether, 1998). A frequently used broad definition defines 'technology-based firms' as all firms that operate in high-technology sectors. According to this view, high-technology sectors include all sectors that, for example, *"have higher than average expenditures on research and development and above-average proportion of scientists, professional engineers and technicians in the labor force"* (Butchart, 1987). This definition has been widely applied by studies such as Jones-Evans and Westhead's (1996) study of the high-technology small-firm sector. That study made no reference to the newness of the firm or technology or to the ownership structure (Jones-Evans and Westhead, 1996). Examples of a more narrow operationalisation of technology-based new firms include Maula (2001), who defined technology-based new firms as privately held companies that are less than six years old and operate in biotechnology, medical/health science, internet-specific, communications, computer software and services, computer hardware, or semiconductor sectors. Maine et al. (2010) defined technology-based new firms as young and initially small firms that operate in R&D-intensive sectors. The average age of firms in their sample was five years and the average level of sales was 15 Million USD; *"almost all firms were operating in biotechnology or ICT"* (Maine et al., 2010).

From the above it is clear that however careful the effort, conceptual ambiguity remains, and some of the definitional criteria will always be somewhat arbitrary, such as the age of the firm (at which age does a firm stop being 'new?') and technology intensity (which sectors should we classify as high tech?). By reviewing different operationalisations of the concept it was nevertheless possible to identify a set of widely used criteria that appeared to resonate with research and policy practice. In the context of this research, it was therefore decided that 'newness' refers to new ventures not older than 6 years. This criterion is in line with entrepreneurship studies, which often set a cut-off of five or seven years (van Praag and Versloten, 2007). This is also the criterion adopted by the Finnish National Technology Agency, Tekes.

Databases of Statistics Finland do not provide firm-specific information on founding years. Therefore, to estimate the number of firms up to six years old in the Finnish firm population, survival information was used that was also provided by the Statistics Finland. Specifically, the number on innovative new firms was estimated for 2011, 2012, and 2013 by multiplying previous five years'

new firm foundings in technology sectors by a corresponding survival rate (these figures can be found in Statistics Finland [web pages](#))² and are listed in Table 1.

Table 1 **Number of innovative new firms (up to six years old) in year 2013**

Year of founding	Share of surviving firms in 2013
2012	90%
2011	80%
2010	70%
2009	60%
2008	50%
2007	30%

To further delineate the concept of ‘technology-based’ and ‘innovative’ new firms, we apply the widely used industry sector approach that allows us to define the phenomenon through industry classifications. We use the [Eurostat categorisation](#)³ of manufacturing and services industries according to their technology intensity. Based on NACE revision 2 codes aggregates are compiled related to high-technology, medium high-technology, medium high-technology and low-technology and to knowledge-intensive high-technology services. We use the aggregation at a two digit level to minimize chances that individual firms can be identified in the reported data. The sector classification is provided in Table 2.

² For example, http://www.stat.fi/til/aly/2008/aly_2008_2009-10-29_kat_001_fi.html

³ http://epp.eurostat.ec.europa.eu/statistics_explained/index.php/High-tech_statistics

Table 2 High-technology sectors NACE Revision 2 codes

Technology Sector	NACE Revision 2 codes (TOL 2008)
High-technology manufacturing	21 Manufacture of basic pharmaceutical products and pharmaceutical preparations
	26 Manufacture of computer, electronic and optical products
Medium high-technology manufacturing	20 Manufacture of chemicals and chemical products
	27 to 30 Manufacture of electrical equipment, Manufacture of machinery and equipment n.e.c., Manufacture of motor vehicles, trailers and semi-trailers, Manufacture of other transport equipment
Medium low technology manufacturing	19 Manufacture of coke and refined petroleum products
	22 to 25 Manufacture of rubber and plastic products, Manufacture of other non-metallic mineral products, Manufacture of basic metals, Manufacture of fabricated metal products except machinery and equipment
	33 Repair and installation of machinery and equipment
Low technology Manufacturing	10 to 18 Manufacture of food products, beverages, tobacco products, textiles, wearing apparel, leather and related products, wood and of products of wood, paper and paper products, printing and reproduction of recorded media
	31 to 32 Manufacture of furniture, other manufacturing
Knowledge-intensive high-technology services	59 to 63 Motion picture, video and television programme production, sound recording and music publishing activities, Programming and broadcasting activities, Telecommunications, Computer programming, consultancy and related activities, Information service activities
	72 Scientific research and development

In the analyses that follow, an “innovative new firm” is a new venture, up to six years old, that operates in high-technology sectors as defined in NACE Revision 2. Some analyses focus on ‘NIY firms’ – i.e., participants of Tekes’ “Young Innovative Firms” Programme. The populations of ‘innovative new firms’ and ‘NIY firms’ do not overlap, given that the Young Innovative Firms programme applies expert assessment in participant selection.

Analysis

We start the analysis by looking at the geographical distribution of innovative new firms in Finland. We base this analysis on the [2011 NUTS classification](#)⁴ of Finnish regions (Nomenclature of Territorial Units for Statistics). The NUTS system is used in the EU for defining regions at different levels of aggregation for the purpose of collection, development, and harmonisation of EU regional statistics, for the socio-economic analysis of regions, and for EU regional policy planning. In the 2011 NUTS classification Finland was divided into five regions. In figure one these regions are: 1) Southern Finland, 2) Western Finland, 3) Eastern Finland, 4) Northern Finland and 5) Åland.

The overall economic activity in Finland tends to be concentrated to Southern Finland. In year 2012 there were 189 957 firms based in the area, which corresponds to 57% of all firms in Finland in 2012. In Western Finland there were 88 614 firms in 2012 (25% of all firms in Finland), in Eastern Finland 35 175 firms (10%), in Northern Finland 36 081 firms (10%), and in Åland 2 798 firms (1%). The distribution of firms over geographical area reflects the geographical distribution of population which shows that in Southern Finland area there were 2 727 567 people living in 2012 (50 % of the population), in Western Finland 1 370 384 people (25%), in Northern and Eastern Finland 1 300 222 people (23%), and in Åland 28 501 people (0,5%).

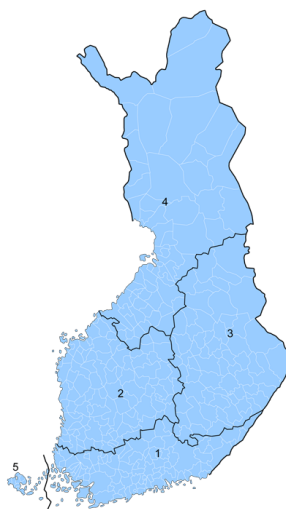


Figure 1 NUTS II regions in Finland in 2011

The overall economic activity may be compared to our estimation of the number of innovative new firms. Table 3 represents the estimated numbers of new innovative new firms in 2011, 2012 and 2013 (i.e. under six year old firms in all technology sectors as presented in the table two). The estimation result shows that in each year there are approximately 12 000 firms that fit the definition. The results show further that most of the firms can be found in Southern Finland (56%). This is consistent with the overall firm distribution that showed 57% of all firms being located in Southern Finland and to population statistics that showed 50% of the population living in the area. Similarly consistent to these statistics are the estimated numbers of innovative new firms in other areas:

⁴ http://epp.eurostat.ec.europa.eu/portal/page/portal/nuts_nomenclature/introduction

Western Finland with 26% of all innovative new firms, Eastern Finland with 9% of all innovative firms, Northern Finland with 9% of all innovative firms and Åland with 1% of all innovative firms. This geographical distribution of innovative new firms seems to be steady over time. There are no changes in the total number of firms or the number of firms over the three-year observation period.

Table 3 Innovative new firms over Finnish NUTS II regions in 2011, 2012, and 2013

	Innovative new firms in 2011		Innovative new firms in 2012		Innovative new firms in 2013	
	N	%	N	%	N	%
Southern Finland	6 908	56	6 960	56	6 848	56
Western Finland	3 204	26	3 130	26	3 079	25
Eastern Finland	1 119	9	1 075	9	1 017	8
Northern Finland	1 095	9	1 091	9	1 116	9
Åland	88	1	85	1	84	1
	12 413	100 %	12 340	100 %	12 144	100 %

Next, the regional distribution of innovative new firms in Finland is compared against the regional distribution of NIY firms – i.e., firms that participate in Tekes’ “Young Innovative Firms” programme. The NIY Programme carefully selects qualifying participants, so NIY firms can be expected to exhibit greater potential for innovation than do innovative new firms in general. Table 4 presents the distribution of the 160 NIY firms over Finnish regions in the end of year 2012 (a more fine-grained regional categorisation than NUTS II is used in the Table). It shows that South-West Finland is the home for 84% of NIY firms, and over 70% of them come from the capital region and its surrounding region (‘Uudenmaan maakunta’). Thus, if we consider NIY firms as representing the most promising innovative new firms in Finland, it becomes clear that especially the Helsinki metropolitan region (which includes the Cities of Espoo and Vantaa) represents an important regional concentration of these firms. Besides this, Turku region (‘Varsinais-Suomen maakunta’), Tampere region (‘Pirkanmaan maakunta’) and Oulu region (‘Pohjois-Pohjamaan maakunta’) are important hubs for NIY participants and highlight the importance of university research and education for the creation of such firms. These areas together with Helsinki area deliver over 90% of innovative new firms.

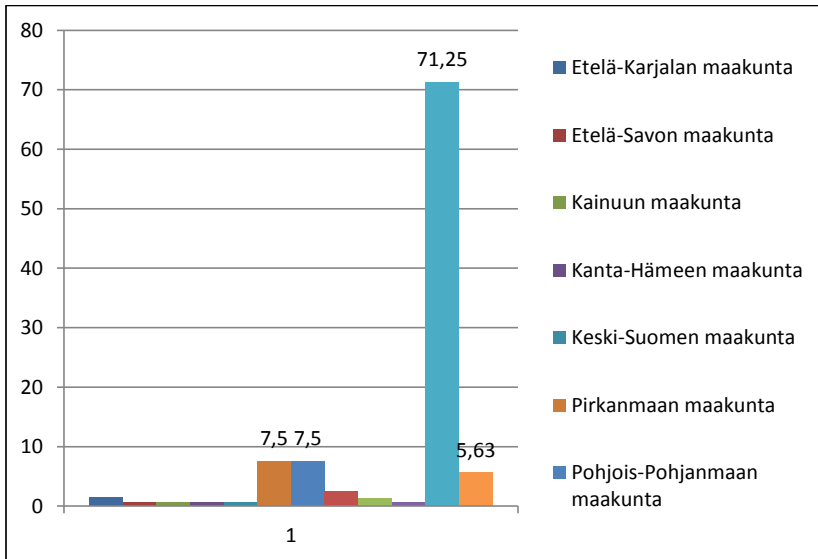


Figure 2 Geographical distribution of NIY firms

Next we take a closer look at the distribution of innovative new firms over technology sectors. Figure 3 shows how innovative new firms are distributed over five sectors that make up technology industries according to the classification used in this study. Statistics show that the most (of the approximately 12 000) innovative new firms are classified as knowledge-intensive high-technology service firms (47%). The next two categories have almost the same share, medium low technology manufacturing with 21% of innovative new firms and low technology manufacturing with 23% of innovative new firms. The smallest technology sectors seem to be medium high-technology manufacturing (with 5% of firms) and high-technology manufacturing (with 2% of firms).

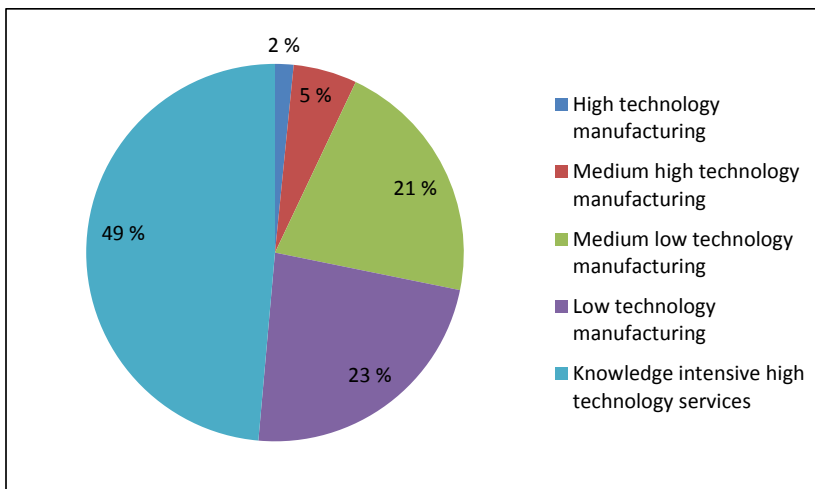


Figure 3 Shares of sectors from the overall number of innovative new firm

Figure 4 shows the same distribution for NIY Programme participants. It can be seen that 58% of these firms are classified as knowledge-intensive high-technology service firms (as opposed to 47% for all innovative new firms). The second largest category is 'other'. This means that these firms did not belong to any of the technology sectors but could have represented important innovative advances in, e.g., business model innovation. The next three categories exhibit almost the same share: low technology manufacturing with 3% of NIY participants, medium high-technology manufacturing firms with 3%, and high-technology manufacturing firms with 4% of NIY participants.

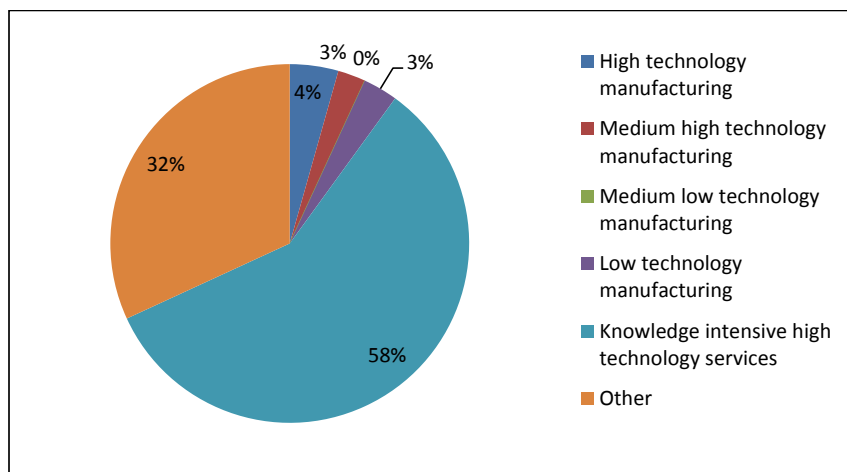


Figure 4 Distribution of NIY firms over high-tech industries

Table 4 shows the distribution of innovative new firms over Finnish regions for each technology sector. These figures reveal more variation than was seen earlier. For Southern Finland each category's share of innovative new firms is around 50% or greater. In knowledge-intensive high-technology services this share is almost 70% and the second largest share is in the category of high-technology manufacturing, with 55% of innovative new firms based in Southern Finland. Furthermore, in each category Southern Finland's share is the highest, followed by Western Finland. Indeed for each category over 70% of the innovative new firm activity seems to be located in Southern Finland and Western Finland. This is in line with the geographical distributions of Finnish firms and population. As for the other regions, the statistics show that Eastern Finland has around 10% of innovative new firms in each category similarly to Northern Finland. However, a peak may be noticed in Northern Finland with high-technology manufacturing: 15 % of firms in this sector are located there. Åland's share of innovative new firms in each category is consistent with population statistics, the share being close to zero.

Table 4 Innovative new firms in Finland by sector and area in year 2013

Sector	Southern Finland (%)	Western Finland (%)	Eastern Finland (%)	Northern Finland (%)	Åland (%)	
High-technology manufacturing	55	23	7	15	0	100%
Medium high-technology manufacturing	52	30	10	8	0	100%
Medium low technology manufacturing	43	34	11	11	1	100%
Low technology manufacturing	48	29	12	10	1	100%
Knowledge-intensive high-technology services	67	19	5	8	1	100%

Table 6 shows the number of innovative firms by sector and geographical area for years 2011, 2012, and 2013. We can see that in high-technology manufacturing the number of innovative new firms has remained approximately the same for three years over all regions. In the next three categories: medium high-technology manufacturing, medium low technology manufacturing and low technology manufacturing the number of firms has decreased consistently over categories and regions. Among the large decreases absolutely and relatively speaking is a drop in medium high-technology manufacturing from 215 firms to 196 firms (-10%) in Western Finland and drops in medium low technology manufacturing in Eastern Finland from 413 firms to 350 firms (15%) and in Southern Finland from 1 425 firms to 1 341 firms (6%). The last category, knowledge-intensive high-technology services has experienced positive development across all regions.

Table 5 Innovative new firms in Finland in 2011, 2012 and 2013 by sector and region

Sector	Region	Innovative new firms in 2011	Innovative new firms in 2012	Innovative new firms in 2013
High-technology Manufacturing	Southern Finland	106	110	105
	Western Finland	42	40	43
	Eastern Finland	13	13	14
	Northern Finland	24	27	30
	Åland	1	1	0
Medium high-technology manufacturing	Southern Finland	401	375	347
	Western Finland	215	205	196
	Eastern Finland	74	71	67
	Northern Finland	68	59	51
	Åland	4	3	2
Medium low technology manufacturing	Southern Finland	1 118	1 131	1 094
	Western Finland	981	942	885
	Eastern Finland	312	303	285
	Northern Finland	276	287	292
	Åland	14	12	13
Low technology manufacturing	Southern Finland	1 425	1 405	1 341
	Western Finland	868	848	820
	Eastern Finland	413	376	350
	Northern Finland	305	292	282
	Åland	25	27	27
Knowledge-intensive high-technology services	Southern Finland	3 858	3 940	3 962
	Western Finland	1098	1 095	1 135
	Eastern Finland	307	311	302
	Northern Finland	423	425	461
	Åland	45	42	41
		12 413	12 340	12 144

Our final analysis relates the shares of new firms to the number of all firms in technology sectors (i.e., the size of the sector firm population). The following tables (7-10) show the stock of firms in Finland and new firms by technology sector for years 2011 and 2012. The first observation is that the share of new firms in the firm population has remained stable in each category in 2011 and 2012. This share seems to be the highest in knowledge-intensive high-technology services. In this category, over 40% of all firms in the industry can be classified as new firms. In this category also the number of firms is high; thus the sector may be considered rather dynamic. The individual sub-industries where the share of new firms is especially high are information service activities, with 57% of new firms in 2011, and telecommunications, with 49% of new firms in 2011. In the other technology categories the share of new firms seems to be above 20% but less than 30% on average. Thus, the share of new firms is below what is experienced in knowledge-intensive high-technology services, suggesting that these sectors are relatively less turbulent – although the dynamism is still high

when compared to non-technology sectors. The lowest average share of new firms can be found with low technology manufacturing where every fifth firm is less than six years old.

Table 6 Share of innovative new firms of all firms in high-technology manufacturing 11/12

		Firms 2011	Innovative new firms 2011	Share of Innovative new firms	Firms 2012	Innovative new firms 2012	Share of Innovative new firms
High-technology manufacturing	21 Manufacture of basic pharmaceutical products and pharmaceutical preparations	42	14	33 %	46	15	33 %
	26 Manufacture of computer, electronic and optical products	733	182	25 %	740	188	25 %
Average				29 %	Average		29 %

Table 7 Share of innovative new firms of all firms in medium high-technology manufacturing 11/12

		Firms 2011	Innovative new firms 2011	Share of Innovative new firms	Firms 2012	Innovative new firms 2012	Share of Innovative new firms
Medium high-technology manufacturing	20 Manufacture of chemicals and chemical products	393	97	25 %	390	101	26 %
	27 Manufacture of electrical equipment	490	108	22 %	491	100	20 %
	28 Manufacture of machinery and equipment n.e.c.	1713	347	20 %	1 714	319	19 %
	29 Manufacture of motor vehicles, trailers and semi-trailers	321	78	24 %	315	83	26 %
	30 Manufacture of other transport equipment	494	188	38 %	478	172	36 %
Average				26 %	Average		25 %

Table 8 Share of innovative new firms of all firms in medium low technology manufacturing 11/12

		Firms 2011	Innovative new firms 2011	Share of Innovative new firms	Firms 2012	Innovative new firms 2012	Share of Innovative new firms
Medium low technology manufacturing	19 Manufacture of coke and refined petroleum products	28	12	42 %	28	13	47 %
	22 Manufacture of rubber and plastic products	703	131	19 %	674	121	18 %
	23 Manufacture of other non-metallic mineral products	1007	195	19 %	986	179	18 %
	24 Manufacture of basic metals	181	41	22 %	183	48	26 %
	25 Manufacture of fabricated metal products except machinery and equipment	5654	1540	27 %	5 665	1 437	25 %
	33 Repair and instalation of machinery and equipment	3055	824	27 %	3 146	933	30 %
Average				26 %	Average		27 %

Table 9 Share of innovative new firms of all firms in low technology manufacturing in 11/12

		Firms 2011	Innovative new firms 2011	Share of Innovative new firms	Firms 2012	Innovative new firms 2012	Share of Innovative new firms
Low technology manufacturing	10 Manufacture of food products	1 895	440	23 %	1 890	452	24 %
	11 Manufacture of beverages	106	23	22 %	111	22	20 %
	12 Manufacture of tobacco products	1	0	0 %	1	0	0 %
	13 Manufacture of textiles	1 285	404	31 %	1 260	381	30 %
	14 Manufacture of wearing apparel	1 688	561	33 %	1 717	569	33 %
	15 Manufacture of leather and related products	270	38	14 %	269	37	14 %
	16 Manufacture of wood and of products of wood	2 807	495	18 %	2 766	441	16 %
	17 Manufacture of paper and paper products	242	54	22 %	229	62	27 %
	18 Manufacture of printing and reproduction of recorded media	1 426	329	23 %	1 426	314	22 %
	31 Manufacture of furniture	1 256	238	19 %	1 232	226	18 %
	32 Other manufacturing	1 644	484	29 %	1 673	492	29 %
Average				21 %	Average		21 %

Table 10 Share of innovative new firms of all firms in knowledge-intensive high-technology services in 11/12

		Firms 2011	Innovative new firms 2011	Share of Innovative new firms	Firms 2012	Innovative new firms 2012	Share of Innovative new firms
Knowledge-intensive high-technology services	59 Motion picture, video and television programme production, sound recording and music publishing activities	2 387	883	37 %	2 475	878	35 %
	60 Programming and broadcasting activities	87	28	32 %	86	26	30 %
	61 Telecommunications	512	249	49 %	534	244	46 %
	62 Computer programming, consultancy and related activities	8 462	3 682	44 %	8 941	3 806	43 %
	63 Information service activities	1 095	620	57 %	1 167	591	51 %
	72 Scientific research and development	744	315	42 %	777	323	42 %
Average				43 %	Average		41 %

Findings and discussion

Findings

In this paper three research questions were studied: (1) How many innovative new firms are there in Finland? (2) Which part of the country are the innovative new firms located in? (3) In what industries can the innovative new firms be found? We summarise our findings below.

(1) How many innovative new firms are there in Finland?

It was estimated that in each year (2011, 2012 and 2013) there were approximately 12 000 innovative new firms – i.e., firms that are under six years old and operate in technology sectors, as defined by Eurostat. This is a broad estimation. If we tighten our criteria and consider only those firms that operate in high-technology manufacturing or in knowledge-intensive high-technology services, the estimated number of innovative new firms drops to around 6 000 firms, of which only around 200 firms operate in high-technology manufacturing and the rest in knowledge-intensive high-technology services.

(2) Which part of the country are the innovative new firms located?

The data shows that most innovative new firms can be found in Southern Finland (56%). This is consistent with the overall distribution of registered businesses in Finland, with 57% of all firms being located in Southern Finland. There is a slight over-representation relative to overall population, as only 50% of the Finnish population live in this area. For each category of innovative new firms, Southern Finland's is 50% or greater. In knowledge-intensive high-technology services, Southern Finland's share of innovative new firms is almost 70%. In the category of high-technology manufacturing, Southern Finland's share is 55%.

(3) In what industries can we find innovative new firms?

Data shows that the greatest share of the population of innovative new firms are located in knowledge-intensive high-technology services (47% of the population of innovative new firms). The two next largest categories are medium-low technology manufacturing, with 21% of innovative new firms found in these sectors, and low-technology manufacturing, with 23% of innovative new firms found in these sectors. Minor sectors in comparison to these are medium high-technology manufacturing, with 5% of all innovative new firms belonging to this category; and high-technology manufacturing firms, with 2% of the population of innovative new firms. Finally, the age distribution of firms within the above sectors has remained stable over time. The share of young firms is highest in knowledge-intensive high-technology services. In this sector, over 40% of all firms are classified as new firms.

Discussion

Our findings are in line with the expectation that most innovative new firms are created in Southern Finland, where most of the Finnish population lives and where the largest universities and research institutes are located. However, even in Southern Finland, innovative new firms are not over-represented relative to the overall level of economic activity. This means that, for example, regional bias due spill-over of knowledge from universities and research is not visible in the data at this level of regional granularity – suggesting either that that knowledge spill-overs may be less regionally localised, or that investments in public sector research funding is sufficiently distributed regionally to inhibit strong regional bias in innovative new firm formation (Casper, 2013).

To further elaborate on the question of where innovative new firms in Finland come from, the distribution of Finnish new firms over technology sectors was compared to that of NIY firms (Table 11). Close to 50 % of firms in each group belong to the sector of knowledge-intensive high-technology services. Otherwise, the similarity in these distributions is weak. It is striking that 51 out of 160 NIY firms do not fall in any of the technology sector categories. This hints that preconceived industry classifications of the kind used in this report do not capture all innovative new firm activity in Finland. One salient form of innovation overlooked by high-technology and knowledge-intensive industry classifications is business model innovation, under which firms change the way they produce, deliver and capture value by re-organising the relationships between the focal firm and its surrounding ecosystem of customers, suppliers, competitors and complements. Business model innovation can drive high growth and profitability, yet may not require heavy investment in technology and knowledge creation.

Table 11 Innovative new firms and NIY firms by high tech sector in Finland in 2013

Innovative new firms in Finland in 2013		Firms in NIY programme in the beginning of 2013	
High-technology manufacturing	192	High-technology manufacturing	7
Medium high-technology manufacturing	663	Medium high-technology manufacturing	4
Medium low technology manufacturing	2 568	Medium low technology manufacturing	0
Low technology manufacturing	2 820	Low technology manufacturing	5
Knowledge-intensive high-technology services	5 901	Knowledge-intensive high-technology services	93
Other	12 144	Other	51

We next consider the important question of growth orientation. It is well established that the bulk of economic contributions produced by new firms are actually produced by the relatively small proportion of new firms who seek and achieve rapid growth. As Maula, Murray and Jääskeläinen (2007) have pointed out, growth oriented new firms are a special group within the population of innovative new firms. While most new firms do not do require or seek external funding, for example, finance may be a challenging constraint for high-growth firms.

Table 12 shows our estimation of the number of highly growth-oriented innovative new firms in Finland. In the Table, we use survey data from the longitudinal evaluation of Tekes' Young Innovative Firms (NIY) Programme. This data includes a self-reported scale of growth orientation. This scale combines three items by which respondents assess whether their firms emphasise the managerial goal of rapid growth over other desirable goals such as profitability, technological distinctiveness, and longevity. The scale ranges from one to seven, with high values indicating preference for high

growth over profitability, technological distinctiveness, and longevity. In the Table we report the relative share of firms who exhibit a high growth orientation relative to other desirable managerial goals. We then extrapolate this figure to estimate the national-level number of innovative new firms exhibiting different preferences for high growth. As the basis of approximation we use growth orientation distribution from a sample that excludes firms that have applied (and subsequently either accepted or rejected) to the NIY Programme. These firms differ significantly from NIY firms in terms of growth orientation (comparison in appendix one).

As seen from the second column in Table 12, the share of innovative new firms indicating a strong preference for rapid growth is 21% of the total. Of these, one fourth (i.e., 5% of all firms surveyed) indicate very strong preference for rapid growth (scale value between 6 and 7), and three fourths indicate a strong preference for rapid growth (i.e., scale value between 5 and 6; representing some 16% of all firms surveyed). From this, two estimates of the number of growth oriented innovative new firms in Finland in 2013 can be derived. Broadly, we can estimate that there are over 2 500 innovative new firms in Finland that exhibit a strong or very strong preference for rapid growth. In high-technology manufacturing and knowledge-intensive high-technology services sectors, there should be over 1 200 firms exhibiting strong or very strong preference for growth.

Table 12 Growth orientation among innovative new firms

Growth Orientation (GO) in sample firms (n=287)*		Growth orientation among innovative new firms in Finland (broad view)			Growth orientation among innovative new firms in Finland (narrow view)		
GO Value between	Share of firms (%)	Number of firms	Multiplier	Number of firms in category	Number of firms	Multiplier	Number of firms in category
6-7	5	12 144	0,05	607	6 093	0,05	305
5-6	16	12 144	0,16	1 943	6 093	0,16	975
4-5	25	12 144	0,25	3 036	6 093	0,25	1 523
3-4	26	12 144	0,26	3 157	6 093	0,26	1 584
2-3	20	12 144	0,20	2 429	6 093	0,20	1 219
1-2	8	12 144	0,08	972	6 093	0,08	487

*Based on the longitudinal evaluation of Tekes' Young Innovative Firms. Distribution is calculated without firms in the NIY Programme and firms that have applied to it but have been rejected. Reflects growth orientation within the population of innovative new firms. Distribution vs. normal distribution and difference to firms within firms that have applied to NIY Programme is shown in appendix 1.

Finally, we estimate the proportion of high-growth firms and innovative new firms in Finnish regions. This analysis compares each Finnish region's share of innovative new firms to that region's share of participants in the NIY programme. In doing so we assume that participants in the NIY Programme represent some of the most promising and innovative new firms in Finland and that the overall population of innovative new firms may be estimated as done in this study.

This analysis suggests that two Finnish regions underperform in terms of the 'production' of high growth innovative new firms. Southern Finland performs above the Finnish regional average, and two regions are at the national average. Our analysis shows that Southern Finland is responsible for 56% of the innovative new firm activity but has delivered some 80% of the participants in the NIY Programme. Northern Finland has approximately 9% of the innovative new firm population, and the area is home for 8% of the NIY firms. Like Åland, thus, Northern Finland performs at national average.

The two underperforming areas are Western Finland and Eastern Finland. According to the estimation, Eastern Finland has approximately 9% of the innovative new firm population but it has delivered only 4% of the participants in the NIY Programme. In Western Finland this discrepancy seems even broader. While there are 25% of innovative new firms in the area, only of the most promising firms, i.e., participants in the NIY Programme originate from the area.

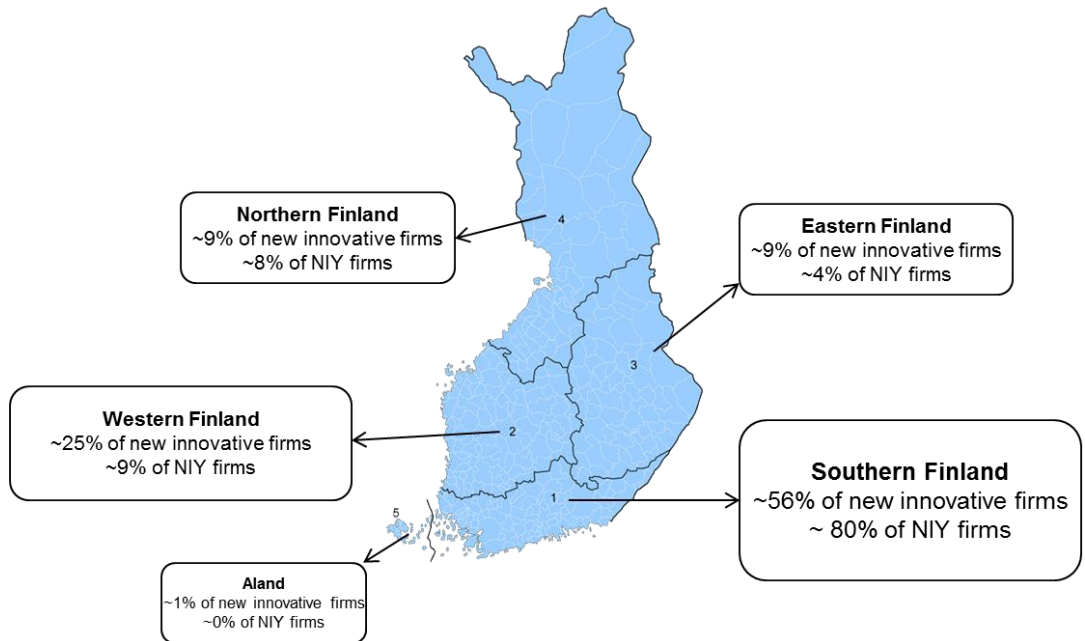


Figure 5 Distribution of innovative new firms and NIY firms over Finland

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Appendix 1

Figure 7 The distribution of growth orientation vs. normal distribution

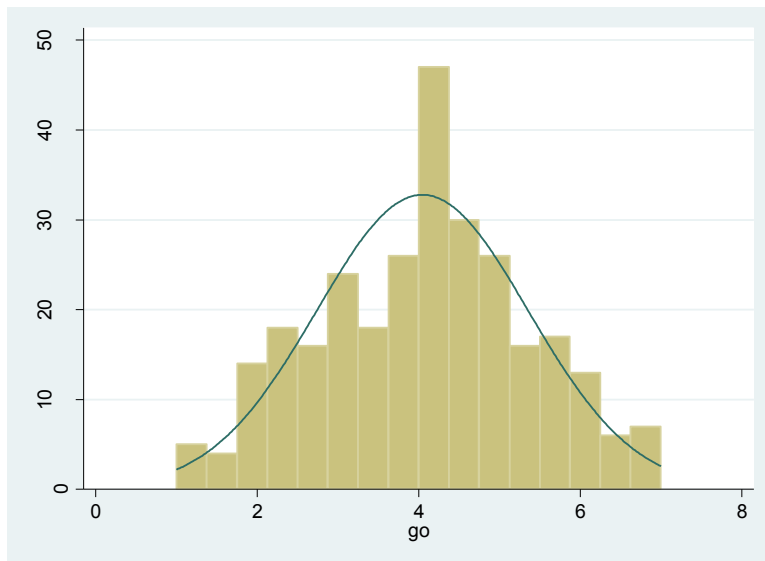


Table 13 Difference in growth orientation between NIY firms and comparison group firms

GO Value between	Share of firms (%) - Firms that have applied to NIY (n=328)	Share of firms (%) - Comparison firms, from Tekes data	Difference (percentage points)
6-7	16	5	+11
5-6	35	16	+19
4-5	31	25	+6
3-4	11	26	-15
2-3	6	20	-14
1-2	1	8	-7

3 Entrepreneurship Ecosystems and Systems of Entrepreneurship: Policy Implications and Applications

Introduction

Policy-makers have explicitly targeted small- and medium-sized firms (SMEs) and new ventures only during the past 30 years or so. Over time, policy initiatives have grown in variety and scope, and much effort is today attached to enhancing co-ordination among different support initiatives over the new venture life cycle, to nurture ‘entrepreneurship ecosystems’. However, while there is widespread acceptance that entrepreneurial activity is good for the economy, there is less clear-cut understanding as to how exactly entrepreneurship contributes to economic development. Researchers have argued various benefits of entrepreneurship, such as promoting innovation (Acs and Audretsch, 1988); promoting job creation (Blanchflower, 2000; Parker, 2009); enhancing economic productivity (e.g., van Praag, 2007); promoting knowledge spill-overs (Acs, 2009; Mueller, 2006); in addition to the classic Schumpeter’s view that entrepreneurs forced industry incumbents to stay honest by threatening to out-compete them (Brouwer, 2002).

The proliferation of benefits attributed to entrepreneurship may signal two things. First, it may signal that entrepreneurship contributes to economic development in many different ways. Second, it may also signal that researchers perhaps may not be sure exactly how entrepreneurship contributes to the economic dynamism, in spite of the widespread belief that it does so. A close examination of the literature seems to suggest that the reality is a composite of both: the contributions of entrepreneurship to economic dynamism are indeed varied; and, there has been little explicit theorising to link entrepreneurship to economic development (Naudé, 2010). It is therefore important to review what is actually known about entrepreneurship and economic development, and also, what the consequent implications for policy might be.

Evolution of Entrepreneurship Policies

One way to make sense of how people have thought about entrepreneurship is to look at how policies addressing new and small (and medium-sized) firms have evolved over time. As noted above, policies explicitly addressing new and small firms are of relatively recent origin. Until 1970s, the main thrust of industrial policy in most countries was targeted at “national champions” – i.e., large industrial conglomerates deemed essential for national industrial performance. This policy could take many forms, from subsidies to ‘structurally central’ firms (e.g., shipyards and car industry) to investment in ‘future champions’ (e.g., national ICT firms). During this era, and notably, in the 1970s, much of the subsidies for small and medium-sized businesses were allocated on a regional basis, often with the motivation of re-locating jobs to regions. Favoured forms of SME support took the form of, e.g., investment subsidy towards building and machinery. The major motivation being to attract manufacturing-intensive SME activity to the municipality and thus attract new jobs, R&D subsidies were not prominently featured in SME-oriented policy. The net outcome of such policy, thus, might have amounted to a form of zero-sum game, under which municipalities used investment subsidies to reallocate labour-intensive industrial activity. Overall, however, support for

SMEs represented only a small fraction of the total subsidies channelled towards industrial activity, the majority of subsidies being directed towards large conglomerates.

The idea of entrepreneurship as a potent source of new jobs only took off with the finding reported by Birch (Birch, 1979) that new firms were net job creators, whereas established firms tended to shed jobs instead of creating new ones. While Birch's finding has been significantly refined subsequently, it received widespread attention subsequent to its publication. Combined with the difficulties experienced with the "national champions" strategy, with many national champions turning out dinosaurs in disguise, Birch's finding enjoyed a receptive audience and did much to legitimise the small- and medium-sized business sector as an object of industrial policy. The nuance Birch helped introduce was the increased emphasis on new firms (as opposed to small firms) in this policy. In consequence, the 1980s and early 1990s saw a proliferation of policy initiatives designed to encourage new firm creation. These initiatives took many different forms, including the creation of business parks and science parks; subsidised loans for new business creation; initiatives seeking to alleviate regulatory burdens faced by new firms; and, for example, initiatives to turn unemployed into entrepreneurs.

While some 'new firm creation' policies were effective, it was also soon discovered that mere creation of new businesses is not necessarily always effective, if the resulting new ventures were of low quality. For example, while many a successful business has been initially motivated by unemployment, not nearly all new firms created by those who have lost their jobs are successful. This reflects a deeper underlying problem with resource allocation: human capital allocated to new businesses is subject to opportunity costs, and sometimes those opportunity costs may be higher than the value produced by the new business entity. Quality therefore mattered. One way to improve quality is through innovation. This thinking speeded up the creation of science parks to foster technology- and knowledge-intensive spin-offs from universities, as well as the introduction of R&D loans and subsidies to encourage new product development by new firms. This latter policy was strongly boosted by the classic finding by Acs and Audretsch (Acs, 1987) that new firms appeared to be more effective in introducing new product innovations than were more established firms.

Innovation support is now a well-established tool in entrepreneurship policy toolbox. The rationale behind this emphasis is that innovation is good for new venture growth: it enhances distinctiveness and enables the venture to offer greater value for its customers. Competing on differentiation is therefore generally better than competing on price. Particularly in economies with a high cost base, achieving a competitive advantage can be challenging – especially in manufacturing sectors where markets tend to be less local than in services – without at least some distinctiveness advantage.

However, it has also been discovered that knowledge- or technology-intensive alone does not ensure growth (although data suggests it may enhance survival). Persuading customers to adopt new, technology-intensive products and services is challenging, especially if these are central to the customers' own performance. The more an innovation requires additional, complementary investment by customers, the more difficult it is to achieve a high rate of adoption. Building legitimacy in knowledge- and technology-intensive new ventures is challenging and requires managerial experience that researchers and engineers often lack. Therefore, although science parks helped facilitate the creation of technology-intensive new firms, it was also found that these firms did not grow automatically – in fact, the great majority remained small, expert-intensive engineering

outlets. To convert innovation into high-growth performance requires skill, much of which can only be gained through experience.

This insight – the importance and sticky nature of entrepreneurial skill – spawned numerous initiatives to boost the supply of equity funding towards new ventures from late 1990s onwards. The idea here was that equity funding comes with the kind of hands-on experience that new ventures need to unlock their growth potential. Many of the early funding schemes were heavily subsidised from public funds, and the growth of private-sector equity funding activity has been much slower. These aspects illustrate the distinctive challenges of equity funding: to do it well equally requires experience, and this cannot, as a general rule, be substituted with managerial experience from mature businesses or from traditional financial institutions. Many early experiments in equity funding assumed that managerial skill from large company contexts travels well to new venture contexts, and that the key to launching a successful equity funding sector is to increase the availability of funds for new ventures. However, it has been subsequently learned that even with financial resources available, effecting new venture growth is difficult without previous experience from successful venture growth and without extensive contact networks that are crucial for opening doors to growth opportunities.

Perhaps the most recent policy development has been an increasingly explicit focus on promoting high-growth new ventures. This focus has been prompted by the discovery that high-growth ventures are responsible for a disproportionate share of economic benefits generated by new firms in general (Autio, 2007; Birch, 1997). While this focus overlaps with the focus on knowledge- and technology-intensive new firms, the policy approaches are quite different, due to the selective nature of the high-growth phenomenon. Policy prescriptions in this stream advocate high selectiveness; control for growth ambition and ability; staging of support that is tied to the achievement of milestones; high-intensity support; and close collaboration between public and private sector organisations in support delivery (Autio, 2007). Good examples of such policy initiatives are the NIY Programme of Tekes, as well as the VIGO Programme.

Finally, as policy initiatives have evolved and entrepreneurship support infrastructures have become more varied, a discernible meta-trend of policy has been enhancing coordination across different policy initiatives, under the rubric of “entrepreneurship ecosystems”. We call this a meta-trend, since unlike the firm- and need-specific trends discussed above, policy focus on entrepreneurship ecosystems extends beyond individual initiatives and instead focuses on the coordination and configuration of sets policy initiatives. There are a number of factors contributing to this meta-trend. First, over the years, quite a substantial support infrastructure has been built to support various aspects of the entrepreneurial process. Much of this infrastructure remains active, and potential value could be gained by enhancing coordination among the different constituent parts of the entrepreneurship support system. Second, as can be inferred from the discussion above, much has been learned about the contributions of and challenges to entrepreneurship over the years. Both the understanding of constraints on entrepreneurship as well as the different ways entrepreneurs contribute to the economy have enhanced a systemic understanding of the entrepreneurial dynamic, as opposed to a firm-specific focus that has prevailed in earlier decades. Third, it has been learned that one-off interventions may not produce optimal outcomes. Firms evolve over time and exhibit different needs in different stages of their growth life cycle. Consequently, one important objective of the entrepreneurship ecosystem approach is to achieve a better coordination and hand-over, as

the venture progresses along its development path. Finally, over the years it has been learned that experience matters in entrepreneurship, and that experience spill-overs exist and tend to accumulate regionally. Entrepreneurship hotspots such as the Silicon Valley cannot be created overnight, but instead represent the accumulation of decades of experience, infrastructure, and specialised resources. Assuming an ecosystem focus is hoped to improve chances of creating and maintaining a self-sustaining entrepreneurial dynamic in entrepreneurship hotspots.

Summarising, entrepreneurship policy has evolved considerably over the last decades, as the understanding of the phenomenon has become more nuanced and trial-and-error experience has accumulated. There is a clearly discernible continuum from investment subsidies targeted at manufacturing SMEs towards the creation of new firms; towards supporting specific aspects such as innovation and high growth; and eventually, towards more systemic approaches that seek to coordinate among different support initiatives and infrastructures over the new venture growth cycle. It seems clear that entrepreneurship policies are evolving to become more systemic, possibly reflecting an improved understanding that while innovative and high-growth firms are beneficial, they do not exist in a vacuum. Instead, many externalities need to be in place for growth to happen and innovations to get adopted. To achieve such a situation, policy approaches are required that enhance the functioning of entire systems of entrepreneurship, in addition to addressing specific market failures and specific groups of firms. A good example of such systemic policies is the VIGO Programme, which sought to remedy a real gap in the provision of early-stage equity funding, not only through increasing the raw supply of funding, but rather, facilitating a self-sustaining dynamic that attracts capital and experience to the sector and feeds positive feedback among different system constituents (Autio, 2013). The key to such, 'systemic' policy initiatives is to facilitate a self-sustaining dynamic within the complex web of constituent stakeholders of the system itself.

As entrepreneurship policy initiatives assume increasingly systemic hues, conceptual frameworks are needed that support the planning of systemic policy initiatives. Recently such conceptual frameworks and measurement approaches have started to emerge. As an example, we next briefly review the National Systems of Entrepreneurship theory and describe an empirical operationalization of this theory – the Global Entrepreneurship and Development Index.

From Entrepreneurship Ecosystems to Systems of Entrepreneurship

With the exception of Schumpeter, most early theories of economic development have tended to ignore entrepreneurship. Schumpeter famously identified entrepreneurs as ‘agents of creative destruction’ who challenged industry incumbents by introducing new products, services, process innovations, and organisational innovations that offered greater value than what the incumbents were able to offer (Schumpeter, 1996). By innovating, entrepreneurs force incumbents to upgrade their game, or, if they are unable to, to exit the market. To Schumpeter, it was this creative destruction that provided the ultimate source of economic development.

Later, Schumpeter’s thinking changed. As large corporations had become better skilled in R&D, Schumpeter thought this would permanently shift the locus of innovation towards large firms. Much of the subsequent thinking in innovation theory reflects this position. When developing the theory of National Systems of Innovation, researchers almost exclusively built on Schumpeter’s “Mark II” model of innovation (Edquist and Johnson, 1997; Lundvall, 1992; Nelson, 1993). Subsequently, substantial effort was directed to describing different national (and subsequently, also sectoral) systems of innovation: how they functioned, what the interactions between different stakeholders, and how knowledge was transformed into innovations.

Because of Schumpeter, the National Systems of Innovation literature grew to almost completely ignore entrepreneurial initiative by individuals. In the structural tradition of NSIs, “...institutions engender, homogenise, and reinforce individual action: it is a country’s institutions that create and disseminate new knowledge and channel it to efficient uses.” (Acs, Autio & Szerb, 2013). Because of this structural emphasis, the NSI literature acquired quite a static flavour and ignored the importance of individual-level motivations, aspirations and initiative.

On the other hand, entrepreneurship research tended to overlook the regulating influence that an entrepreneur’s context exercises on entrepreneurial behaviours. Simplistically put, where the NSI literature has been all about context and ignored the entrepreneur, the entrepreneurship literature has been all about the individual and ignored the context. The National Systems of Entrepreneurship theory addresses this gap (Acs, Autio & Szerb, 2013). It builds on the following premises:

- 1 Entrepreneurial action takes place under uncertainty: Entrepreneurs take risks when creating new firms to pursue opportunities that they perceive;
- 2 Entrepreneurial action involves resource mobilisation: Entrepreneurs access and mobilise resources to pursue opportunities;
- 3 The great majority of entrepreneurial actions are initiated by individuals or teams of individuals;
- 4 Entrepreneurs’ actions are regulated not only by the perception of opportunity, but also, by the perception of the desirability and feasibility of opportunity pursuit;
- 5 The consequences of entrepreneurial action are regulated by the entrepreneurs’ competencies, and also, by contextual factors, such as access to markets and the availability of resources

The National Systems of Entrepreneurship theory seeks to understand entrepreneurship as a systemic resource allocation process. Because of uncertainty, entrepreneurs mobilise resources on a hunch. If this hunch proves correct, resources get allocated towards value-adding uses. If the entrepreneur guesses wrong, the resources will be recycled to alternative uses. Therefore, this activity allocates human capital and resources to value-adding uses, which drives Total Factor Productivity.

Summarising, the core assumptions of the National Systems of Entrepreneurship theory are as follows:

- 1 Economic growth is ultimately driven by a trial-and-error resource allocation process, under which entrepreneurs allocate resources towards productive uses;
- 2 This process is driven by individual-level decisions, but those decisions are conditioned by contextual factors;
- 3 Similarly, the outcomes of individual-level entrepreneurial decisions are conditioned by contextual factors;
- 4 Because of the multitude of interactions, country-level entrepreneurship is best thought of as a system, the components of which co-produce system performance

These notions are captured by the GEDI index methodology, which represents an operationalisation of the National Systems of Entrepreneurship theory. The systemic features of the National Systems of Entrepreneurship theory are captured by GEDI's:

- (1) Contextualisation of individual-level data by weighting it with data describing a country's framework conditions: This approach captures the notion that individual-level activities are regulated by context;
- (2) Use of 15 context-weighted measures of entrepreneurial Attitudes, Abilities, and Aspirations which are further organised into three sub-indices: This approach captures the notion that country-level entrepreneurial processes are complex and multi-faceted;
- (3) Application of the Penalty for Bottleneck algorithm: This approach captures the notion that system components co-produce system output;
- (4) Consequent recognition that national entrepreneurial performance may be held back by bottleneck factors – i.e., poorly-performing pillars that may constrain system performance.

The GEDI indicators are illustrated in Figure 1 below.

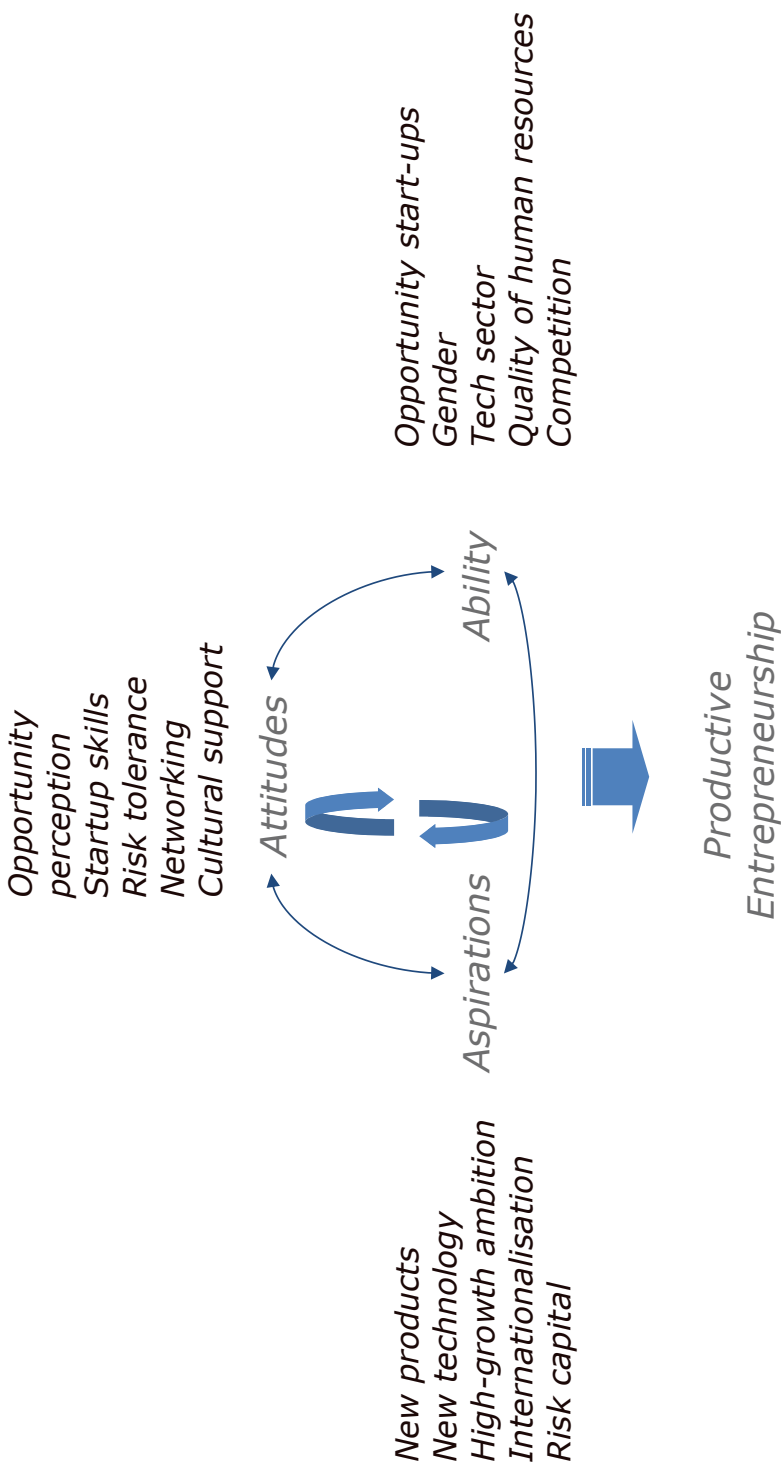


Figure 1 Dynamic of National Systems of Entrepreneurship

As a multi-faceted index, GEDI recognises that country-level entrepreneurship is a complex systemic phenomenon. Country-level entrepreneurship cannot be satisfactorily captured by single-item aggregates, and it cannot be captured by focusing exclusively on attitudes, abilities or aspirations. Nor can it be captured by considering the framework conditions alone. What is needed, therefore, is an approach that combines all of the above. GEDI does this by using a total of 15 measures of entrepreneurial attitudes, abilities, and aspirations and by weighting them with descriptors of country-level framework conditions.

By applying the Penalty for Bottleneck approach, the GEDI index methodology captures the notion that systems comprise multiple components and that these components co-produce system performance. For example, we know that education is important for high-growth entrepreneurship, as is funding. In reality, we know that education alone does not drive high-growth entrepreneurship if funding is not available, and even in the presence of funding, difficulties in accessing markets will inhibit high-growth entrepreneurship. A simple summative index would ignore such interactions – thereby ignoring crucial aspects of system-level performance.

The GEDI index is optimised to produce the highest index value when all individual component (or pillar) values (after normalisation) are more or less even – in other words, when there are no major gaps among pillars – i.e., when individual components are in balance. If there are major performance differences between individual pillars – i.e., bottleneck factors exist within the system – the values of well-performing pillars are ‘penalised’ by adjusting them downwards. This reflects a situation where some system components constrain system-level performance – much like a chef cannot make full use of the ingredients of a particular dish if important ingredients are in short supply.

GEDI 2013 Rankings

Figure 2 shows the GEDI index rankings for the top 60 countries (of a total of 120 countries). As can be seen, Finland ranks high: the 7th overall with a GEDI index score of 69.3 out of 100. This means that, in GEDI parlance, Finland’s National System of Entrepreneurship operates at 69% level of efficiency relative to its theoretical maximum. The top ranked country is the US at 82.5 points, followed by Australia, Sweden, and Denmark. Thus, although Finland ranks 7th, it is preceded by two Scandinavian countries. In order to “catch up” with the US performance, Finland would have to improve its GEDI ranking by some 20%.

Rank	Country	GDP PC*	GEDI	Rank	Country	GDP PC*	GEDI
1	United States	43 063	82,5	31	Spain	26 545	46,9
2	Australia	35 669	77,9	32	Korea	27 991	46,7
3	Sweden	35 134	73,7	33	Hong Kong	44 770	46,6
4	Denmark	32 333	72,5	34	Slovakia	21 257	46,6
5	Switzerland	39 344	70,9	35	Japan	31 425	46,1
6	Taiwan	35 604	69,5	36	Bulgaria	12 178	45,5
7	Finland	31 810	69,3	37	Bahrain	21 345	45,4
8	Netherlands	36 599	69,0	38	Uruguay	13 821	45,3
9	United Kingdom	32 723	68,6	39	Turkey	13 737	44,7
10	Singapore	53 266	67,9	40	Romania	11 443	44,6
11	Iceland	34 029	67,5	41	Czech Republic	23 763	44,6
12	France	29 819	67,2	42	Hungary	17 033	44,5
13	Belgium	32 649	66,5	43	Kuwait	47 935	44,3
14	Norway	47 547	65,1	44	Malaysia	14 775	44,1
15	Chile	15 848	65,1	45	Saudi Arabia	21 430	43,5
16	Germany	34 766	64,6	46	China	7 958	41,6
17	Austria	36 259	64,0	47	Peru	9 429	41,3
18	Ireland	36 755	61,8	48	Italy	26 328	40,9
19	Puerto Rico	17 300	61,7	49	Croatia	16 148	40,9
20	Israel	26 720	59,7	50	South Africa	9 860	40,4
21	Estonia	18 722	59,0	51	Cyprus	23 475	40,3
22	Slovenia	24 320	52,7	52	Montenegro	10 711	39,5
23	Qatar	77 987	52,7	53	Brunei Darussalam	45 979	39,3
24	Colombia	9 124	49,8	54	Lebanon	12 592	38,9
25	Lithuania	18 776	49,6	55	Barbados	17 564	38,5
26	Poland	18 297	49,1	56	Argentina	15 501	38,4
27	Latvia	15 946	48,4	57	Mexico	12 617	38,2
28	United Arab Emirates	42 293	48,3	58	Greece	20 922	37,8
29	Oman	25 330	47,6	59	Tunisia	8 442	37,2
30	Portugal	20 962	46,9	60	Costa Rica	11 156	37,2
* GDP per capita (PPP), constant 2005 dollars							

Figure 2 GEDI Rankings for 2013

Figure 2 only shows the overall index scores. More nuanced information can be retrieved by looking at individual pillar values. This is shown in Figure 3, where Finland's pillar-level NSE profile is compared against that of the US.

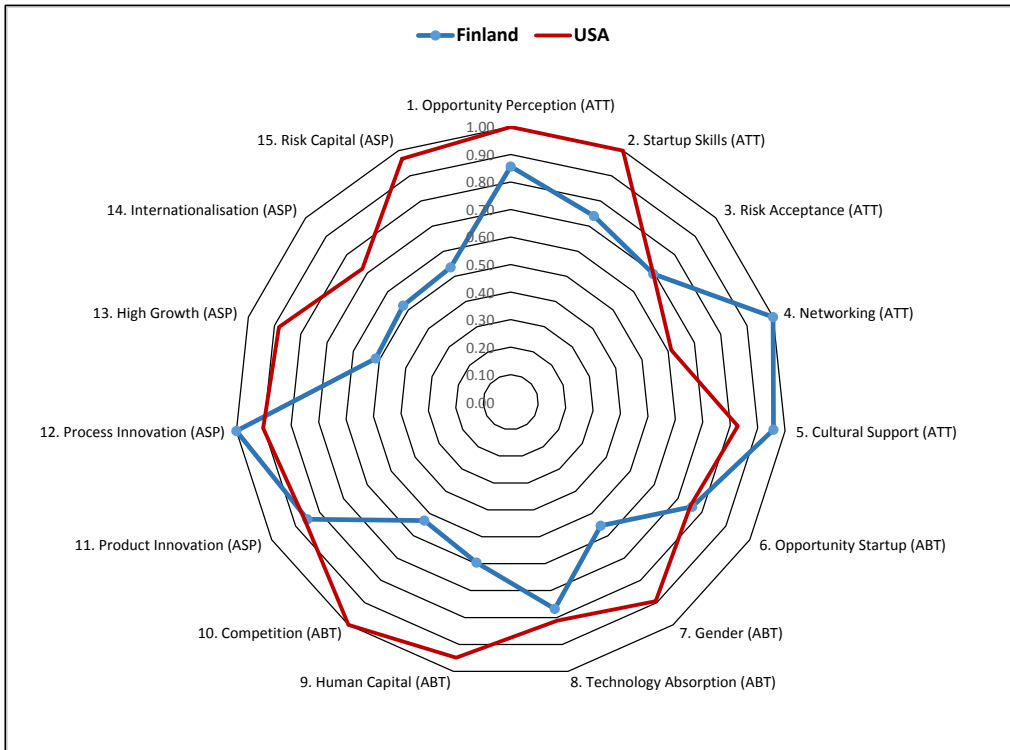


Figure 3 Finland’s NSE profile compared against USA

Figure 3 shows interesting additional nuance. Overall, the profile of the US NSE is quite round, suggesting the absence of major bottlenecks. Finland’s profile is clearly less even. Figure 3 suggests that Finland lags behind the US the most in terms of high-growth activity; competition; risk capital; (somewhat surprisingly) internationalisation; and gender. These findings confirm earlier data that Finnish start-ups generally lack high-growth ambitions. The human capital pillar indicates the quality of human capital flowing to new ventures, and the gender pillar indicates the balance between male and female entrepreneurship. The relatively low high-growth ambitions may also have a bearing on internationalisation aspirations. Of all pillars, the high-growth pillar exhibited the lowest GEDI score for Finland.

On the other hand, Finland leads the US in a couple of areas – notably, in networking and in cultural support. The figure suggests, however, that the fastest way for Finland to “catch up” with the US is by investing in enhancing high-growth aspirations, risk capital, among some other pillars.

Using GEDI as a Policy Tool: Example Scotland

The Scottish example highlights the usefulness of the GEDI method as a policy analysis, planning, and implementation platform. In 2012, Scotland participated in a joint effort to review their entrepreneurship ecosystem. As the first step, a boilerplate GEDI analysis was carried out. The boilerplate GEDI report contained three analyses:

- GEDI pillar numbers for Scotland: individual-level data, institutional data, and pillar values
- Scotland rankings relative to the World and high-income countries, respectively, for all pillars (including also individual-level and institutional data rankings)
- Benchmarking comparisons in the form of spider web graphs
- A 'policy portfolio optimisation' analysis, which identified priority pillars to improve in view of enhancing the performance of the Scottish National System of Entrepreneurship

A series of three Policy Stakeholder Engagement Workshops was then organised to debate the GEDI analysis. Approximately 12 – 15 policy stakeholders were invited to each workshop, representing different parts of the Scottish entrepreneurship ecosystem, including, e.g., banks, policy agencies, entrepreneurs, universities, and so on. These workshops performed the following activities:

- Debating, challenging, and amending GEDI analysis
- Debating Scottish bottlenecks, as suggested by the GEDI analysis
- Suggesting insights and perspectives from different parts of the Scottish entrepreneurship ecosystem
- Suggesting follow-on analyses and data to further explore identified bottlenecks
- Debating underlying causes for the bottlenecks
- Identifying and prioritising actions to alleviate the bottlenecks

By providing a coherent systemic platform, the GEDI helped focus the attention of different stakeholders when considering the trade-offs of alternative courses of action, and thus, to debate system issues outside their individual policy 'silos'.

Because the insight into what really makes the system work (or not) is distributed across different stakeholders, with no individual or agency possessing full and complete information, these distributed insights need to be extracted from within the system. This is what the Stakeholder Engagement Workshops have been designed to do. They use the 'hard' facts of the GEDI index to extract 'soft' insights from within the system on issues that make a real difference for the system. This process can add important insight. In Scotland, for example, the GEDI boilerplate analysis suggested Finance as a bottleneck for the Scottish entrepreneurship ecosystem. The stakeholder debates confirmed this but also added important nuance: the debates suggested that the *supply* of funding was not the real bottleneck. Instead, comments from different stakeholders pointed to a problem with insufficient exit opportunities for equity investments. Although equity funding as such was reasonably plentiful, illiquid markets for exit meant that this funding got stuck in portfolio companies and was not recycled back to new investments.

More generally, the stakeholder workshops identified five priority themes and underlying causes: "financing for growth" (including exits for investors in angel-backed companies, increasing access to institutional and international funds); "effective connections" (this included networks but was more fundamental than "networking"), "skills for growth" for leadership teams within IBE ventures, "role of the

universities in the IBE ecosystem”, and “role models and positive messages”. Chairs and members of the stakeholder community were identified for High level Task Groups charged with implementing solutions to each of the five themes. For the universities theme, two task groups were formed: one internal to the universities and one external. The task forces have continued their work after the conclusion of the workshops, with mandates extending at least one year after the conclusion of the Stakeholder Engagement Workshops.

Summary

Summarising, the above discussion suggests the following heuristic for using the Penalty for Bottleneck approach for policy analysis, design, and implementation:

1. Identify bottleneck factors in the country’s National System of Entrepreneurship and compare these against relevant peers (i.e., countries at a similar level of economic development, with similar demographic conditions and with similar levels of market size and market openness).
2. Examine the bottleneck factors more closely, complementing GEDI indicators with alternative proxies.
3. Conduct policy comparisons in bottleneck areas against relevant peers, with a focus on analysing the anatomy of individual policy measures as well as identifying transferable good practices
4. Design and implement policy Programmes designed to alleviate bottleneck factors in the country, using GEDI to help set targets for performance improvement

Used this way, GEDI could provide a helpful platform for implementing a systemic approach to entrepreneurship policy analysis, design, and implementation, one that focuses on improving the performance of National Systems of Entrepreneurship.

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4 Supporting the Growth of New Innovative Firms – Case NIY Programme and VIGO Programme

Introduction

The NIY Programme of Tekes and the VIGO Accelerator Programme of the Ministry of Employment and the Economy represent two important policy instruments in the area of high-growth entrepreneurship in Finland. This paper explores the impact of these programmes on the growth of their participating firms. We conduct two types of analysis. First, a descriptive analysis is presented. Second, for the NIY Programme, we conduct a Propensity Score Matching analysis that is able to control for the selection effect that threatens to bias estimations of the impact of policy interventions.

Descriptive analysis is carried out for NIY firms and partly for VIGO firms. The growth and development of each group is compared against a reference group. The aim of the analysis is to gain overall understanding about the growth of sales, employment, and finance in each group in comparison to the base population of innovative new ventures in Finland. This analysis focuses on five research questions:

- (1) How have the NIY participating firms grown in terms of sales and employment in comparison to other innovative new firms between 2006 and 2012?
- (2) How have the VIGO participating firms, NIY firms and firms in the comparison group been able to attract equity funding during 2009 and 2011?
- (3) How have the NIY participating firms perceived access to finance before and after the financial recession of 2008, and also, in comparison against other external resources?
- (4) How do the NIY participating firms perceive finance as a constraint to growth in comparison to reference group and in comparison to other possible constraints?
- (5) How have the NIY participating firms and firms in the comparison group been able to attract external investment during 2006 and 2012?

Statistical analyses are carried out to improve the understanding about the impact of the NIY Programme on facilitating the growth and development of select innovative new firms in Finland. These analyses inform on the development of NIY participating firms (research question one). The impact of the VIGO Programme is not considered as yet, since there is not enough longitudinal data to isolate the impact of the VIGO Programme itself from bias introduced by participant selection. In the latter part of the study, Propensity Score Matching is applied as the main statistical method to minimise bias resulting from the fact that NIY participants have had to apply and get selected into the programme. Before presenting these analyses, we present a short summary on both the NIY Programme and the VIGO Programme and how they are configured to enhance the Finnish high-growth entrepreneurship ecosystem. The paper ends with conclusions and discussion on the limitations of the study.

NIY and VIGO Programmes in the Finnish High-Growth Entrepreneurship Ecosystem

The “Finnish paradox” states that, in spite of extensive support infrastructure and high R&D expenditure, Finland still suffers from a lack of innovative new firms that exhibit high growth aspirations (Autio, 2009). This paradox has raised the question whether the Finnish SME support ecosystem might be lacking important elements – i.e., those that push and pull innovative new firms to seek growth. While there are numerous initiatives to support the creation of new innovative firms, there are only a few initiatives designed to push innovative firms to grow, such as the NIY Programme of Tekes and the VIGO Programme of the Ministry of Employment and Economy.

These programmes have their origins in the speculation why the number of high-growth start-ups in Finland is small relative to its investment in R&D, and also, relative to other similar countries. It has, for example, been proposed that Finland might simply lack the kind of experience and contact networks necessary to effect rapid venture growth. After all, many of the skills and contacts e.g. to financial sources required to effect growth can only be acquired through experience (Maula et. al., 2007). Thus, it may be that the growth bottleneck in Finland may reflect deeper systemic deficiencies, and both the NIY and the VIGO Programmes represent policy responses to remedy the observed situation.

The NIY Programme was established in 2008. It aims to accelerate the growth and internationalisation of the most promising innovative new firms in Finland through supporting the development of their business activities in a hands-on fashion. To be eligible for the programme, a firm must meet the following conditions: (1) It needs to exhibit good potential for rapid organisational growth in international markets; (2) There must be a comprehensive, high-quality business plan and capacity to implement it; (3) There needs to be evidence about promising business activities and customer references; (4) The firm must possess a competitive advantage with which it is possible to reach an important market position; and (5) The firm must have a committed and competent management team (Tekes, 2013). The NIY Programme is open for young (under six years old) firms that employ less than 50 people with a maximum sales turnover of €10M, or a balance sheet totalling at least €10M. The firms must also have spent at least 15 percent of all business costs in research and development during the previous three years, and they must be domiciled in Finland (Tekes, 2013).

Central to the NIY Programme is the milestone design and the use of an external evaluation panel. At the time of its funding decision Tekes sets milestones for the applicant, which, if met, enable the applying firm to progress to the next phase of funding. In the first phase the firm should be able to gain a solid foothold on the growth track and demonstrate signs of ability to compete in international markets. Firms that have met their milestones during the first phase will be invited to present their progress to an evaluation panel organised by Tekes. The panel assesses candidate firms’ business potential, internationalisation potential, development needs and the overall suitability as an investment target. The panel has an advisory role in relation to Tekes funding decisions. The panel members are capital investors, business angels and board professionals. The panelist pool has some fifty members, and 3–5 experts at a time participate in the monthly evaluation events. If a candidate firm is deemed to have good growth potential, it is allowed to progress to the second phase. The goal for the second phase of funding is to accelerate and intensify the growth and internationalisation of the NIY firm. The firm also has to build up its organisation in a manner required to sustain rapid growth. In order to sustain rapid growth, the participating firm should also have significant external funding, usually from equity investors. If necessary, participating firms are required to

be active in international VC forums. Depending on the firm's rate of growth, funding can be granted in one or more instalments until the firm is eight years old (see: www.tekes.fi/rahoitus/yriyksille/nuorille-innovatiivisille-yriyksille for more information).

By the end of year 2012, 160 innovative new firms had received NIY funding through the Programme. Of these, 34 firms had completed the Programme, and a further 34 firms had had to exit the Programme because of failure to meet their milestones. The rest of the participating firms were continuing the Programme in different phases, as shown in table 1.

Table 1 NIY participating firms by funding phase at the end of year 2012

Phase (12/2012)	2008	2009	2010	2011	2012	Sum
Completed NIY	12	12	7	3	-	34
Phase 1	-	-	-	4	30	34
Phase 2	1	-	5	33	1	40
Phase 3	-	6	10	2	-	18
Interrupted	8	13	9	4	-	34
Sum	21	31	31	46	31	160

The milestone configuration of the NIY Programme can be seen in Table 2. The 160 firms that had participated in the NIY Programme by the end of year 2012 are grouped by NIY funding phase. By the end of year 2012, those firms that had completed NIY had received, on average, €1 013k funding from Tekes; they were 6,7 years old on average, and they had spent 950 days under the NIY Programme. For those firms that participated in the first phase of NIY only, the mean age is 4,2 years; the length of NIY participation is 244 days, and the funding received amounts €255k per participating firm. As the rest of the groups shown in are between these two extremes, the Table shows that the milestone principle has been consistently applied in the implementation of the NIY Programme.

Table 2 Age, duration of NIY, and Tekes funding received by NIY firms by NIY funding phase

Phase (12/2012)	Firms	Age(2013)	NIY participation	NIY funding (mean)
Completed NIY	34	6,7 years	950 days	€1013k
Phase 1	34	4,2 years	244 days	€255k
Phase 2	40	5,3 years	635 days	€631k
Phase 3	18	6 years	961 days	€983k
Interrupted	34	6,7 years	749 days	€488k

The second major policy instrument in the area of high-growth entrepreneurship, the VIGO Programme, was launched in March 2009 by the decision of the Ministry of Employment and Economy (VIGO, 2012). The VIGO Programme seeks to facilitate the creation of new business accelerators that raise and invest their own funds (and that of other private-sector operators) to take equity stakes in promising new ventures. To support this development, public-sector funds are provided to support programme coordination and limited aspects of accelerator operation. Also, public sector agencies (notably, Tekes and

Finnvera) commit themselves to respecting the VIGO brand and providing preferred treatment for the funding applications filed by VIGO participating firms (provided these are within regulation and meet the usual criteria, as applied by the support instruments concerned). By facilitating the creation of a well-functioning network of business accelerators, the VIGO Programme seeks to enhance the provision of ‘smart’ and ‘hands-on’ funding for potential high-growth ventures in Finland, and to introduce mechanisms that push high-potential ventures to proactively and aggressively seek growth.

The system-level dynamic of the Finnish high-growth entrepreneurship ecosystem, and the role of the NIY and VIGO Programmes within it, is illustrated in Figure 1. As such, systems are built up of components, relationships, and attributes (Carlsson et al., 2002). Narrowly seen, the relevant components in the Finnish high-growth ecosystem are entrepreneurial teams, venturing teams, research organisations, domestic and international financiers and public-sector actors in Finland. These stakeholders do not act in isolation but interact with one another. The interactions and relationships among the constituent stakeholders of the high-growth ecosystem bring the system to life. The relationships across constituent stakeholders depend on their roles within the system. In order for the Finnish high-growth entrepreneurship ecosystem to succeed, each component of the system must evolve in concert with the other components and reinforce the system dynamic. It takes time for the high-growth entrepreneurship ecosystem to reach maturity, and success is seldom achieved without government intervention. For example, the US high-growth entrepreneurship ecosystem has been gradually evolving over the past 50 years with continued government intervention (Reid et. al, 2011).

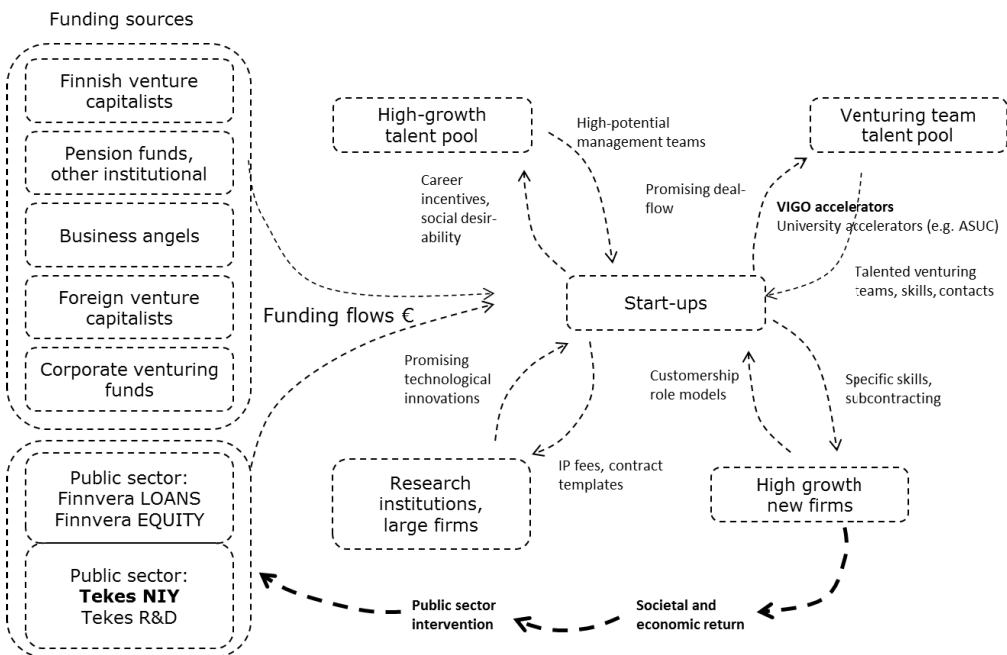


Figure 1 The Finnish high-growth entrepreneurship ecosystem

In order for the Finnish high-growth ecosystem to succeed, first, high-potential entrepreneurial teams need to be attracted to the ecosystem from the pool of potential entrepreneurs. To achieve this, Finnish high-growth ecosystem must establish a strong reputation and offer incentives and growth prospects that

make establishing new ventures an attractive proposition for prospective entrepreneurial teams. The growth prospects need to be sufficiently attractive to overcome trade-offs and opportunity costs presented by the abandonment of alternative occupational pursuits. In addition to the prospect of funding and other support, one important way of achieving this outcome is by creating and communicating tangible success stories. In the first place a talent pool must exist, of which capable enough new entrepreneurs could be attracted to the field. These may come, for example, from universities and research institutes, from universities of applied science, from industry, and from the venturing community itself.

Second, new talented venturing teams need to be attracted to the ecosystem. The venturing teams will set up accelerators such as the VIGO accelerators or work with other accelerators such as the Aalto Start-Up Centre and start working with new ventures. However, venturing teams (individuals) may also operate independently, outside any established structure. Venturing teams will bring experience, contact networks and funding, all of which will be mobilised to support the rapid growth of high-potential ventures. To achieve this, the Finnish high-growth entrepreneurship ecosystem must establish a strong reputation and offer sufficient incentives and a setting which improves the prospects of the new venturing teams of locating and investing in high-potential ventures. Again, this prospect needs to be strong enough to offset the opportunity cost created by the rejection of alternative occupational pursuits. Furthermore, there must exist a venturing team talent pool, from which talent can be attracted to the sector. This talent pool is constituted by individuals who have solid previous high-growth venturing experience and well-established contact networks required to enhance the commercialisation of new inventions (e.g., experienced entrepreneurs, venture capitalists and seasoned business managers with strong connections to the international high-growth venturing community).

Third, for the Finnish high-growth entrepreneurship ecosystem to operate successfully, the availability of technologies and innovations around which new ventures can be created must be ensured. Important elements in this respect are universities, research institutes and established large firms. Ideas need to spill over smoothly from these to new firms through formal and informal mechanisms. Ideas from established corporations may flow through licensing or idea release agreements, as was done, for example, in the Nokia Corporation's Bridge Programme.

Fourth, public-sector agencies such as Finnvera and Tekes need to support innovative new firms (for example, through initiatives such as the NIY Programme). They need to participate in the market by sharing technology risk and market risk and provide an incentive for private investors to step in and co-invest in new firms. To ensure smooth adjustment and continued support by public-sector agencies, the Finnish high-growth ecosystem needs to demonstrate an ability to generate sufficient societal and economic returns to justify continued public-sector participation. To guarantee the continued interest of external investors, the Finnish high-growth entrepreneurship ecosystem needs to demonstrate high-quality deal flow and attractive returns to equity investment to facilitate the continued flow of equity funding into prospective portfolio firms.

Performance of NIY and VIGO Participating Firms

Sales and Employment Growth

Sales and employment growth are important performance metrics for innovative new firms. NIY firms are expected to be in a commercialisation stage, and therefore especially with these firms one should be able to see signs of positive development in both sales and employment time series. The first participants were selected into the NIY Programme in year 2008, and by the time a firm joins the programme, it may not be over six years of age. With five years of operating history, there is now sufficient data to start analysing the sales and employment growth in some of the NIY participating firms. The VIGO Programme's operating history is much shorter, so the data is not sufficient to analyse the VIGO Programme's growth impact at this point in time.

For the descriptive analyses, sales and employment data has been collected for both NIY participating firms and a reference group as a part of the longitudinal evaluation of Tekes financed young innovative firms. The reference group have been chosen from Tekes customer registers such that the reference firms must have been founded after year 2003 and their sales must not have exceeded €2.5M in year 2003. Moreover, these firms must not have been part of the NIY Programme or the VIGO Programme. From all groups those firms have been included to the analysis for which full sales or employment time series have been found for the study's time frame. In the analysis, annual mean and median figures are reported.

The main conclusion from the sales and employment time series is that NIY firms' sales and employment have grown more rapidly than in the comparison group. Figure 2 shows both NIY firms' (n=30) and comparison group's (n=21) employment growth between 2006 and 2010. The graphs show that the mean for employment starts from five employees for the NIY group and from seven employees for the comparison group in 2006. During the period, mean employment rises to 17 employees for NIY firms, while for the comparison group the mean grows to nine employees. Similar patterns can be observed in median employment for both groups, meaning that employment growth is similar across the two groups. Increasing gaps between mean and median employment after year 2008, when the first firms were chosen to NIY Programme, hint that high-potential firms have been chosen to the NIY Programme in 2008 and that the Programme may have had a positive effect on the employment growth of its participating firms.

It is notable how the employment mean curves change from 2008 onwards, when the NIY Programme started. For the group of NIY participants, the mean employment continues to grow, in spite of the severe economic downturn that occurred in late 2007. For the comparison group, the growth in mean employment turned flat. This suggests that the NIY participating companies were more resilient against the economic downturn than were the comparison group. The continued mean growth suggests that the NIY Programme is likely to have had an impact beyond the selection effect. This conclusion receives further support in the statistical analyses that follow.

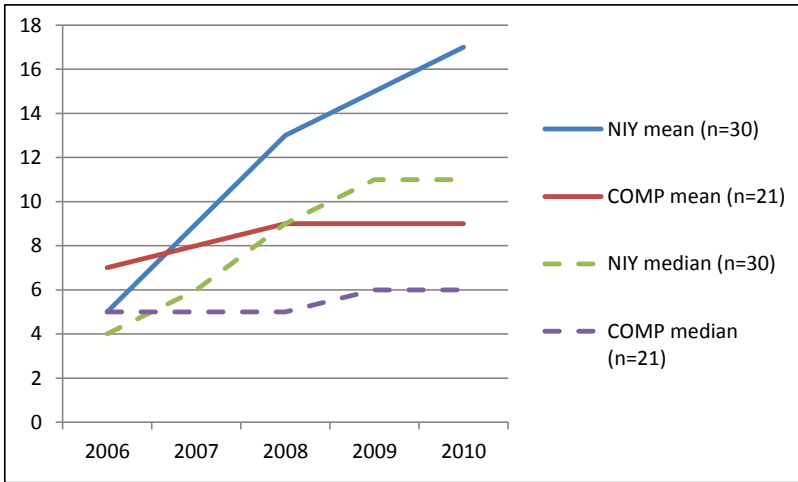


Figure 2 Mean and median employment for the NIY group and the Comparison group, 2006-2010

Figure 3 shows NIY firms' (n=33) and comparison group's (n=93) sales growth between 2006 and 2010. The starting levels of mean and median sales are between €200k and €400k in year 2006 and median levels are lower than these for both groups. Interestingly, the development of both mean and median sales is similar in both groups until 2008, when the NIY Programme started. Until 2008, NIY firms increased their sales similarly to the comparison group. After 2008, both mean and median sales curves plateaued for the comparison group, while the NIY group mean and median level of sales kept growing in 2009 and 2010. Note again that the NIY Programme started in 2008. The difference is thus quite telling. In 2010, the mean of sales for the 33 NIY firms was above €1.8M, while for the comparison group the mean of sales was €800k. The difference in the development of median sales is similar. These figures again suggest that the NIY Programme may have had an effect on its participating firms that goes beyond selection – a conclusion reinforced by the statistical analyses that follow.

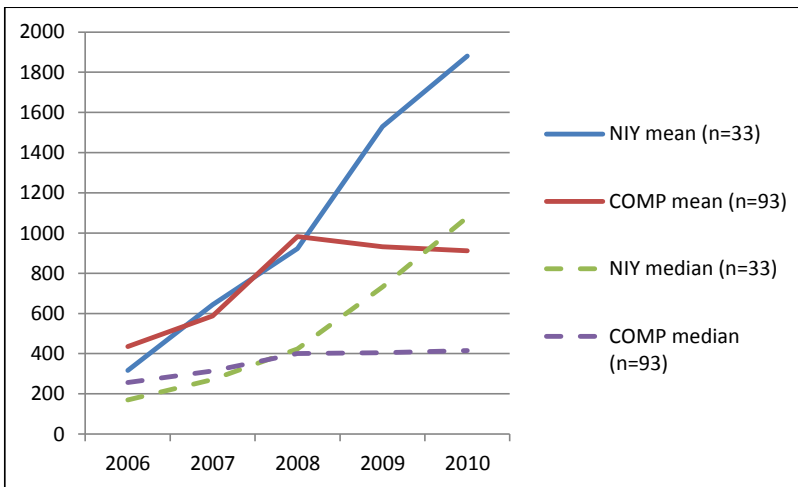


Figure 3 Mean and median sales for the NIY and Comparison groups between 2006 and 2010

Whereas the previous figures illustrated sales and employment growth of NIY firms as a group, in Figure 4 this group is divided to sub-groups, the development of which is analysed separately in comparison to the reference group. This analysis tells essentially the same story as reported above, although some variation between groups can be observed. Note, however, that the groups are quite small.

The slowest sales growth can be observed for those firms that were initially accepted to the NIY Programme but were subsequently excluded from the Programme for failing to meet their growth milestones (NIY exit firms, n=14). For these firms, the mean sales in 2007 were €235k, and they grew to €988k by 2011 (change +300%). The growth of these firms is largely similar to growth in the comparison group (Young firms, n=96), for which the mean sales in 2007 was €457k, and the mean sales in 2011 was €1561k (change +241%). Although these figures exhibit positive development, even more positive figures can be found for those firms that have completed the NIY Programme (NIY completed firms). For this group, the mean sales in 2007 was €442k, and the mean sales in 2011 was €2 934k (change +563%). If we look at NIY firms by the year they started their NIY projects, we see some evidence of the impact of the NIY Programme. Specifically, for firms that started their NIY projects in 2008, the slope of the curve turns upwards after 2009. However, for firms that started their NIY project in 2009, the same phenomenon can't be noticed. In fact, for these firms the slope first decreases and then increases again. This may mean that it requires some time before the benefits of the NIY Programme are realised. Also the financial crisis may have had an effect. Taken as a whole, however, the graph clearly signals a positive effect of the NIY intervention on sales growth. Again, while this descriptive analysis alone does not demonstrate a positive effect beyond the inevitable selection effect, the subsequent statistical analysis provide evidence that the NIY Programme has had a significant positive impact on the growth of its participating firms.

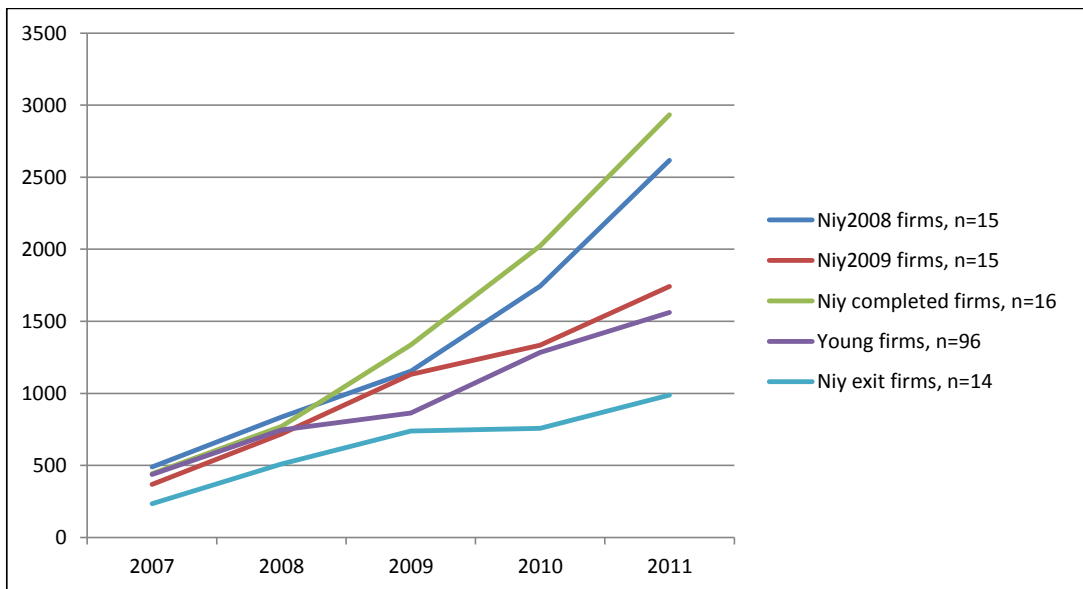


Figure 4 Mean sales for different NIY groups and Comparison group between 2007-2011

Equity growth

While sales and employment growth are important metrics of success, so is the ability of the new venture to raise equity funding. A characteristic of innovative new firms is, by definition, their involvement in developing, manufacturing and commercialising technology. These are high-cost, yet uncertain activities (Katila et al., 2008). Therefore, innovative high-growth firms in particular must attract external funding to overcome the temporal separation of upfront costs and subsequent uncertain revenues (Katila et al., 2008). Thus, the second research question is: how have VIGO participating firms, NIY participating firms and firms in the comparison group been able to attract equity funding between 2006 and 2012? To answer this question, three groups were analysed: 'VIGO firms' are those firms that operate under a VIGO accelerator; 'NIY firms' are those firms that have been selected to the NIY Programme; and 'comparison group' includes firms that have been founded after year 2003, are customers of Tekes and do not belong to either the 'VIGO group' or the 'NIY group'.

To analyse whether firms in these groups have been able raise equity funding, time series data were collected for each group for total equity, restricted equity and share capital from 'Voitto+' financial database. Restricted equity is calculated by subtracting profits for the financial year and retained earnings from total equity. 'Full time series' for a period from 2009 to 2011 were found for 21 VIGO firms, 85 NIY firms and 115 comparison group firms.

The lowest starting level of total equity is for VIGO group, with a mean equity level of -€44k and median level of -€2k. The negative equity testifies of heavy investment by VIGO firms in R&D and business development. The highest starting equity level was observed for the NIY group, with a mean equity level of €103k and median equity level of €58k (Table 3). In between is the comparison group with mean equity of €15k and median equity of €10k. By 2011 in VIGO group the mean equity level had increased by 497% to €177k, but median value had decreased to -€18k. In the NIY group, the mean equity value had increased by 151% to €258k, and the median value had increased by 121% to €258k. The comparison group shows an increase of 89% in mean value and an increase of 110% in median value. In both the NIY group and the comparison group, the mean and median equity levels have thus developed at the same rate. In the VIGO group, however, variance is more substantial. In sum, the absolute level of equity increased in the VIGO group by €4 678k, in the NIY group by €13 196k, and in the comparison group by €1 600k.

Table 3 The growth of equity in VIGO firms, NIY firms and comparison group firms

Equity* (k€)	VIGO			NIY			Comparison group		
	2009	2010	2011	2009	2010	2011	2009	2010	2011
N in data	21	21	21	85	85	85	115	115	115
Missing	0	0	0	0	0	0	0	0	0
Mean	-44	68	177	103	233	258	15	4	29
Mean, yearly change %		253 %	159 %		126 %	11 %		-70 %	535 %
Mean, change 09-11			497 %			151 %			89 %
Median	-2	0	-18	58	123	129	10	15	21
Median, yearly change		100 %			111 %	5 %		50 %	40 %
Median, change 09-11			-800 %			121 %			110 %
Standard deviation	139	898	903	693	1 151	715	532	5 853	664
Minimum value	-411	-1 092	-1 472	-3 946	-5 191	-1 092	-3 131	-3 180	-4 318
Maximum value	126	3 745	2 742	3 178	6 241	4 047	1 743	1 600	1 659
Sum	-941	1 441	3 737	8 759	19 829	2 1955	1 805	536	3 405
Sum, yearly change		253 %	159 %		126 %	11 %		-70 %	535 %
Sum, change 09-11			497 %			151 %			89 %

*Equity=share capital + reserves + profits of the financial year + retained earnings

The analysis of restricted equity complements the total equity analysis by showing the impact of accumulated profits and losses on equity (Table 4). Interestingly, the lowest starting level is for the comparison group with mean level of restricted equity of €166k and median level of €12k, and the highest restricted equity level is observed for the NIY group (mean €660k and median €323k). In between is the VIGO group, with a mean of €168k and median of €23k. By 2011 the mean value had grown by 666% in the VIGO group to €1 292k, and the median value had increased by 2 413% to €578k. In the NIY group, the mean value had increased by 100% to €1 322k, and the median value had increased by 165% to €856k. The comparison group shows an increase of 51% in mean value and an increase of 8% in median value. When compared to earlier total equity figures, two observations impose themselves. First, the relative changes in mean and median levels of restricted equity are much higher in the VIGO group than in the two other groups. Second, the mean and median levels of restricted equity are higher than in total equity. This means that especially in the VIGO and NIY groups, investments in equity have occurred (either in reserves or share capital). On the other hand, in these groups, losses decreased total equity during the period. In total, the absolute level of restricted equity increased in VIGO group by €23 602k, in the NIY group by €56 307k, and in the comparison group by €9 726k.

Table 4 Growth in restricted equity for VIGO firms, NIY firms and comparison group firms

Restricted equity* (k€)	VIGO			NIY			Comparison group		
	2009	2010	2011	2009	2010	2011	2009	2010	2011
N in data	21	21	21	85	85	85	115	115	115
Missing	0	0	0	0	0	0	0	0	0
Mean	168	554	1 292	660	1 107	1 322	166	208	251
Mean, yearly change %		228 %	133 %		68 %	19 %		25 %	21 %
Mean, change 09-11			666 %			100 %			51 %
Median	23	374	578	323	723	856	12	12	13
Median, yearly change		1 528 %	54 %		124 %	18 %		0 %	8 %
Median, change 09-11			2 413 %			165 %			8 %
Standard deviation	275	867	1 837	1 004	1 780	1 682	427	473	560
Minimum value	3	3	3	2,5	2,5	8	1	1	1
Maximum value	834	4 005	7 784	5 783	10 991	9 263	3 292	3 293	3 816
Sum	3 545	11 642	27 147	56 138	94 151	112 445	19 199	23 927	28 925
Sum, yearly change		228 %	133 %		68 %	19 %		25 %	21 %
Sum, change 09-11			666 %			100 %			51 %
*Restricted equity (=equity-profits of the financial year-retained earnings)									

To finally see whether the recognised positive changes in restricted equity are due to changes in share capital, the growth of share capital is analysed. Table 5 shows clearly that in comparison to the above mentioned changes, the changes in share capital are non-existing or minor. For example, the change in median level of share capital between 2009 and 2011 is 0 % for the VIGO group and the comparison group and 20% for the NIY group. Thus, the positive changes in restricted equity seem to have occurred through changes in reserves.

Table 5 Growth in share capital for VIGO firms, NIY firms and comparison firms

Share capital (k€)	VIGO			NIY			Comparison group		
	2009	2010	2011	2009	2010	2011	2009	2010	2011
N in data	21	21	21	85	85	85	115	115	115
Missing	0	0	0	0	0	0	0	0	0
Mean	17	22	22	33	59	57	36	38	44
Mean, yearly change %		30 %	0 %		75 %	-4 %		6 %	15 %
Mean, change 09-11			30 %			68 %			22 %
Median	3	3	3	10	11,5	12	9	9	9
Median, yearly change		0 %	0 %		15 %	4 %		0 %	0 %
Median, change 09-11			0 %			20 %			0 %
Standard deviation	37	42	42	51	122	123	90	95	129
Minimum value	2,5	3	2,5	2,5	2,5	2,5	1	0	1
Maximum value	168	168	168	270	838	838	726	725	1 189
Sum	370	480	481	2 881	5 033	4 855	4 191	4 461	5 113
Sum, yearly change		30 %	0 %		75 %	-4 %		6 %	15 %
Sum, change 09-11			30 %			68 %			22 %

Access to Finance

The previous analyses of equity growth show that the NIY and VIGO firms have been able to attract substantial amounts of new equity capital. For NIY firms we could further see that these investments have helped fuel sales growth. Next we move from accounting data to consider the firms' subjective perceptions regarding the availability of external funding during different time periods. We again focus on three groups: firms that have been admitted to the NIY Programme ("NIY accepted"); firms that have been founded after year 2003, are customers of Tekes, and do not belong to the NIY group ("comparison group"); and firms that applied to the NIY Programme but were not selected into the programme ("NIY not accepted"). To analyse how the respondents perceived access to finance over time and in comparison against other resources, responses to survey questions in year 2008 and after were analysed. The working assumption here is that access to finance is perceived more difficult in reference groups than among NIY firms; and that access to finance in general should have grown more restricted after year 2008 when the financial crisis started.

Table 6 shows that up to year 2008, the respondents especially in the comparison group and in the "NIY not accepted" group perceived access to finance as relatively restricted. For both groups, finance is perceived as the most difficult resource to access. The average for these groups is above four on a scale of 1 to 7, indicating perceived difficulty to access finance (higher values indicate greater perceived difficulty). NIY firms perceive that the most difficult resources to access are competent managers and distribution channels. The difference in mean values between NIY accepted firms and NIY not accepted firms for the access to finance item is statistically significant. Remember again that the NIY Programme started in 2008.

Table 6 Access to finance and other resources, up to year 2008 (scale 1 easy....7 difficult)

	NIY accepted			Comparison group		NIY not accepted	
	Mean	Obs	Std. Dev	Mean	Obs	Mean	Obs
How easy is it for you to access advice and consulting	2,86	43	1.80	2.43	94	2.41	63
How easy is it for you to access finance	3,95	43	1.54	4.29	94	4.57*	63
How easy is it for you to access competent personnel	3,95	43	1.37	3.88	94	3.88	63
How easy is it for you to access competent managers	4,30	43	1.45	3.87	93	3.74	63
How easy is it for you to access distribution channels	4,30	42	1.58	3.68*	94	3.71	63
Significance of t-test NIY accepted vs. comparison groups *, p=0,05, **, p=0,01, ***, p=0,001							

In year 2009 or later, finance is perceived as the most difficult resource to access among all groups, and the perceived difficulty has increased (Table 7). Statistics show, however, that among NIY accepted firms, access to finance is perceived as a less severe constraint than in the reference groups, and that these differences are statistically significant. The easiest resource to access at both points of time is advice and consulting. This is also the only item for which there is a statistically significant difference between answers from 2008 or earlier and answers from 2009 or later (for the NIY accepted group). To conclude, it seems that the pre-assumptions hold: the NIY firms perceive easier access to finance than what is perceived in reference groups, and accessing finance is perceived to have become more difficult after the financial crisis year 2008. Especially in the latter period it is possible that the NIY Programme has helped alleviate the financial resource constraints for the NIY firms.

Table 7 Perceived difficulty in accessing external resources after 2008 (scale 1 easy....7 difficult)

	NIY accepted			Comparison group		NIY not accepted	
	Mean	Obs	Std. Dev	Mean	Obs	Mean	Obs
How easy is it for you to access advice and consulting	2,23	190	1.41	2.82 ***	236	2.85 ***	147
How easy is it for you to access competent personnel	3,66	152	1.50	3.54	188	3.48	123
How easy is it for you to access competent managers	3,83	190	1.54	3.75	239	3.64	148
How easy is it for you to access distribution channels	4,01	189	1.50	4.03	239	3.98	148
How easy is it for you to access finance	4,30	190	1.60	4.73*	240	4.83**	149
Significance of t-test Niy accepted vs. comparison groups *, p=0,05, **, p=0,01, ***, p=0,001							

Finance as a Perceived Barrier to Growth

We next look at how the NIY firms perceive finance and other external resources as a growth constraint in comparison to the reference group. To answer this question, two groups were formed: firms that have been accepted to the NIY Programme (“NIY accepted”) and firms that applied to the NIY Programme but were not accepted (“NIY not accepted”). In this analysis, responses to survey questions in years 2011 and 2012 are used.

Statistics show (Table 8 and Table 9) that finance seems to be the most important perceived barrier to growth for both groups. For the “NIY accepted” group, the average perceived constraint value is 5,0 on a scale from 1 to 7 (higher values indicating greater severity of constraint). For the “NIY not accepted” group, the perceived constraint value was 5,35. Of the respondents in the “NIY accepted” group, 67% indicated that finance is a barrier, and for the “NIY not accepted group”, this share was the same, 66%. For both groups, finance is seen as significantly more severe barrier than the other resources considered. The only other statistically (almost) significant difference between the two groups is that the “NIY accepted” firms perceived human resources to be a more severe constraint to growth than did the comparison group.

Table 8 Do the following resources constitute significant barriers to growth? (1 No barrier.....7 Barrier)

NIY accepted (n=58)	Mean	Std. Dev.	1 (%)	2 (%)	3 (%)	4 (%)	5 (%)	6 (%)	7 (%)
Finance	5,00	1,66	3	7	7	16	27	16	24
Human resources	4,44+	1,74	9	9	9	17	28	16	12
Customers	4,14	1,60	9	12	9	19	28	23	-
Distribution channels	3,89	1,79	14	10	17	16	24	12	7
Co-operation	3,82	1,50	9	10	21	27	16	17	-
Internationalisation	3,77	1,88	14	21	7	19	20	10	9
Product/service development	3,53	1,53	9	21	21	23	10	16	-
Our own choices	1,78	1,06	55	25	9	9	2	-	-

Table 9 Do the following resources constitute significant barriers to growth? (1.No barrier.....7. Barrier)

NIY not accepted (n=51)	Mean	Std. Dev.	1 (%)	2 (%)	3 (%)	4 (%)	5 (%)	6 (%)	7 (%)
Finance	5,35	1,78	2	8	10	14	2	29	35
Human resources	3,86	1,68	4	21	20	21	18	4	12
Product/service development	3,78	1,59	6	16	24	24	12	12	6
Internationalisation	3,70	1,90	16	16	16	14	20	8	10
Customers	3,66	1,75	14	16	16	21	17	10	6
Distribution channels	3,58	1,55	12	14	20	26	16	10	2
Co-operation	3,44	1,60	12	26	10	18	28	4	2
Our own choices	1,93	1,16	48	26	13	9	4	-	-

External Fundraising

The final issue in this descriptive analysis focuses on the attempts of the firms to raise external funding. To guide our analysis, the research question was set as: how have the NIY firms and firms in the comparison group been able to attract external investment from 2006 to 2012? To answer this question, three groups were formed: firms that have been accepted to the NIY Programme (“NIY accepted”), firms that have been founded after year 2003, are customers of Tekes and do not belong to the NIY group (“comparison group”) and firms that applied to the NIY Programme but were not accepted (“NIY not accepted”). Responses to survey questions in year 2012 and 2013 are used. Survey questions probed whether external funding had been sought and received and whether external funding will be sought in the coming year.

Table 10 shows that 34% of the firms in the “NIY accepted” group searched for external funding during the last year. The firms in the “NIY not accepted” group were only slightly less active, with 28% seeking external funding. During the last year, 72% of the firms in the “NIY accepted” group that sought to raise funding were successful (Table 11). This is a higher success rate than in the “NIY not accepted” group (47% success rate) and substantially higher than for the “comparison group” (10%). The average size of new investment was €1 085k for the “NIY accepted” group and €370k for the “NIY not accepted” group (Table 12). In the coming year, approximately 50% of the firms in both “NIY accepted” and “NIY not accepted” groups are planning to seek external funding. In the “NIY accepted” group, the average sum that is being searched for is €2 500k, while in the “NIY not accepted” group the financial need is approximately €1 000k on average. In summary, these statistics suggest that firms in the NIY Programme have been able both more successful in fundraising and had attracted larger investments than their counterparts in the two comparison groups.

Table 10 Have you tried to raise external funding during the last year?

Group	N	Yes (%)	No (%)
NIY accepted	41	34%	66%
NIY not accepted	69	28%	72%

Table 11 Has your firm received new equity funding during the last year?

Group	N	Yes (%)	No (%)
NIY accepted	36	72%	28%
NIY not accepted	34	47%	53%
Comparison group	19	10%	90%

Table 12 New investment size (k€)

Group	N	Mean	Std. Dev.	Min	Max	Sum
NIY accepted	25	1 085	2 431	3	12 500	27 100
NIY not accepted	16	370	472	29	1 900	5 934
Comparison group	2	775	35	750	800	1 550

Table 13 Do you plan to seek new external funding during the next year?

Group	N	Yes (%)	No (%)	Does not know
NIY accepted	30	53%	43%	4%
NIY not accepted	42	55%	38%	7%

Table 14 Required new investment size (k€)

Group	N	Mean	Std. Dev.	Min	Max	Ownership share for the investment (mean)
NIY accepted	15	2 506	2 551	300	10 000	20 %
NIY not accepted	22	1 000	1 327	50	5 000	20 %

Impact of NIY on Sales Growth: Statistical Analysis

Above we have performed descriptive analysis on the impact of the NIY and VIGO Programmes on the growth of their participating firms. These findings suggest that the NIY and VIGO firms VIGO have performed well in the marketplace, and they have also been successful in attracting external investment. However, an important limitation in the above analysis is that we have not controlled for the possible bias introduced by the selection procedure. Both the NIY and VIGO Programmes are highly selective, and growth potential is used as the primary selection criterion. Therefore, although the above descriptive analysis suggests that the impact has been positive, it is still possible that this impact is primarily due to selection rather than any intrinsic impact delivered by the programme itself beyond the selection effect. In statistical parlance, such intrinsic effect is often referred to as a “treatment effect”. The question therefore remains: are the above reported findings due to selection only?

To address this question, we next perform complementary statistical analyses designed to gauge the treatment effect of the NIY Programme. As of now, there is not enough longitudinal data on the VIGO firms to perform the same analysis. Specifically, we use Propensity Score Matching (PSM) technique to assess the treatment effect, if any, produced by the NIY Programme. PSM is a state-of-the-art method used in programme evaluation that is designed to provide an effective control of the selection bias (Guo et. al., 2010). We apply this technique to analyse the growth performance of all firms that have applied to the NIY Programme. Within this group, there are two kinds of firms: those that have been accepted into the Programme (indicated with a dummy variable: “niy_accepted”, which takes the value 1 if true) and those firms that have applied but were not accepted to the Programme (indicated with the same dummy variable “niy_accepted”, which takes the value of zero for these firms). For greater reliability, we use survey data that was collected on both accepted and non-accepted NIY firms at the time when they applied into the NIY Programme but did not yet know whether their application was successful.

PSM analysis starts from each treated case’s (niy_accepted) propensity score (this indicates the probability that a given firm belongs to the “treatment group” – i.e., was accepted into the NIY Programme). This propensity score is then used to identify a control firm that is as similar as possible to the “treated” firm, except that it did not get admitted into the NIY Programme. Hence the term: Propensity Score Matching. Propensity scores are estimated through a probit model that predicts selection into the treatment group (i.e., niy_accepted) within the population that also includes firms that have applied to the NIY Programme but have not been accepted. It is believed that these control group firms are similar to treatment group firms because they have applied to the NIY Programme and may therefore be thought to possess very similar qualities. Importantly, the act of applying to the NIY Programme indicates that the applicant is motivated to pursue growth. In the probit model the probability that a firm has been selected to the group of NIY firms is explained by the firm’s ability to attract financial resources (resmob_fin), by the perceived internationality of the industry (sect) and by the extent to which the firm aims to grow through internationalisation (grow_intl). As control variables we use industry sector, firm location, and the year of foundation (age). Explanatory variables are derived from each firm’s survey answers at the time when a particular firm applied to the NIY Programme. Control variables are derived from the Fonecta database. The dependent variable is the log difference of sales between the year before a firm applied to the NIY Programme and realised sales during each of the three following years. Thus, three different measures of log difference are used. In addition, the analysis was also carried out for mean annual log difference of sales.

This figure has been obtained for the “NIY accepted” and “NIY not accepted” firms by first calculating the log difference for as many subsequent two-year periods between 2008 and 2012 as possible and by calculating the arithmetic mean of these. Thus, in this case, for each firm in the analysis, there is at least one log difference observation. The source of the sales information is financial Voitto+ database. The results of the latter analyses are presented in Appendix 2.

Tale 15 shows the results of the probit model that was used to calculate each firm’s propensity score. Not all parameters of the model are zero (likelihood ratio), indicating that the model is valid. Our explanatory variable, the extent to which a firm aims to grow through internationalisation, seems efficient in predicting selection to the NIY Programme. Thus, the more there is emphasis on internationalisation in the firm’s growth strategy, the more probable it is that the firm has been admitted to the NIY Programme. As for the control variables, the dummy for industry and the establishment year are significant predictors, indicating that if the firm operates in the IT industry, it has a higher probability of gaining acceptance into the NIY Programme than if the firm operates in other industries. Also, younger firms have higher probability to gain acceptance into the NIY Programme. The model’s explanatory power (r squared) is around 30%, indicating good explanatory power.

Table 15 Estimation of propensity score values (probit model)

Variable	Coefficient	Std. Err.
Financial resource mobilisation	-.02	,12
Internationality of sector	,13	,14
Grow by internationalisation	,43***	,13
IT industry dummy	,97 *	,42
Establishment year	,18*	,09
Location dummy (big city)	,46	.40
Constant	-379,01*	191,93
Pseudo r squared 0,31		
LR 34,03***		
Dependent variable: dummy variable of whether the firm has been accepted to the NIY Programme (1 = accepted, 0 = not accepted)		

Table 16 shows the estimated treatment effects. These are indicated in the Table as ATT, which indicates the average treatment effect for the treated cases (‘treatment’ here meaning participation in the NIY Programme). This statistic shows that the NIY Programme has had a positive impact on the sales growth of its participating firms. To check robustness, the analysis was carried out using three different methods that

used different matching procedures (one neighbour matching, five neighbours matching and caliper matching). The results are consistent across different matching procedures, and also, across different dependent variables. For example, the ‘DV1’ row shows the difference in sales growth between the “NIY accepted” and propensity score matched “NIY not accepted” firms after one year. The log difference (which is an approximation of percentage change for at least small changes) in sales for treated cases after one year and untreated cases after matching (average treatment effect for treated cases) is 0.99, indicating that the NIY firms had grown their sales by 99 percentage points more than their propensity score matched pairs in the comparison group. This difference is statistically very significant (the stricter, 2-tailed significance criterion is used). The results are consistent over different models and outcome variables.

Table 16 Results from the propensity score analysis

Dependent variable	One neighbour		Five neighbours		Caliper	
	ATT	T-stat	ATT	T-stat	ATT	T-stat
(DV1) $\log[\text{sales}(t+1)] - \log[\text{sales}(t)]$	0.99	2.23	1.02	2.45	1.06	2.72
(DV2) $\log[\text{sales}(t+2)] - \log[\text{sales}(t)]$	1.00	1.89	0.98	1.96	1.02	2.10
(DV3) $\log[\text{sales}(t+3)] - \log[\text{sales}(t)]$	1.10	0.93	0.78	1.23	1.13	1.18
(DV1) Common support untreated/treated off support treated	34/48		34/48		34/39 9	
(DV2) Common support untreated/treated off support treated	30/44		30/44		30/32 12	
(DV3) Common support untreated/treated off support treated	23/35		23/35		23/24 11	

For example, the 99% treatment effect signals that the impact of the NIY programme on the sales growth rate of the treated (i.e., NIY) group has been 99 percentage points higher than in the control group, when controlling for previous year’s sales and other factors. The size of the impact is demonstrated in Table 17. We can see that the median sales of the NIY group has grown by 286% over the period, whereas in the control group the median sales grew by 65%. This is a notable difference, given that the NIY participating firms were already larger in 2007 – thus, they managed a faster relative sales growth from a larger base.

For growth in mean sales (i.e., the arithmetic average of sales), NIY participating firms achieved a 406% growth over the period, whereas the untreated group achieved a still healthy sales growth of 159% over the same period.

Note that the differences in growth rates in the table do not directly translate to the 99 percentage point difference suggested by the Propensity Score Matching analysis, because the PSM method forms the estimate controlling for propensity scores and other factors. Thus, the figures in the Table include both the selection and treatment effects for the NIY group, and they are also influenced other factors such as the base from which the growth is computed. It can nevertheless be said that controlling for selection effect and other factors, the PSM analysis indicates that the treatment impact delivered by the NIY Programme has resulted in a rough doubling of the sales growth rate of NIY firms relative to their closely matched peers.

Table 17 Realized growth of treated and untreated firms

		2007	2008	2009	2010	2011
Median	Untreated (n=17)	195	239	240	264	321
	Annual growth rate		23 %	0 %	10 %	22 %
	Growth over the period					65 %
	Treated (NIY; n=27)	250	362	683	1 025	964
	Annual growth rate		45 %	89 %	50 %	-6 %
	Growth over the period					286 %
Mean	Untreated (n=17)	372	554	653	773	964
	Annual growth rate		49 %	18 %	18 %	25 %
	Growth over the period					159 %
	Treated (NIY; n=27)	475	868	1 301	1 717	2 403
	Annual growth rate		83 %	50 %	32 %	40 %
	Growth over the period					406 %

Overall, the above results from the propensity score matching analysis show that the NIY Programme has had a strong, positive impact on the sales growth of its participating firms. Importantly, our analysis strongly suggests that this impact is due to the contribution made by the Programme itself, and not because of the selection effect. In the above analysis, we report treatment effects above and beyond selection effects, which were controlled with propensity score matching. Thus, the NIY Programme has delivered genuine additional value to its participating firms, and the resulting impact on firm growth has been substantial.

The literature on matching suggests that after the propensity score analysis is carried out, it is important to check matching performance in terms of balance and the region of common support. Checking balance means analysing whether it was possible to make comparison firms more similar to treatment group firms with respect to variables that were included in the probit model. Analysing the region of common support, in turn, means analysing whether there is enough overlap in terms of propensity score values between the treatment group and the control group so that reasonable comparisons between treatment cases and matched cases can be made. These issues are addressed in appendix one. In summary, this robustness check shows that, on the one hand, the matched sample consists of more similar firms than firms in an unmatched sample of control firms, and, on the other hand, that there is overlap in terms of propensity scores between treatment cases and matched cases. However, although these checks support the robustness of our findings, we nevertheless performed an additional robustness check by repeating the analysis with a different dependent variable (shown in Appendix 2). This additional robustness check again supports the main conclusion: when the mean annual log difference of sales was used as the outcome variable, the results are fully in line with results produced by the other modelling specifications. The average treatment effect on treated firms remains positive and significant over different models, and internationalisation strategy remains as significant predictor in the probit equation (in addition to internationality of the sector and financial resource mobilisation). These results lend even further support to our main conclusion: that the NIY Programme has delivered a genuine, substantial positive impact on the sales growth of its participating firms.

Discussion and Conclusions

This paper addressed five research questions. In the following, findings regarding these five questions are summarised. We address each research question separately.

(1) How have the NIY participating firms grown their sales and employment in comparison to other innovative new firms between 2006 and 2012?

The main conclusion from analysing sales and employment time series is that NIY firms' sales and employment have grown more strongly than in the comparison group. For instance, the starting levels of mean and median sales in year 2006 were between €200k and €400k for both NIY firms and the reference group firms. In 2010, the mean sales for the 33 NIY firms had grown to above €1.8M, while for the comparison group, the mean sales had grown to €800k. The observed difference in the development of median sales in each group follows the same pattern. The descriptive analysis shows that the NIY firms have grown their sales substantially more rapidly than the comparison group.

We further analysed whether this effect was due to selection or treatment – i.e., whether the NIY Programme had delivered a genuine, value-adding impact on the sales growth of its participating firms. A statistical technique called Propensity Score Matching was used for this purpose. This technique helps minimise bias introduced due to the selection of firms into the NIY Programme, thus helping tease out the treatment effect – i.e., the genuine growth-enhancing impact delivered by the NIY Programme. The Propensity Score Matching analysis strongly supports the conclusion that the NIY Programme has produced a genuine and substantial, positive effect on the sales growth of its participating firms.

(2) How have the VIGO firms, NIY firms and firms in the comparison group been able to attract equity from 2009 to 2012?

The balance sheet analysis shows that the NIY, VIGO and control group firms have been able to attract new equity funding during 2009-2011 in all three groups. The increase in equity has been driven by an increase in reserves, and this has offset the impact of losses especially in the VIGO and NIY groups. In sum, the aggregate level of restricted equity increased in the VIGO group by €23M (21 firms), in the NIY group by €56M (85 firms) and in the comparison group by €9 726k (115 firms). These sums may be considered an approximation of the money invested in the firms by external investors between 2009 and 2011.

(3) How have the NIY firms perceived access to finance before and after the financial recession and in comparison to other important resources?

Concerning the perceived difficulty in accessing finance, the pre-assumptions seem to hold: the NIY firms perceived easier access to finance than the reference group firms. Accessing finance was also perceived to have become more difficult after the financial crisis started in 2008. Especially in subsequent years it seems that the NIY Programme has significantly alleviated the financial resource constraint for its participating firms.

(4) How do the NIY firms perceive finance as a constraint to growth in comparison to the reference group and in comparison against other possible constraints?

Among different growth constraints, finance seems to be the perceived as the most important. The NIY programme participants seem to perceive finance as a little bit smaller constraint than the comparison groups, but the difference, although statistically significant, is relatively minor. As for other external resources, these were perceived quite similarly by the NIY firms and their comparison group.

(5) How have the NIY firms and firms in the comparison group been able to raise external funding?

The final research question focused on external fundraising. The data analysed came from survey answers from years 2012 and 2013. The data suggests that firms in the NIY Programme have sought funding more often than their peers, and they have been more successful in obtaining external equity funding, both in terms of funding events and amounts. For example, 34% of the NIY participating firms had sought external equity funding during the year preceding the survey in comparison to 28% of the firms that applied but were not accepted to the NIY Programme. Moreover, during the year preceding the survey, 72% of fundraising attempts by NIY participants were successful, whereas some 47% of the unsuccessful NIY applicants managed to raise external equity funding when seeking to do so. For the base population of innovative young firms, the success rate was only 10%.

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Appendix 1

Balance and the region of common support in propensity score analysis

The tables below shed light on matching performance in terms of balance and the region of common support. Table 17 shows that the matching operation was successful. This can be seen from the mean values of control group firms. For example, the mean value for the 'Sect' variable is 5,48 for the unmatched control group, whereas for the matched control group 'Sect' variable has the mean value of 6,14. This is much closer to the mean value of 6,11 for the 'Sect' variable in the treatment group. The table further shows the remaining difference between means for different variables, and that the remaining difference is not statistically significant. The highest bias (35,9% in the %bias column) can be found with the industry dummy variable, meaning that treated (NIY) firms more often represent information technology industries. In summary, through matching, a reference group has been achieved that is more similar (in terms of financial resource mobilisation, sector, internationalisation, industry, location and age) with treated firms than without matching.

Table 18 Comparing variables before and after propensity score matching

Variable	Unmatched Matched	Mean		%bias	%reduct bias	t-test	
		Treated	Control			t	p> t
resmob_fin	Unmatched	4.3958	4.4412	-3.1		-0.14	0.888
	Matched	4.3958	4.3667	2.0	35.7	0.13	0.900
sect	Unmatched	6.1111	5.4804	51.8		2.40	0.019
	Matched	6.1111	6.1458	-2.8	94.5	-0.17	0.866
grow_intl	Unmatched	6.25	4.8824	85.2		4.02	0.000
	Matched	6.25	6.1125	8.6	89.9	0.54	0.592
ind_info_du~y	Unmatched	.45833	.26471	40.6		1.79	0.076
	Matched	.45833	.2875	35.9	11.8	1.74	0.085
big_cities~y	Unmatched	.89583	.64706	61.2		2.84	0.006
	Matched	.89583	.8125	20.5	66.5	1.15	0.252
founded_year	Unmatched	2005.9	2004.5	62.4		2.87	0.005
	Matched	2005.9	2005.2	28.2	54.8	1.66	0.101

To address the latter issue (region of common support), the distribution of firms over different values of propensity score (that may have values between zero and one) is presented in table 18. This plot can be used to check the region of common support, i.e., to analyse whether there is enough overlap between the treatment group and the control group so that reasonable comparisons between treatment cases and matched cases can be made. The graph shows that both treated (NIY) cases (in red) and matched cases (in blue) are spread over different values of the propensity score. This shows that there is substantial overlap between the treatment and control groups, although the untreated cases seem to spread more evenly over the continuum. Moreover, for untreated cases there is a peak in frequency with values close to zero, and for treated cases there is a peak in frequency for values close to one. This means that overlap is not perfect, although still acceptable for the matching purposes.

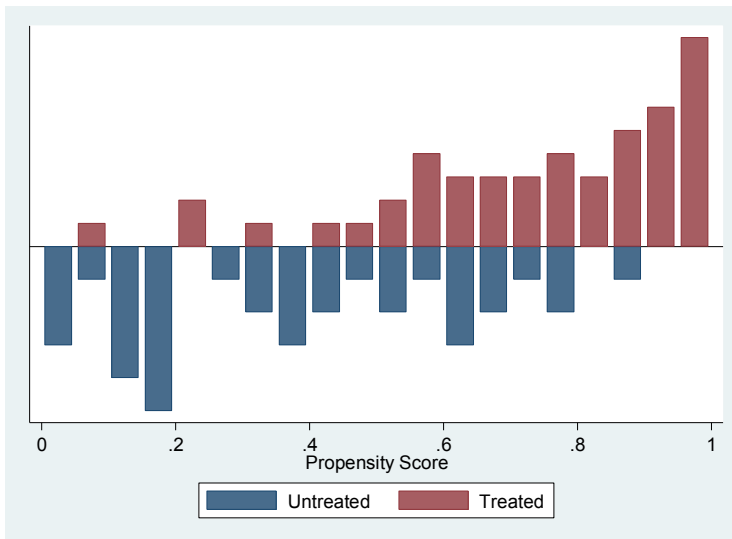


Figure 5 Analysis of the region of common support

Appendix 2

Propensity score analysis with mean annual log differences as the outcome variable

Table 19 Estimation of the propensity score values with a probit model

Variable	Coefficient	Std. Err.
Financial resource mobilisation	-,18*	,09
Internationality of sector	,21*	,11
Grow by internationalisation	,37**	,10
IT industry dummy	,73*	,30
Establishment year	-,01	,34
Location dummy (big city)	,42	,07
Constant	18,95	149,35
Pseudo r squared 0,23		
LR 35,90***		
Dependent variable: dummy variable of whether firm has been accepted to NIY (value 1 - accepted, value 0 – not accepted)		

Table 20 Results from the propensity score analysis

Dependent variable	One neighbour		Five neighbours		Caliper	
	ATT	T-stat	ATT	T-stat	ATT	T-stat
mean of $\log[\text{sales}(t+1)] - \log[\text{sales}(t)]$	0,70	3,73	0,53	2,98	0,71	3,78
Common support untreated/treated	51/62		51/62		51/61	
off support treated					1	

5 The Impact of Startup Services Offered for Employees – Case Nokia’s Bridge Programme

Evaluation of the Bridge Programme’s Entrepreneurship Track

In this summary, the results of the larger assessment of Nokia’s Bridge Programme entrepreneurship track are presented within an evaluation framework shown in figure 1. This framework is used to evaluate how successful the support provided by the Programme has been, and how well the businesses that took part in the Programme have performed in the early part of their life cycle. Thus, the first starting point of the Programme is considered in the light of background information on the participants. Secondly, the implementation of the Programme is assessed in the light of support achieved for the start-up process. Third, the Programme outcomes are assessed, and finally, the applicability of the Programme as a policy intervention is discussed.

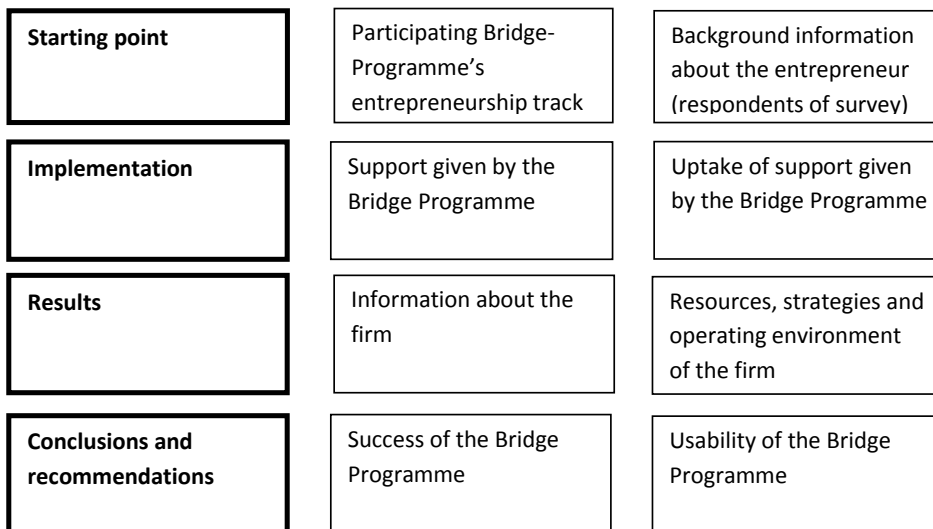


Figure 1 Evaluation framework

The summary, as well as the larger assessment, are based on the results of a survey sent to the participants of the Bridge Programme’s entrepreneurship track. Besides this, data were collected through interviews with companies, experts and stakeholders and financial data through Voitto+ financial data-base.

Starting Point of the Bridge Programme's Entrepreneurship Track: Facilitating Entrepreneurship

Nokia's Bridge Programme was launched in spring 2011, and it will continue until spring 2014. The Programme's entrepreneurship track has facilitated the start-up of some 400 companies in Finland set up by around 500 former Nokia who thus became entrepreneurs. About one out of ten employees laid off from Nokia in Finland in 2011-2013 chose to become an entrepreneur. Nokia supported the re-employment of the dismissed employees in many ways through the Bridge Programme. The most comprehensive, detailed and individually tailored support may have been provided for those who chose the entrepreneurship track, which aimed to mobilise as much of the internal expertise of Nokia as possible, and also to direct the employees to use the best national and regional business services.

Examined by the location of Nokia's branches, the share of those choosing the entrepreneurship track was 37% in the Helsinki Metropolitan area, 25% in the Oulu region, 21% in the Tampere region and 17% in the Salo region. In the responses received in the survey, the Helsinki Metropolitan area and the Oulu region were slightly overrepresented, while the Salo region was underrepresented. Categorised by sector, some 40% of those who chose entrepreneurship worked in the ICT sector or similar, 30% in expert services and similar, and 30% in other sectors.

Less than 40% of the respondents had joined Bridge in 2011, some 60% in 2012 and only less than 2% in 2013. They had been given some two months to prepare their business plans. In their feedback, the entrepreneurs criticised the fact that in the early phases of the Programme, more time had usually been allowed than in the later phase. The results of the survey do not support this view. However, the entrepreneurs would have liked more guidance in drawing up the business plans – for example, a ready-made template that would have indicated the key contents. Some criticism was also levelled at the fact that companies operating in different sectors were not treated equally. The entrepreneurship track was seen as a Programme tailored for start-ups in the technology and financial sectors mostly. In light of the data produced by the survey, we can neither confirm nor refute this claim.

The majority of those having chosen the Bridge Programme entrepreneurship track met the criteria Nokia had set for its support and thus passed the scrutiny of the Bridge evaluation group. Each region in which Nokia had been based had its own Bridge staff. The entrepreneurs were slightly critical about this in their feedback, as they felt that full equality could thus not be guaranteed for the regions. They also noted that there was a large turnover in the Bridge staff. On one hand, some entrepreneurs found this negative in their opinions, as the operating methods did not become established, and the staff could not accumulate experience. On the other hand, some thought it was a positive feature, as it eliminated the possibility of referring back to previous decisions, and all entrepreneurs could thus set out their plans "on a clean desk". While each region did indeed have its own staff, the final decisions were made by a joint panel comprising representatives from all regions. The turnover of Bridge staff was large, but the staff taking part in the decision-making panel usually was only replaced one person at a time, which made it possible to preserve continuity and a consistent policy in the decisions.

The respondents to the entrepreneurship track survey had had a great variety of tasks and positions in Nokia. The respondents were middle-aged, as almost 90% were in the age group 35-54. Women were slightly underrepresented; only one out of five respondents were female. The respondents had a high standard of education, as more than 90% had a degree from a university, higher education institution or a

university of applied sciences. Some two thirds had a technical education, and the fields of education of the remaining third were rather evenly divided between a business degree and other types of education. The majority of those who chose entrepreneurship did not have enterprising experience. Only 10% of the respondents stated that they had been startup entrepreneurs before.

And why did the respondents choose the entrepreneurship track (Figure 2)? Almost one half of them said that they had been wanting to become entrepreneurs for some time and now had the opportunity. Only slightly over 10% said they became entrepreneurs because it was the only way of avoiding unemployment. Other reasons included "a possibility of starting a business based on an innovation/capability developed at Nokia", "I found an attractive business opportunity through Bridge", "I did not want to continue in paid employment", and "an opportunity to exploit Nokia technology that the company failed to exploit". The majority of the respondents had become entrepreneurs for reasons that gave them a high motivation for enterprising. The right motivation also guarantees a good end result in most cases. Only in case of those who became entrepreneurs to avoid unemployment can we talk about "forced entrepreneurship" and a low motivation for enterprising.

The Bridge Programme was considered an important factor in the respondents' decisions to become entrepreneurs. It was considered the most important by those who had found their reason to become an entrepreneur specifically through the Bridge Programme. Tampere differed from the other regions in that entrepreneurs in the Tampere region stressed the importance of the Bridge Programme more than others.

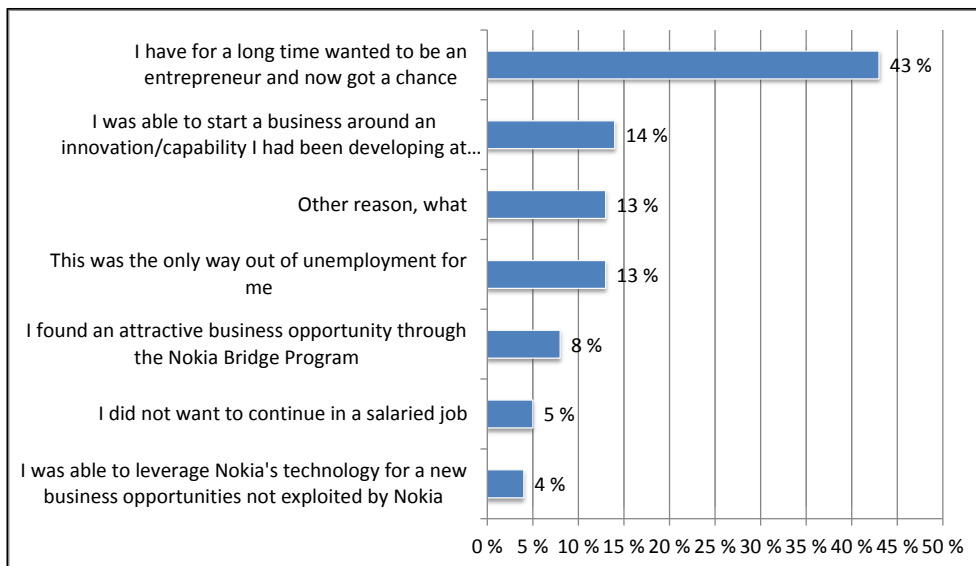


Figure 2 Reasons for becoming an entrepreneur and applying for startup support from Nokia

Four out of five respondents who had selected the Bridge Programme entrepreneurship track had been taking steps to prepare the starting of a business even before their joined Bridge. These initial steps indicated systematic and rather prudent preparation for entrepreneurship: drafting a business plan, investing personal funds and saving for investments, putting a startup team together etc. The significance

of support from the Bridge Programme and Nokia's severance package is reflected in the fact that very few, or only one out of ten, had focused on applying for other subsidies or received them (Figure 3).

Bridge Programme entrepreneurs usually set up their businesses while taking part in the Programme. Only about one out of ten of the respondents already had a company when they joined Bridge, and even fewer bought a company or a share in one while taking part in the Programme. In their feedback, respondents were critical about the need to set up a company before they knew whether or not they would receive a Bridge grant. However, preliminary approval could be applied for before setting up a company.

The Bridge entrepreneurs were rather evenly divided between those who started alone and those who started in teams. The team-based companies had an average of three persons, and the majority of the teams consisted of persons with a background in Nokia. While Bridge strove to encourage team building, only four persons from Nokia having received a Bridge grant could be part of one team. In their feedback, the entrepreneurs were critical of this restriction limiting the team to four persons, as they felt that a company would have a sounder basis at the start if it had a greater number of partners as its owners. The tax authorities' definition of an entrepreneur is someone with a minimum of 50% ownership, and accepting a 25% ownership as eligible for a startup grant was already a clear concession in favour of those taking part in the Programme's entrepreneurship track.

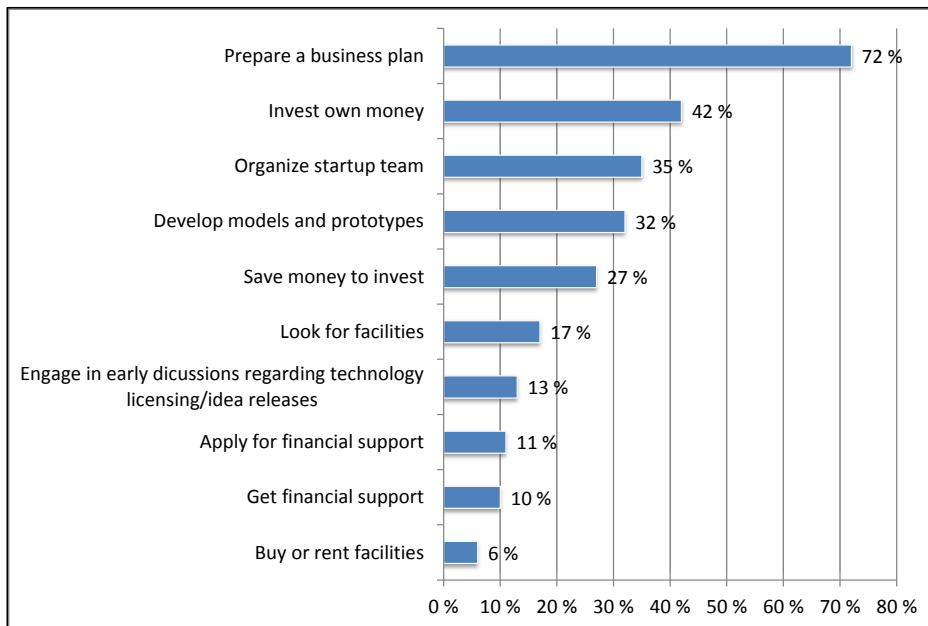


Figure 3 The share of those who had taken steps towards starting a business before joining the Bridge Programme

Of the entrepreneurs who responded to the survey, 4% are the sole owners of their companies. The majority own 25-99% of their company. Under the Bridge Programme rules, an eligible entrepreneur had to own at least 25% of their company (consistent with the team size restriction). Changes in the ownership since the entrepreneurs joined the Programme have taken place in about one out of five Bridge companies.

This explains the fact that some of the Bridge entrepreneurs own less than 25% of their companies. In some cases, the ownership share has also increased.

Some 90% of the Bridge companies are still actively operating, which is rather a good indication of their early success. In addition, some respondents who said that the company no longer is in active operation specified that its operations continue in another company, or in a new company that was set up to replace the Bridge company.

Implementation of the Bridge Programme entrepreneurship track: support and support uptake

The persons eligible to take part in the Bridge Programme were invited to information sessions organised by Nokia, which introduced them to the overall offer of the Bridge Programme, the entrepreneurship track and other options for finding employment. Personal discussions about the various Bridge tracks were also offered. Bridge Help Desk offered assistance to all Bridge participants. As part of the entrepreneurship track, information was also provided about business services in the local area, and individual startup coaching was available. Particular support forms for those who chose enterprising were direct financial support and a possibility of having a bank loan guaranteed.

Only about one out of ten in those who chose the entrepreneurship track did not take part in any of the information sessions on entrepreneurship. Nearly two out of three took part in these sessions several times (Figure 4). In their feedback, the entrepreneurs mainly found the contents of these information sessions good and extensive. A high number of the respondents said that the information sessions pointed them in the right direction and towards the right targets, after which setting up the company went smoothly. However, the respondents mentioned that they would have liked a more in-depth introduction to enterprising issues. Many would even have liked entrepreneur training/courses about setting up a business and running it in the early stages (including taxation, insurance, sales, marketing, productising, accounting, financial planning).

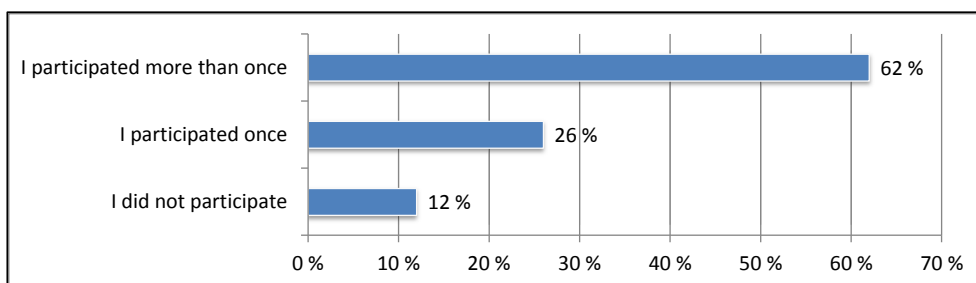


Figure 4 Participation in the information sessions about entrepreneurship organised by Nokia as part of the Bridge Programme

A maximum of EUR 25,000 was available for a person who chose the Bridge entrepreneurship track as a Bridge grant. In other words, a single company could receive grants totalling up to EUR 100,000. However, there were major variations in the grant amounts received (Figure 5). The survey indicates that the average grant amount received by an individual company was about EUR 27,000. The population of the survey was 348 companies, and based on these figures, Nokia Oyj gave them a total of nearly EUR 10 million in Bridge grants. In their feedback, entrepreneurs criticised the fact that in the early phases of the Bridge Programme, the grants were larger than in the later phase. Based on the survey, however, the difference between the grant amounts for companies that joined Bridge more than a year ago (on average, EUR 28,000) and less than a year ago (on average, EUR 25,000) was rather small.

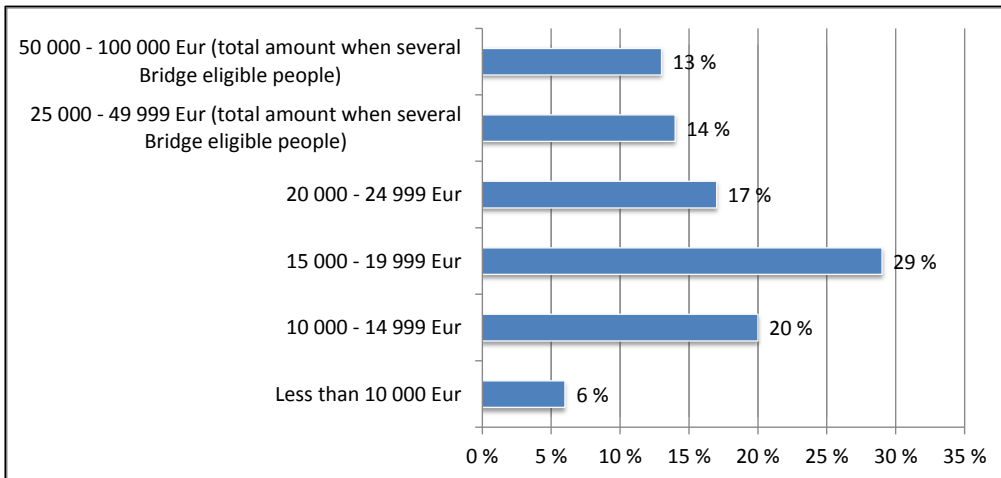


Figure 5 The amount of the direct Bridge startup grant received by the company

Those who chose the Bridge entrepreneurship track could also apply for Nokia’s guarantee for a bank account with a credit facility. Nearly one half of the entrepreneurs who had applied for the guarantee had activated it in the bank. The other half had either not activated the guarantee or not applied for it in the first place. Those who received credit felt that the significance of Nokia’s guarantee was extremely high. This aspect was also criticised – without Nokia’s guarantee, no credit could be obtained.

Those who became entrepreneurs could conclude a technology licensing and/or an idea release agreement with Nokia within the framework of the Bridge Programme. The share of these entrepreneurs was approximately one out of five. In practice, only companies operating in the ICT sector could conclude such agreements. As 40% of the respondents are active in the ICT sector, nearly one half of these companies have an agreement of this type in place.

The Bridge entrepreneurs found the services offered in the Bridge Programme useful for developing their companies (Figure 6). What they found the most useful was direct financial support and loan guarantees. Information about enterprising, presentation of the Programme’s overall offer and the entrepreneur track process were also found very useful. Interestingly, the respondents found the general information sessions more useful than individual discussions and personal coaching. Bridge Help Desk was found the least useful of the services evaluated in this survey. It may have become a target for criticism that concerned such

aspects of the Programme as its intranet site. The site was criticised for poor functionality and infrequent maintenance. To support Programme implementation, the respondents called for a web platform that would promote networking between Bridge entrepreneurs and more experienced "mentor entrepreneurs".

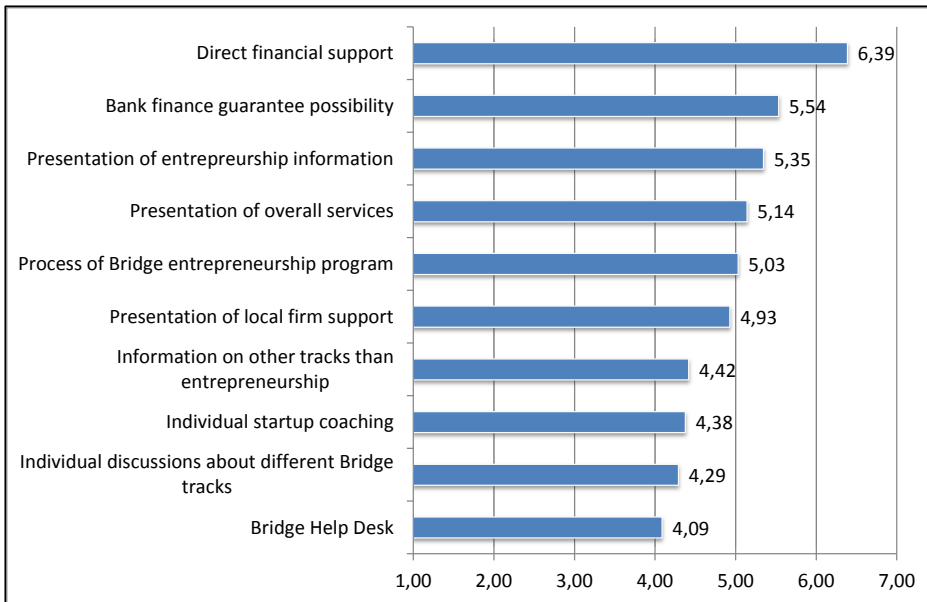


Figure 6 The usefulness of the services offered in Nokia's Bridge Programme in terms of developing the company (weighted average on a scale of 1 completely useless – 7 highly useful)

The responses to claims concerning the support provided by the Bridge Programme translate as a clear endorsement of the Programme's usefulness and the successful range of measures it provided. The financial support provided by the Programme was considered highly significant, and the information on entrepreneurship was found necessary and comprehensive. The Bridge Programme staff was found competent. The picture of becoming an entrepreneur given by the Bridge information sessions on entrepreneurship was considered rather realistic. The Bridge process helped to make the companies operational, and many of the respondents would not have become entrepreneurs without financial support from Bridge. The claim that juxtaposed the significance of the coaching and financial support provided by the Bridge process in terms of the company's future produced interesting results. The financial support was found more important, but the difference remained rather small.

In most cases, the companies spent the Bridge Programme grant on their day-to-day expenses (Figure 7). A major share of it was also spent on investments in fixed assets and subcontracting. As a positive indication, only 10% of the companies spent it on salaries for the entrepreneur or other staff. In their feedback, the respondents approved of the fact that the purposes for which the grant could be spent were not restricted, as long as it went towards the company's operation.

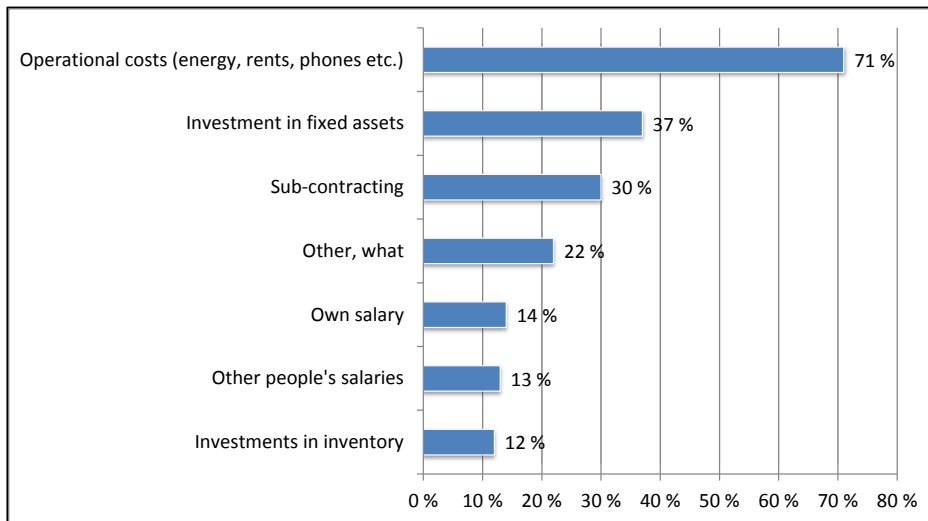


Figure 7 Uses of the direct financial support under the Bridge Programme

In other words, the direct financial support was a personal grant to the new entrepreneur. Usually, the same person also received a severance package at the same time (at maximum, 1.5 years' salary). Many entrepreneurs criticised the severity of taxation in cases where these payments were made in the same year. They said it resulted to a measure of inequality, as in some cases, these payments may have fallen on different years. If the employee was dismissed at the end of the year, they had in practice been receiving a salary all year, in addition to which they received the severance package (a year and a half's salary). Those who set up a business also received a startup grant. When all these amounts were calculated as income for a single year, the tax bill could be up to one half of the total amount. Those whose payments fell on the early part of the year, or whose startup grant payment was delayed until after the turn of the year, were in a better position. Nokia had negotiations with the tax authorities on the taxation procedures in connection with the Bridge Programme, but it was not possible to resort to any special practices in individual cases of this type.

Expert interviews indicated that a personal grant for the entrepreneur that had to be spent on the company's operations was a positive aspect. The funds saw the company through its early days, and it was not always necessary to apply for public grants or other external funding.

The Bridge Programme's information sessions on entrepreneurship strove to provide as much information about national and regional business services as possible. They were also used quite frequently by the Bridge entrepreneurs. Examined by the region, the Helsinki Metropolitan area had the greatest share of companies that did not use these business services at all. In the other regions, nearly all enterprises used business services. The most active users of business services were found in the regions of Tampere and Oulu. The information about business services provided at the Bridge Programme information sessions on entrepreneurship was considered both versatile and comprehensive. Many respondents used these business services to build up their knowledge about enterprising during and after the Bridge Programme.

Results of the Bridge Programme entrepreneurship track: companies and their operating environment

At the time of the survey, the Bridge companies that responded employed on average 2.1 persons. They anticipated an increase to 2.8 persons in their employee numbers by the end of 2013 and to 7.0 persons by the end of 2015. In other words, a roughly 2.5-fold increase in the two-year period of 2013-2015 is expected. These companies estimate their turnover in 2013 at EUR 132,000 on average, and their turnover in 2015 at EUR 1.2 million. They thus expect a 9-fold increase in their turnover in two years.

The aforementioned average estimates of employee numbers and turnover figures can be extrapolated to apply to the entire population in the company survey, or 348 companies. Accordingly, the companies would employ a total of nearly 1,000 people by the end of 2013, and nearly 2,500 people by the end of 2015. Their total turnover would be EUR 46 million in 2013 and nearly EUR 420 million in 2015.

Interpretations of how successful Bridge companies have been mainly rest on data provided by the survey. The companies have only been operating for such a short period that adequate final accounts material to interpret their success is not yet available. Usually, at least four successive sets of final accounts are needed. However, the fact that 90% of the companies continue to operate actively and that their forecasts of personnel numbers and turnover development are very positive indicate that the early phases of these companies have been rather successful.

The Bridge companies find it relatively easy to access consultation and advice, and they do not report any major difficulties in obtaining competent staff. Having access to distribution channels has proven harder, while obtaining funding has been found the most difficult aspect. The Bridge companies experienced somewhat more difficulty in accessing all the resources than Tekes NIY Programme companies⁵ and other young technology companies that are Tekes beneficiaries⁶ to which they were compared.

The Bridge entrepreneurs were also able to draw on the resources they had acquired in the Bridge Programme or when working for Nokia. The entrepreneurs found “identifying customer needs”, “recognizing conditions in the sector”, “technological resources”, “strategy”, “research and development”, “operational resources” and “sales and marketing” the most important ones of these resources. “Technological resources” and “research and development” stand out in that they were more frequently than others found either highly important, or they had not been used at all. About 60% of the Bridge companies no longer have any relationship with Nokia. Some companies do have a relationship with Nokia, in most cases as customers or partners.

The most important goal for the Bridge companies is providing the entrepreneur with a reasonable income (Figure 8). The next most important ones were maximizing profitability, ensuring survival and longevity in long term and maximizing sales growth. Maximizing firm’s valuation and ensuring ownership control were clearly less important as goals. Regarding some of the goals, the Bridge companies differed significantly from Tekes NIY companies. The NIY companies clearly considered maximizing sales growth and firm’s

⁵ Includes Tekes Young Innovative Companies (NIY) and VIGO companies. The NIYs are innovative technology companies that are beneficiaries of the Tekes funding instrument directed at young innovative companies.

⁶ Includes Tekes beneficiaries that do not belong to the NIY or VIGO groups but are technology companies set up after 2005.

valuation more important than the Bridge companies. The rankings of the goals were reversed, especially regarding maximizing profitability and ensuring ownership control. In other words, Bridge companies aim for profitability and permanence that provides the owners with an income, rather than increasing their sales and the value of the company.

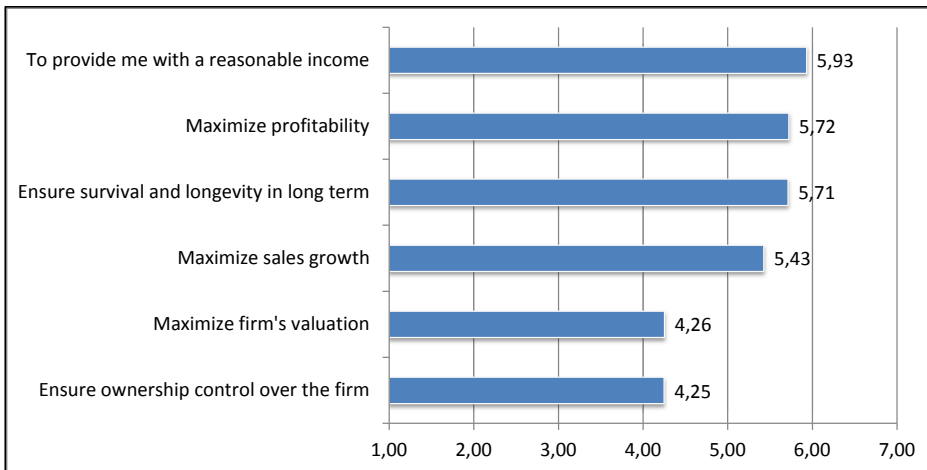


Figure 8 The significance of various goals for the company (weighted averages on a scale 1 less important – 7 more important)

The Bridge companies found the competitive situation in their sectors tough. There also were several strong actors competing for the same customers in the sector, and the customers were liable to change suppliers. The Bridge companies found competition in their sector tougher than Tekes NIYs.

Of the claims concerning the company's strategy (Figure 9), the Bridge companies ranked as the most important "we will grow our sales by acquiring new customers". However, the most interesting claim concerning strategies is "Our sales growth will result from outside Finland", which indicates that one third of the respondents is clearly looking for growth from outside Finland, one third in practice only focuses on the domestic market, and the remaining third takes a neutral stand on this claim. In this respect, the Bridge companies also differed substantially from Tekes NIYs, which were very strongly looking for growth from outside Finland. Clear differences were also found between different Bridge companies in case of this claim. Team entrepreneurs, for example, are looking for growth from outside Finland more often than sole traders.

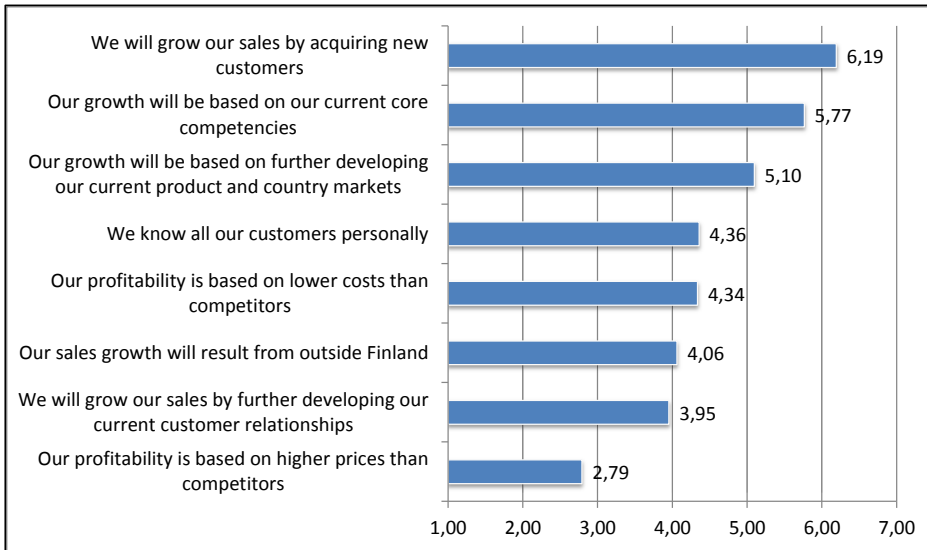


Figure 9 Claims concerning company strategy (weighted averages on a scale of 1 fully disagree – 7 fully agree)

Success and Utility of the Bridge Programme Entrepreneurship Track

The majority of feedback on the Bridge Programme received in the survey and from the company, expert and stakeholder interviews was positive. Positive feedback usually concerned the entire Programme package and the way in which it supported ex-employees in becoming entrepreneurs. Negative feedback usually targeted some detail of the Programme which had been experienced as unequal or possibly misunderstood, or where there had been problems in information flows.

In the feedback received, the Bridge Programme and its entrepreneurship track were considered a successful measure that promoted the effectiveness of the innovation system, boosted the creation of new enterprises and supported the success of startups. The positive examples highlight two things: the Programme was useful and Nokia has a good track record in corporate social responsibility.

The comment of a serial entrepreneur who kept a close eye on Bridge but did not take part in it was: “The Bridge Programme was very good, it was the best thing that has happened in Finland in this field during my time.” One Bridge entrepreneur said: “As a whole, the Bridge Programme showed that Nokia Oyj took very good care of its corporate social responsibility in a difficult situation where it had to let go a great number of employees.”

The following comments picked from the feedback received in the survey and the interviews also reflect these positive attitudes:

- A very useful Programme.
- What a wonderful Programme! The information and financial support it provided made it easy for me to start a business.
- Outstanding expertise, great support
- The consultations and support we received were a very positive experience, and so was my new career as an entrepreneur.

In this context, we should highlight certain themes discussed above that support the appraisals of the Programme as having been successful:

- The majority of those who chose the Bridge Programme entrepreneurship track became entrepreneurs for reasons that gave them a high motivation.
- Startup grants were personal. The money had to be spent on the company's operations. The grant together with the severance package supported the company in its early steps to the extent that other support and external funding were not (necessarily) needed.
- The fact that 90% of the companies continue to operate actively and that their forecasts of personnel numbers and turnover development are very positive indicate that the early phases of these companies have been highly successful.

Naturally, many details of the Programme received critical feedback, and improvements were suggested. However, these details would often have necessitated the tailoring of the entire Programme to the needs of each individual company. Many of these details are discussed in sections above, where possible counter-arguments or possibilities of making changes are also addressed. A number of positive Programme details are also cited above, which indicate that the companies launched with support from the Programme have been successful in their early days.

What further highlights the success of the Programme is that in the beginning, it was launched on an extremely rapid schedule. The Bridge Programme would be an excellent model to be applied in similar situations of mass dismissals. Nokia obviously is an unusually large company in the Finnish circumstances, and the scale of the dismissals was also exceptional. Consequently, the Programme was put together for a company operating in a specific sector with enough resources to manage the aftermath of dismissals in a responsible manner and to invest sufficient financial and personnel resources in it.

While the Programme was designed for a large company and dismissals on a major scale, its basic premises, operating methods and tools as well as its support forms can naturally also be used on a smaller scale. In the following section, we will thus examine the aspects that should be taken into consideration in order to apply a similar Programme to promote startup enterprising in case of any future large-scale dismissals.

Firstly, the location, sector and size of the company letting its employees go must be taken into consideration. The location to a great extent determines the public and any private business services with which the company can engage. The employment situation in the local area also has a bearing on how strong the inputs in the entrepreneurship option need to be. A poor employment situation in an area means poor possibilities for finding new jobs in paid employment. The sector in which the company operates to a great extent determines the backgrounds of the dismissed employees. The company size

restricts the resources available for a company-specific Programme. In most cases, larger companies also have better resources for mobilising various support forms and operating methods in the Programme.

The selection of the available support forms and operating methods is restricted by the background of the dismissed employees: their age, gender, education and tasks in the company. Age may be an obstacle to finding a new job in paid employment, but not so much to entrepreneurship. The significance of gender is minor, however, but it may to some extent obstruct re-employment if the job structure in the area is clearly dominated by either women's or men's jobs. Education and training together with the employee's duties in the company are quite a decisive factor. Those with a higher standard of education are in a slightly better relative position, as education provides capabilities for a variety of tasks. Those employees who were trained on the job to perform a single task are in the most vulnerable position, especially if re-training appears an unrealistic option due to their age, and no jobs that match their skills are available in the area. Choosing entrepreneurship drawing on their skills and strengths may be a more realistic option in these cases.

Next, a schedule must be drawn up for the Programme: how quickly must the Programme be launched and for how long will it be implemented. Even a rapid schedule is possible when Nokia's Bridge Programme can be used as a template. A decision must be made on to what extent the Programme will be implemented by the company's internal personnel resources. Are the resources adequate for a flexible implementation of the Programme, or should the company strive to work closely together with external business service providers from the outset?

Finally, the contents of the Programme must be decided. What type of tracks aiming for employment are realistic in each case? For the entrepreneurship track, a decision must be made on the support forms to be used. Will financial support be granted and in what amounts, or are the resources only sufficient for general and/or personal advice and guidance in cooperation with the business services and incubators of the town or area?

The time available for drawing up business plans should be restricted, aiming for equality between all participants. In this context, Nokia's Bridge Programme was criticised as in a very early phase, more time was allowed for preparing business plans than in the final phase. The phase in which a participant must have set up a business should also be carefully considered. Must the company be set up before any support may be granted, or should there be certainty about being eligible for a grant before you need to establish your company? In Nokia's Bridge Programme, the participants had to set up a business before being eligible for a grant, but a preliminary grant decision could be issued to a participant before this.

Many other decisions must also be made regarding the grants. The grant amount may be the same for everyone, or it can depend on such factors as the quality of the business plan and credibility of the business idea, as was the case in Nokia's Bridge Programme. The grant may be personal, or it may be given to a company. If it is personal, a decision must be made on how many dismissed employees a team forming a company may comprise. If the grant is made to a company, it must be decided if the amount will be the same to all companies, or whether it is dependent on the size of the team. Naturally, there will be decisions to make on many other details of the Programme, but as a general guideline could be given to follow the example of Nokia's Bridge Programme in as many points as possible.

On the basis of this evaluation, the entrepreneurship track in Nokia's Bridge Programme succeeded well in its task: encouraging entrepreneurship and generating successful enterprises. It was designed for a large

company and for such large-scale dismissals that we can only hope similar situations will not reoccur in our country. However, all components of the Programme can be converted onto a smaller scale. The Bridge Programme thus offers a useful model for a company facing a need to dismiss employees and wishing to take care of its corporate social responsibility.



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