

New Venture Financing and Business Support: Three Papers on Accelerators' Impact on Startups' Development

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Dedicated to my family

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List of Abbreviations

ACC	Accelerator
Approx.	Approximately
BA/BAs	Business angel/Business angels
CEO	Chief Executive Officer
CFO	Chief Financial Officer
COO	Chief Operating Officer
CTO	Chief Technology Officer
CXO	Chief Experience Officer
Ed./eds.	Editor/editors
E.g.	Exempli gratia (for example)
Et al.	Et alii (and others)
Etc.	Et cetera (and so on)
EXIST	Existenzgründungen aus der Wissenschaft (founder's grant by the Bundesministerium für Wirtschaft und Energie)
f	Female
H	Hypothesis
H(t)	Hazard function
I.e.	Id est (that is)
IPO	Initial public offering
IT	Information Technology
m	Male
M	Mean
Max	Maximum
MBA	Master of Business Administration
Min	Minimum
N	Sample size
No.	Number
N/a	Not available
OECD	Organisation for Economic Co-Operation and Development
OLS	Ordinary Least Squares
p	P-value to indicate statistical significance
p. / pp.	Page/pages

List of Abbreviations

PhD	Doctor of Philosophy
SD	Standard deviation
SME(s)	Small and medium-sized enterprise(s)
Startup/s	Startup company/startup companies
S(t)	Survivor function
SU	Startup
t	Time
U.S.	United States
VC/VCs	Venture capitalist/Venture capitalists
JQ3	VHB-JOURQUAL3
VIF	Variance Inflation Factors
β	beta / regression coefficient
%	percentage

CHAPTER 1 | Introduction

1.1 Motivation

Startup companies (startups) represent an important source of stable economic growth and strengthening of the long-term competitiveness of an economy. In particular, startups create new jobs (Bellavitis et al. 2017; Fritsch and Wyrwich 2017; Zinke et al. 2018), generate economic growth (Bellavitis et al. 2017; Hafer 2013; Kollmann et al. 2019), establish and access new markets (Metzger 2018; Rammer et al. 2016), strengthen innovation capital (Zinke et al. 2018), increase competition (Metzger 2016), represent innovative drivers of digitalisation and play a leading role in the field of future technologies (Kollmann et al. 2018). Although startups are characterised by their potentially high growth and innovation (Kollmann et al. 2018), they typically struggle to survive, with a failure rate of approximately 50% within the first three to five years after their foundation (U.S. Bureau of Labor Statistics 2010; van Praag 2003). The failure of startups is often attributed to their lack of resources (Thornhill and Amit 2003) both financial (Cassar 2009; Greene et al. 1997; Hahn 2014) and non-financial (Greene et al. 1997; Zinke et al. 2018).

The lack of financial resources involved in the ‘funding gap’, a particular concern of small and young firms (Peneder 2008), is discussed in entrepreneurship research as a primary reason for startups to fail (Bruton and Rubanik 2002). Due to their high risk and lack of security, startups are usually ineligible for debt financing through banks (Cassar 2004; Fischer and Rassenfosse 2011; Kim and Wagman 2016; Metzger 2018; Zinke et al. 2018). In addition, most startups have difficulty raising the necessary capital from their own financial resources. As a result, they are in need of support from equity investors (Achleitner et al. 2011; Baum and Silverman 2004; Metzger 2016). Moreover, experts

highlight the need for non-financial support (Zinke et al. 2018) since startups typically also lack business and industry-specific knowledge, management and startup experience (Brush et al. 2001; Shepherd et al. 2000), as well as customers and cooperation partners (Abatecola et al. 2012; Cafferata et al. 2009; Freeman et al. 1983; Stinchcombe 1965). Established investors that support startups with financial resources as well as non-financial support (so-called non-financial ‘value-added’) are known as venture capitalists (VCs) and business angels (BAs) (Ardichvili et al. 2002; Large and Muegge 2008; Politis 2008). VCs and BAs have historically dominated not only the equity market (Metzger 2016) but also entrepreneurial finance research (Bellavitis et al. 2017).

Since 2005, however, the modern entrepreneurial equity funding landscape has witnessed the rise of a new player – the accelerator (Andreoli 2018; Bellavitis et al. 2017; Block et al. 2017) – which increasingly attracts the attention of participants in the startup ecosystem, politicians and researchers (Bellavitis et al. 2017; Cohen et al. 2019; Drover et al. 2017). Accelerators are a phenomenon of rapid growth (Cohen et al. 2019; Zinke et al. 2018) with more than 3,000 accelerators having emerged worldwide from 2005 through 2016 (Hochberg 2016) and with 120 accelerators having been founded in Germany until 2018 (Zinke et al. 2018). Well-known and successful startups, such as Airbnb, Dropbox and Stripe, were initially supported by accelerators (Bellavitis et al. 2017; Y Combinator 2019).

Accelerators are organisations that support cohorts of startups during a short time-span by providing seed capital as well as non-financial services, including working space, networking and mentoring services (Cohen et al. 2019; Cohen and Hochberg 2014; Zinke et al. 2018). Hence, in the light of the critical necessity of access to resources, accelerators seem to provide startups with valuable support (Hallen et al. 2017; Pauwels et al. 2016; Phan et al. 2005; Yin and Luo 2018). Investors, governments and corporations expect

accelerators to drive entrepreneurial success, innovation and economic growth and thus invest in accelerator programmes (Global Accelerator Learning Initiative 2019; Hochberg 2016). So far, however, the effectiveness of accelerators in terms of their effect on startups' development lacks clarity and empirical evidence (Bellavitis et al. 2017; Cohen et al. 2019; Global Accelerator Learning Initiative 2019; Gonzalez-Uribe and Leatherbee 2017; Hochberg 2016; Yu 2019). Therefore, this dissertation addresses the overall research question of how accelerators affect startups' development.

1.2 Research Gaps and Research Objectives

To answer the overarching research question of how accelerators influence the development of startups, this dissertation includes three studies that take different theoretical angles on startups' financial and non-financial development through accelerators. First, accelerators' portfolio of non-financial inputs and its effectiveness in providing value-added to startups is examined. Second, cooperative relationships as one under-examined but crucial non-financial factor to startups and how accelerators support such relationships are investigated. Third, the financial perspective on startups' development is added by examining accelerator-backed startups' success in subsequently acquiring financial resources. The studies will be briefly presented in the following paragraphs.

First, due to startups' lack of resources, prior literature argues that investors' non-financial value-adding activities are particularly helpful for early-stage ventures (Aspelund et al. 2005) and provide the firms with a competitive advantage (Politis 2008). The extant research shows that established investors, such as BAs and VCs, are successful in providing startups with additional non-financial value-added beyond pure financing (Large and Muegge 2008; Mason 2013; Politis 2008). While accelerators, as recently emerging investors, seem equally to offer non-financial support (Block et al. 2017),

accelerators' inputs and non-financial outcomes have not yet been empirically evaluated from a value-added perspective. The actual effectiveness of accelerators' non-financial support is still unclear both to researchers and practitioners. Since accelerators distinguish themselves from established types of investors through various characteristics, including their cohort structure and their intense, time-compressed education and training programmes (Cohen 2013b), prior results on the value-added of VCs and BAs cannot be transferred to accelerators. Therefore, the first study with the title 'The Value-Adding Impact of Accelerators on Startups' Development' taps into this research gap by investigating the value-added outcomes for startups generated by the value-adding inputs provided by the accelerator. In particular, this study examines the following research questions:

Which types of value-adding inputs do accelerators provide?

And which value-added outcomes do they generate for the startups' development?

Second, one aspect of investors' non-financial value-added that is perceived as critical is their provision of networks (Hansen et al. 2000; Soetanto and Jack 2013). Prior literature establishes that networking activities and the resulting access to networks is important for the successful development and growth of a firm (Hite and Hersterly 2001; Lechner and Dowling 2003; Venkataraman and Van de Ven 1998; Witt 2004) and in particular for entrepreneurial firms (Lechner and Dowling 2003; Lechner et al. 2006; Venkataraman and Van de Ven 1998) because networks offer young firms the opportunity to access resources they otherwise lack (Brinckmann and Hoegl 2011; Hoang and Antoncic 2003). One particular type of network relationship which is argued to be advantageous for firms because it simultaneously combines the benefits of both cooperation and competition within one relationship is called 'coopetition' (Bengtsson and Kock 2000).

Although it is likely that also young and small firms ‘coopete’ and can benefit from coopetition, especially due to their lack of resources (Soppe et al. 2014), the formation process (Mariani 2007; Mariani 2009) and specific characteristics of coopetition among startups have thus far not been empirically investigated, since prior research on coopetition has focused mainly on large firms (Gast et al. 2015; Gnyawali and Park 2009; Park et al. 2014b). Therefore, the second study, entitled ‘Accelerators as Drivers of Coopetition among Early-Stage Startups’, taps into the research gap on coopetition among early-stage startups by investigating the formation process and characteristics of coopetition among early-stage startups within the startup ecosystem established by accelerators. Specifically, this study examines the following research questions:

How do startups establish and practice coopetition?

And what role does the accelerator play in this relationship?

Third, in addition to non-financial resources, financial means are usually critical but lacking in a firm’s early stages (Bruton and Rubanik 2002; Cassar 2009; Gilbert et al. 2006; Hahn 2014). As accelerators provide startups with seed capital (Drover et al. 2017), their support would seem to address startups’ funding gap (Block et al. 2017) in the first instance. As accelerators provide only a small sum of capital, however, and support the startups for only a short period of time (Cohen 2013b; Drover et al. 2017), startups are usually in need of follow-up funding from other investors (Cremades 2016; Maynard and Warren 2014; McGowan 2018).

Prior research proves the tight interconnection of established investors, such as BAs and VCs, through complementarities like sequential investing, co-investing or deal referral (Harrison and Mason 2000), yet with the accelerator as a new type of investor that preponds at the very first stage of a startup’s life cycle, the interplay of various

investors in the startups' funding process is less clear-cut. Therefore, the third study, entitled 'Kick-starting Startups' Financing Cycle: Accelerators' Effect on Startups' Follow-up Funding', sheds light on how accelerators affect the startups' acquisition of financial resources after the acceleration phase. In particular, this study addresses the following research question:

How does the involvement of an accelerator in the first funding round affect the time to and extent of a startup's follow-up funding round?

1.3 Overview of the Dissertation

This dissertation is composed of six chapters; the three chapters that constitute the main body (*Chapters 3 to 5*) are embedded in the surrounding chapters, which provide the theoretical background (*Chapter 2*) and conclusions (*Chapter 6*).

To prepare the context of the studies, *Chapter 2* provides a basic understanding of startups' relevance, challenges and development, as well as their financing. Furthermore, accelerators as early-stage investors are presented and distinguished from incubators. In addition, prior research on accelerators is categorized and summarised. To contribute to the understanding of how accelerators affect startups' development, *Chapters 3 to 5* present three studies that examine the role of accelerators' financial and non-financial support. Table 1 gives an overview of the studies' characteristics by summarising the research objective, theoretical perspective, contribution, method and sample of each study. To conclude the dissertation, *Chapter 6* summarises the three research projects, discusses their main implications and offers prospects for potential future research. Figure 1 provides an outline of the structure of this dissertation.

Figure 1. Overview of the dissertation

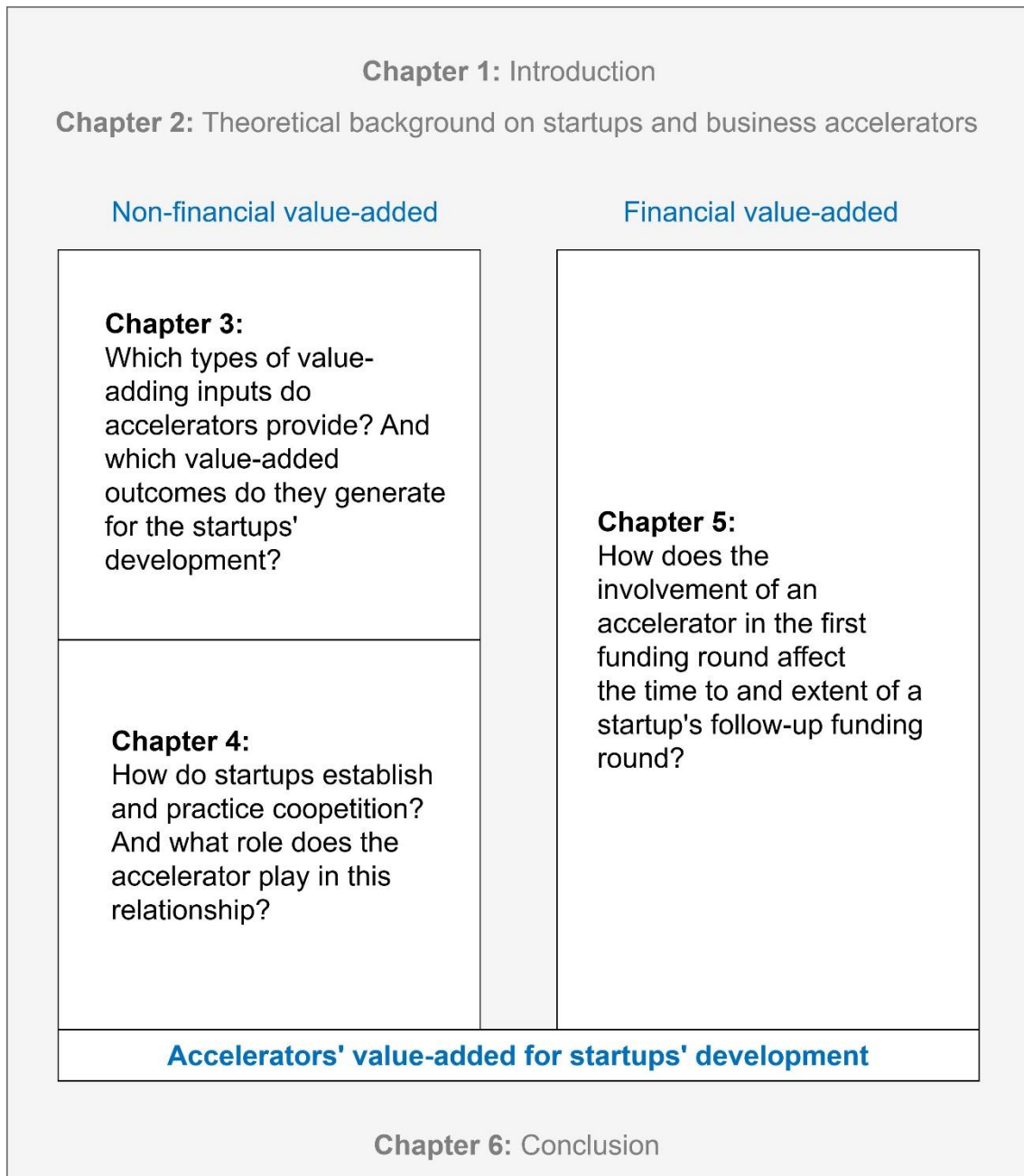


Table 1. Characteristics of the three studies

Studies <i>(Chapters)</i>	Title	Research objective	Theoretical perspective	Contribution	Method	Sample
Study 1 <i>(Chapter 3)</i>	The Value-Adding Impact of Accelerators on Startups' Development	Investigate the non-financial value-added outcomes for startups generated by the non-financial value-adding inputs provided by the accelerator.	Investors' value-added	<ol style="list-style-type: none"> 1. Advances the literature on accelerators by highlighting accelerators' supportive activities in startups' developmental process. 2. Contributes to the literature on investors' value-added by clarifying accelerators' role as a creator of non-financial value-added. 3. Contributes to the literature stream on entrepreneurial learning by identifying accelerators as an effective tool for entrepreneurial learning. 	Multiple case study design using a variety of sources, e.g. 34 interviews, informal conversations and observations within the accelerators' coworking spaces and at events	6 in-depth cases (i.e. accelerators) within Germany, including 23 startups
Study 2 <i>(Chapter 4)</i>	Accelerators as Drivers of Coopetition Among Early-Stage Startups	Examine the formation process and characteristics of coopetition among early-stage startups in accelerators.	Entrepreneurial networks and environments	<ol style="list-style-type: none"> 1. Advances the understanding of accelerators' role in startups' relationships. 2. Adds to the literature stream of coopetition within the field of entrepreneurship by showing that coopetition is a relevant strategy for startups in their early stages. 3. Enhances the literature on coopetition formation by revealing how the external environment of startups, such as an accelerator, can serve as a driver of coopetition. 	Multiple case study design using a variety of sources, e.g. 34 interviews, informal conversations and observations within the accelerators' coworking spaces and at events	6 in-depth cases (i.e. accelerators) within Germany, including 23 startups
Study 3 <i>(Chapter 5)</i>	Kick-starting Startups' Financing Cycle: Accelerators' Effect on Startups' Follow-up Funding	Investigate how accelerators affect startups' financial resource acquisition in terms of the time to and extent of a startup's follow-up funding after the acceleration phase.	Signalling and certification; investors' complementarities	<ol style="list-style-type: none"> 1. Advances the entrepreneurial finance research on accelerators by exploring the effect of accelerators on startups' financial resource acquisition after the acceleration phase. 2. Advances the entrepreneurial finance literature stream on the complementarities of different investor types by considering accelerators' interconnectedness with other investors, such as VCs and BAs. 3. Adds to the literature on signalling theory in entrepreneurship by identifying accelerators as a means to signal a startup's quality to follow-up investors. 	Secondary data study based on the dataset from Crunchbase; statistical analysis including propensity score matching, OLS regression, survival analysis	Sample of 198 startups with 99 accelerator-backed startups and 99 non-accelerator-backed startups

1.4 Additional Remarks

The three studies of this dissertation are under review by peer-reviewed scientific journals in the field of entrepreneurship and finance. In the following, the current state of the papers, the co-authors, presentations at conferences and awards are summarised.

Study 1: Naulin, Tamara and Moritz, Alexandra, ‘The Value-Adding Impact of Accelerators on Startups’ Development’, unpublished working paper (submitted to *International Journal of Entrepreneurial Venturing* (VHB-JOURQUAL3 (JQ3) ranking ‘B’) on 04.10.2019).

Conference presentations:

- 8th Entrepreneurship in Modern Economy (ENTIME) Conference, Gdansk, Poland, 11.04.2019.
- 23. Interdisziplinäre Jahreskonferenz zu Entrepreneurship, Innovation und Mittelstand (G-Forum 2019), Vienna, Austria, 27.09.2019.

Awards:

- ‘FGF Best Entrepreneurship Research Newcomer Award 2019’, Vienna, Austria, 26.09.2019.

Study 2: Naulin, Tamara; Moritz, Alexandra and Lutz, Eva, ‘Accelerators as Drivers of Coopetition among Early-Stage Startups’, unpublished working paper (submitted to *Technovation: The International Journal of Technological Innovation, Entrepreneurship and Technology Management* (JQ3 ranking ‘C’) on 01.05.2020).

Conference presentations:

- 15th Interdisciplinary European Conference on Entrepreneurship Research (IECER), Siegen, 21.09.2017.
- 21. Interdisziplinäre Jahreskonferenz zu Entrepreneurship, Innovation und Mittelstand (G-Forum 2017), Wuppertal, 05.10.2017.

- RENT Conference 2017 (Presentation at ECSB Doctoral Workshop), Lund, Sweden, 15.11.2017.

Study 3: Naulin, Tamara; Henn, Marisa and Lutz, Eva, ‘Kick-starting Startups’ Financing Cycle: Accelerators’ Effect on Startups’ Follow-up Funding’, unpublished working paper (first round of revisions at the *European Journal of Finance* (JQ3 ranking ‘B’) on 23.09.2019).

Conference presentations:

- 22. Interdisziplinäre Jahreskonferenz zu Entrepreneurship, Innovation und Mittelstand (G-Forum 2018), G-Forum 2018, Stuttgart, 12.10.2018.
- 8th Entrepreneurship in Modern Economy (ENTIME) Conference, Gdansk, Poland, 11.04.2019.
- 23. Interdisziplinäre Jahreskonferenz zu Entrepreneurship, Innovation und Mittelstand (G-Forum 2019), Vienna, Austria, 27.09.2019.

CHAPTER 2 | Theoretical Background

2.1 Relevance of Startups

Startups are typically characterised by being younger than ten years old, (having aspirations of) showing significant growth in sales or employees and having innovative business models, technologies or products/services (Kollmann et al. 2018). Thus, startups are important and relevant to Germany's economy, as they support economic growth through jobs, with on average 13.3 employees per startup and through creating new markets (Kollmann et al. 2019; Rammer et al. 2016; Zinke et al. 2018). In addition, they strengthen the innovative capacity of the country, drive digitalisation (Kollmann et al. 2019; Rammer et al. 2016) and spur market competition, forcing corporations and small- and medium-sized enterprises (SMEs) to keep up (Metzger 2016). Although the German entrepreneurship landscape has recorded a decrease in new foundations since 2014, their structural quality, in terms of creativity, innovation capacity and growth orientation of the newly founded firms, is improving significantly (Metzger 2018). The decline in the number of new firms can be explained by, among other things, changing foundation motives, which are divided into so-called 'push' and 'pull' factors (Hessels et al. 2008). Accordingly, the positive economic development and the continuing record number of new jobs in the labour market mean that the share of necessity entrepreneurs (those who are 'pushed' into entrepreneurship) continues to decline, while the share of opportunity entrepreneurs (those who are 'pulled' into entrepreneurship) is growing (Bielawa 2018). The latter are particularly associated with 'startups' and are considered more stable and employment-intensive, making a strong contribution to the long-term economic success of a country (Metzger 2018).

2.2 Life Cycle of Startups

The development of a startup is typically divided into three main life cycle phases – early, expansion and later stages – each of which is mirrored by corresponding activities, financing phases and sources (see Figure 2).

2.2.1 Early Stages of Startups' Development

The idea generation, formulation and realization are main elements of the early stages of a startup and are accompanied by financing phases, which are divided into the pre-seed, seed and startup phase (Achleitner 2001; Kollmann 2019). The first step for each startup is the generation of an idea (idea generation) which must then be checked for feasibility and concrete formulation in a business plan (idea formulation). The next step is the idea realization, which includes further activities like the selection of a legal structure, the foundation, the start of operations and the search for first investors. By a startup's initial phases, founders are already confronted with capital requirements for their preparation, personnel and development costs (Hahn 2014; Kollmann 2019). Thus, for each life cycle phase there is a corresponding suitable financing source. Bootstrapping, i.e. financing the startup without relying on long-term external finance, e.g. through the entrepreneur's own savings or the support from family and friends, is usually the first choice in the pre-seed and seed phases (Leach and Melicher 2018; Markova and Perkovska-Mircevska 2009; Winborg and Landström 2001). Since founders usually do not have enough financial resources on their own (Baum and Silverman 2004; Hottenrott et al. 2017; Wiklund et al. 2010), other financing sources, such as crowdfunding and in particular funding by investors like BAs, incubators and accelerators, are used (Kollmann 2019). As soon as the startup begins its actual operational business in the startup phase, costs may increase rapidly. In that respect, founders can additionally receive funding

through VCs (Leach and Melicher 2018) or public subsidies (Achleitner et al. 2011; Hahn 2014).

Startups in their early stages, i.e. in their pre-seed, seed and startup phases, are in the focus of this dissertation, as these phases are both important and risky. In particular, early-stage startups are typically unexperienced in terms of market, technology and management and lack necessary resources. Consequently, startups face the highest risk of failure in their earliest stages (Abatecola et al. 2012; Hahn 2014; Salamzadeh and Kawamorita 2015; Shepherd et al. 2000). Therefore, the support from investors that can compensate for these liabilities, is especially valuable in a startup's early stages (Salamzadeh and Kawamorita 2015). In particular, accelerators, as recent investors, and their effect on early-stage startups are thematised and examined in this dissertation.

2.2.2 Expansion Stages of Startups' Development

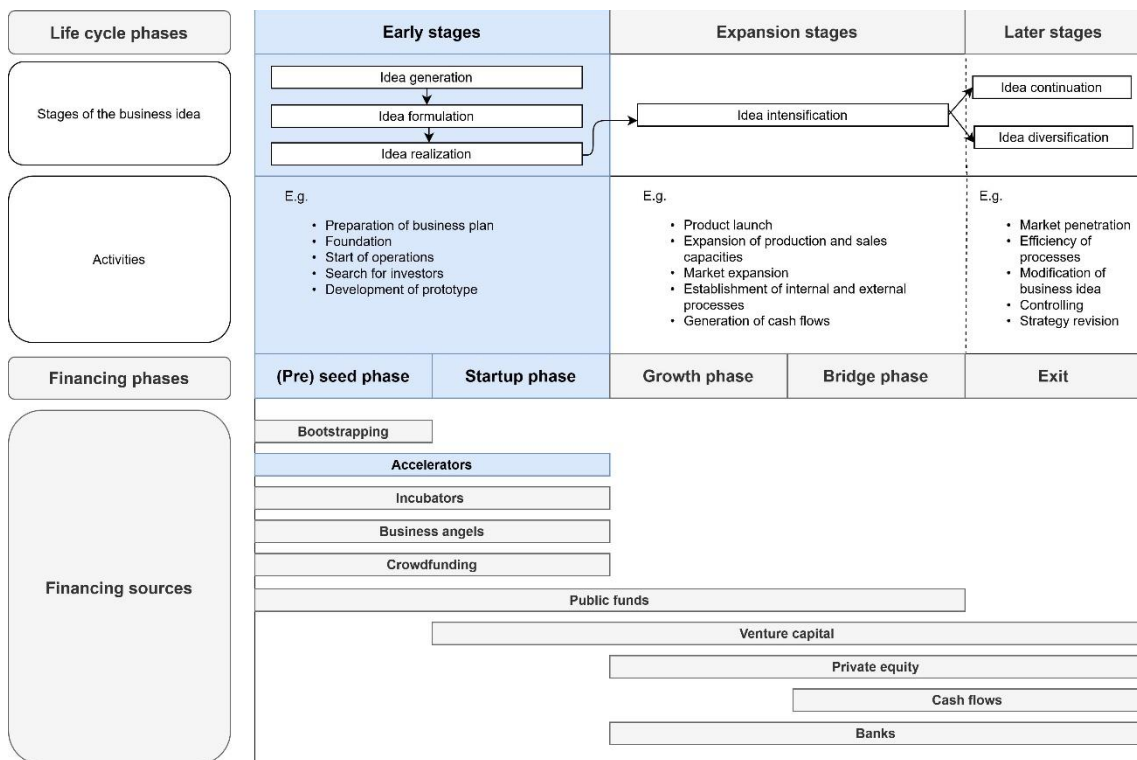
With the successful launch of the business idea or product on the market, the actual startup phase ends and the firm enters its expansion stages. One of the main strategic goals of young firms in this phase is the intensification of their business idea and operations, the expansion of their production and sales capacities, adaptation of their business model and the generation of cash flow, which, in the best case, will be sufficient to meet their upcoming growth investments, or at least can be used as collateral. Self-financing then becomes possible in practice if the startup passes the break-even point. Nevertheless, to reach this point, additional external financing sources, like public funds, venture capital or private equity, are often necessary (Hahn 2014; Kollmann 2019).

2.2.3 Later Stages of Startups' Development

Once a firm has reliable revenue with a continuing strong sales growth forecast, it reaches the later stages of its development (Achleitner 2001). Since the revenue is stable, the original business idea is either continued or diversified. The firm has an

established unique selling proposition and achieved high market penetration. With a corresponding further growth potential, bridge financing can be used or an initial public offering (IPO) can be prepared. In addition, investors from previous financing rounds can exit through a trade sale to a strategic investor or through the back sale to the founders or a management team within the framework of a Management-Buy-Out or Management-Buy-In. The firm is thus heading towards a phase of new formation, which requires a restructuring of the business processes or a redefinition of the business objectives (Achleitner 2001; Kollmann 2019).

Figure 2. Life cycle of startups



Source: Own illustration based on Fueglistaller et al. (2016); Hahn (2014); Kollmann (2019); Zinke et al. (2018)

2.3 Accelerators as Early-Stage Financing and Support Sources of Startups

2.3.1 Importance of Early-Stage Financing and Support Sources of Startups

With a failure rate of about 50% within the first three to five years after their foundation, startups usually face a struggle to survive (Statistics Canada 2019; U.S. Bureau of Labor Statistics 2010; van Praag 2003). Challenges in the nascent venturing process can theoretically be explained by the liabilities of ‘newness’ and ‘smallness’ which argue that failure rates depend on a firm’s age and size. Accordingly, young and small firms have higher failure rates, as they lack the necessary resources (Abatecola et al. 2012; Aldrich and Auster 1986; Freeman et al. 1983; Stinchcombe 1965; Wiklund et al. 2010). These resources include financial resources, i.e. funds, and non-financial resources, including human (attributes, education, experience, reputation, etc.), social (relationships and networks), physical (tangible assets) and organisational (organisational structures, knowledge, relationships, etc.) (Ardichvili et al. 2002; Greene et al. 1997). Prior research proves that the initial resources a firm has at its foundation significantly determine its probability of survival (Aspelund et al. 2005).

Financial resources are related to both startups’ failures and successes (Bruton and Rubanik 2002; Hahn 2014; Zinke et al. 2018). Since internal financing by the founder’s own financial means is limited (Baum and Silverman 2004; Carpenter and Petersen 2002b; Hottenrott et al. 2017; Wiklund et al. 2010) and debt financing is rarely an option for early-stage startups due to their high risk and lack of collateral and information asymmetries between startups and potential debt financiers (Carpenter and Petersen 2002a; Fischer and Rassenfosse 2011; Zinke et al. 2018) startups often suffer from a so-called ‘funding gap’ (Peneder 2008). Consequently, the acquisition of capital through external equity investors is an important step in most startups’ development (Gómez

2007; Ko and McKelvie 2018; Rammer et al. 2016). In the early stages of a startup's life cycle, its potential equity investors are the crowd (in crowdfunding), VCs, BAs and accelerators (Drover et al. 2017).

In addition, non-financial resources play an important role for early-stage startups (Greene et al. 1997; Zinke et al. 2018). Extant research shows that startups in particular lack business- and industry-specific knowledge, as well as management and startup experience (Brush et al. 2001; Shepherd et al. 2000), skilled employees, market recognition (Aldrich and Auster 1986), customers and cooperation partners (Abatecola et al. 2012; Cafferata et al. 2009; Freeman et al. 1983; Stinchcombe 1965). As the provision of such non-financial resources significantly enhances a startup's competitiveness (Politis 2008; Zinke et al. 2018), some investors, including VCs, BAs and accelerators, provide startups with the corresponding non-financial services, which create additional value-added, in addition to financial resources (Gonzalez-Uribe and Leatherbee 2017; Mason 2013).

2.3.2 The Rise of Accelerators in the Entrepreneurial Ecosystem

While VCs and BAs have been established investors in entrepreneurial equity financing for many decades (Duran and Farres 2018; Mason and Botelho 2018), accelerators only began to emerge in 2005 (Andreoli 2018). Since then, accelerators have caused a rapid increase in the number of support offers worldwide (Zinke et al. 2018). With more than 3,000 accelerator programmes estimated worldwide (Hochberg 2016), accelerators have resonated well in the entrepreneurial ecosystem (Andreoli 2018). In total, one-third of all startups raising a first round of venture capital, so-called 'Series A' financing, in the United States (U.S.) in 2015 had previously gone through an accelerator (Mikey 2016). Airbnb is an example of a firm that received Series A financing from a syndicate of VCs after having been previously financed by an accelerator (Craft 2019).

Accelerators are organisations that foster existing startups in their early stages, in particular in the seed and startup phases, with both financial and non-financial support (Cohen 2013b; Cohen et al. 2019; Zinke et al. 2018). Accelerators usually operate on a cohort basis; i.e. several startups run through the programme in parallel as a ‘batch’ over a fixed period of three to six months. The aim of accelerators is to improve the existing business models of the startups, sharpen their offers and products, implement initial projects with customers and cooperation partners, put them on a growth course, accelerate their development and increase the probability of receiving external financing (Cohen 2013b; Cohen et al. 2019; Zinke et al. 2018). To this end the founders are mentored intensively and provided with seminars, networking opportunities and a coworking space. The so-called ‘demo day’, a final pitching event at the end of each accelerator programme, and further pitching events are a common way to connect the startups with external stakeholders like investors and customers (Cohen 2013b; Cohen et al. 2019; Zinke et al. 2018). Furthermore, accelerators usually support the startups through an initial seed capital (Cohen 2013b) of 25,000–150,000 US dollars (Drover et al. 2017). With this package of financial and non-financial support, accelerators help early-stage startups either “survive, scale up and grow” (Mian et al. 2016, p. 2) or otherwise fail rapidly (Caley and Kula 2013; Holstein 2015; Kohler 2016; Winston-Smith and Hannigan 2015; Yu 2019).

The underlying idea of accelerators has existed for many decades, as accelerators historically descended from business incubators (Hoffman and Radojevich-Kelly 2012), which first emerged in the 1950s (Lewis 2001). Accelerators differ from incubators in that they pursue an ‘acceleration approach’ – with the aim to accelerate market interactions, rather than an ‘incubation-approach’ – with the aim to nurture young ventures by shielding them from the environment (Cohen 2013b; Malek et al. 2014). Additionally, accelerators typically offer more services than incubators, including the

provision of seed capital, an intense education and mentoring programme and the characteristic ‘demo day’. Moreover, they differentiate themselves through specific characteristics (see Table 2), including their competitive selection process, cohort structure, limited period of support, fast pace and intensity (Cohen 2013b). Accelerators try to offer an improved and efficient support package to startups (Pauwels et al. 2016) to address their persistent need for financial and non-financial support during their early-stage development (Block et al. 2017).

Table 2. Comparison of accelerators and incubators

	Accelerators	Incubators
Purpose	Speed up startups’ market interactions	Nurture and shield startups
Duration	3–6 months	1–5 years
Venture stage	Early stages	Early stages or expansion stages
Cohorts	Yes	No
Business model	Profit (and non-profit)	(Profit and) non-profit
Compensation	Equity stake	Rent or fee
Selection process	Competitive; cyclical	Non-competitive; ongoing
Structured programme	Yes	No
Financing	Yes	No
Mentoring	Yes	Ad hoc
Networking	Yes	Yes
Education	Yes	Ad hoc
Venture location	On-site	On-site
Demo day	Yes	No

Source: Own illustration based on Cohen (2013b) and Andreoli (2018)

The research to date on accelerators can be categorized into three literature strands: (1) conceptual descriptions of accelerators as a phenomenon, (2) empirical assessments of accelerators’ effects on the wider ecosystem and regional development and (3) empirical assessments of accelerators’ effects on startups’ outcomes (Gonzalez-Uribe and Leatherbee 2017; Hochberg 2016).¹

¹ The specific literature on corporate accelerators has been excluded in this dissertation as it represents a separate literature strand.

The first wave of research defines accelerators, their services and their business models. Some early reports describe the phenomenon's emergence in practice and observe the rapid increase of accelerators in the U.S., Canada and Europe (Caley and Kula 2013; Miller and Bound 2011). Cohen (2013b) and Cohen and Hochberg (2014) are the first to formally define accelerators and, based on this definition, distinguish them from other investors. Specifically, they stress that accelerators differ from BAs and incubators in the characteristics of their duration, cohort structure, business model, selection process, venture stage, education, mentorship and venture location (Cohen 2013b; Cohen and Hochberg 2014) (see Table 2). Correspondingly, it is discussed that startups must consider the following five key factors when making incubator versus accelerator decisions: their own venture's stage, the investor's mission, services and network as well as selection and graduation policies (Isabelle 2013). Furthermore, the different types of accelerator designs are studied and defined (Cohen et al. 2019; Malek et al. 2014; Pauwels et al. 2016). For example, Pauwels et al. (2016) identify the key design elements of accelerators, including their selection process, strategic focus, programme package, alumni relations and funding structure. Based on these design elements, three overall types of accelerators are defined: 'the ecosystem builder', that creates an ecosystem of stakeholders, including startups and customers, around corporations, 'the deal-flow maker', that identifies attractive investment opportunities for investors, and 'the welfare stimulator', that stimulates economic development through startup-activity (Pauwels et al. 2016). With regard to design types, various researchers stress accelerators' heterogeneity (Cohen et al. 2019; Pauwels et al. 2016).

The second wave includes a small number of studies examining accelerators' wider effects on the startup-ecosystem. The study results of Fehder and Hochberg (2015) suggest that the presence of an accelerator leads to increased funding activity in the region for both treated and non-treated firms. Additionally, Goswami et al. (2018) find that

accelerators act as intermediaries between the founders' micro level and the ecosystem's macro level through their four types of expertise: selection, coordination, development and connection. Therefore, accelerators not only assist individual ventures but also contribute to the wider entrepreneurial ecosystem.

Third, a growing number of empirical studies focus on the effects of accelerators on startups' outcomes. By comparing accelerator-backed and angel-backed firms, Winston-Smith and Hannigan (2015) find that startups from two of the top accelerators achieve a faster exit than do angel-backed startups. Similarly, Hallen et al. (2019) show that some, but not all, accelerators cause and accelerate superior long-term outcomes in terms of web traffic, employee growth and funding. Gonzalez-Urbe and Leatherbee (2017) show with a single case study that accelerators' basic services of seed capital and coworking spaces can significantly increase startups' performance in terms of survival, fundraising and scale only if they are bundled with entrepreneurship schooling. While some studies find a positive effect of accelerators on startups' performance (e.g. Gonzalez-Urbe and Leatherbee 2017; Hallen et al. 2019; Winston-Smith and Hannigan 2015), Yu (2019) set forth evidence of an increased probability of and decreased time to closing down the business for accelerator-backed startups through the effect of accelerator feedback. With regard to accelerators' heterogeneity, Cohen et al. (2019) provide first insights into potential relationships between different accelerator design elements and startups' performance. For example, a longer duration of an accelerator programme is associated with startups' higher post-acceleration performance.

Despite the rapid growth of the accelerator phenomenon in practice, the academic literature on this player in entrepreneurial finance is still in its infancy (Block et al. 2017; Cohen et al. 2019; Hochberg 2016) due to accelerators being a rather recent phenomenon with limited data availability (Hochberg 2016). Although recent research has provided

some detailed insight into the accelerator phenomenon, as discussed above, the extant research is highly fragmented, with many questions remaining which have yet to merge into a robust and complete picture (Cohen et al. 2019; Hausberg and Korreck 2020). This dissertation aims to reduce the literature's fragmentation and enhance the understanding of accelerators' effectiveness in supporting startups by investigating accelerators' effects on startups' development from both financial and non-financial perspectives.

CHAPTER 3 | The Value-adding Impact of Accelerators on Startups' Development²

3.1 Introduction

In the last years, the entrepreneurial finance landscape has significantly changed, and new players have emerged. So called 'accelerators' are one new phenomenon in entrepreneurial finance, which increasingly attract attention in practice and research (Block et al. 2017). They offer support of limited duration for early-stage startups by providing a wide range of services (Cohen 2013b). Therefore, they do not only ease the startups' financial difficulties through the provision of seed funding (Block et al. 2017) but also support them through further services including mentoring, educating, networking, and coworking (Cohen 2013b). With this, accelerators answer recent calls for investors who provide value-added beyond financial support (Mason 2013; Politis 2008; Ramadani 2009). However, little is known about which value-added outcomes for startups are generated by the value-adding inputs of accelerators. Our study aims to shed more light on this particular research gap by using the theoretical lens of 'value-added' on inputs and outcomes of accelerators.

Prior literature argues that value-adding activities are especially helpful for early-stage firms (Aspelund et al. 2005) because of their liabilities of newness and smallness and the corresponding lack of resources (Freeman et al. 1983; Stinchcombe 1965). In that light, investors, that provide not only financial but also non-financial value-added, are argued to be a key strategic resource that generates a competitive advantage for firms in their early stages (Politis 2008). Previous research shows that early-stage investors such as venture capitalists (VCs) and business angels (BAs) not only provide financial

² This chapter is co-authored by Alexandra Moritz, is under review at International Journal of Entrepreneurial Venturing, was presented at ENTIME Conference 2019 and G-Forum 2019 and was awarded with the "FGF Best Entrepreneurship Research Newcomer Award 2019" at G-Forum 2019.

resources but also deliver non-financial value-added to startups (Large and Muegge 2008; Mason 2013; Politis 2008), including credibility and validation, market and business intelligence (Madill et al. 2005), or contacts and networks (Brettel 2003; Lindsey 2008; Madill et al. 2005). This combination of financial and non-financial value-added is known as 'smart money' (Mason 2013).

Although prior research has already deepened our understanding of what accelerators are, which services they provide and how they operate (see e.g. Cohen 2013b; Cohen and Hochberg 2014; Pauwels et al. 2016), accelerators' inputs and non-financial outcomes have so far not been empirically evaluated from a value-added perspective. Whereas the financial value-added of accelerators' support is undisputed, it is so far still unresolved which types of non-financial value-added outcomes are generated for the startups by the value-adding inputs of accelerators (Gonzalez-Uribe and Leatherbee 2015). However, this research topic is highly relevant and needs rigorous investigation for two reasons. First, accelerators distinguish themselves from other early-stage startup financiers and supporters, such as BAs and VCs, with their unique characteristics of intense and time-compressed structured education and training programmes, which are conducted in cohorts of startups. Therefore, prior results on value-added of VCs and BAs cannot simply be transferred to accelerators. Second, accelerators are a rapidly growing phenomenon that attracts high investments of both private and public money (Gonzalez-Uribe and Leatherbee 2017; Hochberg 2016) with an estimated worldwide number of accelerators of over 3,000 and a funding volume of around 57 billion US dollars in 2018 (Seed-DB 2019). However, a clear knowledge about the impact of accelerators on startups does not yet exist (Cohen and Hochberg 2014; Gonzalez-Uribe and Leatherbee 2015; Hochberg 2016). Hence, referring to the distinction of Large and Muegge (2008) between value-adding inputs (i.e. the investor's contribution to the firm) and value-added outcomes (i.e. the improved outcomes resulting from the investor's contributions), we

investigate *which types of non-financial value-added outcomes for the startups' development are generated by accelerators' value-adding inputs.*

We approach this research question with an explorative and phenomenon-driven study using a multiple case study design, including six accelerators in Germany with 23 startups. Our study is based on 34 in-depth interviews with startups and accelerator managers, field observations, and informal conversations.

The results of our study provide several theoretical contributions. First, we add to the scarce research on accelerators by providing more transparency about their impact on the supported startups (Hochberg 2016). We build on Cohen and Hochberg (2014) and Pauwels et al. (2016) who describe accelerator-typical services and programme elements. From there, we empirically evaluate which inputs are actually considered to be value-adding by participating startups, how they do so and which outcomes are generated. Second, we contribute to research on the value-added of early-stage startup financiers and supporters by providing evidence of the value-adding role of accelerators. We particularly integrate and disentangle both value-adding inputs and value-added outcomes. We further provide first insights into which value-adding inputs may lead to which value-added outcomes by bringing the outcomes into perspective to the inputs. Finally, we contribute to prior research on entrepreneurial learning – a concept at the interface of entrepreneurship and organisational learning (Wang and Chugh 2014) – by showing that accelerators are an effective tool for accelerated entrepreneurial learning.

Several practical implications can be drawn from our study. For accelerators, this study underlines their relevance in the startups' development and offers a basis for evaluating their provided value-adding inputs against the potential value-added outcomes for startups. Additionally, we provide information and decision-making support particularly for entrepreneurs who evaluate whether to enter an accelerator.

The next section offers an overview of prior research about investors' value-added for startups and on accelerators. Afterward, the data and method used are described before the findings are presented and discussed. Finally, the article concludes with implications for theory and practice and provides areas for future research.

3.2 Literature Review

3.2.1 Prior Research on Investors' Value-added for Startups

Startups' high mortality rate (Kummer et al. 2016; van Praag 2003) is typically explained in theory by the liabilities of newness and smallness and the corresponding lack of critical resources (Bruton and Rubanik 2002; Freeman et al. 1983; Stinchcombe 1965). Therefore, startups are often dependent on the social process of accessing financial and non-financial resources through external resource providers (Baum and Silverman 2004) like investors.

Subsequently, investors that provide a bundle of financial and non-financial services can even be considered as a key strategic resource that generates a competitive advantage for early-stage firms through value-added (Politis 2008) with so-called 'smart money' (Mason 2013). As a consequence, entrepreneurs nowadays often seek investors that provide more than just financial support (Mason 2013). These additional non-financial services of smart money investors are argued to create added value for the supported firms (Mason 2013; Politis 2008; Ramadani 2009).

A growing number of studies presents evidence for the value-added of early-stage investors (Gonzalez-Uribe and Leatherbee 2015) such as VCs and BAs (see for example Large and Muegge 2008; Politis 2008). Large and Muegge (2008) propose to distinguish between two constructs: value-adding inputs (i.e. the investor's contribution to the firm) and value-added outcomes (i.e. the firm's enhanced outcomes resulting from the investor's contributions). Empirical evidence reports investors' value-adding inputs

include facilitation of further financing (Maula et al. 2005; Sørheim 2003); credibility and validation; market and business intelligence (Madill et al. 2005); contacts and networks (Brettel 2003; Lindsey 2008; Sørheim 2003); coaching and mentoring (Sørheim 2003); strategic (Amatucci and Sohl 2004; Brettel 2003), financial, and marketing know-how; management experience; recruitment (Brettel 2003); and operational support (Amatucci and Sohl 2004). Value-added outputs considered in prior research include typical measures for firm performance, exit opportunities or success, and IPO exit performance (Large and Muegge 2008).

3.2.2 Accelerators' Value-added for Startups

Accelerators aim to support new businesses to survive and grow (Mian et al. 2016) in their early stages (Cohen and Hochberg 2014) and thus cope with startups' liabilities (Hallen et al. 2016). According to Cohen (2013b), accelerators are programmes of limited duration that support cohorts of startups in their early stages by providing a wide range of services and that culminate in a public pitching event referred to as demo day (Cohen 2013b). The idea of accelerators, however, is not new altogether. Accelerators historically originated from incubators (Hoffman and Radojevich-Kelly 2012), which started to become popular between 1950 and 1980 (Mian et al. 2016). Prior research on incubators highlights the value-added of their services to the supported firms (Mian et al. 2016); however, incubators' efficiency is disputed in literature and practice (Amezcuca 2010; Brodsky 2014; Campbell 2017; Hackett and Dilts 2008; Mackinnon 2017; Schwartz 2013). Hence, accelerators developed, trying to address the shortcomings of incubators (Bruneel et al. 2012; Pauwels et al. 2016), and therefore are also called 'new generation incubation model' (Pauwels et al. 2016, p. 50).

In contrast to incubators, most accelerators ease the startups' difficulties in raising funds (Block et al. 2017) by providing them with a seed investment in exchange for an

equity stake of typically between 5% and 7% (Hochberg 2016). Additionally, accelerators offer intense mentorship, as well as educational seminars, on a variety of entrepreneurship topics; prepare the startups for pitching events (Cohen 2013b; Cohen and Hochberg 2014); and help them build a network (Wise and Valliere 2014). In addition, the startups receive an office in a coworking space (Cohen 2013b). Accelerators wrap their services in a specific and distinguishing fashion, including a cohort structure, high intensity and pace, intense support, and limited duration (Cohen 2013b; Cohen and Hochberg 2014).

By consolidating these unique characteristics – which were previously only available separately and expensive to acquire (Hochberg 2016) – accelerators are becoming a popular and rapidly growing phenomenon (Cohen and Hochberg 2014) “widely adopted by private groups, public and government efforts, and corporations” (Hochberg 2016, p. 25) in the hope to support startups and their innovations and thereby fuel the economy (Isabelle 2013).

Prior studies on accelerators are mostly descriptive and conceptual in nature (Fehder and Hochberg 2015; Pauwels et al. 2016) providing definitions of accelerators and describing the phenomenon (e.g. Caley and Kula 2013; Miller and Bound 2011), distinguishing them from other investors (e.g. Cohen 2013b; Cohen and Hochberg 2014; Isabelle 2013), describing their screening and selection process (Yin and Luo 2018) and discussing the accelerator model's design parameters (e.g. Kohler 2016; Pauwels et al. 2016). In addition, a slowly growing number of studies empirically investigate the impact of accelerators on startups' performance (Gonzalez-Uribe and Leatherbee 2017; Hallen et al. 2017; Winston-Smith and Hannigan 2015; Yu 2019) and ecosystem (Fehder and Hochberg 2015, 2018; Goswami et al. 2018). Since accelerators' practical importance grew in the last years, researchers agree that it is imperative to shed more light on their efficacy (Cohen and Hochberg 2014; Gonzalez-Uribe and Leatherbee 2015; Hochberg 2016). In this study, we address the lack of empirical studies evaluating the actual value-

adding effects of accelerators (Gonzalez-Uribe and Leatherbee 2015) on startups' development (Clarysse and Yusubova 2014). Specifically, we investigate the value-adding impact of accelerators on the startups' development during the acceleration process.

3.3 Method

3.3.1 Research Design

To gain a holistic overview of the phenomenon under investigation in the context of accelerators, we used an in-depth qualitative approach (Miles and Huberman 1994). This allowed us to investigate the experience and perceptions of the involved parties and the dynamics within the accelerator (McAdam and Marlow 2007). In particular, we followed a phenomenon-driven research approach by using a qualitative multiple case study design (Schwarz and Stensaker 2016; Yin 2009). Multiple case studies allow the researchers to examine a complex social phenomenon within its real-life context (Yin 2009). Hence, this explorative approach is suitable in our research context as the value-adding impact of accelerators is not easily measurable through questionnaires (Yin 2009) but rather through the qualitative expression of dynamics, perceptions, and experiences of the people involved (McAdam and Marlow 2007). By investigating six cases (see Table 3), we operated within the recommended number of 4 to 10 cases for multiple case study designs (Eisenhardt 1989). We specifically deployed an embedded case study design by studying the individual subunit (Yin 2009) 'startups' within the context of each individual accelerator (see Annex 4) to get a fine-grained understanding of the topic. By identifying patterns and constructs within and across cases (Eisenhardt 1989), we aimed to gain insights into the non-financial value-adding impact of accelerators on startups' development in terms of value-adding inputs and value-added outcomes.

Table 3. Characteristics of sampled accelerators

Case	Region in Germany	Year of foundation	Corporate versus private accelerator	Programme duration	No. of cohorts per year	No. of startups per cohort	Industry	Funding	Intense support	Offices and equipment	Demo day
A	"[Our goal is] to really accelerate their development within 100 days and to give them the best advice and best practices so that they skip the mistakes that we had done back then." – A_1										
	Lower Saxony	2016	Private	3, 5 months	2	Approx. 3–5	Broad focus on software technology, for example, e-commerce, fashion tech, retail, virtual reality, artificial intelligence, internet of things, food tech, and robotics	✓	✓	✓	✓
B	"Our goal is to use our corporate as a door-opener to the rest of the world for the startups so that the startups can use our name to get access to investors and other corporates, where they would not have any chance on their own." – B_1										
	Hesse	2015	Corporate	3 months	2	Approx. 5–10	Broad focus on health care, life science, performance materials, and digital solutions	✓	✓	✓	✓
C	"We have two goals: one is to get them invested, the other one is to help them with their business development. That's what it comes down to because startups need the product support, business support, and access to capital. These are the fundamentals." – C_1										
	Hesse	2016	Private	4 months	2	8–10	Broad focus on web entrepreneurs, for example, Fintech, Cybersecurity, and RegTech	x	✓	✓	✓
D	"The goal of the programme itself is to help companies to be successful. [...] We say our accelerator is really good in networks and contacts because we work in this specific industry, which is media. We have the right contacts." – D_1										
	Hamburg	2015	Private	6 months	2	Approx. 4–10	Specific focus on media industry	✓	✓	✓	✓
E	"The goal of our accelerator programme is to help our startups reach a certain progress within three months that they would normally reach on their own in a year." – E_1										
	Berlin	2010	Private	3 months	N/a	N/a	Specific focus on energy and transportation industry	✓	✓	✓	✓
F	"Our goal is to support entrepreneurs. We want to create a place where they are provided with everything they need." – F_1										
	North Rhine-Westphalia	2015	Private	6 months (3+3 after internal demo day)	2	Approx. 10	Generalist	x	✓	✓	✓

Table 4. Characteristics of interviewees

Case	Type	Profession	Education	Subject	Age	Gender	Length of the interview
A	Startup 1	CFO	A-Levels	Media Management	23	M	01:18
A	Startup 2	CTO	Diploma	Mathematics	32	M	00:47
A	Startup 3	CEO	A-Levels	Engineering Economics	21	M	00:46
A	Startup 4	CEO	Bachelor	Corporate Management and Economics	26	F	00:47
A	Startup 5	CEO	Diploma	Economics	32	M	00:38
B	Startup 1	Cofounder; Application Specialist	Master	Physics	26	F	01:03
B	Startup 2	Cofounder	PhD	Neuropharmacology	31	M	00:50
C	Startup 1	CEO	Diploma	Economics	49	M	00:38
C	Startup 2	Cofounder	Bachelor	Computer Science	32	M	01:36
C	Startup 3	Head of Product	Master	Public Affairs	32	F	00:44
D	Startup 1	CEO	Bachelor	Business and Marketing	36	M	01:18
D	Startup 2	CEO	Bachelor	Business Administration	26	M	00:30
D	Startup 3	CEO	Master	Rhetoric, Art History	34	M	00:38
D	Startup 4	Cofounder; CEO	Master	Business Management and Computing Science	31	M	00:46
E	Startup 1	Cofounder; CXO	Master	Management	24	F	00:52
E	Startup 2	COO	Master	Management	26	M	00:32
E	Startup 3	CEO	Bachelor	Engineering	32	M	00:42
F	Startup 1	CEO	Master	Business Administration	30	F	00:58
F	Startup 2	CEO	Bachelor	Business Administration	24	M	00:49
F	Startup 3	CEO	Master	Engineering	34	M	00:28
F	Startup 4	CEO	Diploma	Economics	46	M	00:35
F	Startup 5	CEO	Master	Finance	33	M	00:24
F	Startup 6	CEO	Master	Architecture	32	M	00:42
A	ACC Member 1	CEO	Bachelor	Media Management	29	F	01:27
A	ACC Member 2	Relationship and Project Manager	Apprenticeship	Media Management	29	F	00:40
A	ACC Member 3	Creative Director	Bachelor	Visual Communication	28	F	00:45
B	ACC Member 1	Manager	Master	Engineering Economics	29	M	01:00
C	ACC Member 1	Founder; Managing Partner	Master	Strategic Finance	41	M	01:42
C	ACC Member 2	Founder	3 Masters	Chemical Engineering, Organization Psychology, MBA	47	F	00:40
D	ACC Member 1	Programme Manager	Bachelor	Applied Translation	27	F	00:40
E	ACC Member 1	Head of Marketing and Operations	MBA	Management	26	F	00:51
E	ACC Member 2	CEO	MBA and Master	Telecommunication and Finance, International Relations	51	F	00:45
F	ACC Member 1	Programme Director	Bachelor	Business Administration	26	F	00:42
F	ACC Member 2	Trainee Marketing and Events	Master	Innovation and Entrepreneurship	27	M	00:32

3.3.2 Data Collection and Sample

With the aim of selecting information-rich cases, we considered both purposeful (Curtis et al. 2000; Miles and Huberman 1994; Patton 1990a) and theoretical sampling (Eisenhardt and Graebner 2007). Specifically, we deployed the ‘criterion sampling’ technique, which is characterised by sampling based on predetermined criteria (Patton 1990a). Both in theory and practice, the term ‘accelerator’ is broadly interpreted and is inconsistently defined, which leads to different usages of the term (Cohen and Hochberg 2014). To ensure that our cases are comparable, we first determined the criteria accelerators had to fulfil to be considered for the study. Thus, accelerators had to meet at least five out of the following six criteria that we identified through prior research: In line with Cohen (2013b), we defined accelerators as (a) programmes of limited duration (b) that support cohorts of startups (c) through the provision of seed capital, (d) offices and equipment, and (e) intense support and (f) that culminate in a final pitching event called demo day. We identified and contacted 18 accelerators in Germany that matched these criteria. Finally, after having gathered and analysed data from six cases, we reached theoretical saturation, meaning that the marginal enhancement of insights of further cases became negligible (Eisenhardt 1989). The final sample reflected a broad heterogeneity in regards to location, i.e. both huge startup locations like Berlin, small startup locations like Hesse and aspiring locations like North Rhine-Westphalia are covered (Kollmann et al. 2018).

We accounted for triangulation, which is a typical feature of case study research (Eisenhardt 1989; Yin 2009), by using a variety of sources of evidence (Denzin 1978; Tracy 2010), such as informal conversations, interviews, and observations. Since interviews efficiently deliver rich empirical data (Eisenhardt and Graebner 2007), we used interviews as our primary data source. We aimed at understanding the different

views of various key participants – in particular startups and accelerators – and therefore interviewed these participants separately. The aim of the interviews was twofold: (1) gaining insights about which value-adding inputs accelerators deliver and (2) understanding the value-added outcomes that are generated for the startups' development. The interviews were conducted predominantly in person and occasionally by telephone. A previously developed interview guideline (see Annex 1 and 2) ensured semi-structured interviews with open-ended questions to encourage the participants to freely express their experience and opinions (Miles and Huberman 1994). The 34 interviews (see Table 4), which took on average 50 minutes, were tape-recorded and transcribed. Furthermore, the researchers conducted informal conversations with startups and accelerator team members, as well as observations within the coworking space and at events such as workshops, pitches, and demo days, to gain a holistic understanding of the phenomenon under investigation (Miles and Huberman 1994). An advantage of our study over most prior research on investors' value-added is that we investigate the value-adding impact and outcomes directly during the 'treatment', which is during the acceleration process, whereas other studies on value-added are typically retrospective (Large and Muegge 2008), increasing the risk of recall biases (Delmar and Shane 2003; Mason and Stark 2004; Raphael 1987). Besides, accelerators are short-term supporters for a time period of three to six months, aiming to make a considerable impact during the first months of a startup's existence (Kummer et al. 2016; van Praag 2003). Therefore, it is important to investigate the impact of accelerators during the treatment period while impressions of accelerator's inputs are still recent.

3.3.3 Data Analysis

The first step in our analysis was the coding of the transcribed data material from the interviews and observations with the software programme MAXQDA. By

individually attaching codes to words, phrases, sentences, or whole paragraphs, we ensured to keep the statements within their original context (Miles and Huberman 1994). Our initial list of codes was based on our prior knowledge from literature, the research question, and our observations (Miles and Huberman 1994). As part of the iterative and ongoing process of qualitative data analysis we constantly revised the coding scheme (see Annex 3) through extending, condensing, and reorganising the codes while the study continued. This process reflects the important aspect of qualitative data analysis to uncover important empirically grounded factors (Miles and Huberman 1994). We particularly ensured to continuously combine both existing literature on value-added of related investor types such as BAs and VCs (e.g. Large and Muegge 2008; Politis 2008) with our emerging empirical insights, i.e. the patterns and themes which were unique to our dataset on accelerators (Dubois and Gadde 2002), thus refining the existing insights of prior studies on value-added in the context of accelerators (Dubois and Gadde 2002; Miles and Huberman 1994). Subsequently, the codes were aggregated into categories and subcategories to reflect the relational structure of the codes (Miles and Huberman 1994; Strauss and Corbin 1990). To ensure the reliability of the coding, the scheme was thoroughly discussed among the researchers and adapted until a common understanding was achieved. The coded and categorized data then served as basis for the thematic content analysis (Saldaña 2009).

The second step in our analysis was to analyse each case as a stand-alone entity by processing its unique patterns (Eisenhardt 1989) to understand the dynamics of each particular case before drawing cross-case conclusions (Miles and Huberman 1994). We therefore wrote individual case reports analysing how and why certain results were demonstrated in particular cases (Yin 2009). Additionally, we triangulated the data obtained through the interviews with the startups and the accelerator teams to determine

the similarities or differences of our findings across these different study participants (Denzin 1978; Eisenhardt 1989).

Following this, we conducted a cross-case analysis by identifying cross-case patterns (Eisenhardt 1989). Thereby, we also accounted for the replication logic of a multiple case study design, which is necessary to generalize the findings across multiple cases (Yin 2009). To find cross-case patterns, we used two different methods: First, we investigated each category and dimension and examined the similarities and differences among cases. Second, we selected groups of cases (e.g. pairs) to find patterns in each group (Eisenhardt 1989). Subsequently, we used the themes, concepts, and relationships (Eisenhardt 1989) to derive our research results. To ensure the reliability and validity of our study, we applied several case study-specific tactics (Yin 2009) such as using a variety of sources of evidence, clearly defining and demonstrating each step from the research question to the study results, using the replication logic to confirm the findings across cases, and thoroughly documenting the research procedure (Yin 2009).

3.4 Results and Discussion

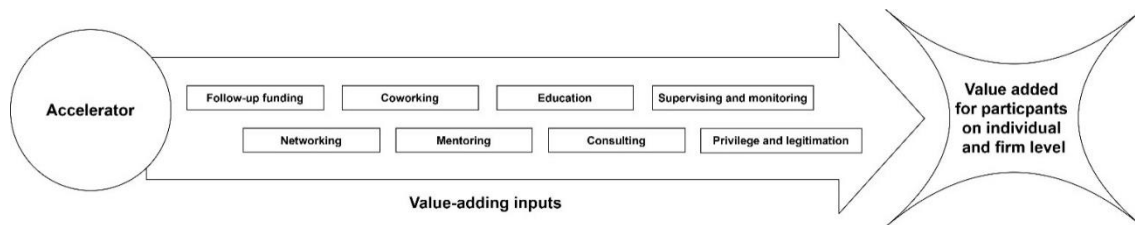
3.4.1 Accelerators' Value-adding Inputs

Although it is suggested in theory and practice that accelerators, as a rather new type of early-stage startup financier and supporter, also provide (non-financial) value-added, there is little empirical evidence on the actual value-adding impact of accelerators on startups. To approach this research gap, we aim to disentangle accelerators' value-adding inputs and value-added outcomes. Therefore, we first investigate and identify the accelerators' value-adding inputs provided to startups.

Our analysis shows that accelerators provide startups with eight categories of value-adding inputs, namely, follow-up funding, networking, privilege/legitimation,

coworking, education, consulting, supervising/monitoring, and mentoring (see Figure 3 and Table 5).

Figure 3. Accelerators' value-adding inputs



Follow-up funding

Through accelerators' direct funding, startups are able to kick-start their development. Funding is, however, one of the basic services provided by investors (Mason 2013). An important part of the value-adding input of accelerators is that they help startups receive *follow-up funding* from other investors. As pointed out by startup C_SU1, "Our main goal is to be ready for our next funding round. We aim at making contacts to investors through the accelerator's network."³ This enables the startups to secure their existence beyond the accelerator's support. Through observations at demo days and in the coworking space, we find that accelerators introduce the startups collectively and individually to potential follow-up investors (e.g. in Case A and C).

Networking

Accelerators own a wide network of high-quality and -quantity contacts, which they make available for their supported startups. They add value to startups by establishing required connections to various stakeholders within the ecosystem, such as investors, customers, suppliers, mentors, coaches, other startups, corporates, and universities individually and through events such as the prominent 'demo day'. Based on

³ The interviews of this study were conducted both in English and in German. The ones in German were translated into English.

the interviews, it seems that networking is one of the most valuable services to startups. For example, B_SU1 stressed “What’s highly important for us, is the network of our accelerator. [...] We get feedback and advice from experts in the field developing this technology but also from people using this technology.”

Privilege and legitimation

Startups seem to understand the participation in an accelerator as a *privilege* providing *legitimation*. This is highlighted by entrepreneur A_SU3: “It motivates us to be one of the few teams [...] that are allowed to take part in the accelerator programme. First of all, that is a privilege.” And entrepreneur E_SU2 pointed out: “All these people believed in us, not only for our background but also because an accelerator involved us. It gives credibility.”

Coworking

Coworking is a very accelerator-specific service typically not offered by other investors such as BAs or VCs. In our study, all the accelerator programmes are structured in cohorts, i.e. batches of startups entering and leaving the accelerator simultaneously, and working closely together in a coworking space. On-site in the coworking spaces we observed that they are provided with offices, equipment, and a space for communication and exchange with their peers. We find that the coworking aspect of their acceleration phase seems to be highly appreciated by the startups. For example, B_SU2 stated, “And the open coworking space helps, that really helps. You can just stand up, talk with other people in any moment without walls, without separations.”

Education

The education support of the accelerators – described as a “startup MBA” by C_SU1 – includes workshops, seminars, and lectures that serve to equip the startups with knowledge and skills about business-related and startup-specific topics which most

startups previously lacked but are of importance for their success. These include topics such as leadership, strategy and product development, information technology (IT) and design, finance and legal, marketing and sales, media and communication,⁴ pitching,⁵ and many more.

Consulting

Additionally, the accelerator's *consulting* service, including strategic support and advice based on their expert know-how and experience, is value-adding for the startups as summarised by accelerator B_1: "They get validation and the opportunity to get feedback, for example, the opinion and the validation of experts. That's a driver of their performance."

Supervising and monitoring

Supervising and monitoring by the accelerator also seems to have a positive effect on the startups. In particular, the accelerators' supervising and monitoring tools such as setting deadlines and targets, checking progress, focusing the entrepreneurs' attention, using emotional pressure, requiring status reports, and conducting the demo day seem to be helpful and important for their development. F_SU6 pointed out "I think I was also motivated by attending the internal status reports once a month because I knew I had to answer to the accelerator. That pressurized and helped me."

Mentoring

Mentoring, which refers to the accelerator's role as a partner that guides, coaches, and inspires, seems to have a positive influence on the entrepreneurs. Accelerator manager A_2 explained that they show the startups that they believe in them and that they are always approachable for them. Likewise, E_SU2 pointed out that the accelerator's

⁴ Examples taken from the homepage of accelerator F.

⁵ Example taken from observations in accelerators D, E, and F.

mentors are helpful since they believe in the startups, which makes the entrepreneurs more confident and happy.

These identified dimensions of value-adding inputs of accelerators resemble, to some degree, those of VCs (see Large and Muegge 2008) and BAs (see Politis 2008). Aggregating the various value-adding inputs of VCs discussed in prior literature, Large and Muegge (2008) propose an eight-category typology of value-adding inputs of VCs, namely, legitimation, outreach, recruiting, mandating, mentoring, strategizing, consulting, and operating activities. Similarly, Politis (2008) condense the wide range of different value-adding inputs of BAs into sounding board/strategy, supervision and monitoring, resource acquisition, and mentoring categories. For example, the legitimation, mentoring, and consulting categories by Large and Muegge (2008) are also identified by us for accelerators as well as the supervising/monitoring and mentoring categories by Politis (2008). Nevertheless, our empirical data highlight that certain patterns and themes are unique to accelerators distinguishing them from other investors such as BAs and VCs. Their specific characteristics, including the programme's high intensity, short time span, cohort structure, on-site coworking space, intense structured education, and networking programme, and the characteristic 'demo day' clearly differentiate them from other investors. These specific characteristics are rooted in accelerators' distinct value-adding input dimensions such as coworking, education, and intense networking.

Table 5. Accelerators' value-adding inputs

Value-adding input	Quotes
<p>Follow-up Funding: Accelerators add value to the startups by providing them with seed funding and helping them receive follow-up funding by other investors after the accelerator support.</p>	<p><i>“And when you're there pitching in front of 200 investors, as we did on the launch day, it's super nerve-wracking, but, at the same time, you've just pitched to 200 investors [...]; and now I'm talking to [...] a dozen investors [...].”</i> – C_SU2 Total number of evidence: 9 quotes (8 by startups; 1 by accelerator managers)</p>
<p>Networking: Accelerators add value to the startups by establishing connections to various stakeholders such as investors, customers, suppliers, mentors, coaches, other startups and entrepreneurs, corporates, universities, (cooperation) partners, hubs, consultants, etc.</p>	<p><i>“We were particularly interested in expanding our network. Being new to [this place], and a new startup, we had no experience in this startup community. So it has been really useful to expand our network.”</i> – C_SU3 <i>“When the accelerators open the doors, you can boost your network.”</i> – E_SU2 Total number of evidence: 15 quotes (15 by startups; 0 by accelerator managers)</p>
<p>Coworking: Accelerators add value to the startups by providing them with an office in a coworking space, where they work alongside other startups and entrepreneurs.</p>	<p><i>“The accelerator is basically an open space, an open space where you have the possibility to give value to your time, to your mistakes, to your experience. [...] You find a place that is open to your ideas, that is open also to crazy ideas to reach your goal. [...] You can just stand up, talk with other people in any moment without walls, without separations.”</i> – B_SU2 Total number of evidence: 13 quotes (9 by startups; 4 by accelerator managers)</p>
<p>Privilege and legitimization: Accelerators add value to the startups by providing a “privilege of participation” and by creating a certification and reputation effect.</p>	<p><i>“All these people believed in us, not only for our background but also because an accelerator involved us. It gives credibility.”</i> – E_SU2 <i>“I guess they should be happy because they were selected out of many startups. [...]. They should feel pretty special.”</i> – D_1 Total number of evidence: 6 quotes (4 by startups; 2 by accelerator managers)</p>
<p>Education: Accelerators add value to the startups by offering an education programme, which includes workshops, seminars, and lectures such as entrepreneurial education.</p>	<p><i>“Even if [our startup] completely fails – knock on wood – it would still have been an invaluable learning experience. It would be like taking some four-month intensive course on management, on startup development, on founding and legal stuff, marketing, and all kinds of things. And for your next idea you find another startup, you will be years ahead of where you were before.”</i> – C_SU2 Total number of evidence: 6 quotes (6 by startups; 0 by accelerator managers)</p>
<p>Consulting: Accelerators add value to the startups by providing strategic advice based on their own business know-how and experience, for example, helping formulate a business strategy, reflection on ideas, giving advice, etc.</p>	<p><i>“Since we have continuous training and consultants who give us subject-specific advice, our performance improved.”</i> – A_SU1 Total number of evidence: 7 quotes (3 by startups; 4 by accelerator managers)</p>
<p>Supervision and monitoring: Accelerators add value to the startups by defining terms of the startups' engagement, focusing their effort, preventing distractions, setting controls and targets, etc.</p>	<p><i>“By participating, you're becoming more accountable. It has helped me enormously because within five months, there are deadlines all the way, for example, get the pitch deck ready, deliver this, revise the deck, find investors, close investments, etc. The participation is very productive.”</i> – D_SU1 Total number of evidence: 10 quotes (6 by startups; 4 by accelerator managers)</p>
<p>Mentoring: Accelerators add value to the startups by providing them with mentorship, guidance, coaching, and motivation. Furthermore, by being a trustful and open partner with whom the startups can share their burden, for example, by giving moral support, lifting the mood, etc.</p>	<p><i>“Because the accelerator programme gives us a lot of stories, a lot of experience, and a lot of insights that show us how complex the world of startups is, but also that seriously, nothing is completely impossible. So it's encouraging us. [...] It's just a question of strategy. And we are gaining the experience to manage the strategy in the accelerator. So thanks to the accelerator, we feel that we have more control in our company, so we feel motivated. The feeling of control is important.”</i> – B_SU2 <i>“Indirectly, you're happier because you know [the accelerator] believes in you. That's always important on navigation.”</i> – E_SU2 Total number of evidence: 9 quotes (6 by startups; 3 by accelerator managers)</p>

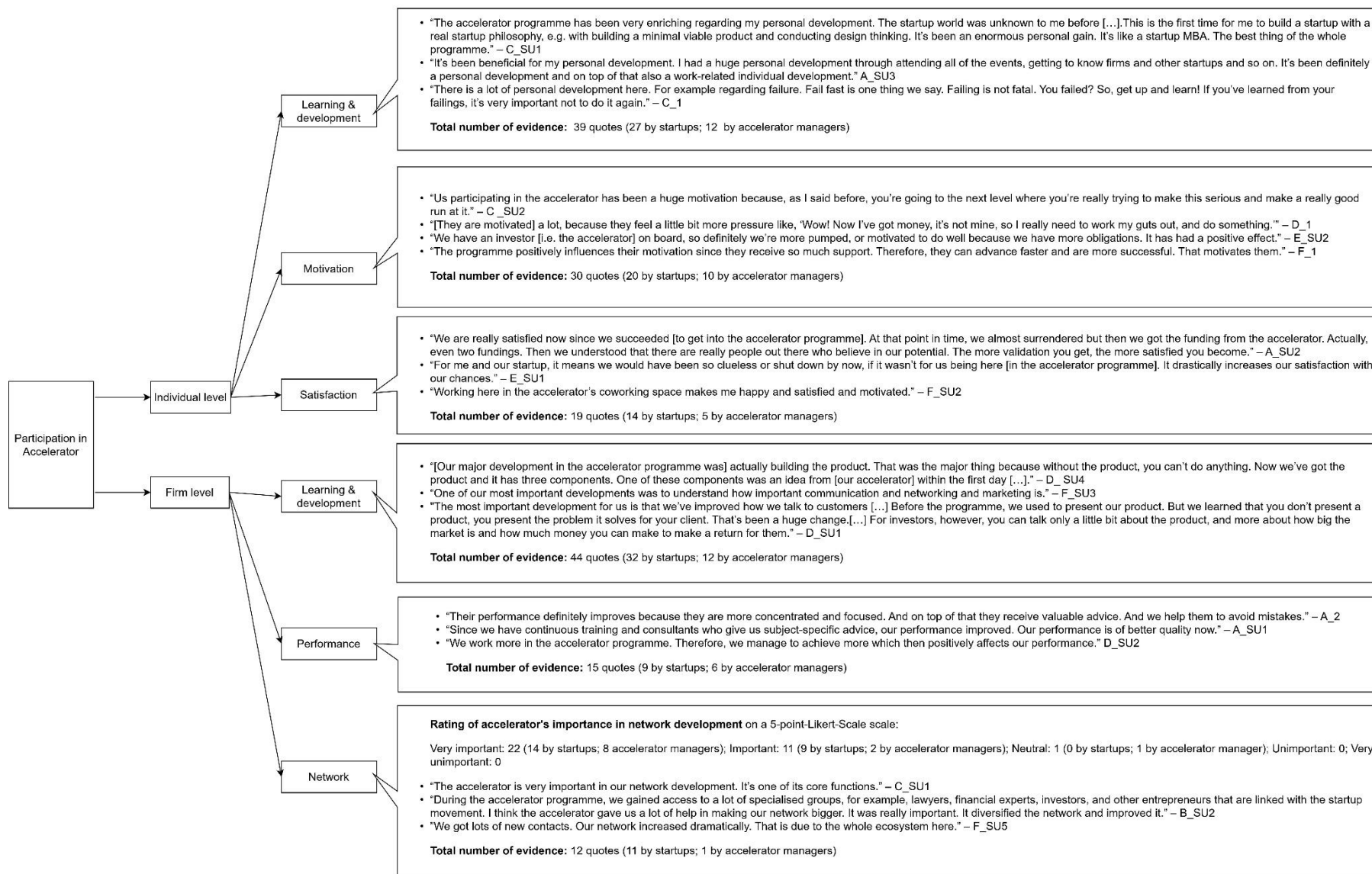
3.4.2 Individual- and Firm-level Value-added Outcomes

In the second part of the analysis, we investigate our research question regarding the value-added outcomes generated by their value-adding inputs. The empirical evidence of our study reveals that participation in an accelerator affects participants on different levels: on the individual level, that is, the entrepreneur as a person, as well as on the firm level, that is, the startup as a whole. Even though this differentiation is in the case of early-stage startups not always distinct⁶, we find that some outcomes the interviewees refer to are clearly related to them as a person, whereas others are related to the startup as a whole.

Overall, we find that participation in an accelerator seems to affect the entrepreneur on an individual level regarding *individual learning and personal development, motivation, and satisfaction*. On the firm level, the startups' *learning and development, their performance* as well as their *network* appear to be influenced (see Figure 4). In the following, these categories will be discussed in more detail.

⁶ In early-stage startups founders are often inseparable from their firm (Carter and Welter 2016; Foss and Klein 2012). Hence, the boundaries between these two levels often becomes blurred. For example, this might be the case for individual versus organisational learning or for the founder's and the firm's networks (Hite and Hersterly 2001).

Figure 4. Non-financial value-added outcomes of participating in an accelerator



3.4.2.1 Individual-level Value-added Outcomes

Individual learning and development

Based on our study, it seems that accelerators enhance the *individual learning and the personal development* of the entrepreneurs. As E_SU3 summarised, “I learned a lot [within three months in the accelerator], which I would have learned in two years if I had done the startup alone.” This finding is in line with prior literature that suggests that startup supporters such as VCs, incubators, or accelerators might be capable of supporting and facilitating entrepreneurial learning (Berglund et al. 2007; Cohen 2013a; Patton and Marlow 2011). Entrepreneurial learning refers to learning in an entrepreneurial context (Harrison and Leitch 2005) and can operate both on the individual and organisational level (El-Awad et al. 2017; Franco and Haase 2009; Wang and Chugh 2014).

Focusing first on the individual level, entrepreneurial learning refers to the acquisition of information and knowledge, as well as individual skills and competencies, during the entrepreneurial process (Cope 2003, 2005; Politis 2008; Wang and Chugh 2014). Specifically, our data suggest a differentiation between the entrepreneur's *personality development* and *work-related learning and development*. Entrepreneur A_SU3 explains,

“It has been beneficial for my personal development. I had a huge personal development through attending all of the events, getting to know firms and other startups, and so on. It has definitely been a personal development and, on top of that, also a work-related individual development.”

In particular, we find that the entrepreneurs gain various insights regarding important questions such as “What is my specific role in the team?” and “Do I really want to be an entrepreneur?” and “What can I learn from failure?” In addition, they develop confidence in themselves, particularly regarding their communication and presentation skills. Furthermore, they learn to be more open-minded and accept (critical) feedback. With regard to their work-related development, the entrepreneurs learn much about

pitching requirements, taking action, setting realistic goals, the startup's philosophy and subject-specific aspects. Based on our interviews and observations, it seems that the entrepreneurs draw this individual learning and development mostly from the value-adding inputs *education*, i.e. directly learning from the accelerator's educational programme, and *coworking*, i.e. indirectly learning from the peer entrepreneurs. These two dimensions – *personality* and *work-related learning and development* – are in line with the entrepreneurial learning areas described by Cope (2005), that is, learning about oneself, the business, the environment and entrepreneurial networks, small business management, and the nature and management of relationships. This value-added outcome seems to be especially important since learning, broadly defined as “increasing one's capacity to take effective action” (Kim 1998, p. 43), is critical for entrepreneurs to reach entrepreneurial effectiveness and to develop a successful firm (Rae and Carswell 2000).

Individual motivation

Besides the positive learning effect, our study participants regularly highlighted their enhanced *motivation*. Although the entrepreneurs seem to be already self-motivated, they experience an additional motivational effect by the accelerator programme (see Figure 4). Entrepreneur A_SU3 stated, “Participating in the accelerator definitely motivated us,” and entrepreneur A_SU5 confirmed, “Participating in the accelerator programme absolutely strengthened our motivation because we were confirmed in our idea and strategy.”

Looking at the value-adding inputs, we find that in particular the inputs – *follow-up funding*, *networking*, *coworking*, *supervising/monitoring*, and *mentoring* – strongly affect the entrepreneur's motivation. For example, comments such as from startup F_SU5 and F_SU2 highlight the valued-adding effect of *coworking* on the entrepreneurs' motivation. F_SU5 stated, “I think I am more motivated by being here in the accelerator's

coworking space because of the positive atmosphere here,” while F_SU2 said, “Working here in the accelerator’s coworking space makes me happy and satisfied and motivated.” However, also the value-adding input dimension *supervising/monitoring* seems to lead to a motivational effect according to F_SU6: “I think I was also motivated by attending the internal status reports once a month because I knew I had to answer to the accelerator.” In addition, the *mentoring* input of accelerators appears to influence the entrepreneurs’ motivation according to accelerator manager A_2: “I think we motivate them since we tell them that we believe in their idea and that we are always approachable for them if they need us.”

Our findings link to extant theoretical and empirical research, which argues that motivation toward work can be intrinsic, extrinsic, or both (Amabile et al. 1996; Carsrud and Brännback 2011; Franco and Haase 2009; Guzmán and Javier Santos 2001). Intrinsic motivation arises from the intrinsic value of the work for the individual such as enjoyment, interest, self-expression, and satisfaction. Extrinsic motivation arises when the individual is driven by an outcome, for example, rewards or evaluations, outside the work itself (Amabile et al. 1996; Carsrud and Brännback 2011). Altogether, our results indicate that accelerators function as extrinsic motivators by offering (follow-up) funding and support as well as enhancing the already-existing intrinsic motivation of the entrepreneurs by providing coworking, mentoring and networking opportunities.

Individual satisfaction

Entrepreneurial research on satisfaction predominantly uses domain-specific happiness and well-being indicators such as job satisfaction and work-related affect (Stephan 2018). Therefore, similar to Berge et al. (2015), we asked the entrepreneurs how satisfied they are as entrepreneurs and how they evaluate their present business situation. Our research highlights that participating in an accelerator affects the entrepreneurs’ satisfaction. Overall, most of the entrepreneurs reported a positive influence on their

satisfaction through the accelerator (for examples, see Figure 4). Entrepreneur A_SU2 summarised, “I think we developed very well through the accelerator, and I am very satisfied with that.” Specifically, the value-adding input dimensions – *networking*, *coworking*, and *mentoring* – seem to affect the entrepreneur’s satisfaction. For example, the value-adding input dimension *mentoring* seems to positively influence the entrepreneur’s satisfaction as highlighted by E_SU2: “You’re happier because you know other people believe in you.”

Nevertheless, we find that participating in an accelerator can also have a negative impact on the entrepreneurs’ satisfaction. Accelerator manager A_2 explained that in general, the entrepreneurs become more satisfied in the course of the accelerator programme, but this effect also depends on the progress they make. Some startups just do not evolve fast or good enough, resulting in dissatisfaction for them. Accelerator manager E_2 even stated that satisfaction decreases by the end of the support period because the startups might realize that some milestones, e.g. pilot projects, take longer than they expected.

However, we identified dissatisfaction in only two cases of our study. Looking more closely at the reasons of dissatisfaction in these cases, it seems that it mainly results from the startups’ feeling of pressure to develop and internal conflicts:

“The accelerator programme definitely influenced our satisfaction with our startup. At the beginning of the programme, we were really satisfied with our idea. However, we were progressing quite slowly. But then we developed a kind of pressure in the programme, and we were too fast in launching our product. Afterwards, we were quite dissatisfied with our product. [...] I think this pressure to develop fast arose through the accelerator programme.” – A_SU3

“I think we would have been faster with our product development if it had not been for all the compulsory programme in the accelerator. [...] Therefore, I am not satisfied with the development of our product.” – C_SU1

Prior research suggests that one’s well-being is essential for optimal human functioning (Ryan and Deci 2001; Ryff 2017). In line with this, it is shown that entrepreneurs that are happier are more likely to persist (Gorgievski et al. 2010) and

perform better on a variety of performance measures (Stephan 2018). Satisfaction, happiness, and well-being are especially interesting in the entrepreneurship context since entrepreneurs are typically exposed to more stressful working conditions than employees because of higher workload, pressure, complexity, responsibility, and uncertainty (Lazarus and Folkman 1984). Our results suggest that being supported by accelerators further increases the pressure and workload of entrepreneurs because of the short time frame of the programme and the high requirements of the accelerator. Altogether, we find that accelerators can increase or decrease satisfaction depending on the entrepreneur's individual situation.

3.4.2.2 Firm-level Value-added Outcomes

Organisational learning and development

In addition to individual learning and development, our data suggest that accelerators also enhance their *organisational learning and development* (see Figure 4). Organisational learning is defined as “increasing an organisation's capacity to take effective action” (Kim 1998, p. 46). It includes the acquisition of information and knowledge useful for the organisation (Kim 1998) and the transformation into the firm's operational level (Franco and Haase 2009). Even though in the early stages of a startup, individual learning and organisational learning cannot always be clearly separated because of a small number of people involved and simple organisational structures (Kim 1998), we still find that the accelerator seems to create added value for the startups on the organisational level on four dimensions: *team, product, communication, and business related skills and activities*.

First, our data suggest that accelerators add value on the *team* dimension by facilitating teamwork, defining team roles, and setting up a functioning team. This is especially important as the majority of startups are founded with teams of two to three

persons (Kollmann et al. 2018). Accelerator manager A_3 pointed out, “Many teams work pretty unorganised at the beginning. Although it seems to be easy, working in a team is harder than expected.” In line with this, E_SU1 stressed the accelerator’s role in facilitating their teamwork:

“We learned to work better together. Because we used to be working mostly by ourselves but never in a group where we stick with each other. [...] Working together is rather difficult because we disagree on a lot of things. It’s stressful. [...] But we’re learning to be on the same side when we’re in public because that’s what you do when you work together for a company. You make sure you support each other. We developed a lot and learned what to do and what not to. It was a major breakthrough for us in the accelerator programme.”

Second, the startups’ learning and development occurs on the *product* dimension. The startups are able to enhance their products through the accelerator’s support. Most of them are able to develop a minimum viable product (MVP) or prototype and validate the product or even develop their end product and launch it. Accelerator manager F_2 highlighted that all their startups have an MVP within the first three months of the accelerator programme because that is one of the accelerator’s goals. D_SU4 stressed the accelerator’s importance in their product development:

“[Our major development in the accelerator programme was] actually building the product. That was the major thing because without the product, you can’t do anything. Now we’ve got the product, and it has three components. One of these components was an idea from [our accelerator] within the first day [...].”

Third, the accelerator appears to enhance the startups’ learning with regard to their *communication requirements and skills*. Communication includes all dimensions of internal and external communication, for example, networking with stakeholders such as customers and investors. Accelerator manager C_1 concluded,

“At the end of the programme, we show our startups the presentations they made when they applied for the programme versus the presentation at the end of the programme. You can really see the change. [...] Also, they understand how to negotiate with investors, etc.”

Fourth, the accelerator supports the startups in developing *business-related skills and activities*. These skills include entrepreneurial capital, which refers to the skills and resources that are needed to start and eventually grow as a business (Gonzalez-Uribe and

Leatherbee 2017), such as pitching skills. Accelerator manager E_1 confirmed this: “The specific takeaway that every startup has: they can pitch at the end of the programme.” Our on-site observations confirmed this statement as the startups showed progress from the mid until the end of the accelerator programme in their pitching skills in terms of persuasiveness, professionalism and confidence. However, they also develop skills and know-how related to business activities such as sales, market and customers, business model, financing, marketing, administration as well as vision, strategy, and focus.

“Two weeks ago, we thought “we are on the wrong track,” and then we actually quit the business model, so we are doing something completely different now in comparison to what our initial idea was. Now we know we’re on a good track because we’ve learned a lot about the market in these two months.” – E_SU1

“I think we have made a lot of progress. We started with a certain idea. And the idea in its core has not changed, but our ability to execute has strengthened a lot. Our company’s business model became a lot better.” – C_SU3

Overall, since organisational learning is fundamental for the sustained existence of a firm (Franco and Haase 2009; Kim 1998) and positively contributes to a firm’s innovation, competitiveness, and financial results (Pérez López et al. 2005), our findings suggest that the value-added outcome of organisational learning provided through the accelerator seems to be especially valuable for startups. This enhanced learning and development outcome seems to mostly arise from the dimensions *coworking* and *education*. The value-adding input dimension *coworking* was assessed by the study participants to positively influence both the entrepreneur’s individual and the firm’s organisational learning and development. This was confirmed by accelerator manager E_2, who stated, “It is a part of our philosophy that we think 50% of the startups’ learning what we offer here comes from the other startups, from collaboration.” Moreover, the startups acquire necessary skills and know-how through the workshops, seminars, and lectures as part of the accelerator’s structured *education* programme.

Organisational performance

In our study, we used the subjective evaluation by the entrepreneur and the accelerator managers to measure organisational performance. Even though this method has the disadvantage that different entrepreneurs have different subjective views, perceptions, and expectations regarding themselves and their business performance (Witt 2004), we used this approach for three reasons. First, startups in accelerators are in such early stages that typically, performance measures (Murphy et al. 1996) are not yet available or difficult to calculate (Cohen and Hochberg 2014). Second, the short acceleration period of three to six months does not allow to measure changes in performance measures reliably. And third, entrepreneurs are often unwilling to disclose financial information (Witt 2004). Consequently, we decided to rely on the entrepreneurs' and accelerator managers' personal subjective assessment of the startups' performance. Thereby, we find that the second firm-level value-added outcome of startups through accelerators' support seems to be an improved *performance* of the startups (examples, see Figure 4). Entrepreneur D_SU3 summarised the accelerator's impact on their startup's performance: "The accelerator positively influenced our performance. We made big steps within a short period of time, which we would otherwise not have made." We find that, in particular, the value-adding input dimensions *networking* and *supervising/monitoring* strongly affect the startups' performance. The value-adding input *supervising/monitoring*, for example, increases the perceived startup performance through deadlines, targets, status reports, and the demo day as summarised by A_1: "The programme absolutely positively influenced their performance because they only have 100 days. They have a deadline. They have the demo day [...]".

Only two exceptions from that exist. Startup A_SU3, who was relatively dissatisfied with their product development (also see construct satisfaction), stated, "Well, I think we worked faster but worse." Furthermore, A_SU2, who defined

productivity in terms of “product development productivity,” explained that the obligations within the accelerator such as attending the mentoring programme, doing pitches, and networking sometimes reduced their productivity. However, overall, most of the startups expressed the accelerator’s positive influence on their performance.

Organisational network development

The startups in our study agreed that the accelerator positively affects their network development (examples, see Figure 4) through the value-adding input *networking* and *coworking*. Their overall view was summarised by entrepreneur B_SU2: “I think the accelerator gave us a lot of help in making our network bigger.” Overall, the startups assessed the accelerator’s importance in building up their network as either very important (14 startups) or important (9 startups). The network, broadly defined as “a set of actors and some set of relationships that link them” (Hoang and Antoncic 2003, p. 167), of each startup before the accelerator support varies significantly. Their initial network mostly depends on the own (personal) background of the entrepreneurs. For example, many startups already have industry-related contacts before the acceleration period as many of the founders continue to work in the same industry. However, all the startups in our sample were able to enlarge the quality and quantity of their network due to the accelerator support independent of their initial network size.

The importance of networks is highlighted by prior entrepreneurship research (Brüderl and Preisendörfer 1998; Witt 2004). In line with the ‘network success hypothesis’ (Brüderl and Preisendörfer 1998; Witt 2004), it is proven that networks have a positive influence on startups’ development and growth (Basu and Virick 2015; Hite and Hersterly 2001; Lechner and Dowling 2003; Lechner et al. 2006), performance, resource acquisition (Brinckmann and Hoegl 2011), innovativeness, and productivity (Pittaway et al. 2004) and consequently are a critical factor for startups’ success (Brüderl

and Preisendörfer 1998). Through networking and the thereby established network contacts, firms receive the opportunity to access required resources from external resource providers (Zhao and Aram 1995). To enter these network contacts, however, it is easier for startups to get access through brokers (Davila et al. 2003; Hansen et al. 2000) such as accelerators. Thereby, firms can fulfil the task to transform from a resource weak to a resource strong entity (Zhao and Aram 1995). This is an important transformation for startups because of their liabilities of newness and smallness (Freeman et al. 1983; Stinchcombe 1965; Witt 2004) which typically are reflected in a lack technologies, customer relations, experience, capital, reputation, and other resources (Zhao and Aram 1995).

Our data further show that accelerators create two different types of networks for the startups: an accelerator-internal network and an external network. The internal network mostly consists of other startups in the coworking space, the accelerator's team, internal mentors, and consultants. The external network includes lawyers, consulting companies, corporates, (cooperation) partners, industry contacts, investors, customers, politicians, universities, and potential employees. The size and diversity of network contacts are particularly valuable because different contacts and resources are required in different life cycle stages of a company (Greve and Salaff 2003). While the entrepreneurs' social network, that is, their family and friends, plays the most important role in the very early stages of the firm, they need to develop a relational mix consisting of reputational, social, knowledge, technology, and innovation, as well as cooperation networks, in the first years after foundation (Lechner and Dowling 2003; Lechner et al. 2006). Our data demonstrate that accelerators are brokers who provide startups with the value-added outcomes of an increased quality and quantity of network contacts required to kick-off their development.

3.5 Conclusion and Implications

3.5.1 Summary of the Main Results

The aim of our study was to evaluate accelerators through a value-added perspective by investigating which types of non-financial value-added outcomes for the startups' development are generated by accelerators' value-adding inputs.

A key result of our multiple case study of six accelerators and 23 startups in Germany is that accelerators play an important role in startups' development by providing value-adding inputs, which lead to various value-added outcomes for the startups. More specifically, our data suggest that accelerators add value to the startups' development by providing them with eight dimensions of value-adding inputs: *follow-up funding*, *networking*, *coworking*, *privilege/legitimation*, *education*, *consulting*, *supervising/monitoring*, and *mentoring*. Some of these value-adding input dimensions are also applicable to VCs and BAs such as legitimation, mentoring, consulting, and supervising/monitoring (see Large and Muegge 2008; Politis 2008), but due to the specific characteristics of accelerators, they provide additional and unique value-adding input dimensions, in particular, *coworking*, *education*, and *networking*.

Additionally, our data suggest that accelerator support affects the startups' development on the *individual* and on the *firm level*. Accelerator support seems to affect the entrepreneur on an individual level regarding *individual learning and personal development*, *motivation*, and *satisfaction* and the startup on the firm level regarding *its organisational learning and development*, *performance*, and *network*.

3.5.2 Theoretical Contributions

This study contributes to the literature in different ways. First, we add to the scarce research on accelerators (Hochberg 2016) by providing more transparency about their inputs and outcomes from a value-added perspective (Hochberg 2016). We particularly

enhance prior descriptive insights from Pauwels et al. (2016) and Cohen and Hochberg (2014) by empirically evaluating which value-adding outcomes are generated by the accelerators' value-adding inputs. Based on the identified value-added inputs, our study further contributes to the scarce literature of empirical assessments of accelerators' impact on startups' outcomes (Hochberg 2016) by finding that accelerators indeed seem to create value-added outcomes regarding learning and development, motivation, satisfaction, performance, and network development.

Second, our study contributes to the literature on value-added of startup investors. Prior research has already established that BAs and VCs provide startups with added value (see Large and Muegge 2008; Politis 2008). We add to this research by focusing our attention on the value-added of accelerators as a new and alternative type of investor (Block et al. 2017). Specifically, we integrate and disentangle accelerators' value-adding inputs and the value-added outcomes for the supported startups by bringing the outcomes into perspective to the inputs. We further provide first insights into which value-adding inputs may lead to which value-added outcomes.

Third, this study contributes to prior research on entrepreneurial learning by finding that accelerators are a tool for early-stage startups' 'accelerated learning'. Although in the early stages of a startup, individual and organisational learning cannot always be unambiguously distinguished (Kim 1998), we find that accelerators create value-added concerning learning and development on both levels. Our findings suggest that accelerators have a positive effect on individual learning regarding *personality development* and *work-related development* as well as on organisational learning regarding *team, product, communication, and business-related skills and activities*.

3.5.3 Practical Implications

Our study provides some practical implications particularly for startups, accelerators and initiators of accelerator programmes. For startups our study can serve as a source of information about the value-added accelerators might provide and how they distinguish themselves from other value-adding investors. This information can help startups to decide for the most fitting type of investor during their investor selection and decision-making process. Accelerators can use our findings to benchmark and evaluate their own services and adapt them accordingly to optimize their value-added for startups. Furthermore, accelerators are typically financed by governments, universities, corporates, or privates who are interested in the question whether accelerators are indeed able to support startups in the intended way. Our study is able to clarify accelerators' inputs and outcomes for startups and advocate their existence since accelerators seem to succeed in enhancing the startups' learning and development, motivation, satisfaction, performance, and networks.

3.5.4 Limitations and Future Research

Our study has the following limitations: First, we focus on the German entrepreneurial finance market and on German accelerators. Therefore, the results might be specific for the underlying geographic area and cannot simply be transferred to other geographical areas with different market characteristics. Second, business models of accelerators are very heterogeneous (Cohen et al. 2019). Hence, our cases are incapable of mirroring all possible types of accelerators with their specific combinations of value-adding inputs. As a result, future research should cover other geographical areas to be able to consider different market characteristics and to identify the complete set of accelerators with their value-adding inputs. Third, even though the strength of our study lies in the during-treatment-analysis, it would be interesting to investigate the long-term

effects of accelerators on startups' development. Future research could reopen the cases after a certain time horizon investigating the long-term effects of accelerators. Additionally, we base our study on a multiple case study design. Case studies are very useful for creating rich insights into a phenomenon (Yin 2009). However, it is not the goal of a qualitative multiple case study design to produce statistically generalizable results (Yin 2009). Therefore, our study should be understood as a starting point for further quantitative analysis. Specifically, since our study indicates which value-added outcomes are generated by the accelerators' value-adding inputs, it might be interesting to investigate how this is reflected in the startups' future performance. Furthermore, quantitative studies could integrate and thereby help reflect the heterogeneity of accelerators' business models and evaluate accelerators' performance along the identified value-adding input dimensions of our study.

CHAPTER 4 | Accelerators as Drivers of Coopetition among Early-Stage Startups⁷

4.1 Introduction

In recent years, business accelerators with their specific environments for startups have created an increasing interest among practitioners, researchers and, in particular, politicians as a new way to improve a country's entrepreneurial landscape. Accelerators are places where startups, typically in their early stages, are provided with seed-capital, offices in a coworking space, mentoring, education as well as networking (Cohen 2013b). Due to their specific business model, accelerators are understood as value creators beyond financing (Block et al. 2017). In particular, one aspect that is perceived to be critical in their support for startups is their provision of networks (Hansen et al. 2000; Soetanto and Jack 2013). Accessing and building networks is especially important for entrepreneurial firms (Lechner and Dowling 2003; Lechner et al. 2006; Venkataraman and Van de Ven 1998), as they provide access to important resources (Brinckmann and Hoegl 2011; Hoang and Antoncic 2003), which startups typically lack due to their resource constraints related to the liabilities of newness and smallness (Freeman et al. 1983; Stinchcombe 1965).

A firm's network consists of relationships to various stakeholders (Lechner et al. 2006) interconnected in different types of relationships including ones that are cooperative, competitive or a mixture of both (Bengtsson and Kock 1999). This simultaneous occurrence of both cooperation and competition is called coopetition (Bengtsson and Kock 2000) and is argued to be the most complex but also the most

⁷ This chapter is co-authored by Alexandra Moritz and Eva Lutz, is under review at *Technovation: The International Journal of Technological Innovation, Entrepreneurship and Technology Management* and was presented at IECER 2017, G-Forum 2017 and RENT 2017.

advantageous type of relationship between competitors because the firms integrate their resources and capabilities and simultaneously push each other towards more innovative behaviour (Bengtsson and Kock 2000). However, previous coopetition research has concentrated mainly on large firms and has mostly neglected small and medium-sized enterprises (SMEs) (Gnyawali and Park 2009; Park et al. 2014b) and particularly startups (Gast et al. 2015). Due to the specific environments, challenges, tasks and strategies, fewer resources and smaller networks of startups, it is argued that corporates' cooperative behaviour cannot be transferred to startups. Initial empirical evidence suggests that coopetition is, however, also relevant for entrepreneurial firms (Soppe et al. 2014) and might help young and small firms to overcome challenges related to resource acquisition (Lechner et al. 2016) and positively influence outcomes such as knowledge acquisition (Song and Lee 2012) and sales growth (Lechner et al. 2006). However, the formation process (Mariani 2007; Mariani 2009) and the specific characteristics of coopetition among startups are unresolved so far which leads to an insufficient understanding in theory (Gast et al. 2015) and challenges to profit from coopetition for startups in practice.

We use the context of accelerators to study coopetition among startups since accelerators offer a natural environment to study relevant phenomena for startups such as their challenges, processes and behaviours. We assume that cooperative behaviour is also a relevant strategy for startups in their very early stages, particularly in their pre-seed and seed phases. Our study taps into the research gap on coopetition among early-stage startups in an explorative way by investigating the formation process and characteristics of coopetition among early-stage startups in business accelerators. Specifically, we examine the research questions: *How do startups establish and practice coopetition? And what role does the accelerator play in this relationship?* To investigate our research

objective, we use a multiple case study approach including six accelerators in Germany and 23 startups younger than one year on average.

This study has a number of theoretical contributions. First, it adds to existing research on coopetition specifically in the field of entrepreneurship by showing that coopetition is an important strategy for startups already in their very early stages. Second, we contribute to the coopetition formation literature, as we show that the external environment of firms can trigger coopetition. More specifically, accelerators can trigger cooperative behaviour among startups through their available tools, including different events, communication and the coworking space. Finally, this study contributes to the literature on accelerators, by critically investigating the role of accelerators in the formation of relationships among startups.

The practical implications concern both accelerator managers, startups and politicians. For accelerators, the study demonstrates the importance of their role in the startups' relationships and development. By using the right tools to support cooperation and competition among startups, accelerators can help startups generate positive results from this cooperative relationships. For startups, we underline coopetition as an advantageous strategy and motivate them to actively establish cooperative relationships and exploit them through accelerators. The startups can proactively initiate cooperative relationships with other startups while simultaneously allowing for competition. For politicians, our findings suggest that accelerator programmes seem to indeed foster local entrepreneurial activity by supporting the startups' interaction.

This paper proceeds as follows. Next, the article commences with an overview on prior research about coopetition, incubation and acceleration. Afterwards, we present the method and data used before the findings are presented and discussed. Finally, we provide theoretical contributions, managerial implications and avenues for further research.

4.2 Literature Review

4.2.1 Prior Research on Coopetition

4.2.1.1 *Theoretical Foundation of Coopetition*

The conventional view of dynamics between firms proposes that relationships are either cooperative or competitive (Walley 2007). Accordingly, competitive and cooperative relationships are argued to harm or threaten each other (Bengtsson et al. 2010). However, today's global markets require that firms pursue both competitive and cooperative strategies simultaneously (Luo 2004). As a result, scholars started to suggest a blended theory of cooperation and competition (Bengtsson et al. 2010) called “coopetition” (Bengtsson and Kock 2000).

This emerging new type of relationship can be explained by the resource-based view (Gnyawali and Park 2009), game theory (Gnyawali and Park 2009; Soppe et al. 2014) and network theory (Gnyawali and Park 2009). The resource-based view stresses that developing and strengthening resources is a key target of coopetition (Gnyawali and Park 2009). Game theory provides a useful lens to analyse the partners' goal alignment, their common and personal benefits (Gnyawali and Park 2009), their choices made and how the interplay between cooperation and competition leads to different outcomes (Bengtsson and Raza-Ullah 2016). Network theory provides the conceptual basis for coopetition, as it helps to explain how to access and extend knowledge and resources from the external environment (Gnyawali and Park 2009). The latter theoretical approach also links to entrepreneurship research that considers social networks as important to secure resources and to affect nascent firms (Mejia and Gopal 2015) through access to information and advice (Hoang and Antoncic 2003).

Prior research considers drivers, types, processes and outcomes of coopetition. Drivers of coopetition can either be internal, external or relation specific, which push or

pull firms into coopetition (Bengtsson and Raza-Ullah 2016). Coopetition can be classified into different types (Bengtsson et al. 2010; Bengtsson and Kock 2000; Lado et al. 1997; Park et al. 2014b) based on different combinations of high and low levels of its two elements cooperation and competition (Bengtsson et al. 2010): weak, balanced-strong, cooperation-dominant and competition-dominant coopetition (Bengtsson et al. 2010; Bengtsson and Kock 2000; Park et al. 2014a, b). Regarding the process and outcomes of coopetition it was found that coopetition is complex (Bengtsson and Raza-Ullah 2016) and naturally includes tensions (Tidström 2014) and challenges (Bengtsson and Raza-Ullah 2016; Dowling et al. 1996) but also produces outcomes related to innovation (Bouncken and Fredrich 2012; Park et al. 2014a, b), knowledge (Bouncken and Kraus 2013; Ho and Ganesan 2013; Song and Lee 2012), performance (Lechner et al. 2016; Luo et al. 2006), efficiency (Peng et al. 2012) and relations (Bengtsson and Raza-Ullah 2016).

4.2.1.2 Coopetition among Startups

Coopetition can also be relevant for entrepreneurial firms (Soppe et al. 2014), especially in firms' first years (Lechner and Dowling 2003; Lechner et al. 2006), due to startups' limited size and resources (Dagnino and Mariani 2010; Soppe et al. 2014). Competitors are a valuable source for firm development, since they can motivate the firm to constantly improve its products and processes, be subcontractors or enable the realization of joint projects. Therefore, cooperative relationships increase the entrepreneurial firm's flexibility and positively influence sales growth while being a low-risk strategy through the limitation of required investments such as employees and assets (Lechner and Dowling 2003; Lechner et al. 2006). Particularly through cooperating with competitors of the same size or even smaller, startups are jointly able to compete more effectively against larger competitors (Gnyawali and Park 2009). Most entrepreneurial

firms prefer alliances with smaller or similar-sized firms because these relationships are easier to control and manage, are less time consuming and incur less transaction costs (Soppe et al. 2014).

The question, however, remains how coopetitive relationships among startups in their very early stages are established and how they can be characterised.

4.2.2 Coopetitive Relationships among Startups in Accelerators and Incubators

The idea of incubators and accelerators is to create an environment for entrepreneurial firms with shared resources, mentoring and education as well as with a coworking space leading to close physical proximity and interaction opportunities. Accelerators recently originated from incubators (Hoffman and Radojevich-Kelly 2012), and the two have many similarities but also some differences (Cohen and Hochberg 2014). Incubators are generally organisations providing resources that support the founding of new businesses (Löfsten and Lindelöf 2002). This general definition is wide enough to include accelerators as well (Caley and Kula 2013). The differences, however, lie in how they help the startups (Caley and Kula 2013). Accelerators usually offer services beyond those of incubators and typically have the following characteristics: limited duration of three to six months, strong intensity and high pace, a cohort structure, equity investment, an intense educational programme with mentorship and seminars, network development and a final pitching event called demo day (Cohen and Hochberg 2014). Their intent is to support new businesses to survive and expand (Mian et al. 2016) or otherwise to fail fast (Caley and Kula 2013; Holstein 2015; Kohler 2016).

Although coopetitive relationships among early-stage startups in incubators and accelerators have, to the best of our knowledge, not yet been investigated, a number of

researchers shed some light on the networking behaviour and complexity of relationships within incubators. The provision of networks is perceived to be a critical element in business incubation (Hansen et al. 2000; Soetanto and Jack 2013). Like accelerators, most incubators offer to participants both external networks, such as other startups, universities and investors, and internal networks, which are the relationships among the incubated startups (Lyons 2000; Soetanto and Jack 2013). Ahmad and Ingle (2011) consider these internal human relations to be the most important aspect of business incubators. Both cooperative (Bøllingtoft and Uihøi 2005; Campbell 1989; McAdam and Marlow 2008) and competitive elements (Evald and Bager 2008; McAdam and McAdam 2006) seem to be present in the relationships among incubated startups.

On the one hand, cooperative networking activities were observed, such as close collaborations among incubated firms (Bøllingtoft and Uihøi 2005), the development of friendships (Ahmad and Ingle 2011) and the use of the incubator as an internal market place by mutually contracting as buyers and sellers of services and products (Campbell 1989). Additionally, the firms create a supportive environment based on empathy and shared values (McAdam and Marlow 2008), engage in discussions concerning challenges and use their peer startups as sounding boards for new ideas (McAdam and Marlow 2008).

On the other hand, tensions regarding intellectual property and competitive strategies (McAdam and Marlow 2007) and a low level of knowledge sharing due to a lack of physical forums and political rivalry (Evald and Bager 2008) were observed. Startups are particularly cautious in regard to sharing information about funding, since they are all competing for limited financial support. Consequently, this competitiveness affects the interaction between the startups (McAdam and Marlow 2007).

Moreover, incubators themselves influence the startups' relationships. Some incubators actively encourage 'client-client coproduction' through exchange platforms

such as cafeterias, regular events and meetings (Ahmad and Ingle 2011). These incubators sometimes even require that the firms treat each other as colleagues rather than competitors (Bøllingtoft and Ulhøi 2005). Other incubators, in contrast, make mutual exchange difficult due to a lack of physical forums (Evald and Bager 2008), adverse design of the incubator's office and lack of internal networking opportunities such as internal meetings and event spaces (McAdam and McAdam 2006).

Despite some evidence of cooperative and competitive behaviour of startups in incubators, little is known about how this dual relationship of cooperation and competition is precisely developed and performed among startups, particularly in their very early stages. Our study focuses on coopetition among startups in accelerators for two reasons. First, accelerators offer a natural environment to approach and study early-stage startups' behaviours and strategies, specifically the formation and practice of coopetition. Second, we assume that accelerators create a unique environment for cooperation and competition. For example, the colocation of startups and the cohort structure are typical aspects of business accelerators. Besides, Cohen (2013b) suggests that startup teams within accelerators establish close relationships and help as well as motivate one another. However, simultaneously, competitive elements due to the final demo day where all startups seek follow-up financing could exist (Winston-Smith and Hannigan 2015). Summarised, it can be assumed that both the cooperative element and the competitive element are likely to be even stronger in accelerators than in incubators due to the intensity of the programme, the pressure from the short time span, the importance of the demo day, the structure of the programme in cohorts, and the requirement to interact with and support each other.

4.3 Method

4.3.1 Research Design

We used an in-depth qualitative research approach that is consistent with our research goal of investigating the formation process and characteristics of coopetition among startups. Specifically, we deployed a multiple case study design that allows us to examine a complex social phenomenon in its real-life setting (Yin 2009). This approach is suitable to understand the complex interrelations involved in coopetition between startups in accelerators. According to Eisenhardt (1989), four to ten cases are recommended for multiple case studies depending on the specific research questions. In our study, we investigated six accelerators (details see Table 6) in the form of an embedded case study design by studying 23 subunits (Yin 2009) in terms of “startups” (see Annex 4) within six accelerators.

4.3.2 Data Collection and Sample

In line with the qualitative research approach, six information-rich cases were selected through purposeful (Curtis et al. 2000; Miles and Huberman 1994; Patton 1990b) and theoretical sampling (Eisenhardt and Graebner 2007). We used a sampling technique called “criterion sampling”, which is based on predetermined criteria (Patton 1990b). Since there is much disagreement about the definition of accelerators (Cohen and Hochberg 2014), we only included accelerators in the study that fulfilled at least five out of the following six main characteristics identified in the literature. An accelerator is (a) a programme of limited duration (b) that helps cohorts of startups by providing them with seed capital, (c) working space, (d) networking, (e) mentorship and education opportunities (f) and culminates in a final pitching event (Cohen 2013b). Based on the pre-defined criteria 18 suitable accelerators in Germany were identified. After data collection and analysis of six cases, the researchers agreed that theoretical saturation was

reached, since the marginal improvement of insights through additional cases became very small (Eisenhardt 1989).

For the purpose of triangulation, we used multiple sources of evidence (Denzin 1978; Tracy 2010) such as interviews, informal conversations and observations. Since interviews are an efficient way to gather rich, empirical data (Eisenhardt and Graebner 2007), we used interviews as the primary data source for our study. After having pre-tested the interview guideline for logic, clarity and feasibility, we conducted 34 interviews across the six cases with key participants within accelerators, including startup team members and accelerator team members. This approach allowed us to investigate both sides – the startups’ view as an internal perspective and the accelerators’ view as an outside perspective – and hence, triangulate the data by assessing the congruence or differences of our findings across different study participants (Denzin 1978) as part of the within-case analysis. The aim of the interviews was threefold: (1) gaining insight about relationships among startups in accelerators, (2) understanding the formation and practice of coopetition, (3) explaining the role of the accelerators in the startups’ relationships. The interviews were based on a semi structured interview guideline (see Annex 1 and 2) with open-ended questions to ensure the free expression of the participants’ experiences and opinions (Miles and Huberman 1994). The interview guideline was developed from previous coopetition studies and continuously adapted within the data collection process. Each of the 34 interviews (see Table 7), which ranged from 24 to 102 minutes, was tape recorded and transcribed. We enriched the interview data with informal conversations with startups and accelerator members and observations were conducted by the researchers in the field, for example, in the coworking area and at events such as demo days, pitching sessions or workshops and recorded through field notes.

Table 6. Characteristics of sampled accelerators

Case	Region in Germany	Year of foundation	Corporate versus private accelerator	Programme duration	No. of cohorts per year	No. of startups per cohort	Industry	Funding	Intense support	Offices and equipment	Demo day
A	“[Our goal is] to really accelerate their development within 100 days and to give them the best advice and best practices so that they skip the mistakes that we had done back then.” – A_1										
	Lower Saxony	2016	Private	3, 5 months	2	Approx. 3–5	Broad focus on software technology, for example, e-commerce, fashion tech, retail, virtual reality, artificial intelligence, internet of things, food tech, and robotics	✓	✓	✓	✓
B	“Our goal is to use our corporate as a door-opener to the rest of the world for the startups so that the startups can use our name to get access to investors and other corporates, where they would not have any chance on their own.” – B_1										
	Hesse	2015	Corporate	3 months	2	Approx. 5–10	Broad focus on health care, life science, performance materials, and digital solutions	✓	✓	✓	✓
C	“We have two goals: one is to get them invested, the other one is to help them with their business development. That’s what it comes down to because startups need the product support, business support, and access to capital. These are the fundamentals.” – C_1										
	Hesse	2016	Private	4 months	2	8–10	Broad focus on web entrepreneurs, for example, Fintech, Cybersecurity, and RegTech	x	✓	✓	✓
D	“The goal of the programme itself is to help companies to be successful. [...] We say our accelerator is really good in networks and contacts because we work in this specific industry, which is media. We have the right contacts.” – D_1										
	Hamburg	2015	Private	6 months	2	Approx. 4–10	Specific focus on media industry	✓	✓	✓	✓
E	“The goal of our accelerator programme is to help our startups reach a certain progress within three months that they would normally reach on their own in a year.” – E_1										
	Berlin	2010	Private	3 months	N/a	N/a	Specific focus on energy and transportation industry	✓	✓	✓	✓
F	“Our goal is to support entrepreneurs. We want to create a place where they are provided with everything they need.” – F_1										
	North Rhine-Westphalia	2015	Private	6 months (3+3 after internal demo day)	2	Approx. 10	Generalist	x	✓	✓	✓

Table 7. Characteristics of interviewees

Case	Type	Profession	Education	Subject	Age	Gender	Length of the interview
A	Startup 1	CFO	A-Levels	Media Management	23	M	01:18
A	Startup 2	CTO	Diploma	Mathematics	32	M	00:47
A	Startup 3	CEO	A-Levels	Engineering Economics	21	M	00:46
A	Startup 4	CEO	Bachelor	Corporate Management and Economics	26	F	00:47
A	Startup 5	CEO	Diploma	Economics	32	M	00:38
B	Startup 1	Cofounder; Application Specialist	Master	Physics	26	F	01:03
B	Startup 2	Cofounder	PhD	Neuropharmacology	31	M	00:50
C	Startup 1	CEO	Diploma	Economics	49	M	00:38
C	Startup 2	Cofounder	Bachelor	Computer Science	32	M	01:36
C	Startup 3	Head of Product	Master	Public Affairs	32	F	00:44
D	Startup 1	CEO	Bachelor	Business and Marketing	36	M	01:18
D	Startup 2	CEO	Bachelor	Business Administration	26	M	00:30
D	Startup 3	CEO	Master	Rhetoric, Art History	34	M	00:38
D	Startup 4	Cofounder; CEO	Master	Business Management and Computing Science	31	M	00:46
E	Startup 1	Cofounder; CXO	Master	Management	24	F	00:52
E	Startup 2	COO	Master	Management	26	M	00:32
E	Startup 3	CEO	Bachelor	Engineering	32	M	00:42
F	Startup 1	CEO	Master	Business Administration	30	F	00:58
F	Startup 2	CEO	Bachelor	Business Administration	24	M	00:49
F	Startup 3	CEO	Master	Engineering	34	M	00:28
F	Startup 4	CEO	Diploma	Economics	46	M	00:35
F	Startup 5	CEO	Master	Finance	33	M	00:24
F	Startup 6	CEO	Master	Architecture	32	M	00:42
A	ACC Member 1	CEO	Bachelor	Media Management	29	F	01:27
A	ACC Member 2	Relationship and Project Manager	Apprenticeship	Media Management	29	F	00:40
A	ACC Member 3	Creative Director	Bachelor	Visual Communication	28	F	00:45
B	ACC Member 1	Manager	Master	Engineering Economics	29	M	01:00
C	ACC Member 1	Founder; Managing Partner	Master	Strategic Finance	41	M	01:42
C	ACC Member 2	Founder	3 Masters	Chemical Engineering, Organization Psychology, MBA	47	F	00:40
D	ACC Member 1	Programme Manager	Bachelor	Applied Translation	27	F	00:40
E	ACC Member 1	Head of Marketing and Operations	MBA	Management	26	F	00:51
E	ACC Member 2	CEO	MBA and Master	Telecommunication and Finance; International Relations	51	F	00:45
F	ACC Member 1	Programme Director	Bachelor	Business Administration	26	F	00:42
F	ACC Member 2	Trainee Marketing and Events	Master	Innovation and Entrepreneurship	27	M	00:32

4.3.3 Data Analysis

To analyse our data, we first conducted individual within-case analysis by coding the transcriptions with the software programme MAXQDA to become familiar with each case as a stand-alone entity (Eisenhardt 1989). To ensure that the statements of our respondents were left in their original context, we coded words, phrases, sentences, or whole paragraphs (Miles and Huberman 1994). The initial list of codes was based on our prior knowledge (Miles and Huberman 1994). While working with the data material, the coding system was continuously extended, revised and condensed following the qualitative data analysis approach as an iterative, on-going and inductive process (Eisenhardt 1989; Miles and Huberman 1994). The codes were then aggregated into meaningful categories and subcategories (Miles and Huberman 1994; Strauss and Corbin 1990). To ensure reliability of the coding, the coding scheme (see Annex 5) was extensively discussed among the authors and adapted until final agreement was reached. After these steps, the categorized data were used to perform a thematic content analysis (Saldaña 2009). Since it is important to first understand the dynamics of each particular case before proceeding to cross-case explanations (Miles and Huberman 1994), we wrote individual case reports that indicated how and why particular patterns and results were demonstrated or not (Yin 2009).

In the second step, we conducted a cross-case analysis by identifying cross-case patterns (Eisenhardt 1989) to account for the replication logic of a multiple case study (Yin 2009). We used two different approaches: First, we selected categories and dimensions and looked for similarities and differences among cases. Second, we selected groups of cases (for example pairs) to find patterns in each group (Eisenhardt 1989).

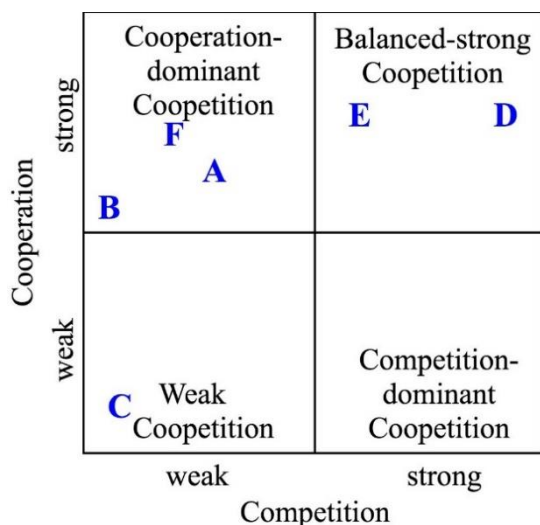
Finally, the themes, concepts and relationships between variables that emerged (Eisenhardt 1989) built the basis for answering our research questions.

4.4 Results and Discussion

4.4.1 Types of Coopetition among Accelerated Startups

Investigating the different types of coopetition not on an individual relationship level but on an aggregated level of the accelerator, we find that three out of the four coopetition types – cooperation-dominant, weak and balanced-strong coopetition (Bengtsson et al. 2010; Park et al. 2014b) – occur within accelerators. We allocated accelerators to different coopetition types in a two-step process. In the first step, the startups self-reported their coopetition type through three survey questions on a Likert Scale in the interviews. In the second step, we adapted and enhanced the self-reports through data from the qualitative interviews, observations, and cross-case comparisons.

Case D is an example of balanced-strong coopetition, a type of relationship where cooperation and competition are equally distributed but both strongly represented (Bengtsson and Kock 2000). In this accelerator, both cooperation and competition are the strongest compared to the other cases. Case E interacts at the intersection between balanced-strong coopetition and cooperation-dominant coopetition. Cases A and F are examples of cooperation-dominant coopetition, where the cooperative part of the relationship is strongly dominant (Bengtsson et al. 2010; Park et al. 2014b). Case B's relationships range between cooperation-dominant coopetition and weak coopetition. That is, overall, both cooperation and competition are quite weak compared to the other cases, representing a rather low level of interaction between the involved firms (Bengtsson et al. 2010) but cooperation is still dominant. Case C shows weak coopetition, as both cooperation and competition are only slightly existent. Figure 5 illustrates the different cases.

Figure 5. Types of competition among startups in accelerators

Source: Own illustration based on Park et al. (2014b)

We do not find evidence for competition-dominant coopetition, i.e. a combination of strong competition and weak cooperation (Bengtsson et al. 2010; Park et al. 2014b), and argue that there are several reasons. First, the empirical evidence shows that both cooperation and competition are part of accelerators, but the main aim of accelerators seems to be not the creation of a competitive atmosphere but rather a cooperative and supportive atmosphere. Second, accelerators usually do not take perfect market competitors into their programme. We elaborate on the accelerator's role in the type of competition further in section 4.4.3 Accelerators as Drivers of Coopetition. Third, although competition – as part of coopetition – is beneficial for firms, evidence shows that cooperation-dominant coopetition or balanced-strong coopetition are most beneficial (Bengtsson et al. 2010; Park et al. 2014b). These types of competition allow firms to benefit from both elements, whereas competition-dominant coopetition includes strong tensions that make meaningful cooperative exchange difficult (Bengtsson et al. 2010).

In summary, across all investigated accelerators, our data demonstrate that both cooperation and competition play a role among accelerated startups. Therefore, we propose the following:

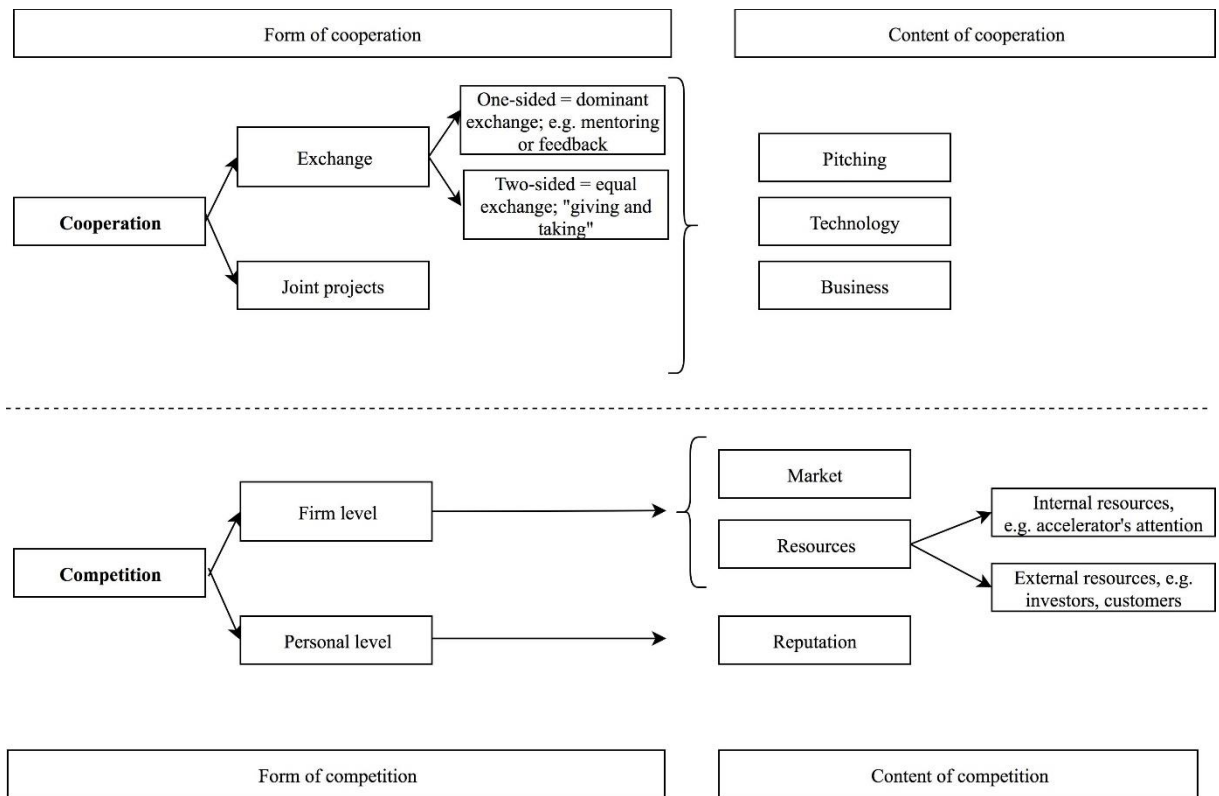
Proposition 1: The startups in accelerators are involved in coopetitive relationships with each other. Specifically, they are involved in the following different types of coopetition: cooperation-dominant coopetition, weak coopetition and balanced-strong coopetition.

4.4.2 Coopetitive Elements of the Startups' Relationships

From an interfirm relational perspective, coopetition is regarded as a specific form of “interorganisational ‘multifaceted’ relationship” between two firms that simultaneously compete and cooperate with each other (Dowling et al. 1996, p. 155). Thus, to analyse coopetition among startups within accelerators, we take the stance of processual studies that suggest that the competitive and cooperative parts of cooperative relationships are divided by activities instead of by parties (Bengtsson et al. 2010; Bengtsson and Kock 1999). The two parts of coopetition – namely, the competitive and cooperative parts – occur between the same set of parties. That is, one organisation cooperates with another organisation in one activity but competes with the same organisation in a different activity (Bengtsson et al. 2010). Consequently, in the present study, we do not restrict coopetition to “cooperative alliances between competitors” (Bengtsson et al. 2010, p. 194) or to “competing firms [that] are involved in partnerships such as joint ventures, research consortium, or licensing agreement” (Dowling et al. 1996, p. 157). Instead, we consider any kind of competitive and cooperative relational elements occurring in the same relationship as coopetition.

Based on these considerations, the following paragraphs will individually analyse the cooperative and competitive elements in the relationships of the accelerated startups. Figure 6 summarises our findings on how startups in accelerators cooperate and compete.

Figure 6. Cooperation and competition forms and contents of startups in accelerators



4.4.2.1 The Cooperative Element of Coopetition among Startups

Our data show that cooperation is not the main reason for startups to join an accelerator programme in the first place, since the startups need to concentrate on their own business; however, cooperation is a frequently named benefit of accelerators. This common perception was summarised by D_1:

“I think [cooperation] is strong. (...) Of course, at the end of their story, everyone has their own product. They need to work on it and for themselves. That's Priority Number 1. Priority Number 2 would be to help each other.”

Prior research shows that in the context of coopetition, corporates usually cooperate through long-term relationships such as alliances (Bengtsson and Kock 2000; Faems et al. 2010). It is, however, questionable whether startups cooperate in the same way as corporates due to their early stages with their specific characteristics, challenges and fewer resources.

In fact, we find evidence that in accelerators, startups do not have joint R&D alliances, since the startups typically come up independently of each other with their own startup idea some months before participating in an accelerator. Instead, our results suggest that for startups within accelerators, cooperation can take on two different forms: *joint projects* and *exchange* (see Figure 6). Most similar to the alliances of corporates are the *joint projects* among startups. These projects might be of a different nature, such as joint customer projects, market research or product integration. While some startups work closely together during the accelerator programme, for others there is not the right cooperation partner or they are too early in their development to enter close collaborations. Many of the latter, however, plan to do some joint projects in the future and are constantly looking for opportunities to cooperate (see Table 8, constructs “*joint projects and future joint projects*”). F_SU4 explained their ideas for future joint projects

“One example: At the very first pitch here in this accelerator programme I met someone (...) and they sell journeys. Since we also sell a specific part of journeys we already discussed whether we could work together. That would be a good opportunity. Or here is another girl working for another startup which also is about travelling. And of course we search for ways how to pool our traffic. For example if one created traffic through their offer, maybe the other could offer their products to the same customer – or at least support each other.” – F_SU4

In addition to these joint projects, the startups cooperate through *exchange* (see Table 8, construct “*exchange*”). This exchange can either be *one-sided*, which means that there is one partner dominating the exchange, such as when one startup mentors another one. Or this exchange can be *two-sided*, which means that it is a relationship where both exchange partners have an equal role. Accelerator manager D_1 gave an example: “[Startup 1] is very good at pitching, and there is another guy with us, who's not a good presenter. Therefore, [Startup 1] really tells him: You need to change this, change that! He's a mentor in pitching. This is wonderful! I don't even need to say anything, they're helping each other.” Overall, as the statements of the interviewees show, the main

contents of the cooperative relationships seem to be in the areas of *pitching* – one of the main topics within accelerator programmes – *technology* and *business*.

In summary, our data demonstrate that the startups within accelerators cooperate with each other. However, in contrast to research on cooperation among corporates, we find evidence that startups use their own specific forms to cooperate, which are adjusted to their early stages. Therefore, we propose the following:

Proposition 2: The startups in accelerators cooperate with each other through joint projects and exchange.

Our data further indicate that the startups consider the cooperative element of their relationships to be beneficial and that they highly appreciate it. One example of a particularly successful collaboration was about two startups that started working together on acquiring new customers (Case E). In the end, the two startups decided to merge, as their skills complemented each other well. Subsequent to the merger, the startup was able to raise millions of follow-up financing clearly expressing the success of this strategic decision.

Overall our data demonstrate that cooperation plays an important role for startups in accelerators and that those cooperative relationships seem to lead to successes for the involved firms. In the light of the liabilities of newness and smallness (Freeman et al. 1983; Stinchcombe 1965), this particular type of relationship seems to be highly valuable for entrepreneurial firms. In previous coopetition literature, the cooperative part of coopetition is supposed to provide the involved parties access to resources such as competence, time, knowledge, and prominence (Bengtsson and Kock 2000). In the context of our study, we find that cooperation among startups in business accelerators appears to be one potential aspect that reduces their liabilities of newness and smallness by providing access to important networks, business, and technological knowledge, the

possibility to target larger markets and reach more customers. Entrepreneur D_SU4 summarised:

“We always bounce ideas off each other, especially with [Startup3]. We’re doing this mutual event together (...). We’re both presenting there, but we’re also providing our services (...) in a combined effort. Additionally, [Startup3] and I (...) discussed how we can integrate. (...). So, it’s mutually beneficial.”

We therefore propose:

Proposition 3: The cooperative element of coopetition has a positive effect on the startups’ development by providing access to networks, knowledge and markets.

Table 8. Cooperation

Construct	Group	Quotes
Joint projects	Startups	“There is a very concrete example: We are currently having a common project with one of the other startups. There is the upcoming event [...] where we stream lots of sessions. [...] We deliver the software for streaming and [startup 4] delivers the programme [...]” – D_SU3 Total number of evidence: 7 quotes
	Accelerator staff	“There are wonderful examples. For example, two years ago, we had two different startups, both with very distinct business models for the trucking industry [...]. At some point they decided to work together since they approached the same target markets and the same customers. During that collaboration for market analysis and customer analysis they decided to unite and establish a new firm. Although only half of the accelerator programme’s time was left to establish their new firm, they were the first ones to collect one million of follow-up funding.” – E_2 Total number of evidence: 5 quotes
Future joint projects	Startups	“We actually thought about concrete collaborations – complementing each other’s business field – once or twice. It didn’t work out in the end but generally I think that there could emerge opportunities from collaborations in future.” – F_SU3 Total number of evidence: 5 quotes
	Accelerator staff	“They are too different and it’s too early for them to collaborate. Some of them do not even have a product. Therefore, you cannot work on a joint project. But eventually [Startup 2] is going to be ready to connect its own software with the one of [Startup X] to enhance both products. [...] However, that is possible only after the accelerator programme.” – A_1 Total number of evidence: 2 quotes
Exchange	Startups	“I think we're all students and teachers at the same time between each other. We can learn from our stories, even if it’s just a story.” – D_SU1 Total number of evidence: 22 quotes
	Accelerator staff	“They help each other. Some startups are full of programmers and some have less, and they help each other when it’s needed. Some others have more business understanding, financial understanding, and they also help the others. It’s bringing passionate people together.” – C_1 Total number of evidence: 11 quotes

Table 9. Competition

Construct	Group	Quotes
Firm level competition	Startups	“The business side would be whether we have any conflict of interest; so, do we believe we fight for the same investor? And do we fight for the same customer? If there is any conflict in there, naturally, we become competitive.” – E_SU1 Total number of evidence: 7 quotes
	Accelerator staff	“Sometimes, they are talking to the same clients, maybe there might be a clash.” – D_1 Total number of evidence: 7 quotes
Individual level competition	Startups	“It’s no rivalry in the sense of market competition. But, of course you want to prove to the accelerator that you push your idea forward. If you see that the other startups developed relatively more, of course you don’t like that. Everyone wants to progress as much as possible.” – A_SU1 Total number of evidence: 7 quotes
	Accelerator staff	- Total number of evidence: 0 quotes
Healthy competition	Startups	“It’s a positive competition – so that we push and motivate each other. I don’t know of any example where someone begrudged someone else. Instead, it’s a really supportive competition.” – F_SU2 Total number of evidence: 10 quotes
	Accelerator staff	“They truly feel happy when one startup gets the investor, gets the business. [...] And then they think, okay, now let’s be the next one.” – C_1 Total number of evidence: 2 quotes
Motivational effect	Startups	“I think our competition is positive. Because slight competition leads to being even more motivated to work hard. If competition was too fierce, the cooperative mindset – that is exchanging and helping each other – would get lost. But I think we have a healthy mixture of competition and cooperation here. Competition is not so strong that we wouldn’t talk to each or keep secrets from each other.” – D_SU2 Total number of evidence: 9 quotes
	Accelerator staff	“It’s amazing, because they get encouraged. The other startups are working and they want to be better. They see people who stay and work so many hours. And then they think, wow! I should, maybe, too. It’s a very healthy competition.” – D_1 Total number of evidence: 4 quotes

4.4.2.2 The Competitive Element of Coopetition among Startups

Prior research on coopetition has focused mainly on competition defined as two firms competing in the same market (e.g. Bengtsson and Kock 1999). We find that competition among startups expresses itself differently. In particular, it seems to exist both on the *firm level* and on the *individual level*. On the firm level, several interviewees mentioned market competition, for example, accelerator director E_1 mentioned: “I think

competition would come if someone else did something similar.” However, according to our interviews with accelerator directors and team members, most of them are careful not to take two similar startups into one batch, as stated by C_2: “It is very important for us that none of the startups are direct market competitors. We select them on purpose because we want that they help and support each other.” Although some overlaps regarding markets and customers cannot be ruled out completely, startups are mostly not perfect market competitors. According to our data, competition on the *firm level* among startups in accelerators does, however, not only refer to market competition but also to competition over access to specific resources (quotes see Table 9, construct “*firm level competition*”). Prior incubation research supports our finding. McAdam and McAdam (2006) indicate that even if startups within incubators are focused on different sectors, they still compete for grants, other funding sources, and publicity (McAdam and McAdam 2006). We find that startups in accelerators compete *on the firm level* for specific resources (see Figure 6), which include accelerator *internal resources*, such as the accelerator’s attention, and accelerator *external resources*, such as investors. An example was given by entrepreneur C_SU2, “And on the other side [there is competition], if the accelerator did something like the (...) investor day, which we had a couple of weeks ago”, where the startups had to pitch in front of investors to convince potential investors. Another example was stated by programme director F_1, “I think that is going to change now at the internal demo day where there is going to be the decision on who is staying and who is leaving. Most certainly there will be more competition.”

Additionally, our data suggest that there is further competition on an *individual level*, that means on the level of the individual entrepreneur, for *reputation*, for example at the demo day or through interaction with the accelerator (quotes see Table 9, construct “*individual level competition*”). Every entrepreneur likes to build up the best possible

reputation and not lose face. This sentiment was summarised by entrepreneur D_SU4, “There’s competitiveness in a way to out-do each other and be the one that gets the funding or be the one that signs the next pilot, or be the one that gets picked to go to an event or something”, and entrepreneur A_SU1 “Of course it is friendly, but also a bit of a rivalry. You also want to be an entrepreneur that makes progress and you want to prove that to the accelerator.” These results lead us to the following proposition:

Proposition 4: The startups in accelerators compete for (a) internal as well as external resources on the firm level and (b) for reputation on the individual level.

Although our data suggest competition among startups, they do not perceive this to be negative or unhealthy but rather healthy. Entrepreneur D_SU1 remarked:

“It’s healthy competition. We cheer each other on. Someone launched an app the other day, Yeah! Right! We all cheer for each other, but at the back of your mind you’re always working on competitiveness. If there is competition, you push yourself.”

This healthy competition is underlined by the fact that the entrepreneurs show a positive attitude towards the success of other startups. Instead of being jealous, they seem to be happy for the others, become even more motivated to be the next successful startup and see the success of others as a development opportunity for themselves (see Table 9, construct “*healthy competition*”). This is in line with prior research that found that the competitive element of coopetition pressures firms to develop new products, services or access new markets (Bengtsson and Kock 2000).

Our research demonstrates that the entrepreneurs seem to be intrinsically motivated, as stated by A_SU2: “Generally, we are the first to come in the morning and the last to leave in the evening. We are very much intrinsically motivated”. However, for startups within accelerators, the main advantage of competition seems to be the additional positive effect on their entrepreneurs’ inspiration and motivation. This conclusion was affirmed by entrepreneur B_SU2: “The others can inspire you to make more and be better. From this point of view, we can see the competition that can be created in the accelerator.”

and similar statements summarised in Table 9 (construct “*motivational effect*”). This finding is in line with prior research that demonstrates the positive effect of competition on intrinsic motivation, showing that competition can have a positive impact on motivation for specific types of individuals, such as those high in achievement motivation, that is those that seek challenges, desire to attain competence and strive to outdo each other (Epstein and Harackiewicz 1992; Tauer and Harackiewicz 1999). Correspondingly, our data further show that some of the entrepreneurs were inherently more competitive than others, as cited by entrepreneur A_SU3: “I think the competitive mindset is also dependent on the individual personality of the founder. For example, I like competition. I like it if others are better than I am. Then, I try to outrun them.”

Based on these findings, we propose the following:

Proposition 5: The competitive element of coopetition enhances the entrepreneurs’ motivation.

Overall, our data suggest that both cooperation and competition, and therefore coopetition, play a role in the startups’ relationships. The startups, however, adapt the characteristics of cooperation and competition to their early stages. This flexible adaptation of the cooperative process by startups to their specific needs corresponds with the dynamic and complex character of coopetition (Bengtsson and Raza-Ullah 2016), which might include tensions (Tidström 2014) and challenges (Bengtsson and Raza-Ullah 2016; Dowling et al. 1996).

Nevertheless, our data highlight that the startups assess both elements of their cooperative relationships to be beneficial and healthy. This is in line with prior literature that argues that coopetition is the most advantageous type of relationship between competitors – compared to pursuing only a competitive strategy – because the competitors

integrate their capabilities and resources and simultaneously push each other towards more innovative performance (Bengtsson and Kock 2000). Coopetition thereby combines the advantages of both cooperation and competition and “involves cooperating to create a bigger business pie, while competing to divide it up” (Luo 2004, p. 9). In our research setting, the outcomes were related to the startups’ early-stage needs, which were to acquire specific resources such as networks, knowledge, markets and customers through cooperation and, simultaneously, to increase and keep up their inspiration and motivation through competition.

4.4.3 Accelerators as Drivers of Coopetition

4.4.3.1 Accelerators’ Role in Coopetition among Startups

Prior literature on incubators describes the incubator manager as a broker between incubated firms. Since the incubator manager has a relationship with all firms, he is in the unique position to identify and bridge gaps in their knowledge and expertise by facilitating the interaction among them (Ahmad and Ingle 2011). The role of the accelerator in coopetition, however, seems to go beyond this broker role. Specifically, the accelerator seems to be an external driver of coopetition. Although most prior literature discusses the intentional and deliberate formation of coopetition by the involved firms (e.g. Bengtsson and Kock 2000; Faems et al. 2010; Soppe et al. 2014) through internal drivers (Bengtsson and Raza-Ullah 2016), coopetition can, in the first stage, also be an unintended and therefore emergent strategy driven by the external environment (Mariani 2007).

In the context of early-stage startups, our data particularly indicate that the accelerator possesses different tools (see Figure 7) – which can be categorized in *events*, *communication* and *coworking space* – that are capable of triggering cooperative

behaviour among startups. The tool category *events* includes the introduction week, workshops, socializing events, pitching practice, status reports, startup events, so-called “Stammtische” and the demo day. The tool category *communication* includes the accelerator’s activities regarding his role as broker, the development of motivation and pressure, the accelerators’ mindset on cooperation and competition, investor and customer relations, slack-channel communication and the working climate and atmosphere. The tool category *coworking space* includes the layout of the offices, exchange corners, integration in wider coworking area, “coffee-corners” and equipment (see Table 10).

Based on our data, it seems that, depending on the number and intensity (composition) of the tools being used, the accelerator triggers different types of coopetition, in particular cooperation-dominant, weak and balanced-strong coopetition. Accelerators in our study, however, do not trigger competition-dominant coopetition, since it seems that accelerators do not give priority to competition. Overall, we find that the environment created by the accelerator induces coopetitive relationships among startups. This mechanism is shown in Figure 8.

Furthermore, our research demonstrates that unintended and induced coopetition does not necessarily require acknowledging the partner before attending the accelerator programme. Cooperating and competing simultaneously can emerge from scratch through the external environment. We therefore propose the following:

Proposition 7: The accelerator acts as an external driver of coopetition among startups through its toolbox, including events, communication and coworking space.

Table 10. Accelerators’ coopetition tools

Coopetition tools	Quotes
Events	
<p>Pitching practice: Some accelerators offer pitching practice where each startup has to do a pitch on stage in order to improve themselves through feedback from the accelerator staff and from other startups.</p>	<p><i>“We developed a very good relationship and we help each other. For example, twice a week we have public pitch sessions [...] we all get together to provide people with feedback” E_SU1</i></p>
<p>Demo Day: The final pitching event is one of the specific characteristics of accelerators where investors, mentors, entrepreneurs and other participants of the startup scene are invited.</p>	<p><i>“That’s how they foster this competitiveness: by putting things like demo day as the ‘carrot’.” – D_SU1</i></p>
<p>Status-reports: Some accelerators regularly organize status-reports, for example each two or four weeks to provide the startups with the opportunity to present their tasks, successes and challenges and discuss with their peers.</p>	<p><i>Although competition is not the main focus of the status reports, they created a certain motivation.” – F_SU2</i></p>
<p>Workshops: Workshops serve to impart knowledge to the startups about business-related topics such as strategy & product development, IT & design, finance & legal, marketing & sales, media & communication, leadership, etc. (example taken from the homepage of accelerator F). Usually, the startups work closely together on these workshops and exchange feedback.</p>	<p><i>“In the ‘positioning and sales’ training, the trainer always goes through each startup’s business idea. And then the startups give to and receive feedback from each other [...] they help each other to improve their idea. And the same occurs at the business model canvas or pitching training.” – B_1</i></p>
<p>Introduction week: Some accelerators offer an introduction week to facilitate getting to know each other through conducting fun events, workshops or networking events with mentors.</p>	<p><i>“Mostly through fun events to break down the barrier. For example, at the beginning, we do a boat trip, we go for dinners, etc. The idea is that they become more comfortable approaching each other [...] instead of being so anonymous” – E_1</i></p>
<p>Startup-events: These startup-events may include, for example, trade shows, investor days and additional pitching events.</p>	<p>-</p>
<p>Socializing-events: In addition to the introduction week, most accelerators offer socializing-events, such as playing sports, eating and drinking together, watching games, so that the startups become acquainted.</p>	<p><i>“[The accelerator team] also organizes activities which are independent from the accelerator programme itself in order to get to know each other better. [...] for example watching an ice hockey game or going to a market or eat pizza together.” – A_Alumni2</i></p>
<p>‘Stammtische’: ‘Stammtische’, such as regular breakfasts, beer after work or barbecues, also aim at making the startups exchange ideas and feedback and network among each other.</p>	<p><i>“Every Friday, when we have a breakfast meeting, we all talk together what has been done, what are challenges and so forth. We use it as a sounding board and for brainstorming.” – C_1</i></p>
Communication	
<p>Accelerator as broker: Most accelerator team members and managers are well informed about the startups, their strengths and challenges. Therefore, they can easily act as ‘broker’ and bring together startups which might cooperate well.</p>	<p><i>“The accelerator is in close contact with each team and therefore [...] I would say the accelerator acts a bit like a broker.” – D_SU2</i></p>
<p>The accelerator’s mindset on cooperation & competition: Most accelerators have a predefined attitude towards cooperation and competition among the startups within their programmes. They either evaluate both or one of them to be beneficial or useless and transfer this evaluation to the startups through their communication.</p>	<p><i>“They teach us that we are all a big team. Their aim is not to produce fighting machines but to foster collaboration.” – F_SU6</i></p>

Development of motivation & pressure: The accelerators can generate motivation as well as pressure among the startups through their communication. They can, for example, encourage them, set deadlines, compare them to each other, etc.

Investor & customer relations: Another way to stimulate either cooperation or competition (but mostly competition) is through investor and customer relations.

Slack-channel communication: Most accelerators offer Slack, which is a tool to facilitate communication among team members. Therefore, the startups have the opportunity to communicate with the accelerator staff as well as with the other startups while not being in the coworking space.

Working climate & atmosphere: The accelerator can create a specific climate through their policies, practices, procedures as well as behaviours.

"[the accelerator fosters this kind of competitive mind-set when the accelerator manager is] coming out of the office, saying how many pilots are closed? Come on, Guys! Demo day's 24 days away!" – D_SU1

"When we're doing the pitches [for customers and partners] [...] we pitched in front of five different audiences [...] so it's a case of people that were, at the end of it, saying, "We're interested in that. Send me your details. Let's get in touch". So, I think it got a bit competitive then." – D_SU4

"And we are using Slack. Sometimes people post there if they need support on something. That is a good communication tool." – C_SU3

"And that is exactly how we wanted to build our accelerator: an accelerator that is approachable where no one has to be frightened to pitch. [...] Instead, we want to communicate at eye level. [...] That is also why we defined our corporate identity and the physical layout here so that everyone feels comfortable." – A_1

Coworking Space

Integration in wider coworking area: Accelerators can either provide a coworking space on their own where exclusively startups of the accelerator programme work or integrate into a wider coworking area where also other startups, entrepreneurs, accelerators, incubators, etc. take part.

Layout of the offices: The structure of the accelerator's coworking space differs. Some offer separate rooms for each startup, while others provide large open spaces with various desk groups. Additionally, some provide conference rooms, telephone rooms and quiet rooms.

'Exchange-corners': Some accelerators provide special places where startups can easily meet and exchange, such as a common living room or a large table in the kitchen to eat lunch together.

'Coffee-corners': The kitchen as well as 'coffee-corners' are often also provided for the additional purpose of stimulating exchange among the accelerator participants.

Equipment: There is also lots of scope in how to equip the coworking space, for example with sofas, dining tables and football tables.

Based on observations.

"The atmosphere here is definitely characterized by openness. You find a place that is open to your ideas [...] and helps you to reach your goals. [...] And the open space really helps. You can just stand up, talk with other people in any moment without walls, without separations." – B_SU2

"The accelerator had this large living room which they furnished with different seating possibilities and a football table where we could meet and exchange. They really created places for exchange." – A_Alumni2

Based on observations.

Based on observations.

Figure 7. Accelerators' competition toolbox

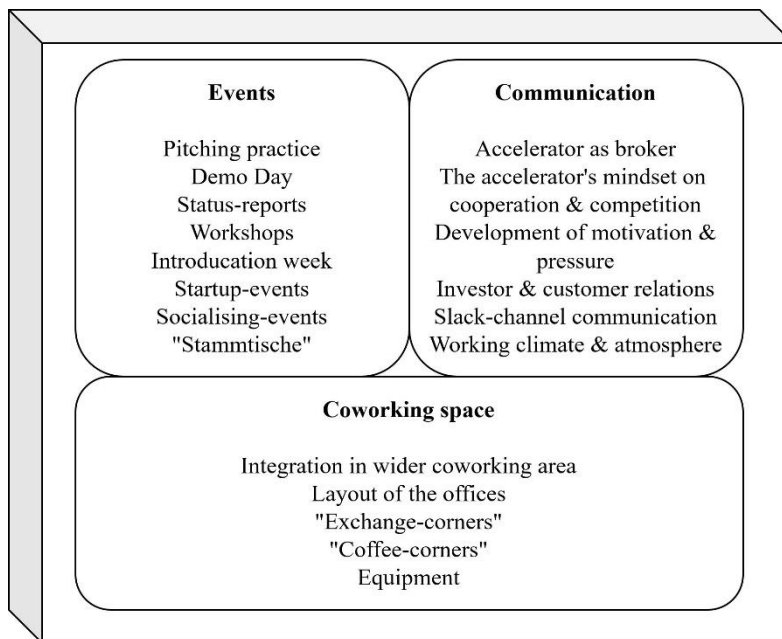
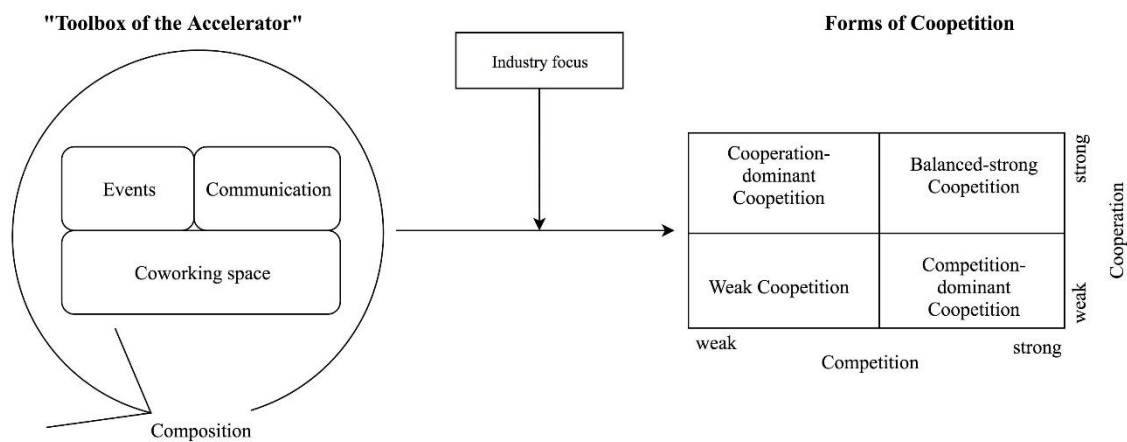


Figure 8. Accelerators as drivers of coopetition



4.4.3.2 The Moderating Effect of Accelerators' Industry Focus

Our data suggest that the effect of the accelerator's toolbox on the startups' coopetition is influenced by the accelerator's industry focus. While many accelerators are generalists across industries, others have an industry focus such as digital media, energy or healthcare (Hochberg 2016). One reason for strategically selecting firms from the same sector is to allow the pooling of resources and to stimulate experience and knowledge

sharing (Ahmad and Ingle 2011). We find that if the accelerator has an industry focus, the startups seem to cooperate and compete more extensively through the accelerator's tools. This result is in line with prior research showing that if the startups within an incubator have something in common, for example the same industry sector, cooperation is more likely to occur (Schwartz and Hornych 2008) as it facilitates sharing knowledge and technical resources (Chan and Lau 2005). Therefore, the industry specialization of incubators is supposed to increase the networking and cooperative interactions among the startups (Schwartz and Hornych 2008).

In our study, we find evidence confirming these findings in the context of accelerators. The startups seem to cooperate better when they operate in the same industry, for example, through pitching practice sessions, workshops, status reports and exchange corners. Simultaneously, the same industry focus seems to strengthen competition, which arises from tools, such as the demo day and the activities of the accelerator triggering pressure and motivation, as the startups are more likely to be market competitors (quotes see Table 11, construct "*industry focus*"). One example is Accelerator D, which accepts only startups from the media industry. Within this accelerator, the startups seem to both cooperate and compete more intensely than in the other accelerators. On the one hand, they were able to help each other better and came up with many ideas for joint projects. On the other hand, they competed more intensely for investors and customers (further examples see Table 11, construct "*industry focus*"). As a result, we propose that an industry focus of accelerators moderates the effect on the accelerator's toolbox on the startups' coopetitive relationships. More precisely, we propose that:

Proposition 8: If an accelerator has an industry focus, it strengthens the effect of the accelerator's toolbox on the startups' coopetition.

Table 11. Moderating effect: industry focus

Construct	Group	Quotes
Industry focus	Startups	“For us it depends on the similarity. If one startup is similar to us, we consider it automatically to be a competitor in a certain way.” – A_Alumni2 Total number of evidence: 14 quotes
	Accelerator staff	“In the first batch the startups operated in different fields. Therefore, there was not much exchange among the startups. In the current batch there a two teams who have similar customers. Therefore, they exchange more intensively.” – A_3 “If they target the same industry, the competitive mindset is stronger. For example, yesterday in the status-report the two startups tested [...] each other to find out: Are the others our competitors? And if yes, how can we approach them?” – F_1 Total number of evidence: 10 quotes

Altogether, accelerators seem to take on a special role in the startups’ relationships. It appears that they drive startups’ coopetition through different tools, such as *events*, *communication* and *coworking space*. Depending on which tools they use and with which frequency and intensity (composition), accelerators create coopetition. Furthermore, accelerators’ industry focus seems to play an important role in triggering cooperative and competitive relationships among startups.

4.5 Conclusion

4.5.1 Summary of the Main Results

Accelerators have received much attention in recent years because they are understood as an instrument to help startups access important networks and create a unique ecosystem for their development. Despite their increasing practical relevance, to date, little research has been conducted to fully comprehend the impact of the specific environment of accelerators on startups. In addition, previous coopetition literature has concentrated mainly on large firms and neglected SMEs and startups, although coopetition is relevant for startups, especially due to their liabilities associated with

newness and smallness. Therefore, the aim of our study was to explore the formation process and characteristics of coopetition among startups in business accelerators.

The key result of our study is that relationships among startups in accelerators include both cooperative and competitive elements. Compared to corporates that practice competition, early-stage startups apply different forms to cooperate and compete with each other. It seems that they intuitively and flexibly adapt cooperation and competition to their specific needs. Consequently, cooperation is conducted either through joint projects or through the personal exchange of ideas, feedback, and help. Cooperation seems to play an important role for startups in accelerators and appears to be linked to successes for the involved firms. While in previous coopetition literature, the cooperative part of competition is supposed to provide the involved parties with access to resources such as market knowledge, time, competence, and image (Bengtsson and Kock 2000) in the context of early-stage startups in accelerators, it provides access to important networks, business and technological knowledge, markets and customers.

Competition in accelerators occurs on the firm level for the accelerator's internal and external resources as well as on the individual level for reputation. Even though we find competition among the startups, they describe it to be healthy, and it seems to particularly fuel their motivation. This is in line with prior research that found that the competitive element of coopetition motivates firms to develop new markets and products (Bengtsson and Kock 2000).

In addition, we find that accelerators play a key role in the startups' competitive relationships. Through its toolbox, including events, communication and coworking space, the accelerator acts as an important driver for coopetition and determines which types of competition are developed among the startups. As the participating startups in accelerators are typically not related before the programme, these cooperative

relationships emerge from scratch through the external environment. Furthermore, we find that the industry focus of the accelerators seems to moderate the creation of coopetition. Figure 8 summarises our results.

4.5.2 Theoretical Contributions

First, our study adds to previous research on coopetition specifically in the field of entrepreneurship by showing that coopetition also exists among early-stage startups in accelerators. Previous coopetition research has focused mainly on large firms and has neglected SMEs (Gnyawali and Park 2009; Park et al. 2014b) and especially startups (Gast et al. 2015). Coopetition is, however, also relevant for entrepreneurial firms (Soppe et al. 2014). The specific characteristics of accelerator programmes, such as the cohort-based structure, the joint education and mentoring sessions, the limited time span and the final demo day, result in relationships characterised by both cooperation and competition. Thus, coopetitive relationships among startups are relevant in their daily coexistence in the accelerator programme. On top of that, in contrast to established corporates which were investigated in earlier coopetition research, we find that startups cooperate intuitively and flexibly adapting both cooperation and competition to their early-stage needs. Thus, they cooperate through joint projects and exchange and compete on the firm level for internal and external resources and on the individual level for reputation.

Second, we show that coopetition can be promoted through the external environment. Specifically, the accelerator itself can trigger different types of coopetition among startups through its available tools, such as events, communication and the coworking space. Previous coopetition studies have focused mainly on the content of coopetitive relationships, resulting in a scarce understanding of the coopetition formation process (Mariani 2007; Mariani 2009). In our study, we focused on this process and developed a model of coopetition formation within the specific context of business

accelerators. Additionally, we show the relevance of the unintentional and emergent development of cooperative relationships among early-stage startups. In other words, coopetition might be unintended by the startups but emerges through the external environment, which is in our case the accelerator. Most coopetition studies emphasize the intentional and deliberate formation of coopetition by the involved firms (e.g. Bengtsson and Kock 2000; Faems et al. 2010; Soppe et al. 2014). Prior literature shows that coopetition can be induced by the external environment (for example institutions and policy makers), for example, by imposing the requirement to cooperate between competitors (Mariani 2007). We add to this literature stream by showing that not only institutions and policy makers can induce coopetition but also entrepreneurial environments such as accelerators.

Finally, this study contributes to the literature on accelerators by critically investigating their role in the formation of different types of relationships among early-stage startups. Due to the newness of accelerators, there are only scarce research findings (Dempwolf et al. 2014) about their impact and efficacy on the entrepreneurial landscape (Hochberg 2016). Given that a substantial amount of resources is invested in accelerator programmes with the hope of many local governments to foster local economies, there is a need to better understand the impact of accelerators (Hochberg 2016). We contribute to this discussion by providing evidence of the accelerator's key role in the networking of startups. Through its tools, the accelerator creates an environment that has a significant influence on the startups and their respective relationships either towards cooperation, competition or coopetition.

4.5.3 Practical Implications

Our findings have several practical implications. Accelerators should be aware of their critical role as a driver of coopetition among startups and of the different tools they

could use to influence cooperation and competition. Furthermore, accelerators should understand that both cooperation and competition each can have positive effects for startups and, consequently, the success of their programme. Cooperative relationships, on the one hand, help startups to advance their business, technology, and pitching capabilities, and on the other hand, certain competitive environments can increase their motivation.

For startups, this study provides an understanding of coopetition as a relevant strategy for their development. Startups in their early stages should be aware that both cooperation and competition can have positive effects for their firms in terms of increased motivation, access to networks, business and technological advice. These effects are likely to be higher if they use the coworking space provided, as this physical attendance increases the contact with other startups as well as the accelerator. With this knowledge, startups can actively establish coopetitive relationships and exploit them through accelerators but also through other types of startup centers such as coworking spaces or incubators.

Finally, we can draw policy implications. Based on our findings, it seems to be promising to support accelerator programmes, since they are able to foster local entrepreneurial activity. Through their local support, policy makers can establish an entrepreneurial landscape to raise the entrepreneurial potential in their region and increase their attractiveness for local and even nonlocal startups. This finding might be especially interesting for policy makers that often provide funding for incubators and accelerators and typically have high expectations for their regional development (Messeghem et al. 2018).

Altogether, our study can help to better understand the importance of coopetitive network relationships in the early stages of startups – especially in the pre-seed and seed

phases of acceleration – and provide useful information about accelerators’ role in startups’ relationships for diverse stakeholders.

4.5.4 Limitations and Future Research

Our study has some limitations. First, due to the specific nature of each case, statistical generalizations of our findings to the population of accelerators and startups cannot be undertaken. Our explorative research instead aimed at analytically generalizing our set of results that we obtained through replication logic to the broader coopetition theory. Second, we did not conduct a longitudinal case study, which follows the startups beyond the accelerator programme. Future research could analyse how startups carry on their cooperative relationships beyond the accelerator programme and what impact the relationships have on their further development. Third, with our study, we are not able to specify in a quantitative way which combination and strengths of the accelerator’s tools – namely, events, communication and coworking space – lead to which coopetition type among the startups. Therefore, our insights might be a starting point for a quantitative study investigating these different types of coopetition among startups.

CHAPTER 5 | Kick-starting Startups' Financing Cycle: Accelerators' Effect on Startups' Follow-up Funding⁸

5.1. Introduction

As new players in the landscape of entrepreneurial finance, accelerators have in recent years rapidly pervaded the market and increasingly attracted the attention of participants in the startup ecosystem, politicians and researchers (Block et al. 2017; Cohen et al. 2019; Cohen and Hochberg 2014; Drover et al. 2017). Accelerators are organisations that support cohorts of startups in their early stages by providing seed capital and additional services (Cohen 2013b). Since financial means are a critical but often scarce resource at the start-up of a firm (Bruton and Rubanik 2002; Cassar 2009; Gilbert et al. 2006; Hahn 2014), accelerators' financial support appears valuable to early-stage startups. Accelerators, however, only support startups for the relatively short time span of three to six months (Cohen 2013b) and invest an initial capital of only 25,000 to 150,000 US dollars (Drover et al. 2017). Therefore, startups that are in need of more financial resources, as most are (Maynard and Warren 2014; McGowan 2018), must seek follow-up funding from additional investors (Cremades 2016). Established investors on the market include venture capitalists (VCs) and business angels (BAs). Prior studies prove that these investors work well together through complementarities such as sequential investing, co-investing or deal referral (Harrison and Mason 2000). With accelerators emerging in the field (Block et al. 2017) and prepending at the initial stage of a startup's life and financing cycles, however, the interplay of the various investors is less clear-cut. Accelerators are less likely to participate in future, larger financing rounds

⁸ This chapter is co-authored by Marisa Henn and Eva Lutz, is in the first round of revisions at The European Journal of Finance and was presented at G-Forum 2018, ENTIME 2019 and G-Forum 2019.

and become rather passive investors after the end of the accelerator programme (Cohen et al. 2019; Regmi et al. 2015). We shed light on how accelerators affect the startups' financial resource acquisition after the acceleration phase. In particular, we approach the research question: *How does the involvement of an accelerator in the first funding round affect the time to and extent of a startup's follow-up funding round?*

There is a need for research exploring this phenomenon (Hochberg 2016) for several reasons. First, it is critical to investigate accelerators' thus far unproven and disputed effectiveness in supporting startups' development (Cohen and Hochberg 2014; Gonzalez-Uribe and Leatherbee 2017; Hochberg 2016) because many financial resources from governments and investors, as well as the hopes of many local governments, are invested into accelerators (Hochberg 2016). Second, accelerators claim to accelerate the startups' development in terms of their startup life cycle, but – from an empirical perspective – startups have so far mostly been left in the dark regarding the fulfilment of this promise (Hathaway 2016). This is particularly critical, as startups give equity stakes to accelerators (Cohen 2013b). Third, accelerators alter the former entrepreneurial finance landscape by offering a distinct type of early-stage funding, and their connection with other investors is not well understood (Drover et al. 2017).

To investigate our research objective, we use a dataset, based on Crunchbase, comprising 198 firms, of which 99 are accelerator-backed firms. Our dataset includes details on firms, funding rounds and investors covering the period 2006–2017. We further enhance the dataset with founder characteristics drawn from LinkedIn and the firms' websites. To test our hypotheses, we track the firms' first and second funding rounds and conduct ordinary least squares regression and survival analysis. In order to account for a potential endogeneity problem and approach the selection bias of accelerators, we first apply propensity score matching to create a 'pseudo-random sample', including both a

treatment and a control group (Reeb et al. 2012). Second, we include further control variables on the startups' team level in a sub-sample analysis to control for the quality of a startup team.

Our analysis outlines the following results. First, we find evidence that accelerator-backed startups receive their follow-up funding on average 120 days faster than do non-accelerator-backed startups. Consequently, it seems that accelerator involvement can quite literally 'accelerate' the life cycle of startups, enabling them to approach the next funding stage earlier than comparable startups. Second, our results suggest that accelerator-backed startups can attract and convince more investors, as well as more diverse types of investors, in their follow-up funding rounds than non-accelerator backed startups. Third, we find evidence that the involvement of an accelerator in the first funding round positively affects the follow-up funding sum so that accelerator-backed startups receive higher follow-up funding investments than non-accelerator-backed startups. Consequently, accelerators seem to not only kick-start startups' funding process but also to stimulate fast and extensive follow-up funding

Our study has several theoretical contributions. First, we add to entrepreneurial finance literature in two ways. In particular, we contribute to the literature stream evaluating the new investor type of 'accelerators'. Although prior studies have deepened our understanding of accelerator programmes' typologies, designs and characteristics (see for example Cohen 2013b; Dempwolf et al. 2014; Hathaway 2016; Isabelle 2013; Kanbach and Stubner 2016; Pauwels et al. 2016), they do not yet comprehensively explore the effect of accelerators on the entrepreneurial ecosystem, the involved startups and investors. By finding that accelerators positively affect startups' follow-up funding in terms of both time to and extent of follow-up funding, our study helps to further the understanding, insufficient to date, of accelerators' effect on startups (Hochberg 2016).

In addition, we advance the entrepreneurial finance literature stream on the complementarities of different investor types. Prior literature found that established investors like VCs and BAs complement each other through different investment strategies (Harrison and Mason 2000). Research, however, has so far considered the new investor type accelerators rather in isolation (Drover et al. 2017) instead of taking a holistic approach and considering these different investor types as complements instead of substitutes (Block et al. 2017). We account for this gap by considering accelerators' interconnectedness with other investors. Our study discusses the ways in which accelerators communicate and cooperate with other investors by working closely together with and serving as a new model of deal-flow makers for follow-up investors.

Second, our study adds to the literature on signalling theory in entrepreneurship. As early-stage startups tend to have rather few signals upon which they can rely to show external observers their potential (Islam et al. 2018), it is important to turn scientific attention towards potential signals for early-stage startups, such as during the acceleration phase. Our data suggest that accelerators serve as 'door-openers' to follow-up investors and incorporate a signalling value for the startups. We argue that accelerators serve particularly as a signal of startups' quality to potential follow-up investors through their strict and competitive selection process (Cohen 2013b; Pauwels et al. 2016; Yin and Luo 2018) and their intense educational programme (Gonzalez-Uribe and Leatherbee 2017). Thereby, accelerators provide their startups with a signal which makes them stand out from the masses in the 'noisy' and crowded market of potential investments for investors (Connelly et al. 2011), resulting in faster and more extensive follow-up funding for accelerator-backed startups.

5.2. Theoretical Background and Hypothesis Development

5.2.1 Accelerators as Early-stage Investors

Financial resources are a critical and frequently lacking type of resource at the start-up of a firm (Bruton and Rubanik 2002; Cassar 2009; Gilbert et al. 2006; Hahn 2014), often discussed in entrepreneurship research as a primary reason for startups' failure (Bruton and Rubanik 2002; Peneder 2008). As entrepreneurs cannot or are unwilling to raise the required capital from their own personal financial means, they are dependent on external resource providers (Baum and Silverman 2004): i.e. investors. Established equity investors primarily include (corporate) VCs, who typically invest in mid- or later-stage firms, avoiding the high risk of early-stage startups, and BAs, who usually invest in startups in their early stages (Drover et al. 2017; Elitzur and Gavius 2003; Fishback et al. 2007; Moritz and Block 2014; National Venture Capital Association 2016).

One relatively new investor type is the accelerator (Block et al. 2017; Drover et al. 2017). Besides providing non-financial services, such as mentoring, networking and coworking, accelerators support early-stage startups with financial resources, particularly in their seed rounds, thereby easing the first financial needs of startups (Block et al. 2017; Cohen and Hochberg 2014; Drover et al. 2017). Since accelerators only provide a small amount of seed capital, however – in the range of 25,000 to 150,000 US dollars (Drover et al. 2017) – and a relatively short support time period of three to six months (Cohen 2013b; Malek et al. 2014; Pauwels et al. 2016), startups typically need more financial resources and therefore seek follow-up funding from other investors (Cohen et al. 2019; Hahn 2014; Maynard and Warren 2014; McGowan 2018). For startups' survival and success, reliable, sufficient and timely funding rounds are needed (Ahlers et al. 2015; Eisenhardt and Schoonhoven 1990; Peneder 2008). Although accelerators claim to

support startups in finding follow-up investors, the actual effect of accelerators' involvement in the first funding round on startups' second funding round is unclear. There is so far limited evidence of accelerators' effect on startups' development. Winston-Smith and Hannigan (2015), on the one hand, argue that accelerator-backed startups, specifically compared to angel-backed startups, receive faster follow-up funding from VCs in the short term but slower in the long-term. Hallen et al. (2017), on the other hand, question accelerators' efficacy and suggest that only the top accelerators, such as Y-Combinator and TechStars, can accelerate the startups' development as only they can provide valuable resources, such as an extensive network. Therefore, we investigate in our study the effect of accelerators' involvement in the first funding round on the startups' follow-up funding in terms of the time and extent of the funding.

5.2.2 Accelerators Effect on Startups' Time to Follow-up Funding

We assume that accelerators are able to accelerate startups' time to follow-up funding through two mechanisms: certification, as an external mechanism, and the investors' goal to cash out through an exit, as an internal mechanism.

Regarding the external mechanism, information asymmetries between entrepreneurs and investors arise as startups inherently obtain more information about their product, business and quality than do outside observers (Connelly et al. 2011). Therefore, as posited by 'signalling theory' (Spence 2002), external observers like investors must rely on signals sent by entrepreneurs or by third parties in order to evaluate the unobservable characteristics of startups (Connelly et al. 2011; Plummer et al. 2016). Various types of signals (e.g. board structures, top management team characteristics, the presence of prior investors or government grants) lead investors to fund startups (see Certo 2003; Elitzur and Gaviols 2003; Islam et al. 2018; Janney and Folta 2006; Lester et al. 2006). For example, a firm's prior choice of funding can serve as a signal for follow-

up funding. In particular, attracting funding from more experienced investors enhances a startup's capability to attract follow-up funding from new investors (Janney and Folta 2006), as the signal sent by experienced prior investors (e.g. BAs) might help other investors (e.g. VCs) to conduct better investment screening (Elitzur and Gaviious 2003).

One particular type of signal which reduces the information asymmetry between startups and other parties, such as investors, is 'certification' by a third party (Seppä and Maula 2001). This certification is particularly valuable if information asymmetry and uncertainty is high (Seppä and Maula 2001), which is the case for early-stage startups. Based on this research stream, we argue that accelerators function as a quality certificate to simplify and accelerate access to follow-up funding (Hallen et al. 2016; Kim and Wagman 2014) through reducing information asymmetries and uncertainties between startups and follow-up investors (Davila et al. 2003). For a quality certification to be effective, however, three criteria – namely, reputational capital at stake for the rewarding institution, observability/verifiability and costliness of the certificate – must be met (Megginson and Weiss 1991). Similar to the receipt of public subsidies (Hottenrott et al. 2017), it can be argued that the receipt of accelerators' support fulfils all certification criteria. First, accelerators have their own reputational capital at stake, since their success depends on the quality of the startups they support (Yin and Luo 2018). Second, the certification is both observable and verifiable by outsiders, such as follow-up investors. Third, their certification is costly to obtain due to a rigorous, multi-stage selection process (Pauwels et al. 2016; Yin and Luo 2018), resulting in a final acceptance rate of fewer than 3% of applications (Yin and Luo 2018). Therefore, venture development organisations, such as accelerators, have a reputation among investors for being highly capable of making informed assessments about startups (Plummer et al. 2016). Consequently, due to the prior rigorous selection process of accelerators and the certification of the startups' quality, that reduces investors' information asymmetry, we assume that follow-up

investors' due diligence is either reduced or accelerated (Cohen et al. 2019; Miller and Bound 2011), leading to rapid follow-up investment for the startups.

In addition, we argue that accelerator-backed startups receive fast follow-up funding, since investors, such as accelerators, seek ways of a profitable exit from the firm in which they invested (Cohen and Hochberg 2014; Madill et al. 2005). To achieve that, startups need to grow until an IPO is feasible or they become attractive for a strategic acquirer. To make them grow to that point, the support and financial means of VCs is typically required (Johnson and Sohl 2012; Madill et al. 2005). It seems then to be in the interest of an accelerator to support startups in receiving fast follow-up funding.

Therefore, based on the assumption of accelerators' certification effect and their desire for a profitable exit, we derive the following hypothesis:

Hypothesis 1: The involvement of an accelerator in the first funding round reduces the time to startups' follow-up funding round.

5.2.3 Accelerators' Effect on Startups' Scope of Follow-up Funding

Investors

We further assume that accelerators positively influence the number and diversity of the startups' follow-up investors due to investor networking, signalling and the popularity of co-investing among investors.

First, we argue that there is a connection between intense networking of accelerated startups and their number and diversity of follow-up investors. In line with the 'network success hypothesis' (Brüderl and Preisendörfer 1998; Witt 2004), networks are proven to be of high importance for startups (Lechner and Dowling 2003; Lechner et al. 2006; Venkataraman and Van de Ven 1998). Because of startups' intent to transform from resource-weak to resource-strong (Zhao and Aram 1995), they depend on the social

process of accessing resources through external resource providers (Baum and Silverman 2004) in their network. In order to enter the necessary networks, brokers, such as accelerators, are helpful. Indeed, networking is considered to be one of the most beneficial services of accelerators (Hoffman and Radojevich-Kelly 2012), since they are known for having wide networks (Lall et al. 2013), including contacts to peer startups, mentors, corporates and investors like VCs and BAs (Cohen 2013b). Accelerators open up their networks to their startups, thereby facilitating the flow of knowledge, talent and resources, including financial ones, towards their firms (Hansen et al. 2000).

In particular, accelerators have many connections to potential investors, to which they connect their startups in order to receive follow-up funding (Hoffman and Radojevich-Kelly 2012). They do so by both introducing certain startups individually to specific investors and collectively offering networking events, such as 'demo day', where the whole cohort has the opportunity to pitch their business ideas in front of a large audience of potential investors, thereby potentially winning over more investors (Cohen 2013b). Based on this, we assume that accelerator-backed startups have contact with more (diverse) investors, thereby having the opportunity to convince more (diverse) investors of their business, which results in a higher number of (diverse) follow-up investors. This is also in accordance to prior research, which demonstrates that the arrival of an accelerator in a region causes a significant increase in the number of early-stage VC investments in that region (Fehder and Hochberg 2015; Hochberg 2016). The batching structure of accelerators – i.e. the sorting and batching of startups into cohorts – makes it easier for investors to take notice of potential investments, and the cohorts become an easy target for investors' deal sourcing (Hochberg 2016).

In addition, we assume that the number and diversity of investors might be associated with the quality signal of accelerators' 'entrepreneurship schooling'.

Accelerators are known for providing startups with intense and immersive mentoring, consulting, training and education (Cohen et al. 2019; Cohen and Hochberg 2014; Hathaway 2016; Hoffman and Radojevich-Kelly 2012). This type of service is called 'entrepreneurship schooling' and provides entrepreneurs with 'entrepreneurial capital', including resources and expertise related to starting and growing a business, which entrepreneurs often lack (Gonzalez-Uribe and Leatherbee 2017). Through entrepreneurship schooling, years of learning value are compressed into a few months (Hathaway 2016), resulting in accelerated learning (Cohen 2013a) and in more entrepreneurial capabilities (Gonzalez-Uribe and Leatherbee 2017). We argue that this quality increase through entrepreneurship schooling and the corresponding quality signal reduces the perceived risk of investors. Therefore, more (diverse) follow-up investors are interested in investing in accelerated startups. Consequently, we assume that accelerator-backed startups have more (diverse) investors in their follow-up funding round than non-accelerator-backed startups.

Finally, we argue that the number and diversity of follow-up investors can be explained by the co-investing strategy of investors. Generally, there are complementarities among various types of investors (Cumming et al. 2019; Harrison and Mason 2000). Research shows that, for example, between BAs and VCs are four particular types of complementarities: sequential investing in firms, co-investing in deals, BAs investing in venture capital funds and deal referring (Harrison and Mason 2000). Although sequential investing in firms (i.e. the subsequent funding by VCs of firms originally raised by BAs) is the most common type of complementarity between BAs and VCs (Hellmann and Thiele 2014; Madill et al. 2005), co-investing is also becoming a significant investment strategy in which BAs invest alongside VCs in the same firm and funding round (Harrison and Mason 2000; Johnson and Sohl 2012). Co-investing also reduces both risk and workload during due diligence and the support period (Cumming

2006; Zider 1998). Since VCs are typically risk averse – and thus prefer to avoid early-stage startups (Fishback et al. 2007) – co-investing with other investors, such as BAs, might be an opportunity to reduce the risk so much that investing in an accelerated early-stage startup can become acceptable or attractive. As accelerators tend to have large networks of different types of investors which they bring together around one table on various occasions, such as demo days (Cohen 2013b), accelerators make it possible for different investors to establish relationships with each other, resulting in common investment projects. Therefore, we argue that accelerators increase the probability of co-investments among investors, which results in more (diverse) investors for accelerated startups.

Therefore, based on networking theory, signalling theory and co-investment strategies of investors, we formulate the following hypotheses:

Hypothesis 2a: The involvement of an accelerator in the first funding round positively affects the number of investors in startups' follow-up funding round.

Hypothesis 2b: The involvement of an accelerator in the first funding round positively affects the number of different investor types in startups' follow-up funding round.

5.2.4 Accelerators' Effect on Startups' Extent of Follow-up Funding

In addition to the speed of follow-up funding and the scope (both in number and diversity) of investors, the third criterion related to funding is the amount of funding. We assume that accelerators positively influence startups' amount of follow-up funding through first creating the startups' need for higher follow-up funding by accelerating the start of the next life cycle and funding stage and, secondly, by reducing the information asymmetry between startups and follow-up investors.

First, we argue that higher investment sums might be attracted from accelerator-backed startups in their follow-up funding round compared to non-accelerator-backed

startups, due to accelerator-backed startups' higher investment requirements. If accelerators are indeed able to literally 'accelerate' the startups' development, lifting them onto the next stage of their startup life cycle (Salamzadeh and Kawamorita 2015) – i.e. from the early stages to expansion stages – their funding requirements increase (Hahn 2014) to match the required financial resources with the startups' development (Eisenhardt and Schoonhoven 1990). As a consequence, accelerator-backed startups might require higher follow-up investment sums.

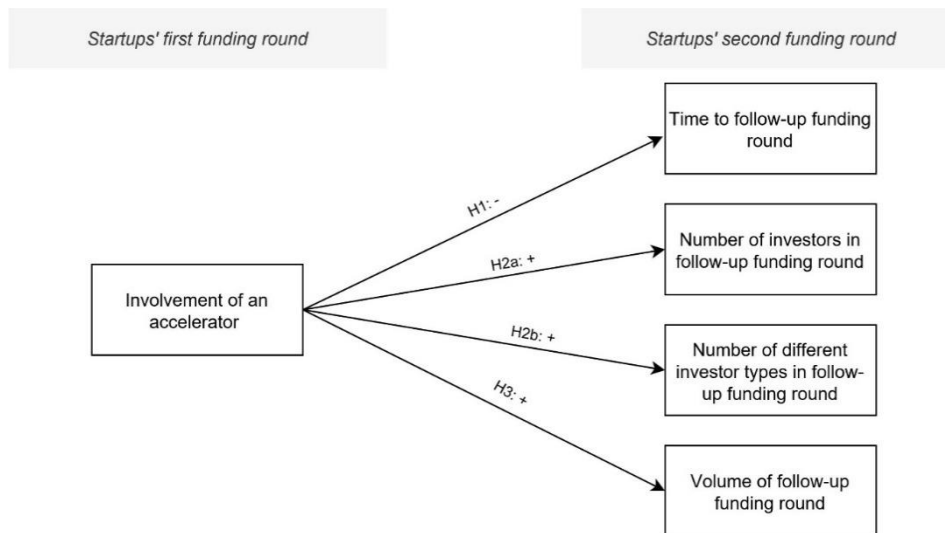
Second, it is difficult for startups to stand out for investors in today's 'noisy' and crowded market, which is overloaded with potential startup investment opportunities (Connelly et al. 2011; Plummer et al. 2016). Assuming, however, that accelerators are capable of providing useful signals to decrease the information asymmetry between their startups and follow-up investors through certification and corresponding signals (Hallen et al. 2016; Kim and Wagman 2014), the adverse selection problem (Cumming 2006; Mishra and Zachary 2014) will also be reduced and the actual growth potential of the firms will become more transparent for investors. This transparency, which is especially important for risk-averse investors, such as VCs (Drover et al. 2017; Elitzur and Gaviols 2003; Fishback et al. 2007), reduces the investors' perceived risk. Thus, investors like VCs are more likely to get on board with the follow-up funding round. Since VCs generally tend towards larger investments, startups might achieve higher funding sums by including them in their funding round (Fishback et al. 2007; Hellmann and Thiele 2014; National Venture Capital Association 2016).

Therefore, we formulate the following hypothesis:

Hypothesis 3: The involvement of an accelerator in the first funding round positively affects the volume of the startup's follow-up funding round.

Figure 9 summarises the above discussion and illustrates our research model, including the four hypotheses.

Figure 9. Research model



5.3. Data and Method

5.3.1 Data Sources and Sample

Our research is based on data from Crunchbase, a platform that provides information about technology firms, people, investors, funding rounds, acquisitions and IPOs worldwide. Our final dataset contains 198 firms with details on firm, funding round and investors, covering the period 2006–2017. Specifically, our sample includes 99 accelerator-backed and 99 non-accelerator-backed startup firms. Subsequently, we enlarge the dataset with hand-collected founder characteristics drawn from LinkedIn and the firms' websites.

5.3.2 Structure of the Dataset

Our unit of analysis is the startups' funding rounds: i.e. the round of financing from investors which startups use to set up and develop their business. Therefore, we only include startups with a full funding history and complete investor details.

As we investigate the effect of accelerator involvement in the first funding round on the startups' subsequent funding round, we restrict our analysis to the first and second funding rounds of each startup. Our sample includes 99 firms which involved an accelerator (in the treatment group) and 99 firms which involved another investor (in the control group) in their first funding rounds and subsequently received second-round funding from one or more follow-up investors. Thus, each startup has at least two funding rounds completed. This approach avoids biases resulting from previous investment experiences. Additionally, our sample excludes startups with a first financing round prior to the year 2006 or with a second financing round after the year 2017 because the first accelerator (Y-Combinator) was established in 2005 and accelerators have since grown rapidly (Cohen and Hochberg 2014), becoming a complement to VCs and BAs for early-stage startups seeking funding and support (Block et al. 2017).

Furthermore, in order to avoid biases resulting from differences in the quality and reputation of the startups, we conduct the following three steps. First, all startups included in our dataset received business angel financing in the first funding round alongside the financial support of the accelerator. We consider the provision of angel funding as a quality criterion (Elitzur and Gaviious 2003) since the startup has been additionally checked through due diligence and supported by an angel investor. Second, due to the non-random treatment effect in our sample that might result in selection bias and potential endogeneity problems, propensity score matching is applied to identify an appropriate control group of startups (Schwartz 2013) that were not funded by accelerators but from other investors, such as BAs and micro VCs, in their first funding rounds. We estimate the propensity scores – the probability that an observation receives treatment, given a number of important characteristics (Schwartz 2013) – via a probit regression. The matching variables include the variables industry, the funding volume of all funding rounds in total, the year of the first funding round and the firm's home country. We

conduct nearest-neighbour matching with the Mahalanobis distance and apply a caliper of 0.1. We do so because being selected into an accelerator programme is not the result of random chance; rather, accelerators select startups into their programme specifically based on their estimation on the startups' potential (Yin and Luo 2018). Third, we select only startups that have at least one additional funding round after the funding by an accelerator, which also serves as a quality control.

5.3.3 Variable Description

5.3.3.1 *Dependent Variable: 2nd Funding Round*

We proxy the construct *2nd funding round* with four dependent variables. First, the *time to 2nd funding round* is a continuous variable measuring the time in days from the first funding round until the follow-up funding round. Second, the *number of investors in 2nd funding round* reflects the total number of investors in the firm's follow-up funding round. Third, the *number of different investor types in 2nd funding round* measures the diversity of investor types: i.e. VCs and micro VCs, accelerators, BAs, incubators, private equity, corporate VCs and family office, thereby mirroring the diversity of investor types. Fourth, the *volume of 2nd funding round* measures the amount of money in US dollars the firm received in total from investors in the follow-up funding round.

5.3.3.2 *Independent Variable: Accelerator-backed Startup*

The independent variable is a binary variable that equals one for a startup's first funding round being backed by an *accelerator* and zero for a startup's first funding round being backed by another investor type.

5.3.3.3 *Matching Variables*

Previous studies in incubator and accelerator research have used the following important variables to identify an appropriate control group: industry, firm location, age of the firm (e.g. Colombo and Delmastro 2002; Ferguson and Olofsson 2004; Lindelöf

and Löfsten 2004; Schwartz 2013; Winston-Smith and Hannigan 2015). We decide to use *industry, total funding volume of the firm (in all rounds), year of 1st funding round* and *country*. Industry and country are important in matching startups to make them as comparable as possible. Instead of using the age of the firm, however, we match along the *year of 1st funding round* since our focus is on the startups' funding. Additionally, we use the *total funding volume of the firm* in order to match the financial requirements and the quality of the startups.

5.3.3.4 Control Variables

In our analysis of startups' follow-up funding, we are confronted with two different parties that are involved in the funding – the startup and the investor(s) – each of which have particular factors that might influence the startups' second funding rounds; therefore, we control for these factors. In regards to the startup, we control for the *number of employees, the raised amount in the first funding round* and the *firm's age*. Concerning the investor, we control for the type of investor in the first round using the binary variables *VC* and *Micro VC*. We do so because our data show that in the first funding round the accelerator is not necessarily the only investor but might invest along other investors, such as BAs and VCs. By controlling for these variables, we can separate their effect from the effect of the accelerator on the dependent variable. As well, we control for the *number of investors in the 1st funding round*, for a *single investor in the 1st funding round* with a binary variable and for an international syndicate of investors in the first funding round with the binary variable *international syndicate in 1st funding round*, since prior studies found an effect of the number and diversity of investors on startups' development (see for example Plagmann and Lutz 2019; Tastan et al. 2013). The full set of variables used in our models and their definitions are described in Table 12.

Table 12. Definition of variables

Variables	Definition
Dependent variable:	
Time to 2nd funding round	A continuous variable counting the time period from the first to the second funding round, measured in days
No. of investors in 2nd funding round	A discrete variable reporting the total number of investors in the second funding round
No. of different investor types in 2nd funding round	A discrete variable reporting the total number of different funding instruments in the second funding round
Volume of 2nd funding round	A continuous variable that depicts the total funding volume in the second funding round, measured in US dollars
Independent variable:	
Accelerator	A dummy variable that equals 1 if a startup received a funding of an accelerator in the first funding round and zero otherwise
Matching variables:	
Total funding volume	A continuous variable reporting the startup's total funding volume in US dollars
Year of 1st funding round	A discrete variable including the years of the startup's first funding
Country Dummies	A set of dummy variables for each of 12 countries in our sample; they equal one for a startup from that country and zero otherwise.
Industry Dummies	A set of dummy variables for each of 44 industries in our sample; they equal one for a startup from that industry and zero otherwise.
Control variables:	
VC	A dummy variable that equals 1 if the startup received a funding from a venture capitalist in the first funding round and zero otherwise
Micro VC	A dummy variable that equals 1 if the startup received a funding from a micro venture capitalist in the first funding round and zero otherwise
Employees	An ordinal variable that depicts the number of employees; it ranges from 1 to 9, with the following values: 1 (1-10 employees), 2 (11-50), 3 (51-100), 4 (101-250), 5 (251-500), 6 (501-1000), 7 (1001-5000), 8 (5001-10000), 9 (10000 +)
Volume of 1st funding round	A continuous variable reporting the total funding volume in the first funding round, measured in US dollars
No. of investors in 1st funding round	A discrete variable reporting the total number of investors in the first funding round
LN_age	Natural logarithm of a startup's age in years
Single investor in 1st funding round	A dummy variable that equals 1 if the startup is funded by only one investor in the first funding round and zero otherwise
International syndicate in 1st funding round	A dummy variable that equals 1 if the startup is funded by at least two investors of different countries and zero otherwise

Note: This table displays the measurement of all variables used in our analysis

5.3.4 Empirical Strategy

The aim of the study is to analyse the effect of accelerator involvement in the first funding round on the startups' follow-up funding round. The empirical analysis is split

into two different statistical approaches: time-to-event analysis (for H1) and linear regression models (for H2–H3).

First, in order to test H1, we conduct survival analysis, also called time-to-event analysis. In the survival analysis, we estimate the time until our event of interest (the startups' 'second funding round') occurs (Schober and Vetter 2018). Consequently, survival time is defined in our study as 'time until second funding round'. Our data are neither censored nor left-truncated (Kleinbaum and Klein 2011). It seems, however, that our data involve right truncation, since we naturally excluded relatively 'long' times until the second funding round as our dataset ends in 2017 (Jenkins 2005).

In the first step, we calculate the survivor function $S(t)$, which in our study gives the probability that a startup receives follow-up funding only after some specified time t (Kleinbaum and Klein 2011). We compute the survival probability curves using the Kaplan-Meier method, "a nonparametric method to estimate survival probabilities over time" (Schober and Vetter 2018, p. 738). The resulting Kaplan-Meier curves enable the descriptive comparison of the survival probabilities. The Log-rank-test and Wilcoxon test are subsequently used to statistically compare the values of the Kaplan-Meier curves (Zwiener et al. 2011).

Additionally, we calculate the hazard rate of receiving follow-up funding with the Cox proportional hazard model. The hazard function $h(t)$ can be understood as the instantaneous risk for the event 'receiving follow-up funding' to occur at time t , given that the startup has not received funding up to time t (Kleinbaum and Klein 2011; Zwiener et al. 2011). Hence, in contrast to the survivor function, which focuses on the event 'second funding round' not occurring, the hazard function concentrates on the event occurring (Kleinbaum and Klein 2011).

In the second part of the analysis, we use linear regression models to analyse the effect of an accelerator involvement in the first funding round on the number and diversity of follow-up investors (H2a–b) and the follow-up funding sum (H3).

5.3.5 Descriptive Statistics

The descriptive statistics can be found in Table 13 and 14. Table 13 provides an overview of the key descriptive statistics. The sample includes 198 observations: i.e. startups that receive follow-up funding. The means, medians, standard deviations (SD) and minimum and maximum values of the matching, dependent, independent and control variables related to the startups, as well as their first and second rounds of funding, are reported. The statistics indicate that the average funding volume increases from 617,300 US dollars in the first funding round to 2,023,219 US dollars in the second funding round. Furthermore, the firms need on average 423.96 days from the first funding round until the follow-up funding round and have 3.16 investors and 2.12 different investor types in their second funding round. We also report the descriptive statistics of further relevant variables for our research model, such as the average age of the startups during the first funding round (1.75 years) or the average number of investors during the first funding round (2.96).

Table 14 illustrates the frequencies of both industries and countries, as well as the time to the follow-up funding of the startups in the sample, respectively. In particular, Panel A shows the number of firms per industry in our sample. There is a broad range of industries represented in the sample, with the software industry the most represented (16.59%), followed by the data analytics industry with 8.68%. Panel B presents the number of firms per country in our sample. Most of the firms (77.27%) in our sample are located in the US. Panel C provides the number of firms that received their follow-up funding during each time period. The occurrence of the event of interest (follow-up

funding) is clustered based on quarterly periods. Overall, 20% of all firms receive their follow-up funding within the first six months after the first funding round, 50% within the first year and 85% within the first two years.

In Table 15 we present in the first numerical column Variance Inflation Factors (VIF) and, thereafter, the Pearson correlation coefficients of the variables used in our regression models, including the p-values indicating whether the correlation coefficients are significantly different from zero (indicated with *). The VIFs, which indicate the degree to which the respective independent variable is correlated with the other independent variables, are all below the threshold value of 10 (Chatterjee and Hadi 2015). Therefore, multicollinearity can be excluded (Kroll et al. 2008). Additionally, the table shows that all correlation coefficients are below the critical threshold of 0.7, which also implies that multicollinearity is not an issue (Anderson et al. 2014).

Table 13. Descriptive statistics

Variables	N	Mean	Median	SD	Min	Max
Dependent variables:						
Time to 2nd funding round	198	423.96	365	293.09	8	1.352
No. of investors in 2nd funding round	198	3.16	2	2.34	1	11
No. of different investor types in 2nd funding round	198	2.12	2	0.76	1	4
Volume of 2nd funding round	165	2,023,219	1,000,000	2,625,233	3,346	17,300,000
Independent variable:						
Accelerator	198	0.50	0.50	0.50	0	1
Matching variables:						
Total funding volume	198	2,303,316	0	3,051,235	4,470	18,900,000
Year of 1st funding round	198	2013	0	2.05	2006	2018
Control variables:						
VC	198	0.29	0	0.46	0	1
Micro VC	198	0.32	2	0.47	0	1
Volume of 1st funding round	198	617,300	2	835,293	1,124	4,000,000
No. of investors in 1st funding round	198	2.96	1,5	3.04	1	20
LN_age	198	1.75	1.79	0.39	0.69	2.64
Single investor in 1st funding round	198	0.45	0	0.49	0	1
International syndicate in 1st funding round	198	0.20	0	0.4	0	1

Note: This table represents the descriptive statistics, including the mean, median, standard deviation, minimum and maximum values of the variables in the multivariate regression models. We do not report the industry and country dummies. Our sample consists of 198 observations.

Table 14. Industries, countries and time to follow-up funding of sampled startups

Panel A:	Frequency	Percent		Frequency	Percent	
<i>Observations per Industry</i>			<i>Observations per Industry</i>			
Software	109	16.59%	Navigation Mapping	7	1.07%	
Data Analytics	57	8.68%	Privacy Security	7	1.07%	
Mobile	48	7.31%	Contentpublishing	6	0.91%	
Internet Services	41	6.24%	Consumer Electrics	5	0.76%	
Commerce Shopping	35	5.33%	Food Beverage	5	0.76%	
Information Technology	30	4.57%	Platforms	5	0.76%	
Media Entertainment	28	4.26%	Real Estate	5	0.76%	
Apps	27	4.11%	Sports	5	0.76%	
Artificial Intelligence	25	3.81%	Biotechnology	4	0.61%	
Financial Services	22	3.35%	Community Lifestyle	4	0.61%	
Sales Marketing	21	3.20%	Gaming	4	0.61%	
Healthcare	20	3.04%	Lending	4	0.61%	
Scienceengineering	20	3.04%	Admin_services	3	0.46%	
Education	17	2.59%	Clothing Apparel	3	0.46%	
Hardware	15	2.28%	Government	3	0.46%	
Advertising	12	1.83%	Payments	3	0.46%	
Transportation	9	1.37%	Events	2	0.30%	
Video	9	1.37%	Professional Services	2	0.30%	
Consumer Goods	8	1.22%	Energy	1	0.15%	
Design	8	1.22%	Music Auto	1	0.15%	
Travel Tourism	8	1.22%	Natural Resources	1	0.15%	
Messaging Telecommunication	7	1.07%	Sustainability	1	0.15%	
Total observations			657	100%		
Panel B:	Frequency	Percent	Panel C:	Frequency	Percent	Cumulative %
<i>Observations per Country</i>			<i>Observations per Time Period</i>			
The United States of America	153	77%	Year 1, month 1-3	4	2.02%	2.02%
The United Kingdom of Great Britain and Northern Ireland	15	8%	Year 1, month 4-6	39	19.70%	21.72%
Australia	8	4%	Year 1, month 7-9	31	15.66%	37.37%
Canada	6	3%	Year 1, month 10-12	26	13.13%	50.51%
Brazil	4	2%	Year 2, month 1-3	21	10.61%	61.11%
The Russian Federation	4	2%	Year 2, month 4-6	16	8.08%	69.19%
India	2	1%	Year 2, month 7-9	16	8.08%	77.27%
Italy	2	1%	Year 2, month 10-12	17	8.59%	85.86%
Denmark	1	1%	Year 3, month 1-3	12	6.06%	91.92%
Spain	1	1%	Year 3, month 4-6	5	2.53%	94.44%
Slovenia	1	1%	Year 3, month 7-9	2	1.01%	95.45%
The United Arab Emirates	1	1%	Year 3, month 10-12	2	1.01%	96.46%
Total observations			198	100%		
			Year 4, month 1-3	2	1.01%	97.47%
			Year 4, month 4-6	0	0.00%	97.47%
			Year 4, month 7-9	5	2.53%	100.00%
			Total observations	198	100.00%	

Note: Panel A in this table represents the number of firms per industry in the dataset. The total number of observations is 657 since firms could name more than one industry to describe their business. Panel B in this table represents the number of firms per country in the dataset with a total number of 198 firms. Panel C in this table presents the number of firms that received their follow-up funding in the respective time period after their first funding round. Time periods are calculated based on quarterly periods.

Table 15. Variance inflation factors and correlation coefficients

Variables	VIF	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1 Time to 2nd funding round		1.00														
2 No. of investors in 2nd funding round		-0.23 *	1.00													
3 No. of different investor types in 2nd funding round		-0.11	0.52 *	1.00												
4 Volume of 2nd funding round		0.14	0.23 *	0.22 *	1.00											
5 Accelerator	1.10	-0.23 *	0.34 *	0.19 *	0.12	1.00										
6 VC	1.72	0.17 *	0.05	0.30	0.39 *	0.00	1.00									
7 Micro VC	1.43	0.11	0.15 *	0.24 *	0.14	-0.06	0.24	1.00								
8 Volume of 1st funding round	1.75	0.18 *	0.03	0.21 *	0.65 *	0.01	0.57	0.25 *	1.00							
9 No. of investors in 1st funding round	2.23	0.11	0.09	0.22 *	0.33 *	0.16 *	0.55	0.52 *	-0.06 *	1.00						
10 LN_age	1.09	0.10	-0.09	-0.07	-0.11	-0.05	-0.11	-0.06	0.11	-0.06	1.00					
11 Employees	1.14	0.23 *	-0.08	0.05	0.23 *	-0.13	0.14	0.11	0.19 *	0.11	0.24 *	1.00				
12 Single investor in 1st funding round	1.80	-0.08	0.01	-0.19 *	-0.26 *	-0.06	-0.43 *	-0.46 *	-0.44 *	-0.59 *	0.05	-0.11	1.00			
13 International syndicate in 1st funding round	1.45	0.03	0.13	0.27 *	0.20 *	0.05	0.31 *	0.30 *	0.38 *	0.45 *	-0.07	0.25 *	-0.46 *	1.00		
Country Dummies		incl.	incl.	incl.	incl.	incl.	incl.	incl.	incl.	incl.	incl.	incl.	incl.	incl.	incl.	incl.
Industry Dummies		incl.	incl.	incl.	incl.	incl.	incl.	incl.	incl.	incl.	incl.	incl.	incl.	incl.	incl.	incl.

Note: This table presents the variance inflation factors (VIF) and the pairwise Pearson correlation coefficients of the independent variables used in the multivariate regression models. Stars (*) indicate *p* values smaller than 0.05.

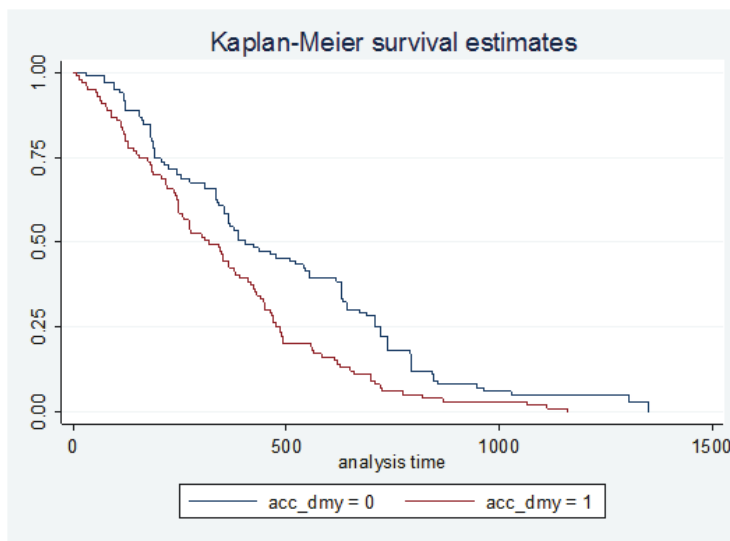
5.4. Results and Discussion

5.4.1 Acceleration of Startups' Time to Follow-up Funding through

Accelerators

To investigate our first hypothesis, we analyse the effect of an accelerator involvement in the first funding round on startups' time to the second funding round. As the dependent variable is 'time to follow-up funding', we conduct time-to-event-analysis. A comparison between the survival probabilities of accelerator-backed and non-accelerator-backed startup groups at different points in time is provided by the survivor curves in Figure 10 (Kleinbaum and Klein 2011). The graphs show that the survivor function of the treatment (accelerator-backed) group consistently lies below the control (non-accelerator-backed) group. That indicates that the treatment through an accelerator appears effective at all points in time because the event 'follow-up funding round' consistently sets in earlier than for the control group. Our analysis further provides estimates of the median survival time ("the time at which the survival probability is 0.5 for each group" (Kleinbaum and Klein 2011, p. 30)). For the treatment group, the median is 318 days; for the control group, the median is 402 days. This comparison further indicates that the accelerator treatment is more effective in inducing rapid follow-up funding, thereby also reducing the time to follow-up funding. Moreover, to test the equality of the survivor functions, we perform a log-rank and a Wilcoxon-Breslow-Gehan test. The log-rank statistic is 12.10 with a corresponding p-value of 0.0005, and the Wilcoxon test statistic is 9.05 with a corresponding p-value of 0.0026. As the p-values are smaller than 0.05, we can conclude that the treatment and control groups have significantly different Kaplan-Maier survival curves (Kleinbaum and Klein 2011).

Figure 10. Kaplan-Meier survival curves



Note: As part of the time-to-event-analysis, we conduct the survivor function $S(t)$ which gives the probability that a person survives longer than some specified time t . Respectively in our study the survivor function $S(t)$ gives the probability that a startup only receives follow-up funding after some specified time t . We compute the survival probability curves by using the Kaplan-Meier method. This figure shows the graphs of the Kaplan-Meier survival curves of accelerator-backed versus non-accelerator-backed startups. The graphs show that the survivor function of the accelerator-backed group lies consistently below the non-accelerator-backed group. The estimate of the median survival time for the accelerator-backed group is 318 days and for the non-accelerator-backed group 402 days.

Furthermore, the calculated hazard ratio allows us to compare the survival times of the treatment and control groups. Since the hazard ratio in our Cox proportional hazard model is 1.7 for accelerator-backed startups compared to non-accelerator-backed startups (for Cox regression, see Table 16) the risk of receiving follow-up funding for accelerator-backed startups is 1.7 times as fast (in other words, 70% faster) as that of non-accelerator-backed startups (Zwiener et al. 2011). The p-value for the test statistic, here the Wald statistic, is smaller than 0.0001, and therefore the effect is significant. Overall, these test results show that the treatment effect is significant, which implies that the involvement of an accelerator is more effective in reducing the time to follow-up funding compared to other early-stage investors.

Table 16. Cox regression

Variables	Time to 2nd funding round Model 1
Main variable of interest:	
Accelerator	0.553*** (0.158)
Control variables:	
VC	-0.231 (0.236)
Micro VC	-0.183 (0.196)
Volume of 1st funding round	-6.83e-08 (1.18e-07)
No. of investors in 1st funding round	-0.0103 (0.0397)
LN_age	-0.504** (0.223)
Single investor in 1st funding round	0.0595 (0.198)
International syndicate in 1st funding round	0.117 (0.220)
Observations	198

*** p<0.01, ** p<0.05, * p<0.1

Note: As part of the time-to-event analysis, we conduct the Cox proportional hazard regression in order to calculate the hazard rate of receiving fast follow-up funding. This table represents the empirical results of the Cox-regression analysis. Standard errors are reported in parentheses. It is important to note how to calculate the hazard rate of 1.7 based on the regression coefficient:

The Cox proportional hazards regression model states that the hazard rate for the j^{th} subject in the data is: $h(t|x_j) = h_0(t) \exp(x_j\beta_x)$ where the regression coefficients, β_x , are to be estimated from the data (Cleves et al. 2010).

The results report that for the accelerator-backed firm data,

$$H(t|Accelerator) = h_0(t) \exp(0.5530286 * Accelerator)$$

Since in our dataset, the variable *Accelerator* equals 1 or 0; it equals 1 if the firm is accelerator-backed and 0 otherwise. These results say that

$$H(t|Accelerator = 0) = h_0(t);$$

$$H(t|Accelerator = 1) = h_0(t) \exp(0.5530286);$$

so the hazard (i.e. the hazard ratio) is $\exp(0.5530286) = 1.73851$

Additionally, we check the robustness of our results by conducting a linear regression analysis. For this purpose, we run Model 1 (see Table 17), controlling for factors of the startup and the investor(s). Our results indicate that the involvement of an accelerator in the first funding round reduces the time to the second funding round by 120 days on average compared to being funded by a comparable investor, such as a business angel or micro VC, in the first funding round (-120.1, $p < 0.01$). That means that accelerator-backed startups receive their follow-up funding faster than do non-accelerator-backed startups. Based on survival analysis and linear regression analysis, we therefore confirm Hypothesis 1.

Consequently, accelerator involvement is able to quite literally 'accelerate' the cycle of a startup. When referring to startups' funding, 'acceleration' becomes relevant, particularly for startups that must rely on a fast execution of their first or early-mover advantage (Ahlers et al. 2015). Fast receipt of follow-up funding is necessary to avoid interruptions based on financial restrictions (Ahlers et al. 2015) and be ready for launching the growth stages from a financial standpoint (Eisenhardt and Schoonhoven 1990; Peneder 2008). Hence, rapid follow-up funding reduces the risk of failure due to a lack of financial resources (Bruton and Rubanik 2002). Although receiving follow-up funding, particularly from VCs, is considered the 'holy grail' of fundraising (Bueschen 2015), it must be noted that it is also associated with drawbacks, such as giving up equity stakes and control rights and high expectations of the investor early in the startup's life cycle (The Startups Team 2019)

Table 17. Empirical analysis: effect of accelerators on startups' 2nd funding round

	Time to 2nd funding round	No. of investors in 2nd funding round	No. of different investor types in 2nd funding round	Volume of 2nd funding round
Variables	Model 1	Model 2	Model 3	Model 4
Main variable of interest:				
Accelerator	-120.1*** (41.58)	1.701*** (0.32)	0.343*** (0.10)	797,433** (316,091)
Control variables:				
Employees	61.08** (26.20)	-0.21 (0.20)	-0.0108 (0.07)	551,948*** (187,867)
Volume of 1st funding round	3.95E-05 (0.00)	7.25E-08 (0.00)	3.84E-08 (0.00)	2.272*** (0.26)
No. of investors in 1st funding round	4.019 (10.26)	-0.0862 (0.08)	-0.0412 (0.03)	-95,284 (73,764)
LN_age	49.63 (53.97)	-0.235 (0.42)	-0.0109 (0.13)	-576,501 (402,086)
VC	60.31 (57.44)	0.381 (0.44)	0.450*** (0.14)	239,581 (436,294)
Micro VC	27.61 (52.13)	1.266*** (0.40)	0.366*** (0.13)	-37,338 (389,839)
Single investor in 1st funding round	10.51 (53.34)	0.869** (0.41)	0.0733 (0.13)	-106,646 (401,834)
International syndicate in 1st funding round	-71.57 (59.48)	0.877* (0.46)	0.360** (0.15)	-721,664 (444,724)
Constant	250.1** (108.80)	2.162** (0.84)	1.723*** (0.27)	790,701 (825,590)
Observations	198	198	198	165
R-squared	0.136	0.185	0.195	0.485

*** p<0.01, ** p<0.05, * p<0.1

Note: Our sample consists of 198 observations of which 99 are accelerator-backed and 99 are non-accelerator-backed startup firms. To account for potential endogeneity and selection bias problems we conduct propensity score matching. Thereby, we identify an appropriate control group of 99 startups that were not backed by accelerators but similar on important characteristics including the variables industry, funding volume of all funding rounds in total, funding year of the first funding round and country. This table represents the empirical results of the multivariate regression models to investigate the effect of an accelerator involvement in the first funding round on the follow-up funding of the firms. Model 1 reports the results of the effect of the dummy variable *Accelerator* on the *time to 2nd founding round*. Model 2 reports the results of the effect of the variable *Accelerator* on the *number of investors in the 2nd founding round*. Model 3 reports the results of the effect of the variable *Accelerator* on the *number of different investor types in 2nd funding round*. And Model 4 reports the results of the effect of the variable *Accelerator* on the *volume of 2nd funding round*. All models contain the control variables number of employees, the volume of 1st funding round and the firm's age as well as the number of investors in 1st funding round, VC, Micro VC in the 1st funding round, single investor in the 1st funding round and international syndicate in 1st funding round. Standard errors are reported in parentheses.

5.4.2 Increase in Startups' Follow-up Funding through Accelerators

In order to generate not only insight into the speed to follow-up funding (see H1) but also the extent of follow-up funding (H2–3), we run Models 2, 3 and 4 (see Table 17). In Model 2 we focus on the total number of second-round investors. The results show that the involvement of an accelerator in the first funding round positively affects the number of second-round investors. This effect is significant on the 1% level. Looking at the coefficient, accelerator-backed startups have 1.7 more investors in the second funding round than do comparable non-accelerator-backed startups (1.701, $p < 0.01$). Thus, it appears that accelerator-backed startups are able to attract and convince more investors in their follow-up funding round than can non-accelerator backed startups. Therefore, the results are in line with hypothesis 2a.

Having more investors in the same funding round might result in receiving more total support if the investors are, for example, VCs or BAs, who provide not only financial resources but also non-financial value-added (Large and Muegge 2008; Politis 2008). This is especially beneficial when startups operate in complex industries and thus are able to benefit from the specialised skills and knowledge of various investors (Bayar et al. 2018). Having more investors in one funding round, however, might also imply less support per investor due to a so called 'free-rider' problem: i.e. investors do not contribute the effort expected of them (Bayar et al. 2018). In particular, large syndicates (with more than six investors) involve more coordination and communication problems as well as conflicts of interest, (Cumming et al. 2019) leading to an adverse effect on the startups' development: for example, regarding the time to IPO, under-pricing at IPO and post-IPO-profitability (Tastan et al. 2013).

Subsequently, in Model 3 (see Table 17) we focus on the diversity of follow-up investors in the startups' second funding round, specifically on the number of different

investor types. Our results indicate that accelerator-backed firms have 0.3 more types of investors (0.343, $p < 0.01$) in their follow-up funding round than do non-accelerator-backed startups; this supports hypothesis 2b. Diversity or heterogeneity in investor types might be beneficial, since different investors have different characteristics, skills, experience and areas of specialisation, which influence the startups' performance and success differently (Bayar et al. 2018; Manigart and Wright 2013; Moen et al. 2008). This co-investing strategy among different investor types (for example, BAs and VCs) reduces the costs and risks for the involved investor parties but might also result in VCs' withdrawing from mentoring and monitoring, leaving this task to the angel investors (Harrison and Mason 2000).

Lastly, in Model 4 (see Table 17) we analyse the effect of accelerator funding in the first funding round on the volume of the second funding round. In accordance with Hypothesis 3, we find that accelerator involvement in the first funding round positively affects the follow-up funding sum: i.e. accelerator-backed startups receive higher follow-up funding investments than non-accelerator-backed startups. The coefficient indicates that accelerator-backed startups receive on average 797,433 US dollars ($p < 0.05$) more follow-up funding than comparable startups backed by other investors in their first funding rounds. More extensive funding volumes might support the growth of the startups, since startups not only typically lack resources at the start-up of their firm (Bruton and Rubanik 2002; Cassar 2009; Gilbert et al. 2006; Hahn 2014), but also feel the pressure of the lack of financial resources when they intend to grow beyond the foundation period (Brown and Earle 2017; Bruton and Rubanik 2002; Carpenter and Petersen 2002b; Eisenhardt and Schoonhoven 1990; Peneder 2008).

Overall, our results provide support for our hypothesis regarding accelerators' effect on startups' follow-up funding in terms of the speed and extent of the second funding round.

5.4.3 Robustness Checks

In order to address potential endogeneity problems which might result from the quality of the startup's team, we perform a robustness check by including further control variables on the team level. The team's quality might influence its success in receiving follow-up funding from investors. To proxy the quality of the startup's team, we use several indicators, which can also be observed by investors during their investment decision. Prior literature shows that investors explicitly consider the entrepreneur and entrepreneurial team as critical decision criteria in their investment process (Baum and Silverman 2004; Franke et al. 2006; MacMillan et al. 1985; Sudek 2007). Therefore, first we hand-collect data on the startup founders' characteristics through the firms' websites and LinkedIn. We include the variables *number of founders* to account for team size, as it is argued that firms founded in a team are more successful than single-founder firms (Almus and Nerlinger 1999), and *number of male founders* to account for gender diversity in the team, since prior research shows that gender diversity can positively influence the success of a firm (Francoeur et al. 2008). Additionally, we use *work experience in total of the startup's founders* in years to control for working capabilities (Cooper et al. 1994); similarly, we use *experience in founding and working for startups* to control for prior involvement in startups (Hottenrott et al. 2017). Moreover, we control for the *total number of university degrees* in the founding team since education is related to the founders' skills, knowledge, commitment and problem-solving ability (Cooper et al. 1994). Finally, we include the *network size* of the founders as a control variable, since

networks increase the probability of new firms' succeeding (Brüderl and Preisendörfer 1998) (for detailed variable descriptions, see Table 18).

We then construct a sub-sample of the original sample because the necessary data is not available for all the firms' founders. Thus, our sub-sample consists of 163 observations. Then, we re-run our basic models (Models 1–4) with the additional control variables. The results (see Table 19) show that after controlling for team level variables, the direction and significance of effects remain the same, and the effects can therefore be interpreted as being robust. From this it follows that indeed the involvement of an accelerator in the first funding round positively affects the speed to and extent of startups' follow-up funding.

Table 18. Definition of additional variables for sub-sample analysis

Additional variables for sub-sample analysis	Definition
Additional control variables:	
University degrees in startup_total	The summation of all university degrees (each degree counts as 1) of all founders in a startup team (absolute number)
No. of founders	The total amount of founders in the startup team (absolute number)
No. of male founders	The relative amount of male founders in relation to the total amount of founders (relative number)
Work experience_total	The summation of all years of work experience of all founders of a startup team (absolute number)
Startup work experience_total	The summation of all years of work experience in a startup of all founders of a startup team (absolute number)
Networksize_total	Number of founders that have a network bigger than 500 persons in their LinkedIn account (absolute number)

Note: This table displays the definition of all additional control variables used in the sub-sample analysis for robustness checking.

Table 19. Robustness check, sub-sample analysis: additional control variables

VARIABLES	Time to 2nd funding round	No. of investors in 2nd funding round	No. of different investor types in 2nd funding round	Volume of 2nd funding round
	Model 1	Model 2	Model 3	Model 4
Main variable of interest:				
Accelerator	-151.6*** (54.29)	1.672*** (0.367)	0.384*** (0.119)	874,413** 365.898
Control variables:				
Employees	127.6*** (36.16)	-0.511* (0.263)	-0.0312 (0.0851)	611,471** 248.714
Volume of 1st funding round	2.27e-05 (3.91e-05)	3.42e-07 (2.88e-07)	1.39e-07 (9.32e-08)	2.347*** (0.310)
No. of investors in 1st funding round	11.48 (10.63)	-0.139 (0.0885)	-0.0498* (0.0286)	-146,256* 83.902
LN_age	94.93 (69.08)	-0.290 (0.484)	-0.0922 (0.157)	-924,189* 479.510
VC	134.4 (93.00)	-0.0202 (0.522)	0.402** (0.169)	10.482 536.45
Micro VC	-11.35 (73.15)	1.590*** (0.467)	0.471*** (0.151)	320.686 448.372
Single investor in 1st funding round	13.22 (68.84)	0.736 (0.469)	0.160 (0.152)	-361.261 462.908
International syndicate in 1st funding round	-124.9 (83.35)	0.562 (0.519)	0.272 (0.168)	-987,424* 504.121
University degrees in startup_total	17.36 (14.75)	-0.0737 (0.0934)	0.0175 (0.0302)	15.074 91.345
No. of founders	0.00798 (23.60)	0.256 (0.164)	-0.0413 (0.0529)	60.304 167.197
No. of male founders	-69.34 (119.3)	1.675** (0.778)	0.427* (0.251)	919.495 734.114
Work experience_total	-2.604* 1,553	-0.0308*** (0.0117)	-0.00523 (0.00377)	-2.613 11.700
Startup work experience_total	40.12 (30.12)	0.228 (0.211)	0.0275 (0.0681)	-496,747** 212.447
Networksize_total	-72.18** (34.16)	0.391 (0.254)	0.0524 (0.0821)	479,452* 259.252
Constant	185.3 (132.7)	1.760* 1.048	1.644*** (0.339)	627.793 1.036e+06
Observations	163	163	163	137
R-squared	0.274	0.276	0.262	0.544

*** p<0.01, ** p<0.05, * p<0.1

Note: This table represents the empirical results of the multivariate regression models with additional control variables on the founder team level, including number and gender of founders, the experience in founding/working for startups, the overall work experience, the network size (based on LinkedIn network) and the university degree of the founders, for robustness checking in other sub-sample analysis. In order to address potential endogeneity and selection bias problems in the sample, it is constructed with propensity score matching. We create a balanced sample of accelerator-backed and non-accelerator-backed firms by matching along the variables industry, funding volume of all funding rounds in total, funding year of the first funding round and country. Standard errors are reported in parentheses.

5.5. Conclusion

5.5.1 Summary of Main Results

In this study, we shed light on the effect of accelerators on startups' follow-up funding in terms of the speed and extent of funding. We focus on a scenario in which accelerators were involved in the first funding round and the startup received second-round funding from one or more follow-up investors. We use a dataset comprising 198 firms (of which 99 are accelerator-backed and 99 are a non-accelerator-backed control group) that we extract from the database Crunchbase. Additionally, we complement the dataset with hand-collected data on founder characteristics drawn from LinkedIn and the firms' websites.

Our study outlines four main results. In particular, our results show that having an accelerator involved in the first funding round increases the speed to the follow-up funding round by 120 days on average compared to being funded by another investor in the first funding round. Hence, it seems that accelerator involvement can quite literally 'accelerate' the cycle of a startup. Besides, our results show that the involvement of an accelerator in the first funding round positively affects the number of second-round investors. Moreover, our results indicate that accelerator-backed firms have more diverse types of investors in their follow-up funding round than do non-accelerator-backed startups. Finally, our results reveal that accelerator-backed startups receive on average 797,433 US dollars more follow-up funding than do comparable startups backed by other investors in their first funding rounds. Consequently, our findings underscore the relevant role accelerators play in startups' funding cycle. Accelerators are shown not only to kick-start a startup's funding process but also to stimulate the speed and extent of follow-up funding from other investors.

5.5.2 Theoretical Contributions

Our study makes several contributions to literature. First, it adds to the literature on entrepreneurial finance in two main ways. Venture capital has historically dominated entrepreneurial finance research. Emerging new investor types however, now demand attention in order to have a comprehensive understanding of all types of high-growth financing (Drover et al. 2017). Therefore, we particularly enhance the thus-scarce literature stream on accelerators and help to eliminate the to-date insufficient understanding of accelerators' effect on startups (Hochberg 2016) by shedding light on their effectiveness in supporting early-stage startups' development with regard to the receipt of follow-up funding from other investors. Second, we extend the literature on the complementarities of entrepreneurial finance players. Prior research specifically investigated the nature and extent of complementarities between BAs and VCs (Harrison and Mason 2000; Madill et al. 2005; Wong et al. 2009). New entrepreneurial finance players like accelerators, however, have so far been considered separately (Drover et al. 2017). By introducing accelerators as a complement to established investors, such as BAs and VCs, we account for this research gap. In particular, we conclude from our study that accelerators serve as a deal-flow maker for expansion and later-stage investors by closely communicating and cooperating with potential follow-up investors and introducing their startups to them. Therefore, accelerators embed themselves efficiently in the existing entrepreneurial finance landscape by complementing established investors.

Additionally, our study further adds to the literature on signalling theory in entrepreneurship. As startups typically have few ways to signal their quality to market participants, such as potential investors, due to their short existence (Islam et al. 2018), this research tries to identify the signals which help startups reduce information asymmetry and thereby achieve specific outcomes, such as receiving funding from

investors. We identify accelerators as a way to signal a startup's quality to follow-up investors due to accelerators' strict and competitive selection process (Cohen 2013b; Pauwels et al. 2016; Yin and Luo 2018) and their intense educational programmes (Gonzalez-Uribe and Leatherbee 2017).

5.5.3 Practical Implications

Moreover, our study is of interest for practitioners. The increasing number of alternatives for high-growth funding nowadays gives entrepreneurs more options from which to select and thus more power in negotiations with investors (Drover et al. 2017). Due to the emergence of accelerators, it is important for entrepreneurs to know about the consequences of being funded by an accelerator in their early stages (Drover et al. 2017). Since accelerators serve as a stepping-stone for fast and extensive follow-up funding, accelerator programmes might be helpful for startups that need not only non-financial support but also multiple funding rounds in a timely manner in order not to disrupt their growth path (Ahlers et al. 2015). Furthermore, it might be of interest to startups that accelerators can serve as a way to certify and signal their quality to potential follow-up investors and thereby stand out from the 'noisy' and crowded market of potential investments for investors. Additionally, our findings might be of interest to participants of the entrepreneurial finance landscape. Similar to a healthy angel industry that helps the VC industry to flourish by pre-scanning investment opportunities and enhancing the startups' quality through (non-)financial support (Harrison and Mason 2000), a strong accelerator industry also appears to help the angel and VC industry to thrive by providing a pipeline of pre-scanned and presumably high-quality startups which increase their entrepreneurial capabilities even further through accelerator support.

5.5.4 Limitations and Future Research

This study has some limitations that we shall address here. First, startups' performance metrics (e.g. revenue) are not available in the Crunchbase dataset. As well, obtaining performance metrics for such early-stage firms is generally challenging, since entrepreneurs in the startup phase are rarely willing to disclose financial information (Witt 2004). Specifically, startups in accelerators are in such early stages that typical performance measures like liquidity, market share, growth, profit and efficiency (Murphy et al. 1996) cannot yet be calculated. Therefore, we cannot link the involvement of an accelerator to the future success of a startup. Second, although accelerators have specific and unique characteristics that distinguish them from other investor types, there is still a certain heterogeneity of accelerators themselves in practice (Cohen et al. 2019; Cohen and Hochberg 2014; Hochberg 2016) regarding their industry focus (Kanbach and Stubner 2016), objectives (Cohen and Hochberg 2014), business models, strategies, operations (Pauwels et al. 2016) and the services they offer (Gonzalez-Uribe and Leatherbee 2015). Therefore, future research could take accelerators' heterogeneity into account by, through surveys, gathering quality measures on the accelerator level, such as cohort sizes (Winston-Smith and Hannigan 2015), business model and objectives, experience and success rates. Moreover, it might be interesting to conduct a qualitative study in order to understand the comprehensive process through which startups receive follow-up funding from investors with the help of accelerators. In depth-interviews with startups, accelerators and follow-up investors might answer questions relating to accelerator funding as an entrance ticket to follow-up investments and concerning the cooperation and interaction of accelerators with different investor types in equity financing.

CHAPTER 6 | Conclusion

6.1 Overall Conclusions

Accelerators have recently attracted increasing attention in entrepreneurial finance research (Bellavitis et al. 2017; Block et al. 2017) and have gained popularity in the startup scene (Cohen et al. 2019; Hochberg 2016; Zinke et al. 2018). Although prior research has studied the phenomenon (see e.g. Cohen 2013b; Cohen et al. 2019; Cohen and Hochberg 2014; Pauwels et al. 2016) and shed some light onto accelerators' effects on startups and the wider ecosystem (see e.g. Fehder and Hochberg 2015; Gonzalez-Uribe and Leatherbee 2017; Hallen et al. 2019; Yu 2019), important questions about accelerators' effectiveness remain under-explored (Bellavitis et al. 2017; Block et al. 2017; Cohen et al. 2019; Cohen et al. 2018; Hausberg and Korreck 2018). Therefore, this dissertation addresses the central issue of accelerators and their effects on early-stage startups' development from three perspectives. The results of the three studies included in this dissertation highlight that accelerators play an important value-adding role for early-stage startups by providing both financial and non-financial value-added. Moreover, the findings show that accelerators affect startups on both an individual and a firm level and that accelerators influence startups' development during acceleration as well as after acceleration.

Following the three studies presented in *Chapters 3 to 5*, this dissertation provides three major findings. First, given the increasing preference of startups for investors that provide more than just financial means, i.e. additional non-financial value-added, *Chapter 3* evaluates accelerators from a value-added perspective. Using a multiple embedded case study design with accelerators across Germany, the value-added outcomes for startups generated by the value-adding inputs provided by the accelerator are examined. The

results indicate that accelerators play an important role in startups' non-financial development, in particular by providing the startups with eight value-adding inputs: follow-up funding, networking, privilege/legitimation, coworking, education, consulting, supervising/monitoring and mentoring. Accelerators thereby help to generate various value-added non-financial outcomes, which seem to span across different levels of the startups' organisational structure. To be precise, startups appear to progress on both the individual level of the entrepreneur and on the organisational level as a whole. These findings make a connection to other early-stage investors, such as BAs and seed VCs, and suggest that accelerators can also be considered as value-adding investors for early-stage startups.

Second, considering accelerators' non-financial value-added more closely, *Chapter 4* investigates the value-added outcome of 'networks' through the lens of 'coopetition' among startups in the context of accelerators. The results of the included multiple case study show that accelerators create a unique environment of coopetition and thereby act as enablers of cooperative relationships amongst startups. In particular, the environment within the accelerator enables startups to experience both parts of cooperative relationships – cooperation and competition – adapted to their early-stage needs. Thus, startups in accelerators are equipped with a setting in which they can unfold different types of relationships that support their individual developmental stages and lead to different positive outcomes. More precisely, the cooperative part of coopetition can compensate for the networks, knowledge, capabilities and market access that startups lack while the competitive part can inspire and motivate startups.

Third, given that accelerators provide not only the aforementioned non-financial value-added but also financial resources, which together form the accelerator-specific support package, *Chapter 5* examines accelerators' roles as investors and their

interconnection with follow-up investors. In particular, the study sheds light on accelerators' effects on startups' funding development beyond the acceleration phase. The results of the secondary data study, based on the dataset from Crunchbase, show that accelerators are able to kick-start the startups' funding process. Thus, by receiving support by an accelerator, startups are enabled to collect their follow-up funding from further investors more rapidly and more extensively than comparable non-accelerator-backed startups. The results underscore accelerators' ability to serve as brokers between startups and investors and incorporate a valuable signalling effect to potential investors about the quality of the startups they support.

6.2 Implications

6.2.1 Theoretical Implications

Integrating the findings from the three studies, this dissertation contributes to the four literature streams of **entrepreneurial finance, acceleration and incubation, entrepreneurial ecosystems** and **entrepreneurial learning**.

First, this dissertation contributes to the **entrepreneurial finance literature** in several ways. Traditionally, the entrepreneurial finance literature has been dominated by research on venture capital (Bellavitis et al. 2017; Drover et al. 2017; Kaplan and Lerner 2017), disregarding emerging trends in entrepreneurial finance, such as accelerators (Bellavitis et al. 2017; Block et al. 2017; Drover et al. 2017). Moreover, the prior research on entrepreneurial finance is highly segmented, focusing mostly on single financing instruments instead of taking a holistic approach and regarding these instruments as interacting complements (Bellavitis et al. 2017; Block et al. 2017; Hanssens et al. 2015). This holistic view, however, would more realistically reflect startups' funding, as startups most often use several financing instruments simultaneously (Hanssens et al. 2015; Moritz et al. 2016) and successively (Hahn 2014; Harrison and Mason 2000). Prior

research focusing on VCs and BAs find complementarities between these two types of investors (Harrison and Mason 2000). This dissertation builds on this research stream by introducing accelerators, a new type of investor, as a complement to other established investors, like VCs and BAs, and by providing a better understanding of how they collaborate. In particular, the results of *Chapter 5* suggest that accelerators act as deal flow makers for other investors by providing a pipeline of investable high-quality startups and directly connecting them to potential follow-up investors. This approach by accelerators facilitates the screening, due diligence and selection processes with which other investors must engage (Cohen et al. 2019; Miller and Bound 2011). Thus, this dissertation finds that accelerators represent a new element in the entrepreneurial finance landscape, complementing existing investors well in the funding process of early-stage startups.

Additionally, there is an established literature stream on the value-added of investors within entrepreneurial finance as summarised in the literature reviews of Politis (2008) and Large and Muegge (2008). Prior research finds that both VCs and BAs deliver additional non-financial value-added through their specific value-adding activities (Large and Muegge 2008; Lindsey 2008; Madill et al. 2005; Politis 2008), and thereby distinguish themselves from pure financing providers like banks (Mason 2013). As accelerators are a unique type of investor, however, with specific characteristics distinguishing them from established types of investors (Cohen 2013b; Cohen et al. 2019; Cohen and Hochberg 2014), the results of prior studies cannot be transferred to accelerators. This dissertation contributes to the literature on investors' value-added by focusing on accelerators' value-added for startups' development. In particular, the results contribute by suggesting that accelerators provide both financial value, through initial seed capital and follow-up funding, and non-financial value-added, through further value-adding input, including, for example coworking, education and mentoring.

Second, this dissertation enhances the literature on **acceleration and incubation**. Since 1984 there has been a long and extensive research tradition on business incubators (Hackett and Dilts 2004; Hausberg and Korreck 2018). The first incubator emerged in 1959 in New York (Lewis 2001), and the phenomenon began expanding in the 1960s and 1970s (Hackett and Dilts 2004). Accelerators are described as the descendants of incubators or the ‘new generation incubation model’ (Pauwels et al. 2016, p. 50). With scientific publications discussing accelerators only since 2013 (e.g. Cohen 2013b; Isabelle 2013), this literature stream is still in its infancy (Block et al. 2017; Cohen et al. 2019; Hochberg 2016). The prior literature on accelerators is mostly descriptive and conceptual (Fehder and Hochberg 2015; Pauwels et al. 2016); it introduces the phenomenon, defines accelerators’ characteristics (e.g. Cohen 2013b; Cohen and Hochberg 2014) and their business model’s parameters and processes (Cohen et al. 2019; Kohler 2016; Pauwels et al. 2016; Yin and Luo 2018) and distinguishes them from incubators and BAs (Cohen 2013b; Cohen and Hochberg 2014; Isabelle 2013). In addition, a number of studies start off empirical investigation regarding the effect of accelerators on the wider ecosystem (Fehder and Hochberg 2015; Goswami et al. 2018) and on the startups’ performance in terms of survival (Gonzalez-Uribe and Leatherbee 2017; Yu 2019), growth (Gonzalez-Uribe and Leatherbee 2017; Hallen et al. 2019), exit (Winston-Smith and Hannigan 2015) and funding (Gonzalez-Uribe and Leatherbee 2017; Hallen et al. 2019; Winston-Smith and Hannigan 2015; Yu 2019). Still, scholars agree that the literature on accelerators is highly fragmented and lacks a clear understanding of their effect on startups (Bellavitis et al. 2017; Cohen et al. 2019; Gonzalez-Uribe and Leatherbee 2017; Hausberg and Korreck 2018). This dissertation, therefore, contributes to this evolving literature stream threefold.

Building on the work of Cohen and Hochberg (2014), Pauwels et al. (2016) and Cohen et al. (2019), who describe basic accelerator services, *Chapter 3* goes beyond pure

description of the services offered by empirically evaluating which inputs of accelerators are considered as value-adding for startups. On this basis this dissertation disentangles the value-adding inputs from the value-added outcomes of accelerators and clarifies their relationship. While prior research investigates accelerators' effects on startups' performance quantitatively in terms of their survival, funding, growth and exit, this dissertation provides a broader perspective on non-financial value-added outcomes for startups. The results show that accelerators influence not only startups' performance but also their motivation, networks, learning and development.

In addition, this dissertation enhances prior literature on accelerators by identifying the accelerator's key role in both internal and external networking. Although prior research recognizes that accelerators offer a wide network of internal and external contacts (e.g. Cohen 2013b), this dissertation delivers more detailed and in-depth insight into internal and external networking aspects. With respect to internal networking with peer startups, *Chapter 4* shows that accelerators establish an environment of motivation and mutual learning through cooperation. With regard to external networking, *Chapter 5* suggests that accelerators interact closely with other investors, which leads to accelerated and extensive follow-up funding for their startups.

This dissertation also links to the research, thus far inconclusive, concerning accelerators' effectiveness in supporting startups' development (Gonzalez-Uribe and Leatherbee 2017; Hallen et al. 2019; Yu 2019). Specifically, *Chapter 5* partly eliminates the knowledge gap in our understanding of accelerators' effectiveness at supporting early-stage startups' development with regard to their acquisition of financial resources. The results show that accelerators affect startups' financing even beyond the acceleration timeframe, thus displaying an ongoing effect with regard to funding. Additionally, the

findings contribute by suggesting that accelerators are effective in supporting the seamless follow-up financing of startups.

Furthermore, whereas prior research identifies board structures, top management team characteristics, public subsidies and research grants as quality signals for startups (Certo 2003; Hottenrott et al. 2017; Islam et al. 2018; Lester et al. 2006), the results of this dissertation suggest that accelerators also serve as a signal of startups' quality to potential investors and other stakeholders through their rigorous selection processes and intense educational programmes.

Third, this dissertation adds to the relatively novel but thriving literature on **entrepreneurial ecosystems** (Adner and Kapoor 2010; Carayannis et al. 2018; Cavallo et al. 2018; Minà et al. 2016). Scholars have come a long way from their belief that firms are stand-alone entities working alone in an isolated world (Brandenburger and Nalebuff 1997) through acknowledging the necessity of alliances to account for the increasing complexity of the business world (Dussauge et al. 2000; Garette and Dussauge 2000) towards understanding the importance of 'business ecosystems' (Dedehayir and Mäkinen 2011; Mäkinen and Dedehayir 2014; Moore 1993) and 'entrepreneurial ecosystems' (Carayannis et al. 2018). Prior research shows that coopetition plays an important role in such business ecosystems (Dagnino 2015; Dagnino and Mariani 2010; Zahra and Nambisan 2012). This dissertation takes up these prior findings and contributes to the literature stream on coopetition in entrepreneurial ecosystems by investigating coopetition among startups in the context of accelerators. Whereas prior research has focused mainly on coopetition among corporations, *Chapter 4* adds to the field of coopetition among startups, a field which has been largely neglected so far. Specifically, the results show that coopetition is relevant for early-stage startups and that the characteristics of coopetition among startups clearly differ from those of corporations, as

startups have needs in accordance with their early stages. By applying coopetition, startups can increase their motivation and gain access to the networks and know-how they lack in their early stages. In addition, *Chapter 4* adds to the coopetition formation literature, which previously established that coopetition can be an emergent strategy induced by the external environment (Mariani 2007; Mariani 2009) by showing that not only institutions and policy makers but also accelerators can induce coopetition in their unique environment. By entering the specific entrepreneurial ecosystem within accelerators, startups have the opportunity to benefit from cooperative relationships.

In addition, in line with Moore (1993), who introduced ‘business ecosystems’ as clusters of interrelating actors, such as firms, customers, science parks and universities, coexisting in a common setting and evolving together (Carayannis et al. 2018; Zahra and Nambisan 2011, 2012) *Chapters 3 to 5* contribute to the literature on entrepreneurial ecosystems by highlighting accelerators’ role as a focal point, creating an ecosystem of interconnected internal and external parties, including peer startups, investors, mentors, coaches, consulting companies, corporations, customers, politicians, universities and employees.

Finally, this dissertation contributes to the literature stream on **entrepreneurial learning**. Building upon the work of Cohen (2013a), who identifies accelerators as a tool for accelerated learning, and Politis et al. (2019), who describe the experiential learning process of entrepreneurs in the context of accelerators, this dissertation identifies accelerators as tools for holistic and extensive entrepreneurial learning. Prior research establishes that entrepreneurial learning, characterised by learning in an entrepreneurial context (Harrison and Leitch 2005), can be expressed on both the individual and organisational levels (El-Awad et al. 2017; Franco and Haase 2009; Wang and Chugh 2014). *Chapter 3* finds evidence that accelerators create an environment of learning that

affects both levels of entrepreneurial learning and development. Specifically, accelerated startups generate this learning and development from the accelerator's coworking opportunities, by which they learn from each other's knowledge and experience, and from its intense educational programme including seminars, workshops and lectures which enable the acquisition of new knowledge and skills.

6.2.2 Practical Implications

The findings of this dissertation provide practical implications for **early-stage startups, accelerators, programme sponsors and further stakeholders**.

First, this dissertation can aid **early-stage startups** in understanding the design and consequences of accelerators' support and in selecting a suitable investor. Today's entrepreneurial finance landscape holds new emerging financing opportunities, such as crowdfunding and accelerators, therefore startups have more funding and support alternatives than in the past. This increased number of options gives startups the power not only to select but also to negotiate with investors (Drover et al. 2017). For entrepreneurs to benefit from the increased choices, however, transparency is needed, including the advantages of different types of investors and the consequences of being funded and supported by certain investors.

The results of this dissertation support early-stage startups by providing transparency about the actual value-added that accelerators offer to startups and how it can be distinguished from other early-stage investors' value-added. Based on the studies' results, accelerators seem not only to provide startups with financial means but also with so called 'smart money', i.e. additional value-added beyond pure financing in terms of non-financial services. The findings further indicate that accelerated startups are provided with eight specific dimensions of value-adding inputs. The resulting value-added outcomes for the individual entrepreneur are individual learning and personal

development, enhanced motivation and satisfaction. On the organisational level, the value-added outcomes include startups' learning and development, enhanced performance and a larger network. On this basis startups can use the study's findings as a source of information when deciding whether an accelerator is a fitting type of investor for their unique situation and requirements.

In addition, two of the identified value-adding inputs – coworking and networking – are involved in a unique phenomenon: so-called 'coopetition' among startups in accelerators. The results of *Chapter 4* enhance startups' understanding of coopetition as a relevant strategy for their development. The findings also provide startups with the knowledge to establish coopetitive relationships and exploit them in the accelerator. For this purpose, startups should be conscious that both cooperation and competition are valuable parts of the relationship, with each having positive effects on their development, e.g. in terms of access to technological and business know-how, networks as well as increased motivation. In addition, startups should recognize that these effects are likely to be more intense with the more time the startups spend on site in the coworking space and actively engage in relationships with peers and the accelerator team.

Furthermore, this dissertation provides startups with insights into accelerators' financial support. In particular, the results of *Chapter 5* identify accelerators as stepping-stones for startups' follow-up funding. As finding follow-up funding is a major challenge for early-stage startups (Achleitner et al. 2011; Gómez 2007), it is important to know that accelerators are helpful in increasing both the speed to and the extent of follow-up funding. Additionally, the results suggest that accelerators have a signalling value and a networking effect whereby startups can stand out from the crowded market of investors' potential investments. Startups can utilize these insights to compare accelerators' potential effects with their estimated financial requirements and thereby make a more

nuanced investor-decision. In addition, the findings of *Chapters 3 and 5* make startups aware that accelerators can literally accelerate their venture's development, e.g. accelerators enable startups to approach their next funding round faster and induce fast and extensive learning.

Second, this dissertation holds practical implications for **accelerator managers and teams**. As outlined by *Chapters 3 to 5*, accelerators can play an important role in startups' early-stage development. Therefore, it is important for accelerators to evaluate and optimize their support services constantly to be able to deliver the promised value-added. *Chapter 3* provides a useful basis for the purpose of accelerators' self-evaluation and optimization, since it highlights accelerators' value-adding inputs. Based on the identified value-adding inputs, accelerators can benchmark their provided inputs and adapt them accordingly if needed to enhance their value-added for startups.

Additionally, this dissertation raises accelerators' awareness of the importance of the value-adding input of 'networking', i.e. connecting their startups to various types of stakeholders, including relationships to internal peer startups as well as to external parties. With regard to the internal peer network, *Chapter 4* finds that 'coopetition' is a valuable strategy for startups. In particular, accelerators must be aware of their critical role in the coopetition formation process of startups through the diverse tools they have at hand, including events, communication and coworking space. Through these tools accelerators can create and induce different types of coopetition, which can be cooperation-dominated, competition dominated or equal. In essence, accelerators can influence the type of relationship the startups have within their cohort. Accelerators should further be aware that both elements of coopetition, namely cooperation and competition, can have positive effects on the startups' development. Thus, they should make sure to support both elements through their set-up and daily interactions with startups. Furthermore, they

should understand that if they have an industry focus (versus being a generalist accelerator) competition tends to increase, as startups can cooperate better and compete more intensely due to their shared industry sector.

As noted above, however, the value-adding input of ‘networking’ also includes the generation of connections to external stakeholders. In this context, *Chapter 5* stresses that accelerators have an external network effect that influences startups’ post-acceleration acquisition of financial resources through their ties to follow-up investors. An accelerator also has a role as a startup’s ‘quality certifier’ through its established selection process and educational programme. This dissertation argues that accelerators need to effectively use this network and certification effect to benefit the startups they support.

Third, behind each accelerator there are specific **programme sponsors** (Vandeweghe and Fu 2018), i.e. external institutions that supply the necessary resources, such as funding, support, office space, mentors, etc. (Cohen et al. 2019). These external institutions can be universities, corporations, governments, investors (e.g. VCs or BAs), entrepreneurs or non-profit organisations (Cohen et al. 2019). Although different programme sponsors might have different ultimate goals for sponsorship, what usually unites sponsors is the question of the accelerators’ effectiveness, because an effective accelerator will increase their chances of reaching their ultimate goals. Therefore, *Chapters 3 to 5* are useful to programme sponsors, as they provide some answers to the question of accelerators’ effectiveness in supporting their startups from various perspectives. Accelerators seem to be effective insofar as they provide startups with value-added, create an internal ecosystem with the potential to foster startups’ competitiveness and support startups’ being awarded funding. In particular, for policy makers and local governments, accelerators can be a promising tool to increase local

entrepreneurial activity, as accelerators seem to raise the entrepreneurial potential of a region and make it more attractive for both local and nonlocal startups. Besides, the results of *Chapter 5* may be of interest to investors that operate as programme sponsors and whose ultimate goal is to make a return on their initial investment (Cohen et al. 2019; Colombo et al. 2018; Winston-Smith and Hannigan 2015). As the receipt of follow-up funding increases the overall valuation of a startup and therefore the potential returns for investors, the results in *Chapter 5*, which emphasise accelerators' potential to accelerate and amplify startups' follow-up funding, are valuable for investors.

Finally, this dissertation holds practical implications for **further stakeholders** in the wider startup financing ecosystem, including follow-up investors, such as BAs and VCs. *Chapter 5* shows that accelerators act as pipelines of startups, which are potential investment targets for other follow-up investors. In addition, through their close connections to other investors and their intense collaborative interactions, accelerators can be considered as deal makers or brokers between startups and follow-up investors; a strong landscape of accelerators helps the venture capital and business angel industry to thrive as well. Therefore, other types of investors should consider accelerators instead of competitors rather as complements with whom they work together for a common goal.

6.3 Limitations and Future Research

Despite the several contributions of this dissertation, the three research projects do have some limitations and leave open some questions that suggest avenues for future research.

First, the research approach of the studies in *Chapters 3* and *4* provides the unique opportunity to evaluate accelerators' effects on startups' development directly during the treatment, which eliminates a potential recall-bias, however, the method is not designed with a longitudinal perspective. Therefore, based on this dissertation's results it might be

promising to investigate accelerators' long-term effects on startups' development. Besides, the studies' multiple case design allowed to gain rich insight into the accelerator phenomenon. Nevertheless, case studies are designed neither for drawing statistical generalizations nor for proving causal relationships. Therefore, follow-on work might use this dissertation's findings as the basis for statistically testing the relationship of value-adding inputs and corresponding startup outcomes, or accelerator tools and the corresponding types of cooperation.

Second, while *Chapter 3* uncovers specific accelerator value-adding inputs, further deductive work is needed to establish which inputs are most valuable for startups. This way, accelerators could become more efficient in providing startups with the services they require, or there might emerge new and other support mechanisms to deliver these services (Cohen et al. 2019; Cohen et al. 2018). In addition, considering prior research on human and social capital (Davidsson and Honig 2003; Yusuf 2010), it is likely that different types of entrepreneurs benefit in different ways from accelerators' value-adding inputs. Therefore, on the unit of analysis of the individual entrepreneur, future research should address the question of which types of entrepreneurs, in terms of their human and social capital, benefit most from accelerators' value-adding inputs.

Third, there are promising avenues for future research on the level of network or ecosystem analysis. This dissertation repeatedly identifies accelerators' important role in startups' network development. The persistence and expansion of the startups' network contacts through accelerators beyond the acceleration phase, however, remains unresolved. Therefore, more research on the development of startups' networks, for example through quantitative network analysis with corresponding network diagrams, can be encouraged. Similarly, this dissertation underscores the importance of the ecosystem created through accelerators. Nevertheless, there remain many open questions

with regard to accelerators' wider effects on the local ecosystem, their entrepreneurial capacity and activity and the benefits for different types of stakeholders, such as corporations, customers and employees. In particular, instead of taking a static view on the accelerator's ecosystem, in-depth longitudinal case studies that investigate the emergence and dynamics of an entrepreneurial ecosystem (Minà et al. 2016) through the creation of accelerators along their own life cycles can be encouraged.

Fourth, based on *Chapter 5*, another future research opportunity lies in gathering key performance indicators from early-stage startups, e.g. through a large-scale survey, and using them to control for startups' performance when investigating accelerators' effect on startups' development. Moreover, *Chapter 5* starts off research on the interplay of different types of entrepreneurial finance players, including more recent investors like accelerators. This is an important research stream, as in practice startups often use several financing instruments at once (Moritz et al. 2016), a fact which is mostly neglected by prior studies, which focus on financing instruments in isolation rather than considering their complementarity potential (Block et al. 2017; Drover et al. 2017). Although *Chapter 5* contributes to this neglected research area, there remain many open issues regarding the concrete interconnectedness, path dependencies and simultaneity of different investor types, which future research should address. For example, it might be intriguing to study their patterns of collaboration, which are likely to involve cooperative elements, the benefits and downsides of investors' simultaneity for startups and the long-term effect on startups' financing development and structures.

Lastly, all studies included in this dissertation cannot fully take the heterogeneity of accelerators into account. Accelerator types can vary in aspects including the services offered, sponsors or business models. Therefore, future research on accelerators' value-added, the creation of cooperation and the effect on follow-up funding should take

accelerators' heterogeneity into account, preferably through a large-scale survey on their heterogeneous characteristics. Beyond that, research should shed light on new types of accelerator models, as they are perpetually evolving (Cohen et al. 2018; Hallen et al. 2019). Whereas in the past, accelerator trends involved corporate accelerators and particular industry verticals (Cohen et al. 2019; Kanbach and Stubner 2016), new design choices include, for example, the creation of accompanying venture funds, virtual accelerators or accelerators concentrating on under-represented or disadvantaged groups, like women, seniors, adolescents or migrants (Cohen et al. 2019; OECD 2019). Research on these new types of accelerators and their particular effect on startups and ecosystems is recommended to generate more clarity and transparency in their approaches and outcomes and determine whether these investors are merely hyped trends or in fact valuable startup supporters.

In conclusion, accelerators offer a natural setting in which to observe and study how early-stage startups overcome their challenges. In addition, accelerators provide the opportunity to study multiple units of analysis, including business ideas, founders, startups, accelerators and ecosystems (Cohen et al. 2019; Yin and Luo 2018). This dissertation uses the research potential of accelerators to contribute to the understanding of accelerators' effects on startups' development from both the financial and non-financial perspectives. The results emphasize the relevance and importance of accelerators in the entrepreneurial ecosystem and uncover the potential for promising future research projects.

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Appendix 1. Interview guidelines (German)

Interviewleitfaden Startup Team Mitglieder

Begrüßung

Zunächst möchte ich mich bei Ihnen bedanken, dass Sie sich die Zeit für ein Gespräch nehmen.

Mein Name ist Tamara Naulin und ich bin Doktorandin an der Manhot Graduiertenschule „Wettbewerbsfähigkeit junger Unternehmen“ an der Wirtschaftswissenschaftlichen Fakultät der Heinrich-Heine-Universität Düsseldorf. Im Rahmen meiner Dissertation beschäftige ich mich mit der Frage der Entwicklung von Startup Unternehmen durch die Unterstützung von Accelerators. Deshalb führe ich derzeit Interviews mit Startup Teams in Accelerators und mit den entsprechenden Accelerator Teams. Das Interview wird ca. 45-60 Minuten dauern und ich werde Ihnen hauptsächlich offene Fragen zu Themen wie Beziehungen im Accelerator, Networking, Klima & Kultur im Accelerator und Effekte auf die Startups stellen.

Ich würde Sie gerne um Erlaubnis bitten, das Interview aufzeichnen zu dürfen. Somit kann ich sicherstellen, dass wichtige Informationen nicht verloren gehen. Sämtliche Gesprächsinhalte werden streng vertraulich behandelt und zur späteren Verwendung anonymisiert. Nach der abgeschlossenen Auswertung werden die Aufnahmen gelöscht.

Es ist mir noch wichtig zu sagen, dass ich mich ganz besonders für Ihre persönliche Meinung und Ihre Erfahrungen interessiere. Fühlen Sie sich frei entsprechend Ihrer Ansichten auf meine Fragen zu antworten – Ihre Antworten werden absolut vertraulich behandelt.

Kurzfragebogen

Zu Beginn möchte ich Ihnen gerne einige Fragen zu Ihrer Person und zum Unternehmen stellen. Diese werden, wie das gesamte Interview, selbstverständlich vertraulich behandelt.

- Geschlecht: männlich weiblich
- Darf ich nach Ihrem Alter fragen? (Jahre)
- Was ist Ihr höchster Bildungs-/Ausbildungsabschluss?
- In welchem Fach wurde dieser Abschluss erlangt?
- Haben Sie schon einmal ein Unternehmen gegründet? ja nein
- Wie lange sind Sie insgesamt schon berufstätig?
- Welche Position haben Sie in Ihrem Startup inne?
- Wann wurde Ihr Startup gegründet?
- Wie viele Mitarbeiter hat Ihr Startup?

- In welcher Stage befindet sich Ihr Startup? ((pre)Seed⁹, Startup¹⁰, Expansion¹¹, Later Stage¹²)
- Wie wurde Ihr Startup bislang finanziert? (z.B. Familie & Freunde, Förderprogramme, Business Angels, sonstige Finanzierungsquellen, etc.)
- In welcher Industrie ist Ihr Startup tätig?
- Ist ihr Produkt / Service bereits geschützt, z.B. durch ein Patent?

Einstieg / Warm-up

1. Sie nehmen hier am XY Accelerator Programm teil. Ich interessiere mich für die Beweggründe Ihrer Teilnahme. Würden Sie mir bitte erzählen weshalb Sie sich dafür entschieden haben an diesem Programm teilzunehmen?
2. Wie wurden Ihre Erwartungen bislang erfüllt?
3. Welchen Mehrwert bietet Ihnen der Accelerator?

Fragenblock 1 – Beziehungen im Accelerator: Startup Team – Accelerator Team

Nun würde ich gerne mit Ihnen über Ihre Beziehung zu Ihrem Accelerator Team sprechen. Unter Accelerator Team verstehe ich die fest angestellten Mitarbeiter im Accelerator.

1. Wie würden Sie die Beziehung zwischen Ihnen als Startup Team und Ihrem Accelerator Team beschreiben?
2. Wie empfinden Sie die Unterstützung von Ihrem Accelerator Team?
3. Sind Sie stolz darauf Teil des Accelerator Programms zu sein? [Ja] Aus welchen Gründen? [Nein] aus welchen Gründen?
4. Wie würden Sie die Beziehung zwischen Ihnen als Startup Team und Ihrem/n Mentor/en beschreiben?
5. Wie empfinden Sie die Unterstützung von Ihrem/n Mentor/en?

Fragenblock 2 – Beziehungen im Accelerator: Startup Team – Startup Team

Nachdem wir gerade über Ihre Beziehung zum Accelerator Team und zu den Mentoren gesprochen haben, würde ich gerne mit Ihnen über die Beziehung der Startups untereinander sprechen.

1. Wie würden Sie Ihre Beziehung zu den anderen Startup Teams beschreiben?
2. Wie wirkt sich die Anwesenheit der anderen Startups auf Sie und Ihr Startup aus?
3. Welche Vorteile und welche Nachteile sehen Sie für Ihr Startup durch das Zusammensein mit den anderen Startups im Accelerator?

⁹ (pre)Seed Stage: Gründungsvorbereitung, Entwicklung eines Produkts / Konzepts, Situation & Marktanalyse

¹⁰ Startup Stage: Gründung des Unternehmens, Produktentwicklung bis zur Marktreife, Marketingkonzept

¹¹ Expansion Stage: Beginn der Produktion, Markteintritt, Wachstumsfinanzierung

¹² Later Stage: Vorbereitung Exit, MBO / MBI

Fragenblock 3 – Klima und Kultur im Accelerator

Nun würde ich Ihnen gerne einige Fragen zum Klima im Accelerator stellen. Unter Klima verstehen wir “das Gefühl, das in der Luft liegt”, d.h. die Atmosphäre, die Sie wahrnehmen.

Stellen Sie sich hierzu gerne einen typischen Tag im Accelerator vor.

1. Wie empfinden Sie das Klima im Accelerator im Allgemeinen?
2. In welchen Situationen verändert sich das Klima? Und wie?
3. An welche Regeln müssen Sie sich hier im Accelerator halten?
4. Wie frei sind Sie in Ihren Handlungen und Entscheidungen in Bezug auf Ihr Startup im Accelerator?
5. Wie herausfordernd sind die Standards und Ziele, die Ihnen der Accelerator setzt? Und was bedeutet das für Sie?
6. Inwieweit haben Sie das Gefühl hier im Accelerator mit Gleichgesinnten zu sein?
7. Welche ähnlichen Denkweisen haben Sie?

Fragenblock 4 – „Coopetition“

Nun würde ich gerne mit Ihnen über die Zusammenarbeit mit den anderen Startups im Co-working Space sprechen.

Kooperation

1. Inwieweit/wie kooperieren, unterstützen, helfen sich die Startups untereinander?
2. Wie fördert das Accelerator Team die Zusammenarbeit / den Austausch der Startups?
3. Welche Situation der Zusammenarbeit mit einem/mehreren anderen Startup/s war besonders hilfreich? Und warum?
4. Welche Situation der Zusammenarbeit mit einem/mehreren anderen Startup/s war weniger hilfreich bzw. hat weniger gut funktioniert? Und warum?
5. Wenn Sie konkret einschätzen müssten - auf einer Skala von 1 bis 5 - wie stark ist der Kooperationsgedanke unter den Startups?
1: sehr stark; 2: stark; 3: neutral; 4. niedrig; 5: sehr niedrig
6. Wie beeinflusst die Kooperation mit den anderen Startups Sie und ihr Startup?

Wettbewerb

7. Haben Sie das Gefühl, dass hier im Accelerator Wettbewerb/ein Wettbewerbsgedanke unter den Startups vorliegt?
 - a. [Nein] Weshalb?
 - b. [Ja] Wie äußert sich das im Alltag?
 - c. [Ja] Welche Elemente im Accelerator führen dazu?
 - d. [Ja] Wie würden Sie den Wettbewerbsgedanken bewerten? Und warum?
8. Wie fördert der Accelerator den Wettbewerbsgedanken unter den Startups?
9. Wenn Sie konkret einschätzen müssten - auf einer Skala von 1 bis 5 - wie stark ist der Wettbewerbsgedanke der Startups untereinander?
1: sehr stark; 2: stark; 3: neutral; 4. Niedrig; 5: sehr niedrig
10. Wie beeinflusst der Wettbewerb mit den anderen Startups Sie und Ihr Startup?

Coopetition

11. Wenn Sie konkret einschätzen müssten – welche der vorliegenden Beziehungen zu den anderen Startups treffen am ehesten zu?
 - Kooperation-dominante Beziehung
 - Kooperation-Wettbewerb gleichmäßige Beziehung
 - Konkurrenz-dominante Beziehung
12. Von welchen Faktoren machen Sie es abhängig, ob Sie sich eher kooperativ oder kompetitiv gegenüber anderen Startups verhalten?
13. Wie würden Sie Ihre eigene Persönlichkeit beschreiben? (z.B. kooperativ, wettbewerbsorientiert, hilfsbereit, zielorientiert, etc.)
14. Wie empfinden Sie das Thema Privatsphäre ihres Unternehmens und Schutz Ihrer Ideen und Strategien im Accelerator?

Frageblock 5 – Netzwerk / Beziehungen zu weiteren Stakeholdern

Nun würde ich gerne mit Ihnen über Ihr Netzwerk sprechen.

Bitte erinnern Sie sich an die Zeit **vor** Ihrer Teilnahme im Accelerator und an Ihr **damaliges** Netzwerk:

1. Welche Gruppen/Personen waren damals Ihre wichtigsten Kontakte?

Wenn Sie jetzt an die Zeit **seit** Ihrer Teilnahme im Accelerator und an Ihr **jetziges** Netzwerk denken:

2. Was hat sich an Ihrem Netzwerk verändert?
3. Wie hat Ihr Accelerator Sie in Bezug auf Ihre Netzwerkentwicklung beeinflusst?
4. Zu welchen neuen Gruppen haben Sie durch die Teilnahme im Accelerator Kontakt bekommen?
5. Auf einer Skala von 1 bis 5 - für wie wichtig erachten Sie die Rolle des Accelerators im Ihrem Netzwerkaufbau?
1: sehr wichtig; 2: wichtig; 3: neutral; 4. unwichtig; 5: sehr unwichtig

Fragenblock 6 – Effekte auf die Startups

Nun würde ich gerne mit Ihnen über den Einfluss der Teilnahme am Accelerator auf Ihr Startup eingehen.

1. Wie beeinflusst die Teilnahme am Accelerator Sie und Ihr Startup?
2. Denken Sie bitte an die Tage und Wochen bevor Sie hier im Accelerator gestartet haben. Wie empfinden Sie die Entwicklung Ihres Startups und Ihre eigene Entwicklung hier im Accelerator von damals bis heute?
3. Was empfinden Sie, wenn Sie an die Zeit nach Abschluss des Accelerator Programms denken?

Abschließende Frage

Nun habe ich alle Fragen aus meiner Sicht gestellt. Möchten Sie aus Ihrer Sicht noch einen wichtigen Aspekt nennen, der Ihrer Meinung nach im Interview zu wenig berücksichtigt wurde?

Abschluss

Vielen herzlichen Dank für Ihre Offenheit und die Teilnahme am Interview. Zum Abschluss würde ich Sie noch gerne fragen, ob es für Sie in Ordnung wäre, wenn ich Sie per E-Mail / Telefon kontaktiere, sofern sich noch Rückfragen zu unserem Gespräch ergeben?

[Ja] Unter welcher E-Mail Adresse / Telefonnummer dürfte ich Sie kontaktieren?

Interviewleitfaden Accelerator Team Mitglieder

Begrüßung

Zunächst möchte ich mich bei Ihnen bedanken, dass Sie sich die Zeit für ein Gespräch nehmen.

Mein Name ist Tamara Naulin und ich bin Doktorandin an der Manhot Graduiertenschule „Wettbewerbsfähigkeit junger Unternehmen“ an der Wirtschaftswissenschaftlichen Fakultät der Heinrich-Heine-Universität Düsseldorf. Im Rahmen meiner Dissertation beschäftige ich mich mit der Frage der Entwicklung von Startup Unternehmen durch die Unterstützung von Accelerators. Deshalb führe ich derzeit Interviews mit Startup Teams in Accelerators und mit den entsprechenden Accelerator Teams. Das Interview wird ca. 45-60 Minuten dauern und ich werde Ihnen hauptsächlich offene Fragen zu Themen wie Beziehungen im Accelerator, Networking, Klima & Kultur im Accelerator und Effekte auf die Startups stellen.

Ich würde Sie gerne um Erlaubnis bitten, das Interview aufzeichnen zu dürfen. Somit kann ich sicherstellen, dass wichtige Informationen nicht verloren gehen. Sämtliche Gesprächsinhalte werden streng vertraulich behandelt und zur späteren Verwendung anonymisiert. Nach der abgeschlossenen Auswertung werden die Aufnahmen gelöscht.

Es ist mir noch wichtig zu sagen, dass ich mich ganz besonders für Ihre persönliche Meinung und Ihre Erfahrungen interessiere. Fühlen Sie sich frei entsprechend Ihrer Ansichten auf meine Fragen zu antworten – Ihre Antworten werden absolut vertraulich behandelt.

Kurzfragebogen

Zu Beginn möchte ich Ihnen gerne einige Fragen zu Ihrer Person und zum Unternehmen stellen. Diese werden, wie das gesamte Interview, selbstverständlich vertraulich behandelt.

- Geschlecht: männlich weiblich
- Darf ich nach Ihrem Alter fragen? (Jahre)
- Was ist Ihr höchster Bildungs-/Ausbildungsabschluss?
- In welchem Fach wurde dieser Abschluss erlangt?
- Haben Sie schon einmal ein Unternehmen gegründet? ja nein
- Wie lange sind Sie insgesamt schon berufstätig?
- Welche Position haben Sie im Accelerator inne?
- Wie viele Mitarbeiter hat Ihr Accelerator?

Einstieg / Warm-up

1. Sie veranstalten ein Accelerator Programm für Startup Unternehmen. Ich interessiere mich für die Ziele Ihres Accelerator Programms. Würden Sie mir bitte mehr darüber erzählen, welche Ziele Sie haben und wie Sie die Startups unterstützen?
2. Welchen Mehrwert bieten Sie den Startups?

Fragenblock 1 – Beziehungen im Accelerator: Accelerator Team - Startup Team

Nun würde ich gerne mit Ihnen über Ihre Beziehung zu den Startup Teams sprechen.

1. Würden Sie bitte die Beziehung zwischen Ihnen als Accelerator Team Mitglied und den Startups beschreiben?
2. Wie motivieren Sie Ihre Startup Teams?
3. Wie würden Sie die Beziehung zwischen den Mentoren und den Startups aus Ihrer Perspektive beschreiben?

Fragenblock 2 – Beziehungen im Accelerator: Startup Team – Startup Team

Nachdem wir gerade über Ihre Beziehung zu den Startup Teams und die der Mentoren zu den Startups gesprochen haben, würde ich gerne mit Ihnen über die Beziehung der Startups untereinander sprechen. Auch wenn Sie die Beziehung der Startups untereinander aus Ihrer Perspektive sozusagen nur indirekt nachvollziehen können, würde mich Ihre Einschätzung interessieren.

1. Wie würden Sie die Beziehung zwischen den Startup Teams untereinander beschreiben?
2. Welchen Einfluss hat die Anwesenheit der „peer startups“ auf die Startups?
3. Welche Vorteile und welche Nachteile sehen Sie für die Startups durch das Zusammensein im Accelerator?

Fragenblock 3 – Klima & Kultur im Accelerator

Nun würde ich Ihnen gerne einige Fragen zum Klima im Accelerator stellen. Unter Klima verstehen wir hierbei “das Gefühl, das in der Luft liegt”, d.h. die Atmosphäre, die Sie wahrnehmen.

Stellen Sie sich hierzu gerne einen typischen Tag im Accelerator vor.

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2. In welchen Situationen verändert sich das Klima? Und wie?
3. An welche Regeln müssen sich die Startups hier im Accelerator halten?
4. Wie frei sind die Startups in Ihren Handlungen und Entscheidungen in Bezug auf Ihr Startup?
5. Wie herausfordernd sind die Standards und Ziele, die Sie den Startups setzen? Und was bedeutet das für die Startups?
6. Welche ähnlichen Denkweisen teilen Sie mit den Startups und die Startups untereinander?
7. Was genau verbindet die Startups?

Frageblock 4 – „Coopetition“

Nun würde ich gerne mit Ihnen über die Zusammenarbeit der Startups untereinander sprechen.

Kooperation

1. Inwieweit/wie kooperieren, unterstützen und helfen sich die Startups untereinander?
2. Wie fördern Sie die Zusammenarbeit / den Austausch der Startups?
3. Welche Situationen der Zusammenarbeit unter zwei oder mehreren Startups war – aus Ihrer Sicht – besonders gelungen?
4. Welche Situationen der Zusammenarbeit unter zwei oder mehreren Startups war – aus Ihrer Sicht – weniger gelungen?
5. Wenn Sie konkret einschätzen müssten - auf einer Skala von 1 bis 5 - wie stark ist der Kooperationsgedanke der Startups?
1: sehr stark; 2: stark; 3: neutral; 4. niedrig; 5: sehr niedrig
6. Wie beeinflusst die Kooperation der Startups untereinander die Gründer/Startups?

Wettbewerb

7. Haben Sie das Gefühl, dass hier im Accelerator ein Wettbewerbsgedanke unter den Startups vorliegt?
 - [Nein] Weshalb?
 - [Ja] Wie äußert sich das im Alltag?
 - [Ja] Welche Elemente im Accelerator führen dazu?
8. [Ja] Wie würden Sie den Wettbewerbsgedanken bewerten? Und warum?
9. Wie fördern Sie als Accelerator den Wettbewerbsgedanken unter den Startups?
10. Wenn Sie konkret einschätzen müssten - auf einer Skala von 1 bis 5 - wie stark ist der Wettbewerbsgedanke der Startups untereinander?
1: sehr stark; 2: stark; 3: neutral; 4. niedrig; 5: sehr niedrig
11. Wie beeinflusst der Wettbewerb der Startups untereinander die Gründer/Startups?

Coopetition

12. Wenn Sie konkret einschätzen müssten – welche der vorliegenden Beziehungen unter den Startups treffen am ehesten zu?
 - Kooperation-dominante Beziehung
 - Kooperation-Wettbewerb gleichmäßige Beziehung
 - Konkurrenz-dominante Beziehung
13. Was denken Sie, von welchen Faktoren machen die Startups es abhängig, ob sie sich kooperativ oder kompetitiv gegenüber anderen Startups verhalten?
14. Wie schätzen Sie das Thema Privatsphäre der Startups und Schutz deren Ideen und Strategien im Accelerator ein?

Frageblock 5 – Netzwerk / Beziehungen zu weiteren Stakeholdern

Nun würde ich gerne mit Ihnen über Ihre Rolle beim Networking der Startups sprechen.

1. Wie tragen Sie dazu bei das Netzwerk Ihrer Startups zu erweitern?
 - a. Welche Art von Kontakten können Sie Ihren Startups vermitteln?
 - b. Wie aktiv tragen Sie dazu bei das Netzwerk Ihrer Startups zu erweitern?

2. Auf einer Skala von 1 bis 5 - für wie wichtig erachten Sie Ihre Rolle im Netzwerkaufbau der Startups?
1: sehr wichtig; 2: wichtig; 3: neutral; 4. unwichtig; 5: sehr unwichtig

Fragenblock 6 – Effekte auf die Startups

Sie arbeiten im Accelerator und können so eventuell den Outcome/die Entwicklung der Startups durch das Accelerator Programm einschätzen.

1. Wie beeinflusst die Teilnahme im Accelerator die Gründer/Startups?
2. Wie schätzen Sie die Entwicklung der Gründer/Startups im Accelerator ein?
3. Inwiefern sind die Startups nach Abschluss des Accelerator Programms bereit alleine auf dem Markt zu bestehen?

Abschließende Frage

Nun habe ich alle Fragen aus meiner Sicht gestellt. Möchten Sie aus Ihrer Sicht noch einen wichtigen Aspekt nennen, der Ihrer Meinung nach im Interview zu wenig berücksichtigt wurde?

Abschluss

Vielen herzlichen Dank für Ihre Offenheit und die Teilnahme am Interview. Zum Abschluss würde ich Sie noch gerne fragen, ob es für Sie in Ordnung wäre, wenn ich Sie per E-Mail / Telefon kontaktiere, sofern sich noch Rückfragen zu unserem Gespräch ergeben?

[Ja] Unter welcher E-Mail Adresse / Telefonnummer dürfte ich Sie kontaktieren?

Appendix 2. Interview guidelines (English)

Interview Guideline Startup Team Members

Greeting

First of all I would like to thank you for taking the time to talk to me.

I am Tamara Naulin and I am a PhD student at Manhot Graduate School “Competitiveness of Young Enterprises” at the Faculty of Business Administration and Economics of Heinrich-Heine-University Düsseldorf. In the scope of my dissertation I address the question of the development of startup companies supported by accelerators. Therefore, I am currently conducting interviews with startup teams and their accelerator teams. The interview takes approximately 45-60 minutes and I am going to ask mainly open-ended questions about topics such as relationships, networking, climate & culture within the accelerator and effects on the startup teams.

I would like to ask you for permission to tape this interview. This is only for me to make sure that I do not miss the key points. I assure you that our conversation is handled absolutely confidentially and anonymously. After the analysis the tapes will be deleted.

It is important for me to point out, that I am especially interested in your personal opinion and experience. Therefore, please feel free to tell me your opinions and experiences – your answers are handled absolutely confidentially.

Short questionnaire

I would like to start with asking you some questions about yourself and your company. They will be treated confidentially as well.

- Gender: male female
- May I ask for your age? (years)
- Which is your highest educational qualification?
- In which subject did you graduate?
- Did you ever found a company once before? yes no
- For how long have you been working?
- Which position do you have in your startup?
- When was your startup founded?
- How many employees does your startup have?
- In which stage is your startup? ((pre)Seed¹³, Startup¹⁴, Expansion¹⁵, Later Stage¹⁶)
- How did you finance your startup before the accelerator programme? (family & friends, funding programmes, Business Angels, other financing sources, etc.)
- In which industry is your startup active?
- Is your product or service already protected by e.g. a patent?

¹³ (pre)Seed Stage: Foundation preparation, development of product / concept, market & situation analysis

¹⁴ Startup Stage: Foundation of the firm, product development until market maturity, marketing concept

¹⁵ Expansion Stage: Production start, market entry, growth financing

¹⁶ Later Stage: Preparation of exit, MBO / MBI

Warm-up

1. You are taking part in this accelerator programme at XY. I am interested in the reasons for your participation. Would you please tell me why you chose to take part in this programme?
2. How have your expectations been fulfilled until now?
3. Which value-added does the accelerator provide you with?

Set of questions 1 – Relationship: startup team – accelerator team

Now I would like to talk to you about your relationship with the accelerator team. For me the accelerator team are the full-time employees at the accelerator.

1. How would you describe your relationship to your accelerator team?
2. How do you perceive the support of the accelerator team?
3. Are you proud to be part of the accelerator programme? [Yes] why? [No] why?
4. How would you describe your relationship to your mentors?
5. How do you perceive the support of the mentors?

Set of questions 2 – Relationship: startup team – startup team

We just discussed your relationship with the accelerator team and the mentors. Now I would like to talk about your relationship with the other startup teams.

1. How would you describe the relationship between your startup team and the others?
2. How does the presence of the other startups affect you and your startup?
3. Which advantages and which disadvantages do you perceive from being together with the other startups within the accelerator?

Set of questions 3 – climate and culture in the accelerator

Now I would like to ask some questions regarding the climate within the accelerator. We understand climate to be “the feeling in the air”, i.e. the atmosphere which you can sense.

Please imagine a typical day within the accelerator.

1. How do you perceive the climate within the accelerator?
2. In which situations does the climate change? And how?
3. Which rules do you have to follow here in the accelerator?
4. How free are you regarding your actions and decisions of your startup within the accelerator?
5. How challenging are the standards and goals which are set by the accelerator? What does that mean for you?
6. To what extent do you think you are here with like-minded persons?
7. Which similar mind-sets do you have?

Set of questions 4 – “Coopetition”

Now I would like to talk with you about the cooperation with the other startups in the co-working space.

Cooperation

1. To what extent/how do the startups cooperate, support and help each other?
2. How does the accelerator foster the cooperation / mutual exchange of the startups?
3. Which situation of cooperation with one/more other startup/s was especially helpful? And why?
4. Which situation of cooperation with one/more other startup/s was less helpful or did not work properly? And why?
5. If you have to assess very concretely – on a scale from 1 to 5 – how strong is the cooperation thinking among the startups?
1: very strong; 2: strong; 3: neutral; 4. weak; 5: very weak
6. How does the cooperation/interplay/exchange with your peers influence you and your startup?

Competition

7. Do you think that there is competition/a competitive mindset among the startups within the accelerator?
 - a. [No] Why?
 - b. [Yes] How does this show in everyday life in the accelerator?
 - c. [Yes] Which elements within the accelerator foster competition?
 - d. [Yes] How do you assess this competitive mindset? And why?
8. How does the accelerator foster a competitive mindset among the startups?
9. If you have to assess very concretely – on a scale from 1 to 5 – how strong is the competitive mindset among the startups?
1: very strong; 2: strong; 3: neutral; 4. weak; 5: very weak
10. How does the competitive mindset/the competition influence you and your startup?

Coopetition

11. If you have to assess very concretely – which of the following relationships best describe your relationship to the other startups?
 - cooperation-dominated relationship
 - cooperation-competition equal relationship
 - competition-dominated relationship
12. From which factors does it depend whether you behave cooperatively or competitively?
13. How do you describe your own personality? (e.g. cooperative, supportive, competitive, helpful, ambitious, etc.)

14. How do you perceive the privacy of your startup and the protection of your ideas and strategies within the accelerator?

Set of questions 5 – Network/ Relationship to other stakeholders

Now I would like to talk with you about your network.

Please remember the time **before** your participation at the accelerator programme and your network **at that time**:

1. Which groups were your most important contacts? (tick above)

Now please think of **today** and of your **current** network:

2. What changed within your network?
3. How did your accelerator impact your network development?
4. To which new groups did you get contact through the accelerator programme?
5. In your opinion - how important is the accelerator in developing your network – on a scale from 1 to 5?
1: very important; 2: important; 3: neutral; 4: unimportant; 5: very unimportant

Set of questions 6 – Effects on the startups

Now I would like to talk with you about the effects of the participation at the accelerator on your startup.

1. How does the participation affect you and your startup?
2. Please remember the time before starting the accelerator programme. How do you perceive the development of your startup and yourself from then until today?
3. What do you feel when you think about the time after the accelerator programme?

Final question

Now I asked all my questions. Would you like to add any important aspect which you think was not considered enough?

End

Thank you very much for your openness and for having participated in the interview. Finally one last question: Would you mind if I contact you via phone or mail in case I have a question regarding our conversation?

[Yes] How may I contact you (mail /telephone number)?

Interview Guideline Accelerator Team Members

Greeting

First of all I would like to thank you for taking the time to talk to me.

I am Tamara Naulin and I am a PhD student at Manhot Graduate School “Competitiveness of Young Enterprises” at the Faculty of Business Administration and Economics of Heinrich-Heine-University Düsseldorf. In the scope of my dissertation I address the question of the development of startup companies supported by accelerators. Therefore, I am currently conducting interviews with startup teams and their accelerator teams. The interview takes approximately 45-60 minutes and I am going to ask mainly open-ended questions about topics such as relationships, networking, climate & culture within the accelerator and effects on the startup teams.

I would like to ask you for permission to tape this interview. This is only for me to make sure that I do not miss the key points. I assure you that our conversation is handled absolutely confidentially and anonymously. After the analysis the tapes will be deleted.

It is important for me to point out, that I am especially interested in your personal opinion and experience. Therefore, please feel free to tell me your opinions and experiences – your answers are handled absolutely confidentially.

Short questionnaire

I would like to start with asking you some questions about yourself and your company. They will be treated confidentially as well.

- Gender: male female
- May I ask for your age? (years)
- Which is your highest educational qualification?
- In which subject did you graduate?
- Did you ever found a company once before? yes no
- For how long have you been working?
- Which position do you have in the accelerator?
- How many employees does your accelerator have?

Warm-up

1. You offer an accelerator programme for startup companies. I am interested in the goals of your accelerator programme. Would you please tell me more about the goals of the programme and how you support the startups?
2. Which value-added do you provide the startups with?

Set of questions 1 – Relationship: accelerator team - startup team

Now I would like to talk with you about your relationship with the startups.

1. How would you describe your relationship with the startups?
2. How do you motivate the startup teams?
3. How would you describe the relationship of the mentors and the startups from your perspective?

Set of questions 2 – Relationship: startup team – startup team

We just discussed your relationship with the startup teams. Now I would like to talk about the relationship between the startups. Even though you can only indirectly understand their relationship from your perspective, I am interested in your opinion.

1. How would you describe the relationship between the startups?
2. Which effect does the presence of the “peer startups” have on the startups?
3. Which advantages and which disadvantages do you think the startups have by being together with the other startups within the accelerator?

Set of questions 3 – Climate & culture within the accelerator

Now I would like to ask some questions regarding the climate within the accelerator. We understand climate to be “the feeling in the air”, i.e. the atmosphere which you can sense.

Please imagine a typical day within the accelerator.

1. How do you perceive the climate within the accelerator?
2. In which situations does the climate change? And how?
3. Which rules do the startups have to follow here in the accelerator?
4. How free are the startups regarding their actions and decisions within the accelerator?
5. How challenging are the standards and goals which you set for the startups?
What does that mean for the startups?
6. Which similar mind-sets do you and the startups, and the startups amongst each other have?
7. What unites the startups?

Set of questions 4 – “Coopetition”

Now I would like to talk with you about the cooperation among the startups in the co-working space.

Cooperation

1. To what extent do the startups cooperate, support and help each other?
2. How do you foster cooperation among the startups?
3. Which situation of cooperation amongst the startups was especially successful – in your opinion?
4. Which situation of cooperation amongst the startups was less successful – in your opinion?
5. If you have to assess very concretely – on a scale from 1 to 5 – how strong is the cooperation thinking among the startups?
1: very strong; 2: strong; 3: neutral; 4: weak; 5: very weak
6. How does the cooperation/interplay/exchange amongst the startups influence the founders/startups?

Competition

7. Do you think that there is competition/a competitive mindset among the startups within the accelerator?
 - a. [No] Why?
 - b. [Yes] How does this show in everyday life in the accelerator?
 - c. [Yes] Which elements within the accelerator foster competition?
 - d. [Yes] How do you assess this competitive mindset? And why?
8. How do you, as accelerator, foster a competitive mindset among the startups?
9. If you have to assess very concretely – on a scale from 1 to 5 – how strong is the competition thinking among the startups?
1: very strong; 2: strong; 3: neutral; 4: weak; 5: very weak
10. How does the competition/competitive mindset amongst the startups influence the founders/startups?

Cooperation

11. If you have to assess very concretely – which of the following relationships best describe the startups' relationship?
 - cooperation-dominated relationship
 - cooperation-competition equal relationship
 - competition-dominated relationship
12. What do you think - from which factors does it depend whether the startups behave cooperatively or competitively?
13. What do you think about the privacy of the startups and the protection of their ideas and strategies within the accelerator?

Set of questions 3 – Network/ Relationship to other stakeholders

Now I would like to talk with you about your role in the networking of the startups.

1. How do you contribute to the network development of the startups?
 - a. Which types of contacts can you mediate?
 - b. How active are you contributing to the network development of the startups?
2. In your opinion - how important are you in developing the startups' network – on a scale from 1 to 5?
1: very important; 2: important; 3: neutral; 4: unimportant; 5: very unimportant

Set of questions 6 – Effects on the startups

You work at the accelerator and therefore might be able to assess the outcomes/development of the startups.

1. How does the participation of the accelerator programme affect the founders/startups?

2. How do you perceive the development of the founders/startups during the accelerator programme?
3. How do you think the startups are ready to persist on their own on the market after the programme?

Final question

Now I asked all my questions. Would you like to add any important aspect which you think was not considered enough?

End

Thank you very much for your openness and for having participated in the interview. Finally one last question: Would you mind if I contact you via phone or mail in case I have a question regarding our conversation?

[Yes] How may I contact you (mail /telephone)?

Appendix 3. Coding scheme Study 1

100 Value-adding inputs

- 110 (Follow-up) Funding
- 120 Networking
- 130 Coworking
- 140 Mentoring
- 150 Education
- 160 Consulting
- 170 Supervising and monitoring
- 180 Privilege and legitimation

200 Individual level value-added outcomes

- 210 Learning and development
 - 211 Work-related personal development
 - 212 Personality development
- 220 Motivation
 - 221 Intrinsic existing motivation
 - 222 Extrinsic additional motivation through accelerator
- 230 Satisfaction
 - 231 Increase in satisfaction
 - 232 Decrease in satisfaction

300 Firm level value-added outcomes

- 310 Learning and development
 - 311 Team
 - 312 Product
 - 313 Communication
 - 314 Business-related skills & activities
- 320 Performance
 - 231 Increase in performance
 - 322 Decrease in performance
- 330 Network
 - 331 Networking channels
 - 332 Internal network
 - 333 External network
 - 334 Accelerators' importance in startups' network development

Appendix 4. Characteristics of startups

Case	Startup	No. of employees	Life cycle stage	Prior funding	Industry	Foundation status (at date of data collection)
A	Startup 1	6	Pre-seed	Bootstrapping	Travelling	not yet founded
A	Startup 2	4	Seed	Bootstrapping, EXIST	E-commerce	not yet founded
A	Startup 3	3	Pre-seed	Bootstrapping	Others (Online-service portal)	founded
A	Startup 4	4	Seed	Bootstrapping	Others (hardware, software, service)	founded
A	Startup 5	4	Seed	Bootstrapping; Employment at another firm	E-commerce	founded
B	Startup 1	3	Seed	EXIST	Bio-, nano-, medical technology	not yet founded
B	Startup 2	5	Pre-seed	Bootstrapping	Bio-, nano-, medical technology	not yet founded
C	Startup 1	2	Pre-Seed	Bootstrapping	Others (FinTech)	founded
C	Startup 2	2	Pre-Seed	Bootstrapping	Travelling	founded
C	Startup 3	3	Pre-seed	Bootstrapping	Others (FinTech)	founded
D	Startup 1	3	Seed	Bootstrapping, grant	Media- and creative industries	founded
D	Startup 2	4	Seed	Bootstrapping	Media- and creative industries	founded
D	Startup 3	3	Pre-seed	Bootstrapping	Media- and creative industries	founded
D	Startup 4	2	Pre-seed	No prior funding	Media- and creative industries	founded
E	Startup 1	2.5	Pre-seed	Bootstrapping	Travelling/Others (mobility, logistics)	founded
E	Startup 2	5	Pre-seed	Bootstrapping	E-commerce/Others (mobility, logistics)	founded
E	Startup 3	3	Pre-seed	Bootstrapping	IT/Software development/Others (mobility, logistics)	founded
F	Startup 1	0	Pre-seed	Bootstrapping	Others (Online Service Portal)	not yet founded
F	Startup 2	4	Seed	Bootstrapping; one prior accelerator	Others (mobility, logistics)	founded
F	Startup 3	3	Pre-seed	EXIST	IT/Software development	founded
F	Startup 4	4	Startup	Business angels	Travelling	founded
F	Startup 5	3	Pre-seed	Bootstrapping	Software as a service	founded
F	Startup 6	2	Pre-seed	Bootstrapping	E-commerce	founded

Appendix 5. Coding scheme Study 2

100 Cooperation

- 110 Forms of cooperation
 - 111 Joint projects
 - 112 Exchange
- 120 Contents of cooperation
 - 121 Pitching
 - 122 Technology
 - 123 Business
- 130 Successful cooperation
- 140 Unsuccessful cooperation
- 150 Effects of cooperation
- 160 Strength of cooperation
- 170 Cooperation formation
 - 171 Through accelerator's toolbox
 - 172 Independent formation

200 Competition

- 210 Forms of competition
 - 211 Firm level
 - 212 Personal level
- 220 Contents of competition
 - 221 Markets
 - 222 Resources
 - 224 Reputation
- 230 Competition formation – through accelerator's toolbox
- 240 Effects of competition
- 250 Assessment of competition
- 260 Strength of competition

300 Coopetition

- 310 Forms of coopetition
 - 311 Cooperation-dominant coopetition
 - 312 Balanced coopetition
 - 313 Competition-dominant coopetition
- 320 Privacy and idea protection
- 330 Accelerators' toolbox
 - 331 Events
 - 332 Communication
 - 333 Coworking space
- 340 Industry focus

Eidesstattliche Erklärung

Ich, Tamara Naulin, versichere an Eides statt, dass die vorliegende Dissertation von mir selbstständig und ohne unzulässige fremde Hilfe unter Beachtung der „Grundsätze zur Sicherung guter wissenschaftlicher Praxis an der Heinrich-Heine-Universität Düsseldorf“ erstellt worden ist.

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Tamara Naulin