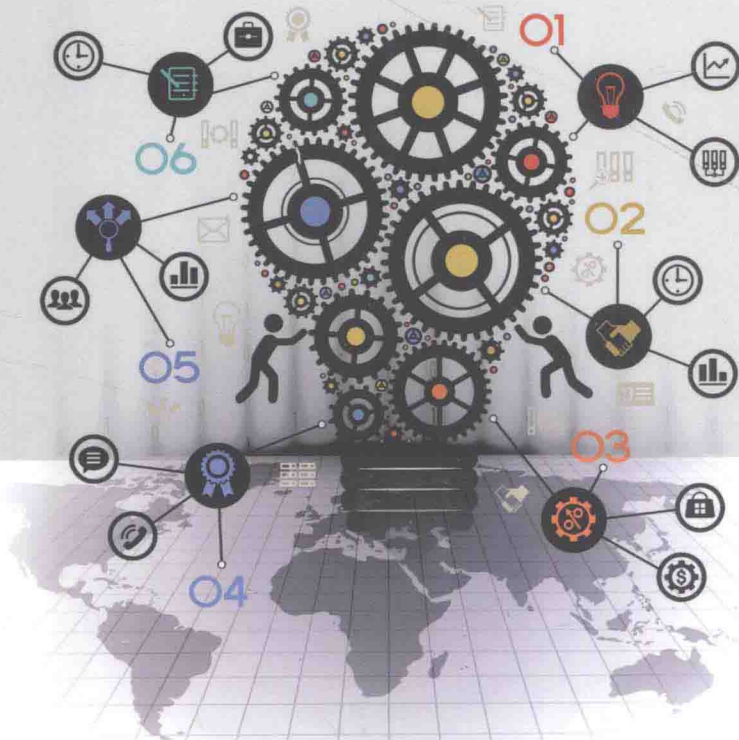


Theory • Practice • Lessons Learned

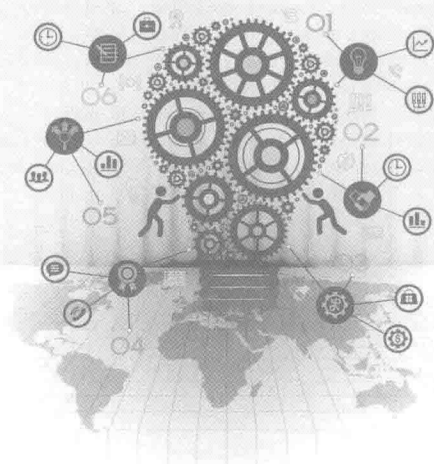


Phillip H Phan • Sarfraz A Mian • Wadid Lamine

Imperial College Press

TECHNOLOGY ENTREPRENEURSHIP AND BUSINESS INCUBATION

Theory • Practice • Lessons Learned



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TECHNOLOGY ENTREPRENEURSHIP AND BUSINESS INCUBATION

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Redux: What do We Know about Business Incubation Today?

Phillip Phan, Sarfraz Mian and Wadid Lamine

Introduction

According to Google Trends, interest in business incubators¹ peaked in the mid-2000s in North America.² Today, more scholarly and policy interest in business incubators tend to be found in emerging economies such as China, India and Russia or small countries with an interest in technology-based economic development such as Singapore, Israel, Scandinavia, Kenya and South Africa. This is partly due to the accumulation of evidence on their generally positive effects of promoting technology entrepreneurship and economic development (c.f., Audretsch *et al.*, 2015).

While there has been a marked increase in the number of scholarly papers on business incubators in general, there has yet to be an organized volume narrowly focused on their impact on technology entrepreneurship.

¹ Although the scholarly literature makes a distinction between various types of incubators, Chapter 1 indeed goes through a long list of forms and definitions, because their purpose is similar, we use the term ‘incubator’ to refer to all property-based startup sponsoring organizations.

² https://www.google.com.sg/trends/explore?q=%2Fm%2F0581_y [Accessed January 16, 2016].

This book represents a first attempt. It reports on selected research from around the world, each focusing on an aspect of business incubation most salient to that part of the world. There are already a number of competent reviews of the scholarly research on incubators from North America and Continental Europe (see, for example, Hackett and Dilts, 2004). Less prominent is the research on incubators from emerging economics such as China, Russia and Brazil or developing economies such as Tunisia and South Africa. Most chapters begin with a definition of the incubators they investigate and take the reader through a short history of their development within the geographic region of interest. Another reason we present business incubation research in this way is to provide the reader a geographically broad view of the field. We note that while incubation is a universal concept, the way it has expressed itself, as these chapters illustrate, differs around the world. We hope that the reader would consider the theoretical and empirical opportunities for advancing this research by seeking out collaborations from these and other scholars around the world.

Research on business incubation has covered topics such as descriptions of different types of business incubators, discussions of the various service models and their implications for value creation, the impact of business incubation on business survival, regional economic development and employment and the policy determinants and implication for the growth of incubators. One of the earliest attempts at articulating the incubator concept is by Smilor and Gill (1986) in which they argued business incubators provided the type of support that startups are not able to obtain on their own from the marketplace, either because they are resource poor, conceptually vague or bereft of the right connections to needed resource pools. The implication of their book is that business incubation is a policy response to market failure and the 'linking' function is the result of policy interventions by governments, corporations, universities, non-governmental organizations or research institutes. Indeed, much of the research following Smilor and Gill (1986) have focused on describing the attempts by various actors to foster entrepreneurial activity using property-based organizations (incubators, science parks, accelerators, and so on). In this research, scholars have focus on the policy rationale for intervention (e.g. La Rovere *et al.*, 2015) or characterize incubators as outcomes of institutional (such as universities and corporations) strategies to create economic wealth (Mian, 1996; Foss and Gibson, 2015).

Other collections of the research have characterized incubators as mechanisms to foster inter-firm collaboration and the exchange of ideas and technology (Mitra and Edmondson, 2015). Yet, others have looked at the connection between regional development and the development of human capital, with incubators as the enabling organizational entity, among others (Baptista and Leitão, 2015).

The above being said, because various business incubation models have rapidly evolved in form over the past more than 30 years, it has been challenging to study the phenomenon from a theoretical and empirical perspective. For example, the early business incubators were conceived as sponsoring organizations that provided low cost space to newly formed technology businesses. The later provision of discounted business services such as accounting, legal advice and business incorporation and business planning was added to render this combination of space and services the basis of the classic incubator model. As the pace of new business creation accelerated with the advent of the *connected era*, incubators that proved they could shorten the time between discoveries and commercialization became more attractive to funders and entrepreneurs.

Hence, a generation of incubators in the biomedical sciences emerged that combined wet laboratory facilities, the most costly type of space and typical incubator services. Wet lab incubators brought the concept of ‘cheap rent’, which had fallen off as the reason for incubation success, back a full circle because scientist-entrepreneurs could not conduct the needed translational research in university-based labs, usually due to conflict-of-interest, and did not have the financial means to set up private ones. Incubators became magnets for angel investors and venture capitalists looking for ‘ground floor’ opportunities in such technology domains as biotechnology, materials and information/communications. Today, the original incubator model exists within a constellation of other property-based sponsorship organizations such as science parks, accelerators and ‘maker spaces’. Indeed, Google Trends reports that while interest in incubators has abated in Internet searches, interest in Y-Combinator, the prototypical accelerator and its analogs has exploded around the world.³

³<https://www.google.com.sg/trends/explore#q=Y%20Combinator> [Accessed January 16, 2016].

Overview of the contributions

To begin, Chapter 1 provides definitions, a brief history and a review of the research in business incubation. It describes the typical incubation process, with a focus on the interventions typically encountered in such organizations. The point being made is that incubation in its evolved form is a deliberate, non-market based activity designed to move a nascent enterprise through its natural stages of growth at an accelerated rate, and to protect it from market forces that threaten early survival. To do so requires planning and resources, since growth is naturally constrained by the available resources. Because of being cloistered, startups are also protected from the competitive forces that can prematurely kill them. Whether such protection is efficient in the end or leads to 'zombie' startups has been a matter of debate since the concept was introduced to the literature. That debate continues today, even though in practice incubators have implemented various mechanisms such as term limits, performance targets and stage-gates to mitigate the risks of over-investment in poor ideas.

Chapter 2 turns its attention to business accelerators, a more recent form of incubator. Specifically, they examine the empirical evidence from 13 business accelerators based in London, Berlin and Paris. Accelerators have taken on an importance, in part fueled by the Internet, not seen in earlier discussions of incubators. While accelerators are still an emerging organizational form, and therefore too young to study for their long-term performance, through a comparative case analysis, the authors were able to suggest a number of factors that could improve the odds of success. These are the selection process and criteria for inclusion, comprehensiveness of business support services and presence of networking opportunities for the startup firms. The chapter employs institutional theory to view the data, representing a minority of studies to use theory and worthy of emulation. They suggest that accelerators are more likely to survive if they can legitimate themselves in the eyes of stakeholders. This is because accelerators are an unfamiliar organizational form and hence not accorded the institutional support that familiar forms can take for granted.

Chapter 3 continues the theme with an inductive study of accelerators based in the United Kingdom. They define accelerators as an umbrella term for any program providing structured mentoring, networking

opportunities and access to funding. The chapter addresses two related questions, which are how accelerators make a difference in the performance of their tenant firms, and whether they act strategically to position themselves in the marketplace for incubation. Similar to the approach taken by other chapters, the authors begin with a typology of accelerator archetypes, in their case, ecosystem builders, investors and matchmakers. Ecosystem builders are public entities focused on creating business ecosystems that are friendly to startups to attenuate early-stage failures. Matchmakers, on the other hand, are accelerators that help tenant firms find their first customers and are focused on the activities and support structures devote to that aim. The different accelerator models address a wide range of startup types and provide useful indications on how and where to position themselves in the ecosystem.

Chapter 4 employs an ecological perspective to investigate the survival odds of incubator tenant firms in China. They take as given that incubators operate in a market for tenant firms and are therefore connected by resource networks. As a result, they simultaneously collaborate and compete with each other. This mutualism–competition dynamic directly affects tenant firms' performance, so that the task of the incubator manager is to manage this dynamic rather than ignore or suppress it. They look at how this is done in terms of two contextual constraints: government ownership and portfolio specialization. They find that these constraints attenuate the effects of mutualism and competition on tenant firm performance.

Chapter 5 offers a historical view of incubation (or innovation habitats) in Brazil, beginning with early government initiatives to instigate knowledge transfer and exploitation as the means of economic and social development to the present day. The author highlights the importance of academic institutions, a theme that is played out in similar attempts around the world, as creators of knowledge, and sources of energy, imagination and risk taking among young people. The chapter reports on the material and intangible results and discusses the challenges and future prospects.

Chapter 6 reports on the effectiveness of technology incubation mechanisms in Russia. Similar to Chapter 5, it provides an overview of incubator development over two decades. This period coincides with the post-Soviet development of Russia into a market-driven economy. The social changes brought on by the economic shift created the need to

unleash entrepreneurial activity as a means to mitigate the job losses brought on by transformations in State-owned enterprises, especially in the oil and gas sector. Their study takes a value-added approach (Mian, 1996) to assess incubator services to the 83 companies they studied in the Nizhniy Novgorod region of Russia. As expected, in regions fostering incubation capabilities in developing environments, the results suggest that main attraction for startups when choosing incubators is the latter's ability to facilitate access to governmental funding.

Chapter 7 reports on a sample of tenant firms from various incubators in Tunisia, and shows that successful startups are associated with entrepreneurs with the educational background and experience in starting companies. As such, those incubators that can extend this learning process for the entrepreneur, by hosting serial startups, are more likely to be associated with successful tenant firms. This chapter represents an interesting take on the role of the incubator, which is that by keeping startups alive longer, they also extend the learning cycle of the founding entrepreneurs, which improves the chances of future successful starts.

Chapter 8 reports on the selection processes used by 24 publicly funded business incubators from South Africa, where incubation is a relatively new phenomenon. Hence, the authors' investigative approach is exploratory and utilizes semi-structured interviews to capture the ongoing dialog between incubator managers and their tenant firms. They find that, beyond standard demographic factors, incubators selected their tenant firms in an interactive, yet, relatively structured manner. This is consonant with a portfolio view of incubation, in which the composition of the tenants firms is as important as the individual competencies or assessment of the probability of success of individual tenants. Composition matters because tenant firms learn from each other and the mature incubator is adept at exploiting this mechanism to accelerate knowledge transfer.

Chapter 9, which is an updated reprint from an earlier paper published in the *Journal of Business Venturing*, looks at the problems with the extant literature on science parks and incubators in terms of three levels of analysis: the science parks and incubators themselves, the tenant firms and tenant entrepreneurs and their teams. It concludes, after reviewing the key literature, that there is no systematic framework to understand these organizations. While there has been a few attempts at such frameworks in

the decade since the publication of the paper, the authors' general conclusion remains true today. They argue that the lack of clarity regarding the performance of incubators is associated with problems in defining performance, and by implication, has led to the lack of theoretical rigor in much of the research till and since then.

Conclusion

In summary, the chapters in this volume offer the scholar a retrospective of incubators and the related research, the latest research from regions that are new to the study of this phenomenon and prospective views of the theories and frameworks applicable to future research. Research has also shown that incubation and related forms of sponsoring property-based organizations *can* work to lower the odds of failure among technology startups (Hackett and Dilts, 2004). For example, based on a survey of 19,000 incubated businesses in the US, Amezcua *et al.* (2013) found that successful incubated businesses were those whose resource gaps matched the competencies provided by the sponsoring organization. Hence, from the entrepreneurs' standpoint, incubators offer an opportunity to mitigate the risks of failure through learning-by-doing and vicarious transfer of knowledge from experienced mentors and resource providers.

As the reader will discover, the public policy discussion emerges repeatedly throughout this book, suggesting that incubation has become a popular method to support economic development. From this standpoint, the general evidence suggests reasons for optimism. This is because incubation represents a relatively low cost tool (compared to 1950s-style industrial policy or the five-year plans of centrally planned economies) to experiment with economic development initiatives that do not require long time horizons to realize.

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Chapter 1

Business Incubation and Incubator Mechanisms¹

Sarfraz Mian

Introduction

The Oxford dictionary defines incubation as ‘the process or an instance of incubating something in a controlled environment’ (OED, 1993). The embryonic developments of an animal within an egg, and exposure to an infection or disease with the appearance of the first symptoms are often quoted as examples of the incubation phenomenon. In its business use, incubation is considered as a unique and flexible mix of organized enterprise development processes that enable fledgling new and small businesses by providing critical support to survive and grow in their early stages of development. Therefore, incubation mechanisms also known as incubators are designed to serve as launching pads for young and small business startups, which need access to support services; they serve as business development tools for providing a nurturing milieu. The National Business Incubation Association, the world’s largest professional association representing the field in the US provides the following definition: “Business incubation is a business support process that accelerates the successful development of startup and fledgling companies by providing entrepreneurs with an array

¹ Updated reprint from the *Handbook of Research on Entrepreneurship*, Alain, F. (Ed.), (2014), pp. 335–366, with permission from Edward Elgar Publishing, Cheltenham, UK.

of targeted resources and services. These services are usually developed or orchestrated by incubator management and offered both in the business incubator and through its network of contacts. A business incubator's main goal is to produce successful firms that will leave the program financially viable and freestanding. These incubator graduates have the potential to create jobs, revitalize neighborhoods, commercialize new technologies and strengthen local and national economies" (NBIA, 2012).

According to the UK Business Incubation association, "Business Incubation provides SMEs and startups with the nurturing environment needed to develop and grow their businesses, offering everything from virtual support, rent-a-desk through to state of the art laboratories and everything in between. They provide direct access to hands on intensive business support, access to finance and experts and to other entrepreneurs and suppliers to really make businesses and entrepreneurs to grow. Business incubation provides a nurturing, instructive and supportive environment for entrepreneurs during the critical stages of starting up a new business. The goal of incubators is to increase the chance that a startup will succeed, and shorten the time and reduce the cost of establishing and growing its business. If successful, business incubators can help to nurture the companies that will form the true creators of a region's or a nation's future wealth and employment" (UKBI, 2012).

Other major business incubation-related professional associations such as the European Business and Innovation Centre Network (EBN), International Association of Science Parks (IASP), German Association of Innovation, Technology and Business Incubation (ATD) and France Technopolis Enterprises Innovation (RETIS), each define the incubation function with slight variation and even use different terminologies for some of the mechanisms employed. For example, in Germany, the innovation center mechanism is more prevalent; this in terms of functionality is equivalent to a technology incubator in the US/UK terminology. In France, the incubator support is generally limited to the business idea development, testing and resources planning stages and ceases prior to the legal set up of the business that is generally carried out in a pépinières or hatchery.

To understand the relationship of each of these mechanisms to the business incubation support process, it is important to envision the steps involved in the startup cycle of a business, which can be directly related to the types of interventions that incubator mechanisms provide (Table 1).

Table 1. Phases of the Incubation Process and Incubator Mechanisms

PHASE 1: Pre-incubation/Idea development	PHASE 2: Incubation and acceleration	PHASE 3: Post-incubation consolidation and growth
This earlier stage of intervention is intended to help aspiring/potential entrepreneurs in germinating/refining their business ideas. Recommended for risky S&T based startups, it is often provided by university incubators/innovation centers. The overriding objective is technology commercialization, rather than market opportunity and seeks public funds.	This support stage kicks in when the business plan is being implemented, with a team, and operations have begun. Incubators can help refine the plan, build the team, provide resources and even invest in the company. The company is yet to become profitable and pays for assistance/services. Also known as 'acceleration' in which cases targeted assistance is provided. They often require subsidizing.	This stage provides incubator graduates and R&D units of larger firms to interact and help new technology-based firms consolidate and grow in a customized and often knowledge laden host environment. Science parks and some larger incubators also act as hosts to mature anchor tenants which can be a crucial strategy to help provide know-how as well as financial sustainability by assisting with and subsidizing their other programs.
<i>Development/Mixed use incubator</i>		
<i>Innovation center/Technology incubator</i>	<i>Science park/Research park</i>	<i>Technopolis</i>
<i>French research/Academic incubator</i>	<i>Pépinières and hatcheries</i>	
	<i>Virtual incubator/Accelerator</i>	

Source Adapted from EU (2002).