

Towards a Software Startup Ecosystems Maturity Model

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Abstract. Resulting from the technological revolution from the last decades, we observed many software startup ecosystems emerging around the globe. Having tech entrepreneurs as their main agents, some ecosystems exist for more than 50 years, while others are newly born. This difference in terms of evolution and maturity makes the task of comparing different tech hubs a challenge. Moreover, nascent ecosystems need a clear vision of how to develop their community to evolve towards a fruitful and sustainable ecosystem. This paper proposes a maturity model for software startup ecosystems based on a multiple case study of two existing ecosystems. By determining the maturity level for each ecosystem, it is possible not only to compare different realities, but mainly to identify gaps and propose customized practical actions that can lead to real improvements in the existing ecosystems, taking it to the next level of development.

Keywords: Software Startups, Startup Ecosystems, Ecosystem, Maturity Model, Entrepreneurship, Innovation

1 Introduction

In the last two decades, we observed the rising and maturation of many software startup ecosystems around the world. Society evolves driven by the technological revolution, started with the broader access to the Internet and the popularization of mobile devices, and technologies evolve driven by society's progress, in a co-embedded evolution phenomena. The Global Entrepreneurship Monitor shows that human capital and social capital co-evolve [31, 34]. Given the existence of hundreds of technological clusters in different countries, it is difficult to identify what is the level of development of each ecosystem. This paper proposes a methodology to measure each Ecosystem's level of maturity with respect to multiple factors. By determining the maturity level for each ecosystem, it is possible not only to compare different realities, but mainly propose practical actions that can lead to real improvements in the existing ecosystems.

As our previous research has identified [23, 24], software startup ecosystems are a complex social structure where entrepreneurs and their tech ventures are the main actors. Some of these high tech ventures will evolve to high-growth

firms, which make a disproportionate impact to economic growth [28]. By identifying opportunities in the market, an entrepreneur creates a startup. Startups face multiple challenges to discover its market fit [16] and be successful. For that, the entrepreneur gets support from family, friends, and other personal connections, who are part of a society and culture that influence the entrepreneur's behavior. Demographics characteristics such as language, race, religion, and gender influence the culture and creates opportunities and barriers to the entrepreneur. The geopolitical status also influences the culture and creates opportunities and barriers for the startup. Universities and research centers provide knowledge in technologies that enable the startup, by preparing the entrepreneur and providing networking possibilities. Universities and research centers also guide entrepreneurs on the technology transfer process [5]. Successful, experienced entrepreneurs serve as mentors to novices. Universities and established companies run incubators and accelerators that train and instrument the startup with methodologies such as agile methods [1], lean startup [32], customer development [7], and disciplined entrepreneurship [3]. Eventually, established companies buy, compete, or collaborate with the startup. Private funding bodies like angels and venture capitalists mentor and invest on startups, which can also get financial resources from governmental programs through R&D funding agencies or tax incentives. The existing legal frame (labor laws, tax laws, IP, patents, and its associated bureaucracy) influences costs and frames the startup business model.

Daniel Isenberg argues, "There's no exact formula for creating an entrepreneurial economy; there are only practical, if imperfect, road maps". Instead of trying to imitate successful ecosystems, each region should identify its own qualities and develop them [22]. He also proposes a conceptual model for entrepreneurship ecosystems. The model maps different agents in the ecosystem and proposes that these agents must work together. The entrepreneurship ecosystem can be viewed as a new paradigm for economic policies [21]. Isenberg's model is based on the OECD indicators of entrepreneurial determinants that proposes indicators for measuring the ecosystem performance in 6 areas: regulatory framework, market conditions, access to finance, creation and diffusion of knowledge, entrepreneurial capabilities, and entrepreneurship culture. A limitation of this model is that it misses the dynamics and the interconnectivity aspects of ecosystems.

2 Related Work

Startup ecosystems cannot be analyzed as static entities. Similar to biological ecosystems, they behave like living organisms, changing over time. Some changes are planned or somehow controlled, while others are results of unexpected forces acting within and outside the ecosystem. Although software startup ecosystems are a novel object of study, we already have enough examples to state that these ecosystems pass through the following phases during their development: **Nascent**, **Evolving**, **Mature**, and **Self-sustainable**. There are also examples

of ecosystem **degradation** or **illness**, like what has been reported in Atlanta [9].

As many of these studies claim, culture is a very important aspect that defines the ecosystem characteristics. Thus, mapping its culture is one way to understand the ecosystem. Hofstede presented measurements for cultural aspects in many different countries [19]. Even places with very different cultural behaviors have their own successful ecosystems, which shows that specific cultural characteristics themselves are not a requirement for the existence of healthy ecosystems, but a base over which ecosystems evolve. Every region or country has a different entrepreneurial identity and part of it has been attributed to culture [25]. Besides culture, the success of an innovation ecosystem highly depends on the level of interconnectivity between its players [20]. Connectivity matters and gets better as an ecosystem progresses [36].

Frenkel and Maital propose a methodology for mapping national innovation ecosystems [15]. The methodology is based on a workshop with experts on the ecosystem. These experts identify anchors and processes that characterize that particular ecosystem, leading to a visual innovation ecosystem map. Their methodology was applied to several countries and it resembles, in some aspects, the methods we use in this research. The major difference is that our work extends their approach by also including meetings and interviews with ecosystem players, while Frenkel and Maital's methodology is based on a single workshop with experts. Another difference is that our study focus only on software startups.

Lemos mapped entrepreneurship ecosystems based on the perspective of a research university [26] [27]. His model has elements similar to Isenberg's, but the model is mostly focused on the research university elements, and not on the startup ecosystem as a whole. While research shows that the university has a very important role on the development of a healthy ecosystem, the presence of a high-quality university is only one of many factors that characterize an innovation hub, as we can see in a report by Endeavor comparing the level of entrepreneurship of different cities in Brazil [12].

The World Economic Forum mapped eight pillars of entrepreneurial ecosystems [14], namely (1) accessible markets, (2) human capital workforce, (3) funding and finance, (4) mentors and advisors support system, (5) regulatory framework and infrastructure, (6) education and training, (7) major universities as catalysts, and (8) cultural support. All these eight elements are present in our proposed maturity model and conceptual framework.

Stangler and Bell-Masterson propose four indicators of entrepreneurial ecosystem vibrancy: density, fluidity, connectivity and diversity [4]. **Density** could be measured by the number of new and young firms per 1,000 people, share of employment in those young firms and high tech sector density. Population flux, labor market reallocation and number of high-growth firms measure **fluidity**. To evaluate **connectivity**, they propose the spinoff rate, dealmaker networks and program connectivity. For **diversity**, the measurements are mobility, number of immigrants and multiple economic specializations. The authors emphasize the

importance of the dynamics when analyzing ecosystems, claiming that measures need to be tracked continuously.

In another approach trying to understand ecosystems, Brad Feld presents the “Boulder Hypothesis” [13] with four essential characteristics in a successful startup community: (1) it must be led by entrepreneurs and not by other important players such as government, universities, service providers, big companies, etc., which Feld call feeders; (2) the leaders (entrepreneurs) must have a long term commitment with the community (at least 20 years); (3) it has to be inclusive, which means that everybody who wants to participate must be welcome; and (4) it must have high quality events to engage people, specially acceleration programs and mentoring sessions. Less fragmented ecosystems would score higher on all 4 elements. Feld’s model challenges the triple helix model (governments, universities, and industries) [8]. Recent studies show that policies with focus on bottom-up approaches are more efficient when developing startup ecosystems [35], putting the entrepreneur as the main change agent, while the traditional triple helix model tends to discard the entrepreneurs focusing only on government, university, and industry.

Changes in ecosystems are observed over time, and some differences can take years or sometimes decades to be observed. Ecosystems have a dynamic and evolutionary nature rather than a static phenomenon that can be captured by a snapshot at a given point in time [28]. The startup ecosystem report 2012 [18] proposes a ranking of the top 20 ecosystems in the technologic economy. It puts Silicon Valley as a benchmark and compare other ecosystems to it. Three years later, another report, The global startup ecosystem ranking 2015 [17], revises the 2012 version, presenting a new landscape of ecosystems, showing new technological hubs entering the ranking as well as old startup agglomerations that did not evolved enough to enter in the new top 20. The questions that arise are: what happened to those ecosystems that felt out of the ranking? What did the ecosystems that entered in the ranking performed to scale up? Being higher in the ranking means to get better? Being lower means to get worse? Could the evolution across maturity levels stages be an evidence of a virtuous cycle [6]?

3 Methodology

The maturity model proposed in this paper is based on a conceptual framework for startup ecosystems that we developed after an extensive literature review about existing ecosystems and a detailed qualitative research we performed in two existing ecosystems: Tel Aviv [23] and São Paulo [11]. Our qualitative methodology was based on two different techniques.

The first technique was a multiple case study [37] based on more than 80 semi-structured interviews with key players (entrepreneurs, investors, educators, executives, etc.) in both ecosystems. Based on qualitative methods with elements from Grounded Theory [10] for the identification of the key factors that led to the emergence of a successful ecosystem, our goal was to develop a conceptual

framework [29] of the software startup scene that may help in analyzing the current status of ecosystems as well as finding opportunities for their improvement.

A second qualitative technique that complements the first was based on a systematic workshop / focus group that we executed in São Paulo [11]. Figure 1 depicts the resulting conceptual framework. In a first look, the figure may seem too complex and difficult to digest. So, we suggest that one should examine this figure in the same way a traveler looks at a map, navigating through it, without the obligation to understand every small detail at the first time. It may take some time to understand the whole topology. Nevertheless, it shows clearly that the elements that play a role in a startup ecosystem are numerous and the relationships among them are various.

The conceptual framework contains core elements that relate with each other. We can analyze the level of development of each core element, as well as the quality of the relationship between them to measure some degree of maturity in each aspect. For example, there is the funding bodies core element. The development level of the funding structure inside the ecosystem is a measurement of maturity. The presence of technical talent, provided by high quality educational institutions, or access to educational resources are other examples of factors to measure the ecosystem maturity. Thus, we propose, for each core element, a scale to evaluate its state. The scale contains three levels of development: **L1**, **L2**, and **L3**. We then propose a metric to classify ecosystems for each core element maturity, described in Table 1. This table was generated after a series of iterations with specialists and confirmation of what they considered the right measurement of **L1**, **L2** and **L3** in each aspect.

- **Exit strategies** - Entrepreneurs and investments are considered successful when one of these things happen: (a) profitable growth to global market, (b) acquisition by a big company, (c) merge with other company, or (d) IPO. Specially for investors, the existence of exit options in the local ecosystem is an attractive factor. While mature ecosystems present all three strategies, there is a lack of exit options in new ecosystems. Zero option is considered low, one option is medium and two or more options is high. Related framework elements: startup, funding bodies, established companies.
- **Global market** - Percentage of startups that targeted global market. A startup is considered to target the global market if it is acting in markets outside its country, with existing customers or at least an official representation office. Related framework element: market.
- **Military influence on technologies** Related framework element: research center.
- **Entrepreneurship in universities** - Percentage of alumni that founded a startup within 5 years of graduation. Related framework elements: universities and research centers, education.
- **Number of startups** - Quantity of Startups founded by year according to a trusted database. Related framework elements: startup, market, entrepreneur.

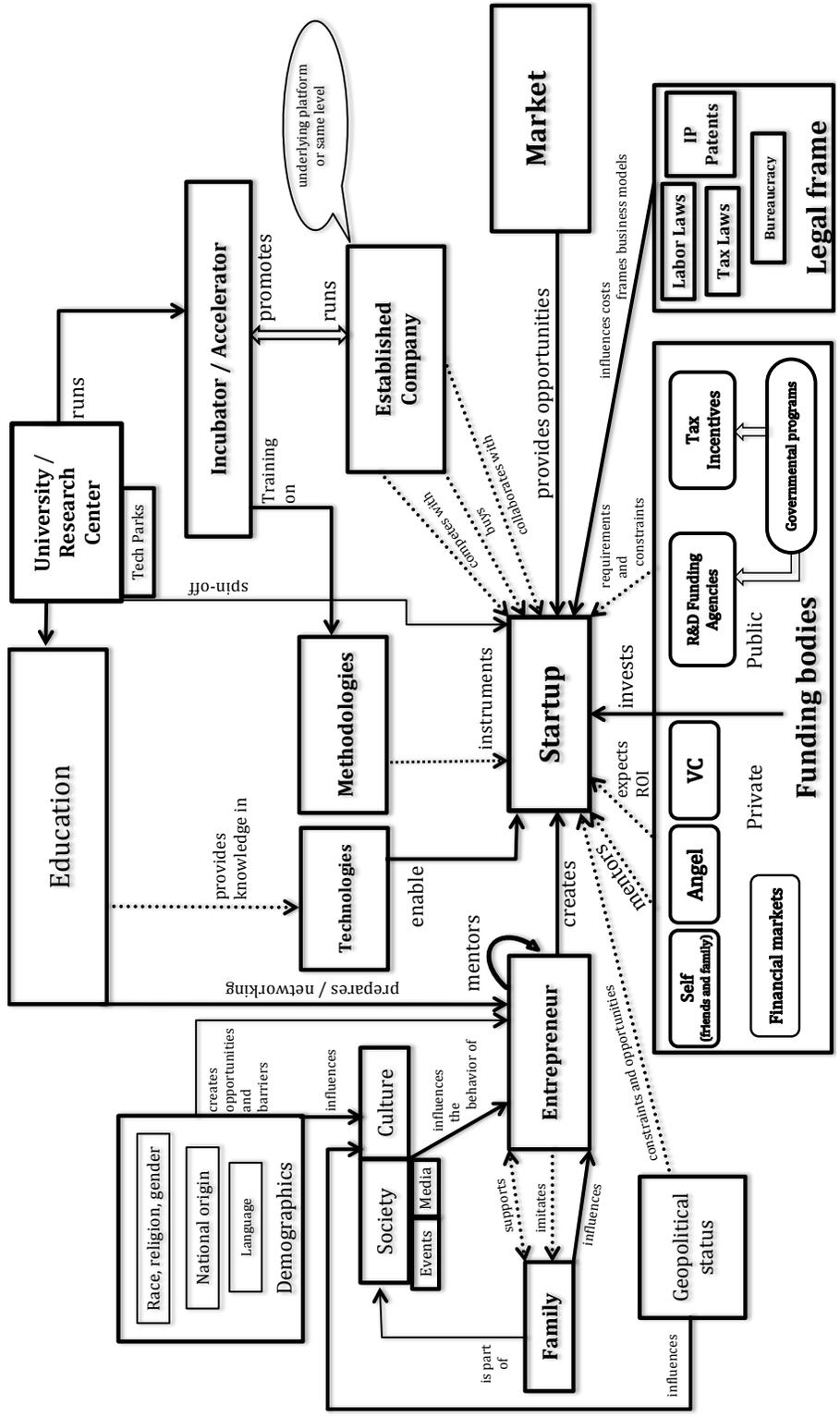


Fig. 1. Startup Ecosystem Conceptual Framework

Table 1. Ecosystem Maturity Factor Classification

Factor	L1	L2	L3
Exit strategies	0	1	≥ 2
Global market	$< 10\%$	10 – 50%	$> 50\%$
Military influence on technologies	$< 10\%$	10 – 50%	$\geq 50\%$
Entrepreneurship in universities	$< 2\%$	2 – 10%	$> 10\%$
Number of startups	$< 500k$	500 – 3k	$> 3k$
Access to funding in USD / year	200M	200M-1B	$> 1B$
Access to funding in # of deals / year	200	200-1000	1000
Mentoring quality	$< 10\%$	10-%50%	$> 50\%$
Bureaucracy	$> 40\%$	10 – 40%	$< 10\%$
Tax burden	$> 50\%$	30 – 50%	$< 30\%$
Incubators / tech parks	2	2 – 10	> 10
Accelerators quality	$< 10\%$	10 – 50% success	$> 50\%$ success
High-tech companies presence	< 10	10 – 50	> 50
Established companies influence	< 20	20 – 80	> 80
Human capital quality	$> 20th$	15 – 20th	$< 15th$
Culture values for entrepreneurship	< 0.5	0.5 – 0.75	> 0.75
Technology transfer processes	< 4.0	4.0 – 5.0	$> 5.0 ?$
Methodologies knowledge	$< 20\%$	20 – 60%	$> 60\%$
Specialized media players	< 3	3-5	> 5
Ecosystem data and research	not available	partially available	fully available
Ecosystem generations	0	1	2

- **Access to funding in US\$** - Total amount of investment in startups in US\$ according to a trusted database. Related framework element: funding bodies.
- **Access to funding in # of deals** - Deal count, independently from value or startup stage. Related framework element: funding bodies.
- **Mentoring quality** - the percentage of mentors that fit on of these criterion: (1) had a successful startup in the past, (2) founded and worked for more than 10 years in one or more startups. Related framework elements: entrepreneur.
- **Bureaucracy** - Based on inefficient government bureaucracy index of the global competitiveness report [33]. It represents the percentage of respondents that considered bureaucracy as a problematic factor for doing business. Related framework elements: legal frame.
- **Tax burden** - Based on the country total tax rate ranking of the global competitiveness report [33]. Related framework elements: legal frame, market.
- **Incubators / tech parks** - The number of incubators and tech parks active in the ecosystem. Related framework element: incubator / accelerator.
- **Accelerators quality** - Percentage of startups in accelerators that reach the stage of receiving a next level investment or reach the global market in a sustainable profitable stage. Related framework element: incubator / accelerator.

- **High-tech companies presence** - How many high tech companies have tech team located in the ecosystem region. Related framework elements: Established Companies.
- **Established companies influence** - How many big companies have activities in that nurture the ecosystem. Activities such as event organization, local community ambassador and mentor, acceleration program or local investment in startups. Related framework elements: events, established companies, startup, accelerator, entrepreneur.
- **Human capital quality** - Based on the ecosystem position in talent index of the global startup ecosystem report [17]. Related framework elements: entrepreneur, education.
- **Culture values for entrepreneurship** - Cultural support index in the global entrepreneurship and development index [2]. Related framework elements: culture, society, family.
- **Technology transfer processes** - Based on Innovation and sophistication factors of The Global Competitiveness Report 2013-2014, p. 22 [33]. Related framework elements: University / Research Center, Legal Frame.
- **Methodologies knowledge** - Percentage of Startups that have knowledge or are trained on methodologies³. Related framework elements: Methodologies.
- **Specialized media players** - Local media specialized in the Startup industry has an important role to spread the word about what is happening in the ecosystem. The existence of at least half a dozen of players is a sign of movement and engagement within the ecosystem. The specialized media must be recognized by the local community as a reference to be considered in this list. Related framework elements: media.
- **Ecosystem data and research** - The existence of database with data about the ecosystem is an indication of maturity. We cannot improve what we cannot measure, so ecosystems that do not have research institutions or managers. Related framework elements: research center, government.
- **Ecosystem generations** - How many generations of old entrepreneurs are re-investing their earnings in the ecosystem. “0” means no old entrepreneurs are investing in the ecosystem, “1” means a first generation of old entrepreneurs re-investment their earnings in the ecosystem, “2” means that entrepreneurs that received investment from generation 1 are investing their earnings in new startups, and so on. Related framework elements: entrepreneur, society.

4 Results

Some factors in the ecosystem comparison table are crucial to be considered when an ecosystem has reached a certain level of maturity. Not achieving a specific

³ This was a factor we found difficult to measure, since there is no data about methodology adoption in ecosystems. Another proposal for classifying this would be the amount of local conferences about Agile, Lean Startup or other methodologies.

grade in any of these factors keeps the ecosystem on a lower level of maturity. Thus, we divided the factors in two categories: **essential** and **summing**. The summing factors are important to “upgrade” the ecosystem to the next level.

Our proposal of maturity model is divided into four levels as described below:

- **Nascent (M1)**: usually when the ecosystem is already recognized as a startup hub, with some already existing startups, a few investment deals and maybe government initiatives to stimulate or accelerate the ecosystem development, but no great output in terms of jobs generation or worldwide penetration.
- **Evolving (M2)**: ecosystems with a few successful companies, some regional impact, job generation and small local economic impact. To be in this level, the ecosystem must have all essential factors classified at least at L2, and 30% of summing factors also on L2.
- **Mature (M3)**: ecosystems with hundreds of startups, where there is a considerable amount of investing deals, existing successful startups with worldwide impact, a first generation of successful entrepreneurs who started to help the ecosystem to grow and be self-sustainable. To be in this level, the ecosystem must have all essential factors classified at least at L2, 50% of summing factors also on L2, and at least 30% of all factors on L3.
- **Self-sustainable (M4)**: ecosystems with thousand of startups and financing deals, at least a 2nd generation of entrepreneur mentors, specially angel investors, a strong network of successful entrepreneurs compromised with the long term maintenance of the ecosystem, an inclusive environment with many startups events and presence of high quality technical talent (as proposed in the Boulder Thesis by Brad Feld [13]). To be in this level, the ecosystem must have all essential factors classified as L3, and 80% of summing factors also on L3.

After generating the classification table for each factor, we filled the table with data about the ecosystems we analyzed, also using the help of two specialists in each ecosystem. The resulting Table 2 shows data collected from both the Tel Aviv and São Paulo Ecosystems.

As a secondary metric, we can use the ecosystem progress within a certain level to understand how far it is from being upgraded to the next level. For example, Tel Aviv has all essential factors in L3 and 54% of the summing factors in L3, which suggests the ecosystem is almost reaching the M4 maturity level. On the other hand, São Paulo has no essential or summing factor on L3, suggesting that the ecosystem just entered the M2 level and needs more effort to reach the next level.

5 Conclusions and Future Work

This paper proposes a novel maturity model for software startup ecosystems based on an extensive literature study as well as a multiple case study of two existing ecosystems. A conceptual framework of software startup ecosystems was

Table 2. Startup Ecosystem Comparison Table

Factor	Tel Aviv	São Paulo
* Exit strategies	L3	L2
* Global market	L3	L2
Military influence	L3	L1
Entrepreneurship in universities	L2	L1
* Number of startups	L3	L2
* Access to funding	L3	L2
Mentoring quality	L3	L1
Bureaucracy	L2	L1
Tax burden	L2	L1
Incubators / tech parks	L3	L1
Accelerators quality	L3	L1
* High-tech companies presence	L3	L2
Established companies influence	L3	L2
* Human capital quality	L3	L2
* Culture values for entrepreneurship	L3	L2
Technology transfer processes	L3	L1
Methodologies knowledge	L2	L2
Specialized media	L2	L2
* Ecosystem data and researches	L3	L2
* Ecosystem generations	L3	L2
* Essential Factors	L3 (9)	L2 (9)
Summing Factors	L2 (5), L3 (6)	L1 (8), L2 (3)
Maturity Level	Mature (M3)	Evolving (M2)

created from these studies and the maturity model was validated with specialists from these ecosystems. The findings show that Tel Aviv is considered a **Mature (M3)** ecosystem, while São Paulo is **Evolving (M2)**.

The maturity model can be used to identify gaps in each ecosystem, showing a direction on which the local community should concentrate, promoting initiatives to take the ecosystem to the next level.

A missing element in the current version of the maturity model is the measurement of interconnectivity between agents within the ecosystem. Literature shows that this is a very important aspect [30] to analyze the ecosystem maturity and, thus, should be included in the evaluation criteria. Future work should investigate how to measure the quality of the entrepreneurship network and how to fit it into the whole maturity model.

As a next step in this research, we will carry out a new round of interviews in the New York ecosystem, classifying it according to the maturity model. These new findings will then be used to further adapt the model towards a refined version. We will then invite specialists from different ecosystems around the world to perform the exercise of classifying their ecosystem using this model, criticizing the criterion we proposed and helping to improve it collaboratively.

References

1. Abrahamsson, P.: Agile Software Development Methods: Review and Analysis. VTT publications (2002)
2. Acs, Z.J., Szerb, L., Autio, E.: The global entrepreneurship and development index. Springer (2015)
3. Aulet, B.: Disciplined entrepreneurship: 24 steps to a successful startup. John Wiley & Sons (2013)
4. Bell-Masterson, J., Stangler, D.: Measuring an entrepreneurial ecosystem. Available at SSRN 2580336 (2015)
5. Berbegal-Mirabent, J., Sabaté, F., Cañabate, A.: Brokering knowledge from universities to the marketplace: The role of knowledge transfer offices. *Management Decision* 50(7), 1285–1307 (2012)
6. Björklund, T., Krueger, N.: Generating resources through co-evolution of entrepreneurs and ecosystems. *Journal of Enterprising Communities* 9 (2015)
7. Blank, S.: The four steps to the epiphany. K&S Ranch (2013)
8. Brannback, M., Carsrud, A., Krueger, N., Elfving, J.: Challenging the triple helix model of regional innovation systems: a venture-centric model. *International Journal of Technoentrepreneurship* 1(3), 257–277 (2008)
9. Breznitz, D., Taylor, M.: The communal roots of entrepreneurial–technological growth – social fragmentation and stagnation: reflection on Atlanta’s technology cluster. *Entrepreneurship & Regional Development* 26(3-4), 375–396 (2014)
10. Corbin, J., Strauss, A.: Basics of qualitative research: techniques and procedures for developing grounded theory (2007)
11. Cukier, D., Kon, F., Maital, S., Fenkel, M.: Innovation and Entrepreneurship in the São Paulo Metropolis - The role of its major university. Submitted to the *International Journal of Entrepreneurship and Small Business* (2015)
12. Endeavor Brasil: Entrepreneurial City Index - Brazil 2014. Tech. rep., Endeavor Brasil (2015)
13. Feld, B.: Startup communities: Building an entrepreneurial ecosystem in your city. John Wiley & Sons (2012)
14. Foster, G., Shimizu, C., Ciesinski, S., Davila, A., Hassan, S., Jia, N., Morris, R.: Entrepreneurial ecosystems around the globe and company growth dynamics. In: *World Economic Forum*. vol. 11 (2013)
15. Frenkel, A., Maital, S.: Mapping National Innovation Ecosystems: Foundations for Policy Consensus. Edward Elgar Publishing, London, UK (2014)
16. Giardino, C., Bajwa, S.S., Wang, X., Abrahamsson, P.: Key challenges in early-stage software startups. In: *Agile Processes, in Software Engineering, and Extreme Programming*, pp. 52–63. Springer (2015)
17. Herrmann, B.L., Gauthier, J.F., Holtschke, D., Berman, R., Marmer, M.: The Global Startup Ecosystem Ranking 2015. Tech. rep., Compass (2015)
18. Herrmann, B.L., Marmer, M., Dogrultan, E., Holtschke, D.: Startup Ecosystem Report 2012. Tech. rep., Telefónica Digital (2012), <http://bit.ly/teleco2014>
19. Hofstede, G., Hofstede, G.J., Minkov, M.: Cultures and organizations: Software of the mind. McGraw-Hill London (1991)
20. Iansiti, M., Levien, R.: Strategy as Ecology. *Harvard Business Review* 82 (2004)
21. Isenberg, D.: The entrepreneurship ecosystem strategy as a new paradigm for economic policy: Principles for cultivating entrepreneurship. Presentation at the Institute of International and European Affairs (2011)

22. Isenberg, D.J.: How to start an entrepreneurial revolution. *Harvard Business Review* 88(6), 40–50 (2010)
23. Kon, F., Cukier, D., Melo, C., Hazzan, O., Yuklea, H.: A panorama of the israeli software startup ecosystem. Tech. rep., University of São Paulo (2014), <http://bit.ly/israeli-startup-ecosystem>
24. Kon, F., Cukier, D., Melo, C., Hazzan, O., Yuklea, H.: A Conceptual Framework for Software Startup Ecosystems: the case of Israel. Tech. Rep. June, University of São Paulo, São Paulo (2015), <http://bit.ly/iframework>
25. Krueger, N., Liñán, F., Nabi, G.: Cultural values and entrepreneurship. *Entrepreneurship & Regional Development* 25(9-10), 703–707 (Dec 2013), <http://bit.ly/norriscult>
26. Lemos, P.: As universidades de pesquisa e a gestão estratégica do empreendedorismo: uma proposta de metodologia de análise de ecossistemas. Ph.D. thesis, UNICAMP (2011), <http://bit.ly/lemosphd>
27. Lemos, P.: *Universidades e Ecossistemas de Empreendedorismo*. Editora Unicamp (2012)
28. Mason, C., Brown, R.: *Entrepreneurial ecosystems and growth oriented entrepreneurship*. Final Report to OECD, Paris (2014)
29. Miles, A., Huberman, M.B.: *Qualitative Data Analysis: An Expanded Sourcebook*. SAGE (1994)
30. Motoyama, Y., Watkins, K.K.: *Examining the connections within the startup ecosystem: A case study of st. louis*. Louis (September 1, 2014). Kauffman Foundation Research Series on City, Metro, and Regional Entrepreneurship (2014)
31. Reynolds, P., Hay, M., Bygrave, W.D., Camp, S.M., Autio, E.: *Global entrepreneurship monitor*. Executive Report (2000)
32. Ries, E.: *The lean startup: How today’s entrepreneurs use continuous innovation to create radically successful businesses*. Random House LLC (2011)
33. Schwab, K.: *The Global Competitiveness Report 2013–2014: Full Data Edition*. Tech. rep., World Economic Forum (2013), <http://bit.ly/GCR-eforum>
34. Singer, S., Amoros, E., Moska, D.: *Global entrepreneurship monitor 2014 global report* (2015)
35. Stam, E.: Entrepreneurial ecosystems and regional policy: A sympathetic critique. *European Planning Studies* 23(9), 1759–1769 (2015)
36. Stephenson, K.: *The Community Network Solution*. Booz Allen Hamilton Inc. (2008)
37. Yin, R.K.: *Case study research: Design and methods*. SAGE Publications, Inc, 4th edn. (2013)