

Towards a More Entrepreneurial Estonia Call for Action

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FOREWORD

Entrepreneurship is a key driver of economic growth. Like all countries that have reached the innovation-driven stage, Estonia needs to nurture its entrepreneurial potential. But to harness the potential of entrepreneurship and innovation, Estonia does not necessarily need more entrepreneurs: it needs better, innovative and growth-oriented entrepreneurs. To facilitate this goal, Estonia needs a national entrepreneurship policy framework. This report offers that framework.

Estonia is a small country with 1.3 Million inhabitants. Its domestic market is small. To grow, therefore, companies with growth ambition need to go beyond the local market. The only way for a small country to compete is through innovation and the smart use of scarce resources. While Estonia is known to produce a disproportionate number of innovative start-ups per capita, the majority of entrepreneurial businesses in Estonia are not very sophisticated and are stuck in subcontracting activities. Because of this imbalance, the number of innovative start-ups is not sufficient to produce a major impact on the economy. In order to enhance the sophistication of the Estonian industrial landscape, an ecosystem-wide approach is required.

Entrepreneurship ecosystems are complex: they comprise numerous different stakeholders and are shaped by laws, regulations and formal and informal institutions. Therefore, policies facilitating entrepreneurship ecosystems need to go beyond individual policy initiatives designed to address specific, well-defined market failures. A national entrepreneurship ecosystem policy needs to look at the ecosystem as a whole, and it needs to understand the ecosystem dynamic. Only by taking an ecosystem-wide perspective and by identifying strengths and bottlenecks at the ecosystem level, it is possible to design and orchestrate coordinated policy actions that systematically address and correct ecosystem bottlenecks, thereby paving the way for a higher-quality entrepreneurial dynamic in the economy.

To address this challenge, this report applies the globally recognised GEDI methodology to analyse the Estonian entrepreneurship ecosystem and design policies to enhance it. This methodology draws on extensive data to provide an overall, internationally benchmarked look into the Estonian ecosystem and identify bottlenecks that hold back its performance. The methodology then draws on stakeholder engagement meetings and workshops to add insight that is not captured in codified data. Combining 'hard' data and 'soft' experience-based insights, the GEDI methodology then identifies priority actions to address the bottlenecks identified through collective action.

The key objective of this report is to help bring about a real improvement in how the Estonian entrepreneurship ecosystem works. The main content of this report is therefore the agenda for collective action. As the report elaborates, many elements of the ecosystem are in place and working, yet the performance of the ecosystem as a whole could be improved. Estonia needs to develop a coherent set of ecosystem resources with distinct roles so as to be able to offer comprehensive support for innovative, growing businesses. Some of the ecosystem bottlenecks can be alleviated through quick action (e.g. training programs for entrepreneurs), while others require more time and strategic changes, for example, in Estonia's education system (e.g., shaping positive attitudes towards entrepreneurship should start already at the primary school level).

This report was commissioned by the Estonian Development Fund, and the process was facilitated by the Global Entrepreneurship and Development Institute (www.thegedi.org). Numerous experts, entrepreneurs, academics, policy-makers and other stakeholders have contributed their insight into this intensive process. The Estonian Development Fund wishes to thank all individuals who have contributed to this report.

EXECUTIVE SUMMARY

This report presents a GEDI analysis of the Estonian entrepreneurship ecosystem. The GEDI approach is designed to identify and analyse bottlenecks that hold back entrepreneurial performance in countries, and to design policies that help alleviate those bottlenecks. The insights produced by this exercise take the form of specific policy actions designed to coherently address Estonian entrepreneurship bottlenecks, thus helping unleash the entrepreneurial potential of the Estonian economy.

The key insights in this report are as follows:

- Estonia “punches above its weight” (relative to its GDP per capita) in terms of the performance of its entrepreneurship ecosystem: Estonia ranks 21st in the global ranking of entrepreneurship ecosystems, ahead of countries such as Latvia and Lithuania, Spain, Portugal and Greece, and even ahead of countries such as South Korea and Japan.
- Importantly, Estonia ranks high relative to its GDP per capita. The only countries ranking higher than Estonia in the GEDI ranking with a similar level of GDP per capita are Puerto Rico and Chile.
- While Estonian performance is strong overall, its entrepreneurship ecosystem also exhibits softness – notably, in individual-level attitudes towards entrepreneurship. This bottleneck drives softness in entrepreneurial skills, which further drives softness in innovation and in entrepreneurial finance.

The four key bottlenecks that hold back Estonian entrepreneurial performance are: Innovation; Finance; Attitudes towards Entrepreneurship; and Skills for Entrepreneurship. The Attitudes and Skills bottlenecks are closely related, and both are key drivers of the Innovation and Finance bottlenecks.

This report concludes by issuing Calls for Action intended to trigger coordinated policy action to address the identified bottlenecks in the Estonian

entrepreneurship ecosystem. The Calls for Action are listed below. More detail is provided later in this report.

Innovation

- Increase the participation of start-ups in research funding and public procurement.
- Create a soft landing package for foreign talent.
- Create an action plan to attract postgraduate students (including doctoral level students) to Estonia.
- Introduce scholarships and internships for university students and student teams in Estonian start-ups and nearby start-up hotspots (e.g., the Aalto University ecosystem in Espoo, Finland).
- Introduce industrial companies to lean start-up methodologies.

Skills and Attitudes

- Launch an ‘Entrepreneur at School’ initiative.
- Create a dedicated Executive MBA programme for entrepreneurs.
- Launch a programme offering support to start-up teams to grow innovative global start-up companies from conception phase into start-up phase.
- Create a bank of teaching case studies of Estonian entrepreneurial businesses.
- Launch spin-out programme for people with industry backgrounds and for university spin-outs.

Finance

- Create an employment tax honeymoon for new businesses.
- Create a legal framework for crowdfunding and related syndication activity.
- Create tax incentives to encourage business angels and crowdfunding investors.
- Allow tax exceptions for in-moving global talent.

INTRODUCTION: MAKING ESTONIA MORE ENTREPRENEURIAL

Entrepreneurship is a crucial engine of economic dynamism. Entrepreneurs are individuals who identify opportunities for economic wealth creation and take action to realise those opportunities. Without entrepreneurship, there would be little innovation, and the economy would stagnate. It is therefore important to think about how Estonia can harness its entrepreneurial potential for economic prosperity.

Not all entrepreneurs are the same, though. Entrepreneurs come in many flavours, and only some will create a real impact on economic development. While all entrepreneurs create employment for themselves, much fewer create many jobs for others. Thus, the success of entrepreneurship policies should not be measured by counting the number of self-employed individuals only. What really matters for economic and productivity growth are those entrepreneurs who innovate and have the ability and aspiration to grow their businesses.

In order to support innovative and high-growth entrepreneurial activity, policies need to look beyond the entrepreneur and his or her business. Innovative and high-growth entrepreneurs need a fertile ground to grow.

Far too often, policies to support entrepreneurship are limited to individual, often isolated policy initiatives, such as provision of soft funding and advice to already existing entrepreneurs. For governments to effectively nurture and harness the true potential of innovative entrepreneurship, more far-reaching and coordinated policy actions are required. Providing a fertile ground for innovative and high-growth entrepreneurs does not mean isolated policy programmes only: policies need to cover the entire entrepreneurship ecosystem in a coherent way.

In order to design policy to enhance entrepreneurship ecosystems, you need to understand how the ecosystem works. This is challenging because entrepreneurship ecosystems are complex, and there are few measurement frameworks that cover the entire ecosystem. This report uses the

acclaimed GEDI methodology¹ to analyse Estonia's entrepreneurship ecosystem and develop calls for action to improve it. Widely recognised as the global benchmark for profiling entrepreneurship ecosystems, the GEDI methodology offers the most comprehensive and sophisticated platform currently available for this task. In addition to providing detailed data for benchmarking Estonian entrepreneurial performance against more than 120 countries, the GEDI Stakeholder Engagement Process offered a way to combine practitioner insights with hard data to develop an evidence-based understanding of how the Estonian entrepreneurship ecosystem works, what its key bottlenecks are, and how those bottlenecks can be alleviated.

The key part of this report is a list of calls for action to improve the performance of Estonia's entrepreneurship ecosystem. We use this term – calls for action – on purpose. While recommendations are helpful, they amount to nothing if not acted upon. Much like entrepreneurship itself is defined by action, action is also needed to improve Estonia's entrepreneurship ecosystem. We call for action in three key areas that we identified as bottlenecks that hold back Estonia's entrepreneurial performance: Innovation, Finance, and Attitudes and Skills.

We next introduce the GEDI methodology and describe how the GEDI analysis was carried out in Estonia. We then lay out our key findings. These are followed by our Calls for Action.

¹ See www.thegedi.org. Also see Appendix I for methodological details.

THE MAKINGS OF AN ENTREPRENEURIAL ECONOMY

How do entrepreneurial economies look like? Contrary to popular belief, the most entrepreneurial countries in the world are not the ones who have the most entrepreneurs. This simplistic notion is, in fact, misleading: the highest self-employment rates in the world are observed in countries such as Zambia, Nigeria, Ecuador and Malawi. This is because developing economies lack the human capital and infrastructure needed to create high-quality jobs. Because of this, in some developing countries, up to 40% of the population are forced to 'subsistence entrepreneurship' to make a living. The result is many people selling baskets and fruit in street corners but few innovative and high-growth start-ups.

In entrepreneurship, quality matters more than quantity. Therefore, to be entrepreneurial, a country does not have to have the most entrepreneurs: it suffices if it has the most innovative and growth-oriented ones. However, achieving this outcome is challenging, as many elements of the entrepreneurship ecosystem need to work smoothly together to facilitate high-quality entrepreneurial activity. To prosper, innovative and high-growth start-ups need skilled employees. They need external sources of technologies, such as universities. They need a well-functioning infrastructure. They need specialised advice and support in, e.g., marketing, legal matters, and financing. They need access to appropriate forms of finance. They need business premises. They require a supportive regulatory framework that reduces regulatory compliance costs. And so on: this list is not complete. Entrepreneurship ecosystems consist of multiple, complementary elements, all of which need to be in sync in order for innovative and high-growth firms to prosper.

And even the above is not enough: to have innovative, high-growth entrepreneurship, you need the right kind of people to choose an entrepreneurial career over alternative occupations. This means that social attitudes towards entrepreneurship also matter. If well-educated individuals do not perceive entrepreneurship to be a desirable and valued career choice, they will choose other occupations. Individuals most able to start

innovative and high-growth firms also have many other career choices available to them.

According to the Systems of Entrepreneurship theory that underpins the GEDI methodology², well-functioning entrepreneurship ecosystems combine action by individuals with favourable framework conditions. Framework conditions can be thought of as the 'structure', or 'institutional framework' within which new ventures operate. A well-functioning institutional framework needs to be in place to support the creation and growth of new, innovative and high-growth ventures. This framework consists of a number of broad elements, such as resources (e.g., finance, human capital, networks); physical infrastructure (e.g., communication infrastructure, transportation infrastructure, business premises); service infrastructure (e.g., research services, educational services; business services); formal institutions (e.g., rules, laws, and regulations); and informal institutions (e.g., social norms and attitudes).

To bring these framework conditions to life, we need action by individuals. This action, and the quality of it, is regulated by different factors. As noted above, social attitudes towards entrepreneurship matter. It also matters who starts new firms, as human capital carried by the founders of the venture sets up the venture's initial productivity potential. Abilities matter – i.e., what kind of new ventures are created, in which areas they operate, and so on. Finally, aspirations matter: new venture growth seldom happens by accident, and even with strong growth aspirations, achieving growth will be challenging.

In summary, entrepreneurship ecosystems are complex, dynamic, living wholes where the quality of the ecosystem – i.e., its ability to facilitate innovative, high-growth entrepreneurial activity depends on many factors. This presents many challenges for any attempt to profile the quality of such ecosystems:

² See Acs, Z. J., Autio, E., & Szerb, L. 2014. National Systems of Entrepreneurship: Measurement Issues and Policy Implications. *Research Policy*, 43(1): 476-494.

- You have to measure many constituent elements of the system
- You need to measure both individual-level attitudes, ability and aspirations, and the framework conditions that regulate the initiation and outcomes of individual-level action
- You need to recognise that the system is a dynamically evolving whole where the system performance is 'co-produced' through the interaction of the system's constituent elements

Because of these complex demands, almost no existing measurement approach is sufficiently broad and sophisticated to meaningfully profile the functioning of entrepreneurship ecosystems. The only measure that is able to handle all the above demands is the GEDI index, as GEDI is the only index that directly builds on the Systems of Entrepreneurship theory:

- 1 GEDI combines individual-level data on entrepreneurial attitudes, ability and aspirations with data on country-level framework conditions into a composite index that profiles countries' entrepreneurship ecosystems
- 2 GEDI allows index components to interact to 'co-produce' ecosystem performance
- 3 GEDI's Penalty for Bottleneck algorithm enables it to identify bottleneck factors that hold back system performance

As the GEDI index covers over 120 countries, we can benchmark any individual country's performance against a large number of others. Because GEDI also provides a whole-systems perspective to entrepreneurship systems, it provides an ideal platform for entrepreneurship ecosystem policy analysis and design. As detailed in Appendix I, the GEDI Index consists of fifteen indicators of entrepreneurial attitudes, activities, and aspirations. Each of the indicators – or pillars, as GEDI calls them – is composed from national-level aggregates of individual-level data, weighted by data describing national framework conditions for entrepreneurship.

ENGAGING POLICY STAKEHOLDERS

Even with its sophisticated features, the GEDI index itself is insufficient to truly understand how any given ecosystem works. In essence, the GEDI index provides ‘hard’ data to describe the ecosystem. Although GEDI covers 14 constituent elements of the ecosystem (or ‘pillars’, as we call them), we know that entrepreneurship ecosystems are more complex than that. To really understand how the ecosystem works, you need to combine ‘hard’ data with ‘soft’ experience-based insights from within the Estonian’s entrepreneurship ecosystem. Without such experience-based insight, ‘hard’ data would be sterile. In contrast, experience-based insights without ‘hard’ data to back them up are easily reduced into mere opinions. Both are needed, and this is why we used a stakeholder engagement approach to combine the two.

To combine ‘hard’ data and ‘soft’ insight, we engaged with numerous stakeholders of the Estonian entrepreneurship ecosystem to ‘ground’ the conclusions suggested by the GEDI index data by combining it with insights and input from different stakeholders. Because entrepreneurship ecosystems are so complex, no single stakeholder can possibly have a comprehensive understanding of all aspects of the Estonian entrepreneurship ecosystem. We therefore used the GEDI analysis as a platform that enabled many different stakeholders to consider the system as a whole and recognise bottlenecks outside their own domain. Facilitated stakeholder debates helped draw out ‘soft’ insights from within the ecosystem on Estonian’s real bottlenecks and how they work. The five steps of this process are shown in Figure 1.

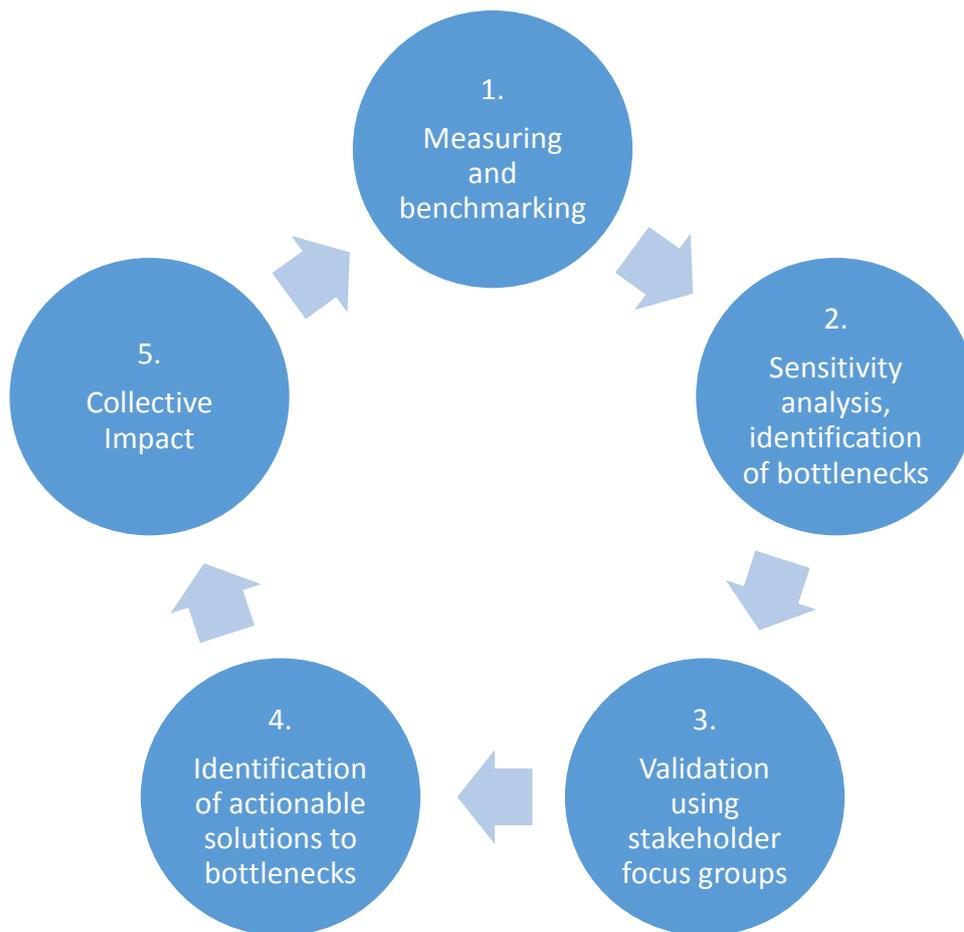


Figure 1 Five Steps of the GEDI Stakeholder Engagement Process

ESTONIAN ENTREPRENEURSHIP ECOSYSTEM PERFORMANCE

With the methodological approach explained, how does Estonia perform? Estonian global ranking is shown in Table 1. We can see that Estonia's entrepreneurship ecosystem ranks 21st among 120 countries, well within the top quartile. The globally leading entrepreneurship ecosystem is the United States, followed by Australia. After these, we have a cluster of European countries: Sweden, Denmark, and Switzerland. This is followed by Finland, Netherlands, and the UK.

Importantly, Estonia ranks high relative to its GDP per capita. Of the top countries, only Chile and Puerto Rico have lower GDP per capita than Estonia. This is important, because the quality of infrastructure is strongly correlated with national wealth, and the quality of infrastructure is also an important driver of the GEDI index score. Compared against similar countries, Estonia ranks comfortably ahead of Slovenia, Lithuania and Latvia. Relative to Lithuania and Latvia, Estonia's entrepreneurial system performance is 19% and 22% better, respectively.

It is also notable that Estonia ranks ahead of such old EU countries such as Greece, Italy, Spain, and Portugal. Estonia's entrepreneurial ecosystem performance is almost 50% higher than that of Italy, in spite of Italy's higher per-capita GDP. Estonia's entrepreneurial ecosystem performance is also significantly better than that of Japan. This is impressive performance.

Overall, Estonia's entrepreneurship ecosystem performs significantly better than what its economic wealth would lead one to expect. This is confirmed in Figure 2. Figure 2 presents the GEDI index score of Estonia relative to a trend line that plots the relationship between the GEDI score and GDP per capita (PPP). From the plot we can see that Estonia's 'proper' GEDI score (i.e., its GDP-predicted score) should be approximately 47 index points, given its GDP per capita. The 'Estonian surplus' – i.e., the difference between Estonian's actual index score and its GDP-projected score is thus over 20%. This surplus is produced by qualities within the Estonian entrepreneurship ecosystem that help it produce above-average performance.

Table 1 Global GEDI Ranking 2014

Rank	Country	GEDI	Rank	Country	GEDI	Rank	Country	GEDI
1	United States	82.5	41	Czech Rep.	44.5	81	Trinidad & Tobago	30.3
2	Australia	77.8	42	Hungary	44.5	82	Ukraine	30.2
3	Sweden	73.7	43	Kuwait	44.2	83	Morocco	29.5
4	Denmark	72.5	44	Malaysia	44.1	84	Ecuador	29.2
5	Switzerland	70.9	45	Saudi Arabia	43.4	85	Algeria	29.1
6	Taiwan	69.5	46	China	41.6	86	Swaziland	29.0
7	Finland	69.3	47	Peru	41.3	87	Paraguay	28.8
8	Netherlands	69.0	48	Italy	40.9	88	Angola	28.7
9	UK	68.6	49	Croatia	40.9	89	Philippines	28.5
10	Singapore	67.9	50	South Africa	40.3	90	Zambia	28.4
11	Iceland	67.5	51	Cyprus	40.2	91	Bosnia-Herzegovina	27.7
12	France	67.2	52	Montenegro	39.5	92	Venezuela	26.4
13	Belgium	66.5	53	Brunei	39.2	93	Ghana	26.2
14	Norway	65.1	54	Lebanon	38.9	94	Egypt	25.2
15	Chile	65.0	55	Barbados	38.5	95	Senegal	24.7
16	Germany	64.6	56	Argentina	38.4	96	Benin	24.6
17	Austria	63.9	57	Mexico	38.2	97	Cameroon	24.6
18	Ireland	61.8	58	Greece	37.7	98	Liberia	24.5
19	Puerto Rico	61.7	59	Tunisia	37.2	99	Iran	24.1
20	Israel	59.6	60	Costa Rica	37.2	100	Honduras	23.9
21	Estonia	58.9	61	Namibia	36.8	101	Kenya	23.8
22	Slovenia	52.7	62	Macedonia	36.1	102	Tanzania	22.5
23	Qatar	52.6	63	Botswana	35.6	103	Nicaragua	22.1
24	Colombia	49.8	64	Thailand	35.5	104	Rwanda	21.0
25	Lithuania	49.6	65	Panama	34.8	105	Gambia	21.0
26	Poland	49.0	66	Dominican Rep.	34.3	106	Malawi	20.8
27	Latvia	48.4	67	Indonesia	34.2	107	Guatemala	20.7
28	UAE	48.2	68	Serbia	33.9	108	Mozambique	20.6
29	Oman	47.6	69	Russia	33.2	109	Burkina Faso	19.8
30	Portugal	46.9	70	Gabon	32.7	110	Ethiopia	19.8
31	Spain	46.8	71	Albania	32.6	111	Madagascar	19.5
32	Korea	46.7	72	Jordan	31.7	112	Côte d'Ivoire	19.4
33	Hong Kong	46.5	73	Nigeria	31.6	113	Uganda	19.3
34	Slovakia	46.5	74	Jamaica	31.4	114	Mali	18.8
35	Japan	46.1	75	India	31.3	115	Pakistan	18.7
36	Bulgaria	45.4	76	Moldova	31.1	116	Mauritania	18.5
37	Bahrain	45.4	77	Bolivia	31.1	117	Sierra Leone	17.6
38	Uruguay	45.3	78	El Salvador	31.0	118	Burundi	15.5
39	Turkey	44.7	79	Kazakhstan	30.6	119	Chad	15.0
40	Romania	44.6	80	Brazil	30.4	120	Bangladesh	13.8

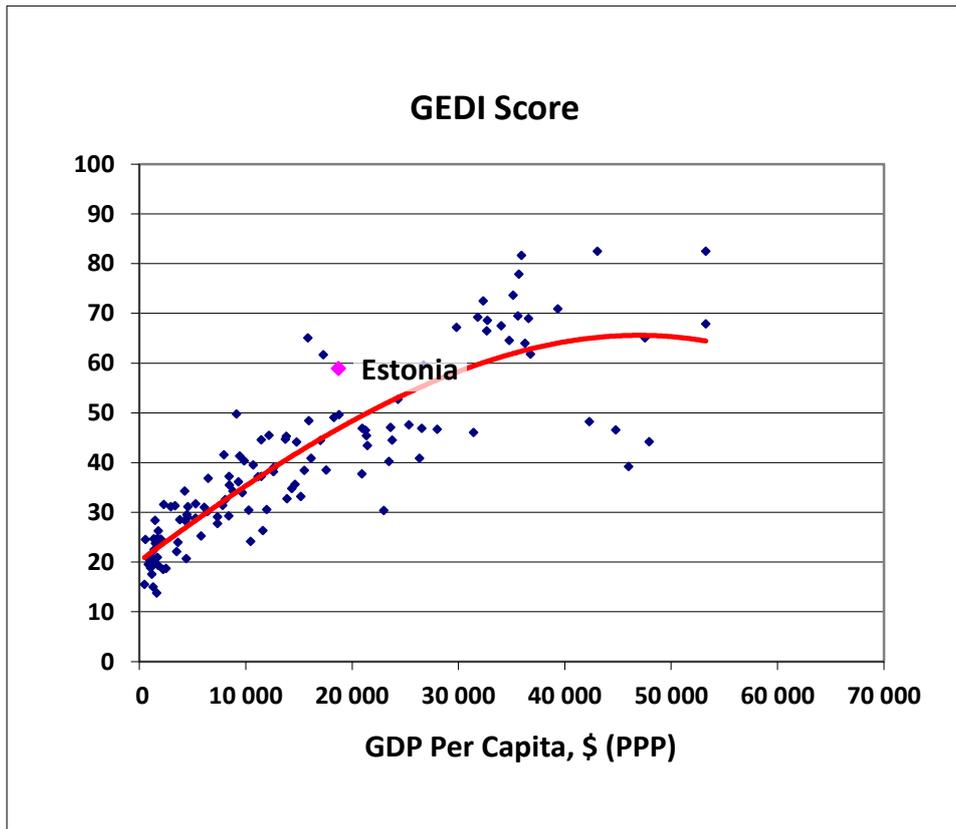


Figure 2 Estonia’s GEDI Performance Relative to GDP Per Capita

Estonia’s performance in terms of the Entrepreneurial Attitudes is shown in Figure 3. For this sub-index, Estonia’s score is 53.7 on a scale from 0 to 100. Thus, Estonia’s Attitudes score is lower than its overall GEDI index score (the GEDI index score is calculated as a simple arithmetic average of a country’s Attitudes, Ability and Aspirations sub-index scores). Nevertheless, even for this measure

Estonia’s score is 17% higher than its GDP-predicted score, which is approximately 46 index points for a country with Estonia’s level of GDP per capita. However, this sub-index also exhibits the lowest score of the three sub-indices, highlighting Entrepreneurial Attitudes as a relative soft point in Estonia’s entrepreneurship ecosystem.

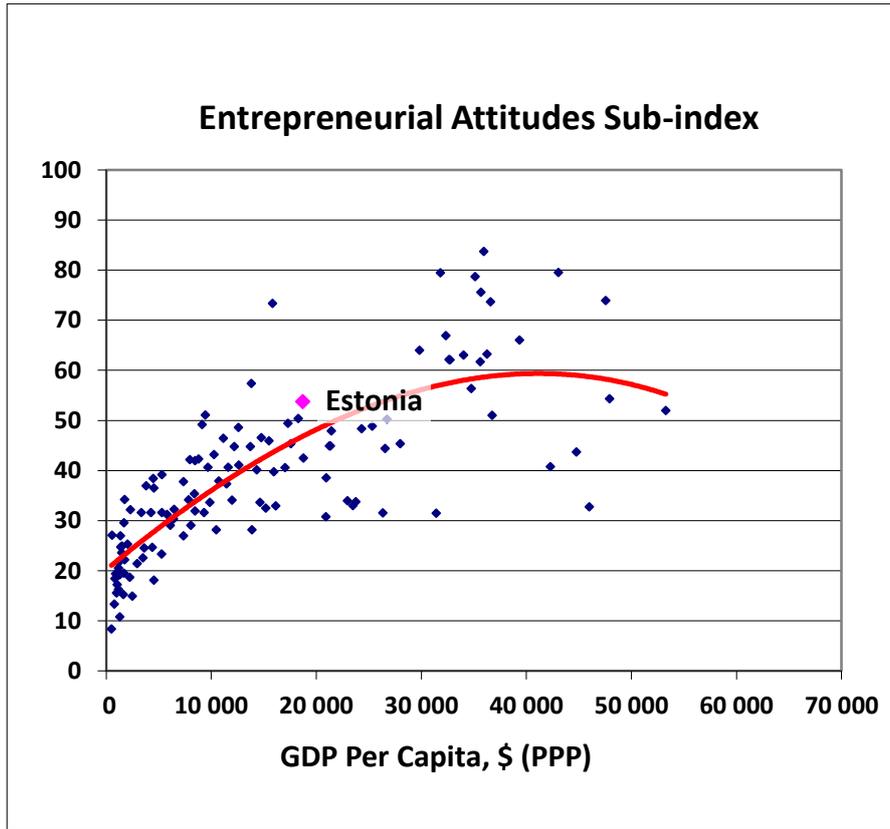


Figure 3 Estonia's Performance in Entrepreneurial Attitudes Sub-Index

Estonia's score of the Entrepreneurial Attitudes sub-index is shown in Figure 4. For this sub-index, Estonia's score is 59.6, which is 30% higher than Estonia's GDP-predicted score

(which is approximately 46 index points). As Entrepreneurial Attitudes is measured with actual entrepreneurial activity, this is encouraging news.

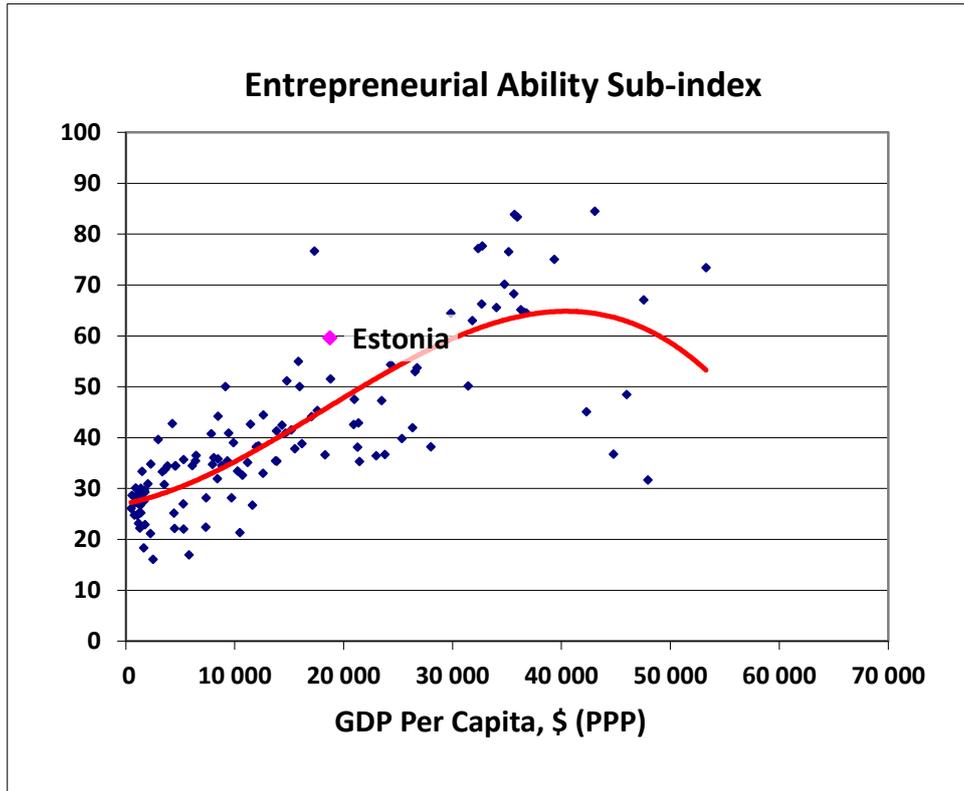


Figure 4 Estonia’s Performance in Entrepreneurial Ability Sub-Index

Finally, Estonia’s Entrepreneurial Aspiration sub-index score is shown in Figure 5. Estonian score for this sub-index is 63.6, which is the highest of any sub-index scores for Estonia. For this sub-index, Estonia’s performance is some 33% better

than its GDP-predicted score would lead one to expect, suggesting a particularly significant “Estonian surplus” for this aspect of the Estonian entrepreneurship ecosystem.

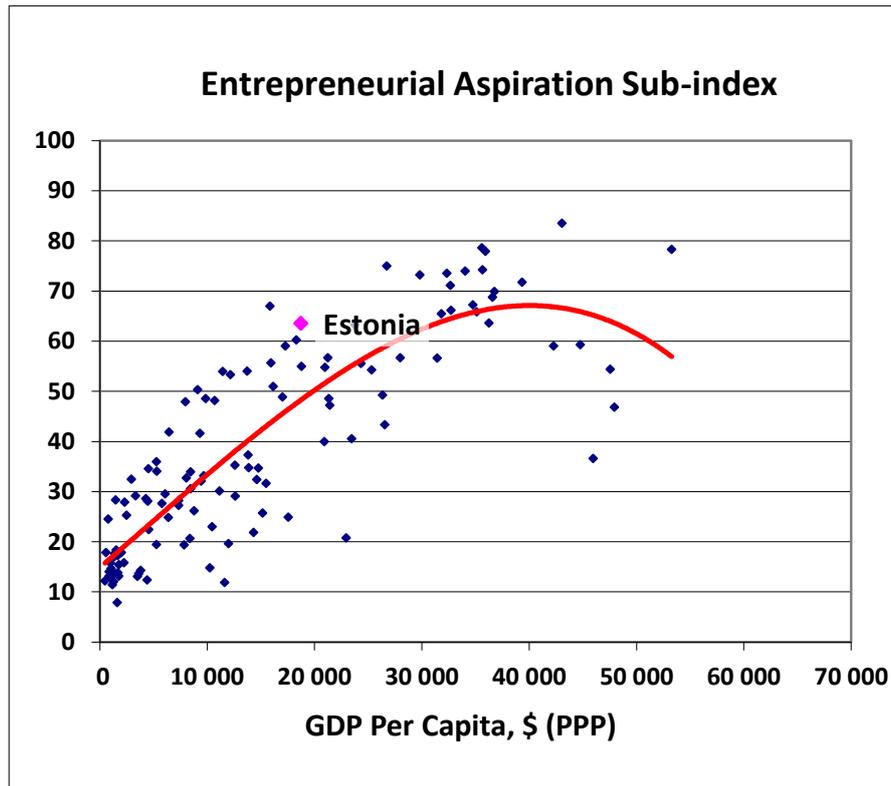


Figure 5 Estonia’s Performance in Entrepreneurial Aspiration Sub-Index

It is interesting that the relative strength of Estonia’s Entrepreneurial Aspirations is almost mirrored by Estonia’s relative weakness in Entrepreneurial Attitudes, when only Estonian’s internal strengths and weaknesses are considered. This is in the sense that the Entrepreneurial Aspirations sub-index score for Estonia is high relative to its overall GEDI score, whereas Estonia’s Entrepreneurial Attitudes score is low relative to its overall GEDI score. This is interesting, because Entrepreneurial Attitudes reflect general attitudes towards entrepreneurial skills, fear of failure and so on, whereas Entrepreneurial Aspirations reflect aspirations within ventures that are already in the start-up pipeline.

In summary,

- Estonia “punches above its weight” (relative to its GDP per capita) in terms of the performance of its entrepreneurship ecosystem
- Estonia tops Baltic countries in terms of its entrepreneurial performance (i.e., Estonia, Latvia and Lithuania)

- While Estonia performs better than its GDP-predicted performance for all sub-indices of the GEDI index, its performance is particularly strong for Entrepreneurial Aspirations and relatively soft (relative to its GEDI score) for Entrepreneurial Attitudes

While the overall index scores tell us something about Estonian entrepreneurship ecosystem’s general performance, they do not provide enough detail about Estonia’s ecosystem bottlenecks. To understand this better, we next take a look at individual pillar values.

ESTONIA'S PERFORMANCE IN AN INTERNATIONAL COMPARISON

Estonia's GEDI index data relative to all 120 GEDI countries is shown in Table 2. Table 2 first shows framework variable data for Entrepreneurial Attitudes, Entrepreneurial Ability and Entrepreneurial Aspirations (see Appendix I for explanations of the variables). The middle column shows data for individual-level variables. The rightmost column

shows data for the resulting pillar values. Normalised values are shown for all variables, each variable normalised to a range from 0 to 1. Next to the normalised value Estonia's rank is shown within the sample. Colour codes highlight whether Estonia is ranked in the bottom quartile, lower middle, higher middle or top quartile.

Table 2 Estonia's GEDI index data compared against all 120 GEDI countries

INSTITUTIONAL VARIABLES			#	INDIVIDUAL VARIABLES			#	PILLARS		#	
ENTREPRENEURIAL ATTITUDES	Market Agglomeration	0.46	79	Opportunity Recognition	0.70	67	Opportunity Perception	0.39	68		
	Tertiary Education	0.80	27	Skill Perception	0.53	91	Start-up Skills	0.60	30		
	Business Risk	0.72	25	Risk Acceptance	0.43	98	Nonfear of Failure	0.46	38		
	Internet Usage	0.92	20	Know Entrepreneurs	0.57	71	Networking	0.79	13		
	Corruption	0.78	27	Career Status	0.41	111	Cultural Support	0.55	39		
Entrepreneurial Attitudes								53.7	19		
ENTREPRENEURIAL ABILITY	Economic Freedom	0.73	32	Opportunity Motivation	0.80	29	Opportunity Startup	0.65	24		
	Gender Equality	0.88	38	TEA Female	0.53	84	Gender	0.48	75		
	Technology Absorption	0.78	29	Technology Level	0.83	14	Technology Sector	0.79	17		
	Staff Training	0.66	40	Educational Level	0.65	41	Quality of Human Resources	0.52	43		
	Market Dominance	0.64	42	Competitors	0.99	8	Competition	0.70	14		
Entrepreneurial Ability								59.6	19		
ENTREPRENEURIAL ASPIRATIONS	Technology Transfer	0.72	27	New Product	0.72	30	Product Innovation	0.67	34		
	GERD	0.81	24	New Technology	0.61	57	Process Innovation	0.69	24		
	Business Strategy	0.61	45	Gazelle	0.85	24	High Growth	0.73	25		
	Globalisation	0.94	8	Export	0.87	21	Internationalisation	0.94	5		
	Capital Market	0.41	71	Informal Investment	0.62	52	Risk Capital	0.41	56		
Entrepreneurial Aspirations								63.6	19		
INSTITUTIONAL		0.72	26	INDIVIDUAL		0.67	25	GEDI		59.0	21
	Bottom quartile										
	Lower middle quartile										
	Higher middle quartile										
	Top quartile										

Estonia's ranking for the variable is indicated next to its pillar value

Countries included are: Albania, Algeria, Angola, Argentina, Australia, Austria, Bahrain, Bangladesh, Barbados, Belgium, Benin, Bolivia, Bosnia and Herzegovina, Botswana, Brazil, Brunei Darussalam, Bulgaria, Burkina Faso, Burundi, Cameroon, Chad, Chile, China, Colombia, Costa Rica, Côte d'Ivoire, Croatia, Cyprus, Czech Republic, Denmark, Dominican Republic, Ecuador, Egypt, El Salvador, Estonia, Ethiopia, Finland, France, Gabon, Gambia, Germany, Ghana, Greece, Guatemala, Honduras, Hong Kong, Hungary, Iceland, India, Indonesia, Iran, Ireland, Israel, Italy, Jamaica, Japan, Jordan, Kazakhstan, Kenya, Korea, Kuwait, Latvia, Lebanon, Liberia, Lithuania, Macedonia, Madagascar, Malawi, Malaysia, Mali, Mauritania, Mexico, Moldova, Montenegro, Morocco, Mozambique, Namibia, Netherlands, Nicaragua, Nigeria, Norway, Oman, Pakistan, Panama, Paraguay, Peru, Philippines, Poland, Portugal, Puerto Rico, Qatar, Romania, Russia, Rwanda, Saudi Arabia, Senegal, Serbia, Sierra Leone, Singapore, Slovakia, Slovenia, South Africa, Spain, Swaziland, Sweden, Switzerland, Taiwan, Tanzania, Thailand, Trinidad & Tobago, Tunisia, Turkey, Uganda, Ukraine, United Arab Emirates, United Kingdom, United States, Uruguay, Venezuela and Zambia

Table 2 reveals many interesting insights. We can immediately spot a relative weakness within the Estonian entrepreneurship ecosystem: individual-level entrepreneurial attitudes (refer to Appendix I for explanations of the variables). Estonia only ranks 111th among 120 countries in terms of how high a status they believe an entrepreneurial career enjoys in Estonia. Similarly, Estonia only ranks 98th in terms of Risk Acceptance – or Estonians’ responses to the question of whether fear of failure would prevent them from starting new businesses. Estonia ranks 91st in terms of entrepreneurial Skill Perception, 71st in terms of how many people personally know entrepreneurs and 67th in terms of how many people believe there to be good opportunities for starting a new business in the area where they live.

The poor attitudes toward an entrepreneurial career choice are bad news. When considering which career to choose, individuals consider not only money, but also, whether the career is valued by others. Poor attitudes towards entrepreneurship are therefore likely to deter people from choosing this career.

The data also indicates a general gap between entrepreneurial attitudes by individuals and the quality of the Estonian framework conditions for entrepreneurship. For Entrepreneurial Attitude framework variables, we can see that most variables are highlighted with a dark blue or pale blue colour, suggesting ranking within the top quartile or in the higher middle quartile. Thus, it is attitudes by individuals that hold back Estonian entrepreneurship performance (for Market Agglomeration we do see a low ranking for Estonia: 79th among 120 GEDI countries. This is because Market Agglomeration is partly determined by the size of the domestic market, which is small in Estonia).

The comparison against all 120 GEDI countries is not a very strict test, given that this group includes a large number of low-income countries in

Africa, South America and Asia. Therefore, we next compare Estonia’s performance against 29 the EU countries in the GEDI sample. This comparison is shown in Table 3. Compared to Table 2, we see that the Estonian entrepreneurship ecosystem shows less strengths, as Estonia ranks in the lower half of the sample for seven out of 15 pillars.

This comparison reveals that Estonia’s framework conditions remain relatively weak when compared against EU countries. The two framework conditions that are particularly weak are Market Agglomeration and Capital Market. Table 3 also confirms Estonian relative weakness in individual-level Entrepreneurial Attitudes – although these weaknesses show up as less dramatic in European comparison. The comparison also confirms that Estonia underperforms in terms of Career Status (where it ranks 27th out of 29 EU countries), Risk Acceptance (18th) and Skill Perception (15th).

In the EU comparison, Estonia’s weakest pillar overall is Risk Capital (27th), followed by Cultural Support (19th), Quality of Human Resources (19th), Start-up Skills (16th), Product Innovation (16th), and Process Innovation (16th). Summarising:

- Estonia performs relatively less well in comparison against EU countries than globally
- Overall, the EU comparison suggests Estonian weaknesses for framework conditions, where Estonia mostly lags behind EU mean
- In the EU comparison, Estonia’s weakest pillar overall is Risk Capital (27th), followed by Cultural Support (19th), Quality of Human Resources (19th), Start-up Skills (16th), Product Innovation (16th), and Process Innovation (16th)
- Overall, the comparison suggests bottlenecks in Innovation; Finance; Attitudes; and Skills

Table 3 Estonian performance against 29 EU countries*

INSTITUTIONAL VARIABLES			#	INDIVIDUAL VARIABLES			#	PILLARS		#	
ENTREPRENEURIAL ATTITUDES	Market Agglomeration	0.46	28	Opportunity Recognition	0.70	7	Opportunity Perception	0.39	15		
	Tertiary Education	0.80	17	Skill Perception	0.53	15	Start-up Skills	0.60	16		
	Business Risk	0.72	12	Risk Acceptance	0.43	18	Nonfear of Failure	0.46	14		
	Internet Usage	0.92	14	Know Entrepreneurs	0.57	12	Networking	0.79	11		
	Corruption	0.78	16	Career Status	0.41	27	Cultural Support	0.55	19		
Entrepreneurial Attitudes								53.7	13		
ENTREPRENEURIAL ABILITY	Economic Freedom	0.73	17	Opportunity Motivation	0.80	11	Opportunity Startup	0.65	13		
	Gender Equality	0.88	14	TEA Female	0.53	14	Gender	0.48	11		
	Technology Absorption	0.78	13	Technology Level	0.83	11	Technology Sector	0.79	12		
	Staff Training	0.66	14	Educational Level	0.65	18	Quality of Human Resources	0.52	19		
	Market Dominance	0.64	18	Competitors	0.99	4	Competition	0.70	11		
Entrepreneurial Ability								59.6	14		
ENTREPRENEURIAL ASPIRATIONS	Technology Transfer	0.72	16	New Product	0.72	7	Product Innovation	0.67	16		
	GERD	0.81	15	New Technology	0.61	14	Process Innovation	0.69	15		
	Business Strategy	0.61	17	Gazelle	0.85	8	High Growth	0.73	10		
	Globalisation	0.94	6	Export	0.87	12	Internationalisation	0.94	4		
	Capital Market	0.41	25	Informal Investment	0.62	25	Risk Capital	0.41	27		
Entrepreneurial Aspirations								63.6	13		
INSTITUTIONAL		0.72	15	INDIVIDUAL		0.67	8	GEDI		59.0	14
Bottom quartile											
Lower middle quartile											
Higher middle quartile											
Top quartile											

* Includes Iceland, Norway, Switzerland and Cyprus

Estonia's ranking for the variable is indicated next to its pillar value

Countries included in the comparison are: *Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom*

ESTONIA'S PERFORMANCE AGAINST SELECTED PEER COUNTRIES

How does Estonia compare against individual countries? Although rankings within different groups of countries are informative, benchmarking against relevant peers may reveal aspects and issues where Estonia could stand to learn from others. In the following, we compare Estonia's profile against selected peers: Latvia, Lithuania and Slovenia. This comparison is shown in Figure 6 below. Estonia's profile is shown in Figure 6 with thick blue line.

The comparison against relevant peers does not suggest serious bottlenecks where Estonia lags behind peer countries. Estonian performance appears weakest, relatively speaking, in Human Capital. This is an area where Estonia might stand to learn from Lithuania: at least the comparison suggests

that a closer look at Lithuania in this regard might reveal interesting insight.

On the other hand, Estonia exhibits strengths in Internationalisation and Competition pillars.

The High Growth pillar is interesting. Although this pillar was suggested as an Estonian strength in comparison against efficiency-driven economies, we can see that both Latvia and Lithuania exhibit stronger performance in this pillar.

Slovenia stands out for two pillars in particular: Startup Skills and Technology Absorption. For both of these pillars, Slovenian performance is at the top globally, so a closer examination of Slovenia might reveal what it is doing well.

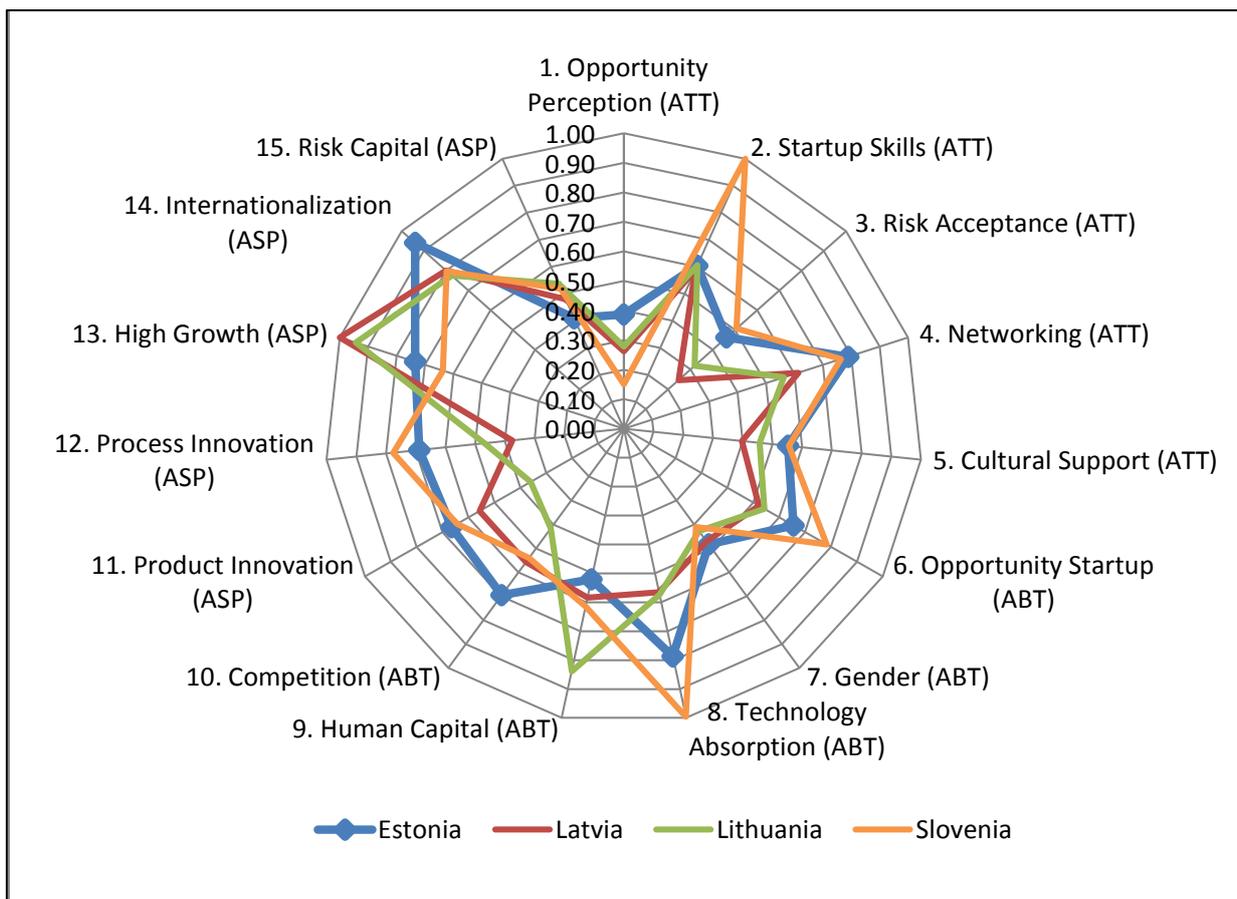


Figure 6 Estonia's profile compared against Latvia, Lithuania and Slovenia

Figure 7 shows Estonian benchmarking against Finland, Israel and Singapore. These countries have been selected as 'aspirational' reference points. The comparison being against less similar countries, more significant differences are ob-

served. We can see that Estonia lags consistently behind the aspirational reference countries in terms of Process and Product Innovation, in Risk Capital, in Human Capital, and, to a lesser extent, in Gender.

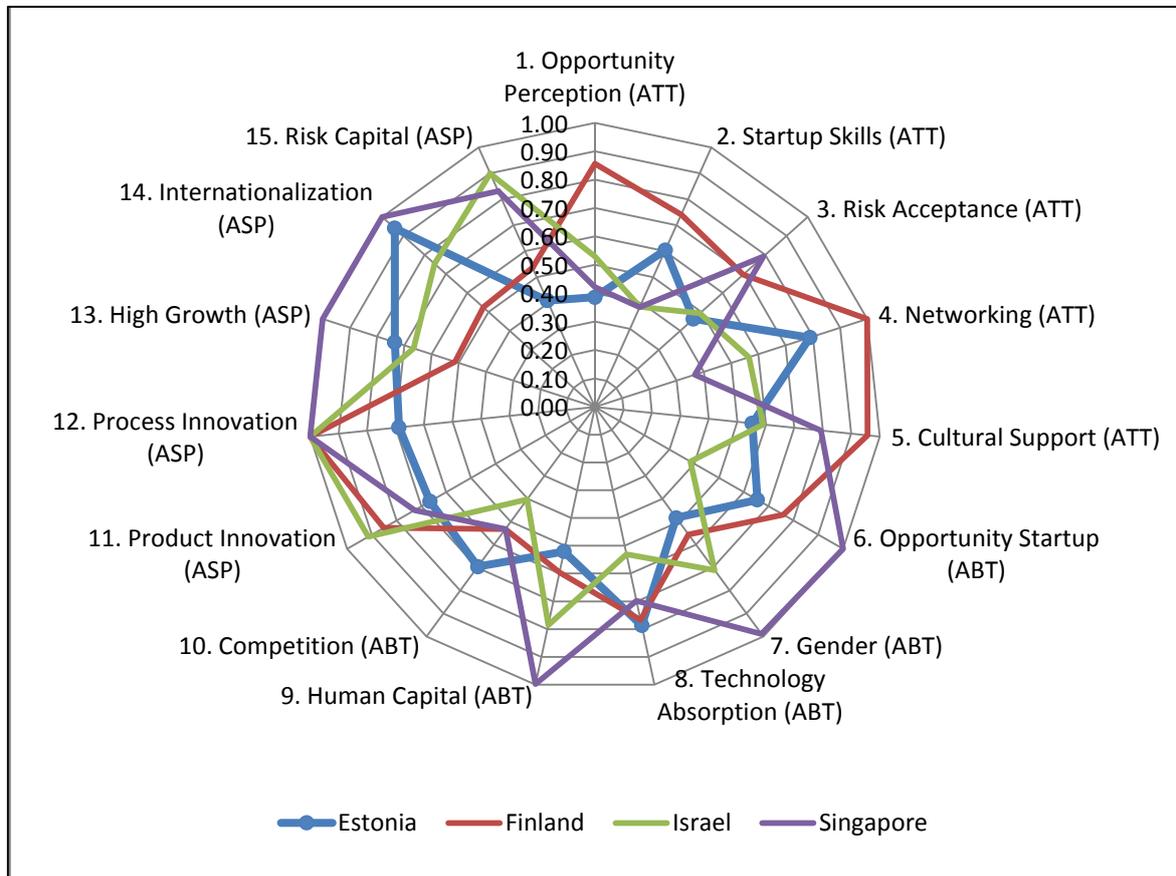


Figure 7 Estonia's profile compared against Finland, Israel and Singapore

Prompted by the observation that Chile achieves a higher GEDI score with smaller per-capita GDP, we also compared Estonian ecosystem profile against Chile. This benchmarking is shown in Figure 8. We can see that the difference exists mainly in Attitude variables: Opportunity Perception; Start-up

Skills; and Risk Acceptance. Chile also outperforms Estonia in terms of Risk Capital and Product Innovation but lags behind notably in Process Innovation. This comparison again reinforces the importance of addressing Attitudes in Estonia, particularly at the individual level.

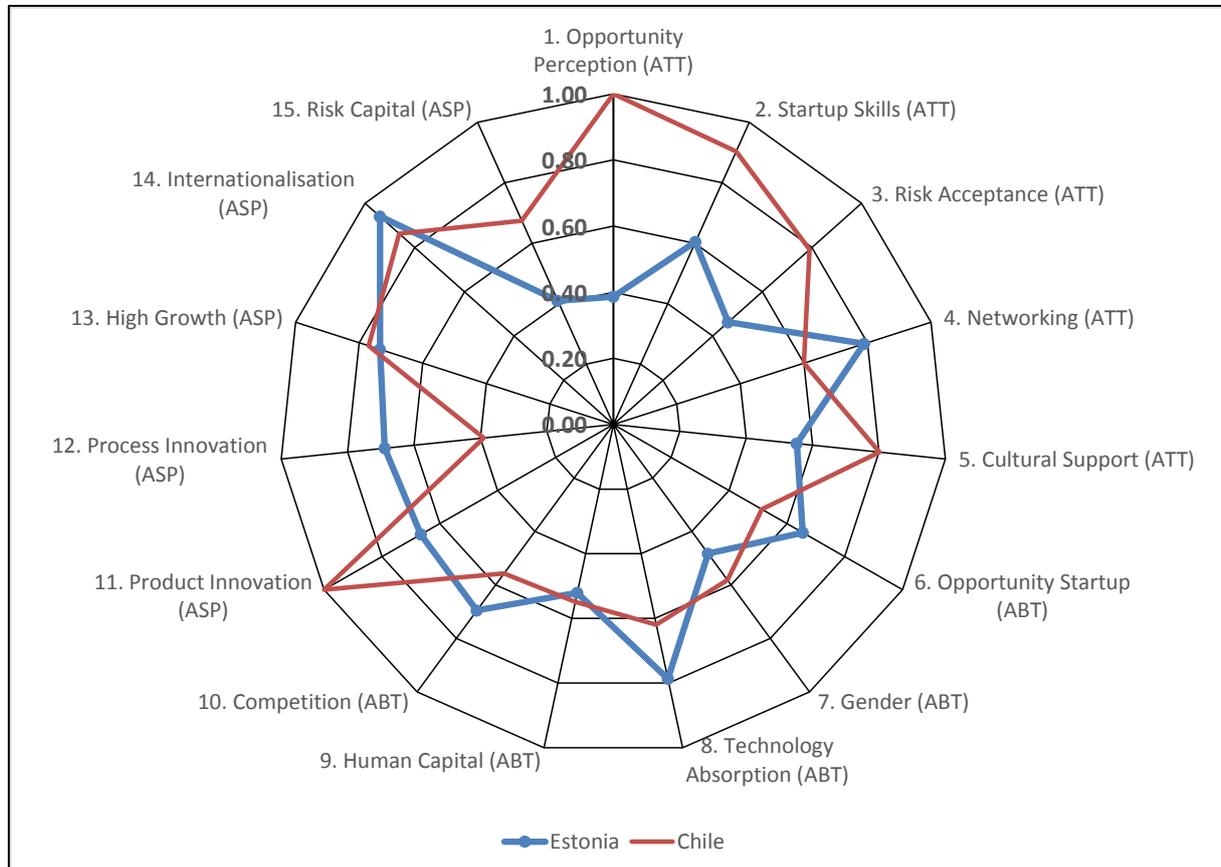


Figure 8 Estonia vs Chile

Finally, Figure 8 provides insight into the completeness of the Estonian entrepreneurship ecosystem. Remember that the Penalty for Bottleneck philosophy maintains that an even, round profile should be better than an uneven profile, since this means that there are no particularly serious bottlenecks that hold back ecosystem performance. Looked in this way, Estonia's profile does not appear particularly even, suggesting that Estonia's bottlenecks do hold back its ecosystem performance.

In summary,

- Estonia lags behind relevant peer countries (Latvia, Lithuania, Slovenia) in High Growth and Human Capital but is ahead in

Competition, Internationalisation and Opportunity Perception

- Estonia lags consistently behind the aspirational reference countries in terms of Process and Product Innovation, in Risk Capital, in Human Capital, and, to a lesser extent, in Gender
- The difference between Estonia and Chile is mainly explained by three Attitude pillars
- In an internal comparison, the Estonian ecosystem profile is relatively uneven, supporting the existence of bottlenecks that hold back Estonia's entrepreneurship ecosystem performance

ESTONIAN ENTREPRENEURSHIP BOTTLENECKS

The above analysis highlighted Estonian entrepreneurship ecosystem profile in the light of GEDI data. This analysis suggested several bottleneck candidates that might hold back Estonia's entrepreneurial performance. The analysis (and the analysis of secondary data) was debated in several Stakeholder Engagement Workshops, which added considerable nuance and insight into the GEDI analysis. The major insights are summarised here.

In short, the Stakeholder Engagement Workshops agreed and confirmed that four major bottlenecks appear to hold back Estonia's entrepreneurial performance. These were:

- Innovation: Moving Up the Value Chain and Incentive Regime for Innovation
- Finance: Capital Availability for Entrepreneurship
- Attitudes: Perceptions of Risk and Rewards Associated with Entrepreneurship
- Education: Skills for Entrepreneurship

The wider labels reflect the qualitative insight provided during the stakeholder debates. We next summarise the main insights arising from the stakeholder debates and present a causal map that illustrates the main factors driving each bottleneck.

INNOVATION: MOVING UP THE VALUE CHAIN AND INCENTIVE REGIME FOR INNOVATION

Both the GEDI analysis and secondary data suggested a bottleneck in the area of innovation. The stakeholder group discussions supported this view and added considerable nuance. In this summary, we first summarise the analysis that suggested an innovation bottleneck. We then summarise and content analyse the stakeholder discussion. This summary results in a causal map describing the Estonian innovation bottleneck.

Estonian Innovation Bottleneck in the Light of Secondary Data

In terms of innovation development, Estonia remains in institutional capability development phase. Typical for catching-up economies, Estonia's early policy emphasis was on establishing a regulatory environment that would not unduly hamper economic activity, would help attract Foreign Direct Investment to exploit Estonian cost advantage, and would facilitate the conditions for knowledge-intensive and innovation-driven growth in the medium term.

These efforts have resulted in an industry landscape that is dominated by low- to medium-

technology activities and exploits Estonian costs advantage through subcontracting. This is illustrated by the facts that the revealed competitive advantage of Estonian firms continues to emphasise low- to medium-technology, and the share of low-technology and medium-technology industry exports of Estonian total exports is almost twice as high as the corresponding share in other OECD countries (2009 figures). On the other hand, the gross expenditure on R&D has increased rapidly, attaining 1.63% of GDP in 2010. However, this investment is driven by public funding, notably EU funding, and the private sector share of GERD is less than half.

The low share of private-sector R&D is problematic, since public-sector R&D spending in Estonia draws heavily on EU structural funding, which is temporary in nature. Building sustained private-sector capacity for innovation in Estonia is therefore a priority. At the moment, progress appears strong, as Estonia has increased its innovation performance the most rapidly among the EU 27 countries during the period from 2008 to 2013, with an average annual increase in the Innovation Scoreboard score of some 7%. This performance increase puts Estonia into the tail of the "Innova-

tion Follower” group in the EU Innovation Scoreboard.

This progress has resulted in a situation where the industrial landscape remains dominated by relatively low value-adding activity, and the transition to an innovation-driven mode is far from complete. Several legacies of the inherited industry structure are transformed only relatively slowly. For example, human capital is not easy to upgrade quickly, and the received mode of industrial activity also tends to shape attitudes that are consistent with this mode. This is indicated in data suggesting that innovation in Estonian SMEs is hampered by lack qualified personnel, and the share of Estonian large firms from industrial value added is much lower than in richer economies. The low value added by large firms in Estonia due to their specialisation in low to medium technology sectors constrains domestic demand for knowledge-intensive products and services.

Innovation Bottleneck: Content Analysis

The stakeholder discussions reflected the situation described above. The discussion suggested a revised description of the innovation bottleneck, paraphrased as: “Lack of motivation for the vast majority of companies to innovate: Low sophistication and value-added entrepreneurship and incentive regime of innovation”.

A content analysis reveals that issues raised in the stakeholder discussions fell into ten major categories (some mentions overlapped categories):

- Industry Structure (5 references)
- Attitude Problems (8/10 references)
- Human Capital issues (11 references)
- Networking problems (4/6 references)
- Cluster development (2 references)
- Lack of Spill-Overs (4 references)
- Infrastructure challenges (2/3 references)
- IP issues (2/3 references)
- Public Sector bias (4 references)
- Incentive problems (3/4 references)

Industry Structure

The Low Value Added category reflects Estonian inherited industrial base, which is characterised by strong subcontracting tradition, dominant focus

on subcontracting activities that represent relatively low value added, and consequent lack of innovation tradition and poor labour productivity in these sectors, which remain prominent in Estonia’s industrial landscape. This structure exhibits fairly strong lock-in effects, meaning that structural change is likely to be gradual.

Given that this is an inherited characteristic, the subcontracting focus is a structural condition that feeds some of the other categories, notably, attitude problems and human capital issues.

Attitude Problems

There were a total of eight references to attitude issues plus an additional two that overlapped with networking. The stakeholder discussions highlighted a continued attitude problem that inhibits innovation. Risk aversion inhibits innovation, as individuals and entrepreneurs prefer operating in a safe comfort zone and run lifestyle ventures. In consequence, there is little growth ambition and internationalisation orientation, reinforced by risk averse and short-termist shareholders. Entrepreneurs often misunderstand innovation and cannot therefore efficiently incorporate this aspect into their business operations. Attitude problems also inhibit networking, thereby inhibiting collaboration crucial for innovation. As a result, there are too few innovation role models for entrepreneurs to follow.

Human Capital Issues

The subcontracting dominance has shaped human capital. This appears a pervasive issue, with the highest number of references, eleven in total. Human capital issues were reflected in labour skills, experience effects (arising from a lack thereof), and foreign human capital.

Labour related human capital challenges are manifested in the low skill base of industrial workforce, particularly in manufacturing sectors and low- and medium-technology industries. Thus, the skill base does not support innovation. Low skill base also means low value added per employee.

The inherited industrial base has also shaped inherited experience base. Many entrepreneurial firms lack professional management experience,

which inhibits them from undertaking innovation. This is partly a symptom of the lack of serial entrepreneurs with innovation experience, the first-generation entrepreneurs having gained their experience in low-tech sectors such as construction. This means that there is a general lack of growth experience and growth skills, as well as internationalisation experience, particularly the crucial form of 'Born Global' experience, which is particularly relevant for economies with small domestic markets such as Estonia.

Human Capital issues are compounded by Estonia's relative inability to attract foreign talent and the generally low level of foreign participation in Estonian entrepreneurial businesses. Combined, these issues inhibit the ability of Estonian firms to integrate innovation as an integral element of their growth and internationalisation strategies.

Networking Problems

Networking challenges are partially linked with Attitude and Human Capital issues. As such, networking received 6 references, two of which overlapped with Attitudes. A general issue here is that there are too few networks in general, and Estonian entrepreneurial businesses do too little of it. Networking is a key driver of innovation due to its effect on demand creation, experience exchange, experimentation and knowledge spill-overs. This problem is partly driven by attitudes, as low levels of trust hamper collaboration and open exchange of ideas. Collaboration is poor between small and large firms due to lack of trust and legitimacy, as the poor innovation track record of entrepreneurial businesses in Estonia undermines their credibility as innovation partners. This is an issue particularly in traditional sectors, where large firms could be a potent source of demand for knowledge-intensive products and services.

Cluster Development

Poor networking results in poor cluster development, an issue which received two references. Overall, the dearth of expertise clusters in Estonia was noted. Innovation proliferates in clusters. Thus far, Estonia has not yet developed strong enough cluster effects around its potential strengths, such as e-governance. This lack of focus on areas of potential innovation strength holds

back innovation opportunities for entrepreneurial firms.

Lack of Spill-Overs

Poor networks and clustering mean few knowledge spill-overs, an essential ingredient for innovation. There are few spin-outs from established corporations, meaning that R&D that could give rise for innovation remains underutilised or is left entirely unexploited, as potentially valuable IP gets stuck in large corporations. There is also an externality effect linked to clustering, as spill-overs are partially hampered by the lack of a sufficient number of technology-based new ventures.

IP Issues

A lack of innovation tradition means that there is a poor understanding of Intellectual Property as an asset that could underpin competitive advantage in new firms and thus drive their growth. This is partly a manifestation of an Estonian lack of innovation culture. The problem is partly compounded by a disjointed IP system that connects universities, research institutions and industry.

Infrastructure Challenges

The primary and secondary data analysis suggested that overall, Estonia is still building and strengthening its infrastructure for innovation. This issue cropped up also in stakeholder discussions. It was noted that Estonia lacks an infrastructure for supporting the testing of ideas. As was noted above, while many elements of an IP system are in place, the system as a whole remains disjointed, which means among other things that clustering effects are not well supported. As a whole, the small domestic market prevents scale building, an issue linked with a lack of positive attitudes toward and experience in early and proactive, innovation-driven internationalisation.

Public Sector Bias

A symptom of Estonia's continued emphasis on building an infrastructure for innovation is that Estonia's innovation system remains dominated by the public sector. This issue manifests itself in a high proportion of public funding in Estonian

GERD and too small private investment in innovation. The dependence on EU funding is a problem given the prospect of gradually diminishing EU support. Public sector bias also means that innovation as a whole remains too much in a push mode, and demand pull for innovation remains insufficient – an issue linked to the structure of Estonia’s inherited industrial base, poor networking and small domestic market size.

Incentive Problems

Finally, an issue was observed concerning Estonia’s incentive structure, which does not effectively support innovation. This is a multi-faceted issue. First, high labour tax inhibits the ability of entrepreneurial firms to hire skilled personnel, thereby hampering their innovation capability. There are few tax incentives for R&D and innovation – an issue associated with Estonia’s tax structure. A partly attitude-driven issue is that talented individuals are not inclined to become entrepreneurs and have few incentives of doing so. Finally, Estonia offers few incentives for registering IP in Estonia, unlike many other countries, thereby depriving the Estonian ecosystem of a potent source of knowledge spill-overs.

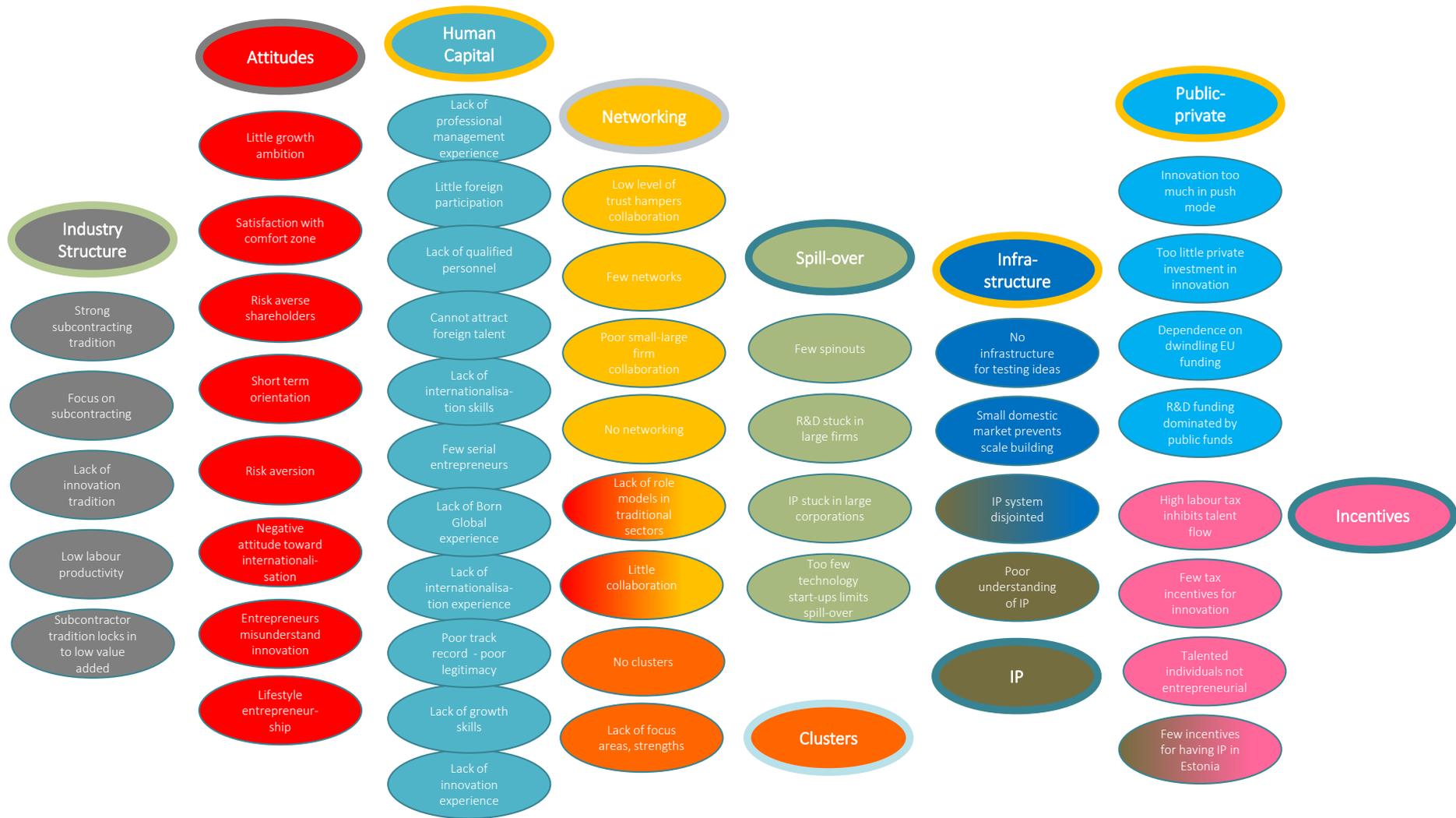


Figure 9 Content Analysis of the Innovation Stakeholder Discussion

Innovation Bottleneck: Causal Connections

The discussion above suggested that the roots of the Estonian relative weaknesses in innovation are varied and interlinked. As such, the content analysis suggests a number of causal connections between the various issues. We elaborate on these below. The causal map elaborated from the content analysis is shown in Figure 10.

Figure 10 shows the associations between issue categories in a rough order of precedence. Ultimately, the innovation landscape in Estonia is inherited and represents the accumulation of assets, resources and institutional structures over time. Hence, the industry structure is positioned in the left. The inherited industry landscape has directly shaped both the attitude climate within Estonia, as well as its human capital stock. While there is little one can quickly do to shape the industry structure, it is useful to understand this inheritance when considering policies designed to address the attitude climate and human capital stock.

Policies to address industry structure could include measures designed to help Estonian subcontractors move up the value chain, as well as policies designed to strengthen the local value chains supporting the subcontractors. For example, policies encouraging personnel training could support such a development while also alleviating human capital problems.

As such, the attitude issues are multifaceted, ranging from risk aversion to reluctance to move beyond one's comfort zone to short-termism and an under-appreciation of the importance of innovation. It seems that many such attitude issues are driven by inherited industrial culture and could perhaps be alleviated by education policies that aim at fostering more entrepreneurial attitudes in the younger generation. This is not a short-term measure, however. Another, perhaps more rapidly achievable outcome may be achieved through encouraging networking, role models and peer learning.

Similar to attitudes, the human capital issues are multifaceted, and many derive from the dearth of experience in growing innovative new firms. Again, experience accumulation is slow and gradual. Possible ways to speed up experience accumulation could be, for example, through accelerator activities and facilitating network and cluster formation. In Sweden, for example, learning- and innovation oriented SME networks have been found to be an effective mechanism for facilitating experience accumulation and exchange.

The above considerations would suggest that Estonia needs to invest more in facilitating networking between large and small firms, and also, among new firms and SMEs. Coordinated SME and new firm networks can effectively facilitate trust formation, experimentation, experience accumulation, technology adoption, and knowledge exchanges, all relevant for facilitating product and process innovation, and also, for creating demand pull for these. This is an area that is susceptible to market failure: therefore, public-sector intervention appears necessary.

Correctly deployed, such networks can aid cluster formation, another stumbling block for innovation. From an innovation perspective, clusters operate as an externality that facilitates knowledge accumulation and innovation benefits through knowledge spill-overs. The stakeholder discussion already identified potential strengths in Estonia broadly in the area of digital technologies and e-governance. Given the strong emphasis on smart cities and sustainability, these strengths could conceivably harness pull generated by an emphasis on these in European policy and research funding.

As such, the Estonian IP culture appears in need of continued attention. This is partly a human capital and attitude issue but also connects with cluster formation and the Estonian innovation infrastructure. In particular, measures and initiatives designed to facilitate spin-off and spin-out formation and strengthen incentives for IP creation might be useful.

Innovation Bottleneck: Conclusions

In summary, the stakeholder discussions both resonated with and added nuance to the GEDI and secondary data analysis that identified innovation as a bottleneck that holds back the Estonian entrepreneurship ecosystem. Above, we have explored issues that underpin this bottleneck and identified causal connects between the issues identified. It seems that both long-term, country-wide policy initiatives are called for, complemented by more short-term and cluster-oriented policy actions. It is suggested that potentially the most

fruitful area for policy action to address this bottleneck could be found in policies designed to address networking and cluster formation, because these drive many corollary effects from attitudes to experience accumulation to human capital formation and spill-over creation. These should be accompanied by a continued focus on developing the Estonian infrastructure for innovation and upgrading the Estonian stock of human capital. Given the multi-faceted nature of innovation systems, such policy actions should be coordinated with and supported by, e.g., labour and education policies and fiscal policies that directly affect incentives for innovation.

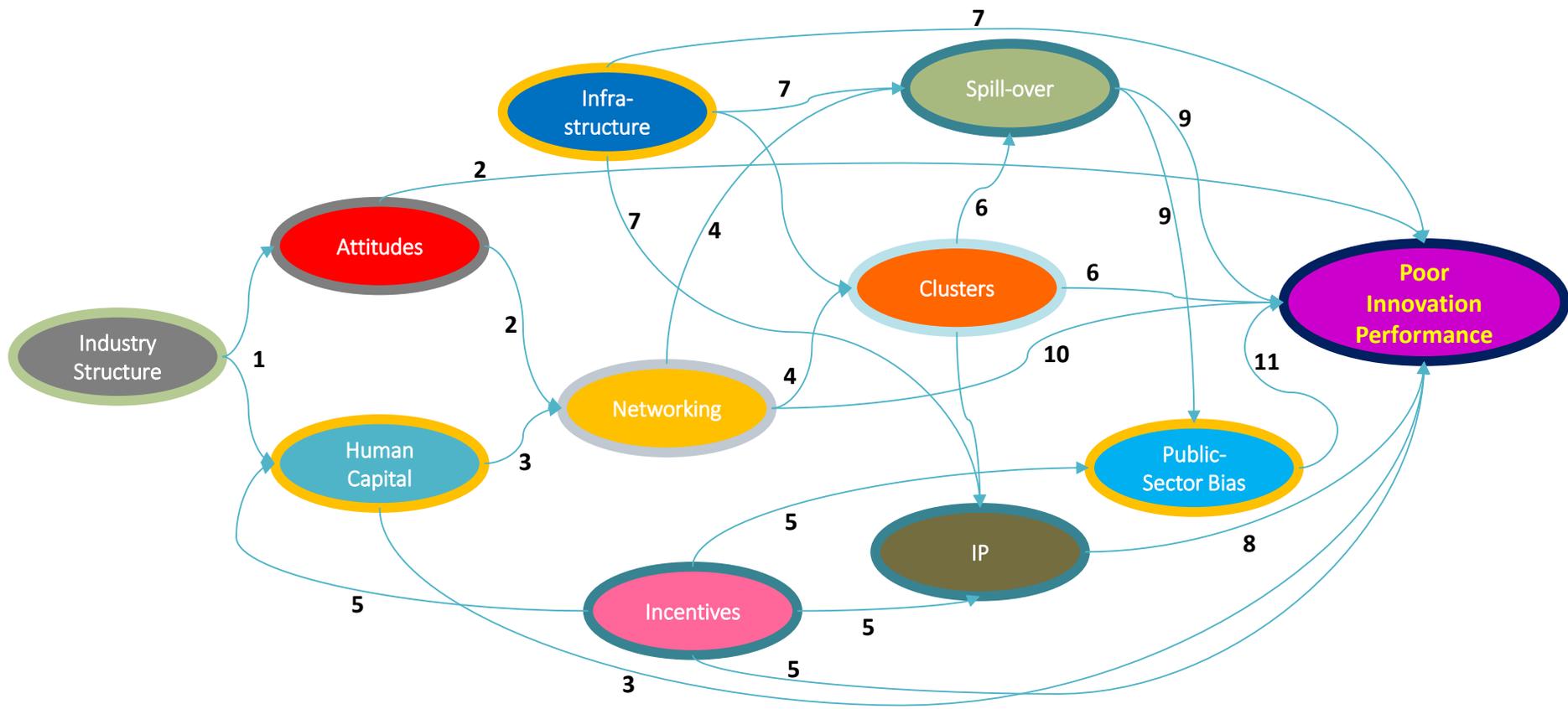


Figure 10 Causal Map of Issues Underlying the Innovation Bottleneck

EASING THE INNOVATION BOTTLENECK: CALLS FOR ACTION

The stakeholder discussions identified action in four major domains. One of these related to how the Estonian labour force and human capital have been shaped by the subcontracting manufacturing tradition, and also, by the lack of experience and skills in innovative entrepreneurship. These issues were related to the relatively weak development of clusters and networks within the Estonian economy. To address these gaps, five specific actions were identified:

- Incentivise industrial companies to undertake innovation and to identify their Unique Selling Propositions (USPs). This could be done by introducing them to 'lean start-up methodologies' to enhance their market and customer validation skills. Also networking between established companies and new start-ups should be further encouraged to enhance cluster formation.
- Train the trainers. Bring in best practitioners from abroad to educate local business trainers to spread lean start-up skills within the Estonian start-up community.
- Make the content of entrepreneurship education more practical by increasing the weight of coaching and business incubation elements, as well as by increasing the weight of internships in the curriculum.
- Offer scholarships to support the placement of university students and student teams into start-ups as part of the formal university curriculum. Internships could be implemented locally, but also, in foreign subsidiaries and affiliates of Estonian start-ups companies (e.g., in the UK and USA). Another possibility is to offer internships in proximate entrepreneurship hotspots, such as the Aalto University ecosystem in Espoo, Finland, and in the Stockholm start-up ecosystem.
- Create a 'Skype Campus' in Estonia following the model of Google Campus in London. This would be a central point for technology start-ups to meet, for mentoring, series of events and meeting inspira-

tional speakers. It would be an environment that truly encourages innovation and helps entrepreneurs realise and pursue their ambitions.

The Estonian shortcomings in networking also extend to international networking. To strengthen this aspect and help strengthen Estonian innovation culture, three actions were identified:

- Support the international connectivity of Estonian new ventures by creating a mentoring network among Estonians who live overseas ('Overseas Estonians Mentoring Network').
- Arrange trade mission-style events to expose Estonian new ventures to foreign markets and improve their connectivity to platform ecosystems (e.g., smartphone platforms, gaming platforms).
- Increase efforts for international brain gain. Estonia should actively seek to attract post-graduate students globally to increase its pool of talent. Today there already are some bachelor's and master's students who come to study in Estonia for a short period of time, but this flow of talent should be substantially increased and upgraded also to include PhDs.

Although Estonian investment in R&D has increased rapidly, it remains dominated by public-sector investment and basic research. To move up the value chain, it is important to strengthen the applied research skills of Estonian SMEs and new ventures. Three specific actions were identified:

- Create a dedicated technology funding agency in Estonia (similar to Tekes of Finland or TSB in the UK) that supports applied research by private-sector entrepreneurial businesses.
- Increase the participation of start-ups in applied university research by prioritising research funding to projects with start-up and industry involvement. Projects with industry involvement would be rewarded with top-up funding. Furthermore, mechanisms need to be created to allow aca-

demics gain a stake in their universities' technology spin-outs to which they have contributed.

- Upgrade the innovation skills of Estonian supply chain SMEs by extending the use of innovation vouchers. The monetary value of the vouchers should be increased, and the range of partners should be diversified, for example, by supporting prototyping services.

Finally, public sector procurement was identified as an important mechanism to introduce demand pull for innovative products and services in the Estonian entrepreneurship ecosystem. To facilitate this outcome, one specific action was identified:

- Develop Estonian public procurement policies, standards and regulations to favour procurement of innovative products and services from Estonian start-ups when possible. Ministries and government agencies can act as lead customers to new technologies. Line ministries should be engaged into the allocation of funds for research funding to articulate demand for innovation.

FINANCE: CAPITAL AVAILABILITY FOR ENTREPRENEURSHIP

Finance was identified as another bottleneck in the Estonian entrepreneurship ecosystem. We first briefly summarise conclusions from the GEDI analysis and related discussions and then highlight insights from secondary data. We then summarise the stakeholder discussions on this bottleneck.

Estonian Entrepreneurship Finance in the Light of GEDI Analysis

During the analysis stage, both the GEDI data and the secondary data identified Finance as a potential bottleneck that holds back the Estonian entrepreneurship ecosystem. Subsequent discussions confirmed this bottleneck. The discussions concluded that there is a general bottleneck in domestic capital accumulation due to Estonia's economic history. It was also concluded that there may be a bottleneck in terms of Angel Funding, due to the first generation of Estonian entrepreneurs having mostly made their fortunes in real estate and thus lacking the skills and confidence to invest in innovative and technology start-ups. Also structural issues were identified, one concern being about the mostly foreign control and consumer lending orientation of Estonian banks, which make them poorly equipped to fund start-ups. It was also noted that the Estonian private equity market appears two-tiered, with weaknesses in domestic supply of venture capital funding and connectivity to foreign sources of equity funding. Finally, the discussions highlighted a demand-side concern. The 'financial absorptive capacity' of Estonian entrepreneurs – i.e., their ability to take on external funding – was found to be weak, perhaps because of Estonia's relatively weak equity funding culture.

Insights from Secondary Data

Also the analysis of external supported the notion of a finance bottleneck in the Estonian entrepreneurship ecosystem. The analysis suggested that while the Estonian financial institutions are in relatively robust health particularly when compared against some other EU countries, gaps and challenges remain in entrepreneurial finance. First, the venture capital industry in Estonia is still quite young. This is important because entrepreneurial

finance requires experience. Experience accumulation in the venture capital industry takes time, since cumulative collective experience is required that covers at least one full, preferably two industry cycles. For example, the Estonian Development Fund was established only in 2006 and made its first investments in 2008. The Estonian Venture Capital Association has 15 members who had made investments in 82 portfolio companies by late 2013. They had a total of 192 million euro under management – although these funds are not exclusively earmarked to Estonian markets.

Second, available indicators suggest a gap in Estonian entrepreneurial finance. The 2013 Venture Capital and Private Equity Country Attractiveness Index ranked Estonia as 51st in terms of the depth and functioning of its market for corporate and new venture finance. In the Index, Estonia's score is five points (10 %) behind that of Lithuania (ranked 43rd). This is a composite index that measures a number of different aspects of the functioning of markets for equity funding and corporate finance.

Third, OECD surveys have identified a gap in terms of the financial literacy of Estonian citizens. While primarily linked with private-sector credit growth and associated pro-cyclicality problems, this observation also resonates with the observation made during the Stakeholder Workshop discussion that Estonian new businesses may lack requisite knowledge to take on external financing.

Finance Stakeholder Discussion: Content Analysis

The stakeholder discussions on Finance reflected the GEDI analysis as well as the analysis of the secondary data. Issues raised in the stakeholder discussions fell into five categories:

- VC Supply (5 references)
- Funding Absorptive Capacity (8 references)
- Regulatory Framework (6 references)
- Incentives (4 references)
- Equity Gap (3 references)

These categories are more overlapping than in the case of Innovation and also involve Human Capital and Attitude issues. One could also arrive at a broader categorisation and assign the references to Supply Side, Demand Side and Regulatory Framework issues. However, such a broad categorisation would make it difficult to explore causal connectivity between the issues.

In this content analysis, Equity Gap emerges as the outcome, or as the manifestation of the Finance bottleneck. We next elaborate on the five categories.

VC Supply

This category refers broadly supply side issues and covers also forms of funding other than VC alone. Broadly, competence and supply issues in the Estonian entrepreneurial finance sector reflect lack of an equity culture in Estonia. Because the venture capital sector is not yet well established in Estonia, there is a lack of informed investors specialising in given sectors and in entrepreneurial ventures. The young age of the VC sector also means that the networks critical for referral and syndication are not well developed. There is a general lack of specialised, patient investors that would invest, e.g., funds accumulated through prior entrepreneurial activity. Banks are unable or unwilling to invest in venture funds, because most banks are headquartered abroad and emphasise consumer lending. Because of these defects, a finance monoculture dominates, and there are few hybrid solutions, contributing to an equity gap in the €1M - €3-4M range.

Absorptive Capacity

This category refers to the inability or unwillingness of the entrepreneurial sector to productively take on and use equity funding to fuel entrepreneurial growth. Altogether, this category captures demand side issues and received the largest number of references. The demand side gap again reflects lack of tradition, experience and a weak equity culture. There is a general lack of fundraising knowhow among entrepreneurial businesses. Combined with a lack of entrepreneurial managerial expertise and low ambition, this constrains demand for entrepreneurial finance. This is exacerbated by a dearth of attractive investment tar-

gets because of inadequate supply of competent entrepreneurial teams, which in itself is contributed to by a lack of national cluster policy, an issue also mentioned in the Innovation bottleneck discussion. These issues are exacerbated by low labour productivity especially in low- and medium-technology sectors due to inadequate supply of skilled labour.

Combined, these demand-side issues contribute to a paradoxical-sounding imbalance between funding supply and demand, with raw supply outstripping high-quality demand. Although there is funding available, there is a lack of specialised funding that could productively invest in high-quality entrepreneurial teams, partly because there is an insufficient number of such teams. There thus seems to be a difficult-to-resolve chicken-and-egg problem that afflicts the Estonian entrepreneurial finance sector. Resolving this issue requires attention to the causal links between bottleneck-specific issues, as well as interactions across bottlenecks.

Regulatory Framework

The regulatory framework of the wider financial sector in Estonia contributes to both demand- and supply-side problems. In the supply side, restrictions on pension fund investment in venture funds constrain supply of funding to entrepreneurial finance. Funding application procedures are cumbersome, with document requirements that confuse entrepreneurs and discourage them from applying. Tax authorities often do not understand entrepreneurs, with the result that there are tax burdens such as social security tax that make it costly for entrepreneurial businesses to employ skilled labour. Regulatory constraints together with foreign ownership of most Estonian banks also probably contribute to the fact that money remains locked in deposits and is not circulated to fuel entrepreneurial businesses.

Incentives

The stakeholder discussion also noted a general lack of incentives to invest in entrepreneurial businesses. There was also a lack of incentives that would help more entrepreneurial businesses to develop in ways that would make them more attractive as investment targets. There are no UK-

style tax reliefs for investment in entrepreneurial businesses. Corporate income tax is nominally 0% but taxed with income tax, resulting in fairly high tax on entrepreneurial income. High social security tax pushes up the cost of hiring employees. In general, the tax system is inflexible and does not recognise the special needs of entrepreneurial businesses.

Equity Gap

Many of the issues noted above contribute to distinctive gaps in the supply of equity funding for entrepreneurial businesses. The very earliest stages are reasonably covered, as are situations where the venture is already 'bankable' (i.e., can show steady, positive cash flow). In between, there is a domestic equity gap in the range from 1 to 4 M€, with the implication that if sufficient funding in this range cannot be raised in Estonia, foreign investors will demand the relocation of headquarters abroad. Also, there are no equity instruments available in the range of 1 to 3 M€, and the finance monoculture contributes to a lack of hybrid investment solutions.

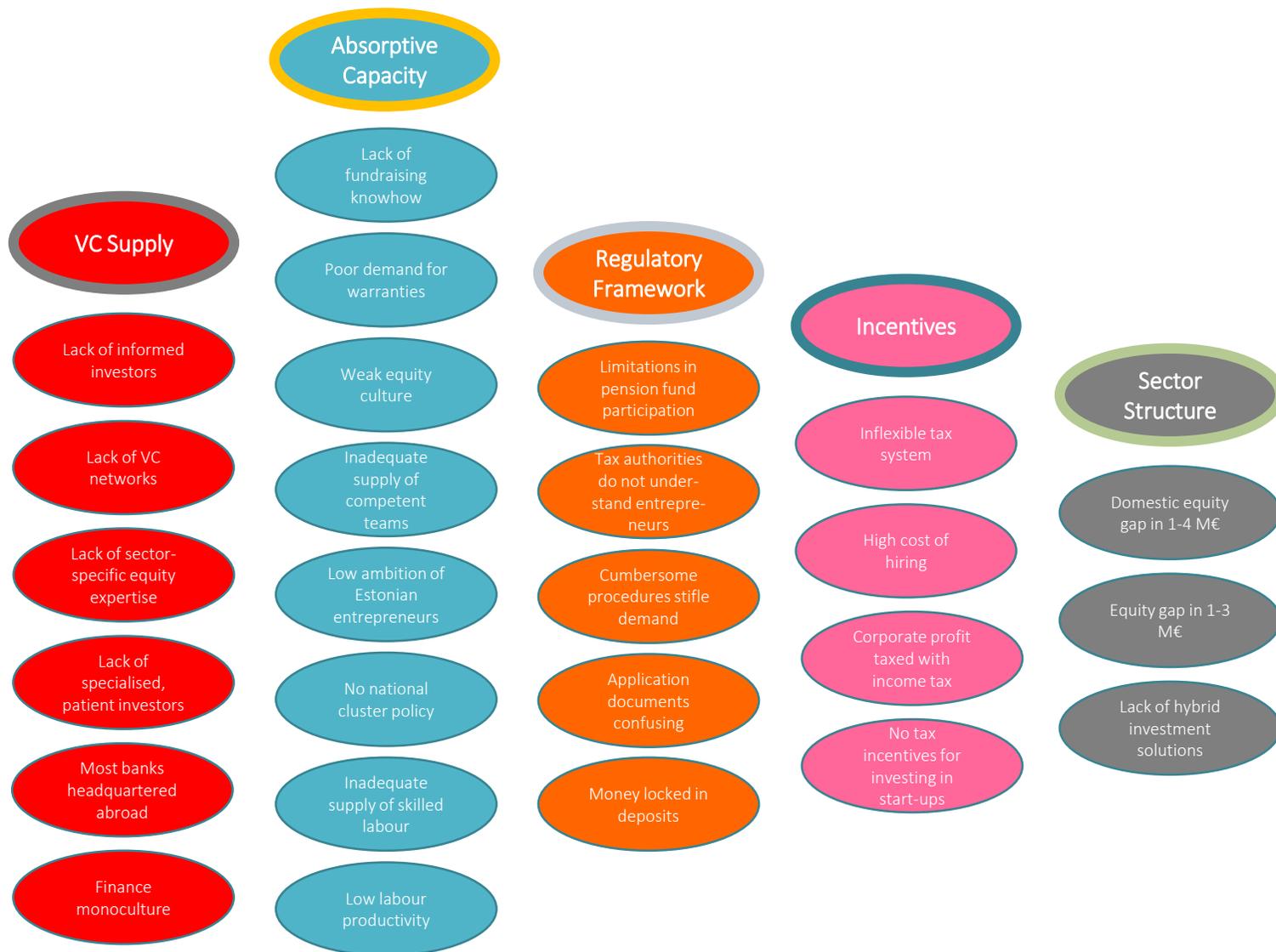


Figure 11 Content Analysis of Finance Stakeholder Discussion

Finance Bottleneck: Causal Connections

The review above suggests a number of causal links between the issue categories mentioned in the stakeholder discussion. Both supply side and demand side issues are partly driven by regulatory problems, partly by lack of incentives. Supply and demand are also constrained by a general lack of equity culture in Estonia. The connections are illustrated in Figure 12.

First, regulatory restrictions affecting pension funds in particular constrain the flow of funding to the entrepreneurial finance sector. This problem is accompanied by the structure of the banking sector, which is dominated by foreign banks headquartered abroad and unwilling to invest in venture funds. This issue thus calls for attention to regulatory measures that could make it easier for pension funds to invest in domestic venture funds in Estonia. However, getting the balance right is complex because of the self-reinforcing links between supply and demand of entrepreneurial finance.

Second, burdensome regulatory procedures and tax incentives discourage entrepreneurial businesses from applying for funding and from investing in the pursuit of innovation and growth that would make them more fundable. This link calls attention to fiscal measures that could be deployed to encourage entrepreneurial growth, as well as legal and potentially other measures to simplify application procedures.

Third, disincentives introduced by an inflexible tax system prevent entrepreneurial businesses from effectively seeking innovation and growth. This link suggests visiting the aspects of the tax system that most dis-incentivise entrepreneurial growth aspirations.

Fourth, lack of UK-style tax reliefs directly constrains investment in entrepreneurial businesses. This link suggests consideration of ways of introducing tax relief for private investment in entrepreneurial businesses.

Fifth, weak equity culture, underdeveloped VC sector with underdeveloped VC networks, few patient and specialised investors and finance monoculture contribute to an equity gap especial-

ly in the 1—4 M€ range and to a finance monoculture. This link suggests consideration of measures to strengthen the equity culture and the VC sector in Estonia. However, there are complex interactions between supply and demand that need to be taken into consideration.

Sixth, weak equity culture, dearth of high-potential teams, low ambition, and lack of entrepreneurial managerial competence contribute to an imbalance between high-quality demand and funding supply, perpetuating the equity gap. This link suggests consideration of what could be done to enhance the entry of competent entrepreneurial teams into the entrepreneurial sector, perhaps through a more widespread deployment of new venture accelerators.

Seventh, the above causal links imply that supply and demand-side links reinforce one another, creating a chicken-and-egg problem. This observation suggests that careful attention needs to be paid to the sequence in which different policy measures are introduced, so as to avoid excessively disturbing the balance between supply and demand.

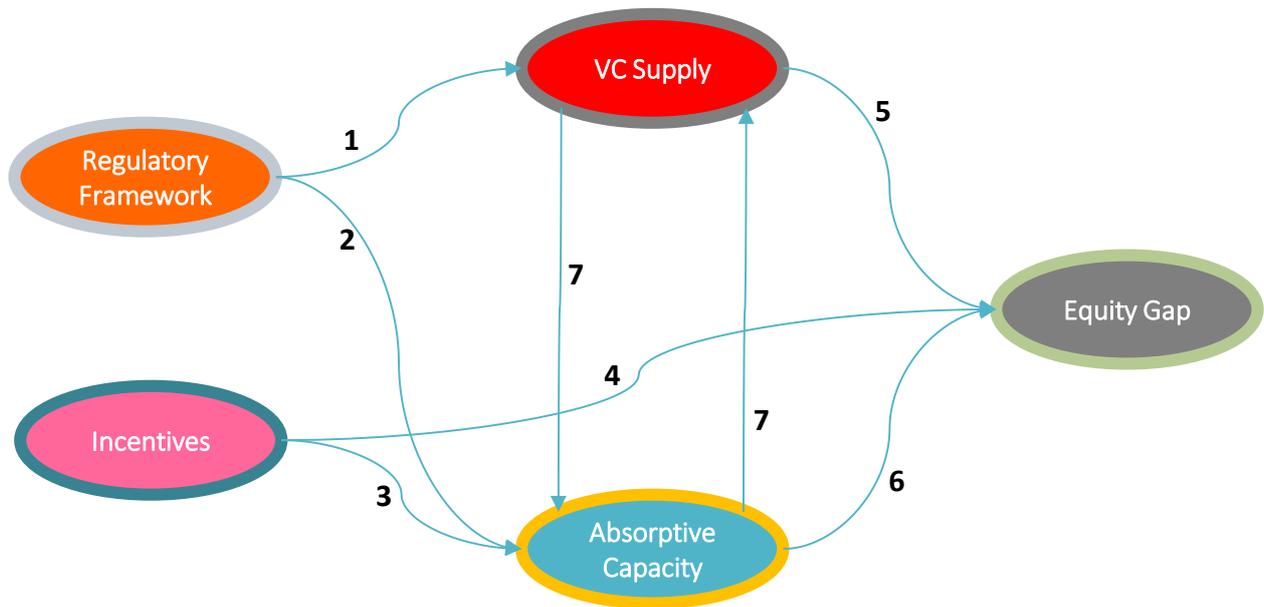


Figure 12 Causal Map of Issues Underlying the Finance Bottleneck

Fixing Finance: Conclusions

In summary, the stakeholder discussions added much nuance to the GEDI and secondary data analysis that identified finance as a bottleneck that holds back the Estonian entrepreneurship ecosystem. Our content analysis identified five major categories of issues and a chicken-and-egg

problem between funding supply and demand. Overall, it seems that a range of policy measures should be considered, addressing both fiscal, regulatory and incentive issues, as well as existing weaknesses both in the supply and demand of equity funding to fuel entrepreneurial growth.

EASING THE FINANCE BOTTLENECK: CALLS FOR ACTION

The stakeholder discussion around Finance identified several areas where action could be introduced to relieve the Finance bottleneck. The first focused on enhancing the demand for new venture finance by Estonian entrepreneurial businesses. Two actions were identified:

- Develop an assisted spin-out programme to support entrepreneurial venture creation by people with managerial experience (e.g., former Skype employees). The Founder Institute provides a good example. In addition to established corporations, also universities should offer similar programmes supporting start-up ventures created by university researchers and students.
- Provide training for existing entrepreneurs so they can better pitch for Venture Capitalists (VCs) and raise their horizons beyond the domestic market. This could be achieved, e.g., by scaling EAS's Export Bulldozer-style training to universities.

Another side of the coin is the supply of specialised funding for innovative and high-growth start-ups. Three actions were identified:

- Develop the legal framework for crowdfunding and syndication approaches so that more experienced Business Angels can syndicate and lead investor rounds with more substantial capital input. Today there are no equity-based crowdfunding portals in Estonia, and a regulatory framework for crowdfunding is also missing. Creating the legal framework for crowdfunding is needed to catalyse the development of the Estonian start-up equity model. Also the procedures for leading a crowdfunding investment round have to be appropriately regulated, so that new investors will have the possibility to back Lead Investors that have track record in angel investing, so as to learn the basics of angel investing from these.
- To avoid the need to sell equity too early, introduce soft-loan type funding for seed-stage businesses (payable back only if the

venture is successful). The loan amount would have to be in the range of 5 000 – 30 000 EUR to make a difference in the start-up stage.

- Since family offices and endowment funds are missing in Estonia, a legal framework should be created to kick-start the family office culture in different industry sectors. A legal framework for trust fund activities is currently missing in Estonia and needs to be created. Also examples of family offices from Scandinavian countries, specialising in specific industries, could be used as inspirational examples in Estonia.

The regulatory framework and, in particular, fiscal (dis)incentives can influence both the demand and supply of new venture funding. Four actions were identified:

- Introduce UK-style tax incentives for business angel and crowdfunding investors. These incentives should allow profits from previous investments to go untaxed if rolled over to new investments.
- To enhance the growth orientation of Estonian new ventures, create an employment tax honeymoon by reducing employment taxes for the early years of the new venture. Alleviating early-stage employment tax burden is particularly important for innovative start-ups, whose growth demands employing the best talent, and for whom salary-related indirect expenses can prove prohibitively high.
- Reduce fringe benefit taxation for new ventures to enhance their ability to recruit and retain managerial talent. Today the employer has to pay close to 70% tax on all fringe benefits, which reduces the attractiveness of the Estonian entrepreneurship ecosystem relative to other regions. Bringing in expats and providing for their apartment, schools, and other relocation and settling costs can be prohibitively expensive and hampers Estonian start-ups' ability to compete for the best talent.

A specific supply-side problem is insufficient coordination and complementarity between different financial instruments. This creates funding traps where new ventures may get caught at certain points of their life cycle. Three actions were identified:

- Create a taskforce to identify and facilitate synergies with major Estonian funding agencies (e.g., KredEx and Enterprise Estonia).
- Introduce a 'Team Estonia' approach under which different stakeholders commit to advancing jointly shared national goals (e.g., developing a fertile environment for new growth ventures). This action is consistent with and could be merged with the 'Made in Estonia 3.0' initiative.
- Organise an annual Slush-style event where selected and trained new ventures can pitch for an international VC audience. Some events are already happening (e.g., the Latitude59 Annual Conference in Tallinn), yet the scope of existing events cannot yet be compared with that of Slush.

Developing supply side sometimes requires long-term orientation. For example, developing venture capital skills is done best through experience, which takes time. Therefore, continuity is required also in policy. The stakeholders identified two specific actions:

- Create long-term policy guidelines to enhance policy coherence and visibility beyond year 2020. For example, the fund-of-funds initiative and BIF and training programmes (e.g., Startup Estonia) should be extended beyond their current duration. This is important so as to allow time for the private sector to properly establish themselves and take over from public-sector agencies. Consistent with this, a new fund-of-funds should be launched in 2017.

- Change the current business law to better accommodate the needs of innovative start-ups. At present, private limited companies (most start-ups use this form) cannot issue shares with different shareholder rights; this constrains their ability to raise funding. This call for action recognises existing work in progress, notably, the Ministry of Justice task force that works on recommendations to amend the business law.

ATTITUDES: PERCEPTIONS OF RISK AND REWARDS ASSOCIATED WITH ENTREPRENEURSHIP

Attitudes were identified as a key individual-level bottleneck in the Estonian entrepreneurship ecosystem. We again briefly summarise conclusions from the GEDI analysis and related discussions and then highlight insights from secondary data. We then focus on the stakeholder discussion on this bottleneck.

Estonian Attitudes Towards Entrepreneurship in the Light of GEDI Analysis

The GEDI analysis suggested that Attitudes were the most consistent individual-level bottleneck in the Estonian entrepreneurship ecosystem, and also, the weakest pillar category. This was the indicator category that most consistently flagged below-standard performance for Estonia, and this was the pillar-level category that explained the performance difference (i.e., the GEDI score) difference between Estonia and Chile.

Although poor attitudes may reflect a weak entrepreneurial culture, this is a multi-faceted issue. In countries with not such a strong entrepreneurial culture, such as Finland, entrepreneurs enjoy a much stronger societal and career status than they do in Estonia. The core group discussion noted that status attributions can be an important career choice consideration particularly for more highly educated individuals, as these typically have access to a range of “safe” employment options, and also, because the opportunity cost of choosing between alternative careers is higher for better educated individuals.

Finally, it was observed that Attitudes and Education are closely linked, as education can have an important direct and indirect influence on attitudes, in addition to directly shaping skills development.

Estonian Attitudes: Reflections from Secondary Data

Although there is not a huge amount of data describing Estonian attitudes towards entrepreneurship, a number of interesting indicators were nevertheless found. The European Values Survey (part of World Values Survey), provides the most recent general review of Estonian attitudes, although the most recent wave dates from 2008. In comparison against Finland and Sweden it was observed that:

- Estonians lag significantly behind other Baltic countries in terms of how important it is considered for children to learn independence at home
- Estonians think to a greater extent than Finns or Swedes that the State should provide for individuals’ needs as opposed to the individuals themselves
- Estonians lag behind Finns in believing that hard work brings about success (although they were ahead of Latvians, Lithuanians and Swedes in this regard)
- Estonians lag behind Finns and Swedes in terms of their attitudes towards risk-taking and change
- There was a significant gap between the Baltic countries and Finland and Sweden, respectively, in terms of individual-level willingness to assume responsibility

Overall, such attitudes appear to reflect a continued hangover from the times when the economy was centrally planned. In part, they may also reflect a ‘deprivation reaction’, with individuals putting a higher value on factors they currently perceive are lacking. The deprivation reaction might help explain why Estonians put more emphasis on the state as opposed to the individual in providing for individuals’ needs.

Attitude Stakeholder Discussion: Content Analysis

In terms of content analysis, the Attitudes bottleneck appears to comprise a much more intertwined set of overlapping issues than do the Innovation and Finance bottlenecks. There could have been a number of different ways to categorise the issues mentioned, but eventually the analysis converged upon five major, partly overlapping categories:

- Entrepreneurial Culture (7 references)
- Status of Entrepreneurship (4 references)
- Small Business Tradition (4 references)
- Education System (5 references)
- Networks (3 references)

In particular, the notion of an Entrepreneurial Culture is a little diffuse and multifaceted and would, as such, constitute a relatively poor target for entrepreneurship policy measures because of its elasticity. Nevertheless, this category captures a broad range of issues that are relevant to the Estonian attitude climate towards entrepreneurship.

It is also noted that attitude issues received frequent mentions also in the Innovation and Finance stakeholder discussions. We next elaborate on each issue category.

Entrepreneurial Culture

As noted, the notion of an entrepreneurial culture is somewhat elastic. This category mostly captures references to issues that reflect a poor understanding of what entrepreneurship actually is all about. It was noted that the older generation tends to continue to see entrepreneurship as speculative action – an attitude overhang from the socialist times. The young generation, however, also seems to have unrealistic misconceptions and think that much wealth can be created with internet businesses without much effort. Both attitudes reflect an insufficient understanding of the essence of entrepreneurship and the effort and skill required to create entrepreneurial value added through opportunity pursuit. A poor understanding is also reflected in the misconception that running and growing an entrepreneurial business is no different from general management. Overall, there is a general under-

appreciation of the role of entrepreneurs in the creation of new economic value (as opposed to the reallocation of existing value). This issue is particularly salient in peripheral regions.

Status of Entrepreneurs

There are two broad status issues attached to entrepreneurship in Estonia: first, the societal status of entrepreneurship and entrepreneurs; and second, the career status attributions attached to entrepreneurship. The image of entrepreneurs as speculators and the failure to see them as value creators deducts from the societal status enjoyed by entrepreneurs. The bias (reinforced by the education system) towards attaching greater value to employment rather than an entrepreneurial career contributes to low career status attributions. These may be particularly salient among the academically educated, who tend to prefer safe employment over entrepreneurship.

Small Business Tradition

A misconception arising from the general misunderstanding of entrepreneurs is the failure to distinguish between small business management and entrepreneurship. This partly contributes to the preference on employment, which is seen as a safer route to income creation rather than entrepreneurship. A small business attitude is also apparent in the general risk aversion among Estonians, as also noted in the Innovation and Finance content analysis. There are strong cultural norms against providing collateral for entrepreneurial risk taking, for example, and a short-termist bookkeeping mentality dominates, which emphasises the short-term balancing of income and expenditure over capital accumulation and investment. Overall, fear of failure and bankruptcy, and social stigma attached to these, serve to lock new businesses into a 'small business mode', rather than a growth-seeking and innovative, 'entrepreneurial' mode.

Education System

The education system contributes to the attitude deficit in a number of ways. First, the education system emphasises the importance of getting a good job over the value of creating new economic value through opportunity discovery and pursuit.

A structural issue is that teachers in Estonian schools and higher educational institutions often do not understand the essence of entrepreneurship. Entrepreneurial skills are not widely taught, as business and management education tends to teach theory and economics over entrepreneurial skills. This means that entrepreneurial attitudes are not sufficiently cultivated by the education system. Insufficient teaching of life and career planning skills also contributes to a failure by students to perceive entrepreneurship as a career option that could logically follow from and contribute to different career and life stages.

Networks

Finally, there were a number of networking issues linked to attitudes towards entrepreneurship. First, as already noted in the Innovation discussion, Estonians exhibit low propensity for networking. This inhibits entrepreneurial opportunity

recognition, opportunity creation, experience sharing, role models and resource mobilisation. There are also weaknesses in international networking, which contributes towards an under-appreciation of entrepreneurial value creation. Finally, a networking related issue is the absence of societal safety nets that could help prevent failing entrepreneurs from 'falling flat on their face'. This last issue contributes to risk aversion and low career status attributions.

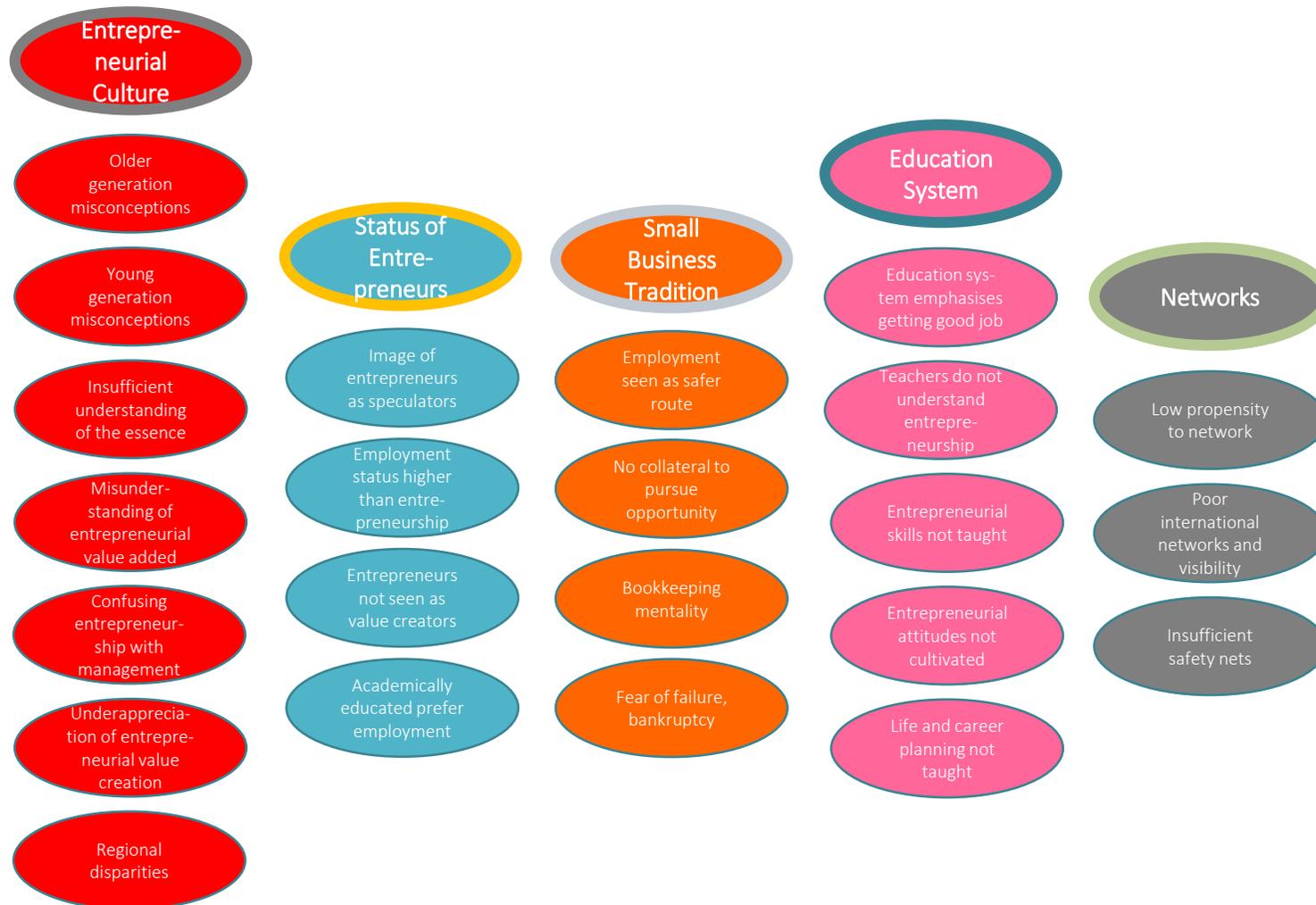


Figure 13 Content Analysis of the Attitudes Bottleneck

Attitude Bottleneck: Causal Connections

The review above suggests a number of causal links between issue categories that emerge from the content analysis. It should be kept in mind that the categories in this content analysis are much more overlapping than in the case of Innovation and Finance. A closer examination of causal connections between issue categories suggest that poor attitudes are ultimately driven, reinforced and perpetuated by the Estonian education system and by the Estonian small business tradition. When it comes to attitudes, the role of the education system cannot be ignored. Combined, status problems and weak entrepreneurial culture constrain the flow of talent to the entrepreneurial sector. The causal connections between attitude issues are illustrated in Figure 14.

First, although the education system cannot be fairly said to have *caused* weak entrepreneurial culture or weak status attributions, it does play a role in reinforcing and perpetuating these. In itself, the education system is as much a reflection of low status attributions and weak entrepreneurial culture as a driver of them. However, there are clear causal links that can be addressed through policy action. First, teachers in Estonian educational institutions mostly lack sufficient understanding and appreciation of entrepreneurial value creation, and they therefore cannot effectively instil these on pupils and students. As such, the education system is biased towards a strong preference of salaried employment over entrepreneurship. Teaching is also biased towards economics and managerial skills rather than entrepreneurial skills. These issues serve to weaken the status of entrepreneurs as well as the Estonian entrepreneurial culture.

Second, poor teaching of entrepreneurial skills directly inhibits talent flow to the entrepreneurial sector.

As such, it appears that coherent and sustained policy action is necessary to address the causal links from the education system. Implications for primary and secondary, as well as

tertiary and graduate education should be addressed separately.

Third, one distinctive aspect of a weak Estonian entrepreneurship culture is the confusion between small business management and entrepreneurship. A bias towards a small business tradition reinforces risk aversion, short term orientation and low capital accumulation, and it also contributes to a low societal and career status of entrepreneurship. As such, these issues appear amenable to manipulation through education policies, perhaps also through media campaigns and role model promotion.

Fourth, underdeveloped entrepreneurial networks and poor networking propensity in general inhibit entrepreneurial orientation (an aspect of entrepreneurial culture) and perpetuate poor status attributions. This issue links to the Innovation bottleneck and should perhaps be addressed in coordination with networking policies.

Fifth, in itself, poor entrepreneurial culture inhibits network formation. This two-directional causality can probably be addressed by investment in network facilitation.

Sixth, weak entrepreneurial culture inhibits entrepreneurial career choice by failing to understand entrepreneurship, particularly among the better educated individuals. This inhibits talent flow to entrepreneurship. It appears that media strategies could help alleviate this problem alongside with education policies.

Seventh, poor status of entrepreneurship (both societal and career status) inhibits entrepreneurial career choice. As above, a mix of media and education policies should help address this problem.

Finally, absence of societal safety nets for entrepreneurs inhibits entrepreneurial career choice, and also, likely inhibits risk taking among entrepreneurs, thereby inhibiting entrepreneurial growth. This issue appears to call for a different set of policy measures, designed to provide cushion in the case of entrepreneurial failure.

Ameliorating Attitudes: Conclusions

In summary, the stakeholder discussions have added nuance to the GEDI and secondary data analysis that identified Attitudes as a bottleneck that holds back the Estonian entrepreneurship ecosystem. Our content analysis identified five major categories of issues and considerable overlap and feedback

mechanisms between these. Overall, education policies emerge as a major category for policy attention, but it appears that also media campaigns and social security policies could help address this bottleneck area.

Because Attitudes and Skills are closely related, we discuss Calls for Action after the Skills bottleneck review, which follows next.

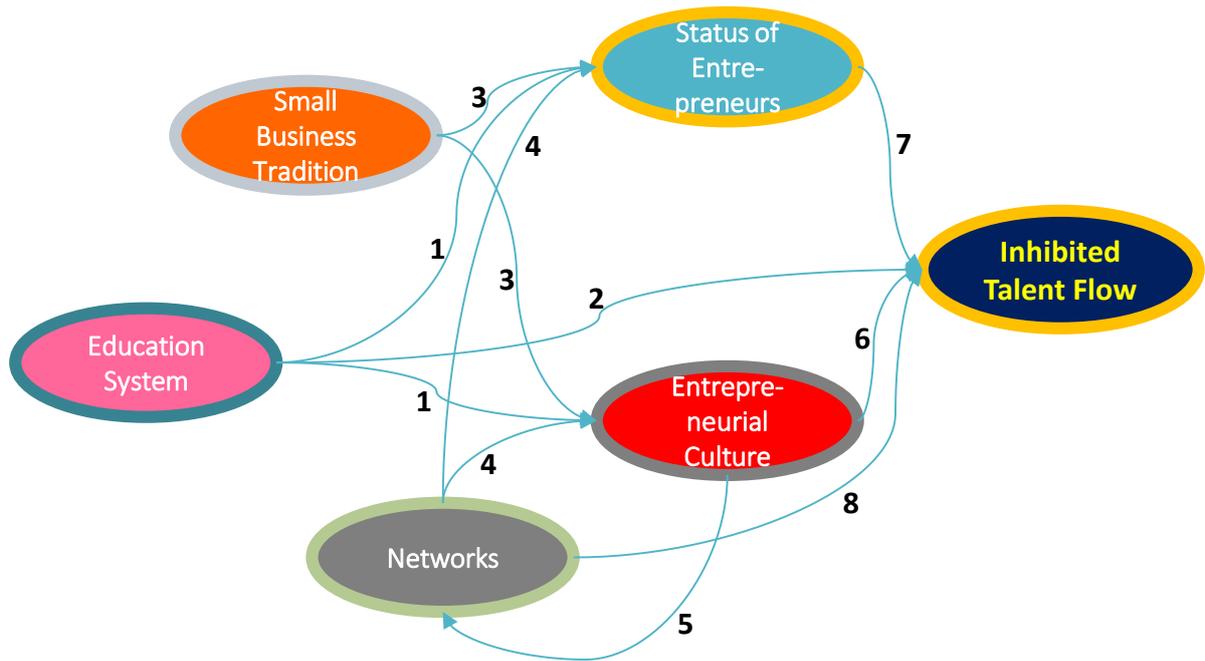


Figure 14 Causal Map of Issues Underlying the Attitude Bottleneck

ENHANCING EDUCATION: SKILLS FOR ENTREPRENEURSHIP

Skills for entrepreneurship were identified as the final bottleneck in the Estonian entrepreneurship ecosystem. This theme is closely linked to entrepreneurial attitudes described above. Skills for entrepreneurship also matter for innovation and for the demand for entrepreneurial finance. Consistent with preceding discussions we first briefly summarise conclusions from the GEDI analysis and then highlight insights from secondary data. We then focus on the stakeholder discussion on this bottleneck.

Entrepreneurial Skills in the Light of GEDI Analysis

The education bottleneck was not extensively discussed during the workshops debating the preliminary analysis, although it was clearly recognised that Education plays a major role in shaping Attitudes, while also facilitating the development of human capital, both in the form of primary training (new graduates) and workforce re-training (upgrading of skills of employees).

In the GEDI analysis, this bottleneck is suggested by the lower-than-average level of tertiary education relative to 29 EU countries, lower-than-average skills perceptions and the resulting Start-Up Skills Pillar, as well as in the lower-than-average level of education of Estonian entrepreneurs relative to their EU counterparts and in the resulting Human Resources pillar.

The core group discussions raised several questions around the Skills for Entrepreneurship theme, including the following:

- Does the primary and secondary education provide sufficient grounding in terms of entrepreneurial attitudes and skills such as opportunity recognition; self-sufficiency and self-confidence; risk acceptance; learning orientation; and performance orientation?

- Do higher educational institutions (HIEs) provide sufficient training and grounding in entrepreneurial skills?
- Do science and engineering universities sufficiently support innovation in terms of developing and spinning out new knowledge-based ventures?
- Does education at different levels provide sufficient examples and inspiring role models for students to emulate later in their lives?

Entrepreneurial Skills in Secondary Data

There is no source of secondary data that directly addresses the question of Skills for Entrepreneurship. The European GUESS survey is not usable, because it is based on a self-selection of respondents and reports respondent perceptions rather than objective assessments. In the core group discussions, the role of Education was highlighted in several ways: first, as a regulating influence on Attitudes; second, as a source of entrepreneurial skills; and third, as an influence on human capital for entrepreneurial businesses, such as labour force skills. As regards the third aspect, we already noted that Estonian businesses perceive lack of specialised human capital as a constraint on innovation to a greater extent than their Finnish counterparts. Second, secondary data also confirms that the average educational attainment of Estonian adult-age population remains behind European Innovation Leaders. Furthermore, spending on labour market policies in Estonia lags behind most European peers: this includes investment in, e.g., re-training and upgrading inactive labour force. This is a problem in a context where an important part of industrial competitiveness is based on low labour costs. As labour costs inevitably go up, industrial labour needs to be upgraded in order to migrate towards higher value-added activities. These inferences are

supported by the high share of under-skilled and under-qualified workforce and the relatively low number of hours spent by Estonian labour force on education and training.

We next consider issues raised in the Stakeholder workshop debating this bottleneck.

Skills for Entrepreneurship: Content Analysis

The stakeholder discussion on skills for entrepreneurship focused largely on education: its structure, content, proper ways to teach entrepreneurship, as well as the effect on resulting skills and attitudes. During the content analysis, four issue categories emerged:

- Primary and Secondary Education (4 references)
- Higher education (9 references)
- Entrepreneurial Attitudes (4 references)
- Entrepreneurial Skills (6 references)

As the discussion around this bottleneck partly overlapped with the other categories – notably, Attitudes – we also will draw on the other discussions for insight on this bottleneck. The content analysis is shown in Figure 15. We elaborate on each category below.

Primary and Secondary Education

The stakeholder discussion clearly recognised that the proper teaching of entrepreneurial skills and attitudes requires coordinated action across the different stages of education. With reference to attitudes, it was emphasised that the teaching of the right attitudes should be started early, as many core attitudes are already fixed before graduation from high school. Structural problems were also recognised, as teachers in primary and secondary (and also tertiary) education are not knowledgeable enough of entrepreneurship, lack entrepreneurial expertise, and therefore cannot effectively instil entrepreneurial attitudes and skills or act as effective role models. Thus, entrepreneurial attitudes are not sufficiently

nurtured at school, which makes it challenging to address the gap later.

Higher Education

We refer to any education after secondary education as higher education. This category attracted the largest number of references – a total of nine – that addressed both content, structure, and wider coordination. Similar to primary and secondary education, it was noted that teachers are not sufficiently knowledgeable about entrepreneurship. Teaching also tends to be too much fact-based and ignore practical training and the development of the kind of soft skills (such as social and leadership skills) that are critical for successful resource mobilisation. Also, teaching tends to ignore many relevant skills such as internationalisation. Because teachers do not effectively deploy role models, the theoretical bias is reinforced. In terms of structural issues, it was observed that different education systems such as formal and informal training are too disjointed, and mutually reinforcing effects are thus lost. Access to entrepreneurship education and training varies too much across regions in Estonia. Formal and informal education and training systems are too disjointed. At the education system level, entrepreneurship education is not systematic, and national centres of excellence and expertise are not sufficiently leveraged. Finally, because of the misunderstandings and misconceptions resulting from teachers' lack of knowledge and insufficient focus on practice, the higher education system fails to strengthen career status attributions to entrepreneurship.

Entrepreneurial Attitudes

In terms of entrepreneurial attitudes, comments were made that resonated with our content analysis of the Entrepreneurial Attitudes bottleneck. Because of education gaps, graduates do not truly understand the essence of entrepreneurship, and the entrepreneurial career enjoys a lowly status among graduates. Also, graduates do not possess the right attitudes of that reinforce an entrepreneurial orientation. The misconceptions regarding entre-

preneurship cause graduates to confuse entrepreneurs with managers.

Entrepreneurial Skills

The entrepreneurial skills category received the second largest number of mentions, six. These represent the outcomes and thus reflect the current situation as perceived by the stakeholders. Education and training relying too much on the teaching of 'facts', graduates

lack soft skills and also experiential knowledge such as growth skills. This is reinforced by the insufficient exposure to entrepreneurial practice during the studies. Thus, the education system contributes to a skills mismatch with the needs of the economy. In particular, more service skills are needed.



Figure 15 Skills for Entrepreneurship: Content Analysis

Skills for Entrepreneurship: Causal Analysis

Finally, we explored causal connections between the issue categories emerging from the stakeholder discussion. As such, the causal maps are relatively straightforward, given that the stakeholder discussion was quite focused on education structure and content and on the resulting skills and attitude deficits.

The causal map of issues affecting the skills bottleneck is shown in Figure 16. Because of the focused nature of this discussion, the causal connections are relatively straightforward and point to policy action addressing the education system. Note that the causal map ignores some skill aspects, such as the training and education of workforce to facilitate moving up in the value chain in subcontracting businesses. This issue was addressed in the context of Innovation. Also, the discussion around Attitudes made several references to education that are not repeated here.

The above suggests that the apparent simplicity of the Education causal map can easily mislead. Education is intimately connected with Attitudes and Innovation, and also, indirectly connected with Entrepreneurial Finance through its effect on the demand side. This does not imply, however, that all problems could be solved through formal education. We next elaborate on the causal connections.

First, primary and secondary education play an important role in shaping entrepreneurial attitudes, and also, to some degree, entrepreneurial skills. Because teachers in primary and secondary education lack understanding and personal exposure to entrepreneurship, they are unable to convey the essence of entrepreneurship or instil appropriate attitudes that would strengthen an Entrepreneurial Orientation among pupils. This is important because many attitudes get fixed during primary and secondary education and may be difficult to change later.

Policies appropriate for addressing this gap could include, for example, introducing a coherent agenda for teaching attitudes compati-

ble with entrepreneurship, such as proactiveness, initiative and independence, goal and accomplishment orientation and an appreciation of the contribution entrepreneurs make in the economy. Such policies could be strengthened by media campaigns and inviting successful entrepreneurs to present in class. It is possible that also teachers' education may need to be addressed.

Second, the above issues also prevent teachers from teaching entrepreneurial skills – although the importance of skills teaching is relatively more important in higher education. Policies to address this issue are largely similar to the above, complemented with skills-oriented activities.

Third, higher education institutions fail to strengthen entrepreneurial attitudes because teachers there do not understand entrepreneurship. This results in misconceptions and failure to understand what entrepreneurship fundamentally is about, which then contributes to an insufficient appreciation of entrepreneurship as a career choice. The policies to address this gap are probably similar to those already discussed above.

Fourth, higher education institutions fail to sufficiently strengthen entrepreneurial skills because teaching is too theory based; does not emphasise practical skills and soft skills; is too disjointed; and offers too limited coverage both geographically and in terms of target groups. Policies to address this issue should probably address both teaching content and the structure and coordination of teaching offerings. The importance of giving practical exposure has already been mentioned. For example, internships could prove an effective means of strengthening entrepreneurial skills and attitudes, as could the more widespread deployment of entrepreneurial role models. Specific, coordinated measures to address this gap should be discussed in detail in the policy-oriented stakeholder discussion.

Fifth and sixth, weak attitudes and skills constrain the flow of talent to the entrepreneurial sector. This is an outcome link, which can be alleviated with measures discussed above.

Skills for Entrepreneurship: Conclusions

In summary, the stakeholder discussions addressing Skills for Entrepreneurship repeated points raised by the other bottleneck discussions while also adding nuance. Our content analysis identified four major categories of issues and considerable overlap and feedback mechanisms between these. Despite the apparent simplicity of the causal map, the Skills theme is extensively linked to the other bot-

tleneck analyses, suggesting that the Skills aspect could be a bridging theme that connects all bottlenecks. That said, although the focus of this stakeholder discussion has been mostly on formal education, the Skills theme is obviously broader, and planned policy actions should not be limited to formal education and training delivery alone. It appears that in addition to focused (perhaps as such relatively straightforward) policy action, also some out-of-the-box thinking and debate may be useful to alleviate the Skills bottleneck.

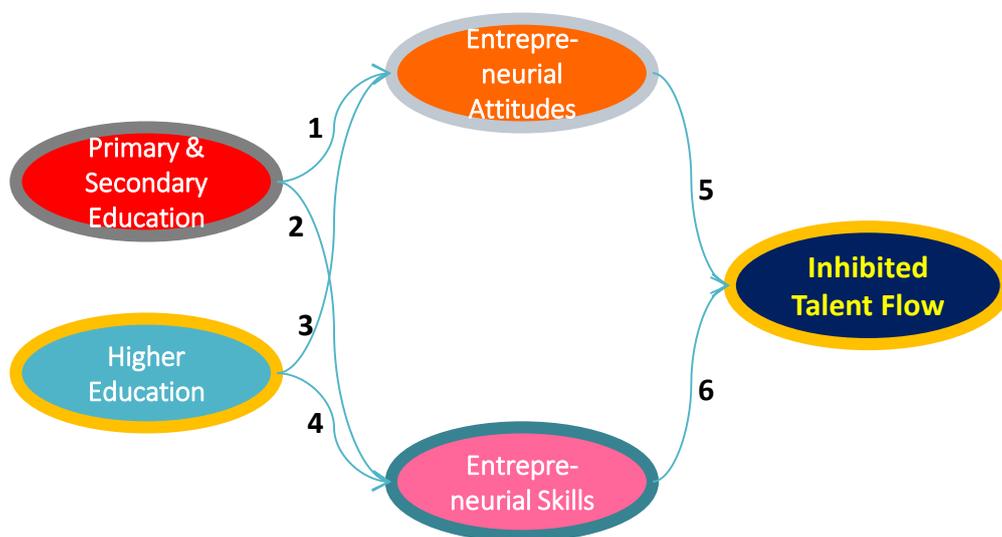


Figure 16 Skills for Entrepreneurship: Causal Connections

EASING THE ATTITUDES AND SKILLS BOTTLENECKS: CALLS FOR ACTION

The Attitudes and Skills theme underpinned, at least in part, the two other bottlenecks. In Innovation, this bottleneck manifested itself as a relatively soft innovation culture in Estonia, labour force re-training needs, as well as in poor innovation and networking skills. In Finance, this bottleneck manifested itself as demand-side constraints best addressed through training programmes. Thus, the actions identified in this theme partly echoed and overlapped those laid out above. In addition to these, several actionable issues arose during the discussion. One of these was concerned with the failure of primary and secondary education systems to teach the right attitudes towards entrepreneurship. Overall, the stakeholders thought that early-stage teaching and training should focus more on attitudes and general life skills, whereas higher levels of education should focus more on training entrepreneurship-specific skills. This is an important distinction: while even primary school students should be exposed to the idea of entrepreneurship, teaching at this level should focus more on entrepreneurial attitudes (e.g., independence, initiative, opportunity recognition, proactiveness) rather than specific entrepreneurship skills. Eight specific actions were identified for enhancing the teaching of entrepreneurial attitudes in primary and secondary education:

- Increase entrepreneurship training for school teachers. The upskilling of existing teachers should be more systematic than what has been the situation thus far. This should be planned and provided by the Centre of Entrepreneurship initiative that is currently under formation (see below for more detail). This Call for Action acknowledges existing initiatives and progress in this area, notably the Entrepreneurship Education Development Programme 2020.
- Provide aspirational goals for schools to extend entrepreneurship teaching by, e.g., providing additional grants to schools where teachers are up-skilled

in entrepreneurship, entrepreneurial attitudes are closely integrated in teaching curriculum and local entrepreneurs are effectively engaged in the teaching process.

- Introduce a pay-increase track for teachers who adopt new skills in teaching entrepreneurial attitudes (e.g., proactiveness, alertness to opportunity, initiative, independence, and so on) and on the other hand, also positive feedback from students.
- Introduce an 'Entrepreneur at School' scheme. A coordinator should be appointed to each school (or shared by several schools in a given area), who would act as the central contact point between schools and local entrepreneurs. This person would suggest school visits by entrepreneurs depending on topics and their availability; and manage contact networks between schools and local communities of entrepreneurs. The purpose of this coordination would be to engage more entrepreneurs with schools to talk about their entrepreneurial journeys and help pupils make study tours to local businesses.
- Increase the teaching of social skills in primary and secondary education to complement 'fact-based' teaching. A crucial determinant of entrepreneurial success is the ability of the entrepreneur to persuade others to commit to a shared vision. This requires good social and networking skills – an aspect often neglected in formal education. As such, the Estonian education system as a whole needs to increase problem-based learning that involves work in teams and develops interpersonal skills.
- Create a national Centre of Excellence on entrepreneurship teaching. The centre would be responsible for creating the content of entrepreneurship education for all school levels and pro-

vide training for teachers. This Call for Action acknowledges existing initiatives inside the Entrepreneurship Education Development Programme 2020.

The other challenge is effectively teaching entrepreneurial skills – i.e., skills required to launch and build a new venture. The stakeholders came up with several actions to strengthen the teaching of entrepreneurial skills in higher educational institutions:

- Increase entrepreneurship training and the teaching of problem-based learning skills for university teachers.
- Create a dedicated Executive MBA programme for entrepreneurs. This programme should be provided in international collaboration to ensure international competitiveness. As an alternative to a full-fledged programme, 2-day training sessions might turn out to be more applicable in some cases.
- Introduce a MOOC (Massive Online Open Course) on entrepreneurship, tailored to the needs of Estonian potential and new entrepreneurs. The first step should be to identify the most applicable materials already available, and tailor them to Estonian needs if necessary.
- Make entrepreneurship teaching in higher educational institutions more practice-oriented, involving more group projects. Introduce secondments in, internships in, and assignments with entrepreneurial businesses as a facilitated learning experience. To support this, create a Teaching Case bank of Estonian entrepreneurial businesses for use as teaching materials.
- Engage entrepreneurs as mentors for student teams who work on real-life cases.
- Change the funding of entrepreneurship courses to accommodate small-group teaching. The current 'pay-per-head' financing system does not allow

universities to provide small-group courses.

The Skills and Attitudes bottleneck discussions also identified poor social attitudes towards entrepreneurship. Attitudes can be addressed with information. One action was identified:

- Introduce stories in the media that profile successful entrepreneurs as role models. According to the GEM survey, Estonian entrepreneurs receive less media attention than in other EU countries. Media tends to focus on failures and risk more than on entrepreneurial successes and opportunities. Entrepreneurial success needs to be more widely celebrated in the media, e.g., through short vignettes in television and in printed and online media.

The stakeholder discussion noted that insufficient flow of talent is one cause of the Skills and Attitudes bottleneck. There are also misconceptions among the general public regarding what entrepreneurship really is about. Several actions were identified:

- Create a soft landing package and provide tax honeymoons for in-moving global talent. Alleviate social tax for in-moving talent. To facilitate the relocation of families, Estonia also needs more and reasonably priced international schools and childcare.
- Launch a programme to support start-up teams to grow their ventures from conception into start-up phase. While many events and seminars address the ideation phase, there are no programmes under which start-ups are created and receive in-depth support to go through product, client and team tracks. In Estonia there is also a need for programmes that help early teams and prototypes grow into real businesses with concrete focus on vertical niches.
- Introduce a scheme under which selected civil servants are seconded to entrepreneurial businesses for short

periods to learn about the realities of start-up businesses. This initiative should be targeted to middle-level managers in ministries and government organisations.

- Draft and launch a country-wide strategy for Lifelong Education. This should be done in collaboration of relevant government agencies, such as Innove, Archimedes and HITSA. This Call for Action acknowledges work in progress inside the Entrepreneurship Education Development Programme 2020.

ESTONIAN ENTREPRENEURSHIP ECOSYSTEM: PRIORITY ACTIONS

The Stakeholder Engagement Workshops introduced considerable nuance and insight into factors that drive the Estonian bottlenecks. The resulting causal maps then provided a good reference point to consider specific actions that could be used to alleviate the bottlenecks by breaking down some of the causal paths. This work identified a number of actions to ease each bottleneck, as listed in the previous section.

Key to the 'collective impact' approach (see Appendix II) is to introduce change in complex social phenomena through tangible, coordinated action. Entrepreneurship ecosystems clearly are a complex social phenomenon. Because entrepreneurship ecosystems comprise a multitude of elements and different layers, individual policy actions rarely help introduce a lasting change into how the system works. If policy actions are performed individually and without an overall understanding of where the binding constraints of the ecosystem are, their effect easily dissipates into the overall 'noise' generated within the ecosystem. Only coordinated action that consistently addresses the key causal drivers of each bottleneck is likely to bring about a lasting change in how the ecosystem works.

Above, we have highlighted a long list of actions identified during the Stakeholder Workshops. However, to increase the chances of introducing real change, the actions need to be prioritised. In the following, we highlight the priority actions. We selected these actions by asking the Stakeholder Workshop participants to indicate the three most important actions that need to be addressed first. We list these priority actions below and highlight initiatives that are already planned or in progress.

Estonian Development Fund as the lead partner of the current study is determined to act on the suggestions suggested by the GEDI analysis. EDF will take these recommendations to the relevant ministries, commissions and government agencies. EDF will also lead in finding owners to the priority actions. These

Action Owners will be charged with ensuring that the actions are implemented. To this end, we expect the Action Owners to organise task forces of committed individuals. EDF will support the Action Owners in their work and help coordinate their activities.

INNOVATION

- **Increase the participation of start-ups in research funding and public procurement.** Top up research funding for projects with start-up and industry involvement with additional funding. Upgrade public procurement policies to engage with start-ups and expand the role of the public sector as a lead customer for new technologies.
- **Create a soft landing package for foreign talent.** Offer support to foreign talent and their families to settle into the Estonian society; this involves building new international schools and childcare facilities.
- **Create an action plan to attract post-graduate students (including doctoral level students) to Estonia.**
- Introduce **scholarships and internships** for university students and student teams in Estonian start-ups (also in foreign offices) and nearby start-up hotspots (e.g., the Aalto University ecosystem in Espoo, Finland).
- **Introduce industrial companies to lean start-up methodologies.** Create a programme for established companies to learn effective customer and market validation approaches that they can use when creating new-to-market products.

SKILLS AND ATTITUDES

- **Launch an 'Entrepreneur at School' initiative.** A detailed action plan needs to be drafted in cooperation with local municipalities, entrepreneurs, schools and government.
- Create a dedicated **Executive MBA programme for entrepreneurs** in cooperation with a strong foreign university.
- Launch a programme that helps start-up teams grow innovative global start-up companies from conception into start-up phase.
- Create a **bank of teaching case studies** of Estonian entrepreneurial businesses.
- Draft and launch **spin-out programme** for people with industry backgrounds and for university spin-outs.

FINANCE

- Create an **employment tax honeymoon for new businesses.**
- Create a **legal framework for crowdfunding and related syndication** activity.
- Create **tax incentives to encourage business angels and crowdfunding investors.**
- **Allow tax exceptions for in-moving global talent.** Propose changes in current legislation to make it easier for start-ups to attract and employ foreign talent.

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APPENDIX 1 GEDI METHODOLOGY

The GEDI index profiles entrepreneurship ecosystems as dynamic interaction between entrepreneurial attitudes, ability, and aspirations; considers entrepreneurial processes within their institutional contexts; and recognises the multifaceted, multi-level nature of the phenomenon:

- 1 The index comprises a broad range of components
- 2 The index uses data on system-level framework conditions as weights for individual-level measures
- 3 The index allows interactions between system components

Contextual Weighting

The GEDI index incorporates individual-level and framework variables. This is important, not only to contextualise the index, but also, to reflect the notion that different index components might ‘produce’ different outcomes in different country settings. For example, market-expanding start-ups might generate a stronger influence on economic development in countries where market entry is not artificially restricted. The novelty of the GEDI approach is that it uses framework conditions as interaction components, not as stand-alone variables. Framework conditions are entered into the index as weights that are combined with aggregated individual-level data.

GEDI uses as weights framework variables that provide: (1) a logical link to the particular aggregate of individual-level data; (2) a clear interpretation of the selected variable; and (3) avoid repetition: one weight was combined with only one aggregate of individual-level data. The framework weights are shown in Table 2 and the resulting index pillars in Table 3.

Penalty for Bottleneck

A defining characteristic of systems is that they consist of components that *interact* to produce system performance. Most received indices

are not systemic, as they allow each component to create an *independent* contribution to the index total regardless of the value of other components. This means that system dynamics produced through component interactions are ignored. GEDI applies the Penalty for Bottleneck (PFB) algorithm to capture interactions within the entrepreneurship ecosystem.

In the GEDI methodology, a bottleneck is defined as the weakest link or the binding constraint in the entrepreneurship ecosystem. Mathematically, a bottleneck is represented by the lowest value within a given set of normalised index components. After normalising the scores of all index components, the value of each component is ‘penalised’ by linking it to the score of the indicator with the weakest performance in a given country. This simulates the notion of a bottleneck: if the bottleneck component is alleviated, the particular sub-index and ultimately the entire GEDI index would show a significant improvement.

Mathematically, the PFB is modelled following the approach proposed by Casadio et al (2004)³. They suggested a correction form of an exponential function of ae^{-bx} . Modifying their original function, GEDI defines a penalty function family as:

$$h_{(i),j} = \min y_{(i),j} + (1 - e^{-(y_{(i),j} - \min y_{(i),j})})$$

where

$h_{i,j}$ is the modified, post-penalty value of index component j in country i

$y_{i,j}$ is the normalised value of index component j in country i

y_{min} is the lowest value of $y_{i,j}$ for country i .

$i = 1, 2, \dots, n$ = the number of countries

$j = 1, 2, \dots, m$ = the number of index components

³ Casadio Tarabusi, E. & Palazzi, P. 2004. An index for sustainable development. *BNL Quarterly Review*, 229: 185-206.

The bottleneck is achieved for each indicator by adding one minus the base of the natural logarithm of the negative difference between a given index component's value in country *i* and the lowest normalised value of any index component for that country. Thus, improving the score of the weakest index component will have a greater effect on the index than will the act of improving the score of stronger index components. The largest potential difference between two index components is 1, when a particular country exhibits the highest value for one index component (across all countries) and the lowest value for another index component, again across all countries.

Pillars and normalisation

To address the multi-faceted character of entrepreneurship ecosystems, the GEDI index is composed of fifteen components, called pillars. These are designed to capture entrepreneurial attitudes, ability, and aspirations. The attitudes and ability sub-indices introduce individual-level motivations and preferences into the index. Each of the pillars is made up by national-level aggregates of individual data, weighted by data describing national framework conditions.

The individual-level data is derived from the GEM survey, as published in annual GEM executive reports. The framework weighting variables are drawn from multiple sources, including Transparency International (Corruption Perception Index), UNESCO (Tertiary education enrolment, GERD), World Economic Forum (Domestic market size, Business sophistication, Gender equality, Innovation, Technology absorption capability, Staff training, Market

dominance), International Telecommunication Union (Internet usage), Heritage Foundation, World Bank (Economic freedom), United Nations (Urbanization index), KOF Swiss Economic Institute (Economic globalisation), Groh et al (2012) (Depth of Capital markets), and Coface (Business climate risk). The full description of the framework variables, their sources and the year of survey are provided in Table 2. The national aggregates of individual-level data are listed in Table 1. The composition of the GEDI index and its sub-indices is given in Table 3.

Some of the variables ('Opportunity Recognition', 'Skill Perception', 'Know Entrepreneurs', 'Career', and 'Business Angel') are density measures, calculated as the share or respondents (drawn from 18-64 year old population using randomised cluster techniques and population weighting) responding affirmatively to the question. The remaining variables describe nascent and new entrepreneurs. Nascent businesses are start-up attempts that have not paid salaries for anyone for longer than three months, whereas new businesses are start-ups who have not paid salaries for anyone for longer than 42 months.

Finally, outliers are a frequent problem in any dataset. GEDI addresses this problem by using the capping method at the pillar level. The benchmarking value in each indicator case was selected as the 95% cut-off point.

Table 4 Classification of GEDI variables into input and output measures

Pillar	Institutional variable	Input or output	Individual variable	Input or Output
ENTREPRENEURIAL ATTITUDES				
Opportunity Perception	Market Agglomeration	I	Opportunity Perception	I
Start-up Skills	Education PostSec	I	Skill Perception	I
NonFear of Failure	Business Risk	I	Risk Acceptance	I
Networking	Internet Usage	I	Know Entrepreneurs	I
Cultural Support	Corruption	I	Career Status	I
ENTREPRENEURIAL ABILITY				
Opportunity Startup	Economic Freedom	I	TEA_Opportunity	O
Gender	Gender Equality	I	TEA_Female	O
Tech Sector	Tech_Absorption	I	TEA_Technology	O
Quality of Human Resources	Staff Training	I	TEA_Education	O
Competition	Domestic Market	I	TEA_Competition	O
ENTREPRENEURIAL ASPIRATIONS				
Product Innovation	Technology Transfer	I	TEA_NewProduct	O
Process Innovation	GERD	I	TEA_NewTech	O
High Growth	Business Strategy	I	TEA_Gazelle	O
Internationalisation	Globalisation	I	TEA_Export	O
Risk Capital	Venture Capital	I	Informal Investment	I

Code: I: Input measure O: Output measure

**Table 5 Description of the individual-level variables used in GEDI
(national aggregates are used)**

Individual-level variable	Description
Opportunity Recognition	Percentage of the 18-64 year old population indicating belief that there will be good opportunities to start a new business in the area where they live over the next 6 months' time.
Skill Perception	Percentage of the 18-64 year old population claiming to possess the required knowledge and skills to start a new business.
Risk Acceptance	Percentage of the 18-64 year old population stating that fear of failure would <u>not</u> prevent them from starting a business.
Know Entrepreneurs	Percentage of the 18-64 year old population indicating that they personally know someone who has started a new business in the past 2 years.
Career	Percentage of the 18-64 year old population stating that people in their country consider starting a new business to be a good career choice.
Status	Percentage of the 18-64 year old population stating that people in their country accord high status to successful entrepreneurs.
Career Status	Calculated as the average of Career and Status.
Opportunity Motivation	Percentage of TEA (Total early-stage Entrepreneurial Activity) businesses initiated because of opportunity start-up motive.
TEA Female	Ratio between female TEA and male TEA (1:1 ratio is considered the best value, and deviations from this ratio to either direction are considered sub-optimal).
Technology Level	Percentage of TEA businesses that are active in high or medium technology sectors.
Educational Level	Percentage of TEA businesses with owner-managers having participated in at least secondary education.
Competitors	Percentage of TEA businesses started in those markets where not many businesses offer the same product.
New Product	Percentage of TEA businesses offering products that are new to at least some customers.
New Tech	Percentage of TEA businesses using new technology that is less than 5 years old.
Gazelle	Percentage of TEA businesses exhibiting high employment expectations (i.e., expecting to have more than 10 employees in five years' time, representing at least 50% increase in employment size relative to current employment size).
Export	Percentage of TEA businesses indicating that at least some of their customers are abroad.
Informal Investment (mean)	Mean amount of informal investment by individuals over the past 3 years.
Business Angel	Percentage of the 18-64 year old population who provided funds for new entrepreneurial businesses started by others.
Informal Investment	Calculated as [Informal Investment (mean)]*[Business Angel].

Table 6 Description of the framework variables used in the GEDI index

Framework variable	Description	Source of data	Data availability
Domestic Market	Domestic market size is the sum of gross domestic product plus value of imports of goods and services, minus value of exports of goods and services, normalized on a 1–7 (best) scale. Data are from the World Economic Forum Competitiveness.	World Economic Forum	The Global Competitiveness Report 2012-2013, p. 496
Urbanization	Urbanization is the percentage of the population living in urban areas. Data are from the Population Division of the United Nations, 2011.	United Nations	http://data.worldbank.org
Market Agglomeration	Market agglomeration is a combined measure of Domestic Market and Urbanization: Calculated as [Domestic Market]*[Urbanization].	Own calculation	
Tertiary Education	Gross enrolment ratio in tertiary education. 2011 or latest available data.	UNESCO	http://stats.uis.unesco.org
Business Risk	The business climate rate “assesses the overall business environment quality in a country... It reflects whether corporate financial information is available and reliable, whether the legal system provides fair and efficient creditor protection, and whether a country’s institutional framework is favourable to intercompany transactions” (http://www.trading-safely.com/). This is part of the Country Risk Rate. The alphabetical rating is converted to a seven-point scale from 1 (“D” rating) to 7 (A1 rating). Data from December 2012.	Coface	http://www.coface.com
Internet Usage	Number of Internet users in a particular country per 100 inhabitants, 2012 data.	International Telecommunication Union	http://www.itu.int
Corruption	The Corruption Perceptions Index (CPI) measures the perceived level of public-sector corruption in a country. “The CPI is a “survey of surveys”, based on 13 different expert and business surveys.” (http://www.transparency.org). Overall performance is measured on a ten-point scale. Data are from 2012.	Transparency International	http://cpi.transparency.org
Economic Freedom	“Business freedom is a quantitative measure of the ability to start, operate, and close a business that represents the overall burden of regulation, as well as the efficiency of government in the regulatory process. The business freedom score for each country is a number between 0 and 100, with 100 equalling the freest business environment. The score is based on 10 factors, all weighted equally, using data from the World Bank’s Doing Business study”. (http://www.heritage.org). Data are from 2011.	Heritage Foundation/ World Bank	http://www.heritage.org
Gender Equality	This is the female economic participation and opportunity sub-index, a part of the Gender Gap Index consisting of three parts: “...as the participation gap, the remuneration gap and the advancement gap. The participation gap is captured using the difference in labour force participation rates. The remuneration gap is captured through ...the ...ratio of esti-	World Economic Forum	The Global Gender Gap Report 2012: pp 10-11

	mated female-to-male earned income... and the gap between the advancement of women and men is ...the ratio of women to men among legislators, senior officials and managers, and the ratio of women to men among technical and professional workers.”		
Tech Absorption	Firm-level technology absorption capability: “Companies in your country are (1 = not able to absorb new technology, 7 = aggressive in absorbing new technology)”.	World Economic Forum	The Global Competitiveness Report 2012 – 2013: p 489
Staff Training	The extent of staff training: “To what extent do companies in your country invest in training and employee development? (1 = hardly at all; 7 = to a great extent)”.	World Economic Forum	The Global Competitiveness Report 2012-2013: p 447
Market Dominance	Extent of market dominance: “Corporate activity in your country is (1 = dominated by a few business groups, 7 = spread among many firms)”.	World Economic Forum	The Global Competitiveness Report 2012-2013: p 451
Technology Transfer	These are the innovation index points from the Global Competitiveness Index: a complex measure of innovation including investment in R&D by the private sector, the presence of high-quality scientific research institutions, collaboration in research between universities and industry, and the quality of protection of intellectual property.	World Economic Forum	The Global Competitiveness Report 2012-2013: p 20
GERD	Gross domestic expenditure on R&D (GERD) as a percentage of GDP, year 2011 or latest available data. The values for Puerto Rico, Dominican Republic, United Arab Emirates, and some African countries are estimated.	UNESCO	http://stats.uis.unesco.org
Business Strategy	Refers to the ability of companies to pursue distinctive strategies, which involves differentiated positioning and innovative means of production and service delivery.	World Economic Forum	The Global Competitiveness Report 2012-2013: p 20
Globalisation	A part of the Globalisation Index measuring the economic dimension of globalization. The variable involves the actual flows of trade, Foreign Direct Investment, portfolio investment and income payments to foreign nationals, as well as restrictions of hidden import barriers, mean tariff rate, taxes on international trade and capital account restrictions. Data are from the 2013 report and based on the 2010 survey. http://globalization.kof.ethz.ch/media/filer_public/2013/03/25/rankings_2013.pdf	KOF Swiss Economic Institute	Dreher, Axel (2006): Does Globalization Affect Growth? Evidence from a new Index of Globalization, Applied Economics 38, 10: 1091-1110
Depth of Capital Market	The Depth of Capital Market is one of the six sub-indices of the Venture Capital and Private Equity index. This variable is a complex measure of the size and liquidity of the stock market, level of IPO, M&A and debt and credit market activity. Note that there were some methodological changes over the 2006-2012 time period so comparison with previous years is not perfect.	EMLYON Business School, France and IESE Business School, Barcelona, Spain	Groh, A, H. Liechtenstein and K. Lieser. 2012. The Global Venture Capital and Private Equity Country Attractiveness Index 2012 Annual Report http://blog.iese.edu/vcpeindex

APPENDIX 2 COLLECTIVE IMPACT METHOD

Collective Impact is the commitment of a group of actors from different sectors to a common agenda for solving a complex social problem.

In order to create lasting solutions to social problems on a large-scale, organisations — including those in government, civil society, and the business sector — need to coordinate their efforts and work together around a clearly defined goal.

Collective Impact is a significant shift from the social sector's current paradigm of "isolated impact," because the underlying premise of Collective Impact is that no single organisation can create large-scale, lasting social change alone. There is no "silver bullet" solution to systemic social problems, and these problems cannot be solved by simply scaling or replicating one organisation or programme. Strong organisations are necessary but not sufficient for large-scale social change.

Not all social problems are suited for Collective Impact solutions. Collective Impact is best employed for problems that are complex and systemic rather than technical in nature. Collective Impact initiatives are currently being employed to address a wide variety of issues around the world, including education, healthcare, homelessness, the environment, and community development. Many of these initiatives are already showing concrete results, reinforcing the promise of Collective Impact in solving complex social problems.

The Five Conditions of Collective Impact Success

Collective Impact is more rigorous and specific than collaboration among organisations. There are five conditions that, together, lead to meaningful results from Collective Impact:

1. **Common Agenda:** All participants have a shared vision for change including a common understanding of the problem and a joint approach to solving it through agreed upon actions
2. **Shared Measurement:** Collecting data and measuring results consistently across all

participants ensures efforts remain aligned and participants hold each other accountable

3. **Mutually Reinforcing Activities:** Participant activities must be differentiated while still being coordinated through a mutually reinforcing plan of action
4. **Continuous Communication:** Consistent and open communication is needed across the many players to build trust, assure mutual objectives, and appreciate common motivation
5. **Backbone Organisation:** Creating and managing collective impact requires a separate organisation(s) with staff and a specific set of skills to serve as the backbone for the entire initiative and coordinate participating organisations and agencies