How Business Startup Accelerators Envision their Future

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Abstract

Accelerators have become an important agent for the growth of new Startups across the world. They provide training and mentorship to startups and help them find investors. However the very nature of accelerators is evolving as they are trying to evolve sustainable Business Models. Through an in depth literature review, we try to explore a deeper understanding about the various types of Accelerators across the world and how they help startups. Also, through a worldwide survey to accelerators landscape, we identify their opinion about major challenges for the future, and through statistical exploration, provide an anatomy of these entrepreneurial firms. Therefore, this research provides a complete portrait on accelerators, regarding their business models, strategies and challenges for the future.

Keywords

Accelerators, Survey, Nonlinear Principal Components

1. Motivation

It is believed that entrepreneurial activity is related to the economic growth, but there is still a lack of theoretical foundation and the community would benefit a lot from further research being conducted (Hochberg, 2015). Accelerators, which are part of any entrepreneurial ecosystem, are also believed to play an important role in the

development of startups. Investing in research will allow us to understand the value and impact accelerators have on entrepreneurs and local ecosystems, based on factual and rigorous data.
Since accelerators are a relatively new phenomenon, there is not much reliable information available on these entities, so we realized it would be of great value to provide a complete study on the main characteristics and trends of these organizations. We understood it was important to analyse their main defining features, including the acceleration programs, the strategic reasons that lead them to running a certain type of program, the value that entrepreneurs get out of the various programs offered, relevant aspects of their business models, their strategies, priorities and challenges for the future. Therefore, we will study two questions that broadly include the former topics:

- How are accelerators evolving around the world?
- What characterizes the dynamics of the acceleration programs?

Therefore, we provide a contribution to the research work about accelerators that is still lacking, mainly because this is a quite recent phenomenon. To study the above mentioned research questions, we adopt two approaches. Firstly we conduct an in-depth literature review to understand the focus and types of accelerators existing. Then, through a survey of more than 50 accelerators across the world we try to have a greater understanding about the opinion of accelerators to the above mentioned questions.

2. Literature review

2.1 Definition

According to Harper-Anderson, Lewis & Molnar (2011), the business incubation industry has led to the development of the 'business accelerator'. The 'seed accelerator' is defined as a 'fixed-term, cohort-based program, including mentorship and educational components, that culminates in a public pitch event, also known as Demo Day (Cohen & Hochberg, 2014).

Table 1 – What is an accelerator program?

Author(s)	Year	What is an accelerator program?
Cohen & Hochberg	2014	Accelerator programs are a legitimately new model of support for entrepreneurs that combines various features that used to be provided unconnectedly in the past.
NUMA	2014	The accelerator programs are usually structured around three different phases: 1) set-up, deal flow and selection; 2) kick-off of the program through Demo Day; 3) follow-on investments and exits.
Dempwolf, Auer & D'Ippolito	2014	Accelerator programs help entrepreneurs bring their technologies, ideas or products into the marketplace and ideally lead entrepreneurs to develop viable businesses

Accelerators are valuable because they allow startups, investors and entrepreneurs to connect with each other and the seed accelerators have become a way of shaping startups into scalable and sustainable businesses (Barrehag et al., 2012).

2.2 Differences between an accelerator and an incubator

Unlike incubators which provide a longer term working space to startups, accelerators have a much deeper involvement with startups. Their programs are of shorter duration but much more intensive. They are also providing close mentorship support. Table 2 provides the key differences between an accelerator and an incubator.

Table 2 – Differences between an accelerator and an incubator (Cohen & Hochberg, 2014)

	Accelerators	Incubators
Duration	3 months	1 – 5 years
Co-horts	Yes	No
Business model	Investment; non-profit	Rent; non-profit

Selection Frequency	Competitive; cyclical	Non competitive
Venture stage	Early	Early or late
Education offered	Seminars	Ad hoc, hr/legal
Venture location	Usually on-site	On-site
Mentorship	Intense, by self and others	Minimal, tactical

2.3 Accelerators in the world

The first accelerator, Y Combinator, was launched in 2005, establishing itself in Silicon Valley as the first program of this kind. Techstars, one of the largest programs to emerge, appeared two years later, when two startup investors in Boulder, Colorado founded the accelerator, in an attempt to transform the Boulder startup ecosystem**.** Since these launches, many other accelerators were launched all over the world, such as 500 Startups, DreamIT Ventures, Startupbootcamp, Seedcamp, The Alchemist Accelerator, AngelPad and Boost VC. Nowadays, we can find accelerators in almost every region of the world, which shows the increasing popularity associated with this phenomenon.

2.4 Different types of accelerators

Accelerators are not all alike. Table 3 summarizes various types that have been identified.

Table 3 – Different types of accelerators

Type of accelerator	Author(s)	Year	Definition
Innovation accelerator	Dempwolf, Auer & D'Ippolito	2014	Innovation accelerators are stand-alone, for-profit ventures that identify classes of promising startup companies with rapid, high-growth potential, making seed-stage investments in those companies usually in exchange for equity, being part of innovation-acceleration activities with such companies to help them get next-stage funding and cashing out for a profit when these companies are acquired or have successful IPOs.
Social Accelerator	Dempwolf, Auer & D'Ippolito	2014	Social accelerators have a combination of founder motivations that bridge public and private goods. These accelerators may be interested in profit while relaxing aspects of the business model to accommodate goals that advance the public good. They may be founded in order to accelerate nonprofit and social enterprise startups, adopting certain characteristics that encourage accelerator profit.
University Accelerator	Dempwolf, Auer & D'Ippolito	2014	University accelerators usually provide seed grants to provide assistance to students through the early stages of development. Unlike for-profit accelerators, university accelerators do not take equity stakes in student-founded companies, and they do not usually have a technology focus.
Corporate Accelerator	Forbes	2015	Similar to seed accelerators, corporate accelerators provide a structured program and financial support for startups to transform their ideas into real and concrete businesses

2.5 Benefits arising from accelerator programs

If accelerator came to life, it means that they add value to real world business dynamics, namely at launching new businesses. Below, Table 4 summarizes the benefits that have been pointed out making the link to the stakeholders.

Table 4 – Benefits arising from accelerator programs

Stakeholder	Author(s)	Year	Benefits arising from accelerator programs
Startups	Miller & Bound	2011	Funding, business and product advice, connections to future investment, validation, a peer support group, pressure and discipline
Angel investors	Miller & Bound	2011	Reduction of the need for due diligence as that role is performed by the accelerator, reduction of the cost and time required to find new companies to work with and possibility to meet other investors and company founders
Venture Capitalists	Miller & Bound	2011	Improvement of deal pipeline, while creating more high quality startups and opportunity to interact with new technology and map trends in startups. Meeting other investors and company founders
Corporations	Miller & Bound	2011	Talent scouting for new employees, possibility of getting new customers for their platforms and services and the possibility of associating their brand with supporting new businesses.

2.6 Types of acceleration programs

Accelerators may run different types of programs: pre-acceleration, generic/horizontal/generalist acceleration or vertical acceleration.
Pre-acceleration programs generally target first time entrepreneurs and recent graduates, as well as unemployed people, researchers and students. These programs are focused on very early and pre-seed stage businesses. Pre-acceleration programs are known for working in different stages, that go from having people that do not even have an idea or team to market validation (PortugalStartups.com, 2015).
Generic programs are also named horizontal or generalist programs. The "horizontal" theme refers to accelerators focused on startups that intend to develop a product or service that meets a similar customer need across in various market niches (Linkedin, 2015).
Vertical programs tend to have the same structure as traditional horizontal programs, but are different because they give startups access to domain experts and mentors as well as certain resources that horizontal programs cannot usually provide, such as access to production facilities, manufacturers or retailers (NUMA, 2014).

2.7 Funding the accelerator

Most accelerator programs got the major part of their working capital from shareholders, such as investors, corporates or public authorities.
There are many ways for the accelerator to get funding:

- Corporate sponsors;
- Grants by the government of private donors;
- Events and workshops held by the accelerator;
- Entrepreneur-in-residence programs;
- Rentals charged by the accelerator;
- Research reports developed by accelerators.

(Best Engaging Communities, 2015)

2.8 Equity

It has become an industry standard for accelerators to demand equity in exchange for startups' participation in their programs. However, according to experts, this is quite risky. Although programs might provide money, access to

domain experts and investors, they cannot guarantee success or even survival. Accelerators typically take 6% to 8% of a company for a cash infusion of about $20,000, an exchange that values a startup with no other investment capital at about $400,000 (Crain's New York Business, 2014).

2.9 KPIs in accelerators

A variety of metrics have been recognized as relevant for accelerators and for startups. Table 6 presents a summary.

Table 6 - Short and long-term metrics for accelerators and their startup firms (source: (Dempwolf et al., 2014)

Time Horizon	Accelerator Metrics	Startup Metrics
Short-term (program duration plus 6 months)	Number of applicants Number of participants (cohort size) Number of investors at Demo Day Percentage receiving next-stage funding Percentage acquired Percentage failed	Operational status (operating, closed, acquired) Number of financial investments or number of investors Size of financial investments Number of customers gained
Long-term (expected cashout in 3 to 7 years)	Sources of funding Performance distribution Internal rate of return Network metrics (partnerships created and others)	Sales or revenue Number of employees Rate of return to investors Stock prices (if applicable)

4. Survey

An online survey was developed for this study. At first, it was important to define the research design and the preliminary version of the survey, which were later analysed by the startup accelerator Beta-i and NESTA. Having taken into consideration the valuable comments that were made, some adjustments were done in order to reach the final version of the survey, which would be sent to numerous accelerators across the world. The objective of conducting an online survey was to collect quantitative data and this method was chosen because it offered the possibility of evaluating and quantifying the respondents' perspectives on their own accelerators, while facilitating the access to the potential respondents.

The survey contained 5 main parts, and the objective was to analyze the current and future trends amongst accelerators worldwide, considering the years of 2015 and 2016. When designing the questions to be included in the survey, it was important to design questions that would not lead to confusion or misinterpretation by the respondent, either because of non-comprehensive language or because of an unsuitable answer format. The survey was then sent to more than 200 accelerators worldwide and a total of 50 answers was collected.

The survey that was part of this research work was entirely conducted in English, and consisted of 38 questions split into 5 main sections. The purpose of the first section was to identify the general traits of the organizations that were participating in the survey and this section had a total of 8 questions. The second, third and fourth sections were focused on the different acceleration programs that organizations may have: generic acceleration, vertical acceleration and pre-acceleration, respectively. In order to avoid spending unnecessary time, there were guiding questions at the beginning of each section with the purpose of identifying if the respondent had each of the programs in its organization. In case the respondent did not have a specific type of program, he was redirected to the next part of the survey. The generic, vertical and pre-acceleration parts of the survey had a total of 5 common questions, structured in a way that would allow the comparison between different types of acceleration programs by different respondents. For the generic and vertical acceleration parts, there were 2 extra and more specific questions that made sense according to the context of the programs. The final part of the survey included questions that aimed to understand the future of acceleration amongst accelerators, with regards to the challenges and priorities they have, for instance.

The survey had a varied range of questions so that it would be possible to gather as much information as possible. Therefore, we had access to very diversified information, which facilitated the process of running descriptive statistics and statistical inference on the data.

4.1. Statistical procedure

The first goal was to measure the association between variables, and we tried to use the highest number of variables possible so that we would be able to compare more results for the accelerators. We have also calculated the associations with a largest data set, and each of the samples used had fewer variables available but more observations (comprising 13, 21 and 46 observations). The results for these larger samples confirmed the ones obtained for the 12 observations and broader dataset. Thereby, our analysis gains more reliability and the conclusions drawn on the various aspects.
In what follows we first measure the association among variables and then apply nonlinear principal components for investigating the vison of accelerators towards the future, namely regarding the challenges.

4.2 Kendall tau-b correlations

The correlation between different variables was calculated for 1%, 5% and 10% levels of significance, in order to identify the most interesting situations. The Kendall nonparametric correlation coefficient, usually referred to as Kendall's tau coefficient was used. This statistic can measure the association between categorical and interval or continuous variables. A tau test is a non-parametric hypothesis test for statistical dependence based on the tau coefficient. More specifically, the Tau-b statistic was the one chosen for the current data, which unlike Tau-a makes adjustments for ties. The values of Tau-b vary from −1 (100% negative association, or perfect inversion) to +1 (100% positive association, or perfect agreement). A value of zero represents the absence of association.
The Kendall Tau-b test was the most suitable option in this case because this a non-parametric test, thereby robust to deviations from normality, and we are dealing mostly with categorical variables. If there is no correlation between two variables, this is also a result, because it means that there is not any kind of connection between them.
After identifying the most relevant correlations, contingency tables were developed in order to verify and assure the significance of the correlations. If two variables were not considered to be statistically correlated in the first part of the analysis, the contingency table was still developed based on the absolute frequency of the data.
The Fischer's exact test and, when applicable, the McNemar's test were used while inspecting the contingency tables. The Fisher's exact test is a statistical significance test used in the analysis of contingency tables. In practice, it is generally used for small sample sizes, but it is valid for all sample sizes. The McNemar's test is a statistical test used on paired nominal data. These two tests confirmed broadly the previously found correlations, when using Kendall Tau-b coefficient.
The Chi-Square test was not the most suitable one because it is only applicable to large sample sizes. In this case, the sample size is small, because the survey had questions that had a large amount of answers and questions that very few people had answered.

Table 7 – Cross-correlations using coefficient Kendall tau-b coefficient
(*, ** mean, respectively, significance at 5% and 1% level; not marked means 10% significance level)

Variable 1	Variable 2	Correlation	Meaning
Accelerators that are from the USA or from other parts of the world	Accelerators that use more or less than 3 metrics	,68*	Accelerators from the USA generally use more than 3 metrics and accelerators from other countries use less than 3 metrics
Number of people working full time (more or less than 10 people)	Number of startups in the generic programs in 2016	,56*	Accelerators with more than 10 people tend to have more startups taking part in the generic programs
Number of people working full time (more or less than 10 people)	Variation of the number of startups in the generic programs between 2016 and 2015	,56*	The variation is more significant for the accelerators that have more than 10 people.
Nature of the organization (public or private)	Funding of the generic programs (public or private)	-,67*	Public organizations tend to look for private funding and private organizations tend to look for public funding
Nature of the organization	Accelerators' views on	,58*	Public accelerators are more

(public or private)	challenges related to the value created, external and internal challenges		worried about challenges related to the value created, while private organizations are more concerned about internal challenges
Accelerators that are from the USA or from other parts of the world	Funding of generic programs (public or private)	0,58	Accelerators from the rest of the world usually have public funding and accelerators from the USA have private funding
Nature of the organization (public or private)	Number of startups in the generic programs in 2015	-0,44	Public accelerators have more startups in the generic programs in 2015, when compared to private accelerators
Nature of the organization (public or private)	Industries that startups may be focused on (Tourism and Services/Clean and Tech)	-0,50	Public organizations have startups whose businesses are mostly focused on Clean and Tech industries and private organizations have startups whose businesses are mostly focused on the Tourism and Services industries
Accelerators that are from the USA or from other parts of the world	Accelerators' views on challenges related to the value created, external and internal challenges	-,56*	Accelerators that are not from the USA are more concerned about internal challenges, while accelerators that are from the USA are more concerned about challenges related to the value created
Accelerators that are from the USA or from other parts of the world	Number of people working full time (more or less than 10 people)	,49*	Accelerators that are not from the USA usually have less than 10 people working full time at their organizations and the accelerators from the USA tend to have more than 10 people working full time
Nature of the organization (public or private)	Accelerator taking or not equity in 2015	-,73**	Private organizations tend to ask for equity, while public organizations do not usually ask for equity
Accelerators that are from the USA or from other parts of the world	Accelerators that use more or less than 2 metrics	0,43	Organizations that are not from the USA generally use less than 2 metrics to evaluate success and the organizations from the USA tend to use more than 2 metrics
Accelerators that are from the USA or from other parts of the world	Accelerator running or not generic acceleration in 2015	0,38	Organizations that are not from the USA tend to run generic acceleration, whereas organizations from the USA tend not to do so
Number of people working full time (more or less than 10 people)	Variation of the number of startups between 2016 and 2015	0,37	The variation is more significant for the accelerators that have more than 10 people.
Number of people working full time (more or less than 10 people)	Accelerators' views on challenges related to the accelerator itself of elements of the ecosystem	-,50*	Accelerators with less than 10 people are more worried about challenges related to the accelerator and elements of the ecosystem, while accelerators that have more than 10 people are more concerned about the challenges related to the accelerator itself

Nature of the organization (public or private)	Accelerator taking or not equity in 2015	-,73**	Public organizations do not usually ask for equity, while private organizations ask.
Nature of the organization (public or private)	Accelerators' views on challenges related to the value created, external and internal challenges	,60** ,58*	Public accelerators are more worried about challenges related to the value created, while private organizations are more concerned about internal challenges
Accelerators that are from the USA or from other parts of the world	Accelerators that use more or less than 2 metrics	0,43	Organizations that are not from the USA generally use less than 2 metrics to evaluate success and the organizations from the USA tend to use more than 2 metrics
Nature of the organization (public or private)	Accelerators' views on challenges related to the accelerator itself of elements of the ecosystem	-0,40	Private accelerators are more concerned with challenges related to the accelerator itself, while public accelerators are more interested in challenges related to the accelerator and other elements of the ecosystem
Accelerators that are from the USA or from other parts of the world	Number of people working full time (more or less than 10 people)	,37*	Accelerators that are not from the USA have less than 10 people working full time, whereas accelerators from the USA tend to have more than 10 people working full time
Accelerators that are from the USA or from other parts of the world	Accelerator taking or not equity in 2015	-,35*	Accelerators that are not from the USA usually do not ask for equity, while the accelerators from the USA tend to ask for equity
Accelerators that are from the USA or from other parts of the world	Accelerators that use more or less than 2 metrics	,43**	Organizations that are not from the USA generally use less than 2 metrics to evaluate success and the organizations from the USA tend to use more than 2 metrics
Accelerators that are from the USA or from other parts of the world	Accelerators that use more or less than 3 metrics	,51**	Accelerators that are not from the USA generally use less than 3 metrics and the accelerators from the USA use more than 3 metrics
Number of people working full time (more or less than 10 people)	Accelerator taking or not equity in 2015	-,35*	Accelerators that have less than 10 people usually do not ask for equity, while accelerators with more than 10 people tend to ask for equity
Number of people working full time (more or less than 10 people)	Accelerators that use more or less than 2 metrics	,36*	Accelerators that have less than 10 people tend to use more than 2 metrics, while organizations with more than 10 people generally use less than 2 metrics
Nature of the organization (public or private)	Accelerator taking or not equity in 2015	-,55**	Public accelerators tend not to ask for equity and private accelerators ask for equity
Number of people working full time (more or less than 10 people)	Accelerator running or not generic acceleration in 2015	0,27	Accelerators that have less than 10 people tend to run generic acceleration, while accelerators that

			have more than 10 people tend not to run generic acceleration

4.3. Nonlinear principal components

We explored the different views of the accelerators looking especially challenges for the future, using Categorical (or also called Nonlinear) Principal Components while applying the Optimal Scaling procedure, as implemented in *SPSS Software*. Then, based on the mapping for the different observations, i.e., accelerators, along the obtained dimensions, we make explicit remarks on the which are the main characteristics exhibited within each group.
Principal component analysis (PCA) takes into account the maximum of information possible and compacts into fewer dimensions that broadly summarize the essentials of the content associated with the variables that we are analysing. PCA is, also for categorical variables, a statistical procedure to summarize a set of variables into a smaller set of components, which are in most cases orthogonal among them. The number of principal components is less than or equal to the number of original variables.
Using the dimensions obtained from PCA for each set of variables, we further analysed the grouping that emerges and characterized the patterns suggested, in particular as exhibited in the figures named *Objects Points Labelled by Casenumber*.
Considering the different options that respondents had to classify in the survey, those options were shortened to 4 important dimensions using the *SPSS Software*, and those 4 dimensions explain 86,568% of the results. Table 8 provides a more detailed description of these conclusions. The first dimension explains the majority of the results (29,252%).

Table 8 - Model Summary for the topic 'Challenges for the future with regards to accelerators that may or may not run generic acceleration'

Dimension	Cronbach's Alpha	Variance Accounted For	
		Total (Eigenvalue)	% of Variance
1 – Network/Financial sustainability	,698	2,633	29,252
2 – Value delivered/Build credibility	,651	2,373	26,367
3 – Attract quality startups	,448	1,662	18,472
4 – Optimize internal processes	,123	1,123	12,477
Total	,981[a]	7,791	86,568

a. Total Cronbach's Alpha is based on the total Eigenvalue.

Table 9 - Component Loadings for the topic 'Challenges for the future with regards to accelerators that may or may not run generic acceleration'

	Dimension			
	1	2	3	4
CHALLENGE-MEASURE	-,176	,839	-,113	-,162
CHALLENGE-CREDIBILITY	-,137	,929	,144	,015
CHALLENGE-NETWORK	,892	-,049	,411	-,078
CHALLENGE-STARTUPS	-,465	,154	,744	-,047
CHALLENGE-MENTORS	-,470	,163	,679	-,250
CHALLENGE-FUNDING	,230	,666	-,250	,564
CHALLENGE-OPTIMIZE	-,038	-,145	,481	,818

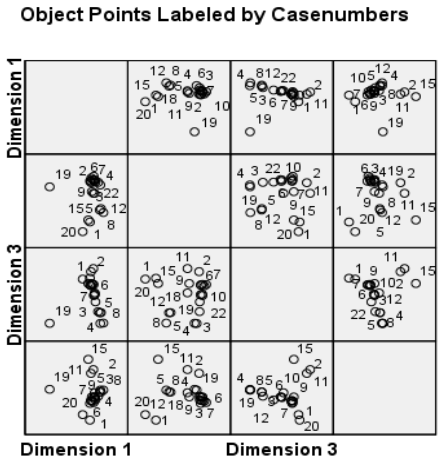
CHALLENGE-COMPETITION	,701	,532	,037	-,181
CHALLENGE-FINANCIAL	,897	-,072	,388	-,077

Variable Principal Normalization.

Table 9 includes each component's importance to each dimension. It is possible to see that the first dimension is mainly characterized as 'Create global network to help startups go global' and 'Financial sustainability of the acceleration business model'. The second dimension is mostly characterized as 'Measure value delivered' and 'Build credibility'. On the other hand, the third dimension is mostly characterized as 'Attract quality startups'. Finally, the fourth dimension is characterized as 'Optimize internal processes'.

4.4 Results from PCA

Figure 1 - Object Points Labeled by Casenumber applied to the topic 'Challenges for the future with regards to accelerators that may or may not run generic acceleration'



Variable Principal Normalization.

Figure 1 represents the Object Points Labeled by Casenumber applied to the challenges for the future of accelerators that may or may not run generic acceleration. On average, accelerators are mostly concerned with the first dimension ('Create global network to help startups go global' and 'Financial sustainability of the acceleration business model'), when compared to the other three dimensions.
Organizations with more than 10 people working full time and that are part of the public sector, tend to be equally concerned with both the first and the second dimensions. Accelerators that are not from the USA and that have less than 10 people working full time are more concerned with the first dimension than with the second one.
When comparing the first and the third dimensions, it is possible to conclude that most organizations are concerned with the first dimension and half of them has the third dimension as a priority and the other half does not. Accelerators in the public sector are more concerned about the first dimension than with the third one.
On average, accelerators are mostly concerned with the first dimension ('Create global network to help startups go global' and 'Financial sustainability of the acceleration business model'), when compared to the other three dimensions.
Organizations with more than 10 people working full time and that are part of the public sector, tend to be equally concerned with both the first and the second dimensions. Accelerators that are not from the USA and that have less than 10 people working full time are more concerned with the first dimension than with the second one. Organizations are generally concerned with the first dimension and half of them worry about the second dimension and the other half does not.

When comparing the first and the third dimension, it is possible to conclude that most organizations are concerned with the first dimension and half of them has the third dimension as a priority and the other half does not. Accelerators in the public sector are more concerned about the first dimension than with the third one.
On average, accelerators are more interested in the first dimension than in the fourth one. The accelerators that take interest both in the first and the fourth dimensions tend not to be from the USA, be part of the private sector, ask for equity and use less than 3 metrics to track progress.
Considering the second and third dimensions, accelerators that are not from the USA and that do not run acceleration programs in more than one country usually take equal interest in both those dimensions. On the other hand, organizations that are part of the public sector and that use less than 3 metrics to evaluate success are not very interested in any of those dimensions.
Accelerators that are part of the public sector are usually more concerned about the second dimension, rather than the fourth one. Finally, accelerators that are not from the USA, that have less than 10 people working full-time and that do not run acceleration programs in more than one country do not take much interest in any of those dimensions.

5. Concluding remarks

Accelerators are a worldwide phenomenon with significant impact on both the development of the startups and in the economic development of the region they operate in. Moreover, these organizations have different business models and, according to their nature and characteristics, having also different ways of assessing their performance, but it is undeniable that they all look forward to keeping track of their progress in order to improve overtime. Importantly, they have distinct ways of facing the challenges and priorities for the future, according to their own nature. Each accelerator emerges under a unique set of circumstances, which makes them distinguishable amongst each other, despite having the same objectives as organizations. Altogether, these leads to recognition of the relevance of investing on global cooperation and network building in order for accelerators and startups to prosper. Sharing information while learning from others is of great importance if one looks forward to improving over time.

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