A systematic literature review on accelerators

A systematic literature review on accelerators[1]

Emil Lucian Crisan[1], Irina Iulia Salanta[1], Ioana Natalia Beleiu[1], Ovidiu Nicolae Bordean[1], Raluca Bunduchi[2]

[1] Babes-Bolyai University, Faculty of Management and Economics; [2] University of Edinburgh, Business School

Abstract

Over the past 15 years, accelerators emerged as a popular and distinct new form of intermediary organization, playing a key role in supporting entrepreneurial and innovation activities. To date, despite significant growth in accelerators research, there is still little understanding of how different forms of accelerators operate, and what outcomes they produce across different contexts. This paper reviews the existing scholarly research on accelerators using the Context-Intervention-Mechanism-Outcome framework and is based on the analysis of 98 research papers on accelerators published in the last 15 years. The analysis identifies four mechanisms which explain how accelerators operate and the role they play in supporting entrepreneurship and innovation: the validation of ideas and products; the provision of product development and models learning; the provision of support to increase startups' market access & growth; and the provision of support for innovation. The paper identifies the methodological and theoretical gaps in current research and provides avenues to support future research and industry practice.

[1] This is a pre-print version of an article accepted for publication in Journal of Technology Transfer

Keywords

Accelerators, systematic literature review, business accelerator, social accelerator, corporate accelerator.

1. Introduction

Accelerators as a distinct form of innovation intermediaries are a relatively recent phenomenon. The first accelerator, the Y Combinator, was founded a mere 14 years ago in 2005. Nevertheless, their impact on developing entrepreneurial ecosystems and fostering communities of innovation has been dramatic (Drori and Wright 2018). Since 2005, the Y Combinator funded over 450 startups with a cumulative valuation of more than $7.8 billion (Cohen 2013). By 2016, there were over 3000 accelerators worldwide (Hochberg 2016), providing funding, by 2018, to over 7,000 start-ups (Seed-DB 2018).

While some research considers accelerators as a special form of incubators (Gliedt et al. 2018; Hausberg and Korreck 2018), others recognize them as a distinct organizational form characterized by a distinct set of features depending on the services they provide to their start-up users (Pauwels et al. 2016). Moreover, in contrast to incubators, accelerators are characterized by a much shorter time of their support programs (Cohen 2013). They are not designed to provide physical resources or office space over a long period of time for startups, are less focused on venture capitalists as next step of finance, and aim to encourage business development through the provision of intensive time-limited support (Miller and Bound 2011; Pauwels et al. 2016).

Despite the relative newness of the accelerators phenomena, there is a wealth of research examining accelerators (Cohen 2013; Cohen et al. 2019; Cohen and Hochberg 2014; Drori and Wright 2018; Drover et al. 2017; Isabelle 2013; Kohler 2016; Miller and Bound 2011; Pauwels et al. 2016; Radojevich-Kelley and Hoffman 2012), including already two systematic literature reviews which refer also to business accelerators, one on business incubation intermediaries (Hausberg and Korreck 2018) and another one on innovation intermediaries (Gliedt et al. 2018), a book of articles coordinated by Drori and Wright (2018), and a book concerning social accelerators

(Roberts and Lall 2018). There is however also a growing recognition that we need more systematic research to understand what accelerators are, how they operate, and what role they play in supporting the development of their participating start-ups, and more broadly in shaping the innovation entrepreneurial landscape (Drori and Wright 2018). Recent research calls for further study to examine accelerators as specific organizational forms (Drover et al. 2017; Roundy 2017) with distinct business models (Cohen et al. 2019) to better understand the acceleration process. Such calls highlight the need for researchers to clarify the portfolio of services accelerators offer (Battistella et al. 2017; Brown and Mawson 2016; Isabelle 2013; Miller and Bound 2011), to better understand their practices, and to clarify their outcomes both on participating start-ups (Battistella et al. 2017; Clarysse and Yusubova 2014; Cohen 2013; Cohen and Hochberg 2014), and on the whole entrepreneurial ecosystem (Cohen et al. 2019). Other researchers point to the lack of an over-arching theoretical framework covering the accelerator phenomena which hampers the ability to holistically understand their impact on the development of entrepreneurial ventures (Qin et al. 2019).

In response to these calls, this study aims to provide a holistic understanding of the acceleration process - their modus operandi - that addresses the context in which accelerators operate and their practices, the services they deliver, and the outcomes they achieve. By focusing on accelerators, we differentiate from other reviews that examined intermediary organizations for start-up incubation support in general (Hausberg and Korreck 2018) or within narrow contexts, e.g. green technology (Gliedt et al. 2018). We also rigorously present findings into the services, outcomes and contexts in which accelerators operate allowing us to identify a set of mechanisms that define accelerators' modus operandi and explain their impact. By doing so we contribute to entrepreneurship and innovation research in general, accelerators research in particular by offering

a framework that can inform both future research and practice, for example by guiding efforts to measure results of accelerating programs (Cohen et al. 2019), and to identify examples of best practices that can be transferred across contexts (Clarysse et al. 2015).

The paper is structured as follows. The next section explains the methodology, followed by a section presenting the results of our analysis. Section four outlines the avenues for future research, and section five includes concluding remarks, implications for practice and limitations.

2. Methodology

Following the recommendations of Tranfield et al. (2003), our systematic literature review comprised three stages: *planning*, involving the identification of the research question, *conducting*, involving searching for relevant literature and its analysis (screening, extracting and coding), and *reporting*. Figure 1 describes the procedure we followed, including the activities we undertook during each step.

= = = = = = = = = = = = = = = = =

INSERT FIGURE 1 HERE

= = = = = = = = = = = = = = = = =

2.1 First iteration

We started by running a pilot search (Activity A1 – see Figure 1), in order to establish a search strategy (Result R1) and identify the search terms (R2). The first search (A2, later updated in A5) was performed initially in June 2017 on the Web of Science (WoS) database. WoS was chosen due to its comprehensiveness as it includes a wide range of academic sources (Hausberg and Korreck 2018). Our search strategy involved searching for the following terms in the title, abstract and keywords of sources: “business accelerator*”, “corporate accelerator*”, “entrepreneurial

accelerator*", "entrepreneurship accelerator*", "innovation accelerator*", "open accelerator*", "seeds accelerator*", "startup accelerator*", "success accelerator*", "university accelerator*" and "venture accelerator*". We constrained the search to (1) publications in English and (2) the source to belong to one of the following WoS categories: management, planning, development, business, economics, finance, public administration, multidisciplinary sciences or education scientific disciplines, education educational research, social sciences interdisciplinary, social issues. This search returned 271 sources (R3). At A3, we removed duplicates and reviewed the abstracts of these sources guided by our inclusion (sources presenting theoretical or practical aspects concerning accelerators) and exclusion criteria (sources with a different topic, focusing mainly on business incubators, presenting different equipment termed as accelerators) (I1). Each source was evaluated by two of the authors. In case of doubt, the article was fully read and discussed between the two authors to until a common agreement was reached. The result of the first screening was 37 eligible sources. We extracted the data from these sources (A4), and also sought to identify other relevant papers cited within these sources.

Data extraction was made using an online data collection sheet (I2) which included the following generic descriptors: authors, year of publication, title, journal, number of citations (in the Web of Science), type of work (empirical or theoretical), primary or secondary focus on accelerators, methodology, geographical area covered, and relevant cited sources. To perform our analysis, we followed the Context-Intervention-Mechanisms-Outcome (CIMO) methodology (Denyer et al. 2008). CIMO analysis serves to identify the mechanisms that explain a phenomena - in our case how accelerators operate - by considering the contexts in which they operate, the interventions accelerators deliver in the form of the portfolio of services offered to their start-up users, and their outcomes in terms of their influence on entrepreneurship and innovation activities. To complement

CIMO analysis, we also extracted the codes for accelerator definition from our sources. To support coding (A8) we thus developed specific coding categories (I3-I7) for definitions, context, intervention and outcomes. For **definitions** we coded the source of the definition (whether the authors use their own definition, use a definition from another source, compile definitions from other sources, or provide no definition), the concept mainly used for accelerators, and the activities mentioned in definitions as performed by accelerators. For **context** we coded the organizational (e.g. universities, corporations, communities, governments, or private) and industrial setting (e.g. IT) where accelerators were set up. For **intervention**, we identified the services accelerators provide relative to Cohen and Hochberg's (2014) comprehensive classification. We coded the **outcomes** according to the levels at which these outcomes refer to: the level of the startup firms participating in the accelerating programs, the accelerator level as a standalone organization, and the ecosystem level of which the accelerator is part. **Mechanisms** (M) were to be identified based on the analysis of the C-I-O results. Data extraction and coding was done concurrently by four authors, each source being examined independently by two researchers. Where their opinions diverged, the issue was discussed with the other members of the team until consensus was reached. Our analysis identified the most cited paper (in Google Academic) for business accelerators as being a SRRN paper with 87 citations at that time (Cohen and Hochberg 2014), which was not available in WoS. This result suggested that relying exclusively on WoS was not appropriate in our case. In addition, seeing the recentness of the accelerator phenomena, it was likely that there might be more research at an earlier development stage such as conferences, reports and dissertations which are not necessarily reflected in the journal databases included in WoS. We thus decided to extend our search to other databases (R5).

2.2 Second iteration

A second search (A5) was performed in November 2018 on Scopus, Elsevier and Proquest Central, complemented with a manual analysis of in source citations and an update of the original search in WoS. Using the same research terms (R2) as at A1, A5 led to the identification of 809 sources. After excluding duplicates, and performing a second screening (A6) using the same exclusion and inclusion criteria (I1), we were left with 76 sources (R7). We then proceeded to data extraction and coding (A7) in a similar way to A4/5. During data extraction, two further sources were excluded based on our inclusion and exclusion criteria. The number of sources included in our research at this stage was 74. A final update of the search (A8) on the same databases was made in August 2019 (A10), when 24 new sources (R11) matching our inclusion and exclusion criteria were identified, raising the total number of sources to 98.

3. Results

In this section we describe the sources and present the key findings from our analysis following CIMO framework. Section 3.1. presents the descriptive analysis, followed in section 3.2. by the discussion of the findings concerning the approach to define accelerators. Section 3.3. presents the CIMO results, discussing the accelerators context, intervention and outcomes identified in existing research. Finally, in section 3.3.4. we discuss the results of CIMO analysis which led to the identification of four types of accelerator mechanisms that typify kinds of interventions leading to certain outcomes within specific contexts.

3.1 Descriptive analysis

The 98 sources were published between 2004 and November 2019 (see Table 1). Almost 40% entered the literature within the last two years (n=42), the peak was in 2018 (n=29) which was the

last full year to be included in our review, suggesting an upwards trend in studying this topic. Out of 98 sources, the majority (n=76) are journal articles, the rest being conference papers (n=10), reports (n=5), theses (n=2), book chapters (n=4), and a book.

= = = = = = = = = = = = = = = = = =

INSERT TABLE 1 HERE

= = = = = = = = = = = = = = = = = =

Concerning the country of origin, a large number of sources examine accelerators across multiple countries (n=30), and a significant number of sources (n=18) either do not mentioned a location, or do not focus on a particular accelerator. Where a country was mentioned, 19 studies focused on Western Europe, 16 on North America accelerators, 7 on Asia, 5 on Australia and New-Zeeland, 3 on South America, and none in Africa. As expected, current research focuses on examining accelerator processes in western world, with little interest in developing countries.

Regarding their scope, 73 sources focus on accelerators, with the remainder (n=25) covers accelerators as part of a wider phenomenon (e.g. incubation). The significant size of accelerator dedicated research indicates that acceleration have become a research topic in itself, distinct from other forms of innovation intermediaries (such as incubators). 83 sources are empirical papers, while the rest are conceptual papers (n=11), literature reviews (n=2) and systematic literature reviews (n=2). As expected with early stage phenomenon, most research is exploratory and relies on qualitative methods (61 from 83 empirical papers), with much fewer studies using quantitative (n=15) or mixed methods (n=7).

3.2 Definitions analysis

The definition of accelerators remains discordant. Within the 98 sources, 26 provided their own definition of the concept, 24 did not frame the concept in a definition, and 48 compiled a definition

using different existing sources. Despite the lack of a commonly agreed definition, our analysis points to a diversity in how research presents what accelerators are. Originally presented as a kind of incubator (n=6), currently the research defines accelerators a distinct form of innovation intermediary (n=24), while a number of studies focus on examining the range of services they offer through emphasising the differences with those delivered by incubators (n=46). Studies defining accelerators as an incubation model refer to accelerators as "a new incubation model" (Clarysse et al. 2015), "a new form of rapid business incubation" (Jackson and Richter 2017), "a type of incubation program that are concerned with attracting, supporting and developing new ventures" (Malek et al. 2014), and "an emerging incubation-like model" (Yang et al. 2018) and consider that accelerators derive many of their characteristics from business incubators. The first definition attempt of the term "accelerator" dates back only eight years ago, when (Miller and Bound 2011) conducted the first in depth study on the evolution, benefits and business models of accelerators and their programmes. This marked the beginning of new era for accelerator research as scholars define accelerators as a new form of organization, distinct from incubators (n=24). A greater majority of the studies (n=46) focuses on examining the various services provided by accelerators in contrast with those offered by incubators (e.g. (Cohen and Hochberg 2014)). The most commonly noted differences include the duration of the programs with accelerators offering a shorter participation in the program as compared to incubators (n=18), the target client groups, with accelerators targeting established firms with growth potential, while incubators focus on assisting startups (n=10); and their business model, with accelerators typically offering financial support (n=11).

Moreover, as accelerator research has gathered pace, definitional efforts have also moved away from emphasizing distinction with other forms of incubation, to highlight differences between

types of accelerators, mostly by defining different types of accelerators depending on the organizational context in which they operate (e.g. corporate versus university accelerators). This focus on differentiating between kinds of accelerators can be observed in the proliferation of terminology to refer to accelerators visible in studies published in the past 2-3 years, ranging from "social accelerator" (Harima and Freudenberg 2019; Pandey et al. 2017), and "ecosystem builder accelerator" (Prexl et al. 2018), to "prescriptive accelerator" (Mansoori 2017), and "virtual accelerator" (Mitra and Euchner 2016). Our analysis of the main term used to refer to accelerators reveals that the most common term is accelerator (n=38), followed by a diversity of specific terms including corporate accelerator (n=13), accelerator program (n=8), startup accelerator (n=5), innovation accelerator (n=5), business accelerator (n=4), seed accelerator program (n=3), seed accelerator (n=3), impact accelerator (n=1), venture accelerator (n=1), social accelerator (n=1), prescriptive accelerator (n=1), open innovation accelerator (n=1), investment accelerator (n=1), innovation platform (n=1), growth accelerator (n=1), and global accelerator (n=1).

3.3 CIMO analysis

CIMO analysis is useful to generate prescriptive knowledge, under the following logic: if you want to achieve outcome O in context C, then use intervention type I (Denyer et al., 2008). CIMO-logic thus allows us to explain how accelerators operate taking into account their variety and particularities. To conduct the analysis, we initially included all empirical sources (n=83). Further analysis revealed that four of these sources provided too few details concerning accelerators' operations (Choi and Kim 2018; Frimodig and Torkkeli 2017; Kim and Wagman 2014; Yang et al. 2019) and were thus excluded, while two further conceptual papers provided valuable examples concerning university accelerators activities (Drori and Wright 2018; Wright et al. 2017) and were included. Thus 81 papers were finally included for analysis.

3.3.1 Context

Context refers to the external and internal environment factors that influence behavioral change (Denyer et al. 2008). In our case, the context includes both the (1) organizational context in which the accelerator operates and (2) the industry where accelerators were launched. Out of 81 sources, 13 did not mention any context.

We identified five organizational contexts in which accelerators exist. The most frequently encountered context is the *start-up context (n=27),* viewed as a business providing funding, mentorship and assistance to start-up companies, in batches, pioneered by the founders of Y Combinator (Christiansen 2009). The second most common organizational context is *governmental context (n=21)* viewed as a manifestation of government efforts to improve the local business ecosystem, for example through encouraging crowd sourcing as a main solution for raising capital (e.g. Start-up Chile, (Gonzalez-Uribe and Leatherbee 2016)), or through systematic efforts to develop an entrepreneurship training curriculum by partnering up with universities (Qin et al. 2019). The *corporate context* (n=19) concerns accelerators developed either internally within existing corporations and aimed at fostering incremental innovation, or externally as a separate entity and aimed to generate disruptive innovation (Kanbach and Stubner 2016). Accelerators that operate within an *university context* (n=17) aim either to create a valuable learning experience (Adomdza 2016; Mansoori 2017), to foster innovation (Wise and Valliere 2014), or to support technology transfer. Finally, *community context (n=12)* includes accelerators which are meant to improve collaboration and create better business ecosystems within specific communities.

Most accelerators are targeted at *specific industries* (n=64), with only a few sources mentioning *industry agnostic* accelerators which include startups from any industry (n=5), omitting to specify the industry at all (n=16), or focusing on *multiple industries* are popular (n=20). Among industry

specific accelerators IT/technology/clean technologies sector is the most popular (n=31), followed by clean energy (n=8), , health (n=5), finance (n=4), biotech, telecom and social fields (each with 3), aeronautical and agriculture (each with 2), tourism, marketing and entertainment (each with 1).

3.3.2 Interventions

Considering the range of services offered by accelerators, we identified three types of interventions: narrow, typical, and extended. Only a few sources (n=5) do not mention any services in relation to the accelerators investigated thus not allowing the identification of specific interventions. The *narrow intervention* is the least common (n=6) and includes accelerators that provide a limited bundle of services such as virtual community support services (Gabrielsson et al. 2018; Mitra and Euchner 2016), workshops (Audretsch et al. 2011), a 3-day geek camp plus communal housing (Fraiberg 2017), research and development services, clinical development and trialing, legal services and financial services (Gardner and Webster 2017), video lectures and case studies, online strategy roundtables (Mitra and Euchner 2016) or transforming ideas into workable concepts (Alänge and Steiber 2018).

Typical intervention are the most popular type of intervention (n=45), including accelerators that provide a wide range of services such as: mentoring, coaching, selecting participants organized in cohorts, boot-camp training over a fixed period, preparation to pitch investors during the demo-day, networking, access to financing, all in exchange of equity. Typical interventions may include either accelerators offering the same program package to all participatory firms, or accelerators that provide customized programs by designing distinctive programs for firms at different stages (Breznitz and Zhang 2019).

The *extended intervention* (n=36) involves the inclusion of additional services to typical interventions based on the participants' needs. The most commonly offered additional services

include: office space (Clarysse et al. 2015; Clarysse and Yusubova 2014; Connolly et al. 2018; Drori and Wright 2018; Fernandes 2016; Gonzalez-Uribe and Leatherbee 2016; Goswami et al. 2018; Grilo et al. 2017; Gutstein and Brem 2018; Kanbach and Stubner 2016; Lall et al. 2013; Miles et al. 2017; Radojevich-Kelley and Hoffman 2012; Thompson 2012; Uhm et al. 2018; Vandeweghe and Fu 2018); free housing (Bliemel et al. 2019; Brown et al. 2019; Fernandes 2016; Fraiberg 2017; Harima and Freudenberg 2019; Thompson 2012; Uhm et al. 2018); and building a product (Caley and Kula 2013; Glinik 2019; Grilo et al. 2017; Malek et al. 2014; Shao and Shi 2018; Vandeweghe and Fu 2018). Less observed are services such as: financial and legal support (Clarysse et al. 2015; Gardner and Webster 2017; Glinik 2019; Grilo et al. 2017; Shao and Shi 2018; Thompson 2012); stipends (Connolly et al. 2018; Thompson 2012); catering, materials needed for the workshop, and participant incentives are arranged (Gutstein and Brem 2018); 4 months semi-structured support program with the optional 8 months extension (Wise and Valliere 2014); targeted networking through the organization of field-specific start-up nights focusing on specific industries, teambuilding (Wright et al. 2017) and geek camps (Fraiberg 2017); media exposure, brand recognition, exposure to relevant and timely R&D, post-program support to all of their graduates at no cost (Lall et al. 2013; Pandey et al. 2017), internet marketing (Uhm et al. 2018), creating and submitting all of the company formation documents on the behalf of the participants (Christiansen 2009); offering free access to online platforms (Adomdza 2016), or more widely Internet access, encouragement, assistance and help with technical issues (Radojevich-Kelley and Hoffman 2012), HR/recruitment support (Lall et al. 2013), and help to accommodate to the local business environment such as finding accommodation, opening a bank account, getting a phone number (Vandeweghe and Fu 2018).

3.3.3 Outcomes

To analyze outcomes, we differentiate between the levels at which they relate to (participating startups, the accelerators themselves as an organization, and the wider ecosystem level) and their nature (soft or hard depending on whether they translate directly into economic benefits) (see Table 2).

= = = = = = = = = = = = = = = = = =

INSERT TABLE 2 HERE

= = = = = = = = = = = = = = = = = =

The top five outcomes identified at *startups' level* are funding (n=42), validation (product or idea) (n=32), product development (n=30), network (n=27), and knowledge (n=26). Validation, referring to product or business idea validation, is an implicit result related to the participation in classic accelerators (Regmi et al. 2015), but it can be generated as a result of the enrollment in a virtual accelerator (Mitra and Euchner 2016), or the participation in a workshop (Audretsch et al. 2011). Network concerns access to an international network of partners of the accelerator (Assudani et al. 2017; Shao and Shi 2018), access to corporate suppliers and customers (Shankar and Shepherd 2018), access to advisers or venture capital (Regmi et al. 2015). Knowledge outcome is related to knowledge acquired through training and mentoring (Pandey et al. 2017; Uhm et al. 2018), useful for creating products and services, for running a business or for creating a business model.

The top four outcomes at *accelerators level* mentioned by our sources are the number of participants (n=18), number of applicants (n=14), startups survival rate (n=14), and funds provided to startups (n=10). A few studies highlight the problems with this approach to consider outcomes

which are supposed to define accelerators performance (Isabelle 2013; Richter et al. 2018): number of participants, or funds provided refer to outputs of the accelerator programs, i.e. a direct immediate-term result created at the end of a process, rather than outcomes, such as the startup survival rate, which are non-immediate results reflecting the performance of the accelerating process.

The top three outcomes generated by accelerators at *ecosystem level* are: network builder (n=31), innovation enabler (n=18), and entrepreneurship culture (n=11). Accelerators are network builders by improving the survival rate of startups (Bustamante 2018); by creating new networks formed by startups, venture capital and mentors; by uniting a community (Bliemel et al. 2016; Gonzalez-Uribe and Leatherbee 2016) through increasing connections with the local (Byrd et al. 2017), and international (Fraiberg 2017) community; by stimulating other organizations to develop the ecosystem (Iwamoto 2016); and by ensuring new business relations between startups and existing corporations (Malek et al. 2014). Accelerators enable innovation by speeding it up (Gabrielsson et al. 2018), by helping companies to develop new ideas (Gutstein and Brem 2018), to test and share ideas (Lundsgaarde 2017), and by creating an innovation culture (Aragon et al. 2017). The entrepreneurship culture is a long-term outcome of accelerators' programs, and is generally observed by examining the change in people's interest in entrepreneurship (Adomdza 2016), or in people's tolerance to failure (McHugh et al. 2013).

Out of the 81 sources included in the CIMO analysis, only one paper mentions any negative outcomes related to accelerators (Miller and Bound 2011), including the danger that they exploit startup funders (at startup level), and their role in creating a bubble, and diverting talent from other, more economically beneficial pursuits (at ecosystem level).

We also analyzed outcomes depending on their nature. Similarly with Voisey et al. (2006) we differentiate between soft outcomes including personal skills, knowledge, validation, and hard outcomes including funding, market access, access to research facilities, exits. Hard outcomes refer to economic benefits and results, with soft outcomes comprising non-economic results which may however be important as an intermediate stage on the road to achieving hard outcomes. We further differentiated between two types of hard outcomes depending on their magnitude: average hard outcomes which are associated to incremental innovation and the transformation of an idea into a successful business on the market; and top hard outcomes associated with radical innovation and the creation of innovative products or business models. Average hard outcomes include funding, market success, jobs created, while top hard outcomes include exits, startups valuation, or economic wealth generation. The analysis reveals that hard outcomes (including both average and top hard outcomes as described before) are dominant, though their presence varies across levels. At startup level most sources mention both soft outcomes and hard outcomes (n=40), 18 mention hard outcomes, and 14 soft outcomes, while 9 have mentioned no outcomes. At accelerator level, the most popular are hard outcomes (n=28), with other types are less mentioned (for soft n=4, for hard & soft n=2), while for the ecosystem level the number of sources which identified hard outcomes is even higher (n=35), 9 mention both hard & soft outcomes, and 4 mention only soft outcomes.

3.3.4 Mechanisms

Mechanisms are recognized as the key results of synthesizing research, providing basic theory on why specific outcomes emerge (Denyer et al., 2008). Mechanisms are more broadly understood as one of the processes in a material system that makes it what it is, such as photosynthesis in plants, litigations in courts of law and work in organizations (Bunge 2004). In the context of accelerators,

mechanisms thus refer to the processes that explain their peculiar functioning or activity, in other words, their modus operandi - the processes that make accelerators what they are. Because most mechanisms are concealed, they have to be conjectured (Bunge 2004) as their identification is not straightforward. Following Denyer et al. (2008), one way of identifying mechanisms is through considering the processes triggered by specific interventions in a specific context (Denyer et al., 2008).

For establishing the mechanisms that characterize accelerators, we have analyzed the links evident in existing research between accelerators' contexts, interventions and outcomes. *Context* based categorization of accelerators, such as differentiating between ecosystem builder (corporate accelerator), deal-flow maker (startup accelerators), and welfare stimulator (government accelerators) (Pauwels et al., 2016), while usefully distinguishing between contexts, cannot associate *interventions* – i.e. services that accelerators offer, with the *outcomes* accelerators achieve in specific contexts or for specific bundle of services delivered at the different levels we considered: start-ups, accelerators and ecosystem level. For example, welfare stimulator accelerators, such as the Startup Chile Ecosystem (Gonzalez-Uribe and Leatherbee 2016), has similar interventions and outcomes as individually operated accelerators (e.g. Y Combinator), and ecosystem builder accelerators (Mahmoud-Jouini et al. 2018). More confusedly, research has also found that accelerators which run similar typical interventions generate in similar contexts different outcomes for different participants. This variation in *outcomes* across similar interventions and contexts has been explained based on the different types of participants involvement in the process, and based on different participants' situational logic (Jackson and Richter 2017). Our analysis of outcomes identified in existing research suggests however that this variation in outcomes might also be due to the confusion between output and outcomes, and to the

different time perspectives different studies may take in measuring outcomes. Measuring the outcomes of same interventions in similar contexts over short versus long term is thus likely to lead to different (soft versus hard) outcomes.

Our CIMO analysis suggests that it is possible to link outcomes (hard and soft) to specific interventions (typical, average and extended) to identify specific mechanisms that explain how different types of accelerators operate. Considering our approach which differentiates between the range of interventions offered (rather than bundling different interventions together depending on context) into narrow, typical and extended, we have observed that the different range of interventions on offer are associated with different types of outcomes: narrow interventions such as competitions for students (Adomdza 2016), university accelerators (Glinik 2019), workshops (Gutstein and Brem 2018), or corporate internal accelerators (Selig et al. 2018) seem to lead to soft outcomes including idea discovery and validation, learning, and the development of an an entrepreneurial culture and self-confidence. In contrast, extended interventions tend to lead to top hard outcomes including exits, new technologies with high impact on the market, and increased number of employees at ecosystem level. Typical interventions are somewhere in between, leading to providing a range of both soft (validation and learning) and hard (economic results through access to new markets and growth in revenue / performance) outcomes, what we have termed previously as average hard outcomes. We thus differentiate 4 types of mechanisms that explain the association between these interventions and set of outcomes: two types of mechanisms that associate interventions with soft outcomes: validation, learning, one type of mechanism that associate intervention with average hard outcomes: access and growth, and one type of mechanism that links intervention with top hard outcomes: innovation (see Table 3).

The four mechanisms explain the relationship between I-O either directly, where a particular intervention leads to a particular set out outcomes (e.g. narrow interventions lead to validation and learning); or indirectly, as a particular mechanism triggers other mechanisms (e.g. validation, explained by a particular combination of intervention and outcomes, leads to learning, which could lead to innovation) (see Figure 2).

= = = = = = = = = = = = = = = = = =

INSERT FIGURE 2 HERE

= = = = = = = = = = = = = = = = = =

M1. Validation is a basic mechanism describing simple accelerators which run narrow interventions such as workshops or meetings (real or virtual) leading to a soft outcome - accepting/validating entrepreneurs' ideas. Validation accelerators' main goal is supporting entrepreneurs to engage in idea discovery and validation. Idea validation represents a basic activity during the acceleration process for startups, which often, but not necessarily, complements learning, and which can be seen as the trigger for launching a business (i.e. a precursor to access & growth). While validation has been considered a by-product of the acceleration process (Drori and Wright 2018), our analysis indicates that it represents an essential process that accelerators perform by leveraging a narrow range of services to validate a product/idea. There are few accelerators which can be termed validation accelerators, such as a two-day workshop (Gutstein and Brem 2018) or an innovation platform where individuals present and evaluate their ideas (Gabrielsson et al. 2018), with most accelerators providing also other services. A range of context based accelerators such as university competitions for students (Adomdza 2016), university accelerators (Glinik 2019), corporate internal accelerators (Selig et al. 2018), and social accelerators (Roberts and Lall 2018) can be mainly validation oriented. Validation accelerators are

the least common in our sources (n=5) though validation as a soft outcome at startups' level is found in 32 sources.

M2. Learning is another basic mechanism observed regardless of accelerators' context (university, community related, or startups) which explains the connection between narrow interventions and soft outcome which represents learning – acquiring new relevant information, knowledge and skills. Pure learning accelerators interventions are related to helping entrepreneurs to gain skills while they are experimenting with specific ideas (i.e. learning without validation), although most soft outcomes oriented accelerators help entrepreneurs to gain business skills while they are working on their idea (i.e. validation happens at the same time as learning and the accelerator combine learning and validation mechanisms). The narrow interventions associated to learning are online learning, workshops, geek camps, while the soft outcomes of learning accelerators include business and technical knowledge, vicarious learning, social capital (Etzkowitz 2013; Miles et al. 2017; Mitra and Euchner 2016; Wright et al. 2017). Learning accelerators are much more common comparing with validation accelerators (n=23).

M3. Access & growth is the connection between typical interventions and average hard outcomes. It denotes the increased market orientation of some accelerators which focus not simply on supporting idea validation and learning, but rather on providing startup firms with average hard outcomes: access to investors, avenues to reach new markets, and support for product development and launch. The main outcomes of these accelerators are hard average outcomes including the number of surviving startups, the number of profitable startups measured at certain points in time after graduation. Typical interventions include a wide range of services such as: mentoring, coaching, selecting participants organized in cohorts, boot-camp training over a fixed period, preparation to pitch investors during the demo-day, networking, and access to financing. These

interventions typically generate both average hard outcomes, and the soft outcomes related to validation and learning mechanisms. Access & growth accelerators emphasis market success, and are the most common mechanisms observed (n=31).

M4. Innovation is the connection between extended interventions and top hard outcomes**.** Though all accelerators have an innovation focus, we have chosen the term innovation for our last mechanism to denote the complex innovation process that occurs in these accelerators. The access & growth accelerators focus on market-oriented results (number of survival firms and number of profitable firms) and involve the typical interventions to support the development of products to reach the market. They do not however support more complex innovation processes that often need to accompany efforts to develop and launch new products. In addition to market focused interventions, innovation accelerators also offer support to access relevant research, run complex technology transfer processes, and possess the capability to adapt their interventions to suit startups' characteristics and needs. Innovation accelerators aim to support the creation of complex, often research intensive, products and services and deliver them to the market. Such complexity requires extended interventions such as research support, post-program support, and lengthier interventions. Innovation accelerators lead mostly to top hard outcomes including the number of exits, the number of technologies with high impact on the market, the number of employees, and the introduction of a different technological paradigm within an industry. Innovation (n=30) is the second most observed mechanism in our sources.

= = = = = = = = = = = = = = = = =

INSERT TABLE 3 HERE

= = = = = = = = = = = = = = = = =

Mechanisms emerged as the key explanatory characteristic of accelerators, depicting the process through which interventions transform into outcomes. Following Bunge's (2004) terminology, validation, learning, access & growth and innovation are essential mechanisms that represent specific functions performed by accelerators. Our analysis demonstrates that it is these essential mechanisms: validation, learning, access & growth and innovation, rather than the context in which accelerators operate (cf. Pauwels et al. 2016), that uniquely define how they operate. However, our analysis also finds that specific contexts are often associated with some interventions, for example universities are more inclined to organize students competitions (Adomdza 2016), while larger and world-wide recognized accelerators are more inclined to focus on top hard outcomes. However, the way in which accelerators operate seems to be explained by the connection between interventions and outcomes, rather than by the organizational context in which they are embedded. The proposed mechanisms offer a fresh perspective explaining the way in which accelerators work, these results being in line with previous studies performed on technology business incubation mechanisms (Lamine et al. 2018).

Considering the four mechanisms which emerged in our research, we define accelerators as:

> *organizations which provide support for startups in order to accelerate their development through one or more processes: learning, validation, access & growth, and innovation.*

4. An agenda for future accelerators research

Building on our review of accelerator research, we highlight the shortcomings in the current conceptualization of accelerators (through our analysis of definitions of accelerators), develop a future research agenda aimed at improving the understanding of how they operate (through our CIMO analysis), and point to a few methodological shortcomings evident in current research and suggest avenues to address these in the future.

4.1 What are accelerators: shortcomings and future research

Our definitional analysis indicates an evolution in how research conceptualizes the accelerator phenomena, moving from seeing it as a specific form of incubation, to understanding it as a distinct organizational form and finally to explaining it through emphasizing variation between its different forms. All such conceptualizations focus on defining accelerators with respect to the services they provide (i.e. interventions) vis-à-vis services offered by other forms of innovation intermediaries (i.e. incubators), and more recently across organizational contexts in which they occur (e.g. corporate versus university). While such a conceptualization was critical in setting up the acceleration process as a distinct phenomenon, and in highlighting the variety within the accelerator landscape, it is less useful in clarifying the underlying processes that make accelerators what they are. Conceptualizing accelerators in terms of what they are not (i.e. not incubators) or by where they are contextually situated (differentiating between types of accelerators) fails to explain what acceleration really is (Brown and Mawson 2016; Qin et al. 2019). Such approaches black box the concept, hampering researchers' ability to explain for example why similar types of accelerators lead to different outcomes.

Our proposition for a definition based on accelerators mechanisms which links context, interventions and outcomes, aims to open the accelerators black box and thus to provide the conceptual means through which further research can examine and explain the ways in which different accelerators (characterized by different mechanisms) pursue different interventions in different contexts, leading to different outcomes.

Beyond offering a new way of conceptualizing accelerators – as defined by their underlying mechanisms – our review also points to a range of avenues for future research. The plethora of studies focusing on defining acceleration process highlights that the industry around providing

support for entrepreneurial firms is now well established, and populated by a range of intermediary firms, among which accelerators organization are but one – increasingly seen as distinct – organizational actor (Hausberg and Korreck 2018). As a new form of organization emerging within a new industry, accelerators offer a range of interesting avenues to further research. For example, little is known about the evolution of accelerators as a new form of innovation intermediary actors (Kim and Wagman 2014), and the patterns of professionalization within this field. Research could consider here for example how accelerators became legitimate actors, and what kind of legitimation strategies and mechanisms did they use? Is there such a thing as accelerator professionals and what do they look like? It would also be relevant to consider the business model(s) that accelerators adopt to create and deliver value within the wider entrepreneurial ecosystem (Cohen et al. 2019; Gliedt et al. 2018; Yang et al. 2018), and to understand how such models relate to the underlying mechanisms. A further relevant area of research is examining how, within an increasingly crowded entrepreneurial support landscape, accelerators compete against other intermediary actors for startup attention (Dempwolf et al. 2014). Such research would be critical to understand the pattern of evolution, professionalization, value creation and competition within this emerging field.

4.2 How to understand what accelerators do: shortcomings and future research

Our analysis explains what accelerators do (their mechanisms) through examining the context in which they operate, the intervention (services) they deliver and the outcomes they achieve. Our analysis revealed underexplored subjects across all four areas and highlights future areas of research for each.

We found a huge interest in examining a wide range of organizational *contexts* in which accelerators operate (e.g. government, corporate, university, community), and a tendency to use

such contexts to define what accelerators do (e.g. Pauwels et al. 2016). While some contextual areas tend to be over represented, such as business and government, other tend to be less examined, such as social (Roberts and Lall 2018), or even corporate (Prexl et al. 2018; Selig et al. 2018). A key tendency in existing research is a diversification of the specific contexts which researchers examine, such as social (e.g. Roberts and Lall 2018), which is likely to amplify in the near future. More promising areas of research include examining issues such as the governance of accelerators in specific organizational contexts (for an exception see Vandeweghe and Fu, 2018), or their strategies and culture which are largely ignored by current research. For example the literature does not provide any example of how to implement and coordinate a corporate accelerator (Connolly et al. 2018). There are also limited efforts to compare accelerators operating across different contexts, thus illuminating which best practices are transmissible across context (or not) (Clarysse et al. 2015). This calls for comparison research studies (see section 4.3.)

Our research also highlighted that by and large, research examines industry specific accelerators with the IT industry being over represented, and focuses on accelerators located in the western world, with very limited research examining this phenomenon in developing or low-income countries. There are thus opportunities for research to focus on less examined industries, more likely niche contexts such as environmentally sustainable industries (Gliedt et al. 2018), or specific application areas (e.g. frugal innovation or technology for good), and to examine the accelerator process in other national context, beyond the western world (e.g. Africa). The focus on the western world means there is little understanding of how national culture in particular, but also the broader national institutional environment more generally shapes accelerators operations. Linking accelerators research with the broader sectorial, regional and national context represent a fruitful avenue for future research, especially seeing that many recent studies argue that the role of

accelerators in the wider entrepreneurial ecosystems is not yet properly addressed (Cohen et al. 2019; Yang et al. 2018).

Our review of *interventions* revealed a proliferation of extended approaches to deliver services to startup firms, going beyond the typical bundle of services to include a range of additional new services such as lean startup training (Mansoori 2017; Uhm et al. 2018), and design thinking (Glinik 2019) often delivered in innovative ways, such as through the use of open innovation (Gutstein and Brem 2018) and living lab approaches (Haukipuro et al. 2019). Changes in the way in which these services are provided, either through a standard package or through customization (Breznitz and Zhang 2019), has also been observed.

While research documented the proliferation of these services, the implications that these changes in interventions (in terms of both service extension and degree of customization) have on accelerators' operations, and the evidence base on which these services are provided to clients are less understood. There is thus scope for further research to examine how different levels of services add value to both accelerators and startup clients (Choi and Kim 2018). There are also opportunities for better theoretical grounding of such studies on interventions by drawing from theories related to entrepreneurial development and education. For example, more research into the learning effects that the services provided by accelerators offer to participants (Cohen et al. 2019) is also needed. Theoretical frameworks such as market positioning and resource-based view would also be useful to examine the strategies through which accelerators may exploit their resources, and alter their service offering to position their service differently in the market, for example by offering customization options.

Our analysis of *outcomes* revealed a tendency to confuse outcomes with outputs, especially for considering results at accelerator level, a focus on hard (economic) rather than soft (non-economic)

outcomes especially at accelerator and ecosystem levels, and a very strong bias towards positive outcomes. The first problem explains to some extent the lack of congruency noted in existing research in explanations of accelerators performance and their results (Choi and Kim 2018; Hochberg 2016; Miller and Bound 2011). The key shortcoming here is the lack of a theoretically informed analysis of accelerators outcome, with most studies focused on identifying a list of outcomes, rather than on explaining why they happen in the first place. Moreover, most studies consider outcomes holistically, rather than differentiating between stakeholder groups (unless these manifest at different levels). Our approach to rely on CIMO to explain accelerators based on their underlying mechanisms offer a first step in this direction, but future research is required to better underpin the theoretical foundation of accelerators' research to understand their results, and most importantly differentiate results across relevant stakeholder groups. For example, institutional logics could be used to explain how different actors, driven by different logics, engage with and perceive differently the value that accelerators provide. Cognitive frames would also be useful in explaining how different groups of actors involved in accelerators programs make sense differently of the opportunities provided, leading to different outcomes. Stakeholder mapping would provide a different perspective in examining variation in outcomes. There is also a strong need to differentiate between short and long-term results, which would help alleviate the confusion between outputs (immediate results from the accelerating process) and outcomes (non-immediate results related to performance), as well as help understanding better the relation between soft and hard outcomes. This would require different methodological approaches discussed in the next section (e.g. longitudinal studies). Seeing the wide range of soft outcomes evident at startup level, considering longer time frames to understand the processes involved in and the factors that contribute to their transformation (or lack of) into hard outcomes represent a key area of future

research. Finally, there is a strong need for more nuanced analysis of outcomes, to encompass both positive but also the negative consequences (Drover et al. 2017; Qin et al. 2019; Regmi et al. 2015). To do so, we suggest both more inclusive research designs that include a wider range of participants, as well as a longer time frame to better understand the longer-term effects of accelerator programs (see section 4.3.).

Finally, our identification of the four *mechanisms* explaining how accelerators operate offer important avenues for future research. Regarding learning for example, there is limited knowledge about what is actually learnt in the acceleration programs, and how effective they are in the process of learning (Seet et al. 2018). Future research would be needed to understand how accelerators support entrepreneurial learning process, what practices are more effective, and in what contexts. Regarding the other three mechanisms - validation, access & growth and innovation - there are only limited studies addressing the long-term impact of accelerators which have implemented such mechanisms. Particularly with regard to innovation, which is the most complex mechanism we identified, there is little research understanding the outcomes that such innovative accelerators have longer term in terms of their provision of technology transfer (Bliemel et al. 2016; Byrd et al. 2017; Grilo et al. 2017), open innovation (Battistella et al. 2017; Jackson and Richter 2017), or social innovation (Iwamoto 2016) services.

4.3 Addressing methodological shortcomings

As expected in the case of an early stage phenomenon, our analysis found that most research is exploratory and relies on qualitative methods, most often case study methods (Colombo et al. 2018), with much fewer quantitative or mixed methods studies. Typically, the recommendations in these cases for future research is to focus on quantitative studies that are better placed to test theories, and examine large scale impact of a suite of contexts and interventions onto outputs (i.e.

performance). Calls for more quantitative studies are thus popular in accelerator research, especially for large–scale studies on wider population of entrepreneurs (Brown et al. 2019; Tobiassen et al. 2018), from different geographical regions (Clarysse et al. 2015; Clarysse and Yusubova 2014) and which should examine the relationship between specific accelerators and specific entrepreneurs (Pandey et al., 2017). Such researchers argue that larger samples (more accelerators) and more types of accelerators (with different business models and different international contexts) might generate more interesting results (Miller and Bound 2011; Wise and Valliere 2014). While we acknowledge that there is significant value in engaging in such larger scale, quantitative studies, our review also points to the need to better conceptualize the accelerator phenomenon, to seek better theoretical underpinning of accelerator research (see earlier section), and to examine accelerators more in depth across different groups of participants, contexts, and periods of time. All these call for further explorative studies, requiring more nuanced qualitative methodologies beyond the current focus on case studies research supported by interviews. We highlight three aspects that future qualitative research should address. First, we argue for more *comparative studies* of accelerators. Comparison research designs are relevant because they can easily identify variation in accelerators mechanisms linking contexts and intervention to specific outcomes, thus elucidating the effectiveness and value–added contributions of accelerators (Clarysse et al. 2015). Comparative case studies would help better understanding the differences across ecosystems and regions, as well as between accelerators and other types innovation intermediaries (Radojevich-Kelley and Hoffman 2012). They would also better clarify the outcomes of acceleration through allowing comparison of performance between accelerated and non-accelerated ventures (Breznitz and Zhang, 2019; Clarysse et al., 2015; Pauwels et al., 2016),

across different types of participants, for example between less experienced and more experienced ones (Drover et al. 2017).

Second, we argue for more *longitudinal studies* of accelerators that allow the exploration of long-term process and outcomes and avoid the retrospective bias incurred in one-time case studies. A longer time frame would allow for a better understanding of the process of acceleration, both in terms of how the startup engage with the services delivered by the accelerator programs, and in terms of how the accelerator organization itself develops and delivers the intervention, and may evolve its governance, business model, culture and strategies over time. Longitudinal case studies would also provide a much better understanding of accelerators outcomes, for example in terms of understanding which soft outcomes and under what conditions transform into hard outcomes, and in avoiding the conflation of outputs with outcomes by allowing a longer time frame to understand the realization of non-immediate outcome results. Even on a smaller time frame, longitudinal studies involving "before-during-after" studies (Qin et al. 2019) provide a better way of clarifying the results of acceleration programs on participant startups across different contexts and interventions, thus enabling the generation of "best practices" to achieve intended outcomes.

Finally, we argue for more *nuanced and inclusive studies* of accelerators that can better capture the view of different actors involved in the accelerator process. Accelerators operate across a variety of contexts involving a wide range of actors, driven by different interests, motivations and situation logics which affects their outcomes (Jackson and Richter, 2017). Moving beyond interviews for example, to conduct more in depth ethnographic research, including a wider variety of sources and covering a wider range of participants would allow a more in depth analysis of the views of a wider range of stakeholders, probe their perceptions and experiences better and unveil

their guiding frames and logics that may explain their variation in terms of involvement with the acceleration phenomenon.

5. Conclusions

Although a relatively recent phenomenon, accelerators research has proliferated over the past 15 years, establishing accelerators as a new and distinct form of innovation intermediary supporting startup. Our review aims to draw from current research into accelerators to clarify what accelerators are, how they operate, and what role they play in supporting the development of their participating start-ups, and more broadly in shaping the innovation entrepreneurial landscape. Our analysis leads us to conceptualize accelerators based on the underlying mechanisms that explain what they are and which link the context in which they operate with the interventions they deliver and the outcomes they realize. We thus aim to open the accelerators black box and provide the conceptual means through which further research can examine and explain the ways in which different accelerators (characterized by different mechanisms) pursue different interventions in different contexts, leading to different outcomes. We identify a number of fruitful areas of future research in terms of exploring the patterns of development of this new emerging field, examining how such new organizations are managed and coordinated internally, and the implications that future innovations will have on their ability to deliver their services and realize their outcomes, moving beyond contexts that are currently well understood, and including a wider range of stakeholders that would allow for a more nuanced understanding of their outcomes. We also argue for more comparison, longitudinal and include qualitative studies.

The findings of our study also provide valuable insights for accelerators' managers, entrepreneurs, investors and policy makers. Understanding the relationship between specific contexts, instruments, mechanisms and outcomes is an important asset for all the stakeholders involved in a

business acceleration program. It is widely recognized that acceleration platforms have a key role in developing an entrepreneurial climate; and can be perceived as vehicles that could revitalize industries and regions (Coste and Gatzke 2017; Prexl et al. 2018). Moreover, the mechanisms we identified help practitioners understand the functioning of business accelerators, thus increasing the success chances of the acceleration process.

It is widely recognized that accelerations have a key role in developing an entrepreneurial climate and that they can be perceived as vehicles that could revitalize industries and regions (Coste and Gatzke 2017; Prexl et al. 2018). Managing accelerators and implementing acceleration programs is a challenge due to significant gaps in theory and work practices which our analysis sought to address.

6. References

Adomdza, G. K. (2016). Choosing Between a Student-Run and Professionally Managed Venture Accelerator. *Entrepreneurship: Theory and Practice*, *40*(4), 943–956. doi:10.1111/etap.12145

Alänge, S., & Steiber, A. (2018). Three operational models for ambidexterity in large corporations. *Triple Helix*, *5*(1), 1–25.

Aragon, R., Schneider, J., Yang, W., Basson, J., Burton, A., Holman, R., & Downing, G. J. (2017). Impact of innovation initiatives in a federal government agency: Measuring and understanding the influence of culture and employee attitudes. *The Innovation Journal*, *22*(1), 1.

Assudani, R., Mroczkowski, T., Muñoz-Fernández, A., & Khilji, S. E. (2017). Entrepreneurial support systems: role of the Czech accelerator. *International Journal of Entrepreneurship and Innovation Management*, *21*(6), 530–552.

Audretsch, D. B., Aldridge, T. T., & Sanders, M. (2011). Social capital building and new business formation: A case study in Silicon Valley. *International Small Business Journal*, *29*(2), 152–169. doi:10.1177/0266242610391939

Battistella, C., De Toni, A. F., & Pessot, E. (2017). Open accelerators for start-ups success: a case study. *European Journal of Innovation Management*, *20*(1), 80–111.

Bauer, S., Obwegeser, N., & Avdagic, Z. (2016). Corporate Accelerators: Transferring Technology Innovation to Incumbent. *MCIS 2016 Proceedings. Paper 57*.

Bernthal, B. (2015). Investment Accelerators. *Stan. JL Bus. & Fin.*, *21*, 139.

Berzin, S. C., & Dearing, T. C. (2019). Building Capacity for Innovation: The Case of an Academic–Nonprofit Partnership. *The Journal of Nonprofit Education and Leadership*, *9*(2).

Bliemel, M., Flores, R., De Klerk, S., & Miles, M. P. (2019). Accelerators as start-up infrastructure for entrepreneurial clusters. *Entrepreneurship and regional development*, *31*(1–2, SI), 133–149. doi:10.1080/08985626.2018.1537152

Bliemel, M. J., Flores, R. G., de Klerk, S., Miles, M. P., Costa, B., & Monteiro, P. (2016). The role and performance of accelerators in the Australian startup ecosystem.

Breznitz, S. M., & Zhang, Q. (2019). Fostering the growth of student start-ups from university accelerators: an entrepreneurial ecosystem perspective. *Industrial and Corporate Change*.

Brown, R., & Mawson, S. (2016). Targeted support for high growth firms: Theoretical constraints, unintended consequences and future policy challenges. *Environment and Planning C: Government and Policy*, *34*(5), 816–836.

Brown, R., Mawson, S., Lee, N., & Peterson, L. (2019). Start-up factories, transnational entrepreneurs and entrepreneurial ecosystems: unpacking the lure of start-up accelerator programmes. *European Planning Studies*, *27*(5), 885–904.

Bunge, M. (2004). How does it work? The search for explanatory mechanisms. *Philosophy of the social sciences*, *34*(2), 182–210.

Bustamante, C. V. (2018). Strategic choices: Accelerated startups' outsourcing decisions. *Journal of Business Research*.

Byrd, J., Herskowitz, O., Aloise, J., Nye, A., Rao, S., & Reuther, K. (2017). University technology accelerators: design considerations and emerging best practices. *Technology & Innovation*, *19*(1), 349–362.

Caley, E., & Kula, H. (2013). Seeding Success: Canada's Startup Accelerators. *MaRS, Toronto, Canada. Retrieved August*, *11*, 2014.

Cantone, L., Testa, P., & Di Sarno, G. D. (2016). How does innovator's dna work in service systems for new entrepreneurship acceleration? *Tiziana Russo-Spenaand Cristina Mele*, 482.

Choi, Y., & Kim, D. (2018). The effects of investor types on investees' performance: Focusing on the seed accelerator. *Cogent Economics & Finance*, *6*(1). doi:10.1080/23322039.2018.1550870

Christiansen, J. (2009). Copying Y Combinator, a framework for developing seed accelerator programmes. *University of Cambridge, Boston, USA*.

Clarysse, B., Wright, M., & VanHove, J. (2015). A look inside accelerators. *London: Nesta*.

Clarysse, Bart, & Yusubova, A. (2014). Success factors of business accelerators. Presented at the Technology Business Incubation Mechanisms and Sustainable Regional Development.

Clayton, P., Feldman, M., & Lowe, N. (2018). Behind the scenes: intermediary organizations that facilitate science commercialization through entrepreneurship. *Academy of management perspectives*, *32*(1), 104–124. doi:10.5465/amp.2016.0133

Cohen, B., & Munoz, P. (2015). Toward a Theory of Purpose-Driven Urban Entrepreneurship. *Organization & Environment*, *28*(3), 264–285. doi:10.1177/1086026615600883

Cohen, S. (2013). *How to accelerate learning: Entrepreneurial ventures participating in accelerator programs*. The University of North Carolina at Chapel Hill.

Cohen, S. (2013). What do accelerators do? Insights from incubators and angels. *Innovations: Technology, Governance, Globalization*, *8*(3–4), 19–25.

Cohen, S., Fehder, D. C., Hochberg, Y. V., & Murray, F. (2019). The design of startup accelerators. *Research Policy*, *48*(7), 1781–1797. doi:10.1016/j.respol.2019.04.003

Cohen, S., & Hochberg, Y. V. (2014). Accelerating startups: The seed accelerator phenomenon.

Colombo, M. G., Rossi-Lamastra, C., & Wright, M. (2018). Accelerators: insights for a research agenda. In *Accelerators: Successful Venture Creation and Growth* (pp. 188–203). Edward Elgar Publishing.

Connolly, A. J., Turner, J., & Potocki, A. D. (2018). IGNITE your corporate innovation: insights from setting up an ag-tech start-up accelerator. *International Food and Agribusiness Management Review*, *21*(6), 833–846.

Coste, J.-D., & Gatzke, S. (2017). A Novel Approach to Innovation Platforms: Symbiotic On/Off Spaces, Cross-Industry Sponsor. *New Space*, *5*(3), 155–162.

Dempwolf, C. S., Auer, J., & D'Ippolito, M. (2014). Innovation accelerators: Defining characteristics among startup assistance organizations. *Published online at www. sba. gov/advocacy: Small Business Administration*.

Denyer, D., Tranfield, D., & Van Aken, J. E. (2008). Developing design propositions through research synthesis. *Organization studies*, *29*(3), 393–413.

Drori, I., & Wright, M. (2018). Accelerators: characteristics, trends and the new entrepreneurial ecosystem. In *Accelerators: Successful Venture Creation and Growth* (pp. 1–20). Edward Elgar Publishing.

Drover, W., Busenitz, L., Matusik, S., Townsend, D., Anglin, A., & Dushnitsky, G. (2017). A Review and Road Map of Entrepreneurial Equity Financing Research: Venture Capital, Corporate Venture Capital, Angel Investment, Crowdfunding, and Accelerators. *Journal of Management*, *43*(6), 1820–1853. doi:10.1177/0149206317690584

Dushnitsky, G., & Sarkar, S. (2018). Variance decomposing of accelerator and cohort effects among London startups. Presented at the 78th Annual Meeting of the Academy of Management, AOM 2018. doi:10.5465/AMBPP.2018.80

Etzkowitz, H. (2013). StartX and the 'Paradox of Success': Filling the gap in Stanford's entrepreneurial culture. *Social Science Information*, *52*(4), 605–627.

Fernandes, S. (2016). Innovation accelerators as entrepreneurial and interdisciplinary engines: the portuguese case. *Journal of Spatial and Organizational Dynamics*, *4*(3), 213–228.

Fraiberg, S. (2017). Start-Up Nation: Studying Transnational Entrepreneurial Practices in Israel's Start-Up Ecosystem. *Journal of Business and Technical Communication*, *31*(3), 350–388. doi:10.1177/1050651917695541

Frimodig, L., & Torkkeli, M. (2017). Sources for success-new venture creation in seed and business accelerators. *International Journal of Business Excellence*, *12*(4), 489–507.

Gabrielsson, J., Politis, D., Persson, K. M., & Kronholm, J. (2018). Promoting water-related innovation through networked acceleration: Insights from the Water Innovation Accelerator. *Journal of Cleaner Production*, *171*, S130–S139.

Gardner, J., & Webster, A. (2017). Accelerating innovation in the creation of biovalue: The cell and gene therapy catapult. *Science, Technology, & Human Values*, *42*(5), 925–946.

Gliedt, T., Hoicka, C. E., & Jackson, N. (2018). Innovation intermediaries accelerating environmental sustainability transitions. *Journal of cleaner production*, *174*, 1247–1261.

Glinik, M. (2019). Gruendungsgarage - A Best-Practice Example of an Academic Start-up Accelerator. *International Journal of Engineering Pedagogy*, *9*(3), 33–43. doi:10.3991/ijep.v9i3.9876

Gonzalez-Uribe, J., & Leatherbee, M. (2016). The Effects of Business Accelerators on Venture Performance: Evidence from Start-Up Chile.

Goswami, K., Mitchell, J. R., & Bhagavatula, S. (2018). Accelerator expertise: Understanding the intermediary role of accelerators in the development of the Bangalore entrepreneurial ecosystem. *Strategic Entrepreneurship Journal*, *12*(1), 117–150.

Grilo, A., Mealha, T., & Zutshi, A. (2017). Moving Beyond Corporate Acceleration Programs: The Need for Community Entrepreneurial Acceleration Programs. *ICESI_0157*, *http://icesi2017.globalconf.org/site/userdata/1129/Program/ICESI_Full_papers.pdf?m, 12.2018*.

Gutmann, T. (2019). Harmonizing corporate venturing modes: an integrative review and research agenda. *Management Review Quarterly*, *69*(2), 121–157. doi:10.1007/s11301-018-0148-4

Gutstein, A., & Brem, A. (2018). Lead User Projects in Practice—Results from an Analysis of an Open Innovation Accelerator. *International Journal of Innovation and Technology Management*, *15*(02), 1850015.

Haines, J. (2014). Iterating an Innovation Model: Challenges and Opportunities in Adapting Accelerator Practices in Evolving Ecosystems (Vol. 2014, pp. 282–295). Presented at the Ethnographic Praxis in Industry Conference Proceedings, Wiley Online Library.

Hallen, B. L., Bingham, C. B., & Cohen, S. (2014). Do Accelerators Accelerate? A Study of Venture Accelerators as a Path to Success? (Vol. 2014, p. 12955). Presented at the Academy of Management Proceedings, Academy of Management.

Harima, A., & Freudenberg, J. (2019). Co-Creation of Social Entrepreneurial Opportunities with Refugees. *Journal of Social Entrepreneurship*. doi:10.1080/19420676.2018.1561498

Haukipuro, L., Vainamo, S., Arhippainen, L., & Ojala, T. (2019). Applying a Living Lab Approach Within an eHealth Accelerator. *Technology Innovation Management Review*, *9*(3), 6–19. doi:10.22215/timreview/1221

Hausberg, J. P., & Korreck, S. (2018). Business incubators and accelerators: a co-citation analysis-based, systematic literature review. *The Journal of Technology Transfer*, 1–26.

Hochberg, Y. V. (2016). *Accelerating entrepreneurs and ecosystems: The seed accelerator model* (Vol. 16).

Isabelle, D. A. (2013). Key factors affecting a technology entrepreneur's choice of incubator or accelerator. *Technology Innovation Management Review*, *3*(2), 16.

Iwamoto, T. (2016). Dream-based social innovation. In *2016 Portland International Conference on Management of Engineering and Technology (PICMET)* (pp. 236–242). IEEE.

Jackson, P., & Richter, N. (2017). Situational logic: An analysis of open innovation using corporate accelerators. *International Journal of Innovation Management*, *21*(07), 1750062.

Kanbach, D. K., & Stubner, S. (2016). Corporate accelerators as recent form of startup engagement: The what, the why, and the how. *Journal of Applied Business Research*, *32*(6), 1761.

Kim, J. H., & Wagman, L. (2014). Portfolio size and information disclosure: An analysis of startup accelerators. *Journal of Corporate Finance*, *29*, 520–534. doi:10.1016/j.jcorpfin.2014.10.017

Kohler, T. (2016). Corporate accelerators: Building bridges between corporations and startups. *Business Horizons*, *59*(3), 347–357. doi:10.1016/j.bushor.2016.01.008

Kreusel, N., Roth, N., & Brem, A. (2018). European business venturing in times of digitisation-an analysis of for-profit business incubators in a triple helix context. *International Journal of Technology Management*, *76*(1–2), 104–136.

Kupp, M., Marval, M., & Borchers, P. (2017). Corporate accelerators: fostering innovation while bringing together startups and large firms. *Journal of Business Strategy*, *38*(6), 47–53.

Kuschel, K., Lepeley, M. T., Espinosa, F., & Gutierrez, S. (2017). Funding challenges of Latin American women start-up founders in the technology industry. *Cross Cultural & Strategic Management*, *24*(2), 310–331. doi:10.1108/ccsm-03-2016-0072

Ladd, T. (2018). Does the business model canvas drive venture success? *Journal of Research in Marketing and Entrepreneurship*, *20*(1), 57–69.

Lall, S., Bowles, L., & Baird, R. (2013). Bridging the "pioneer gap": The role of accelerators in launching high-impact enterprises. *Innovations: Technology, Governance, Globalization*, *8*(3–4), 105–137.

Lamine, W., Mian, S., Fayolle, A., Wright, M., Klofsten, M., & Etzkowitz, H. (2018). Technology business incubation mechanisms and sustainable regional development. *The Journal of Technology Transfer*, *43*(5), 1121–1141.

Lundsgaarde, E. (2017). Business Motives in Global Multi-Stakeholder Initiatives: Exploring Corporate Participation in Sustainable Energy for All. *Global Policy*, *8*(4), 464–473.

Mahmoud-Jouini, S. B., Duvert, C., & Esquirol, M. (2018). Key Factors in Building a Corporate Accelerator Capability: Developing an effective corporate accelerator requires close attention to the relationships between startups and the sponsoring company. *Research-Technology Management*, *61*(4), 26–34.

Malek, K., Maine, E., & McCarthy, I. P. (2014). A typology of clean technology commercialization accelerators. *Journal of Engineering and Technology Management*, *32*, 26–39.

Mansoori, Y. (2017). Enacting the lean startup methodology: The role of vicarious and experiential learning processes. *International Journal of Entrepreneurial Behavior & Research*, *23*(5), 812–838.

Mansoori, Y., Karlsson, T., & Lundqvist, M. (2019). The influence of the lean startup methodology on entrepreneur-coach relationships in the context of a startup accelerator. *Technovation*, *84–85*, 37–47. doi:10.1016/j.technovation.2019.03.001

McHugh, P., Whipple, C., & Yang, X. (2013). Failing to Succeed: A Network Theoretic Comparison of Global Accelerators (Vol. 2, p. 425). Presented at the European Conference on Innovation and Entrepreneurship, Academic Conferences International Limited.

Miles, M. P., de Vries, H., Harrison, G., Bliemel, M., De Klerk, S., & Kasouf, C. J. (2017). Accelerators as authentic training experiences for nascent entrepreneurs. *Education+ Training*, *59*(7/8), 811–824.

Miller, P., & Bound, K. (2011). *The Startup Factories: The rise of accelerator programmes to support new technology ventures*. NESTA.

Mitra, S., & Euchner, J. (2016). Business Acceleration at Scale: An Interview with Sramana Mitra: Sramana Mitra talks with Jim Euchner about democratizing innovation through education and mentoring. *Research-Technology Management*, *59*(3), 12–20.

Moschner, S.-L., Fink, A. A., Kurpjuweit, S., Wagner, S. M., & Herstatt, C. (2019). Toward a better understanding of corporate accelerator models. *Business Horizons*. doi:10.1016/j.bushor.2019.05.006

Pandey, S., Lall, S., Pandey, S. K., & Ahlawat, S. (2017). The Appeal of Social Accelerators: What do Social Entrepreneurs Value? *Journal of Social Entrepreneurship*, *8*(1), 88–109. doi:10.1080/19420676.2017.1299035

Pauwels, C., Clarysse, B., Wright, M., & Van Hove, J. (2016). Understanding a new generation incubation model: The accelerator. *Technovation*, *50*, 13–24.

Prexl, K.-M., Hubert, M., Beck, S., Heiden, C., & Prügl, R. (2018). Identifying and analysing the drivers of heterogeneity among ecosystem builder accelerators. *R&d Management*.

Price, R. (2004). The role of service providers in establishing networked regional business accelerators in Utah. *International Journal of Technology Management*, *27*(5), 465–474.

Qin, F., Wright, M., & Gao, J. (2019). Accelerators and intra-ecosystem variety: how entrepreneurial agency influences venture development in a time-compressed support program. *Industrial and Corporate Change*, *28*(4), 961–975.

Radojevich-Kelley, N., & Hoffman, D. L. (2012). Analysis of accelerator companies: An exploratory case study of their programs, processes, and early results. *Small Business Institute Journal*, *8*(2), 54–70.

Regmi, K., Ahmed, S. A., & Quinn, M. (2015). Data Driven Analysis of Startup Accelerators. *Universal Journal of Industrial and Business Management*, *3*(2), 54–57.

Richter, N., Jackson, P., & Schildhauer, T. (2018). Outsourcing creativity: An abductive study of open innovation using corporate accelerators. *Creativity and Innovation Management*, *27*(1), 69–78.

Roberts, P. W., & Lall, S. A. (2018). *Observing Acceleration: Uncovering the Effects of Accelerators on Impact-Oriented Entrepreneurs*. Springer.

Roundy, P. T. (2017). Hybrid organizations and the logics of entrepreneurial ecosystems. *International Entrepreneurship and Management Journal*, *13*(4), 1221–1237.

Seed-DB. (2018). Seed-DB Charts and Tables, https://www.seed-db.com/chartsandtables, accessed in 5.02.2018.

Seet, P.-S., Jones, J., Oppelaar, L., & Corral de Zubielqui, G. (2018). Beyond 'know-what'and 'know-how'to 'know-who': enhancing human capital with social capital in an Australian start-up accelerator. *Asia Pacific Business Review*, *24*(2), 233–260.

Selig, C. J., Gasser, T., & Baltes, G. H. (2018). How Corporate Accelerators foster Organizational Transformation: An internal Perspective. In *2018 IEEE International Conference on Engineering, Technology and Innovation (ICE/ITMC)* (pp. 1–9). IEEE.

Shankar, R. K., & Shepherd, D. A. (2018). Accelerating strategic fit or venture emergence: Different paths adopted by corporate accelerators. *Journal of Business Venturing*.

Shao, Y., & Shi, L. (2018). Cross-border open innovation of early stage tech incubation: A case study of FORGE, the first UK-China accelerator program. *Journal of Open Innovation: Technology, Market, and Complexity*, *4*(3). doi:10.3390/joitmc4030037

Thompson, D. (2012). Accelerating the Growth of the Next Generation of Innovators. *Ohio St. Entrepren. Bus. LJ*, *8*, 379.

Tobiassen, A. E., Elvekrok, I., Jahnsen, E. L., & Løtvedt, A. S. (2018). The value of accelerator programmes in the internationalization of Norwegian international new ventures (Vol. 2018-September, pp. 1064–1072). Presented at the Proceedings of the European Conference on Innovation and Entrepreneurship, ECIE.

Tranfield, D., Denyer, D., & Smart, P. (2003). Towards a methodology for developing evidence-informed management knowledge by means of systematic review. *British journal of management*, *14*(3), 207–222.

Uhm, C. H., Sung, C. S., & Park, J. Y. (2018). Understanding the accelerator from resources-based perspective. *Asia Pacific Journal of Innovation and Entrepreneurship*, *12*(3), 258–278. doi:10.1108/APJIE-01-2018-0001

Vandeweghe, L., & Fu, J.-Y. (Trent). (2018). Business accelerator governance. In Wright, M and Drori, I (Ed.), *Accelerators: successful venture creation and growth* (pp. 37–57). Edward Elgar Publishing.

Voisey, P., Gornall, L., Jones, P., & Thomas, B. (2006). The measurement of success in a business incubation project. *Journal of Small Business and Enterprise Development*, *13*(3), 454–468.

Wise, S., & Valliere, D. (2014). The impact on management experience on the performance of start-ups within accelerators. *The Journal of Private Equity*, *18*(1), 9–19.

Wright, M., Siegel, D. S., & Mustar, P. (2017). An emerging ecosystem for student start-ups. *The Journal of Technology Transfer*, *42*(4), 909–922.

Yang, S., Kher, R., & Lyons, T. S. (2018). Where Do Accelerators Fit in the Venture Creation Pipeline? Different Values Brought by Different Types of Accelerators. *Entrepreneurship Research Journal*, *8*(4).

Yang, S., Kher, R., & Newbert, S. L. (2019). What signals matter for social startups? It depends: The influence of gender role congruity on social impact accelerator selection decisions. *Journal of Business Venturing*.

Yin, B., & Luo, J. (2018). How Do Accelerators Select Startups? Shifting Decision Criteria Across Stages. *IEEE Transactions on Engineering Management*, (99), 1–16.

7. Tables & Figures

Table 1: The contribution of sources to definition analysis and CIMO-logic

Notes: OD – own definition, ND – no definition, OSD – other source definition, GAC – Google Academic Citations.

Authors and year	Source type	GAC 05.09.2019	Definition	Used for CIMO	Dominating mechanism
(Adomdza 2016)	Journal	8	ND	Yes	Validation
(Alänge and Steiber 2018)	Journal	0	ND	Yes	Innovation
(Aragon et al. 2017)	Journal	1	ND	Yes	Innovation
(Assudani et al. 2017)	Journal	1	OSD	Yes	Learning, Innovation
(Audretsch et al. 2011)	Journal	78	ND	Yes	Learning
(Battistella et al. 2017)	Journal	32	S19; S58; S61	Yes	Acces&Growth
(Bauer et al. 2016)	Conference	11	S58; OSD	No	-
(Bernthal 2015)	Journal	19	S23; S51; OSD	Yes	Learning
(Berzin and Dearing 2019)	Journal	0	ND	Yes	Learning
(Bliemel et al., 2016)	Report	12	S58; OSD	Yes	All mechanisms
(Bliemel et al., 2019)	Journal	5	S18; S58; S63	Yes	Learning
(Breznitz and Zhang 2019)	Journal	2	ND	Yes	Acces&Growth, Innovation
(Brown and Mawson 2016)	Journal	27	OD	Yes	Acces&Growth
(Brown et al. 2019)	Journal	3	S08; S39; S58; S61	Yes	Access&Growth
(Bustamante 2018)	Journal	4	S19	Yes	Acces&Growth
(Byrd et al. 2017)	Journal	2	OD	Yes	Innovation
(Caley and Kula 2013)	Report	20	S58	Yes	Acces&Growth
(Cantone et al. 2016)	Journal	1	ND	Yes	Innovation
(Choi and Kim 2018)	Journal	0	S08; S18; S19; S58	No	-
(Christiansen 2009)	Thesis	54	OD	Yes	Learning
(Clarysse & Yusubova, 2014)	Conference	20	S58	Yes	Learning
(Clarysse et al., 2015)	Report	62	S58; OD	Yes	Multiple mechanisms
(Clayton et al. 2018)	Journal	31	S19; S61	No	-
(Cohen & Hochberg, 2014)	Journal	250	S19; OD	No	-
(Cohen & Munoz, 2015)	Journal	27	OD	Yes	Innovation
(Cohen et al., 2019)	Journal	1	S18; S19; S20	Yes	Access&Growth
(Cohen, 2013)	Journal	248	OD	No	-
(Cohen, 2013)	Thesis	34	OD	Yes	Learning

(Colombo et al. 2018)	Book chapter	2	S18; S20	No	-
(Connolly et al. 2018)	Journal	0	OSD	Yes	Innovation
(Coste and Gatzke 2017)	Journal	0	ND	Yes	Innovation
(Dempwolf et al. 2014)	Report	80	S19; OD	No	-
(Drori and Wright 2018)	Book chapter	3	S18	Yes	Access&Growth, Innovation
(Drover et al. 2017)	Journal	116	OSD	No	-
(Dushnitsky and Sarkar 2018)	Conference	1	S19	Yes	Not visible
(Etzkowitz 2013)	Journal	24	ND	Yes	Learning
(Fernandes 2016)	Journal	2	S14; S58	Yes	Innovation
(Fraiberg 2017)	Journal	16	OD	Yes	Acces&Growth
(Frimodig and Torkkeli 2017)	Journal	3	S18; S19; S61; S63	No	-
(Gabrielsson et al. 2018)	Journal	11	ND	Yes	Innovation
(Gardner and Webster 2017)	Journal	9	ND	Yes	Innovation
(Gliedt et al. 2018)	Journal	30	ND	No	-
(Glinik 2019)	Journal	0	ND	Yes	Learning, Validation
(Gonzalez-Uribe and Leatherbee 2016)	Journal	48	S16; OD	Yes	Learning
(Goswami et al. 2018)	Journal	30	S18; S19; S61	Yes	Acces&Growth
(Grilo et al. 2017)	Conference	0	S16	Yes	Innovation
(Gutmann 2019)	Journal	4	ND	No	-
(Gutstein and Brem 2018)	Journal	0	ND	Yes	Validation
(Haines 2014)	Conference	14	S58	Yes	Innovation
(Hallen et al. 2014)	Conference	100	OD	Yes	Acces&Growth
(Harima and Freudenberg 2019)	Journal	0	ND	Yes	Access&Growth
(Haukipuro et al. 2019)	Journal	0	S18; S19; S23; S40; S61	Yes	Innovation
(Hausberg and Korreck 2018)	Journal	29	S18; S19; S39	No	-
(Hochberg 2016)	Conference	103	S18; S19; OD	No	-
(Isabelle 2013)	Journal	129	OSD	Yes	Learning
(Iwamoto 2016)	Conference	1	S19; S37; S39; S40; S54	Yes	Innovation
(Jackson and Richter 2017)	Journal	10	OSD	Yes	Learning
(Kanbach and Stubner 2016)	Journal	36	S18; S19; S37; S40; S54	No	-
(Kim and Wagman 2014)	Journal	45	OD	Yes	Innovation
(Kohler 2016)	Journal	144	S58	Yes	Innovation
(Kreusel et al. 2018)	Journal	2	OD	Yes	Acces&Growth
(Kupp et al. 2017)	Journal	13	ND	Yes	Acces&Growth
(Kuschel et al. 2017)	Journal	17	OSD	Yes	Acces&Growth
(Ladd 2018)	Journal	1	ND	Yes	Innovation
(Lall et al. 2013)	Journal	22	OD	Yes	Acces&Growth
(Lundsgaarde 2017)	Journal	1	ND	Yes	Innovation

(Mahmoud-Jouini et al. 2018)	Journal	2	S19	Yes	Innovation
(Malek et al. 2014)	Journal	51	OD	Yes	Innovation
(Mansoori 2017)	Journal	14	ND	Yes	Acces&Growth
(Mansoori et al. 2019)	Journal	0	S18	Yes	Innovation
(McHugh et al. 2013)	Conference	5	OD	Yes	Learning
(Miles et al. 2017)	Journal	10	S19; S32; S37; S58; OSD	Yes	Learning
(Miller and Bound 2011)	Report	272	OD	Yes	Acces&Growth, Innovation
(Mitra and Euchner 2016)	Journal	2	OD	Yes	Learning
(Moschner et al. 2019)	Journal	0	OD	Yes	Innovation
(Pandey et al. 2017)	Journal	14	S19; S58; OSD	Yes	Acces&Growth
(Pauwels et al. 2016)	Journal	261	S18; S58; OD	Yes	Acces&Growth
(Prexl et al. 2018)	Journal	0	S18; S19; S61	Yes	Innovation
(Price 2004)	Journal	19	OD	Yes	Acces&Growth
(Qin et al. 2019)	Journal	1	S38; S58; S61; S69; S84	Yes	Learning, Access&Growth
(Radojevich-Kelley and Hoffman 2012)	Journal	128	OSD	Yes	Learning
(Regmi et al. 2015)	Journal	14	S58	Yes	Acces&Growth
(Richter et al. 2018)	Journal	9	S39	Yes	Innovation
(Roberts and Lall 2018)	Book	0	S39; S61; OD	Yes	Learning, Access&Growth
(Roundy 2017)	Journal	19	S19; S37	No	-
(Seet et al. 2018)	Journal	9	OD	Yes	Learning
(Selig et al. 2018)	Conference	6	OD	Yes	Validation, Innovation
(Shankar and Shepherd 2018)	Journal	8	S46	Yes	Acces&Growth
(Shao and Shi 2018)	Journal	1	S61	Yes	Access&Growth
(Thompson 2012)	Journal	11	ND	Yes	Acces&Growth
(Tobiassen et al. 2018)	Conference	0	S18; S19; S61	Yes	Learning, Access&Growth
(Uhm et al. 2018)	Journal	1	S06; S18; S37; S61	Yes	Access&Growth
(Vandeweghe and Fu 2018)	Book chapter	0	ND	Yes	Innovation
(Wise and Valliere 2014)	Journal	32	OD	Yes	Acces&Growth
(Wright et al. 2017)	Journal	65	S61	Yes	Learning
(Yang et al. 2018)	Journal	2	S39	No	-
(Yang et al. 2019)	Journal	0	S18; S19; S37; S51	No	-
(Yin and Luo 2018)	Journal	6	S18	Yes	Acces&Growth

Table 2. Outcomes analysis

Note: Output – the mentioned outcome is an output according to system theory, Soft = soft outcome, Average = average hard outcome, Top = top hard outcome.

Outcomes for startups (outcome/presence number/percentage)			Type?
Funding	42	51.85%	Average
Validation	32	39.51%	Soft
Product development	30	37.04%	Top
Network	27	33.33%	Soft
Knowledge	26	32.10%	Soft
Market access	12	14.81%	Average
Reputation	7	8.64%	Soft
Social capital	4	4.94%	Soft
Access to investors	4	4.94%	Average
Market success	3	3.70%	Average
Accelerate business development	2	2.47%	Average
Access to resources	2	2.47%	Average
Increased valuation	2	2.47%	Top
Legal support	2	2.47%	Average
Network – international	2	2.47%	Top
Better performance for startups	1	1.23%	Average
Better team – bounding	1	1.23%	Soft
Business advice	1	1.23%	Soft
Growth	1	1.23%	Average
New business ideas	1	1.23%	Soft
Promotion	1	1.23%	Average
Research access	1	1.23%	Top

Scalable business model	1	1.23%	Top
Self-confidence	1	1.23%	Soft
Space	1	1.23%	Average
Increased speed of internationalization	1	1.23%	Top
Vicarious Learning	1	1.23%	Soft
-- Exploit startup funders	1	1.23%	Soft
Outcomes at accelerator level (outcome/presence number/percentage)			
Number of participants	18	22.22%	Output
Number of applicants	14	17.28%	Output
Startups survival rate	14	17.28%	Average
Funds provided to startups	10	12.35%	Average
Jobs created	5	6.17%	Average
Number of exits	4	4.94%	Top
Number of funded startups	4	4.94%	Average
Percentage receiving next-stage funding	5	6.17%	Average
Network extent	3	3.70%	Output
Return on investment	3	3.70%	Output
Graduating startups	2	2.47%	Output
Knowledge transfer	2	2.47%	Top
Access to ideas	1	1.23%	Average
Businesses started after graduation	1	1.23%	Average
Innovation culture within the home company	1	1.23%	Top
Long-term support	1	1.23%	Top
Number of external innovation partners	1	1.23%	Output
Odds to success in comparison to average survival rate	1	1.23%	Average
Organizational branding for the CA corporate accelerator company	1	1.23%	Average
Paying people for online access	1	1.23%	Output

Percentage of startups obtaining funding	1	1.23%	Average
Rate of profitable startups	1	1.23%	Average
Reputation	1	1.23%	Top
Spun-out companies	1	1.23%	Top
Startups collaboration	1	1.23%	Average
Startups valuation	1	1.23%	Top
Transnational entrepreneurship development	1	1.23%	Top
Outcomes at ecosystem level (outcome/presence number/percentage)			
Network builder	31	38.27%	Average
Innovation enabler	18	22.22%	Top
Entrepreneurship culture	11	13.58%	Soft
Technology transfer	5	6.17%	Top
Economic wealth/development	5	6.17%	Top
Jobs created	3	3.70%	Average
Funding for economy	3	3.70%	Average
Knowledge spillover	2	2.47%	Top
New startups	2	2.47%	Average
-- Create a bubble	1	1.23%	Top
-- Divert talent from others	1	1.23%	Top
Ready to run ventures	1	1.23%	Average
Supporting social entrepreneurship	1	1.23%	Soft

Table 3: Sources dominant mechanisms

Dominant mechanism	Presences	Percentage
Acces&growth	25	30.86%
Innovation	25	30.86%
Learning	17	20.99%
Acces&growth, Innovation	3	3.70%
Access&growth, Learning	3	3.70%
Validation	2	2.47%
Validation, Innovation	1	1.23%
Learning, Innovation	1	1.23%
Learning, Validation	1	1.23%
All mechanisms	1	1.23%

Figure 1: Research process flow. Notes: A=activity, R=result, I=input, CC=coding category.

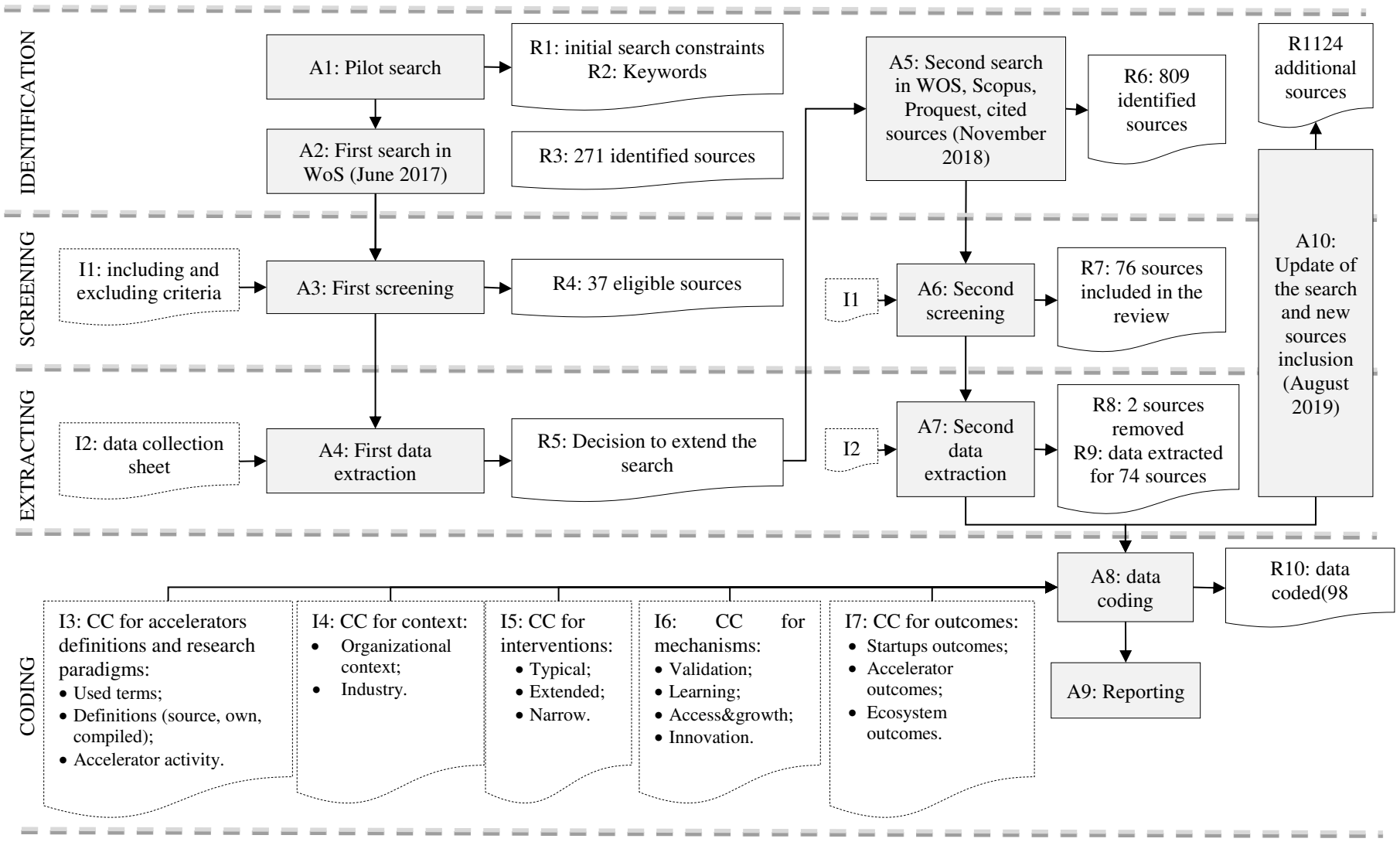

Figure 2: A generic presentation of accelerators CIMO-logic