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THE MULTI-DIMENSIONAL IMPACTS OF BUSINESS ACCELERATORS: WHAT DOES THE RESEARCH TELL US?

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CONTENT

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The authors take full responsibility for the content. Any views expressed are our own.

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02. EXECUTIVE SUMMARY

Over the last two decades, business accelerators have spread globally as popular sources of support for early-stage entrepreneurs. These ‘schools for entrepreneurs’ provide competitively selected participants with capability-building—including business training, networking, and mentoring—and sometimes funding.[1]

Accelerators can impact their participants, but their effects extend to the broader entrepreneurial ecosystem. The resources accelerators offer can help participants close the funding and capability gaps they may have, including those that stem from frictions like information asymmetries between entrepreneurs and investors. Because they are usually highly selective, selection by an accelerator can also de facto validate participants and certify their growth potential to the market. More generally, the ecosystem too stands to benefit from the investors and from the talent accelerators help attract, which makes it easier for even non-participants to raise capital and grow their businesses.

In parallel with the phenomenon it studies, research on the multi-dimensional impacts of business accelerators has also expanded over the last two decades. Academics and practitioners have sought to understand the direct effects of accelerators on participants and the wider, indirect effects on non-participants. The existing research is fragmented, however, largely because much of it has been carried out independent of research in other areas. The result is that critical insights are trapped in disciplinary silos.

This review aims to bridge disciplinary divides to take stock of the literature on how business accelerators impact the economy and then puts forth a guide for future research. We build on research that conceptualizes business accelerators, previous review articles on accelerator impacts, the vast body of research that evaluates training programmes for entrepreneurs in developing countries, and the value-add of specialized early-stage investors.

We begin our review by defining business accelerators and explaining differing views about their ability to impact participants and non-participants. We classify accelerators according to their strategic objectives, their sponsors, and the types of support they offer participants. We draw on key themes in the broader literature on obstacles to company growth—capability gaps in human, social and organizational capital, for instance, and we discuss the economic conditions that make it possible for accelerators to make an impact.

We then provide a critical summary of the research on the multi-dimensional impact of accelerators. We start with an overview of the critical challenges in measuring and tracing impacts. We then review existing work and organize the evidence into three broad sections.

The first of these sections discusses the research on how business accelerators support participating businesses. Then we look at the evidence on how business accelerators go about selecting participants and how successful they are in identifying the most promising entrepreneurs. The last section looks at the evidence on the effects of business accelerators on non-participating businesses.

Our main findings are as follows:

- Business accelerators usually succeed in increasing the average performance of participating businesses. However, the impact that accelerators make depends in part on the profile of the participating entrepreneurs. The determining factors include growth potential (higher), female leadership (lower), and education (mixed). The degree of impact also correlates with accelerator-specific characteristics like sponsorship (higher for investors, lower for governments and corporates). It is important to note, however, that studies on the range and types of business accelerator impacts are still relatively few.

- Changes in average performance do not convey the full nature of the effects, however. Accelerators also tend to affect each end of the spectrum of entrepreneurs by both, ushering promising participants into the upper echelons of company growth and steering less apt participants to fold faster.

- Ongoing research aims to distinguish the effects of different support offerings. The most crucial effects lie in capability-building, even when funding is not part of the equation. But it is still unclear which capabilities matter. Primary effects may lie in programmes that aim to close capability gaps in human and social capital via mentoring and networking opportunities.

- Accelerators can play a crucial role in separating out the bottom of the distribution of entrepreneurs who are seeking to raise specialized financing (i.e. financing from sources other than family and friends). However, we clearly need a better understanding of the roles that cognitive and contextual factors play in the selection process, and of the ability of these programmes to identify impact potential.

- Growing evidence suggests that accelerators affect the performance of non-participating businesses by attracting venture capital and specialized talent to their respective ecosystems. But we need more insights on how these programs can best engage their wider entrepreneurship communities.

As for our recommendations for future research, we encourage studies that address underserved areas. For one, we need more research that explores how the impact of accelerators varies across programmes and entrepreneurs. Rather than asking 'Do accelerators make an impact', we need to explore what types of accelerators and which types of support work best for which types of businesses. The impact accelerators make is likely to be much greater if they can deliver specific services to the businesses and entrepreneurs that need them the most.

We also need to understand how accelerator programmes affect the entrepreneurs themselves, beyond just their businesses. We call for more research on the long-term effects on entrepreneurs to determine if accelerators provide lasting improvements for individuals. By the same token, understanding the determinants of self-selection is important: What types of entrepreneurs are attracted by accelerators, and how does programme design affect demand?

We also call for more research on the effects of accelerators on the social and environmental impacts of businesses, beyond financial and commercial performance. Further study of the impacts of accelerators on non-participants in their wider entrepreneurial ecosystems is another fruitful avenue for further research efforts.

Finally, we also need to gain a better understanding of whether (and perhaps more importantly, how) accelerators identify promising candidates and therefore what their role is in signalling quality. Does participation in an accelerator convey the quality of entrepreneurs to the market? And does it reveal anything to the startup founders about their potential? Answers to these questions will help polish programme design and inform public policy.

03. INTRODUCTION

Over the last two decades, business accelerators, fixed-term, cohort-based support programmes for early-stage entrepreneurs have proliferated globally.[2] Funded by a mix of private investors and governments, these 'schools for entrepreneurs' offer capability-building (See Box 1) programmes that include training and networking, and sometimes funding to competitively selected participants.[3] Accelerators can improve participants' performance and have broader effects on entrepreneurial ecosystems. They can close funding and capability gaps for participating businesses, and given their emphasis on selecting the most promising entrepreneurs, they often serve as a form of quality assurance, signalling their participants' potential to the market and to the founders themselves. They can also attract investors and talent to their respective regions, thereby setting in motion a virtuous cycle of entrepreneurship and venture capital that also benefits non-participants.

BOX 1: What are Firm Capabilities?

By capabilities, we refer to the non-monetary skills and resources that are needed for turning business ideas into successful businesses. Among these are human capital, social capital, and organizational capital. Human capital refers to the personal attributes of entrepreneurs that are considered useful in the production process, like business know-how, which they can acquire from training and mentoring. By social capital we mean entrepreneurs' networks of relationships with other people that enable businesses to function effectively, such as the networks they can acquire from their accelerator cohort peers. Organizational capital includes organizational structure and cultural elements that make businesses more productive; for example, the accelerator's accountability system through regular meetings with staff, which can play a similar role of an independent board of directors for ventures.

Practitioners and academic researchers studying business accelerators have produced a substantial number of studies on accelerators. The online scholastic archive Social Science Research Network (SSRN), for instance, lists almost 800 entries on the topic since 2005, with over two-thirds of the posts dated 2018 or later.[4]

This vast body of work is fragmented, however. And critical insights on the effects business accelerators have on the economy remain in disciplinary silos, so researchers in disparate disciplines—ranging from finance to entrepreneurship and business strategy—may be unaware of work published outside their own disciplinary outlets. Furthermore, most research on the topic is specific to a particular research area—training programmes for entrepreneurs in developing countries, for example.

This review aims to bridge the disciplinary divides in order to take stock of the literature on the multi-dimensional impacts of business accelerators and to advance a guide for future research.

CRITICAL INSIGHTS ON THE MULTI-DIMENSIONAL EFFECTS OF BUSINESS ACCELERATORS REMAIN IN DISCIPLINARY SILOS

We looked for evidence on how business accelerators screen and support their participants and on how they indirectly support non-participating entrepreneurs. In examining how business accelerators provide support, we draw on studies that address obstacles to company growth that entrepreneurs face—gaps in funding and also in human, social, and organizational capital.

The contributions of this review are threefold. First, we provide a documentation of the multi-dimensional impacts accelerators make and offer a comprehensive review of the findings of existing studies. Each article is summarised using plain language and is presented in a consistent structure. Second, we highlight underserved research areas to guide future work on the most pressing open questions. Third, we connect the findings from research on accelerators to the literature that deals with constraints to business growth and the impact of specialized investors on business performance. We address questions such as how research on accelerator programmes might inform longstanding issues about constraints to business growth in general, and how it might spur new lines of inquiry. We also examine how lessons learned from evaluations of entrepreneur training programmes can inform improvements in the various support services offered by accelerators.

METHODOLOGY

We searched out academic studies and white papers on accelerator impacts, using the Web of Science (WoS) database and directly approaching scholars. WoS is a comprehensive dataset that covers a wide range of academic sources (Crișan et al., 2021). Our search spanned several months, from January to July 2021. Our search terms were *business training, business accelerator, corporate accelerator, entrepreneurial accelerator, startup accelerator, venture accelerator, and business incubator.*[5] We limited the search to publications in English and to sources in the following WoS categories: management, business, economics, finance, or public administration.

We must point out that our article does not attempt to be a systematic review of the entire literature on accelerators. For such an overview, we direct the interested reader to the papers of Hackett and Dilts (2004); Mian et al. (2016); Overman et al. (2017); and Crișan et al. (2021). Our primary interest is accelerator impact. To that end, we borrow from previous related compilations like the study of Bone et al. (2019). Our research complements several conceptualizations of the accelerator phenomenon (see Cohen & Hochberg, 2014; Clarysse et al., 2015; Hochberg, 2016; Roberts et al. 2018).

Additionally, we borrow from reviews on the impact of business training and constraints to growth for small firms to complement the evidence from accelerator studies. For details, interested readers are referred to McKenzie and Woodruff (2014), Woodruff (2018), McKenzie (2020), and McKenzie et al. (2021). We also connect our findings to several papers on venture capital.

Our final list consists of 81 academic articles (published articles and working papers) and white papers published between 2014 and 2022. These include three systematic accelerator reviews (Crișan et al., 2021 Madaleno et al., 2018; and Battistella et al., 2017).

04. SETTING THE SCENE

We begin by explaining what business accelerators are and the heterogeneity that exists among them. We then pose questions that attract researchers and that will doubtless be in the back of readers' minds: most pressing are questions about whether we can reasonably expect business accelerators to identify and train promising candidates when this task proves to be impossible even for many specialized investors.[6] And how can these typically small organizations have wider effects on non-participants? We provide answers to these and other such questions whose answers are rooted in economics research, illustrating them with real-life examples. Overall, the examples we cite suggest that an outright dismissal of the ability of business accelerators to impact the economy is too simplistic.

WHAT ARE BUSINESS ACCELERATORS?

Business accelerators are 'schools for entrepreneurs', organizations that offer intensive programmes of limited duration that are designed to help entrepreneurs build their ventures. These schools periodically take in cohorts of businesses, typically via a highly competitive selection process. They aim to help entrepreneurs build their capabilities, providing support in the form of business training, mentoring, networking; some provide a co-working space. Some accelerators also provide funding to their participating businesses and often take an equity stake in the portfolio company in return. Participants 'graduate' at a public pitching event, commonly referred to as a demo day.

Accelerators can be traced back to Y Combinator, a US-based technology startup accelerator established in 2005 in Cambridge, Massachusetts. Four years later, the Difference Engine kick-started the accelerator model in Europe. Since then, the number of accelerators has grown rapidly worldwide. The online platform Crunchbase lists more than 45,000 participants in close to 1,600 accelerator programmes since 2005. Figure 1 illustrates the explosive growth in the number of these programmes over the last decade, and Figure 2 shows the rise in the number of participants.[7]

Figure 1: Number of Business Accelerators

Source: Crunchbase

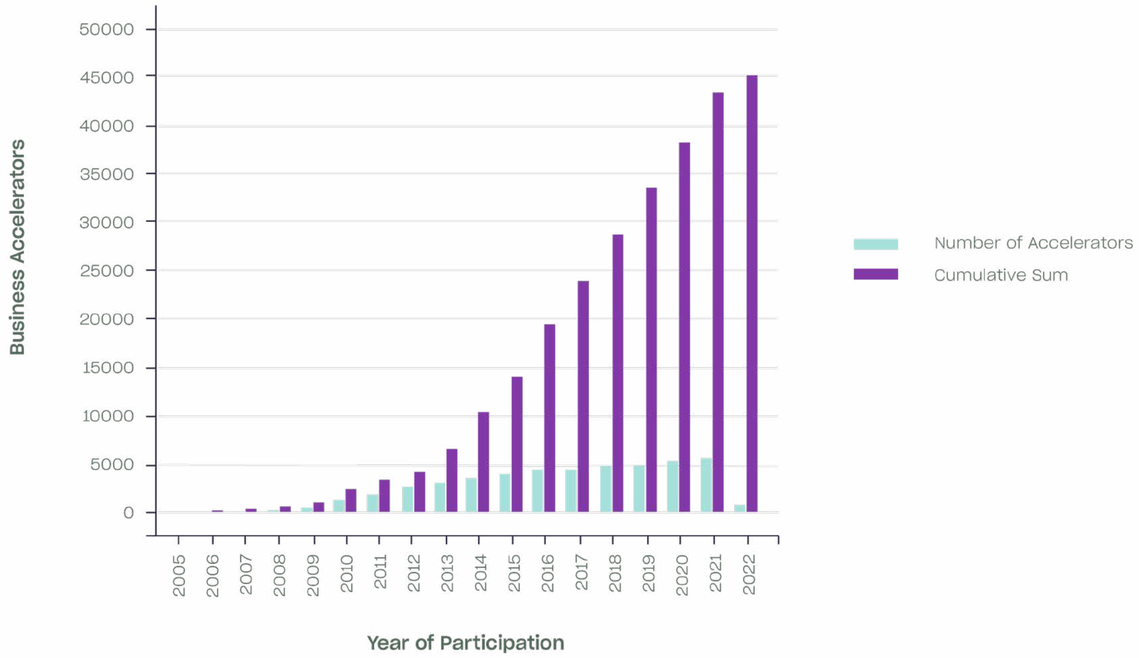
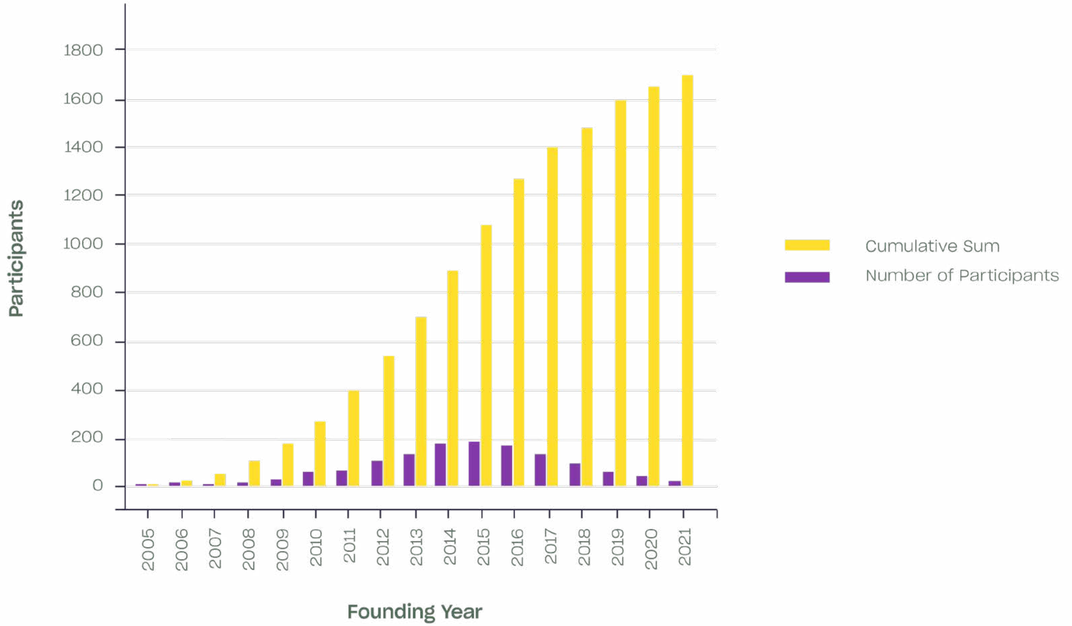


Figure 2: Number of Participating Businesses in Accelerators

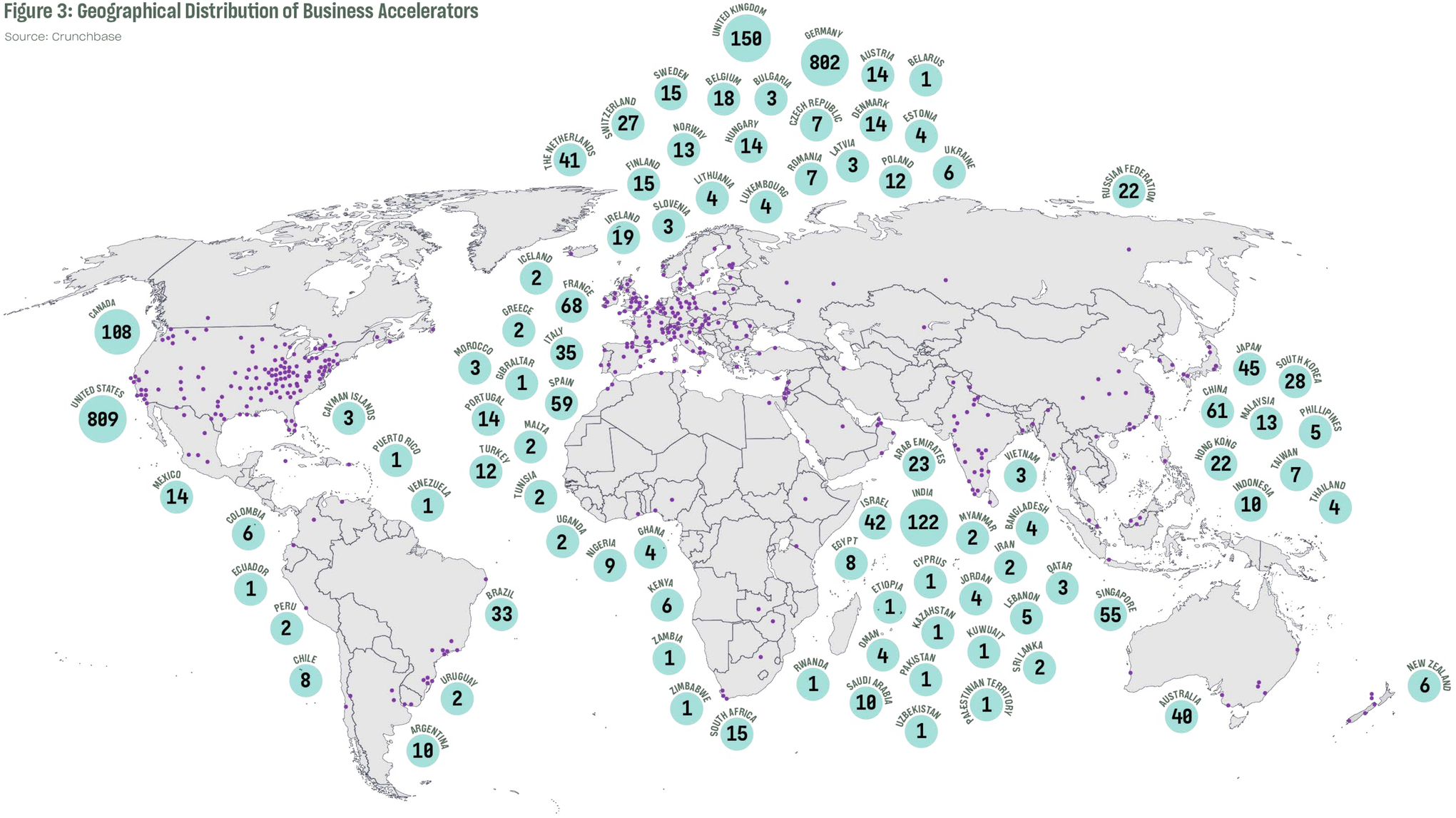
Source: Crunchbase



Many accelerators are rooted in vibrant entrepreneurial hubs like Silicon Valley, but a push into areas that were previously underserved by specialized financiers was the catalyst for much of the exponential growth of accelerator programmes, as indicated by Fehder and Hochberg (2019). Today, accelerators have spread to 530 cities in 86 countries around the world, as shown in Figure 3.

Figure 3: Geographical Distribution of Business Accelerators

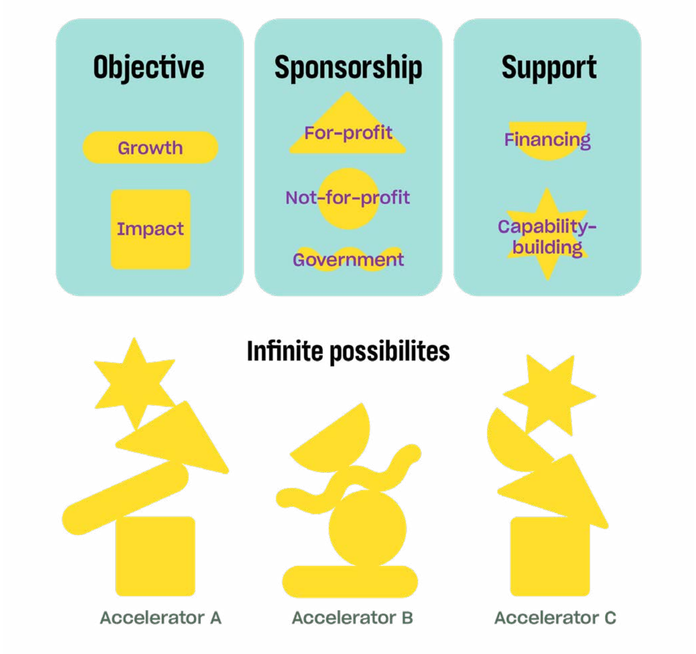
Source: Crunchbase



BUSINESS ACCELERATORS ARCHETYPES

While all business accelerators are structured as schools for entrepreneurs, they vary in three basic dimensions: their strategic objectives, their sponsors, and the type of support they offer participants (see Figure 4). Each dimension consists of different elements, the combination of which defines the type of accelerator.

Figure 4: Dimensions of business accelerators



Accelerator A is a growth- and impact-oriented accelerator with for-profit sponsors that offers participants capability-building. Accelerator B is a growth-oriented accelerator with not-for-profit and government sponsors that offers participants financing. Accelerator C is an impact-oriented accelerator with for-profit sponsors that offers participants financing and capability-building.

OBJECTIVE

The strategic objectives are either growth-oriented or impact-oriented. Growth-oriented accelerators support businesses with the greatest potential to scale. These accelerators provide resources to highly selected participants, often in exchange for equity stakes in their businesses, or in some cases, for a fixed fee. Y Combinator is a prime example of a growth-oriented accelerator.

Impact-oriented accelerators, on the other hand, address broader societal and environmental challenges, and they vary more widely in their design and their support offerings. Impact-oriented accelerators work with participants that tend to be marginalized (e.g. women and minorities) or with ventures in high-impact sectors like agriculture and education (Lall et al., 2020). Some target ventures in marginalized communities, regardless of a business's potential to scale, and provide equity-free resources (see Lall et al., 2020 for examples). Yet other impact-oriented programmes weigh a company's potential for both making an impact and scaling when selecting participants, and some may also take a small equity stake. Zinc, in the UK, is an example of an impact-oriented accelerator. It aims to build and scale innovative solutions to some of the most important societal problems.

In practice, hybrid strategic objectives are common. For example, some accelerators target high-growth companies yet also offer free resources to non-participants via open networking events. This type of accelerator aims to bolster local entrepreneurial ecosystems by taking advantage of the positive externalities (i.e. benefits to third parties) that high-growth participants can have on other local companies. Participation in Start-Up Chile, for instance, is highly competitive, but this accelerator also hosts free events to engage the wider Chilean entrepreneurship community.

SPONSORS

Sponsors fall into three broad categories. The first category consists of for-profit entities. These include investors like business angels and venture capitalists. Such sponsors typically provide capital (as limited partners) for growth-oriented accelerators. Their direct capital returns are usually small, given the modest (and severely diluted by the time of exit) equity stakes the accelerators take from their participants. For-profit sponsors benefit mainly from indirect returns on their investments. For example, gaining early access to highly selected and trained participants allows them to be more confident about placing larger bets out of their primary investment funds, thanks to the availability of more information about the businesses and the fact that they already have established relationships with the founders (Hochberg, 2016).

SPONSORS PROVIDE FINANCIAL OR IN-KIND SUPPORT TO ACCELERATORS

For-profit sponsors also include corporates that support growth-oriented accelerators. Often structured as an arm of more traditional corporate venture capital,[8] these accelerators provide funding and access to the corporate's network and resources, sometimes in exchange for equity stakes. Wayra, the now technological innovation hub sponsored by Telefonica, is one of the oldest and best-known examples. Corporate sponsors benefit from the direct returns on their investments in startups, but they can also derive indirect returns like developing a more systematic way to screen new technologies and scout prospective talent. To that end, the accelerators they sponsor weigh potential economic synergies when selecting participants. Other possible indirect benefits include a strengthening of the corporate's customer relations as a result of supporting ventures whose solutions benefit the sponsor's clients (Clarysse et al., 2015).

The second category of sponsors comprises not-for-profits. Not-for-profits include the social responsibility arms of corporates, universities, and foundations. Well-known accelerators sponsored by not-for-profits include IKEA Social Entrepreneurship, which is sponsored by IKEA's social responsibility arm, and LSE Generate, a programme for students, staff, and alumni of the London School of Economics and Political Science.

Not-for-profits usually sponsor impact-oriented accelerators and hybrid programmes, but the strategic goal depends on the sponsor. University-sponsored accelerators—for example, the Creative Destruction Lab (CDL) launched by University of Toronto's Rotman School of Management—often aim to commercialize technologies developed by the University's own staff and students. They offer scientific founders (i.e. founders who are the inventors of the technology their company is promoting) the managerial know-how they may lack (see Bloom & Van Reenen, 2007 for evidence on differences in managerial practices across firms and their impact on performance).[9] Other examples include foundation- or philanthropist-sponsored accelerators that target participants with solutions to an environmental or grand societal challenge. Although impact is at the centre of their strategic objectives, they may also accept participants with high growth potential. We often see this type of hybridization in accelerators that have participated in the Global Accelerator Learning Initiative.[10]

Governments (both local and central) constitute the final category of sponsors. One example is StartUp Peru, which is sponsored by that country's central government. Like not-for-profits, government sponsors normally support impact-oriented and hybrid accelerators. Their ultimate objective is to strengthen the entrepreneurship ecosystem in their respective country or region, either by attracting new entrepreneurs into their area or by nurturing and retaining skilled entrepreneurs.

Some accelerators have more than one sponsor. Collaborations between different kinds of sponsor (e.g. between not-for-profit and government sponsors) are especially popular. For example, the well-known London accelerator Bethnal Green Ventures is sponsored by both the UK Cabinet Office and Nesta, a UK innovation foundation.

SUPPORT OFFERED TO PARTICIPANTS

Accelerator programmes also vary in terms of the type of support they offer participants; the support may include any combination of financing and capability-building activities. Financing incentivizes entrepreneurs to participate in an accelerator, and it allows them to commit more fully to the programme. The terms for receiving financing vary considerably. Most accelerators take a small equity stake (less than 15%), but some take no equity stake at all (e.g. grants), as in the case of Start-Up Chile. Other programmes may provide funding in the form of either no- or low-interest loans. Not all programmes provide funding, however. Microsoft's accelerator in London (Microsoft Ventures; now closed) provided participants with a host of resources, but no seed capital.

Some accelerators include standardized training in groups, whereas others offer more individualized programmes. One way accelerators tailor their schooling offering

is by providing mentorship, although there is variation in how the advice is provided. In some accelerators, founders are assigned to internal mentors, as in Y Combinator. But participants can also be introduced to multiple external mentors, as is the case of Techstars. Start-Up Chile participants, on the other hand, attend monthly sessions that simulate a board meeting; they are primed to set monthly goals and report on the progress of previously set objectives.

Most accelerators make some provision for in-cohort networking, which might be through online community tools or special events like weekly dinners. Entrepreneur First in the UK even helps entrepreneurs find potential co-founders. Most, but not all, accelerators extend the networking activities to potential investors, often through demo days.

Finally, shared office space is yet another form of support that incentivizes entrepreneurs to participate in an accelerator, as this facility decreases the participant's operational expenses. However, some accelerators intentionally do not provide space so as to respect startups' need to have their own working environment and at the same time avoid co-dependencies between startups and the accelerator. Y Combinator is an example of a well-known programme that does not offer shared office space (Cohen, Fehder, et al., 2019).

CAPABILITY-BUILDING IS A KEY COMPONENT OF ACCELERATORS

CAN BUSINESS ACCELERATORS IMPACT THE ECONOMY?

Before exploring *how* business accelerators can help impact the economy, it is essential to understand *if* they can be effective. If markets work efficiently, good ideas should grow into successful businesses. In such a world, there is no need for business accelerators. But markets are not necessarily efficient, and frictions like information asymmetries are commonplace and can lead to funding and capability gaps. Under such circumstances, good ideas, particularly innovative ones, may fail to reach their potential or never even take off.

Scholars typically maintain that the task of closing gaps in funding and capabilities falls to a combination of government support and specialized investors. To be sure, both play a vital role in entrepreneurial markets. However, recent market shifts have created a demand for other specialized intermediaries to support entrepreneurs *before* they seek specialized financing.

One of the primary shifts in recent decades has been a substantial decline in the cost of developing new technologies. This has created a need to systemize the screening and training of the ever-increasing number of inexperienced entrepreneurs who are looking to raise financing from venture capital firms (see Ewens et al., 2018; Lerner & Nanda, 2020). Growth-oriented accelerators have emerged as a new type of intermediary to fulfil this need. They support the most promising candidates and thus filter businesses before they seek specialized financing.

MEASURING SOCIAL AND ENVIRONMENTAL IMPACTS IS KEY FOR MANY PROGRAMS

Another significant shift is related to the growing emphasis on making a social or environmental impact and simultaneously generating financial returns (see Hand et al., 2020). This shift has created demand for impact-oriented accelerators that can identify and train businesses with high potential to make social and environmental impacts.

However, the sceptic might well wonder whether business accelerators can be effective at all. One reason for the scepticism is the highly skewed nature of entrepreneurship and venture capital returns.[11] What advantage do business accelerators have over specialized financiers when it comes to distinguishing the 'next Google' or the 'impact-driven Google equivalent' from other leading ventures? Perhaps none, but that is beside the point. Instead, the question is whether they can cleave off the bottom of the distribution and train up-and-coming entrepreneurs to be more 'investment ready'.[12]

Another reason for scepticism has to do with the complexity of entrepreneurial skills, which makes them hard to teach (see Katz, 2003). The sceptic would argue that business accelerators attract only low-quality ideas, citing the common adage that entrepreneurs are born, not made. However, even the most talented entrepreneurs will have a hard time deciding which tasks they need to prioritize to grow their business if they have no prior experience.[13] Inexperienced entrepreneurs can also have a hard time breaking through the complexity of the venture capital industry, which relies heavily on close-knit networks and non-standard valuation methods (cf., Lerner & Nanda, 2020; Hochberg et al., 2007).

A final possible reason for scepticism is the issue of scale: Even if we take it as a given that these programmes can identify and support a handful of promising candidates, how can we reasonably expect meaningful economic impacts (beyond investors' returns that trickle down in the economy)? The reality is that only a tiny fraction of young companies contributes disproportionately to economic growth (see Haltiwanger et al., 2017). These few young companies also help explain the differences in economic growth across countries (Eslava et al., 2019). The economic impact of supporting budding entrepreneurs is not necessarily a numbers game, therefore.

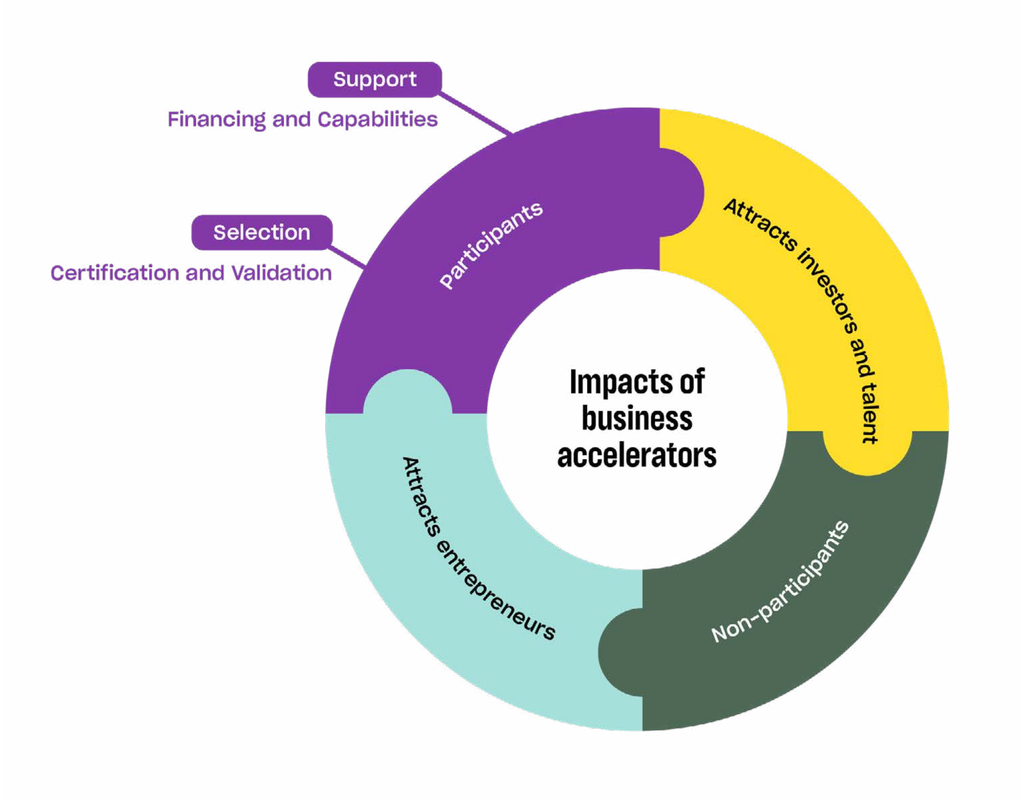
POTENTIAL MULTI-DIMENTIONAL IMPACTS

The above-mentioned arguments suggest that outright dismissing the ability of business accelerators to impact entrepreneurs is perhaps too simplistic. How, then, can accelerators impact the economy?

In the broadest sense, business accelerators can set in motion virtuous cycles of entrepreneurship and venture capital. These cycles have various phases that affect both participating and non-participating businesses as depicted in Figure 5. In the first phase, accelerators select and then support their participants; both the selection and the nature of the support can affect participants' performance.

Being selected to participate in an accelerator can signal quality to the market, and this signalling can affect participants' performance.[14] Accelerators usually expend considerable amounts of resources on a multi-staged selection process, so they take great care in choosing their participants. The acceptance rate of prominent growth-

Figure 5. The multi-dimensional impacts of business accelerators



oriented accelerators like Y Combinator may be as low as 5% or even less.[15] This meticulous screening sets accelerators apart from other kinds of support programmes that open their doors to anyone who can afford their fees (e.g. co-working spaces). Therefore, selection by an accelerator can provide participants with a de facto 'certification' and help them improve their performance, for example, by reducing search frictions between potential investors and entrepreneurs.[16] Participation in an accelerator programme can also reveal to the entrepreneurs their true quality, which in turn can influence their performance, as they adjust their commitment and investment in the business as a response to the quality signal.[17]

The capability-building and the funding offered by accelerators can also affect participants' performance by directly closing funding and capability gaps.[18] Entrepreneurs may not be able to secure funding or develop capabilities outside accelerators, owing to any number of issues—e.g. a mismatch of expectations between entrepreneurs and investors—which can restrict entrepreneurs' access not only to financing, but to human, social, and organizational capital as well.

In the second phase, accelerators support non-participating entrepreneurs by attracting crucial business inputs to their regions—both financing and talent. Several studies show that launching accelerators helps attract specialized investors, thereby substantiating this idea (as we will discuss in more detail in Section 7). Investors are attracted to lower investment costs, which are attributable to the screening and support accelerators provide, along with having promising entrepreneurs in a single location. An influx of specialized investors, in turn, attracts other crucial business inputs such as technical talent, thereby promoting the development of local specialized markets. These local markets then reinforce the breeding ground for entrepreneurs, creating a fertile environment for new businesses to spring up and then be sorted and trained by business accelerators, starting the virtuous growth cycles anew.

05. DO BUSINESS ACCELERATORS AFFECT PARTICIPATING BUSINESSES?

To inform this question, we begin by summarizing the challenges in measuring accelerator impacts on participants and outlining the strategies that researchers use to overcome these challenges. We then provide a high-level overview of the evidence on accelerator impacts on participating businesses.

PRACTICAL CHALLENGES

One of the main challenges is adequately capturing business performance. Researchers have combined quantitative and qualitative data to address this issue.

Most of the qualitative data comes from interviews[19] (some in-depth, some semi-structured) whose respondents included applicants, participants, accelerator managers and staff, and other stakeholders in the ecosystem.[20] There is also qualitative data from studies that use an ethnographic approach, through direct observations of participants at the accelerator site.

As for sources of quantitative data on business performance, researchers access applicant and participant surveys, archival data, and proprietary records. Surveys are the most popular data source, and respondents are generally accelerator participants. (Accelerators typically do not survey non-participants, but one of the few exceptions is the Global Accelerator Learning Initiative.) While surveys can provide useful information, their drawbacks are well known; among the most frequent problems are low response rates and biases from systematic differences between respondents and non-respondents.

Archival data includes any sources that are publicly accessible, either freely online or via data vendors. These include platforms like CrunchBase, AngelList, Capital IQ, LinkedIn, and VentureExpert. The main advantage of archival data over surveys is the extensive coverage it provides, but it has drawbacks as well, e.g. biases from differences in whether and how accurately participants and non-participants report their financing data online. Proprietary data, on the other hand, comprises information from sources such as non-public records (e.g. tax filings) and data in emails belonging to the accelerator. Its main advantages include its extensive coverage (usually all applicants) and the fact that such data are retrievable for the duration of the periods being examined. The main disadvantage is its private nature; researchers therefore have limited access.

A MAIN PRACTICAL CHALLENGE IN MEASURING ACCELERATOR IMPACTS IS ADEQUATELY CAPTURING BUSINESS PERFORMANCE

Most research focuses on measuring financial or commercial performance using one of the above-mentioned quantitative data sources. Commonly used variables include the level and growth in revenues, fundraising (particularly by specialized investors), employment, survival, and successful exits (or valuations) through acquisitions and initial public offerings.

Many accelerator programmes care about social and environmental impacts, but how to measure them? This issue is not specific to accelerators; it is relevant to all impact-

related investigations, as evidenced in a recent survey of accelerators by the Global Impact Investing Network (GIIN), a leading organization that focuses on lifting barriers to impact investing. The main difficulty facing the market, according to the respondents, is the inability to demonstrate and benchmark impact results.[21] At the root of the problem is the lack of a common language to describe social and environmental impact. In the same survey, respondents mentioned more than 15 different tools, frameworks, and systems used to measure impact, with the United Nations Sustainable Development Goals as the most popular reference.

Statistical power is tricky, too. With very few participants per programme, sample sizes are seldom large enough to establish effects with any certainty, but pooling data from multiple accelerators to increase sample size is not always a viable solution if there are wide differences between programmes.[22]

A COMMON LANGUAGE TO DESCRIBE SOCIAL AND ENVIRONMENTAL IMPACT IS LACKING

CONCEPTUAL CHALLENGES

Apart from the practical challenges of measuring performance, researchers also face conceptual challenges in researching the impact of accelerators. The most significant of these is establishing meaningful counterfactuals. That is, what would have happened without the accelerator programme?

This challenge is common to all impact evaluations, but it is particularly meaningful in accelerator research, given the emphasis these programmes place on selecting their participants. Comparing the financial performance of businesses that have successfully been accelerated with those that have not may yield positively biased estimates of accelerator effects if accelerators select the companies with the highest growth prospects, for example. Estimates can also be positively biased if accelerators build pipelines of promising entrepreneurs before selecting those with the highest promise,[23] or if only the best companies complete the programme (thus creating selective attrition). On the other hand, this sort of comparison may yield negatively biased estimates for programmes that select participants based on their potential for social or environmental impact, which means there may not be high financial returns. It follows that without meaningful counterfactuals, researchers risk coming to wrong conclusions about the impact of accelerators on the performance of their participants.

STRATEGIES TO FIND MEANINGFUL COUNTERFACTUALS

Existing studies vary in their approachesto and their ability to find meaningful counterfactuals. Appendix 1 classifies studies according to the empirical strategy employed.

Most early works made little attempt to consider the selectivity of either the applicant or the accelerator. Many relied on *group comparisons*, which compared, for example, the outcomes of businesses participating in accelerators that had different attributes;[24] or they might have compared entrepreneurs who received funding from accelerator investors versus other types of investor.[25]

More recently, various other methods have been used in the search for meaningful counterfactuals. The most common method today is *matched comparisons*, where participating businesses are compared to a matched control group of similar businesses.[26] However, it is not clear if the criteria for the matching adequately captures the characteristics that influence entrepreneurs' decisions to apply for acceleration. The same concern applies when it comes to the factors influencing accelerators' selection of participants.

A potentially more robust method uses *comparisons around selection cut-offs*, where the outcomes of participating businesses are compared to the outcomes of candidates that were narrowly rejected for participation in an accelerator programme. Better still are studies that focus on accelerators that have pre-determined capacities (e.g. 50 spots available) and that make decisions about applicants' participation based on numerical scores assigned by judges. These studies exploit the fact that when programmes have limited capacity, some applicants will always fall just above or below the cut-off point.

By comparing these two groups of borderline entrepreneurs–who are likely to be very similar, except that some were selected to participate in the accelerator programme and others were not–one can get a good sense of the programme's impact. However, one limitation of this method is the inability to generalize the results beyond those borderline entrepreneurs. Are these marginal participants representative of the average applicants these programmes attract?

More recently, some researchers have relied on *comparisons that use quasi-random variation* to estimate impacts. For example, one study exploits the random assignment of applicants to judges who differ in their propensity to assign high or low scores.[29] It compared the performance of very similar applicants–only some of which had been accelerated–depending on how generous (or stingy) their judges were in assigning numerical scores. The main advantage of this approach is that it allows one to extrapolate findings beyond the applicants near the capacity threshold. But it leaves unanswered questions about how valid these findings would be in settings beyond the specific accelerator context.

Borrowing from the literature on development economics, several ongoing studies on accelerators use randomized control trials (RCTs). RCTs are the gold standard for maximizing internal validity and neatly distinguishing mechanisms of impact.[30]

Altogether different approaches include qualitative studies that do a thorough examination of a programme. By design, *case studies* have a small sample size, but what they lack in numbers they make up in detail, which contributes to a better understanding of how an accelerator programme supports a business enterprise.[31] Other studies adopt a *mixed method* approach, which combines inductive and deductive methods.[32]

WHAT IS THE HIGH-LEVEL VERDICT?

By collating evidence from different types of studies that use different approaches, one can (by measuring different variables) reach a high-level conclusion that accelerators can increase the average performance of participating businesses. The evidence shows that accelerators increase the average rate at which businesses grow their revenues.[33] There is also moderately strong evidence that accelerators (a) increase the average amount of funds raised[34] and the average speed at which businesses gain customer traction,[35] (b) grow the number of employees,[36] (c) raise investment,[37] and (d) get acquired.[38]

ACCELERATORS CAN INCREASE THE AVERAGE PERFORMANCE OF PARTICIPANTS, BUT ALSO HELP LESS PROMISING CANDIDATES FAIL FASTER

However, another important conclusion is that changes in average performance do not convey the full nature of accelerator effects on their participants. The evidence shows that accelerators tend to affect the tails of the distribution of entrepreneurs by sorting participants into the top or bottom of company growth. There is evidence that accelerators can usher participants into the upper echelons of company growth to become 'gazelles'–young, rapidly-growing companies that maintain a high rate

of expansion for four years.[39] On the other hand, there is also evidence that some participating businesses are more likely to close down than others,[40] which is not surprising; accelerators need not—nor should they be expected to—have a positive impact on every participating business. Instead, their priority is to zero in on the participants who demonstrate most promise and to make sure they have enough resources to grow. Participants that are thought to be less promising are often counselled to consider closing, thus helping bad ideas 'fail faster'.[41]

One open question is whether accelerators are *directly* responsible for closing gaps in funding or capabilities, or whether they *indirectly* help businesses by attesting to their quality to the market and providing a sense of validation and self-worth to founders. An exception is the evidence that shows the direct effects of participants learning where to focus their information-gathering,[42] even among founders with substantial human capital. Gaining a better understanding of direct and indirect impacts is a promising direction for future research, which is in line with the long-prevailing quest in economics for an answer to the question of whether formal education raises people's productivity or simply signals their existing ability (see, for example, Chevalier et al., 2004).

NOT ALL ENTREPRENEURS AND PROGRAMMES ARE CREATED EQUAL

Just because the evidence suggests that accelerators can generally have positive effects does not mean that those effects are equally powerful for all entrepreneurs and all programmes.

In fact, some tentative evidence shows that impact varies from one entrepreneur to another—for example, that accelerators have more meaningful impacts on high-potential participants than on those with lower potential.[44] Other studies show large gender differences in acceleration: the positive effects of impact-oriented accelerators are felt less strongly by all-female and mixed gender teams relative to all-male teams.[45] There is additional evidence that a founder's educational background matters.[46]

In terms of accelerator archetypes, one study reveals striking correlations between participant performance and who sponsors the accelerator.[47] Participants in venture capital-sponsored accelerators, for example, are more likely to raise significant funding relative to government- and corporate-sponsored programmes. However, studies on the heterogeneity of business accelerator impacts are still relatively few. One reason is sample size: in many studies, the number of subjects under study is small, making it challenging to quantify impact heterogeneity statistically.

This is not to say that most accelerator research focuses on a specific accelerator archetype. In research on strategic objectives, most early efforts concentrated on growth-oriented programmes, but more recent research includes impact-oriented accelerators.[48] Yet the fact remains that the impact of acceleration on participants' financial commercial outcomes is still the focus of most research, while societal impacts remain understudied. Several papers focus on the type of institution that sponsors the accelerator—independent investors,[49] governments,[50] universities,[51] or corporates,[52] but constructing meaningful counterfactuals is a major challenge in this area. The most fertile research ground lies in efforts to distinguish the effects of the different kinds of support offered to participants by accelerators. We now turn to reviewing this literature in Sections 06 and 07.

06. DIFFERENTIATING THE EFFECTS OF FUNDING AND CAPABILITY-BUILDING

The main defining feature of accelerators is their emphasis on building capabilities. While accelerators differ in terms of whether they provide funding or take equity, they all offer capability building. The belief is that many founders fail to transform their ideas into successful businesses because they lack sufficient human, social, and organizational capital, and, they may not know how to go about developing those capabilities. But does the evidence bear this out?

Gonzalez-Uribe and Leatherbee (2018) were the first to provide compelling evidence that helping founders develop their capabilities can matter more than providing funding. They focus on Start-Up Chile, a business accelerator aimed at high-growth ventures. Start-Up Chile offers participants equity-free funding and the possibility of being selected for the 'entrepreneurship school', which offers capability-building activities such as monthly meetings with staff, peers, and industry experts and opportunities for networking.

OFFERING PARTICIPATING BUSINESSES CAPABILITY-BUILDING AND FUNDING IS MORE IMPACTFUL THAN OFFERING FUNDING ALONE

The main findings show that bundling capability training with funding is more impactful than simply providing cash: participants who received a bundled package raised significantly more specialized financing and scaled faster. These findings are consistent with the evidence on training micro-entrepreneurs in settings other than accelerators. Bruhn et al. (2010) show that consulting services for small Mexican businesses make a stronger impact than improved access to capital alone. Similarly, a randomized field experiment in Tanzania by Berge et al. (2015) showed that combining business training and grants resulted in a substantial increase in sales and profits. Providing only business grants had no impact.

The findings also resonate with the evidence on the value add of venture capital investors (above and beyond the financing they provide)–for example, when they share their operational expertise and their networks (see Lerner & Nanda, 2020). In a series of early papers, Hellmann and Puri (2000; 2002) document how venture capital firms add value by professionalizing startups–by hiring human resource managers, for example). More recently, Bernstein et al. (2016) provide evidence that more frequent monitoring by VC firms (made possible in their case by new flight routes between the companies and their investors' headquarters) increases the venture's performance.

THE IMPORTANCE OF OFFERING CAPABILITY-BUILDING ALONE

The number of programmes that provide no funding has grown exponentially in recent years (see, for example, McKenzie, 2019 for data on resources spent in business training programmes that provide no seed capital). Is there evidence from research to justify the popularity of these programmes that offer only capability building?

Gonzalez-Uribe and Reyes (2021) present persuasive evidence that offering only capability building (i.e. without funding) can lead to increases in revenues and employment for accelerator participants. The setting for their study was ValleE, a business accelerator in

Colombia that provides participants no cash, but instead offers capability building through standardized business training, customized business advice, and visibility.

But how far can we generalize the findings beyond the Colombian accelerator? While ValleE applicants are similar to those who apply to other accelerators, many aspects of the ValleE accelerator itself are unique. One is the dedication, drive and sense of purpose of its mentors and staff (as evidenced by their eagerness to conduct rigorous research on their program by partnering with Gonzalez-Uribe and Reyes). However, the ValleE results do echo lessons from research that shows how business performance improves as a result of interactions with specialized investors—through their due diligence processes, for example. Gonzalez-Uribe, Klinger-Vidra, et al. (2021) showed that going through the structured process of a seed fund's due diligence improves venture performance, even for businesses that do not, in the end, raise financing (from the seed fund conducting the due diligence). Relatedly, Howell and Nanda (2019) offer evidence on the importance of venture capital connections beyond investment.

07. WHICH CAPABILITIES MATTER MOST?

The current evidence on this question comes primarily from surveys of accelerator participants, who cited the social capital they had gained through networking opportunities as the most beneficial contribution of their accelerator.[53] Some studies also report a positive association between mentoring (and the improved human capital it provides) and participants' performance.[54]

However, a new strand of research is attempting to rigorously isolate the effects of different types of capability-building activities on business performance. This section reviews this new wave of accelerator papers. We enrich this growing body of work by drawing on the long-established literature on entrepreneurship training in developing countries.

We organize our discussion around the three main types of capabilities that are of interest in the literature on company growth: human capital, social capital, and organizational capital. Appendix 2 classifies accelerator studies according to these three types of capabilities.

HUMAN CAPITAL

Most accelerators target gaps in human capital. The activities vary across accelerators, but they commonly include a combination of (a) business training that teaches standardized content, (b) customized advice from industry experts or mentors, and (c) opportunities for peer learning—for example, through periodic group meetings where founders are encouraged to discuss their startup experiences with each other.[55] At Start-Up Chile, for instance, each cohort is divided into smaller groups of 'platoons' that meet monthly to share experiences (Leatherbee et al., 2021).

The accepted knowledge is that standardized business training has significant but modest effects on business practices and outcomes and that the effects can be improved by incorporating mentoring by experts or peers and elements of heuristics and psychology.[56] However, this belief originated from data about interventions with microenterprises in developing countries. Less is known about the experiences of high-growth and other types of businesses, with a few exceptions such as the studies described below.

Clingingsmith and Shane (2018) showed that high-potential entrepreneurs who received training in pitching techniques were positively evaluated by experienced investors. Camuffo et al. (2020) and Novelli and Spina (2021) showed that training on how to apply a scientific approach to business experimentation had significant positive effects on the performance of startups in Italy and the UK. Leatherbee and Katila (2020) presented similar results for US firms in an intervention where entrepreneurs were encouraged to apply the 'lean startup' method to their businesses.[57] As for mentoring from experts, Assenova (2020a) found that mentoring from high-ability mentors had a positive effect on business revenue and profitability (especially for less experienced entrepreneurs) for participants in a South African incubator that targets low-income and socially disadvantaged entrepreneurs. Sariri and Agrawal (2022) show that mentoring improves the performance of high-technology companies by teaching founders how to set priorities for their business. There is evidence that the type of mentor matters as well. Sariri (2022), for instance, shows that mentors who are business angels are more likely to encourage their mentees to experiment than mentors who are venture capital investors. Hmaddi (2022a) also shows that as repositories of tacit knowledge, mentors are more likely to transfer their knowledge to mentees in their same location and in industries in which the mentors have prior work experience.

THE CAPABILITY BUILDING ACTIVITIES AIM TO CLOSE HUMAN, SOCIAL AND ORGANIZATIONAL GAPS

With regard to mentoring by peers, Chatterji et al. (2018) showed that mentoring by peers with good people-management skills had a positive effect on business performance in an experiment with high-potential ventures in India. Beyond peer mentoring, there is evidence that the composition of peers in the cohort matters. Winston Smith et al. (2013), for example, showed that cohorts with a higher share of serial entrepreneurs and founders with a scientific background got more financing than cohorts with other profiles. Cohen (2013) argued that the competition between peers in the same accelerator helps new ventures quickly set and

implement their strategies. Not all evidence on potential peer influence is positive, however. Using data from a top growth-oriented accelerator, Gonzalez-Uribe, Wang, and Xu (2021) found that a higher share of cohort peers with post-accelerator top performance (e.g., 'unicorn' status–valued at over US$1 billion) is associated with lower performance among the other cohort peers.

If training, mentoring and peer interactions matter, why do entrepreneurs not seek out these resources on their own? One possible explanation is a lack of local expertise, or perhaps it is difficult to find in specific markets. Cost may also be a factor. Supporting the idea of local knowledge markets, Anderson et al. (2021) found a significant impact on sales after pairing Ugandan entrepreneurs with international professionals who volunteered to mentor them.

SOCIAL CAPITAL

The capability-building activities in most accelerators aim to close social capital gaps by building and strengthening participants' business networks (Roberts et al., 2018). Virtually all accelerator programmes organize demo days to connect participants with investors (Dempwolf et al., 2014; Cohen, 2013). Participants are also usually encouraged to interact with their cohort peers and alumni, often through platforms specifically designed for this purpose. Y Combinator, for example, uses a private communication tool that works like a social platform/marketplace where startups in different cohorts can exchange information about suppliers, rate venture capitalists, and post job applications (Gonzalez-Uribe, Wang, and Xu, 2021).

Despite their popularity, there is little rigorous evidence on the effect of social capital-building activities on business performance. The little evidence that does exist comes

primarily from small and medium-sized companies in developing countries. Cai and Szeidl (2018), for example, found that encouraging Chinese SMEs to meet in groups every month over ten months significantly increased their business performance. Evidence on the effect of expanding networks in other contexts is also scant, particularly with respect to business accelerators. Howell and Nanda (2019), however, present evidence of the importance of entrepreneurs' exposure to venture capital investors. They show that, in pitch competitions, exposure to judges who are venture capitalists increases the probability of receiving funding from a VC; it also increases the amount of funding raised from a VC. This evidence is consistent with the work of Hochberg et al. (2007) on the importance of investor networks in venture capital.

If expanding networks can indeed be valuable, why do firms not seek out networking opportunities on their own? Research in Togo by Dimitriadis and Koning (2022) suggests that some entrepreneurs do not know how to network effectively. They show that entrepreneurs who received training in social skills formed 50% more relationships with peers and had significantly higher profits than those who did not. This evidence suggests accelerators can help inexperienced founders learn how to network effectively.

The existing evidence also provides guidance on designing activities to foster relationship-building among businesses that participate in accelerators. In a randomized experiment in the US, Krishnan et al. (2020) showed that only bonding-style activities (e.g. conversations about hobbies or other personal topics) led to spontaneous social interactions and generated friendships and openness. Bonding exercises made entrepreneurs feel comfortable about giving each other valuable tips without receiving anything in return. On the other hand, tournament activities (e.g. reporting progress toward goals in front of others) turned into displays of strength and failed to create friendships and social interaction.

ORGANIZATIONAL CAPITAL

The capability-building that accelerators offer often aims to close organizational capital gaps by helping founders set up organizational structures and establish business routines that can make their business more efficient. An example of such a routine is periodic meetings with individuals who are external to the company, where entrepreneurs are encouraged to set specific milestones and report on their development. These meetings help founders reflect on their progress and can serve as commitment mechanisms, thereby fostering accountability. Another example is the commonly used demo day, which sets a hard deadline for founders to demonstrate quality and progress.

Rigorous research on the effects of organizational capital-building activities on a startup's performance is still limited, but Leatherbee et al. (2021) present experimental evidence on how providing board structures affects accelerator participants. The companies in both the treated group and the control group in their experiment received cash and business training. Both groups also attended monthly group meetings to discuss the development of their ventures. The difference was that the control group companies were not primed to set monthly goals or report on the progress towards those goals, whereas the companies in the treated group had a structured accountability mechanism that functioned like the board of a mature company. The researchers found that structured accountability has no positive effect on the performance of businesses whose founders have advanced degrees (master's and above), possibly because they have developed accountability structures in their higher education experiences. However, it has significant effects for businesses with less-educated founders.

LESSONS LEARNED, AND THE WAY FORWARD

Overall, the papers reviewed in this section provide evidence that capability-building activities can help participants close gaps in human, social, or organizational capital and thereby improve their performance.

One caveat about generalizing the results: Much of the evidence discussed in this section comes from specific interventions in developing countries, often outside accelerator programmes. Readers are therefore encouraged to heed caution in generalizing results without regard to differences in context between research settings.

An example of studies in the diametrically opposite settings of Nigeria and the US illustrates the perils of generalization. One study found that cash prizes in a Nigerian business plan competition had sizable, positive effects on firm outcomes.[58] By contrast, another study found that in the US, cash prizes appeared to be of secondary importance.[59] Generalizing from the Nigerian study would have suggested that similar results would be obtained in other countries, but the context and the cultural factors are radically different. Nigerian applicants start small-scale manufacturing businesses with higher financing needs, so they are more likely to be cash-constrained than the asset-light startups in service sectors that are common in US competitions.

Going forward, it is important that researchers develop more nuanced ways to understand the role that context plays in how accelerators affect the performance of their participants.

08. SELECTING ENTREPRENEURS FOR ACCELERATORS

Selecting promising candidates is an essential task for accelerators. One of the few studies on how successful they are in identifying high-potential entrepreneurs was conducted by Gonzalez-Uribe and Reyes (2021) with the ValleE accelerator in Colombia. The authors examined the judges' scoring of the applicants and the revenue of their companies three years after being accepted to the accelerator. (Like other accelerators, ValleE selects participants based on their scores from judge panels.) They found that the scores of the ValleE judges predicted applicants' future performance, even for the subset of rejected entrepreneurs. However, they also showed that systematic differences in scoring led to crucial selection mistakes by the programme. More lenient judges, for example, occasionally accepted some low-potential entrepreneurs, whereas stricter judges sometimes rejected high-potential applicants. Such selection mistakes stemming from the judges' idiosyncrasies reduced the aggregate revenues of the participants by roughly 30%.

Evidence from other settings on predicting entrepreneurial success is more nuanced. Several studies investigate whether judges in business plan competitions can identify promising candidates. These studies come to different conclusions depending on the context of the competition.

Using data from multiple business plan competitions in the US, Howell (2020) shows that judges' assessments strongly predict success, even after controlling for winning the competition. Judges' assessments of founders as individuals are the strongest predictor of success, which is consistent with evidence from Bernstein et al. (2016) and Gompers et al. (2019), who maintain that early-stage investors care most about the quality of the founders and their teams. Relatedly, Fafchamps and Woodruff (2017) showed that judges' assessments in a business plan competition in Ghana add predictive power to baseline surveys in models that predict applicants' eventual growth. However, this additional predictive power disappeared when the researchers left out the bottom quartile of the distribution of panel scores, suggesting that judges are not so effective at distinguishing within the top layers in the distribution of entrepreneur quality. By contrast, McKenzie and Sansone (2019) found that baseline survey data outperformed expert panels in Kenya's YouWin business plan competition. Variances in the type of information that judges take in and assess may explain differences in the predictive power of judges across competitions in different countries. For example, the Ghana judges—unlike their counterparts in Kenya—had live interviews with the entrepreneurs. It is possible that the Ghana judges were able to pick up on subliminal signals in these live interviews, implying that live interviews may add predictive power to surveys (cf. Hu & Ma, 2021). A judge's ability to pick up on such signals and decipher them surely varies with the context. Goñi Pacchioni and Reyes (2019), for example, uncovered selection errors in StartUp Peru's selection process that stemmed from overweighting the soft skills entrepreneurs demonstrated during live pitches; they essentially disregarded information on the hard skills entrepreneurs had listed on their application forms. For all practical purposes, they ended up selecting businesses at random.[60]

ACCELERATORS HELP SEPARATE OUT THE BOTTOM OF THE DISTRIBUTION OF ENTREPRENEURS WHO ARE SEEKING TO RAISE SPECIALIZED FINANCING

The evidence on the predictive ability of judges in US business plan competitions contrasts with the evidence for specialized investors (in the US). Assessments of VCs and angel investors do not predict future performance, even after controlling for investment (see Kerr, Nanda, & Rhodes-Kropf, 2014; Kerr, Lerner, & Schoar, 2014). The return patterns in the venture capital industry also provide evidence of the difficulties that specialized investors experience in predicting high growth: most startups backed by venture capital investors terminate with a loss, and fewer than 10% account for the majority of gross venture capital returns (Kerr, Nanda, & Rhodes-Kropf, 2014).

The purpose of the screening task might explain the difference between judges and specialized investors in identifying a company's potential: judges in business plan competitions need to eliminate the bottom segment of the distribution of entrepreneurs who are seeking specialized financing, whereas the investors need to discriminate between those in the top group. Consistent with this explanation, Gonzalez-Uribe, Kingler-Vidra, et al. (2021) show that seed investors appear to be able to assess applicants' growth potential. Unlike more traditional VC funds (and similar to business plan competitions and accelerators), seed funds attract large numbers of inexperienced applicants and must therefore eliminate entrepreneurs who are in the lower echelons of business growth.

COGNITIVE BIASES AND CONTEXTUAL FACTORS

Other accelerator studies focus on uncovering the cognitive biases of individual judges. Drawing on data from several social impact accelerators, Yang et al. (2020) show that judges' expectations about female-led and male-led businesses affect selection. Men and women who send signals that are congruent with the expectations for their gender—i.e. men who send economic signals and women who send social signals—are more likely to be selected. When those signals are incongruent with the entrepreneur's gender (e.g. men who send social signals or women who send economic signals), only men benefit. On the other hand, men who send incongruent signals are more likely to be selected than men who send no signals at all; the opposite is true for women.

The evidence on cognitive bias in accelerators corroborates the evidence in the literature on business plan competitions. Balachandra et al. (2021), for example, suggest that investors are less likely to select entrepreneurs who demonstrate stereotypically feminine behaviours like warmth and expressiveness. Interestingly, this finding held true regardless of gender. Similarly, Lee and Huang (2018) find evidence of lower gender penalties for female-led ventures that are presented in a social impact framework, which is stereotypically considered feminine. In another study, Huang et al. (2021) present evidence that communication styles can affect investor perceptions. The evidence from these papers connects to a larger body of literature that examines how personal characteristics affect an entrepreneur's ability to secure capital for themselves and their businesses (see, for example, Ravina, 2019).

In the literature on venture capital, Ewens and Townsend (2020) indicate that angel investors tend to have gendered preferences in terms of the companies they back; male investors are more likely to select male founders, and female investors are more likely to invest in female-led businesses.

Finally, recent evidence shows how contextual factors can matter in selection. In a thought-provoking study using data from several European accelerators, Dushnitsky and Sarkar (2020) show that, for a given startup graduating on a given demo day, the sunnier the weather (i.e. when the sunshine duration is longer than the previous day's), the greater the

likelihood of receiving investment on that demo day. The 'sunnier' effect is more robust for younger companies with less-educated founders.[61]

SO, WHAT DO WE CONCLUDE, AND WHERE DO WE GO FROM HERE?

Overall, the tentative conclusion is that accelerators can and do play a crucial role in separating out the bottom of the distribution of entrepreneurs who are seeking to raise specialized financing. However, a better understanding of how judges' idiosyncrasies and cognitive and contextual factors affect the selection process seems crucial. We also need to devise strategies to mitigate potential selection mistakes that arise from these issues.

Another key area for future study is self-selection. While the selection processes of accelerators have come under limited scrutiny, even fewer studies have investigated the demand for accelerators. Yet this subject is an important one, because accelerators operate as a matching market where they pick applicants who have consciously decided to seek acceleration. It is therefore possible that these applicants differ from the average entrepreneur in the wider population. There is evidence that supports this possibility: individuals who apply to incubators and VCs do not reflect a random sampling of entrepreneurs. Van Weele et al. (2020) find that demand for incubators varies with the type of entrepreneur in an experiment where entrepreneurs were asked about their preferences for an incubator. Ambition-driven entrepreneurs cared most about an incubator's track record, followed by its affiliations and funding options. Innovation-driven entrepreneurs, on the other hand, attached the highest importance to funding. Self-made individualists tended to shy away from an incubator's training, coaching, and networks; instead, they preferred to focus on developing their business with only a minimum level of intervention from the incubator. Hsu (2004) provides related evidence on the crucial role of entrepreneurial demand for venture capital investment; he shows that offers from venture capital investors with a higher reputation are more likely to be accepted, even at a startup equity discount.

09. ACCELERATOR IMPACT ON NON-PARTICIPANTS

The studies reviewed so far, focus on understanding the effects of programs on participating businesses. However, accelerators have the potential to have wider effects on their respective ecosystems. A growing strand of the literature concentrates on ecosystem effects. However, the evidence is still scant.

The pioneering study of Hochberg and Fehder (2015) provides evidence that accelerators help attract and increase venture capital funding for non-accelerated businesses in the US. In a follow-up study, Bone et al. (2019) show similar effects in the UK.

Madaleno et al. (2018) take a more general view of accelerators, positioning them within the broader set of accelerators that require entrepreneurs to move to different locations. Reviewing data from available evaluations, they conclude that co-location programmes have positive effects on ecosystems, although questions about the mechanisms of the impact remain unanswered.

Interview and survey-based studies substantiate claims that accelerators have positive effects on non-participants. Bliemel et al. (2019), for instance, find evidence (from surveys and interviews with sponsors, staff, and founders of growth-oriented accelerators in Australia) that accelerators help build community capital. Goswami et al. (2018) show similar evidence from six Bangalore impact-oriented accelerators. According to the interviewees, accelerators can strengthen stakeholders' commitment to the entrepreneurial ecosystem, leading to venture validation (success or failure). They also pointed out that accelerators can also add value to the ecosystem, which would not happen without the accelerator.

Evidence on how capability-building activities affect non-participants is sparse. McKenzie and Puerto (2017), however, found no evidence of negative spillovers in a study of business training for female entrepreneurs in Kenya where randomization occurred at the market level. This finding suggests that growth in emerging markets need not come at the expense of competitors, and that business training can contribute to overall market growth.

Other studies have explored how context influences the content accelerators present. Using data on 133 incubators in 68 emerging economies, Dutt et al. (2016) showed that context shapes accelerator programme content. Incubators in countries with more significant voids in commercial institutions prioritize developing market infrastructure over developing business capabilities. The opposite balance is seen in incubators in countries with more significant market-based development.

Relatedly, Assenova (2020b) shows that country-level institutional reforms affect the number and quality of the entrepreneurs who apply to accelerators. Using longitudinal data from thousands of applicants to accelerator programmes between 2016 and 2018 in 170 countries, she finds that country-level regulatory reforms that were designed to encourage startup growth increased both the number and the quality of incoming cohorts as measured by various metrics.

ACCELERATORS ATTRACT VENTURE CAPITAL AND SPECIALIZED TALENT TO THEIR RESPECTIVE ECOSYSTEMS

10. CONCLUSION AND GUIDE FOR FUTURE RESEARCH

More than fifteen years of research on the effectiveness of accelerators has revealed that, even without a cash injection, accelerators can have significant effects on the average performance of participating companies: those companies tend to grow bigger and scale faster than other ventures. These strong effects can be traced to the capability-building programmes that these schools for entrepreneurs offer, their defining feature.

As accelerator sponsors, policymakers and academics continue to test out new ways to accelerate startups, we see several key research areas that should receive attention to inform refinements to programme design and developments in public policy. For one, we need more research exploring how accelerators' multi-dimensional impact on participant and non-participant businesses varies according to the resources they offer, the entrepreneurs who participate, and the programs' sponsors and objectives.

We also need to explore effects of accelerators on businesses' social and environmental performance, in addition to their financial and commercial development. Moreover, we also need a better understanding the effects accelerators have on the entrepreneurs themselves, beyond their businesses. Can accelerators deliver lasting improvements for individuals? What types of entrepreneurs are attracted to accelerators, and how do the resources these programs offer affect entrepreneurs' demand for acceleration?

Finally, we need to learn more about how accelerators go about identifying promising candidates and the role accelerators play in certifying business quality to markets and providing a sense of validation to the founders. Is participation in an accelerator a mark of quality? And does it reveal information to founders about their potential?

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APPENDIX 1 – CLASSIFICATION OF ARTICLES ACCORDING TO METHODOLOGY AND DATA SOURCES

Approach	Method	Data Sources	Reference
Quantitative	Group Comparisons	Survey - GALI	Davidson and Guttentag (2020); Davidson et al. (2021); Chan et al. (2020); Roberts et al. (2017); Lall et al. (2020); Assenova (2020a); Yang et al. (2020); Pandey et al. (2017); Roberts et al. (2018)
		Archival Data[62]	Dushnitsky and Sarkar (2020); Choi and Kim (2018); Amezcua et al. (2013)
		Proprietary Data[63]	Avnimelech et al. (2021); Seitz et al. (2019)
	Matched Comparisons	Survey Archival data	Gonzalez-Uribe and Reyes (2021)
		Proprietary data Archival data	Hallen et al. (2020); Assenova (2020b)
		Archival data	Smith et al. (2015); Lasrado et al. (2016)
	Comparison around a selection cut-off	Proprietary data Archival data	Barrows (2017)
		Application data Proprietary data	Gonzalez-Uribe and Leatherbee (2018); Fehder (2015)
		Proprietary Data	Hallen et al. (2020)
		Application data	Bone et al. (2019)
	Quasi-random variation	Proprietary data Survey Archival data	Gonzalez-Uribe and Reyes (2019); Assenova (2020b); van Weele et al. (2020); Hmaddi (2022a); Sariri and Agrawal (2022); Camuffo et al. (2020); Hmaddi (2022b)
Qualitative	Classification / categorization	Survey Interviews Archival data Participant observation[64]	Bliemel et al. (2019); Goswami et al. (2018); Kohler (2016); Mahmoud-Jouini et al. (2018); Moschner et al. (2019); Shankar and Shepherd (2019); Nchang and Rudnik (2019); Politis et al. (2019)
	Case studies	Interviews Proprietary data Participant observation Archival data	Kanbach and Stubner (2016); Kupp et al. (2017); Cohen et al. (2019)
	Mixed Methods	Interviews	Hallen et al. (2020)

APPENDIX 2 – CLASSIFICATION OF ARTICLES ACCORDING TO TOPIC

Selection			Fafchamps and Woodruff (2017); McKenzie and Sansone (2019); Gonzalez-Uribe and Reyes (2021); Yang et al. (2020); van Weele et al. (2020); Yu (2020); Lall et al. (2020); Hmaddi (2022b); Goñi Pacchioni and Reyes (2019); Balachandra et al. (2021); Dushnitsky and Sarkar (2020)
Impacts on participating businesses	Capability-Building	Human Capital	Assenova (2020b); McKenzie (2019); McKenzie et al. (2021); Clingingsmith and Shane (2018); Anderson et al. (2021); Arráiz et al. (2019); Drexler et al. (2014); Cole et al. (2019); Menkhoff et al. (2021); Lafortune et al. (2018); Upadhyaya and McCormick (2020); Campos et al. (2017); Ubfal et al. (2019); Camuffo et al. (2020); Leatherbee and Katila (2020); Leatherbee et al., (2021); Sariri and Agrawal (2022); Hmaddi (2022a); Sariri (2022); Chatterji et al. (2018)
		Social Capital	Krishnan et al. (2020); Anderson and McKenzie (2020); Cai and Szeidl (2018); Dimitriadis and Koning (2022); Roberts et al. (2017); Dushnitsky and Sarkar (2020); Gonzalez-Uribe, Wang, and Xu (2021); Dempwolf et al. (2014); Cohen (2013); Howell and Nanda (2019); Dimitriadis and Koning (2022); Krishnan et al. (2020), Roberts et al. (2018)
		Organizational Capital	Hallen et al. (2020); Leatherbee et al. (2021)
	Funding and Capability-Building		Davidson and Guttentag (2020); Gonzalez-Uribe, Wang, and Xu (2021); Leatherbee et al. (2021); Avnimelech et al. (2021); Gonzalez-Uribe and Leatherbee (2018); Berge et al. (2015)
Impacts on non-participating businesses			Amezcua et al. (2013); Avnimelech et al. (2021); Bliemel et al. (2019); Hochberg and Fehder(2015); Madaleno et al. (2018); Goswami et al. (2018); McKenzie and Puerto (2017); Assenova (2020b)

APPENDIX 3 — LITERATURE REVIEW ON TRAINING ENTREPRENEURS IN DEVELOPING COUNTRIES

Gender: Some programmes target female-led businesses like the Ethiopian intervention on women-owned micro and small enterprises studied by Alibhai et al. (2019). The authors show that gender training can increase growth among female-led businesses. They also highlight the essential role of trainer background. Impacts are more significant for companies assigned to trainers who previously owned a business and may better therefore understand the entrepreneurs' specific challenges. Evidence that shows that female entrepreneurs tend to underestimate their capabilities and have a greater fear of failure than male entrepreneurs justifies these programmes' focus on gender[65]. Other examples of programmes combining standard business training with gender topics include the International Labor Organization's Gender and Enterprise Together programme; see Bulte et al. (2016) and McKenzie and Puerto (2020) for interventions using this programme in Vietnam and Kenya, respectively.

Mentoring by experts or peers: Another type of variation on standard business training aims to adapt the curriculum to the specific needs of individual businesses by incorporating mentoring from industry experts or peers and exposure to role models who explain how the training helped them in their own business. There is growing evidence that mentoring increases business growth, but mentors' qualifications and experience appear to be crucial. Anderson et al. (2021) find more substantial effects on the performance of Ugandan microentrepreneurs mentored by specialists with marketing backgrounds. Relatedly, Brooks et al. (2018) show that mentoring by experienced entrepreneurs in the same community increases short-term profits for female-led microenterprises in Kenya. The evidence on role models' impact on business growth is scant. Lafortune et al. (2018) show that motivational speeches by successful alumni increase business training impacts in microentrepreneurs in Chile. However, they have no effect on business practices and, therefore, most likely work by changing attitudes and perceptions.

Heuristics: One popular programme variation simplifies the curriculum by teaching a few heuristics and rules of thumb. The evidence on these alternative approaches is still growing, but there is already an indication that heuristics training can be more impactful than what is offered in standard programmes. There is also evidence of heterogeneity in impacts: Arráiz et al. (2019) show more significant effects from heuristics training in Ecuador for female entrepreneurs and microentrepreneurs with low recall. Other key papers on heuristics training with microenterprises include studies in Peru by Drexler et al. (2014), in India and the Philippines by Cole et al. (2019), and in Uganda by Menkhoff et al. (2021).

Psychology: While traditional business training programmes have emphasized 'hard' skills such as learning to keep track of accounts, entrepreneurs often attribute success to so-called 'soft skills'. In a study with microentrepreneurs in Kenya, Upadhyaya and McCormick (2020) find that most companies attribute their success to the vision and leadership of the founding entrepreneur. In keeping with this received wisdom, newer approaches to business training borrow lessons from psychology to develop the soft skills associated with successful entrepreneurship. Prominent examples include personal initiative and mindset training programmes. This type of training aims to develop critical behaviours associated with a proactive entrepreneurial mindset, such as constantly searching for new opportunities, learning from errors and feedback to overcome obstacles, and thinking of ways to differentiate oneself from other businesses (McKenzie et al., 2021). The evidence on these alternative programmes is still growing, but there is already indication they can be more impactful than standard business training. Some important studies on personal training programmes include the papers on microenterprises in Togo and Jamaica by Campos et al. (2017) and by Ubfal et al. (2019), respectively.

ENDNOTES

[1] See Vitaly Golomb, “Accelerators Are the New Business School,” TechCrunch, July 11, 2015, http://techcrunch.com/2015/07/11/accelerators-are-the-new-business-school/. According to Natty Zola, the Managing Director of TechStars, business accelerators are ‘a proven way to quickly grow a startup by learning from experts, finding great mentorship and connecting to a powerful network. They provide resources that reduce the cost of starting a company and the early capital a team needs to get their venture off the ground or to achieve key early milestones. They have become the new business school.’

[2] See Cohen and Hochberg (2012) and Wright and Drori (2018).

[3] By capabilities, we refer to the non-monetary skills and resources that are needed for turning business ideas into successful businesses. Among these are human capital, social capital, and organizational capital. Human capital refers to the personal attributes of entrepreneurs that are considered useful in the production process, like business know-how, which they can acquire from training and mentoring. By social capital we mean entrepreneurs’ networks of relationships with other people that enable businesses to function effectively, such as the networks they can acquire from their accelerator cohort peers. Organizational capital includes organizational structure and cultural elements that make businesses more productive; for example, the accelerator’s accountability system through regular meetings with staff, which can play a similar role of an independent board of directors for ventures.

[4] SSRN was searched on October 07, 2021. Search parameters: ‘accelerators’ in the Accounting, Corporate Governance, Economics, Entrepreneurship, Finance, Innovation and Management SSRN Networks.

[5] We included business training because it is a common offering of business accelerators, as we explain in Section 2.

[6] See, for example, the paper by Hallen et al. (2020) for other sources of reasons for scepticism about the potential impacts of business accelerators, including issues of time compression diseconomies and the potential for inappropriate standardization.

[7] We searched the online platform Crunchbase on May 2022.

[8] See Dushnitsky (2012) for an in-depth description and analysis of corporate venture capital.

[9] There is a long literature in economics and strategy studies about the effects of similar support programmes sponsored by universities (e.g., incubators and technology offices) on participants’ performance (see, for example, Clayton, Feldman, & Lowe, 2018; Breznitz & Feldman, 2012). However, accelerators differ from these other support programmes in ways that can affect their expected impacts. Some key distinctions include programme length and selectivity: incubators are not usually fixed-term, and they accept most applicants. These differences can affect impact magnitude and channels: certification effects are less plausible in incubators, as are potential organizational capital effects—see Section 5 for how deadlines imposed by accelerator demo days can affect a venture’s performance.

[10] GALI, “Entrepreneurship Database,” https://www.galidata.org/entrepreneurs/.

[11] Lerner and Nanda (2020) show that 65% of investment rounds in the last decade failed to break even or even lost money for some investors, while less than 4% produced 10X or greater returns.

[12] See Cusolito et al. (2018) for a discussion of investment-ready programmes.

[13] For a discussion on the difficulties of prioritizing particularly for first-time entrepreneurs trained in science and engineering (i.e., ‘the failure in the market for high quality judgment’), see Ajay Agrawal, “CDL: An Introduction,” lecture given in August 2018 at the Rotman School of Management, Toronto, Ontario, Canada.

[14] As we will discuss in Section 6, growing evidence substantiates the potential signalling effects of accelerators, by showing that institutions that support early-stage businesses are indeed capable of identifying promising entrepreneurs whose potential is not necessarily obvious to other market participants.

[15] Acceptance rates are also low (below 15%) for impact-oriented accelerators with broader selection criteria (see Roberts & Lall, 2019).

[16] In the sense of models such as Inderst and Muller (2004); Sørensen (2007); and Ewen et al. (2022).
[17] Learning about entrepreneurial ‘type’ plays a pivotal role in many models of firm dynamics (see Jovanovic, 1982; Ericson & Pakes, 1995; and Berk et al., 2004).

[18] A long literature in economics and finance substantiates the potential role of accelerators in funding and capability gaps. For a review, see Woodruff (2018).

[19] See, for example, Bliemel et al. (2019); Gianoncelli et al. (2020); Goswami et al. (2018); Kohler (2016); Mahmoud-Jouini et al. (2018); Moschner et al. (2019); Shankar and Shepherd (2019); and Nchang and Rudnik (2019).

[20] See, for example, Politis et al. (2019); Goswami et al. (2018); Kohler (2016); and Nchang and Rudnik (2019).

[21] GIIN, 2020, *Annual Impact Investor Survey.*

[22] See Chan et al. (2020); Cohen et al. (2019); and Cohen et al. (2019).

[23] See Section 6 for a closer look at entrepreneurial selection in accelerators.

[24] See Amezcua et al. (2013).

[25] For example, business angels and venture capital; see Choi and Kim (2018).

[26] See, for example, Yu (2020); Smith and Hannigan (2015); Smith et al. (2015); Hallen et al. (2014); and Lasrado et al. (2016).

[27] See for example Hallen et al. (2020).

[28] See for example Gonzalez-Uribe and Leatherbee (2018) and Fehder (2015).

[29] See Gonzalez-Uribe and Reyes (2020).

[30] See the AEA RCT Registry (socialscienceregistry.org) for the list of ongoing pre-registered RCTs.

[31] See, for example, Christiansen (2014) and ANDE (2014).

[32] See Hallen et al. (2020).

[33] See Gonzalez-Uribe and Reyes (2019); Lasrado et al. (2016); Roberts et al. (2017); Davidson and Guttentag (2020); Davidson et al., (2021). [PA: also pay attention to final punctuation.]

[34] See Barrows (2017) and Gonzalez-Uribe and Leatherbee (2018).

[35] See Hallen et al. (2020).

[36] See Bone et al. (2019); Gonzalez-Uribe and Leatherbee (2018); Lasrado et al. (2016); and Fehder (2015).

[37] See Roberts et al. (2017); Hallen et al. (2020); Fehder (2015).

[38] See Hallen et al. (2020); Smith and Hannigan (2015).

[39] See Gonzalez-Uribe and Reyes (2019) and Roberts and Lall (2019).

[40] See Smith and Hannigan (2015).

[41] See Yu (2020).

[42] Cohen et al. (2019).

[43] Hallen et al. (2020).

[44] See Gonzalez-Uribe and Reyes (2019) and Roberts and Lall (2019).

[45] See Roberts and Lall (2019).

[46] See Leatherbee et al. (2021).

[47] See Cohen, Fehder et al. (2019).

[48] See Roberts and Lall (2018); Lall and Park (2022); Roberts et al. (2016); Roberts et al. (2017); Davidson et al. (2021); and Guttentag et al. (2021).

[49] See Yu (2020).

[50] See Gonzalez-Uribe and Leatherbee (2018).

[51] See Lakhani, Luo, and Katsnelson (2020); Sariri and Agrawal (2021); and Sariri (2022).

[52] See Mocker et al. (2015); Kohler (2016); Kupp et al. (2017); Mahmoud-Jouini et al. (2018); Shankar and Shepherd (2019); Moschner et al. (2019); Kanbach and Stubner (2016); and Heinemann (2015).

[53] Perceived benefits of networking vary with the type of accelerator: see Roberts et al. (2017); Lange and Johnston (2020); and Pandey et al. (2017).

[54] See Cohen et al. (2019).

[55] The exact content varies with the type of participant targeted. For high-growth firms, whose founders are often highly educated, the emphasis is on specialized assistance with business modelling and marketing and positioning their firm to receive outside financing from investors. For accelerators that target other types of businesses, the content is most similar to business training offered to microenterprises (see McKenzie, 2019). The emphasis is on separating household and business accounts, keeping records, monitoring inventory, offering discounts to attract customers, and budgeting and planning.

[56] See McKenzie (2020), McKenzie et al. (2021), and Appendix 1 for more details.

[57] See Ries (2011).

[58] See McKenzie (2020).

[59] See Howell (2020).

[60] See also Lall et al. (2020).

[61] See also Clingingsmith and Shane (2017) for evidence that the order of pitch presentation matters. In their study, entrepreneurs in elevator pitch competitions were randomly assigned the order in which they were to pitch. The authors find evidence of a calibration effect, whereby investor-judges express substantially less interest in pursuing investment in the first and second ventures pitched to them.

[62] Archival data comprises a mix of data sources that are accessible online for free or via subscriptions such as data from the web, CrunchBase, AngelList, Capital IQ, LinkedIn, and VentureExpert.

[63] Proprietary data comprises confidential records such as emails, tax data and other types of data that do not include applicant data.

[64] Participant observation data is collected through direct observations at the accelerator site using an ethnographic approach.

[65] Global Entrepreneurship Model, Global Report 2017/18, https://www.gemconsortium.org/report/gem-2017-2018-global-report.