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DOES CONTEXT MATTER?: EXTERNAL AND INTERNAL FACTORS AFFECTING SUCCESS OF ACCELERATORS IN ESTONIA

Master's thesis

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Abstract

Business accelerators are one of the best sources of financing for seed-stage accelerators – the conclusion one can make based on the quite scant accelerator research. However, since the studies of accelerators have mostly based on the data on American top-accelerators, little is known about the success-factors of accelerators in other contexts. This article analyzes whether the success-factors found to influence accelerators are similar to these previously found in a different context of Estonia, where, despite the short period of the free market economy, a highly successful startup ecosystem has developed. To capture the full effect of accelerators in Estonia the complete sample on Estonian accelerated startups and accelerators is provided, which is unique in accelerator research, where mostly crowdsourced, incomplete datasets are used. The analysis from regression models revealed that size of funds gained from accelerators, average yearly sales and employees' growth and being a software company are predictive of success of accelerated startups. The internal and external success-factors that are linked to the fortune of accelerators are explored through semi-structured interviews with accelerator representatives. Accelerators owe their success to their intrinsic qualities, from which social networks creation by accelerator, deal flow/startup selection and reputation were considered important, but the analysis confirms that their external context, most importantly policy environment and presence of human capital, also strongly influence their success and creation.

Keywords **– Accelerator, innovation, startups, growth metrics, company success.**

1. Introduction

Differently from the factors supporting stable economic growth, successful startup companies can, in favorable conditions, bring about an abrupt change into the economic development of the country – they create jobs (Decker, Haltiwanger, Jarmin, & Miranda, 2016), encourage further job creation in related industries (Bos & Stam, 2014) and this not only in their main location, but also in areas where startups expand (Acs & Mueller, 2008). These innovative, scalable companies in charge of sustaining the economic growth by bringing disruptive destruction to an old economic structure (Schumpeter, 1942/2003) are mostly technology startups, that need large investments in the development phase, where

there are no or little real financial gains from the customers. Different measures (venture capitalist funding, angel investors, public grants and other policies, competition awards, accelerators, loans, crowdfunding) are created by stakeholders who try to help companies past this stage for great ideas to be realized. One of these is a startup accelerator – the topic of the present article. This is 'a fixed-term, cohort-based program, including mentorship and educational components, that culminates in a public pitch event or demo-day' (Cohen & Hochberg, 2014: 4).

The present decade has seen the rise of the creation of startup accelerators as means for the promotion of disruptive innovation by high-growth startups (Hochberg, 2016; Regmi, Ahmed, & Quinn, 2015). Business acceleration by accelerator programs has proven fruitful for accepted startups. Examples like lessening time for exit for Y Combinator and Techstars participants (Barnes, 2016; Smith & Hannigan, 2015), quicker follow-up funding from venture capitalists (Smith & Hannigan, 2015), speeding up product launch (Bliemel et al., 2016) and increasing longevity of start-ups (Bliemel & Flores, 2015) say a lot. But they say this lot mostly about establised top accelerators, since accelerator research bases mainly on the American or international data (with some exceptions, e.g. Europe (Yusubova & Clarysse, 2016), Singapore (Yin & Luo, 2018), Chile (Gonzalez-Uribe & Leatherbee, 2018)). US-based accelerators also play unproportional role in the explorations of how accelerators do internationally – by the data of Global Accelerator Report 2016 there were 178 accelerators in the US and Canadian area, where 44% from all the accelerators locate (Gust, 2017). But as grand social theories cannot be assumed to hold in every context, regardless of a socio-political context of a country under inquiry (Daloz, 2013), the same applies for social trends as startup acceleration is. What happens when the context is changed from the US with its stable economic development to a post-socialist transition economy that today is a world-renowned digital success-story? There is a lack in comparisons of the effects of accelerators in different regions and contexts (Hochberg, 2016: 48) and therefore offering contextual diversity for studies of accelerators analyzing Estonian accelerator success factors is one of the reasons for this article.

One of the contextual aspects, that should require us to carefully consider whether it would be fruitful to choose more inductive approaches instead of creating universalistic

theories in measuring economic stimulus such as accelerators, is that accelerator-treated areas see a rise in startup funding environment, that also contributes to the funding environment of non-accelerated startups (Fehder & Hochberg, 2014). These types of ecosystem effects suggest that in areas where accelerators have been working longer, economic environment may contribute to creation of even more events that help startups through the development phase. In other words – present accelerators in America make context well-prepared for other American accelerators to emerge, but in contexts where accelerators emerged later (e.g. Estonia), startup ecosystem development may need more effort by first accelerators themselves. Policy context, governmental support and educational background of a country are amongst other external factors that are, although found influencing startup ecosystem creation (Tripathi, Seppänen, Boominathan, Oivo, & Liukkunen, 2019) and not accelerators directly, probably also influencing accelerator formation, since accelerators are usually also private business organizations interested in a functioning ecosystem. Since there are several external factors that affect whether a startup accelerator is a proportional measure for helping startups to develop, focusing mainly on the context of a country with long-developed economic ecosystems may narrow the phenomenon of accelerators and their success-factors in later theory formation. For these reasons this article seeks to provide tools to analyse different contexts in more detail. Analysis of external success factors helps to structurally understand these contextual differences, providing basis for country comparisons. Adding these to the internal ones in analysis is the main contribution of the study. Understanding the factors, which are out of control of accelerators that affect whether an accelerator with its economic effects can flourish or not, is important for policy suggestions in concrete country contexts. Accelerators act as enablers for new companies, with complex investor-relationships and business models. They cannot be assumed to be similarly influenced by economic, educational, policy and other relevant contexts as companies are. Therefore it is worth studying what influences specifically accelerator-type business models.

The economic ecosystem and other extrinsic contextual factors are only part of the influencers of accelerators' success – several of the success-factors, such as startup selection criteria (Yin & Luo, 2018; Yusubova & Clarysse, 2016), social networks creation

(Bandera & Thomas, 2018; Yusubova & Clarysse, 2016), mentorship quality (Gonzalez-Uribe & Leatherbee, 2018; Yusubova & Clarysse, 2016), focusing on certain stages (Kushner, 2018), fund allocation (Gonzalez-Uribe & Leatherbee, 2018) and having an universalistic or specialized program type (Yusubova & Clarysse, 2016) are intrinsic. These program success factors that are most effective for startups should be studied more (Hochberg, 2016).

This article seeks to fulfill all of these three aforementioned gaps by aiming to explore the success-factors of Estonian accelerators and accelerated startups. With this goal in mind, it contributes to the scarce literature (Hochberg, 2016: 35; Yin & Luo, 2018) on the recent phenomenon of accelerators by asking how can success of an accelerated startup be explained by the success metrics of startups in Estonia, a country where accelerators have had little time to develop. Next, after exploring patterns behind success of accelerated companies, in-depth discovery of the influencing factors of different acceleration programs provided in Estonia is given by interviewing representatives of the accelerators on what influences accelerators themselves. Questions leading this part of the study are: what are the most important internal factors for accelerator success?; what external factors accelerator executives consider having important effects during times of accelerators creation and further in their development?

These tasks are achieved drawing upon the quantifiable as well as qualitative data on Estonian accelerators and startups that have used their services. A novel dataset consisting of all the startups funded by all the four Estonian-located accelerator programs over the time period from 2012 to the first half of the 2018 was developed. The data on accelerators is usually limited and subject to several limitations (Hochberg, 2016: 35), so this is the third contribution of this study. Since Estonia is a small country, the possibility to contact all the accelerator program founders and have all the participating startups listed makes the dataset unique in that it represents the complete sample of accelerator participants. To capture the phenomenon of young accelerators, the success of startups gone through accelerator programs was tracked and the qualities and development needs that accelerator founders identify in semi-structured interviews explored. The analysis from regression models revealed that the size of funds, average yearly sales and employees

growth and being a software company are predictive of success of accelerated startups. Interviews showed that accelerators owe their success both to their intrinsic and extrinsic influencers. From the first ones social networks creation, deal flow/startup selection and reputation were considered the most important. External context, most importantly policy environment and presence of human capital, also strongly influence success and creation of accelerators. The data is then compared to the previous literature to understand whether Estonian differing context influences what participants get from accelerator programs. In doing that this study is the first to take on the task to map and discover accelerators of Estonia and study their outcomes for participants. Research on accelerator phenomenon seems to still be in infancy for drawing large conclusions about their performance as Hochberg (2016) put it some years ago, so qualitative analysis of this type of business growth measure could well contribute to the discussion. Therefore using mixed methods is the fifth unique contribution. And as results indicate – there are context-specific factors that could influence accelerator creation and vitality.

2. Literature review

Startup accelerator is a growing phenomenon. Y Combinator, the first seed-stage accelerator, was founded in 2005 in Cambridge, Massachusetts. To date the community has over 4000 founders, with 2 batches added each year. In 2007 Techstars accelerator started in Colorado and it has also become one of the leading international accelerators. In the last 14 years since the first accelerator was born, vast investments into accelerated startups have been made. According to the Global Accelerator Report 2016 (Gust, 2017) 579 accelerator programs listed have made over 206 740 005 dollars worth of total investments worldwide. Despite their great influence on economy, it is surprising that accelerator effects are understudied and there is even a confusion around the definition of accelerators. The term is often switched with ‘incubators’. Susan G. Cohen and Yael V. Hochberg have aimed to explain the differences of these programs in several articles. In this article their definition of accelerators is used, stating that an accelerator is ‘a fixed-term, cohort-based program, including mentorship and educational components, that culminates in a public pitch event or demo-day’ (Cohen & Hochberg, 2014: 4). Schooling through specialized programs

distinguishes accelerators from incubators that do not usually provide compulsory training program, but act more like co-working spaces (Kushner, 2018: 23). The definition also allows including both publicly and privately funded programs. In the following analysis programs with prolonged mentoring, batches, but also funding for all the participants are defined as being accelerators. Although not all programs provide small seed investment, a typical accelerator does, taking usually a small share (5-7%) in return or giving it in form of a convertible loan (Hochberg, 2016: 32). In sake of adding clearly intensive training programs, initial funding in return for shares, a convertible loan or equity-free funding for participants in order to make sure their maximum commitment is a criteria for accelerators.

What qualities constitute a successful accelerator is not uniformly specified and studies use different measures to track this success. Usually mainly factors hereby categorized as internal environment factors are considered. These are factors listed in Figure 1 that depend on the performance of an accelerator and allow comparisons of programs. But analyses that only consider the internal factors do not reckon the contextual external aspects an accelerator is influenced by.

Startup ecosystems act in conjunction with the events in the surrounding area. As a proof of that, establishment of an accelerator is found shifting the equilibrium of overall early stage financing in the region, generating more seed and early stage financing possibilities also to non-accelerated companies (Fehder & Hochberg, 2014). The effect of an event to a country assumably depends on its scale and the size of a country – sometimes the whole country is influenced, sometimes a county, economic cluster *et cetera*. Accelerators provide individual ventures but also emerging ecosystems with access to expertise and other tangible and intangible infrastructure elements (Goswami, Mitchell, & Bhagavatula, 2018). According to that, an area enjoying benefits a post-accelerator-creation offers may be very welcoming to other accelerators, whereas in an area where there is no accelerator or the benefits of its presence have not yet occured, startup ecosystem development may need more effort by first accelerators themselves. Moreover, since accelerators are not yet proven concepts, their creation and vitality may be influenced also by external factors other than accelerator existence in an area.

World Economic Forum (Foster et al., 2013) has compiled eight main pillars influencing entrepreneurial ecosystems: human capital, education, accessible markets, funding and finance, regulatory framework and infrastructure, major universities as catalysts, cultural support and business support system. Accelerator is a form of business support system, which allows us to exclude this pillar from the analysis of accelerators, so that six success factors shown in Figure 1 remain to be tested as external influencers of accelerators. It is intriguing to discover, whether some of these may be important to accelerators specifically.

According to this list by World Economic Forum the educational background of an area (when combining education and universities as catalysts from this list) is one of the focal elements for building a strong ecosystem. Higher-level education in general is considered to be a key factor of a successful entrepreneurial activity (Bennett & Dann, 2000), with conflicting views on specific entrepreneurship education on entrepreneurship outcomes (O'Connor, 2013). Innovation by patent intensity is in a positive relation with the size of R&D spending and relative number of researchers (Furman, Porter, & Stern, 2002), which indicates the important relationship of innovation and research capacity-building. It is supported by the strong co-localization of research and downstream industrial R&D (Agrawal & Cockburn, 2003), which the authors would not present as a definite correlation between research and innovation. Still, the clustering of research and innovation centers of companies to same locations could at least inform us about the ecosystem effects of these two factors – similar aspects influence their gathering to same places.

Strong educational background, government support, talent supportive policies and young talents are key drivers of human capital. Although the strength of human capital is strongly linked to the education and training of a person for economists (Becker, n.d.), it is worth considering these two concepts equally valid and therefore separately in research concerning startups. Qualified human capital is seen as a key driver of a successful startup ecosystem (Tripathi et al., 2019). In the subsequent interviews, education and human capital were considered as separate criteria. For an accelerator, existing human capital in form of strong teams was considered one of the central qualities of the external environment, without which startups cannot flourish. Educational context of a society was

discussed as a very significant aspect, whereas it was seen having a more long-term effect on startups excelling.

'Regulatory framework and infrastructure' and 'Funding and finance' are hereby considered reflecting a factor of 'Policy direction' supporting accelerators. Stakeholders' needs influence the type and structure (public, private, specific, generic) of accelerators (Yusubova & Clarysse, 2016), which shows how important a role stakeholders (here public stakeholders) have on the decision to establish an accelerator program in the first place.

Which of these affect accelerators as external success factors is a central focus of the subsequent analysis. These external factors are present in the literature about overall startup ecosystem, but the problem statement of the present paper requires these contextual factors to be added to the analysis of accelerator success, since the leading idea tested in this article, for the reasons elaborated in the next subchapter, is that accelerators cannot be established or successful without the supportive external environment. Both of these environments – external and internal – affect accelerated startups' success, which is a metric of measuring accelerators' success. The factors hereby considered as influencers of accelerator success are portrayed in Figure 1.

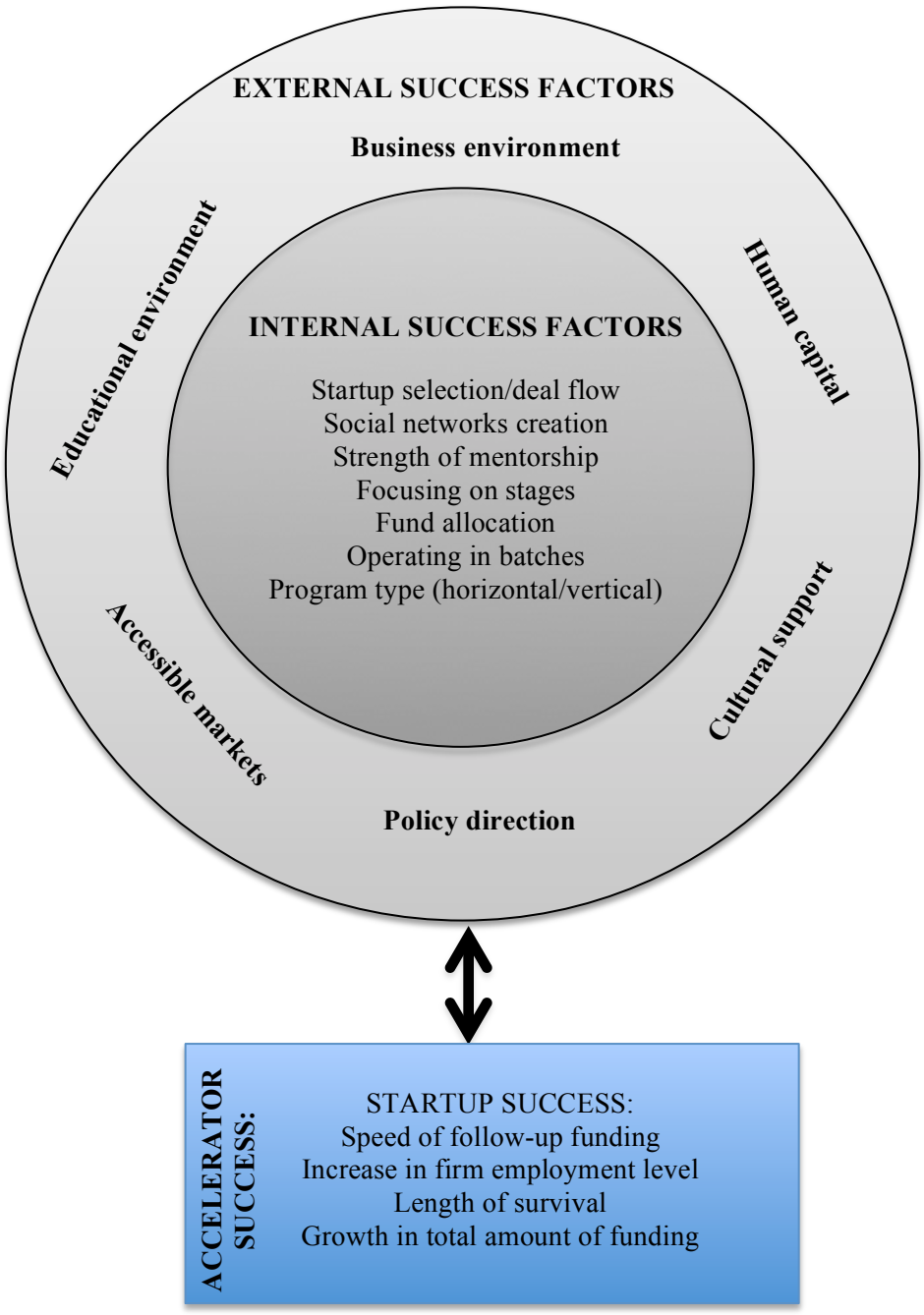

Figure 1. Accelerator success metrics and factors influencing it.
Source: Author's compilation based on literature in Table 1.

What researchers have found to be driving accelerator success are listed in Table 1. Since there is much more extensive literature on incubators and startup ecosystems, while at the same time accelerators are studied insufficiently, some studies with incubators are also added in the list on factors that are not essentially different between the two program types. The present study seeks to clarify these gaps in the analysis of internal success factors of accelerators, analyzing specifically accelerator internal success factors and ranking these in order of salience for Estonian accelerators. The leading question in this part of the study is what are the most important internal factors for a successful accelerator?

Table 1. Overview of the previous studies about accelerator success (compiled and categorized by the author).

	Factors	**Sources**
External environment	Business environment	Foster et al., 2013*
	Educational environment	Bennett & Dann, 2000*; Furman, Porter, & Stern, 2002*; Agrawal & Cockburn, 2003*; O'Connor, 2013*
	Human capital	Tripathi et al., 2019
	Policy direction	Foster et al., 2013*
	Accessible markets	Foster et al., 2013*
	Cultural support	Foster et al., 2013*
Internal environment	Startup selection possibility/deal flow	Yusubova & Clarysse, 2016; Yin & Luo, 2018
	Social networks creation	Hansen, Chesbrough, Nohria, & Sull, 2000*; Miller & Bound, 2011; Yusubova & Clarysse, 2016; Bandera & Thomas, 2018
	Strength of mentorship	Miller & Bound, 2011: 26; Hochberg, 2016: 33; Yusubova & Clarysse, 2016; Gonzalez-Uribe & Leatherbee, 2018
	Focusing on stages	Kushner, 2018
	Fund allocation	Miller & Bound, 2011: 26; Radojevich-Kelley & Hoffman, 2012; Gonzalez-Uribe & Leatherbee, 2018
	Operating in batches and small batch size	Miller & Bound, 2011: 28; Kim & Wagman, 2014; 'Y Combinator: What We Do', s.a.; Barnes, 2016
	Program type (horizontal or vertical)	Schwartz & Hornych, 2008*; Yusubova & Clarysse, 2016
	STARTUP SUCCESS:	
	Speed of follow-up funding	Radojevich-Kelley & Hoffman, 2012; Smith & Hannigan, 2015

Accelerator success metrics	Increase in firm employment level	Fehder, 2015; Stokan, Thompson, & Mahu, 2015*
	Length of survival	Radojevich-Kelley & Hoffman, 2012; Regmi et al., 2015; Hallen, Cohen, & Bingham, 2017
	Growth in total amount of funding	Fehder, 2015

* - article about incubators or overall startup ecosystem
Source: Author's compilation.

One criterion from the above list has stayed ambiguous in the literature and its effects on accelerator success need to be explained further. It is the correlation between participating in a program and having a longeval company, because the increasing lifetime of participants is not always evident. While studies listed in Table 1 found accelerator participation to increase the length of survival (Hallen et al., 2017; Regmi et al., 2015), this evidence seems to be inconsistent. Gonzalez-Uribe and Leatherbee (2018) found that companies are not likely to survive longer when accelerated. Another article discovered, on the contrary, that firms accepted are more likely to be exiting through quitting or acquisition in comparison to the ones acquiring angel investor funding (Smith & Hannigan, 2015). Early quitting could even be beneficial, when acceleration program could quickly make founders aware of the plausibility of their project, so that they could quit and start working with more successful projects.

2.1. External context of Estonian accelerators

Estonia had four accelerators operating during the period of analysis, three of which mostly operate on private (Startup Wise Guys, BuildIt, Gamefounders) and one on public funding (Climate-KIC Accelerator). Although private, Gamefounders located in Estonia in 2012-2014 – the period of government funding. In 2015 the Climate-KIC clean-technology accelerator started to operate in Estonia. The first year of the program for Estonian startups was held under the auspices of the national accelerator of Poland, but the second year marked the beginning of the partnership of EIT Climate-KIC and Estonian Development Fund and Estonia became the official partner of this international accelerator, that mostly finances its operations from the funds of European Commission. The context of the formation of these accelerators is the Estonian startup field, which is as young as its'

indepencence, meaning that private businesses could have been created only since the most recent decade of the 20th century, when a country's government turned from being a communist republic of the USSR to the liberal democracy. The business environment and accessible foreign markets are under continuous development out of transition economy, meaning that comparing these with the US in terms of economic efficiency would still be to the disadvantage of Estonia. When USA is in the position of an unchallenged world leader startup-quality-wise (score 22.02 by StartupBlink) with quality-score four times as high as Israeli's on the second place (score 5.21), Estonia's score is 1.52.

Estonian business environment ranks close-by USA's and other world leaders in terms of e.g. technical infrastructure, bureaucracy *et cetera* (StartupBlink, 2019). While domestic demand of Estonia is very strong, innovative startups are looking for international markets. Estonian exports are concentrated in low and medium technological goods and high value added activities are limited (Euromonitor, 2019). Innovation policies also need to be improved, but there are few efforts in this direction (Euromonitor, 2019). Estonia is located in the periphery of the European Union, bordered by Russia, which makes the transport and infrastructure important for the development of exchange of people, goods and services. But developments of transport and infrastructure have not been consistent enough, holding back private sector development (Euromonitor, 2019).

Regardless of the scarce time-period of companies formation, an internationally renown startup ecosystem developed very quickly and world's rankings of startups' ecosystems have been generous to Estonia (13^{th}). This was mostly driven by the successful IT-sector**.** This success story is found to have been possible owing to the contextual differences of smaller countries. In smaller countries like Estonia, where startups have lower entry barriers, they mostly focus on international markets and have a tendency to create simple solutions to complex problems, which help to stimulate the formation of a successful startup ecosystem with all its related benefits. (Dumas, 2014) This is coupled with the innovative and capable workforce (Euromonitor, 2019). Human capital is important for startup ecosystems. Half a century developed Silicon Valley contributes to America's first position in ecosystem ranking human-capital-wise. It has and still does provide people with enterpreneurial mindset with startup experience that is now being used

in building up world-best ecosystems in other American cities (6 of the 10 world-leading startup ecosystems are located in USA) (StartupBlink, 2019). Entrepreneurial mindset as a supportive cultural factor is well advanced in America, where 24% of the people born between 1965-1995 own or have owned a small business (Americas SBDC and The Center of Generational Kinetics, 2017: 6) with 38 per cent of Millenials having been part of starting a new startup company (Americas SBDC and The Center of Generational Kinetics, 2017: 7). In Estonia, the innovation mindset that was held back during the period of Soviet occupation has increased and now Estonia finds itself on the 24th position in the Global Innovation Index Report 2018, America being the fourth (Dutta, Lanvin, & Wunsch-Vincent, 2018). In terms of general education, PISA tests on the skills of reading and science in 2015 have ranked Estonia amongst the top three performers. Oddly enough, although education is important for onsetting a company, a rigid and over-demanding educational system can impede imagination and innovation. (OECD, 2018)

3. Data

A database with the complete sample of accelerator participants from 2012 to 2017 is used, that bases on the crowdsourced database of an entrepreneurial community Estonian Mafia. Most variables and accelerated companies used in the analysis were added by the handpicked data from the Web, (e.g. largest crowdsourced databases seed.db and Cruncbase, webpages of accelerator companies, founders' LinkedIn accounts) from information gathered via e-mails with accelerator companies and from Estonian business register and credit reports databases. Companies listed in the compiled database are only Estonian companies, meaning that a large quantity of the international companies Estonian accelerators have accelerated are left out from the analysis. The principle for adding a company as an Estonian company was its recognition as an Estonian company by accelerators, with the criterion of having Estonians as (co-)founders. Still, some Estonian-founded companies (e.g. Sympower) are counted out, when they started to gain revenues only after being registered as a company in another country. At the end point of our data gathering by the first half of 2018, the analyzed accelerators had incubated 22 batches with 57 Estonian companies and many more from other countries.

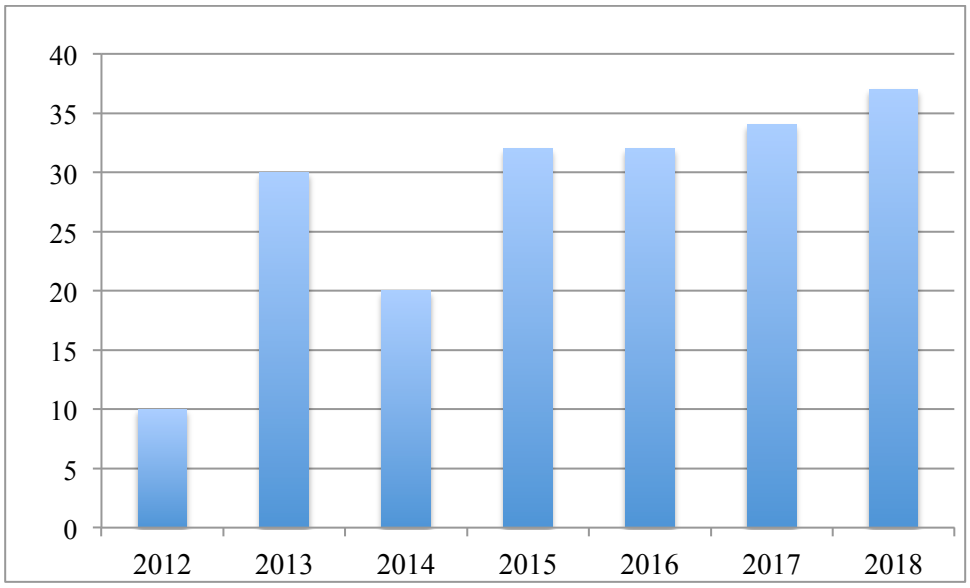

Figure 2. Numbers of startups that graduated accelerators in Estonia (author's compilation)

The gradual rise of startups participating is similar to the whole world (Drori & Wright, 2018: 2-5). Despite the increase of the number of accelerators in 2014 and 2015, the amount of startups participated decreased in 2014, to rise again in 2015. 19 per cent of the accelerated 58 companies have quitted operations by 2018 with the average age of quitting being 3.6 years. Total numbers of Estonian startups accelerated by accelerators are shown in Figure 3. As a metric of success accelerators report the number of exits. Startup Wise Guys (after five years from program participation and establishment) and BuildIt (after two years from program participation and three years from establishment) have both experienced an exit. Both of these were early exits, considering that for VC startups as a reference base, a typical time to exit is seven to nine years (Hochberg, 2016: 34).

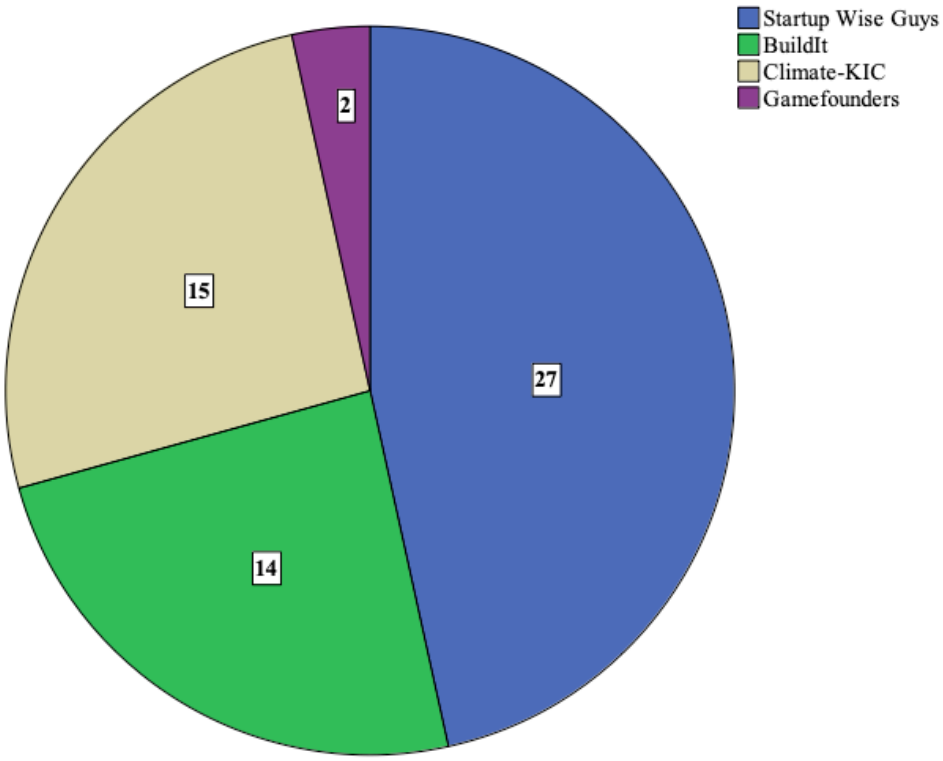

Figure 3. Estonian startups accelerated by Estonian accelerators from 2012-2018 (author's compilation).

Secondly, nine semi-structured, in-depth interviews with top-level representatives of all of the accelerators are conducted. A co-founder of Startup Wise Guys (1 h 10 min), a co-founder of Gamefounders (1 h), two co-founders from BuildIt Accelerator (1 h 37 min) and all three executives of the Climate-KIC Accelerator over its existence (2 h 13 min) were interviewed. The existing connections and third-party introductions were drawn upon to reach the interviewees. Three interviews were conducted face-to-face, with one exception – Climate-KIC – carried out via Skype. All the interviews were recorded on the understanding that the data provided would remain confidential. Interviews focused on the topic of accelerators success and development over time.

4. Methods

To offer thorough analysis of Estonian newly established accelerator field, the study is conducted in three stages outlined in Table 2.

Table 2. Three stages of the analysis (author's compilation)

Method	Purpose	Dependent variable	Independent variables	Control variables
Non-parametric Kruskal-Wallis H test	To map and describe the accelerators in Estonia and explore their differences.	First accelerator a startup has participated in Estonia.	• Length of firm survival • Average employees growth	• Funds from accelerator • Number of founders* • Women percentage from founders* • Field of activity* • Average sales growth • Accelerators' influence on sales
Stepwise OLS regression (2 models)	To capture the predictors of success of accelerated companies.	• Average employees growth • Average sales growth	• Length of firm survival • Average employees growth (if not dependent)	• Funds from accelerator • Number of founders • Women percentage from founders • Field of activity • Average sales growth • Accelerators' influence on sales
Semi-structured interviews	To identify accelerator success factors.	-	-	-

* - These variables significantly differentiate accelerators in Kruskal-Wallis H test

At first, a preparatory Kruskal-Wallis H test is used to map and describe the four accelerators in Estonia. This non-parametric analysis gives a good overview of the differences between the accelerators. The dependent categorizing variable in this part of the analysis refers to the first accelerator a startup has participated in Estonia. Further analysis also considers only the participation in the first Estonian accelerator (two companies have participated in several). The values of this dependent variable stand for all the Estonian accelerators during the period under inquiry and are outlined in Appendix 1 together with the description of what these programs offer to their participants. Independent variables of this test are highlighted in Table 2 and explained in detail later.

Stepwise OLS regression model is then applied to business growth metrics to capture the predictors of success of accelerated companies and compare these to theory. Two regression models are conducted, both having a differing focal independent variable that is used to measure success of accelerated startup companies. Startup growth measures are not unidimensional – one startup can experience growth in different ways than another (Delmar, Davidsson, & Gartner, 2003). In the choice of proper growth indicators a list of measures proposed by Delmar (1997) is adjusted with the availability of data, these being assets, employment, market share, performance index and sales. Some indicators of the presented list are not relevant for comparing companies in different business areas. That said, performance index and market share are not comparable from industry to industry. And total asset value is influenced by the capital-intensity of a certain industry, therefore also being useless while comparing startups with different lines of activities. Considering this, the analysis focuses on sales and employment as the focal dependent variables, operationalized as average yearly employee growth and average yearly sales growth. Both of these are categorical variables with four values. Categories are based upon average scores on variables measuring yearly increase of employee growth and yearly increase of sales growth for all of the years a company has operated. Companies with no sales or employment data for two subsequent years are excluded from the analysis as missings, since the increase is not possible to identify. For the same reason also companies founded in 2017 are coded missing when using dependent variable 'average yearly sales growth', since their performance is not recorded by annual reports two subsequent years in a row. In a regression model with 'average yearly employees growth' as dependent, companies established in 2017 are included, while their values for 2018 are identified from the credit reports data. Some missing values on employment and sales were possible to substitute with the following logic: when sales in the first year of operation are unknown, but in the subsequent these are 0 or less than 3000 Euros and increasing exponentially later, then the first year is also coded as 0, otherwise missing. A technology-intensive company that has only operated one or two years and has no reported employment or sales numbers was coded 0 for both indicators. When number of employees is unknown, but employment costs are 0 or employee number in the subsequent years was 0, employees are coded as 0. If there

are some costs associated with employment, employment number is substituted with one less than the coming year or one more than the last year (depending on the costs of employment). For one company, which did not have any annual reports recorded, turnover instead of sales results coming from Tax and Customs Administration are used.

The four groups are formed on the basis of the yearly averages of these variables that are then categorized using visual binning technique in SPSS (with equal cut points of 25% so that 4 possibly equal groups would form). The data points do not allow making thoroughly equal groups, but for sake of our analysis meaningful groups were formed. The frequency tables of the categories are shown in Appendix 2a and 2b. In a variable of employment growth the first group collates startups with average yearly increase in the number of employees less or equal to zero. This group is also the greatest, since there are several companies with no employees over the period of operation, representing 33% of 39 startups that have values on this variable. The other three groups with positive employees growth compile 21-23 per cent of the cases. Similarly to the groups with employees growth, average yearly sales increase concentrated into almost equal four groups, with startups with negative sales growth making up the largest part – 37% – of all the 38 startups having values on this variable. The second group with the smallest positive increase in sales was the smallest, compiling 16 per cent of the cases, while the third group included 21 and the fourth 26 per cent of the companies.

The analysis of the mean scores and later quantitative modeling both consider the following independent variables. Length of firm survival and average employees growth had proven theoretically important, since the previous studies have associated it positively with accelerator participation. Two other concepts that earlier research associates with accelerator participation – growth in total amount of funding and speed of follow-up funding are left out from the analysis due to the constraints of data. Length of firm survival is measured in years between the establishment as mentioned in the business register and 2018 (or quitting date). To be able to add characteristics from annual reports, then for companies established in the end of the year, next year is taken as an establishment date. In case there are no signs of activity in the past two years, a startup is marked as being quitted. When quitting time is not possible to identify, two years subsequent zero sales revenues are

taken as a marker of this. This coding is possible only when there have been reported sales in earlier years, since otherwise it may be, that a startup is so knowledge- or capital intensive that needs large investments and more time until the first sales.

The control variables were collected based on the limited available data describing startups that the author could collect from the mentioned online sources. As these, funds gained from the accelerator, number of founders and women percentage from founders are measured for their influence on startups. Whether a startups' main field of activity concerns hard- or software (1- or 2), it is also considered. A hardware company produces technological devices or parts of devices or is innovating hardware with the main goal to provide materials based on it (e.g. Gelatex Technologies is developing a technological process to produce gelatine-based leather). When a company develops both, it is considered a hardware company, with exceptions only when hardware does not require technological innovations. A company is coded a software company if it does not produce physical product but code in its' main area of business. Increase in sales is not much studied in relation to accelerators, although it has been one of the most frequently used success metrics for measuring company success (Delmar, 1997) and startups likely attend to accelerator programs to be able to improve their sales. It is controlled with two variables, one categorical variable depicting the average sales growth of a company during its development and the other depicting whether participated accelerator had a direct influence on the sales. The latter was operationalized, by tracking how many years after participation growth appeared. This variable is a dummy variable – when sales growth occurred 1 year after the accelerator, it is considered to be due to the participation and coded 1, when not, it is coded 0.

Since it is hard to study the outcomes of so early-stage companies, – only some of these gain further VC funding soon after the program or make quick exits (only one accelerated Estonian company has exited) – the quantitative inquiry into the phenomenon has several limits. This makes the full effect of accelerator participation hard to capture, even more so in case of younger accelerators. Therefore, as a third step, further analysis will explore what influences the success of accelerators in a greater detail, using semi-structured interviews. Inductive and deductive content analysis is used to identify the core

elements of accelerator success factors in accelerator executives' view. All interviews were transcribed verbatim in Estonian (the language of all the interviews) and translated when used in the article. The categories shown in Appendix 3 were assigned to all the theoretically relevant statements. Not all the statements fit into the categories from the theory, therefore new categories were added to the pre-defined ones. These new categories reflect the value of this study – the contextual differences that influence the success factors of accelerators. To verify coding reliability, the finalized text is sent to the interviewees. For the identification of the most important external success factors the values shown in Appendix 4 were assigned to the relevant statements reflecting the value.

5. Results

5. 1. Determining differences between accelerators

First, all the four accelerators are compared by the descriptors of their participated companies to see whether accelerators differ in their startup portfolio with the Kruskal-Wallis H test done in two stages: firstly, with characterictics that do not depend on time of establishment to be able to add more cases (also companies established in 2018) and the second stage with characteristics for which a company had to have been established earlier than 2017. The test showed that there is a statistically significant difference in Estonian accelerators between

1) *Percentage of women* $\chi2(3) = 8.921$, $p = 0.030$, with a mean rank of 24.74 for Startup Wise Guys, 26.77 for BuildIt, 38.40 for Climate-KIC and 30.50 for Gamefounders.
2) *Number of founders* $\chi2(3) = 8.750$, $p = 0.033$, with a mean rank of 31.59 for Startup Wise Guys, 35.00 for BuildIt, 18.67 for Climate-KIC and 32.50 for Gamefounders
3) *Hard- or software as a main business area* $\chi2(3) = 18.294$, $p = 0.000$, with a mean rank of 36.39 for Startup Wise Guys, 20.96 for BuildIt, 21.40 for Climate-KIC and 38.50 for Gamefounders

The contrasts highlighted by the data mark that in one way or another accelerators attract slightly different companies due reasons that should be further explained in the following

papers. Some reasoning is offered subsequently. Diverse portfolios may refer to differences in programs and their focus. Accelerators differ most significantly in their extent of inclusion of soft- or hardware companies, which is well explainable by the fact that two of the accelerators – Startup Wise Guys and Gamefounders – mostly invest in software and two of them – BuildIt and Climate-KIC – on hardware companies. The other considerable distinguisher is the proportion of women. An accelerator founder said openly:

> 'We'd like to have more women in the program, but only a few come.'

By the analysis, the greatest proportion of women are active in the Climate-KIC Accelerator, where only 33.3 per cent of the companies have no female founders. For other accelerators the tendency is more towards only male founders. An executive of Climate-KIC offered one possible reason for it:

> 'I would speculate that women, when they take the risks associated with startups creation, often want to do things close to their heart – for many, the environment is such an issue.'

This intelligent guess that women are more likely to dedicate their energy to mission-driven entrepreneurship has also found proof in previous research (Hechavarria, Ingram, Justo, & Terjesen, 2012).

From these findings it is seen, that in terms of the success metrics (sales or employees growth or length of survival) the accelerators do not significantly differ. The differences, interpreted later in the discussion, come in comparing the control variables. Therefore it is expected that the predictors of startup success will be similar for the whole population of accelerated startups and turn to the second stage of analysis predicting factors influencing startup success in the overall population of accelerated startups.

5.2. What influences accelerators' success?

Theory agrees that participating startup success is the main indicator of accelerator success. To explore the models that are most predictive to the successful startup, first the variable about the length of firm survival together with the control variables are incorporated in a

stepwise regression procedure to see their effects on average yearly employee growth. The resulting regression model is reported in Table 3. This model includes only control variables average yearly sales growth and funds gained from the accelerator as predictors, both of which have statistically significant effects on startups' employee growth.

When setting average yearly employee growth, length of firm survival and control variables to the model with average yearly sales growth as a dependent variable, the resulting regression model includes average yearly employees growth and company's field of activity (hard- or software) as predictors, both of which have statistically significant effects on startup sales growth. Both models are tested for homoscedasticity, multicollinearity and normality.

Table 3. Estimates (and standard errors) of OLS regression predicting accelerated startup success by average yearly employee and sales growth (author's analysis)

	Model 1: Average yearly employees growth	Model 2: Average yearly sales growth
Funds gained from the accelerator	.370*(.000)	.144
Average yearly sales growth	.436**(.136)	-
Average yearly employees growth	-	.549***(.132)
Hard- or software	-.063	.311*(.352)
Accelerator company	.187	-.160
Sales growth due accelerator	-.064	.042
Number of founders	-.009	.028
Women percentage from founders	.142	-.220
Length of firm survival	-.041	-.026

*p<0.05; **p<0.01; ***p<0.001

Note: N(Model 1)=37; N=(Model 2)=37

R^2(Model 1)=.440; baseline R^2=.375 R^2(Model 2)=.423; baseline R^2=.381

VIF(Model 1)<2; VIF(Model 2)<2

Source: Author's compilation

The general pattern appearing in these models is that they include only some of the added independent and control variables. Considering that the correlation between sales growth and employees growth was assumable – both of these variables are metrics of startup success – only one significant relationship remained for both dependent variables.

Higher funds gained from accelerator are predicting average yearly employees growth. More specifically, with every step of the increase in the group of average yearly employees growth it is likely that funds provided by the first Estonian accelerator a startup participated in were greater (b=.370).

Average yearly sales growth was linked to the type of a company's main field of activity. One group increase in average yearly sales growth means that a startup is more likely to be a provider of software (b=.311). Some of the interviews offer possible explanation for that in the differing market penetration characters of the two types:

> 'Typically it takes more time for hardware startups to launch their products.'

> 'Hardware is slower, more capital-intensive. It is much easier to scale with software. I have a friend driving Click&Grow and they have done hard work for ten years and started to really scale only recently.'

Despite the expectations, length of firm survival does not predict increasing success by either criteria. Similarly insignificant are the effects of the participated first Estonian accelerator, sales growth due accelerator, number of founders and women percentage from founders.

Continuing with the interviews, Table 4 presents an overview of the findings of what interviewees identified as internal success factors of accelerators (that in turn lead to successful accelerated startups). All internal success factor categories reported by all seven interviewees are discussed in descending order of salience. Most important internal success factors are reported in gray.

Table 4. Internal success factors of accelerators by descending order of salience (author's compilation)

Success factor	Salience
Social networks creation	100%
Startup selection	100%
Reputation	100%
Mentorship	92%
Batches	92%
Fund allocation*	83%
Focusing on certain stages	75%
Program type*	67%

* - salience is arguable

The first-sight interpretation from Table 4 is that the lower the salience, the more arguable the categorization on the scale 'Very important'-'Not important'. Thus the most salient factors for accelerator success are more uniformly considered important by interviewees than the least. The three most salient success factors were considered solidly important by all the accelerator executives, these being social networks creation by accelerator, deal flow/startup selection and reputation. None of the factors were proven unimportant by all the respondents.

Social networks creation was uniformly confirmed to be very important by all the leaders of accelerators.

> 'What is the product of an accelerator? The product of an accelerator is selling a network. Why would you like to get into Y Combinator? Since it is totally incredible, with whom they can introduce you to. Whether you take 20 000 [Euros] from Y Combinator or as a governments' grant... everybody would always choose Y Combinator. […] Even so that during the completion of some top-accelerators you can access people some cannot get close to even when they move around conferences for ten years. These high-level contacts mean everything.'

> 'We have good relations with the investors of the whole region and we could introduce them to whoever. […] They [a startup in a batch] tried to talk to those funds themselves – everything moved very slowly, while everybody is busy. But since I know these people personally, then I can tell them that let's make the decision this week. And they do it. They take that time and they make these calls during travel from Tokyo, since we have good relations. But startups cannot get them doing all of this.'

Not only network opportunities with investors were valued, but the fact that a participant could meet with other teams in international programs such as Climate-KIC, was also emphasized by an interviewee:

> 'It is very much appreciated that founders can meet with likeminded startups, who operate in similar fields. Usually they share very good contacts from their countries in these meetings.'

A representative of a public climate-focused accelerator also emphasized the fact others did not mention – networking with local policy-makers:

> 'The governmental input is also very important for our teams, since policymaking becomes increasingly important in these [environmental] themes and state's interest becomes apparent as to what regulations or legislations are of interest to startups – what hinders them or what would be these small changes that would make them develop more quickly.'

Startup selection possibilities were among top three internal success factors, since success of an accelerator was seen in a strong correlation with startup success later on. Therefore every accelerator had lengthy criteria for screening out the best teams. At least one of the accelerators even has a resourcing team for finding the startups worldwide.

> 'Finding strong founders and their validation by evaluating product and market, this is essential. The most important, I think.'

> 'The three major criteria are team, market and product and we value team the most, since we enter at a so early stage, where it is really not possible to compute anything in Excel – there may be no finances yet.'

Reputation can be taken as a success metric, but it can also be added to the list of internal success factors, since it came out from all the interviews as very important for accelerators' success. It is decisive for deal flow.

> 'But one thing that for me is a measure of success is how much we have been invited to speak about out experiences. And I have personally been invited to speak about our accelerator in more than 20 countries.'

And not only is it the international recognition, but a very important aspect of reputation is recognition through successful startups that have finished the program – these are advertising the accelerator to their new contacts.

> 'At first, nobody knows you. The best way to build reputation is the success of your pupils. Y Combinator was no one before it accidentally got AirBnb and Dropbox to its portfolio. After that they are the idols of this world.'

Mentorship is also important. Reasons for this were similar:

> 'Workshops and the mentoring have to be of good quality. Otherwise it would not be possible to find participants for next batches. Mentors, also, do not want to participate in programs, where other mentors are not professional.'

An interviewee found that despite mentorship being a very important component for a successful accelerator program, in reality programs could sometimes overexert with it:

> 'In reality, it would be much-much better, when there would be less mentor-meetings. But you almost cannot go on doing this, since then you would automatically get a poor valuation, so to speak, from the teams. They have a feeling that the schedule has to be tight. Although, in reality, the best thing they could do is to build their company [instead of too many training sessions] and maybe exchange thoughts to somebody once a week.'

Operating in batches instead of continuous intake was found important for being able to run the qualified program. And although Barnes (2016) found there to be no significant difference between batch size and initial money raised during a program, several accelerator representatives brought out the optimal batch size for the synergies to occur:

> 'Our Techstars-type business model does not work taking companies one by one, maybe some do. You can only do it like that and, to my mind, all the accelerators do – incubators not. It is just part of the business model. […] This is a totally systematic curriculum they have to pass. And you cannot do it one by one, you cannot start all over again every month, but have to bring startups together. Economically it does not work when there are much less than 10 companies.'

> 'By my experience, the minimum is eight. Then some kind of feeling of belonging starts to work and teams help each other. The biggest batch we have had so far was eleven teams and I felt that the community feeling was the greatest in there. Teams went out to drink beer and do all sorts of stuff. Ten is the optimal.'

Operating with companies in similar stages of development is not so easy to do, although it would significantly increase the effectiveness of the program by the words of several respondents:

> 'If they are in very different phases, it is difficult to offer value to everybody. In this accelerator we tried to include teams that were on almost similar level, but it actually ended up not being so. Some of the teams were a little bit further in the development and these were also the most successful ones in the program.'

With respect to fund allocation and program type there were more multitudinous opinions. Main conclusions that the author drew from the discussions were that fund allocation depends largely on the needs of a concrete startup and also on the development stage of an accelerator. A diverse portfolio of vertical (specialized) and horizontal (universal) accelerators was found to be good in terms of the selection opportunities for startups.

More exploratory were what concerns the external environment that influences accelerators. The interest of the present paper lies on the times of establishment of accelerators as well as what influences these now. Four external influencers were mentioned by the practitioners, – business environment, educational environment, human capital and policy direction – but not always in a positive correlation. Most intriguing were discussions about effects of political actors, followed by human capital, business environment and educational factors with the numbers of references shown on Figure 4.

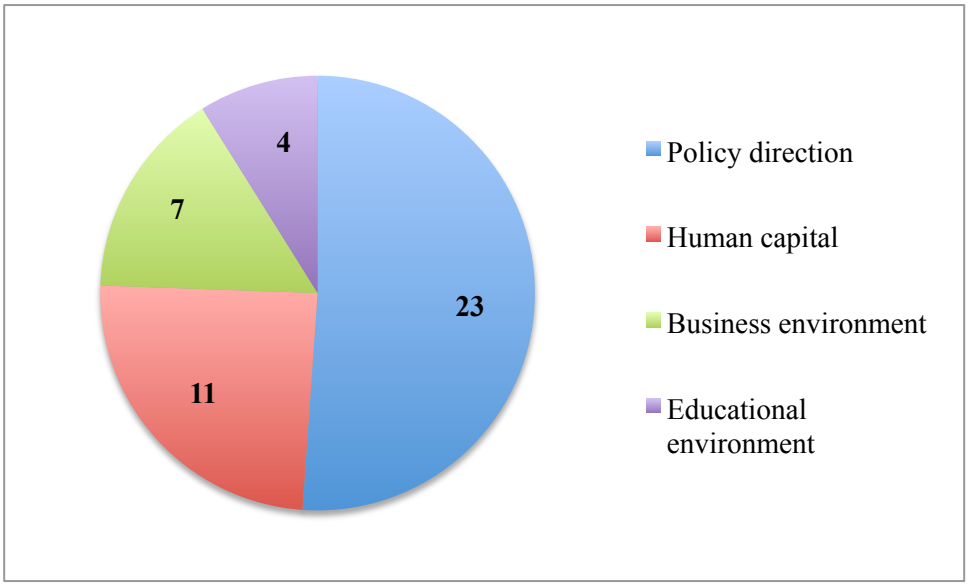

Figure 4. References to external success factors of accelerators from the interviews. Source: Author's compilation.

A critical factor in concerning the establishment of the accelerators mentioned by all was policy direction. The discussions about policy contexts of the times of starting accelerators were in connection with grants – all of the accelerators agreed that without a kick-start funding from public sources, an accelerator is too costly of a project to start with. Every Estonian accelerator was granted some government funding in their earlier stages of development.

> 'It is not possible or during that time it was not possible to do an accelerator in Estonia without public support. When looking at experiences abroad, then there are three options: whether the support comes from the public sector, a big corporation […]. And the third option is that some accelerators compile funds that are a little bigger already from the start, to be able to take money for operating costs. […] We could not immediately find a corporate partner – there are not many in Estonia.'

> 'The availability of the grant was the catalyst that made the founding team working hard to establish the accelerator.'

And not only was the government funding seen as a representation of a policy direction – during the first half of the last decade when the phenomenon of accelerators took up as a global trend, the Estonian governmental development agency held discussions over the

need of these in Estonia. The decision was positive and a fund for accelerator establishment was created. But in some years time accelerator companies were left unfunded, reportedly too quickly. In small Estonia, without much other possibilities for a financing partner, companies moved away to get public support elsewhere – Gamefounders to Malaysia and BuildIt to Riga. Startup Wise Guys did widen their activities to Riga and Vilnius, but was already thus far to be able to finance the accelerator from mostly private funds and therefore did not move the headquarter.

> 'Most die [when public support disappears]. But the first five years was very hard as always in business – we had to do all sorts of tricks to survive.'

But while the accelerators survived by using the regular business logic and moving their finances to places where funds were guaranteed, they question if it was a sustainable move in order to secure the vitality of large investments once made for establishing accelerator ecosystem by Estonian government:

> 'We had the whole system built up – at some point we did as much work as we could for creating the brand and mentor network. […] We had over 100 very strong mentors whom we flew here from the US and England. But as the state had not had thought about supporting this activity further, I would say the investment that the country made in the first place was relatively useless and right now Latvia tastes fruits of this Estonian investment.'

> 'Of course it is the role of a state to eliminate market failures and that is what they did – they helped somebody to the market. But we are not so convinced that what they do now is quite right. But we are happy that we do not need to deal with the state, because it is quite an annoying partner, so to say. One should not really have partner relationships with the state, although in Europe almost all risk capital funds come from public sources like European Investment Fund and others… we do not get by without. And countries actually have a great interest to boost their economies and bring about the structural change that the new economy allows – that is what they really need… sewing factories are closed down one by one, since these are not possible to uphold considering the level of wages we have. And countries need the structural change, to change to the new sustainable economy. Lithuania has taken a different approach than Estonia. They said they do not want more than only a small prearranged return on investment, since they want to boost the economy [through the investments to accelerated companies] – everything else goes to private investors. Of course, they also want some small returns, but this is a clear economy-boosting model. Our country maximizes profits as some bank or investment fund.'

All the accelerators were granted some government funding and what was similar was that all of the starting programs were based on sources of experiences present during establishment. Climate-KIC was and is still based on the program from European-wide network of experts. BuildIt based on the experiences from incubator programs from Tartu's Science Park and hoped to fill the cavity of accelerator financing platform for Tartu's ecosystem of hardware experts. Startup Wise Guys included world-renowned accelerator program experts as co-founders. The presence of the willing participants was a key for accelerator success and there were people with expert knowledge in a diversity of fields thinking about starting a company.

> 'Inevitably, in order to do this, we needed participants who had to be in a rather mature phase, since the accelerator follows ClimateLaunchpad and other preparatory programs for more early-stage startups.'

Opinions differ in terms of whether the quality of participants was high or low. It might have been high for experts, but as an accelerator-maker believes, it still is low considering economic expertise due short period of time a free economy with private businesses had been present in Estonia:

> 'Our focus is Central and Eastern Europe, since we believe that there is a lot of technical talent in the area, but they know little about how to develop businesses, since their parents were not able to own businesses during the Soviet times. There is a lack of this business knowledge carried forward from generation to generation. In my opinion only ten people out of 100 can do business and only one of these is able to startup. […] And we see that these technology-focused founders need help for building up scalable businesses. We are the virtual co-founders or foster parents, who teach this business-side.'

All in all, accelerators are usually present where human capital is:

> 'Now we have expanding our marketing activities to involve Turkey – there is a lot of technical talent in Turkey and people want to move out of there. We have at least three strong Turkish teams in our portfolio.'

But even the different logic is possible – when other aspects are sufficient for accelerators' support, accelerators can play a large part in building this human capital:

> ‘While we held the program, several game-focused university curricula and university subjects were created in Estonia.’

With respect to business environment, three aspects were brought out as favorable to accelerators – Tartu’s living environment by BuildIt, global clean-tech and hardware technology trends by Climate-KIC and BuildIt and economic environment by BuildIt, that used the logic ‘follow the money’ in moving its operations to Latvia.

Surprisingly educational factors were mentioned only by one accelerator and in a negative context.

> ‘Of course it plays a role – it is very hard to do this in Tartu. [...] Yes, Tartu’s Science Park was a strategic partner here – one of the founders. But we have never had cooperation on this level with the University of Tartu. And the attitude of the university has been rather negative towards what we do, I would say.’

> ‘Our preliminary hypothesis that we get teams from the university is not supported. In reality, we have not invested in any of the university teams.’

5. Discussion and conclusion

This article demonstrates that in order to discover accelerator success factors and strengthen them, we need to understand specific contexts of areas under inquiry. Exploring external success factors next to the internal ones instruct in doing so. The article explored the success-factors of Estonian accelerators and accelerated startups with employing complete sample of accelerators and their participants, which is unique in accelerator research thus far. Other important contributions of the study were offering contextual diversity for studies of accelerators by providing the example of Estonia, using mixed methods in studying the phenomenon and, most importantly, exploring the internal and external success factors of specifically accelerator-type business models.

Success of an accelerated startup is theoretically explained by the success metrics of startups by earlier studies. The leading idea tested in this article is that the newly formed body of accelerators research should not ignore contexts of countries under inquiry in the process of theory-formation, otherwise theories considering the concept will become context-inclined and not usable universally. Therefore these metrics were tested in the

context of Estonia – a country where accelerators have had little time to develop. Regression models revealed that the size of funds gained from the accelerator, average yearly sales and employees growth and being a software company are predictive of a success of accelerated startups. Funds gained from the accelerator as a significant predictor of higher average yearly employees growth was held of theoretical importance earlier as well as length of firm. The latter was not found so for these data. Explanation for this may be that accelerators are a new phenomena in Estonia and therefore the longevity of startups is not yet comparable in quantitative datasets on a significant level – over 30 per cent of the analyzed companies did not manage to have any sales or employee growth during the short period of their existence. Although our data covers all the accelerators and their participating startups, due to the access of limited data, only a few theoretically relevant concepts could have been analyzed.

To study what influences the success of the accelerators themselves, in-depth discoveries of the internal and external success-factors of different acceleration programs provided were given. The three most salient internal success factors were considered solidly important by all the accelerator executives, these being social networks creation by accelerator, deal flow/startup selection and reputation of an accelerator. Studies on the effects of accelerator reputation to its success are not found in earlier research, although this is referred to as an important factor by the overview articles (Drori & Wright, 2018: 13; Isabelle, 2013: 19-20). Where the contextual differences of Estonia strongly came in were the statements of interviewees about the external success factors, because policy and business environment of a country with respect to accelerators come out as existential factors for accelerator presence. Interviews reflected upon accelerators as important policy tools, mostly since the establishment of one is not possible without public support. Giving accelerators positive effects on startups growth studied in earlier theoretical literature, public sector as an important stakeholder should be interested in building models for sustainable support of accelerators.

Analysis of the success metrics of accelerated startups revealed that some accelerators attract more female founders than others for reasons that should be further explained in the following papers. The regression models for analysing what causes

accelerated startups success were able to compare success groups inside the uniform population of accelerator participants only. In further studies, it would be interesting to compare the groups of accelerated versus non-accelerated companies in order to analyze the possible differences in accelerated startup success predictors in a diversity of contexts. This analysis would advance the understanding of the accelerator-offered qualities. Later analysis could also add to the theory-formation when studying the external factors in different contexts and internationally in more detail. The focused comparison of USA and Estonia may be an interesting starting point in this, as shown presently.

To conclude, all three parts of the study revealed some deviations from the earlier studies of accelerators – one considering a totally new concept to analyze (external success factors) in accelerator literature – focusing on the possible differences along cultural lines. Therefore this study contributes to the scarce literature (Yin & Luo, 2018) on the recent phenomenon of accelerators.

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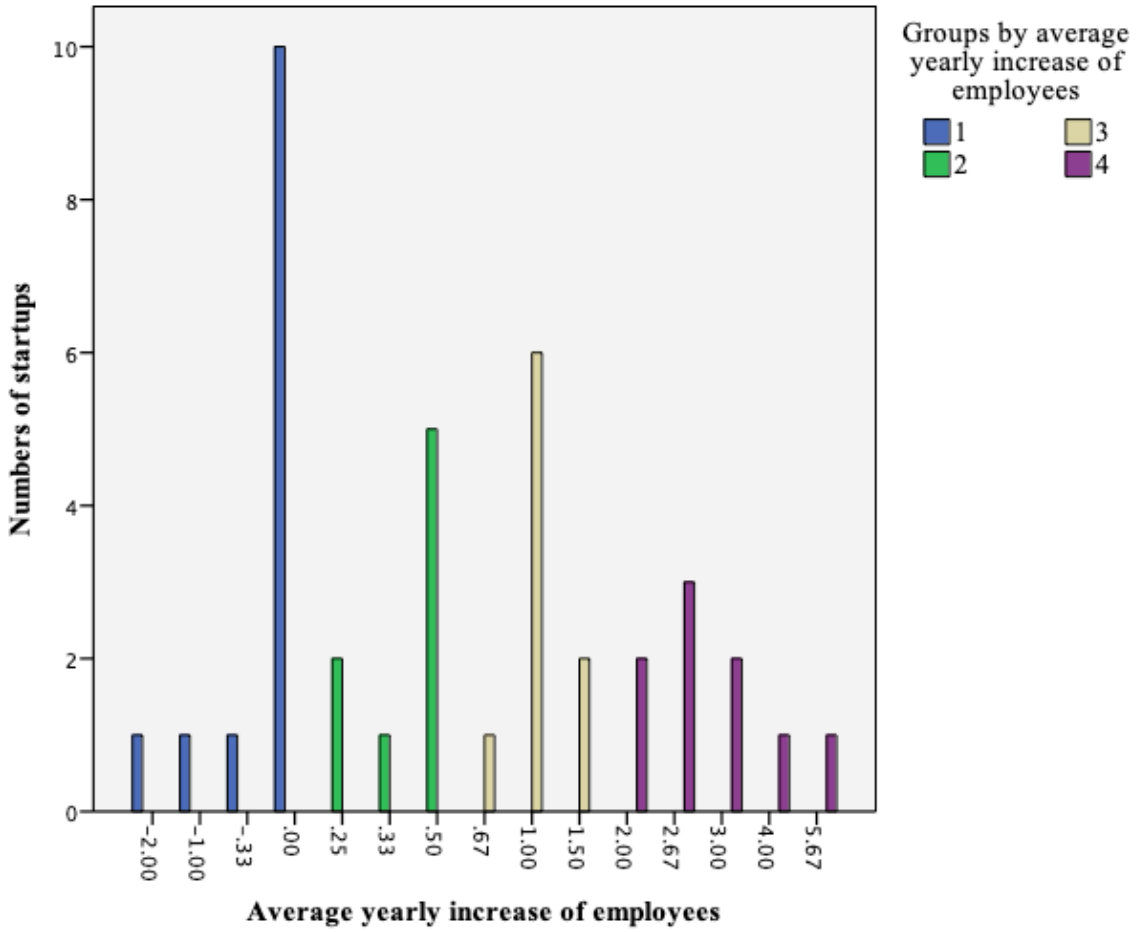
Appendix 1. Properties of Estonian accelerators of 2012-2018 (values of *Accelerator1*) (author's compilation).

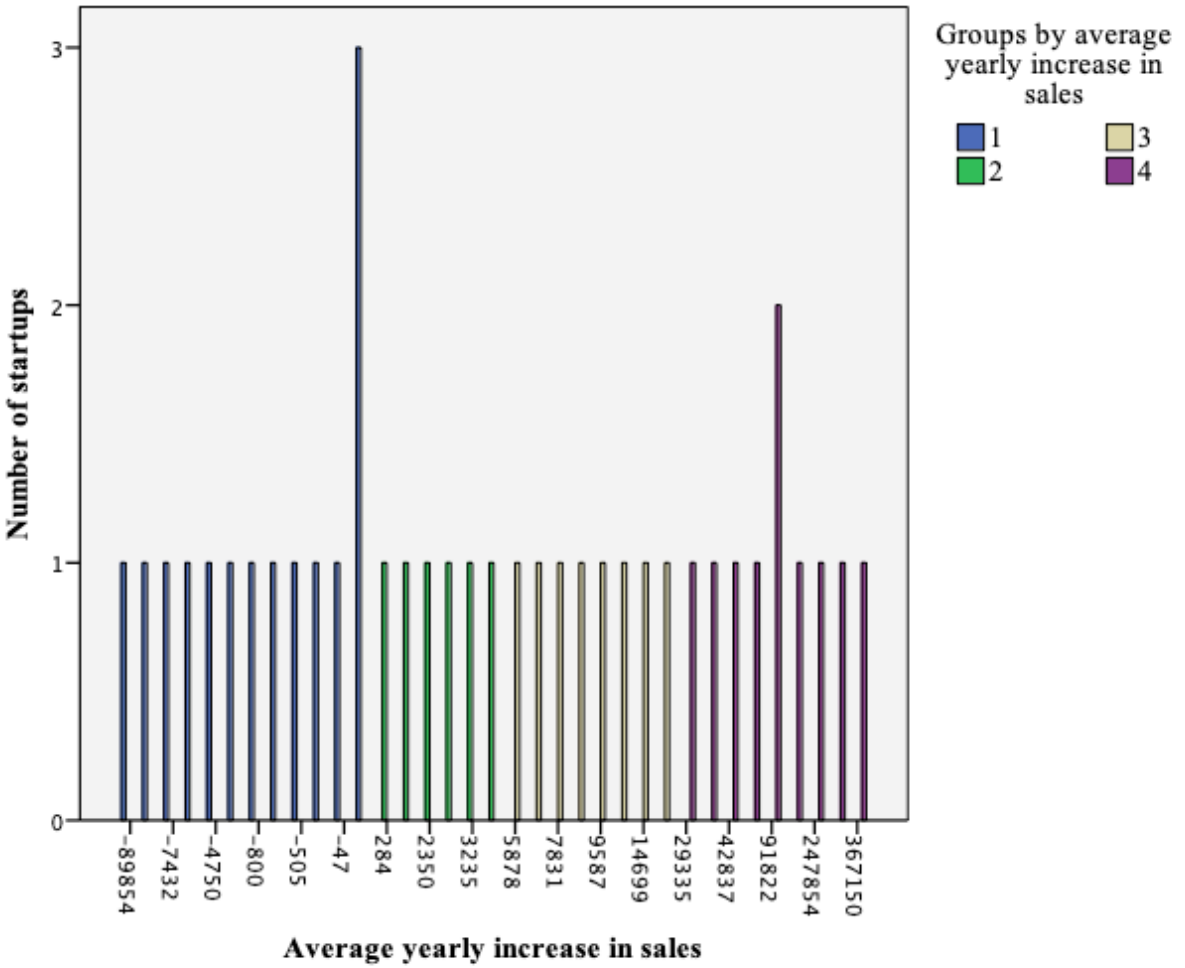
	Startup Wise Guys (1)	**BuildIt (2)**	**Climate-KIC Accelerator (3)**	**Gamefounders (4) (no new batches since 2014)**
Established	2012	2014	2015	2012
Description	Europe's most experienced B2B startup accelerator.	Buildit is an accelerator for new global success stories in hardware and IoT.	Europe's largest green tech accelerator for early stage startups.	Accelerator for teams of gamification.
Number of accelerated startups (until the first half of 2018)	101	48	18	28
Type	Horizontal	Vertical	Vertical	Vertical
Head-quarter	Tallinn (Estonia)	Tartu (Estonia), since 2017 Riga (Latvia)	Brussels (Belgium), Estonian program in Tallinn (Estonia)	Tallinn (Estonia), since 2015 Kuala Lumpur (Malaysia)
Location of program (until 2017)	Tallinn (Estonia), Riga (Latvia)	Tartu (Estonia)	Europe-wide	Tallinn (Estonia), since 2015 Kuala Lumpur (Malaysia)
Program length	3 months	6 weeks	6 moths	3 months
Funding amount	Up to 30 000 EUR	Up to 50 000 EUR	Up to 50 000 EUR	Up to 15 000 EUR
Funding type	For equity	For equity	Equity-free	For equity
Mentors	Dedicated highly rated coaches and access to 150+ world-class business mentors	16 world-class mentors	Some of the best clean-tech mentors from Climate-KIC European-wide network	World-class mentors
Co-working space	Yes	Yes	Yes	Yes

*Until 2014 (incl.)

Appendix 2a. Groups of average yearly employee growth by average yearly increase of employees (author's compilation).



Appendix 2b. Groups of average yearly sales growth by average yearly increase in sales (Euros) (author's compilation).



Appendix 4. Categories and codes for external and internal success factors (author's compilation).

Categories	Codes	Questions
External success factors		If and how accelerators are influenced by their external context (e.g. political, economic, social, educational, cultural)? Which external factors did affect accelerators during their establishment? Whether there were external factors that influenced the starting of the accelerator just then?
Business environment factors	Business environment Economic environment Global business environment Living environment	
Educational factors	Educational factors	
Human capital	Human capital	
Policy direction	Policy direction	
Accessible markets*	Accessible markets	
Cultural support*	Cultural support	
Internal success factors		
Batches	Batches	Is accelerators' success influenced by taking startups into the program in batches? Is it very important, important or not very important? How does operating in batches influence accelerators?
Focusing on certain stages	Focusing on certain stages	Is accelerators' success influenced by focusing on startups of similar stages? Is it very important, important or not very important? How does operating with startups of similar stages influence accelerators?
Fund allocation	Fund allocation	Is accelerators' success influenced by their funding of startups and the amount of funds? Is it very important, important or not very important? How does the fact of fund allocation to startups influence accelerators?

Mentorship	Strength of mentors/program	Is accelerators' success influenced by mentors? Is the strength of mentorship very important, important or not very important? How does mentorship strength influence accelerators?
Program type	Horizontal versus vertical program	Is accelerators' success influenced by focusing on certain technology or field of activity? Is it very important, important or not very important? How does focusing on certain technology or field of activity influence accelerators?
Social networks creation	Social networks creation	Is accelerators' success influenced by their social networks creation? Is it very important, important or not very important? How does social networks creation influence accelerators?
Startup selection	Startup selection	Is accelerators' success influenced by the selection of startups? Is it very important, important or not very important? How do possibilities of startup selection influence accelerators?
Reputation**	Reputation by recognition Reputation by recognizing through successful startups	Is accelerators' success influenced by its reputation? Is it very important, important or not very important? How does reputation influence accelerators?

* - Not mentioned in interviews

** - Came out from the interviews as being important

Appendix 4. Coding scheme for internal success factors

Value	Meaning	Example
1	Not important	
2	Important	
3	Very important	

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