Renata Lèbre La Rovere
Luiz de Magalhães Ozório
Leonardo de Jesus Melo *Editors*

Entrepreneurship in BRICS

Policy and Research to Support Entrepreneurs

Springer

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Editors
Renata Lèbre La Rovere
Institute of Economics
Federal University of Rio de Janeiro
Rio de Janeiro
Brazil

Luiz de Magalhães Ozório
Management Department
Ibmec-RJ
Rio de Janeiro
Brazil

Leonardo de Jesus Melo
Technology Park
Federal University of Rio de Janeiro
Rio de Janeiro
Brazil

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Contributors

Aruna Adarsh JSS Centre for Management Studies, Sri Jayachamarajendra College of Engineering, JSS Technical Institution Campus, Mysore, India

Carlos Arruda Innovation and Entrepreneurship Research Center, Fundação Dom Cabral, Nova Lima, MG, Brazil

Nalina K.B. JSS Centre for Management Studies, Sri Jayachamarajendra College of Engineering, JSS Technical Institution Campus, Mysore, India

Daniel Silveira Barreto Management Department, Ibmec-RJ, Rio de Janeiro, Brazil

Roberto Bartholo LTDS- Laboratory of Technology and Social Development/ COPPE, Universidade Federal do Rio de Janeiro, Rio de Janeiro, Brazil

Corrado Cerruti Department of Studies on Business Government Philosophy, Faculty of Economics, University of Rome 'Tor Vergata', Rome, Italy

Stefano Colombo Department of Sociology, Milano-Bicocca University, Milan, Italy

Fabio Corno Department of Sociology, Milano-Bicocca University, Milan, Italy

Vinícius Costa Innovation and Entrepreneurship Research Center, Fundação Dom Cabral, Nova Lima, MG, Brazil

Afonso Cozzi Innovation and Entrepreneurship Research Center, Fundação Dom Cabral, Nova Lima, MG, Brazil

José Manoel Carvalho de Mello Production Engineering Department, Universidade Federal Fluminense (UFF), Niterói, Brazil

Tainá Albuquerque Bravo de Souza Institute of Economics, Universidade Federal do Rio de Janeiro, Rio de Janeiro, Brazil

Claudio D'Ipolitto FGV Management Department, Fundação Getúlio Vargas, Rio de Janeiro, Brazil

Lia Hasenclever Institute of Economics, Universidade Federal do Rio de Janeiro, Rio de Janeiro, Brazil

Richard Heeks Centre for Development Informatics, University of Manchester, Manchester, UK

Savitha G. Lakkol JSS Centre for Management Studies, Sri Jayachamarajendra College of Engineering, JSS Technical Institution Campus, Mysore, India

Richa Lal Department of Sociology, Milano-Bicocca University, Milan, Italy

Renata Lèbre La Rovere Institute of Economics, Universidade Federal do Rio de Janeiro (UFRJ), Rio de Janeiro, Brazil

Mathew J. Manimala Organization Behaviour and Human Resource Management, Indian Institute of Management Bangalore, Bangalore, India

Leonardo de Jesus Melo Institute of Economics, Universidade Federal do Rio de Janeiro (UFRJ), Rio de Janeiro, Brazil

Heitor Soares Mendes CEFET/RJ and Institute of Economics, Universidade Federal do Rio de Janeiro, Rio de Janeiro, Brazil

Brian Nicholson Centre for Development Informatics, Manchester Business School, University of Manchester, Manchester, UK

Vanessa Silva Nogueira Innovation and Entrepreneurship Research Center, Fundação Dom Cabral, Brazil, Nova Lima, MG, Brazil

Luiz de Magalhães Ozório Management Department, Ibmec-RJ, Rio de Janeiro, Brazil

Isabella Nunes Pereira LTDS- Laboratory of Technology and Social Development/COPPE, Universidade Federal do Rio de Janeiro, Rio de Janeiro, Brazil

Elena Pereverzeva Business School, Moscow International High Business School MIRBIS, Moscow, Russia

Manas Puri Department of Studies on Business Government Philosophy, Faculty of Economics, University of Rome 'Tor Vergata', Rome, Italy

Gerardo Quinones Centre for Development Informatics, Manchester Business School, University of Manchester, Manchester, UK

Thiago Renault Management Department, Universidade Federal Rural do Rio de Janeiro (UFRRJ), Seropédica, Brazil

Ernesto Tavoletti Department of Political Sciences, Communication and International Relations, Faculty of Political Sciences, University of Macerata, Macerata, Italy

P. K. Thomas Organization Behaviour and Human Resource Management, Indian Institute of Management, Bangalore, India

Princy Thomas Organization Behaviour and Human Resource Management, Indian Institute of Management, Bangalore, India

Pedro Vilarinhos Institute of Economics, Universidade Federal do Rio de Janeiro, Rio de Janeiro, Brazil

Yang Yang Graduate School of Arts and Sciences, Columbia University, Graduate School of Arts and Sciences, New York, NY, USA

Youzhen Zhao School of Management, Fudan University, Shanghai, China

Introduction: Entrepreneurship as a Learning Process and Insights from the BRICS

Renata Lèbre La Rovere, Leonardo de Jesus Melo, Luiz de Magalhães Ozório, and Claudio D'Ipolitto

Abstract Capitalism in the twenty-first century is passing through changes that enhance the importance of entrepreneurship and learning processes. This chapter explains how this book was organized as a result of recent discussions on entrepreneurship and learning made by a group of researchers that study Brazil, Russia, India and China. The organizers hope that this book will contribute to increase understanding of entrepreneurial activities in the BRICS and provide lessons for other emerging countries.

Keywords Entrepreneurship • Public policy • Learning • BRICs

Capitalism in the twenty-first century presents some features that are growing more evident as time goes by. The ability of national States to control and develop their territories is being challenged by globalisation and the diffusion of new technologies that allow for a fast circulation of goods, services and ideas. To survive in the present time firms must be flexible and innovative, therefore entrepreneurship has become essential. Also, national States must find new ways of supporting firms, as traditional ways such as giving credit may be necessary but not sufficient conditions to foster innovation and development. One common trait is the essential role of learning in the entrepreneurial ecosystem, whether as a success catalyst or otherwise as a neglected element.

Another trait of the twenty-first century is that the global scenario is more complex than the traditional division between developed and developing countries suggests. Some countries are developing faster than others and incorporating

R.L. La Rovere (✉) • L.d.J. Melo
Institute of Economics, Universidade Federal do Rio de Janeiro (UFRJ), Rio de Janeiro, Brazil
e-mail: renataieufrj@gmail.com; leojmelo@gmail.com

L.d.M. Ozório
Management Department, Ibmec-RJ, Rio de Janeiro, Brazil
e-mail: lmozorio@ibmecrj.br

C. D'Ipolitto
FGV Management, Fundação Getúlio Vargas, Rio de Janeiro, Brazil
e-mail: claudiodipolitto@gmail.com

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millions of people in their middle-class. Among this group of emergent countries, the BRIC group (Brazil, Russia, India and China) has been attracting attention since the beginning of the century, and their Governments decided to form a political group (together with South Africa) whose most recent initiative is the creation of a development bank that can serve as an alternative to the international financial institutions in many focuses, such as to support projects and initiatives that promote investments in technological innovation, with an emphasis on infrastructure and sustainable energy and innovation of processes and products in various fields of industry, services and agribusiness.

With this background in mind, a group of researchers created in 2011 the International Consortium for Innovation and Entrepreneurship Research (ICIER). ICIER was formed by the following institutions: Department of Sociology, Milano-Bicocca University, Italy; Institute of Management Bangalore, India; Institute of Economics, Federal University of Rio de Janeiro, Brazil; Moscow International Business Institute, Russia; and Fudan University, China.

The Consortium aims to study the state of the art in entrepreneurship and to analyse how entrepreneurial activities develop in BRIC countries and Italy, identifying similarities and differences useful for entrepreneurial strategies and public policies. Italy was chosen to be compared with BRIC countries because it has a long tradition in supporting innovative small and medium-sized enterprises (SMEs).

Since its creation, ICIER organized three conferences. The first was in Bangalore, India, with the theme "Entrepreneurship and New Venture Creation", in December 2011. The second conference was organized by MIRBIS in Moscow, with the theme "Entrepreneurship in Transitional Times", in November 2012. The third conference was organized by the Institute of Economics of the Federal University of Rio de Janeiro, in partnership with IBMEC, with the theme "Policies of Support to Entrepreneurship", in November 2013. The next conference will be at Bangalore, India with the theme "Entrepreneurship Education and Training: Design, Delivery and Effectiveness", in January 2015.

This book presents the best papers that were presented in the third ICIER conference. The first part of the book discusses the main elements of entrepreneurial ecosystems in the BRIC countries and Italy. It starts with three chapters on Brazil. The first presents the results of a survey in Brazil that mapped the perception of different actors on the main institutional factors that condition start-up entrepreneurship. The second describes the credit policies for innovation in this country, focusing on the most recent financing mechanisms devised to promote innovation and entrepreneurial activity. The third chapter is based on a survey among Brazilian entrepreneurs and non-entrepreneurs and discusses the main elements that form the entrepreneurial ecosystem. This chapter and chapters "Key elements of the entre preneurial ecosystem facilitating the growth of ICT entrepreneurs in Russia", "Entrepreneurship and new venture creation in China: focusing on ICT sectors", "Perception of entrepreneurial ecosystem in India: influence of industrial versus personal context of entrepreneurship" and "Entrepreneurship and new venture creation in Italy: key issues and policy" were conducted by ICIER researchers. The fourth chapter discusses how the Russian entrepreneurial ecosystem conditions

the activities of an especially dynamic group of entrepreneurs: the ICT entrepreneurs. The fifth chapter is focused on this same group of entrepreneurs located in China. The sixth chapter discusses the main elements of entrepreneurship in India. Concluding this part, the seventh chapter discusses the main issues and policies for entrepreneurship in Italy.

The chapters of the first part point to the relevance of institutional conditions for the entrepreneurial ecosystem. Thus the second part of the book starts with chapter "Business model innovation in emerging economies: leveraging institutional voids" that discusses how institutional voids can be turned on opportunities for entrepreneurs, especially for those at the bottom of the pyramid (low income entrepreneurs) in India. Chapter "Entrepreneurship in Rocinha: a non goal-driven activity" analyses the rationality of low-income entrepreneurs based on a case study of a poor community in Brazil.

In addition to social entrepreneurship, in emerging countries we can observe a growing activity of start-ups whose conditions depend on how the innovation environments perform. Therefore the third part of the book deals with the issue of entrepreneurial learning and the formation of innovation environments. It starts with chapter "A literature review of e-entrepreneurship in emerging economies" that presents a literature review on e-entrepreneurship, a type of entrepreneurship that is growing and providing new opportunities for start-ups. Chapters "A study on entrepreneurial support environment in educational (technical) institutions" and "Resource endowment from parent organization to academic spin-offs: the case of the COPPE/UFRJ" discuss how educational institutions influence entrepreneurship through the activity of incubators, training initiatives and resource endowment. Chapter "A study on entrepreneurial support environment in educational (technical) institutions" presents the case of technical institutions in India and chapter "Resource endowment from parent organization to academic spin-offs: the case of the COPPE/UFRJ" analyses resource endowment from parent organization to academic spin-offs, based on a group of 30 spin-offs of a Brazilian University. Concluding this part, chapter "Development, entrepreneurial activity and industrial extension" discusses the relevance of industrial extension policies for innovation and learning of firms.

The chapters of this book raise several interesting issues to discuss policies to support entrepreneurs, of which we can highlight three. The first issue is that the different actors (government officials, entrepreneurs, researchers) involved in the entrepreneurial ecosystem do have different perceptions on the relevance of government policies for the success of entrepreneurs. As a result policymakers propose initiatives they consider very important (as low-cost credit, for instance) but are not deemed so relevant by entrepreneurs. The chapters on Brazil in this part of the book show that although institutions are making several efforts towards supporting entrepreneurship, Brazilian entrepreneurs tend to view their individual characteristics more effective for success than government policies. The chapters on Russia and India show the same result, while the chapter on China enhances difficulties entrepreneurs have linked to bureaucracy. Italy is also an example of a

country that has several support institutions but support is viewed as bureaucratic and time-consuming.

Therefore the definition of policies to support entrepreneurship must go well beyond the supply of credit lines and the design of innovation initiatives. Most authors from the first part of the book pointed to the need of educational initiatives promoting an entrepreneurial culture. We may add that entrepreneurial culture is not only relevant to encourage people to create new firms, but also to encourage government officials to design more effective support policies. We agree with Mazzucato (2013) that the State has an important role in the entrepreneurial ecosystem as it is capable to foster radical innovation and assume risk in areas not attractive to the private sector. However the effectiveness of policies to support entrepreneurship also depends on coordination of different policies and constant monitoring of initiatives.

Monitoring is important because the trajectory of entrepreneurs change as they proceed in their business. Mintzberg and Waters (1985) stated that when comparing intended strategy with realized strategy of firms, they could distinguish deliberate strategies – realized as intended – from emergent strategies – patterns or consistencies realized despite, or in the absence of, intentions. When studying the interaction between the business strategy process and the technologic innovation process in the creation of emerging technology-based companies, in Brazil, D'Ipolitto (2003) noted that both processes were formed as well as formulated, dynamically and iteratively, along the trajectory of the entrepreneur and the new venture. In the cases studied, four patterns were found: the (1) deliberate process were sometimes (1a) planned and sometimes (1b) intuitive and the (2) emergent process sometimes (2a) emerged from the venture trajectory and sometimes (2b) emerged from the external environment. These dynamic processes of strategy and innovation interact, influence each other and coevolve, defining the trajectory of the business, conditioned by the entrepreneurial team's ability to interpret the environment and adapt to it and/or change it in their favor.

Strategy processes and innovation processes are both in essence learning processes that combine what the entrepreneurs know when starting the business modeling and what the team learns during the trajectory of building and launching the business in interaction with customers, providers, partners, investors, public agents and each new team member. This is why most authors in this book enhance the importance of educational initiatives to promote and develop an entrepreneurial culture in their countries.

The second main issue this book raises is that entrepreneurship may not be associated only with firms' strategy and innovation and does not take place only if the right set of institutional conditions is in force. The authors of part II of this book show that on the contrary, the rationality of low-income entrepreneurs is strongly affected by their social context, culture, habits and informal institutions. Hence those entrepreneurs take advantage of opportunities created by institutional voids. The design of entrepreneurship policies for low-income entrepreneurs must therefore take into consideration the social context and evaluate possibilities of involving informal institutions in support initiatives.

The third main issue this book points to is that institutions also evolve over time and their evolution influences the success of policies to support entrepreneurship. To offer entrepreneurship courses in technical institutions whose students and faculty are not familiar with this concept may lead to disappointing results, as shown by the chapter on India. The chapters on Brazil from this part of the book show how policies evolve over time as the institutional context changes, and their analysis confirms our point on the importance of coordination of policies, as they show a growing importance of social capital and networking.

In conclusion, there are several aspects related to research on policies to support entrepreneurship that still need more discussion. We expect this book will make a contribution to future studies and pave the way to consolidate knowledge on this subject.

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Part I
Entrepreneurial Environments

The Brazilian Entrepreneurial Ecosystem of Startups: An Analysis of Entrepreneurship Determinants in Brazil and the Perceptions Around the Brazilian Regulatory Framework

Carlos Arruda, Vanessa Silva Nogueira, Afonso Cozzi, and Vinícius Costa

Abstract This paper presents the main findings extracted from a quantitative and qualitative research mapping of the Brazilian startup entrepreneurial ecosystem. The analysis was set up based on the six entrepreneurship determinant categories defined by the Organization for Economic Co-operation and Development (OECD), which are: the regulatory framework; market conditions; access to finance; the creation and diffusion of knowledge; entrepreneurial capabilities; and entrepreneurship culture. The study involved gathering quantitative data from secondary bases underlying each one of the six pillars and interviewing Brazilian representatives of the determinants indicated above, to proceed to understand which development stage Brazil is in as concerns encouraging entrepreneurial practice and the favorability of the entrepreneurial ambiance in the country, mainly in regards to the country's regulatory structure.

Keywords Determinants • Ecosystem • Entrepreneurship • OECD • Startup

1 Introduction

Fast-growing startup companies tend to improve their chances of success when inserted in an entrepreneurial ecosystem that encourages business development and innovation. Two benchmarks are the Silicon Valley and Israel, world-acclaimed for their success in entrepreneurial development and for yielding, in 1 year, more successful startup than other nations could create in years or decades. Although their respective ambiances are completely different, both Israel and the Silicon Valley seem to contain a combination of variables in their ecosystem that encourages the entrepreneurial activity to blossom.

C. Arruda • V.S. Nogueira (✉) • A. Cozzi • V. Costa
Innovation and Entrepreneurship Research Center, Fundação Dom Cabral, Nova Lima, MG, Brazil
e-mail: arruda@fdc.org.br; vanessanog@gmail.com; acozzi@fdc.org.br; vinicius.costa@fdc.org.br

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Thus, it is plausible to believe that different nations, albeit resting upon different contexts, are capable of building their own entrepreneurial ecosystems that can encourage the appearance of successful business concerns. For such, the strengths and weaknesses particular to any such community or country beg understanding to develop their entrepreneurship ecosystem on a par with the needs posed by local reality.

Isenberg (2010) postulates that "there's no exact formula for creating an entrepreneurial economy; there are only practical, if imperfect, road maps". This is akin to saying that it is not possible, for example, to replicate a new Silicon Valley in another community or nation by simply replicating the same characteristics of its entrepreneurship ecosystem; rather that, it is feasible to identify benchmark elements to be analyzed and developed according to each country's specific reality.

For the purposes of this study, benchmark elements are the OECD's entrepreneurship determinant groups, to wit: the regulatory framework; market conditions; access to finance; the creation and diffusion of knowledge; entrepreneurial capabilities and entrepreneurship culture.

2 Objectives

The research effort starts from these six pillars to investigate who are the players composing the Brazilian entrepreneurship ecosystem and what role they play as they operate and evolve. Thus, this effort systematically identifies the characteristics, strengths and weaknesses of the Brazilian entrepreneurship environment focusing on the development of startups and becoming a relevant tool to steer the progress of entrepreneurial practice in Brazil.

The research also indicates benchmark countries for each of the investigation's pillars and draws a comparison with the Brazilian reality, seeking to broaden the comprehension of the country's entrepreneurial ecosystem.

To meet the proposed objectives, the full study on which this paper is based was structured in two stages: the first being a qualitative research comprised of in-depth interviews with different players in the Brazilian entrepreneurship environment, amidst whom were notable startup entrepreneurs, investors and investment fund managers, researchers from public universities and representatives of entrepreneurship supporting institutions (such as hubs, incubators, accelerators and law firms) from five Brazilian states; and a second stage comprising a research effort involving the compilation of secondary quantitative data gathered from official institutions such as the World Bank, UNESCO, the OECD and the Brazilian Internal Revenue Service, among others, besides world-acclaimed research reports such as Doing Business, the Global Competitiveness Report, the Global Entrepreneurship Monitor (GEM), *inter alia*.

Notably, the construction of the quantitative database was based on OECD-developed methodology and represents a pioneer effort, as there are no previous efforts of applying this entrepreneurship mapping technology in Brazil – a country

that is not an OECD member – at the level of detail and systematization applied in this study.

3 Theoretical Foundations

Resorting to Schumpeter's classic *Capitalism, Socialism and Democracy* is one of the pathways to understand the reasons for the permanent relevance of entrepreneurship and the space it broaches in the discussion agendas concerning public policies worldwide. In his writings, Schumpeter posits that the business concern is the fundamental element for the capitalist system to operate and develop. This is precisely due to entrepreneurship, which allows the creation of new products, new production methods and new business models, besides being the main driver responsible for opening new markets. (Schumpeter 1975).

Governments of different nations understand entrepreneurship as an indispensable element to preserve the viability and competitiveness of a country's economy. Yet, despite the great attention given to the subject worldwide, measuring entrepreneurship locally, regionally, nationally or internationally has loomed as a major challenge for decades (OECD 2009).

In this sense, a few efforts have been undertaken in the attempt to systematize what could be called "an entrepreneurial economy model", pinpointing the main variables to be considered while assessing entrepreneurship. For the purposes of this study, two such models were used as the main framework: Isenberg's (2011) and the OECD (2011).

Daniel Isenberg's model stems from the initiative developed at the Babson College called BEEP – Babson Entrepreneurship Ecosystem Project. BEEP aimed at developing the concepts based on which would be possible to understand different communities and nations regarding what Isenberg called *Entrepreneurship Ecosystem*. The Ecosystem is composed by the following domains: policy, finance, culture, supports, human capital and markets.

Within the scope of *policy* are governmental institutions to support entrepreneurship, be they public universities that assume an important role by creating knowledge that will eventually be taken to market as a product, or regulatory bodies charged with the implementation of incentives for, or the removal of bureaucratic barriers against, fostering business development.

Within the sphere of *finance* are private institutions in charge of entrepreneurship funding, such as angel investors, venture capital funds and seed capital, among others.

Culture encompasses all social characteristics of a community and the subjective aspects related to the manner by which individuals relate to each other, what they reproach and what is the reason for recognition. Fear of failure, for example, is a limiting cultural factor against the development of entrepreneurship.

Within the scope of *supports* are the institutions not belonging or related to government that play the role of entrepreneurship stimulators, such as hubs,

accelerators, incubators, plus, for example, accounting and law firms required to provide support to the establishment of new companies.

Human capital includes both those professionals who amassed their skills through entrepreneurship-veered education, and the mass work force, which are both part of an intrinsic need of a market seeking economic progress through the creation of new companies.

The *markets* orbit, finally, approaches the need of an existing consumer mass ready to purchase new products and disseminate them via a domestic and international contact network.

Daniel Isenberg (2011) theorizes that the development of entrepreneurship will occur in fact only if these different ecosystem elements are handled altogether, albeit it is not necessary to "worry about changing everything on a full scale at once".

Following the same efforts pursued by the BEEP, the OECD also triggered a movement to map out the experience of different administrations in the quest for entrepreneurship development. OECD's focus, however, lies in facilitating the definition of public policies by political leaders via an internationally comparable database that reflects the reality of different countries as indicators representing the determinant elements of entrepreneurship.

Thus OECD's EIP – Entrepreneurship Indicators Programme – came into being in 2006 and, in 2007, joined forces with Eurostat, a system for the collection and organization of European country statistics, to develop definitions and concepts that would become the basis for the construction of a database on the entrepreneurship phenomenon at the world level.

The result of the OECD-Eurostat partnership is depicted in Fig. 1:

As seen in Fig. 1, OECD identifies three different, however interlinked, flows, which are important for the evaluation and formulation of entrepreneurship policies: determinants, entrepreneurial performance and impact. "The first stage of the model comprises various *determinants*, which policy can affect, and which in turn influence *entrepreneurial performance*, or the amount and type of entrepreneurship that takes place. The final stage is the *impact* of entrepreneurship on higher-level goals such as economic growth, job creation or poverty reduction" (Hoffman and Ahmad 2007).

Albeit recognizing the importance of studying the entire proposed flow, this research effort is concentrated upon the analysis of entrepreneurship *determinants*, as defined in the first quadrant of Fig. 1.[1]

[1] Because of model complexities, the variables are dynamic and have been constantly improved since their inception in 2006. Therefore, although Figure 2 is the most recent graphical representation of the model presented in the available articles, OECD's website (http://www.oecd.org/industry/business-stats/indicatorsofentrepreneurialdeterminants.htm) shows the list of updated determinants as of 2011, with minor variations in the above-mentioned determinant nomenclature. For the purposes of this study, therefore, updated concepts are considered, where *technology and R&D* are recognized as *creation and diffusion of knowledge* and *culture* is specifically called *entrepreneurship culture*.

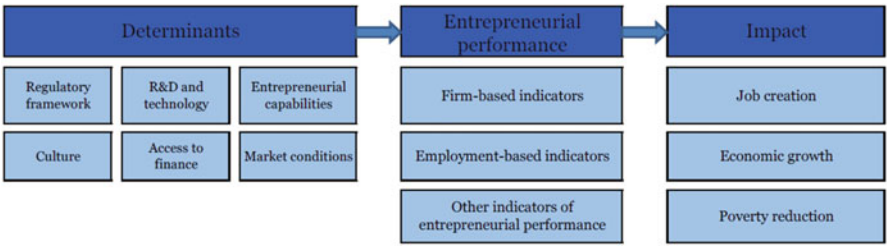

Fig. 1 Topic categories for entrepreneurship indicators (Source: OCDE 2009)

Finally, it is very important to mention that the study gave major focus specifically to startup entrepreneurship, mainly when considering the qualitative approach. According to Julie Meyer's (2012) concept, startups are companies that start life small, but think big and, due to their great innovative potential, harbor a significant probability of early exponential growth.

4 Methodology

Quantitative and qualitative data collection happened between August 2012 and March 2013. Sections 4.1 and 4.2 describe in detail what each stage's process was like.

4.1 Qualitative Stage

Thirty in-depth interviews were conducted, all of them semi-structured such as to broach open dialogues over the six entrepreneurship pillars, as proposed by Daniel Isenberg (2011).

Sample diversification was sought by means of interviews with individuals playing different roles in the Brazilian entrepreneurship scenario. Table 1 shows sample details.

Consultants are understood to be the individuals who do not play a single role in the ecosystem, but command a general view of the subject and have shared their views as interested specialists in the Brazilian entrepreneurship phenomenon.

Table 1 Description of qualitative interviews

Classification	Number of interviewees	States
Entrepreneurs	6	MG/PR
Support Institutions	11	MG/SP/PR/SC
Investors	7	MG/SC
Researchers	2	MG
Consultants	4	MG/RJ/SP

Source: FDC Study – The Brazilian Entrepreneurial Ecosystem of Startups

4.2 Quantitative Stage

The construction of the quantitative database was based on the updated version of the entrepreneurial determinants as defined by OECD in their website section dedicated to entrepreneurship,[2] where the investigation's six main pillars are available and determinant factors and sub-factors of each one of them are specified. OECD also suggests, in the same documents, the sources whence the data corresponding to each variable can be extracted. However, a major part of these is focused upon the study of European countries and, therefore, do not contain data about Brazil. Therein laid the main challenge to the construction of the Brazilian quantitative base.

4.3 Definition of Benchmark Countries

Aiming at enriching this study, comparative analyses were drawn between Brazil and benchmark countries for each of the six studied pillars. An additional research effort was put forth to elect these benchmarks, in compliance with the following methodology: countries were selected that appeared as top countries in the reports from which the quantitative variables under analysis were extracted. This means backtracking to the sources of each one of the variables that were successfully mapped for Brazil. Then the 10 best-rated countries in each of them were mapped out. The investigation then took as a benchmark country that country that appeared among the 10 first positions in the largest number of variables. In the cases where two or more countries appeared the same number of times, the definition criterion was the number of incidences in the first 5 positions. It is important to observe, therefore, that the definition of benchmark countries considered the list of participants in the consulted studies and not the total number of countries on the planet, and countries not mapped by the reports in question may have been left aside.

[2] http://www.oecd.org/industry/business-stats/indicatorsofentrepreneurialdeterminants.htm

5 Discussion of Results

The analysis of the results presented below follows the structure of the six pillars contained in the previous sections, although special attention is given to the Regulatory Framework since the greater number of variables mapped to understand the entrepreneurial ecosystem in Brazil are associated with this exact pillar.

Most relevant qualitative and quantitative data are shown in a condensed manner. The quantitative data provided are for the last year that was available for each indicator. The quotations from the qualitative interviews are not identified in respect to the confidentiality policy applied at the request of the interviewees.

5.1 Regulatory Framework

The qualitative perceptions about this pillar stress the quantitative findings and point towards the Brazilian regulatory framework as a problem for the country's entrepreneurial development.

Concerning quantitative analysis, since there are a considerable number of variables involved in assessing the regulatory framework, the authors decided to split the set of sub-factors into three categories that facilitate understanding, to wit:

Variables in progress: these are the variables that have evolved in the past few years in the sense of facilitating new business in Brazil.

Stagnant variables: these are variables that have not evolved or have regressed in the past few years, showing variations smaller than one unit in the indices analyzed.

Regressing variables: these are the variables that have regressed in the past few years in the sense of facilitating the development of new business in Brazil.

Table 2 shows the classification of all variables analyzed according to the categories above, their corresponding factors within the regulatory framework pillar and, also, the comparison between Brazilian and Singaporean models – Singapore being the country chosen as the regulatory framework benchmark according to the methodology described in the previous section.

The entrepreneurial environment requires dynamism to develop; thus the importance of a regulatory framework that will break with the bureaucratic hamstringing of the entrepreneurship development process.

Mainly when startup entrepreneurship is discussed, it is necessary to consider that the speed of setting up a business and the facilities that encourage its rapid growth are key factors for success. Young entrepreneurs are usually at the helm of these companies, bringing innovative ideas that break away from traditional product standards or business models. They think ahead of their time and their reality seems to run on a faster track.

Table 2 Mapped variables for the Regulatory Framework pillar

REGULATORY FRAMEWORK										
Variables	2007	2008	2009	2010	2011	2012	2013	Singapore	Year*	Corresponding Factor
Variables in progress										
Costs Required for Starting a Business	9.9	10.4	8.2	6.9	7.3	5.4	4.8	0.6	2013	Administrative Burdens
Number of Days for Starting a Business	149	149	149	119	119	119	119	3	2013	Administrative Burdens
Cost to build a Warehouse	62.2	59.4	46.7	50.6	46.6	40.2	36	16.7	2013	Administrative Burdens
Number of Procedures for Starting a Business	15	16	16	14	13	13	13	3	2013	Administrative Burdens
Enforcing Contracts - Number of Procedures	45	45	45	45	45	45	44	21	2013	Court & Legal Framework
Private expenditure on health as a percentage of total expenditure on health	58.2	57.2	56.4	53	ND	ND	ND	63.7	2010	Social and Health Security
General **government** expenditure on health as a percentage of total expenditure on health	41.8	42.8	43.6	47	ND	ND	ND	36.3	2010	Social and Health Security
Taxes on financial and capital transactions (% GDP)	1.7	0.7	0.6	0.7	ND	ND	ND	ND	ND	Business and Capital Taxes
Cost of capital	1.7	2.4	1.9	2.2	2.6	2.8	ND	7.2	2012	Business and Capital Taxes
Stagnant variables										
Burden of Government Regulation	1.9	1.9	1.8	1.9	2	2	ND	5.6	2012	Administrative Burdens
Minimum Capital Required for Starting a Business	0	0	0	0	0	0	0	0	2013	Administrative Burdens
Procedures to Build a Warehouse	17	17	17	17	17	17	17	11	2013	Administrative Burdens
Costs for Register Property	2.8	2.8	2.7	2.6	2.7	2.6	2.6	2.9	2013	Administrative Burdens
Time it Takes to Prepare, File and Pay the Corporate Income Tax, VAT and Social Contributions	2.6	2.6	2.6	2.6	2.6	2.6	2.6	82	2013	Administrative Burdens
Actual Cost to Close a Business	12	12	12	12	12	12	12	1	2013	Bankruptcy Regulations
Actual Time to Close a Business	4	4	4	4	4	4	4	0.8	2013	Bankruptcy Regulations
Immigration Laws	6.1	5.5	5.4	5.0	5.6	5.9	ND	5.6	2012	Product and Labour Market Regulation
Difficulty of Firing[b]	0	0	0	0	ND	ND	ND	0	2010	Product and Labour Market Regulation
Rigidity of Hours Index[b]	60	60	60	60	ND	ND	ND	0	2010	Product and Labour Market Regulation
Pay and productivity	3.8	4.2	4	3.7	3.7	3.8	ND	5.4	2012	Product and Labour Market Regulation
Enforcing Contracts - Cost in % of claim	16.5	16.5	16.5	16.5	16.5	16.5	16.5	25.8	2013	Court & Legal Framework
Enforcing Contracts - Time	731	731	731	731	731	731	731	150	2013	Court & Legal Framework
Total expenditure on health as a percentage of GDP	8.5	8.3	8.8	9	ND	ND	ND	4.0	2010	Social and Health Security
Taxes on income, profits and capital gains (% GDP)	7.3	7.8	7.3	6.9	ND	ND	ND	ND	ND	Income taxes; Wealth/Bequest Taxes
Payroll taxes - payed by the **employer** (% GDP)	3.8	3.8	3.9	3.9	4.0	ND	ND	ND	ND	Income taxes; Wealth/Bequest Taxes
Payroll taxes - payed by the **employee** (% GDP)	1.9	1.9	1.9	1.9	2.1	ND	ND	ND	ND	Income taxes; Wealth/Bequest Taxes
Taxation of Corporate Income (% of GDP)	3.7	4.0	3.8	3.4	ND	ND	ND	ND	ND	Business and Capital Taxes
Intellectual Property Rights	3.3	3.3	3.0	3.1	3.2	3.5	ND	6.1	2012	Patent System; Standards
Property Rights	4.5	4.6	4.4	4.3	4.4	4.7	ND	6.4	2012	Patent System; Standards
Regressing variables										
Number of procedures for register property	13	13	13	13	13	13	14	5	2013	Administrative Burdens
Time for register property	33	33	33	33	33	33	34	21	2013	Administrative Burdens
Days to build a warehouse	375	469	469	469	469	469	469	26	2013	Administrative Burdens
Bankruptcy Recovery Rate	12.1	14.6	17.1	17.1	17.1	17.9	15.9	91.3	2013	Bankruptcy Regulations
Difficulty of hiring[b]	67	78	78	78	ND	ND	ND	0	2010	Product and Labour Market Regulation

Source: FDC Study – The Brazilian Startup Entrepreneurial Ecosystem

A full description of each variable mentioned above is presented in Appendix 1 at the end of the paper

ND unavailable data

[a]Year: indicates to what year the data specified for Singapore corresponds

[b]Difficulty of Firing; Rigidity of hours index and Difficulty of hiring: all data referring to *Doing Business* were provided directly by the report organizing committee. The documents provided to Fundação Dom Cabral listing the requested data included the observation in these specific variables that the indicators are being revised. The figures were then extracted from the *Doing Business* reports available online

In this context, two variables currently regressing in Brazil call attention: personnel hiring difficulties and the bankrupt company recovery rate.

On a scale from 0 to 100, the latter being the highest the score and the greater the influence of laws and regulations representing hurdles against personnel hiring, Brazil was rated at 78 points. Hiring personnel appears, therefore, to be a major limiting factor of the country's dynamism. Entrepreneurs are grid-locked in the face of administrative charges levied against personnel hiring that hamstring their budgets or when labor laws, focused upon workers' needs, do not contemplate the employer's requirements.

> [The Brazilian] labor market is completely different from that of seventy years ago, but it still has the same law of seventy years ago; extremely protective and hardly flexible...

The numbers also indicate that there is no easing in Brazil concerning the regulations applicable to the recovery of bankrupt companies. The rate of recovery assessed above is recorded as cents to the dollar recovered by creditors by means of reorganization, liquidation or debt foreclosing procedures. In Brazil, therefore, once a company slips into red territory and contracts debt for recovery, only 15.9 % of total assets committed are expected to be recovered.

Consequently, Brazilian companies have followed the opposite rationale of a favorable entrepreneurship environment; where entrepreneurs should find ease to venture serially and bankruptcy cannot loom as a limiting factor to the continuity of their efforts towards new businesses. It is precisely the possibility of restarting that strengthens the ecosystem with continual innovative ideas that increase the possibility of successful companies existing in the marketplace.

On the other hand, it is of the essence to note that the costs of building a warehouse decreased substantially in the past few years and that there has been remarkable progress in the process of starting a business, entailing a significant reduction both of the number of days required to start a business and also of the costs and number of procedures involved in the process.

The Brazilian federal administration created the Individual Micro-entrepreneur modality via Complementary Law no. 128, dated 12/19/2008. This is an example of official action that facilitates the establishment of companies, reducing the time required to obtain a valid corporate taxpayer number (CNPJ) down to 15 min, via the Internet. This measure contains many limitations since it is only applicable to entrepreneurs who are enjoying maximum sales of R$60,000 per year and who do not hold equity interest in another company as a partner or owner. However, it does benefit self-employed professionals who are trying to start their own business and offers them the possibility of issuing fiscal invoices, together with the facility of opening a corporate checking account and entering into loan agreements for the company when necessary.[3]

[3] http://www.portaldoempreendedor.gov.br/mei-microempreendedor-individual – 4/16/2013.

Another federal government measure whose purpose is to stimulate the economy and facilitate the development of companies concerns the reduction of payroll taxes, a stagnant variable in Brazil for years.

Tax exemptions upon payroll were implemented in 2011 and extended application to more industries in April 2013, currently favoring 42 sectors of the Brazilian economy by the reduction of taxes levied upon workers' wages. The measure contemplates the substitution of a 20 % contribution on the payroll of companies, made to the National Institute of Social Security (INSS), for a fee varying between 1 and 2 % of companies' sales. It is an interesting reaction by the government to the negative evaluation of personnel hiring in Brazil and, indeed, may stimulate the creation of jobs in the country and improve Brazilian corporate competitiveness.[4]

Although advances have been made in merit recognition because of the important influence it brings to Brazilian entrepreneurial development, the Brazilian regulatory framework is far from being a role model for entrepreneurship incentive. Among the 34 elements mapped above, 25 of them, or approximately 74 % are stagnant or regressing considering the period between 2007 and 2013. This scoring is evidence of a negligent facet of the Brazilian reality that has scantily changed in the past few years in the sense of stimulating the regulatory model such as to facilitate corporate development in Brazil.

> [. . .] as concerns the regulatory framework, having worked in this market for such a long time, my understanding is that Brazil is attractive despite the regulatory framework. There is nothing in the regulatory framework that will make Brazil an interesting country. The regulatory part does not reduce the Brazil Risk.

Still, even considering the results found with variables that denoted some progress in the past few years, a marked contrast can be found between Brazilian and Singaporean numbers, which once more demonstrates the pillar's shortcomings.

Therefore, the reforms implemented by the Singaporean government since 2007 stand as an interesting tool to guide future measures in the sense of developing public policies in Brazil. According to previous years' reports by *Doing Business*, the actions described on Table 3 are notable.

5.2 Market Conditions

Qualitative interviews indicated that individuals who are involved with entrepreneurship in Brazil have an optimistic view of the Brazilian market as concerns the possibility of attracting new business and technology. For these people the increased population's purchasing power in the past few years, together with a growing access to digital tools and the Internet, characterizes an exceedingly fertile environment for the development of startups. Innovative technologies or highly

[4] http://www.fazenda.gov.br/portugues/documentos/2012/cartilhadesoneracao.pdf – 4/16/2013.

Table 3 Singaporean government measures towards entrepreneurship

Singaporean government measures towards entrepreneurship	Corresponding years
Established an online business registration	2007/2008
Allowed the company registration and tax declaration to be made through a single online form	2008/2009
Facilitated the obtaining of building permits by improving the internal process of electronic data processing	2009
Further facilitated the process of obtaining building permits with a new Regulation of Health and Safety that allows low-risk industries to submit documents online	2010
Facilitated the property registration through improvements in the country's digital system	2010

Source: *Doing Business* reports for corresponding years

scalable ideas through e-commerce that are already commonplace in other countries find a practically untapped market in Brazil, a country that is increasing its thirst for digital consumption daily.

> Companies that bring innovations from abroad to this country envision only one thing: our market. We are an emerging economy, with markets sometimes totally untapped. Look at the electric car issue; they're coming to explore our market.

Indeed, the numbers unveiled an impressive e-commerce growth in Brazil. Sales from digital commerce increased from R$ 8.2 billion in 2008 to R$ 22.5 billion in 2012 in Brazil (E-bit Company 2012). However, the consumers' sophistication level did not increase on a par with their purchasing power. The country's evaluations in this respect showed minimal variation, and have remained below average (between 3.8 and 3.6) for the past 7 years; 1 being the score that indicates who base their buying on low price only while 7 denotes consumers who base their buying upon sophisticated product performance analysis (World Economic Forum [WEF] 2012).

This is a peculiar characteristic of the Brazilian entrepreneurship ecosystem, which does not necessarily minimize its development potential but which should certainly be considered by young entrepreneurs at the time of conceiving their business, since the actual purchasing intention is obviously a determinant factor for product and service success or failure.

5.3 Access to Finance

Respondents note a growing supply of capital in Brazil. The economic prosperity this country has experienced for the past few years not only increases the purchasing power of class C but also allows a greater accumulation of wealth by the individuals who were already at the top of the pyramid during crisis times. Such capital accumulation together with a dropping interest rate encourages investors to

cast their eyes upon new investment opportunities, since fixed income investments are no longer so financially attractive.

Besides that, the numbers show that credit availability in the country has increased in the past few years. The percentage of credit extended to the private sector, for example, was 61.4 % in 2011, against only 47.8 % in 2007 (World Bank 2013b). Probably a reflection of improvement of the country's credit rating, from 61.2 in 2007 to 70.9 in 2011, on a scale from 0 to 100, where 100 represents the greatest probability of obtaining credit (IMD 2012).

The *Investor Protection*[5] variable, however, indicates that the economy growth movement is not on a par with adaptations for the improvement of investor conditions. In Brazil it has been stagnant for the past 7 years at a score of 5.3 – an almost 4-point difference compared to Hong Kong, a country defined as a benchmark for this pillar, whose score is 9 (World Bank 2013a).

Thus, on the one hand entrepreneurs complain of not having access to the capital available in the country and stress the reality in that the domestic capital-tapping capacity does not directly influence the ease for entrepreneurs to obtain investments or loans for their businesses during the embryonic stage of their startups.

On the other hand, investors argue that a legal framework is lacking, such as to prompt them to invest in higher risk ventures. Investor insecurity looms as the great hurdle in the process. Most times investors will opt for transactions with larger sized companies, requiring heavier investments, but offering an attractive return at a smaller risk associated to the operation.

> [...] the groups that have investment potential in Brazil are not prepared for startup companies. They look for solid companies. We participated in an application call for credit in 2010 and one of the awarded companies had revenues to the tune of 5 billion reals that year. [...] And this money really makes a difference to those who need it the most, the company that is only just starting.

Of the 11,677 investment funds on record with the CVM – the Brazilian Securities and Exchange Commission – in 2012, only 34 are on record as **Emerging Enterprise** Mutual Investment Funds (FMIEE), which signifies a share of only .3 % of this universe (CVM 2013).

Creation and Diffusion of Knowledge Respondents understand the two axes composing this pillar in different manners. On the one hand, there is a belief that relevant knowledge has been created in the academy, that is, the *creation of knowledge* is not seen as a major problem in Brazil. On the other hand, the *diffusion* of this knowledge has not been satisfactory, that is, the results of efforts veered towards research do not necessarily become business and often times remain mothballed on academic shelves broaching no dialogue with the market. This lack of dialogue appears as a consequence of the incapability of two parties – researchers and entrepreneurs – to understand each other's language.

[5] This variable is an average of the evaluation of three indices: transparency in transactions, responsibility for self-dealing and the capacity stockholders have to sue directors and executive officers for mismanagement.

> Academic researchers have a soft spot for invention; inventors are always quite myopic [...]. I strutted high toting my patent and thought I would save the world with my environmental area invention. I talked to industry people and disaster hit [...]. We speak different languages. In my mind [I thought]: sure, they'll be interested in an invention that'll save the world! We then began to talk and they began asking questions I couldn't answer, and very obvious questions for those in the private area, who are thinking about the use, marketing the technology.

Quantitative evaluation indicates that the collaboration between Brazilian universities and industry is, indeed, below Finnish levels – Finland being the pillar's benchmark country – confirming the Brazilian shortcomings as qualitatively seen in this respect. However, some growth is noticed in the past few years' indices. On a scale where 1 represents a minimal to non-existent level of collaboration between academia and enterprise and 7 represents an intense and continual level of collaboration, Brazil scored 3.4 in 2007 and 4.1 in 2012, not too far from the Finnish score of 5.6 for the same year (WEF 2012).

5.4 Entrepreneurial Capability

The entrepreneurial capability development process, according to the OECD, is determined by two main elements: the presence of education veered towards entrepreneurship and migratory flows bringing qualified foreign professionals into the country.

Both interviews and quantitative data depict the Brazilian reality in a similar fashion. For example, education in Brazil, almost entirely, does not approach entrepreneurship themes either in the traditional formation courses or in higher education courses such as business management, engineering and economics; in which an entrepreneurship curriculum would be applicable. These courses are limited to the classic education to develop professionals who are mostly trained to be fine employees of great organizations – in Brazil, a synonym with professional success – but not to establish their own business.

> [...] as far as I know, universities have at most a junior company, which is something very different [from proper entrepreneurship education]. I think all courses, engineering, IT, chemistry, medical courses – because there are several companies in the medical area as well – all courses should offer some type of training, of guidance, for [the students] to become entrepreneurs. The student finishes school, how is he going to venture?

Given this scenario, it would be interesting for the country's economy to make Brazil attractive to skilled foreign professionals who come to this country to share ideas and abilities with local potential entrepreneurs.

However, considering the year 2010 as the baseline, a comparison between the number of foreign students in Brazil – 14,738 – and in the United Kingdom – 389.958 – is a warning of the lack of the attractiveness necessary to welcome foreigners and possibly retain them in the country (UNESCO 2013).

5.5 Entrepreneurship Culture

Culture is the backdrop of all elements of an entrepreneurial ecosystem and directly affects its operations and growth. Here, investigating the development of an entrepreneurial mindset in individuals from their basic schooling is more important than understanding whether any knowledge about entrepreneurship is being taught in intermediary school and higher education.

An analysis of preferences and characteristics of Brazilian individuals show an interesting counterpoise between the fear of failure and entrepreneurial initiative. The qualitative issue of greatest eminence was precisely the resistance that Brazilians offer against failure and, possibly as a direct consequence of this element, their risk aversion. Failure, in Brazil, often times seems to come hand in hand with hard to overcome social stigmas that loom as impediments or hindrances to the entrepreneur restart.

> Brazil has a complicated problem, that is, the lack of a failure culture. And you don't have any venture capital, no innovation, nothing of the sort here, if there's no tolerance for failures.

Risk aversion, in turn, affects the other side of the coin. Since collateral for investors still has not reached satisfactory levels, as shown in the *Access to Finance* pillar analysis, the risk aversion influences investors even further into resisting greater aggregate risk, represented by the startup companies.

Nevertheless, Brazilians are still seen as people of great initiative. However, such initiative is motivated by the need to find an income generation manner in situations where other alternatives are not available. The fear of failure, in this case, seems to strengthen the profile of the "necessity driven entrepreneur" as a counterpoise to what is expected from entrepreneurs and startup investors, who opt for assuming great risks in exchange for the possibility of achieving significant financial gains. These are the so-called "opportunity driven entrepreneurs".

Conclusion

The Brazilian regulatory framework, albeit showing subtle signs of improvement, does not seem to follow the entrepreneurial movement in Brazil at the same speed as its milieu. Brazilian decision-making regulatory bodies seem not to have yet perceived the role of extreme importance they play in the country's economic development by means of encouraging the creation of new companies, and the need to eliminate legal and regulatory constraints to stimulate the birth and growth of companies in the country.

The market for Brazilian companies, on the other hand, presents itself as a major force in Brazil, with a huge amount of potential consumers. The question that remains, however, is whether the Brazilians are willing to overpay for an innovative product. For emerging businesses it is necessary to study in depth their target audience to understand its peculiarities and develop products and services that can be, in fact, absorbed by them.

(continued)

With regards to the access to financing, it is clear that the progress of the Brazilian economy has created potential investors, that is, people with disposable capital for myriad investments who are at the crossroads of making their investment decisions. Therefore, Brazil has a very important resource with which to move its entrepreneurship ecosystem forward – the capital – and the country needs to apply efforts towards making the *New Enterprise* a more attractive option to these individuals. Measures for investor protection, for example, can smooth the Brazilian's risk aversion trait, serving as an incentive to transfer investments into larger companies to investments into startup enterprises.

Concomitantly, the creation of knowledge and capacity-building professionals for the market – entrepreneurs or otherwise – are ecosystem elements also behind their potential, and require attention both from public bodies and other ecosystem players.

Indeed, public investment in education and measures to encourage the entrepreneurship mindset are of the essence to create a greater number of relevant studies that can become businesses and, just as importantly, to place skilled professionals in the marketplace such as to meet the demand for labor during their growth process.

On the other hand, the responsibility for the great functioning of the ecosystem is incumbent upon all the players in it; entrepreneurs and researchers should also take up important roles in this evolution. Since there is evidence that much knowledge has been created and is mothballed on Brazilian academia shelves, for example, it behooves researchers and entrepreneurs to bring it out in the open and to help each other identify applications for this knowledge that are interesting to both parties.

Measures encouraging high-growth entrepreneurship that yields large-scale economic and financial returns to the country may occur by means of capacity building and entrepreneurship culture, which are complementary pillars. Entrepreneurial capacity building may influence a country's culture change towards entrepreneurship, which would probably return as encouragement to advances in entrepreneurial capacity building investments.

Finally, it is well to consider that greater visibility for the country begets a greater market, attracts foreign talent from abroad and increases the chances of retaining them in the country, awakens investor interest and, more importantly, encourages the implementation of measures by the government to accelerate economic progress. Thus, considering the growing Brazilian international exposure in the past few years and the exposure it will have at least until all sports events end in 2016, the time is definitely favorable to invest in the progress of the Brazilian entrepreneurial ecosystem, aiming at a fast development of the features that require attention indicated in this study; in an effort to leave, for future generations, not just stadiums and memories, but a diverse portfolio of new successful businesses.

Appendix 1: List of Mapped Variables on Regulatory Framework and Their Respective Description and Sources

Table 4 Mapped variables on regulatory framework - description and sources

	OECD VARIABLES	
Regulatory Framework	**Description**	**Data Sources**
Administrative Burdens (Entry and Growth)		
Burden of Government Regulation	Survey responses to the question: how it is to comply with administrative requirements (permits, regulations, reporting) issued by the government in your country? (gradres going from 1 to 7: 1= burdensome, 7 = not burdensome).	Global Competitiveness Report (WEF)
Costs Required for Starting a Business	The official cost of each procedure in percentage of Gross national Income (GNI) per capita based on formal legislation and standard assumptions about business and procedure.	World Bank, Doing Business
Minimum Capital Required for Starting a Business	The paid-in minimum of capital requirement that the entrepreneur needs to deposit in a bank before registration of the business starts.	World Bank, Doing Business
Number of Days for Starting a Business	The average time spent during each enterprise start-up procedure.	World Bank, Doing Business
Number of Procedures for Starting a Business	All generic procedures that are officially required for an entrepreneur to start an industrial or commercial business.	World Bank, Doing Business
Procedures to Build a Warehouse	The total number of procedures required to build a warehouse. A procedure is any interaction of the company's employees or managers with external parties.	World Bank, Doing Business
Days to build a Warehouse	The total number of days required to build a warehouse. The measure captures the median duration that local experts indicate is necessary to complete a procedure in practice.	World Bank, Doing Business
Cost to build a Warehouse	Cost is recorded as a percentage of the economy's income per capita. Only official costs are recorded.	World Bank, Doing Business
Number of procedures for Register Property	The total number of procedures legally required to register property. A procedure is defined as any interaction of the buyer or the seller, their agents (if an agent is legally or in practice required) or the property with external parties.	World Bank, Doing Business
Time for Register Property	The total number of days required to register property. The measure captures the median duration that property lawyers, notaries or registry officials indicate is necessary to complete a procedure.	World Bank, Doing Business
Costs for Register Property	Cost is recorded as a percentage of the property value, assumed to be equivalent to 50 times income per capita. Only official costs required by law are recorded.	World Bank, Doing Business
Time it Takes to Prepare, File and Pay the Corporate Income Tax, VAT and Social Contributions	The time it takes to prepare, file and pay (or withhold) the corporate income tax, the value added tax and social security contributions (in hours per year).	World Bank, Doing Business
Bankruptcy Regulations		
Actual Cost to Close a Business	The cost is measured in percent of estate, based on a standard business closure.	World Bank, Doing Business
Actual Time to Close a Business	Time is recorded in calendar years. The indicator is based on a standard business closure.	World Bank, Doing Business
Bankruptcy Recovery Rate	The recovery rate estimates how many cents on the dollar claimants - creditors, tax authorities and employees - recover from an insolvent firm.	World Bank, Doing Business
Possibility of a Fresh Start	The indicator measures an entrepreneur's possibility to resume running a business after experiencing financial difficulties. A fresh start can be attained through a restructuring of the existing business to avoid bankruptcy or by restructuring debt.	OECD one-off survey "Policy questionnaire on bankruptcy"
	OECD VARIABLES	
Regulatory Framework	**Description**	**Data Sources**
Product and Labour Market Regulation		
Difficulty of Firing*	The index measures whether laws or other regulations have implications for the difficulties of firing a standard worker in a standard company, based on factbased (yes/no) questions, remodelled into a 0-100 index.	World Bank, Doing Business
Difficulty of Hiring*	The index measures whether laws or other regulations have implications for the difficulties of hiring a standard worker in a standard company, based on factbased (yes/no) questions, remodelled into a 0-100 index.	World Bank, Doing Business
Ease of Hiring Foreign Labour	Survey responses to the question: Does labour regulation in your country prevent your company from employing foreign labor? (grades going from 1 to 7: 1 = prevents your company from employing foreign labor, 7 = does not prevent your company from employing foreign labor).	Global Competitiveness Report (WEF)
Extent of Incentive Compensation	Survey responses to the question: what is the extent of cash compensation of management? (grades going from 1 to 7: 1 = is based exclusively on salary,7 = includes bonuses and stock options, representing a significant portion of overall compensation).	Global Competitiveness Report (WEF)
Rigidity of Hours Index*	The indicator is an index with five components: (i) whether night work is restricted; (ii) whether weekend work is allowed; (iii) whether the work week consists of five and a half days or more; (iv) whether the workday can extend to 12 hours or more (including overtime); and (v) whether the annual paid vacation days are 21 days or less. (grades goes from 0 to 100, when higher grades indicates stronger rigity of hours).	World Bank, Doing Business
Immigration Laws	Survey responses to the question: Does immigration laws in your country prevent your company from hiring foreing labor? (grades going from 0 to 10: 0 prevents - 10 does not prevent).	IMD World Competitiveness Yearbook
Pay and productivity	Survey responses to the question: To what extent is pay in your country related to productivity? [Rate: 1 = Not related - 7 = Strongly related].	Global Competitiveness Report (WEF)
Court & Legal Framework		
Enforcing Contracts - Cost in % of claim	Cost is recorded as a percentage of the claim, assumed to be equivalent to 200% of income per capita. No bribes are recorded. Three types of costs are recorded: court costs, enforcement costs and average attorney fees	World Bank, Doing Business
Enforcing Contracts - Number of Procedures	A procedure is defined as any interaction between the parties, or between them and the judge or court officer. This includes steps to file the case, steps for trial and judgment and steps necessary to enforce the judgment.	World Bank, Doing Business
Enforcing Contracts - Time	Time is recorded in calendar days, counted from the moment the plaintiff files the lawsuit in court until payment. This includes both the days when actions take place and the waiting periods between.	World Bank, Doing Business

Table 4 (continued)

Social and Health Security		
Public Expenditure on Unemployment Support	Public expenditure on unemployment per unemployed in US$, current PPPs. Public expenditure includes both partly, full public pay and any other program expenditures the public has.	OECD, Public expenditure and participant stocks on Labour Market Policy (LMP)
Public Health Care Coverage	The share of the population eligible for a defined set of health care goods and services under public programmes.	OECD Health data
Total expenditure on health as a percentage of gross domestic product	This is a core indicator of health financing systems. It provides information on the level of resources channeled to health relative to a country's wealth.	World Health Organization
Private expenditure on health as a percentage of total expenditure on health	This is a core indicator of health financing systems. This indicator contributes to understanding the relative weight of private entities in total expenditure on health. It includes expenditure from pooled resources with no government control, such as voluntary health insurance, and the direct payments for health by corporations (profit, non-for-profit and NGOs) and households. As a financing agent classification, it includes all sources of funding passing through these entities, including any donor (funding) they use to pay for health.	World Health Organization
General **government** expenditure on health as a percentage of total expenditure on health	This is a core indicator of health financing systems. This indicator contributes to understanding the relative weight of public entities in total expenditure on health. It includes not just the resources channeled through government budgets to providers of health services but also the expenditure on health by parastatals, extrabudgetary entities and notably the compulsory health insurance payments. It refers to resources collected and pooled by the above public agencies regardless of the source, so includes any donor (external) funding passing through these agencies.	World Health Organization
	OECD VARIABLES	
Regulatory Framework	**Description**	**Data Sources**
Income taxes; Wealth/Bequest Taxes		
Average Income Tax plus Social Contributions	The average rate of taxation in percentage of the gross wage. The indicator is based on a standard case: single (without children) with high income. [% GDP].	OECD Revenue statistics
Highest Marginal Income Tax plus Social Contributions	The highest rate of taxation in percentage of the gross wage. The indicator is based on a standard case: single (without children) with high income.	OECD Revenue statistics
Revenue from Bequest Tax	The revenue from bequest tax as a percent of GDP on a 3 year moving average.	OECD Revenue statistics
Revenue from Net Wealth Tax	The revenue from net wealth tax as a percent of GDP on a 3 year moving average.	OECD Revenue statistics
Taxes on income, profits and capital gains (% GDP)	Federal or central government's revenue from income, profits and capital gains taxes as a percentage of GDP	OECD Revenue statistics - Latin American Countries
Payroll taxes - payed by the **employer** (% GDP)	Contribution of employers, private or governmental, to public pension schemes.	Receita Federal do Brasil
Payroll taxes - payed by the **employee** (% GDP)	Contribution of employees - of public or private sphere - to the social security system.	Receita Federal do Brasil
Business and Capital Taxes		
SME Tax Rates	Not specified at OECD framework	OECD Revenue statistics
Taxation of Corporate Income (% of GDP)	Corporate Tax Revenue as a percentage of GDP.	OECD Revenue statistics
Revenue	As percentage of GDP on a three year moving average.	Not specified at OECD framework
Taxation of Dividends – Top Marginal Tax Rate	Not specified at OECD framework	OECD Tax database
Taxation of Stock Options	The average tax wedge for purchased and newly listed stocks. Average incomes are used.	OECD, The Taxation of Employee Stock Options - Tax Policy Study No.11
Taxes on financial and capital transactions (% GDP)	Federal or central government's revenue from financial and capital transactions taxes as a percentage of GDP.	OECD Revenue statistics - Latin American Countries
Cost of capital	Survey question: cost of capital encourages business development [RATE: 0 Deters - 10 Encourages].	IMD World Competitiveness Yearbook
Patent System; Standards		
Intellectual Property Rights	Survey responses to the question: intellectual property protection in your country (1 = is weak or nonexistent, 7 = is equal to the world's most stringent).	Global Competitiveness Report (WEF)
Property Rights	Survey responses to the question: property rights, including over financial assets (1 = are poorly defined and not protected by law, 7 = are clearly defined and well protected by law).	Global Competitiveness Report (WEF)

Regulatory framework:

■ Variables suggested by the OECD for which it was possible to find data from Brazil = 24
■ Variables suggested by the OECD for which it was **not** possible to find data from Brazil = 13
■ Alternative variables added to the initial list provided by the OECD = 10

[a]Difficulty of Firing; Rigidity of hours index and Difficulty of hiring: all data referring to Doing Business were provided directly by the report organizing committee. The documents provided to Fundação Dom Cabral listing the requested data included the observation in these specific variables that the indicators are being revised. The figures were then extracted from the Doing Business reports available online

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Financing Innovation in Brazil: Recent Achievements and Future Challenges

Daniel Silveira Barreto and Luiz de Magalhães Ozório

Abstract This article discusses some of the financing mechanisms for innovation created recently by the Brazilian Government, in particular those with participation of BNDES and FINEP. Brazil, despite having redirected its Science and Technology Policy in the late 90s and reformulated its funding mechanisms inspired in OECD countries, did not achieve satisfactory results, as shown in this study. Investments in innovation are shy, with little participation of the private sector. In recent years, the Brazilian Government has been developing a series of initiatives to broaden and make more effective its participation in financing innovation, as well as stimulate private investment. It may be observed that these initiatives seek to fill existing gaps and seem to consider some successful characteristics of foreign mechanisms, seeking a greater alignment with the interests of the market and focus on small and medium-sized companies, as well as focusing on increasing the link between academia and business, and unifying efforts among government agencies. Some improvements, however, still seem to be necessary, not only in the financing mechanisms, but also when tackling larger country issues.

Keywords BNDES • Financing • FINEP • Innovation • R&D

1 Introduction

At the end of the 90s, there was a major shift in the Brazilian Science and Technology Policy. Government actions approached the ones adopted by OECD countries, in particular Europeans', and the importance of the National Innovation Systems was emphasized. Since then, important initiatives have been incorporated, such as the creation of sector funds, economic subvention regulations, institutional changes and tax incentives.

D.S. Barreto (✉) • L.d.M. Ozório
Management Department, Ibmec-RJ, Rio de Janeiro, Brazil
e-mail: daniel.barreto@bndes.gov.br; lmozorio@ibmecrj.br

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However, despite the undeniable progress, innovation indicators show Brazil is far behind developed countries, in addition to been losing competitiveness compared to other emerging markets. The country still underinvests in Research & Development (R&D) and innovation, having low private sector participation. There are few records of patents and a small amount of really innovative companies, besides not having overcome the gap between academia and business.

Seeking to improve this situation, the Brazilian Government has been developing some new actions directed to broaden and make more effective its participation in funding for innovation, as well as stimulate private investment.

The main objective of this work is to analyse some of the financing mechanisms for innovation recently created by the Brazilian Government, in particular those with participation of Brazilian Development Bank (BNDES) and Brazilian Innovation Agency (FINEP). It proposed to identify how these initiatives intend to broaden and make more effective the Government's participation in the financing to innovation, and how they seek to fill existing gaps in the Brazilian scenario.

Besides Introduction and Conclusions, this has three sections. Section 2 explains the research methodology carried out. Section 3 presents a theoretical background about innovation investments and financing, considering peculiarities of each step of the innovative process. Section 4 discusses the results in two parts: the first presents the Brazilian scenario in innovation investments and shows the main existing country gaps; the second describes and analyses some of the recent actions of the Brazilian Government directed to financing innovation, in addition to comparing these actions to other countries' initiatives, pointing out challenges still to be faced.

2 Methodology

To achieve the objectives proposed in this study, an exploratory research through bibliographical survey and unstructured interviews was conducted. Besides, information available in publications such as books, thesis and articles of national and international origin were sought in order to submit a review of relevant literature on the topic.

The main data on investment and financing mechanisms for innovation were collected in annual reports, magazines and websites of major Government and private institutions, as well as through interviews.

The most important interviews were conducted with executives from BNDES, some of them being experts in innovation, belonging to different sectors of the institution: Planning Area, responsible for the development of operational policies and financial instruments of the Bank; Entrepreneur Capital Area, responsible, along with the Capital Markets Area, for BNDES activity in shareholding through funds, debentures and direct participation; Industrial Area, responsible for the financing of part of the Brazilian industry sector.

In Brazil, this research had focused on BNDES and FINEP, since they are the institutions that mainly finance innovation in the country, in addition to information of the Ministry of Science, Technology and Innovation (MCTI) and the Ministry of Development, Industry and Foreign Trade (MDIC).

Finally, it is worth noting that the present study did not focus on the governmental funding for innovation through tax incentives, given that the main objective was to analyse new funding mechanisms that had the participation of BNDES and FINEP. Nevertheless, the authors understand the importance of tax benefits, and that the theme deserves specific studies for improvement.

3 Theoretical Background

3.1 Characteristics of Investments in Innovation

According to Hall and Lerner (2009), investments in R&D have some characteristics that are different from other types of investment. Most of the costs are related to the payment of scientists, researchers and engineers, generating an intangible asset that typically does not create immediate profit. This tacit knowledge is embedded in the human capital of the firm and may be lost in the event of employee leave.

Another relevant aspect is the uncertainty associated with investments in innovation, particularly at the beginning of a research programme or development project.

These peculiarities conduct to the requirement of higher rates of return for these projects and give the investment a character of financial option, being difficult to evaluate it using traditional statistical techniques.

This unpredictability of the return brings also two other problems: the asymmetric information and moral hazard.

If there is a big uncertainty for the entrepreneur himself, that is even greater for potential investors or financiers, who will demand higher rates of return. The asymmetric information causes a difference between the cost of equity and debt required for such projects. The solution for this problem is not simple, because firms avoid disclosing details of their ongoing developments, fearful of imitation by competitors.

Due to these characteristics, companies which are intensive in R&D are less leveraged than others, and prioritize the use of own resources for investment in innovation. The empirical work of Hall (1992) and Himmelberg and Petersen (1994) shows the importance of a positive cash flow for investments in R&D, both in manufacturing firms as in small technology companies, in the U.S.

In addition to the high cost of debt, another reason lies in the fact that investments in R&D generate intangible assets, and these companies usually do not have sufficient physical assets to offer as collateral for bank loans. Finally, for the

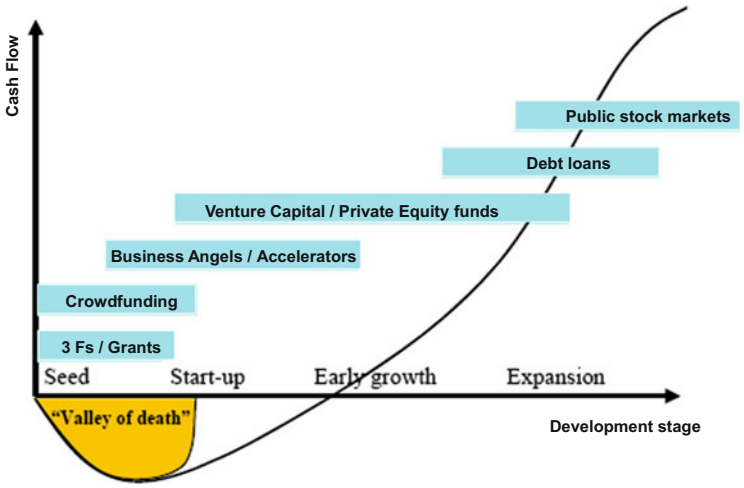

Fig. 1 Development stages, cash flow and sources of finance (Prepared by the authors based on UNECE 2009)

payment of the debt, it is desirable that these companies have a constant and predictable cash flow, which does not usually occur.

3.2 Financing Mechanisms for Innovation

The financing mechanisms for innovation will be influenced by the phase in which the company or the project is.

Figure 1 illustrates the typical cash flow throughout each of the financing stages. In the seed and start-up phases flow is negative, since the company does not obtain revenue from the sales of the new business; it only makes investments and expenses. In the following stages, flow tends to be positive. It is worth noting that despite the necessary amount of resources is much higher in the last stages, the business risks are much smaller, and traditional sources of funding can be obtained more easily (UNECE – United Nations Economic Commission for Europe 2009).

The founders, family or friends' (3Fs) personal financial resources are important at the beginning of life of innovative companies, but normally insufficient to cover all needs. Personal loans at banks are not suitable, as there is a long time required for the company to begin to generate cash. Finally, as already discussed, financing the new company via debt is practically infeasible. As a result, the alternatives presented in the early stages are the non-reimbursable financing and the search for foreign partners.

Non-reimbursable resources are normally granted by public bodies, in line with economic and social objectives of a country. They are resources granted as non-repayable fund, often in the form of "grants", and used for the initial development of the concept and market research. As there are usually strict criteria for the selection of the initiatives to be benefited, this type of funding can also be an important certification to the company to seek private investors (Lerner 1999).

The crowdfunding is a recent development of collaborative funding that is supported by internet platforms, and is an alternative way for financing innovative projects in the early stages. The crowdfunders receive acknowledgement and gifts, and may become a project partner.

The typical providers via equity financing in the early stages are business angels (BAs), accelerators and venture capital (VC) funds. BAs and accelerators tend to be entrepreneurs with previous successful experiences. According to UNECE (2009), the amounts invested are low, not exceeding US$ 500,000. On VC funds, between US$ 1 million and US$ 5 million are invested in each company, focusing on promising innovative or technology based businesses.

In a more mature phase, opportunities arise through the private equity (PE) funds, which can contribute to restructuring, consolidation and/or business expansion. Invested amounts are larger, typically above US$ 10 million per company.

Finally, when the company is already established, traditional financing as bank loans and access to capital markets become viable and attractive.

4 Results and Discussion

4.1 Brazilian Scenario of Investments in Innovation

This first part of the results aims to compare the Brazilian scenario with other countries, showing the main gaps Brazil must still overcome for effective promotion of innovation.

The total investment in R&D in relation to GDP in Brazil is low if compared to developed countries, losing positions to some emerging markets. The U.S., Germany and Japan, countries with a tradition in technology generation, annually invest around 3 % of their respective GDPs (MCTI 2013). Other nations are increasing spending in percentage terms, as South Korea and China (Table 1).

Booz & Co (2012) examined 1,000 publicly traded companies that had the greatest expenses with R&D in 2011. The investment of Brazilian companies presented in the study grew from US$ 1.9 billion to US$ 3.7 billion, however, represented only 0.61 % of total expenses in the companies identified in the ranking. The best placed were Vale (81st) and Petrobras (92nd).

This reduced private investment can be explained in part by the current stage of development in which Brazil is. According to Fonseca (2001), the higher the existence of a stable political, economic and legal environment, the greater the incentive for investment in physical and human capital is, since they reduce the

Table 1 R&D investments 2000–2011 as % of GDP (MCTI 2013)

Country	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
S. Africa	–	0.73	–	0.79	0.85	0.90	0.93	0.92	0.93	0.87	–	–
Germany	2.47	2.47	2.5	2.54	2.5	2.51	2.54	2.53	2.69	2.82	2.8	2.88
Brazil	1.02	1.04	0.98	0.96	0.90	0.97	1.01	1.10	1.11	1.17	1.16	1.21
Canada	1.91	2.09	2.04	2.04	2.07	2.04	2,00	1.96	1.92	1.94	1.85	1.74
China	0.9	0.95	1.07	1.13	1.23	1.32	1.39	1.4	1.47	1.7	1.76	1.84
Singapore	1.85	2.06	2.1	2.05	2.13	2.19	2.16	2.36	2.64	2.2	2.05	2.23
Korea	2.3	2.47	2.4	2.49	2.68	2.79	3.01	3.21	3.36	3.56	3.74	4.03
Spain	0.91	0.92	0.99	1.05	1.06	1.12	1.2	1.27	1.35	1.39	1.39	1.33
USA	2.71	2.72	2.62	2.61	2.55	2.59	2.65	2.72	2.86	2.91	2.83	2.77
France	2.15	2.2	2.24	2.18	2.16	2.11	2.11	2.08	2.12	2.27	2.24	2.24
India	0.81	0.84	0.81	0.8	0.79	0.84	0.88	0.87	0.88	–	–	–
Italy	1.04	1.08	1.12	1.1	1.09	1.09	1.13	1.17	1.21	1.26	1.26	1.25
Japan	3.00	3.07	3.12	3.14	3.13	3.31	3.41	3.46	3.47	3.36	3.25	3.39
Portugal	0.73	0.77	0.73	0.71	0.74	0.78	0.99	1.17	1.5	1.64	1.59	1.49
UK	1.82	1.79	1.8	1.75	1.69	1.72	1.74	1.77	1.78	1.84	1.8	1.77
Russia	1.05	1.18	1.25	1.29	1.15	1.07	1.07	1.12	1.04	1.25	1.13	1.09

In 2011, while Brazil spent US$ 27.6 billion in R&D, the U.S. performed US$ 415.2 billion and China US$ 208.2 billion
Besides, it is verified in Brazil, that the leading role of private investment in R&D is low, representing just 0.55 % of GDP (Fig. 2)

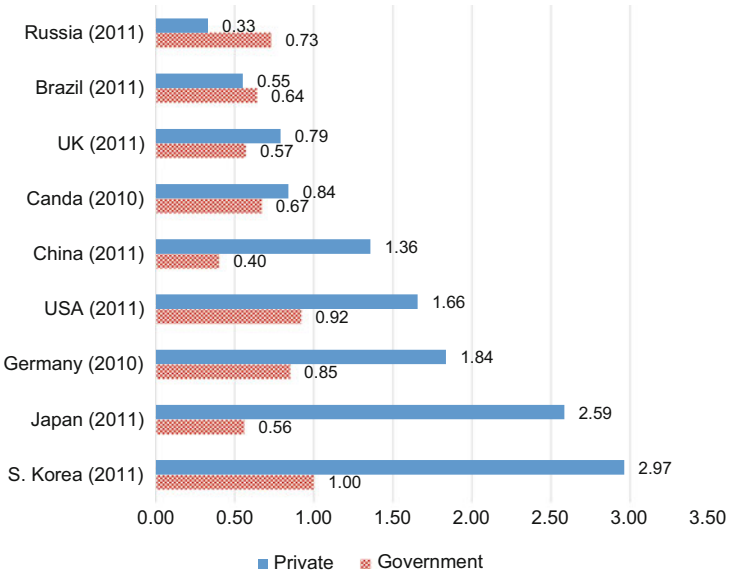

Fig. 2 Private and government investments in R&D – as % of GDP (MCTI 2013)

uncertainties in relation to the expected return. Brazil obtained recent macroeconomic advances as the fall in inflation and interest rate reduction. However, there are uncertainties regarding the maintenance of these achievements, as well as the country's capacity to implement reforms and investments in pursuit of growth sustainability.

Despite having a few universities and research centres of excellence, Brazil offers qualified technical staff in insufficient number,[1] raising labour force cost. It has a poor basic education system, further reducing the potential for new students to go to universities and technical courses.

There is a low presence of researchers allocated in the business environment, an example of the poor link between academia and corporations. According to MCTI (2013), 73 % of Brazilian researchers work for the Government, mainly in universities. This proportion is reversed in several countries. In the U.S., Japan and South Korea, about 80 % of researchers work for private companies.

According to the World Intellectual Property Organization (WIPO), Brazil's participation in the amount of patent applications registered in the world was only 0.3 %, in 2012. Among the 50 companies with largest amount of requests, no one is Brazilian. MCTI data indicate that Brazil made 679 requests, overcoming, among the BRICs, only South Africa, with 318. China made 13,273 requests, India 5,663 and Russia 888.

[1] According to estimates of the Federal Council of Engineering, Architecture and Agronomy – Confea (2013), while Brazil graduates about 40,000 engineers per year, Russia, India and China graduate 190,000; 220,000 and 650,000, respectively.

The number of PINTEC (2011) also illustrates Brazilian companies are not so innovative. Among 128.699 companies surveyed, only 35.7 % implemented some product and/or new or substantially improved process. If we consider only the launch of new products in the domestic market, this percentage drops to 3.7 % in the case of industrial companies and 8.8 % of service companies.

That survey also points out that among companies that invest in innovation, a few access public resources, being the small and medium-sized companies (SMEs) the ones with greatest difficulty. In innovative industrial companies, only 34.6 % used at least one Brazilian Government support instrument. Considering companies over 500 employees, that percentage is higher (54.8 %). FINEP points out that this fact may be due to the lack of knowledge of businessmen in relation to which type of instrument best suits to their needs (Luna et al. 2008). According to interviews conducted for this study, BNDES corroborates with this vision, and some businessmen have the perception that it is laborious and bureaucratic to obtain public funding.

Besides the importance of SMEs to generate employment and income for a country, some studies indicate they seem more innovative than the others. Booz & Co (2012) has identified that financial and innovative performance of companies are more related to how the innovation strategy is performed – involving people, leadership and effectiveness – than to the amounts invested in R&D; and SMEs seem to be more effective, because their organisational issues are less complex and bureaucratic. Acemoglu et al. (2013) ratifies the importance of SMEs when he shows that in the American market, new firms are more innovative and productive, being responsible for most of the sales growth, employment and spending on R&D. Therefore, the author argues that industrial policies and subsidies should be focused on encouraging the development of these firms, instead of older companies that, even with an innovation history, tend to settle in over time.

Barriers to innovation financing in Brazil also may be related to the country's still low developed venture capital industry.

Currently, the number of BAs in Brazil is around 6,300 while in the U.S. is 268,000. The start-up accelerators appeared only in 2011. It is estimated that there are approximately 30 institutions of this nature in the country, while in the world, according F6S (2014), this number jumps to 2,345.

VC/PE funds are also underdeveloped. According to ABVCAP (2013), Brazil ended 2012 with US$ 40.7 billion of capital committed to VC/PE funds, with US$ 25.8 billion already being invested. Of the total invested, only 3.5 % referred to VC funds, because foreign investors and pension funds concentrate investments in mature companies. Despite an increase of 33 % in relation to December 2011, the amount invested in VC/PE funds is small when compared to developed countries, even considering the proportionality of GDPs (Fig. 3).

Other important issue is the mature of Brazilian capital market. Jeng and Wells (2000) conclude that the volume of market IPOs has a high correlation with the existing investment in VC/PE, especially in more mature stages of investment and

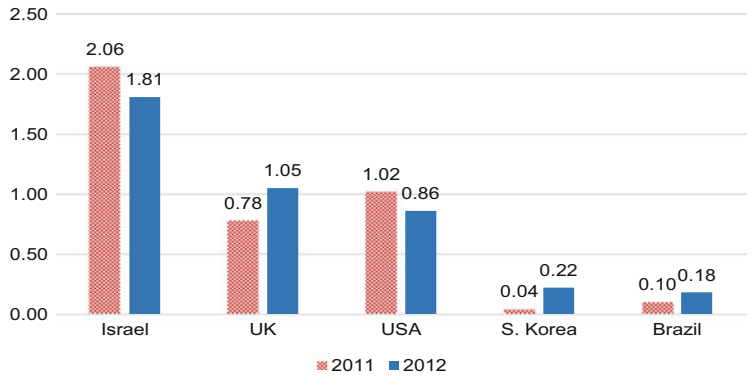

Fig. 3 VC & PE investments – as % of GDP (Emerging Markets Private Equity Association 2013)

when it comes to non-governmental investments.[2] In fact, one of the main risks faced by venture capitalists is not having the return of their investment.

Israel example illustrates it. In addition to the opening of capital in its own stock exchange (TASE), there were incentives for companies also do IPO in American and European stock exchanges. From 1992 to 2012, the number of companies listed on TASE grew from 378 to 549, with 50 of them today being also listed in international stock exchanges.

In Brazil, despite recent drivers to boost the capital market, as the reduction of the basic interest rate and the country investment grade, the amount of IPOs on the main stock market (BM&FBOVESPA) is yet small. As a result, the number of listed companies is low, being the smallest among emerging countries. Despite having the 7th largest global GDP, in 2011 Brazil was the 17th country in number of listed companies, and its stock market was at 26th position. This scenario can be explained because just large companies can access the capital market in the country. Only 50 % of the listed companies have revenues of less than US$ 500 million. The average volume of offers in 2011 remained at approximately US$ 400 million, amongst the largest in the world (Fig. 4).

BOVESPA MAIS is the listing segment of BM&FBOVESPA to companies wishing to enter the capital market gradually, seeking the enlargement of the shareholder base. Despite having been conceived to permit the access of a greater number of companies to the Brazilian stock market, this segment has only nine companies.

Finally, according to Bonawitz et al. (2013), Brazil must suppress legal and regulatory issues to boost its venture capital industry. Brazilian start-ups face a complex tax regime, a restrictive business regulatory system, extreme labour market rigidity and pervasive bureaucracy.

[2] It is important to point out that Jeng and Wells (2000) did not consider in their empirical study the trade sales as exit of the VC/PE funds. Data from Preqin (2013) show that this is the most recurrent exit of investments made in the world, both in VC funds as in PE. From 2008 to 2012, trade sales accounted for 66 %, while exits via IPO just 13 %.

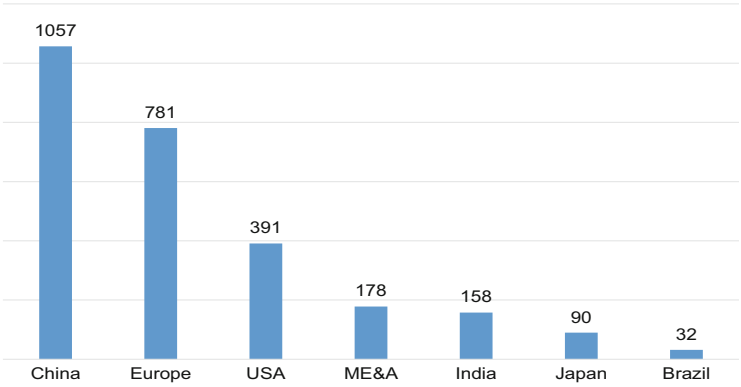

Fig. 4 Number of IPOs – 2008–2011 (Prepared by the authors based on compiled information by BNDES)

4.2 New Financing Mechanisms of the Brazilian Government

The Brazilian Government has been developing new financing mechanisms to broaden and make more effective their participation in financing innovation, as well as stimulate private investment. Some initiatives are presented below, in particular those with direct participation of BNDES and FINEP.

4.2.1 Innovate Company Plan

The various instruments and Government incentives aimed at financing innovation in Brazil indicate a need for greater coordination between the organs of Government, seeking to avoid overlapping of efforts and improve communication with the business community.

BNDES and FINEP sought a form of joint action through the BNDES-FINEP Joint Plan to Support Industrial Technological Innovation of Sugar Energy and Sugar chemical sectors – PAISS, released in 2011. The plan aimed to adopt a model of federal public resources management for the technological development of the sectors mentioned, and integrated financial instruments of support to innovation, contemplating non-reimbursable and reimbursable resources and equity participation.

In addition to avoiding overlapping of public resources applications and creating a single gateway to businessmen, the coordinated efforts among Government, companies and science and technological institutions (ICTs) around a central challenge leveraged cooperation between companies and company-ICT. These relationships maximise the contact of firms with no history of innovation projects

with innovation and development institutions, besides the attraction of new players, acceleration of strategies, skill complementarities and eventually the creation of new Brazilian companies.

In 2012, BNDES and FINEP released INOVA PETRO, along the same lines of PAISS, focusing on the development of Brazilian suppliers for the productive chain of the oil and gas industry.

The success of PAISS and INOVA PETRO made the Federal Government launch in March 2013 the "Plano Inova Empresa" (Innovate Company Plan), expanding previous plans scope and coverage. New strategic sectors were considered: agriculture and cattle farming, energy, health, aerospace and defence, technology information, and social and environmental sustainability.

The Table 2 summarises the conjunction plans already released and their current stages. It is important to notice that the initial resources demand from the private sector surpassed a lot the initial budget allocation.

4.2.2 Embrapii and Tecnova

In 2012, MCTI, in partnership with the National Confederation of Industry (CNI) and FINEP, created the Brazilian Research and Industrial Innovation Company (Embrapii).

Embrapii aims to promote projects of cooperation between domestic companies and ICTs to the development of new products and processes aligned to industry interests, particularly in projects in pre-competitive phase of the innovation process, in which risks are higher.

Through public tenders, Embrapii will select ICTs that will receive funds to develop innovative projects in conjunction with the business environment, with a focus on SMEs. At first, the Federal Government's contribution to Embrapii will be of R$ 1 billion in non-reimbursable resources until 2014.

The model seeks to increase the link between academia and business, with greater institutional articulation between public and private sectors, and foresees technical and economic risk sharing. Part of investments will be made with government resources and part by companies, in addition to the contribution of research institutions for infrastructure and human resources.

Embrapii was inspired by Brazilian Agricultural Research Corporation (Embrapa), which researches are consecrated even internationally. The main difference is that Embrapii will not possess an own research structure, but will use the network of existing laboratories in the country instead.

Another initiative of the Government is Tecnova, launch by FINEP in 2012. This programme will provide R$ 190 million in economic subvention resources directed to technological innovation projects of micro and small companies (annual revenue up to R$ 3.6 million), through partners in the States, besides R$ 19 million for support and training. There will also be support of Sebrae, with supplementary resources of R$ 50 million.

Table 2 "Plano Inova Empresa" (Innovate Company Plan)

			Public tender phases (January 15, 2014)			
Public tender	Total forecast value (R$ billion)	Partnerships	Submission of interest	Companies selection	Submission of business plan (BP)	Business plan selection
PAISS	1	BNDES and Finep	57 companies	39 companies	25 companies	PAISS
			R$ 10 bi	R$ 6 bi	35 BPs	
					R$ 3.1 bi	
Inova Petro	3 (in several public tenders)	BNDES, Finep and Petrobras	38 companies	23 companies	16 companies	11 companies
			62 BPs	35 BPs	25 BPs	16 BPs
			R$ 2.7 bi	R$ 850 mi	R$ 496 mi	R$ 353 mi
Inova Energia	3	BNDES, Finep and ANEEL	373 companies	127 companies	160 companies	102 companies
			R$ 12.3 bi	R$ 9.8 bi	138 BPs	109 BPs
					R$ 8.7 bi	R$ 7.1 bi
Inova Saude[a]	0.6	BNDES, Finep and MS	145 companies	79 companies	72 BPs	45 BPs
			R$ 1.3 bi	R$ 0.9 bi	R$ 0.8 bi	R$ 0.5 bi
Inova Saude[b]	1.3	Finep, MS and CNPq	63 companies	26 companies	26 BPs	21 BPs
			R$ 3.6 bi	R$ 3 bi	R$ 3.5 bi	R$ 2.4 bi
Inova Aerodefesa	2.9	BNDES, Finep, MD and AEB	285 companies	77 companies	70 companies	64 companies
			R$ 13 bi	R$ 12.8 bi	98 BPs	91 BPs
					R$ 10 bi	R$ 8.7 bi
Inova Agro	1	BNDES and Finep	372 companies	132 companies	83 companies	Until 31 January 2014
			R$ 5.7 bi	R$ 3.5 bi	R$ 2.9 bi	
Inova Sustentabilidade	2	BNDES and Finep	Until 17 January 2014	–	–	–
Inova Telecom	1.5	BNDES, Finep and MS	Until 24 January 2014	–	–	–

Total	**16.3**	**–**	**1.333 companies**	**503 companies**	**452 companies**	**265 companies**
			R$ 48.6 bi	**R$ 37.0 bi**	**477 BPs**	**314 BPs**
					R$ 29.5 bi	**R$ 22.2 bi**

BNDES-FINEP conjunction plans already released and their current stages (Prepared by the authors bases on information of BNDES)
The Federal Government estimates R$ 32.9 billion will be invested in innovation projects, being R$ 28.5 billion directly from the Government and R$ 4.4 billion via partner institutions such as ANEEL and National Small Business Support Agency (Sebrae)
ANEEL Brazilian Electricity Regulatory Agency, *MS* Ministry of Health, *MD* Ministry of Defense, *AEB* Brazilian Space Agency, *CNPq* National Council for Scientific and Technological Development
[a]Medical equipment
[b]Biodrugs, pharmacochemicals and medicines

Partners will be regional banks and funding agencies, responsible for the organisation and publication of public notice for companies' selection in their respective States, as well as for projects approval and monitoring.

The new initiatives seem to incorporate successful characteristics of the Government programmes SBIR, from the U.S., and START, from Russia: decentralised actions; shared costs between Government and industry; and focus on SMEs, minimizing crowding out risk.

Apple, Compaq and Intel are examples originally considered by SBIR. Since the beginning of the programme, 15,000 companies were benefited, with a total of US$ 21 billion in disbursements and 50,000 patents generated. Only in 2012, SBIR provided US$ 1.9 billion in financial support. The UNECE (2009) points out that one of the main factors of success is the decentralization of the eligibility of projects to be considered, being this responsibility divided between 11 federal agencies.

SBIR also has another important issue: a continuous evaluation of the effectiveness of its resources' application. Luna et al. (2008) say that in the U.S. this monitoring is done with large accuracy. The U.S Government controls not only the initial phases of the project but also the evolution of companies over time. Siegel et al. (2003) concludes that this is one of the main reasons for the success of SBIR. In Brazil, however, this practice is still incipient, and should be implemented in its financial mechanisms.

4.2.3 Startup Brasil

Seeking to promote the creation and development of start-ups as well as making these companies closer to potential BAs, MCTI launched in 2012 the Startup Brasil programme. Private accelerator companies were chosen to house start-ups which will receive R$ 200,000 each in public funds, in addition to other supports such as a collaborative space in Silicon Valley.

Startup Brasil total investment is in the order of US$ 40 million, aiming to boost at least 150 start-ups until 2016. Accelerator companies will become partners of the investee companies. This initiative resembles programmes recently launched by American and Chilean Governments: the Startup America and Start-up Chile.

In an interview, one of BNDES managers argues that the advantage of Government support via equity in relation to grants is that the first stimulates the complementation of the investment with the private sector, primarily by start-up accelerators, and in following stages by BAs and VC funds. In addition, the new companies may, from the beginning, receive guidance from more experienced investors and management support. Jensen (1993) claims that start-ups need a more active financial performance monitoring, normally made by the funds through positions in Boards of Directors and financial departments. Another advantage is the contact network of companies and investors to which the new firm is exposed, facilitating its integration on the market.

4.2.4 Criatec 2 and 3

In 2012, seeking to help attending the lack of venture funding in Brazil, especially for the early stages, BNDES Board approved the release of Criatec Funds 2 and 3, as a continuation of its work in seed capital. Based on the same model of Criatec 1, the Bank also seeks to contribute to reducing the existing barrier between academy and market.

The expectation is that each of the funds invests in at least 36 companies, pre-operating or not, with annual revenue of up to R$ 10 million. Twenty-five per cent of the resources will be allocated to companies with revenue of up to R$ 2.5 million. Support for each company can reach up to R$ 6 million. Both funds should have R$ 170 million of committed capital each and start investing in 2014 and 2015 respectively. BNDES estimates that these resources will leverage approximately R$ 5 billion in investments in the economy.

As in Criatec 1, the new funds will have, besides a national manager, some regional managers in order to be connected to local innovation ecosystems.

Relevant international experiences show the importance of the VC industry to attract private investment to boost innovation. Nonetheless, above all, each of the successful cases is endowed with its own characteristics, not only regarding the model adopted, but also in relation to some countries peculiarities.

Some of the most successful examples of this industry are found in the U.S., whose first VC fund was created in 1946, after the II World War. In 1958, the "Small Business Act" gave an important impulsion to create incentives for investment in SMEs, such as granting tax incentives for limited partnership and permission for pension funds to invest in high risk assets. In the 90s, Silicon Valley was the largest pole of generation of scientific and technological innovations, and venture capitalists had already provided successful companies like Google, Netscape, Apple and Intel.

Isenberg (2010) argues that Silicon Valley ecosystem evolved under a unique set of circumstances that brings it into a successful model: a strong local aerospace industry; the open California culture; Stanford University's supportive relationship with the industry; the development of semiconductors; a liberal immigration policy towards doctoral students; a massive and continuous investment in education in the U.S. and its ability to develop intellectual property.

Founded in 1993 by the Government of Israel, the Yozma Programme also deserves attention. During the first 3 years, the fund constituted by the Government with US$ 100 million made investments in ten private funds of VC, in addition to direct equity participation in business start-ups. With this investment, the Government sought to attract experienced international venture capitalists which, in turn, should invest about US$ 12 million and act in conjunction with local companies. Yozma then would invest up to US$ 8 million in each fund, subject to a top limit for return on investment, attracting even more private investors. In addition, the shareholders had a call option for Government shares for a period of 5 years.

Among other main achievements of Yozma is the fact that investments have been made in several small funds, reaching a greater number of companies and consequently extending the externalities, such as job creation and dissemination of learning in the VC processes. Another advantage was the promotion of the relationship of local companies with international venture capitalists. As companies grow, new investments become necessary, and contact with potential global investors were fundamental. Most investee companies managed to make IPO, not only in Israel but also in American and European stock exchange markets. Other companies were acquired by strategic investors, including major international groups such as Johnson & Johnson, Microsoft and Intel.

It is important to note, however, that there were other conjuncture factors contributing to Yozma success. Among them, the major investments of Israel Defence Forces for decades, spurring R&D and ensuring government purchases. In addition, the country already had skilled labour force at the time, as a result of compulsory military service that leveraged on young people skills in exact sciences, as well as by the immigration character of the country, which received skilled labour force from other countries. In recent years, Israel maintains one of the largest global investment rates in R&D and in VC funds, as a percentage of GDP. In 2012, Tel Aviv was considered the second city in the world with the best ecosystem of innovation and entrepreneurship, second only to the Silicon Valley.[3]

4.2.5 Incentives for the Use of Capital Markets by SMEs

Seeking to boost the use of capital markets by SMEs, BNDES has been active both institutionally and in its own investment portfolio.

Together with ABDI, BM&FBOVESPA, CVM and FINEP, BNDES is part of a working group that has been studying rules and practices of access markets in other countries. On a visit to several countries, successful stories were evaluated, in which SMEs had been able to issue shares to finance the development of its activities.

Based on the survey made, some initiatives were proposed, and are still under study, among which: cost reduction and simplification of the procedure of shares public offering; reduction of maintenance costs of publicly-held companies; direct tax incentives to specific investors and investment funds; investment limit elevation of private pension plans to the high-risk companies; initiatives for investors and Brazilian businessmen education; formatting of specific vehicles for investments in SMEs.

BNDES has also been trying to bring more companies of its portfolio to market, developing conditions for growth and good corporate governance practices of these

[3] Research conducted by the company Startup Genome, published in *Exame* Magazine of August 7, 2013. In this ranking, the city of São Paulo (Brazil) appears in 13th place.

companies, with a focus on listing and IPO. Of the nine companies listed on BOVESPA MAIS, six have shareholding of BNDESPAR.

Another initiative under consideration by the institution is to assist the demand of future IPOs, supporting public offerings on BOVESPA MAIS with firm guarantee subscription.

4.2.6 Investment Support Programme and BNDES Card

Given the characteristics of investment in innovation, the granting of reimbursable funding is basically made by public bodies, which offer specific lines for companies' innovation with more attractive conditions. In Brazil, the dependence on the development agencies and Government banks are even greater, since private banks do not usually grant long-term financing. In this way, BNDES and FINEP appear as the main financiers.

In 2009, BNDES created the "Programa de Sustentação ao Investimento – PSI" (Investment Support Programme), being innovation one of the focus. The goal was to stimulate companies to not postpone or cancel investments, as a result of economic crisis. Part of BNDES existing innovation lines and programmes turned to have better conditions due to PSI, currently with 4 % of annual interest, with total time of up to 120 months, and loan of up to 100 % of financeable investments. There is also the possibility, on a case-by-case study, of waiver of real guarantees.

Disbursement in 2010 was R$ 136 million, having reached R$ 1,136 million in 2012. In 2010, FINEP also started to transfer BNDES resources relating to PSI, and reimbursable resources disbursed by FINEP jumped from R$ 880 million in 2009 to R$ 1,765 million in 2012.

Another important instrument is the BNDES Card, whose operation resembles the one from traditional credit cards. SMEs wishing to invest in innovation can request the card to fund hiring of services of applied research, development and innovation, and also the purchase of domestic machinery and equipment, and other items. Each company has a pre-approved revolving credit, term of amortization of 3–48 monthly installments, fixed and equal, and interest around 0.9 % per month. In 2012, through this instrument R$ 9.5 billion have been disbursed, with 707,000 operations performed and 206,000 companies attended in 4,689 different municipalities of the country.

Reimbursable funding for innovation investments with more attractive conditions are also offered by several public bodies in the world, such as the European Investment Bank and KFW, a German government-owned development bank.

However, what is important to point out is the loan guarantee schemes, which seek to minimise the difficulty of SMEs in structuring of guarantees. Just in Europe, around 2.8 million of SMEs are using that benefit, with an amount of EUR 79 billion of guaranteed loans. Small Firms Loan Guarantee Scheme is a success example in UK, that guarantees to SMEs up to 75 % of the loan's value.

BNDES has a similar and recent initiative, called "Fundo Garantidor para Investimentos – FGI" (Guarantee Fund for Investments), which guarantees up to

80 % of the credit risk of transfer operations from BNDES to SMEs. However, FGI does not guarantees innovation investments.

Another way to mitigate the obstacle of the guarantees is the use of "semi-equity" financial instruments, where the lender may waive the requirement of collaterals in exchange for being a partner in the project, such as the model of "launch aid", used by the European Union for funding Air Bus innovations in the aviation industry.

Conclusions

Based on presented results and discussion, it can be concluded that recent actions of the Brazilian Government has sought to fill some existing gaps, and broaden and make more effective its participation in funding for innovation, as well as stimulate private investment.

Initiatives analysed in this study have four main characteristics, and seems to consider some successful characteristics of foreign mechanisms: (i) greater alignment with the interests of the market; (ii) greater focus on SMEs, with new non-reimbursable instruments and actions to stimulate the venture capital market; (iii) stimulus to increase the link between academia and business; and (iv) the unification of efforts among government agencies.

The "Plano Inova Empresa" foresees the articulated use of BNDES and FINEP financing instruments, in addition to the involvement of other public bodies. In this way, a greater efficiency in the allocation of resources and quality of public spending is wanted, in addition to facilitate communication with the business community. The analysis of jointed business plans, and not isolated projects, aims cooperation between players and complementarities of competences.

Greater focus on SMEs and market orientation with shared costs between Government and industry have been identified in Embrapii and Tecnova non-reimbursable instruments, and in actions directed to venture capital. These mechanisms, as well as Criatec, has also decentralised actions, in order to be connected to local innovation ecosystems.

Initiatives for the venture capital industry aim to encourage the creation and development of start-ups, through "Startup Brasil" and new venture capital funds, such as Criatec 2 and 3. Despite recent advances in the latest years, investments in funds of VC/PE in Brazil are still low and do not meet the necessary demand. Relevant experiences like Israel and the U.S. showed the importance of this industry to attract private investment for innovation and increase the country's competitiveness. The ideal model for Brazil, however, needs to consider the country current stage of development and peculiarities, as well as present opportunities of investment.

A greater use of capital market by SMEs is also being sought, with initiatives in study ranging from IPO process simplification and cost

(continued)

reduction to keep the company opened to fiscal incentives to increase demand and initiatives for educating investors and companies. In addition to being an alternative source for resources to companies, a developed capital market increases the attractiveness of VC/PE funds since investors see higher chances of exit.

The Government has also tried to facilitate the acquisition of reimbursable resources for innovation by companies through granting better financial conditions, being the main example PSI and BNDES card.

Some improvements, however, still seem to be important, and have been already used by some countries in successful mechanisms. Among them, the development of tools to assess public resources application effectiveness through monitoring the early stages of the project supported and also the subsequent evolution of companies.

Despite the progress mentioned, a greater focus should be given to SMEs. They have more difficulty to obtain funds, but are the biggest generators of jobs and tend to be the most productive and innovative companies. In this way, it would be important to expand the use of loan guarantee schemes, such as FGI, including in its scope the guarantee on innovation investments. Financial instruments characterized as "semi-equity" can also be an alternative way to mitigate the problems of insufficient guarantees.

Finally, extrapolating the issue of funding mechanisms, it is important to emphasise the urgent need for Brazil to make the business regulatory system less bureaucratic and simplify the tax structure, as well as reduce labour market rigidity, so that innovative small businesses can grow. Additionally, besides the need to solve Brazilian lagging educational system, it is also necessary to further business training for innovation management. Studies have shown that the effectiveness in turning good ideas into businesses is not related only to the amounts invested in R&D, but also to how the innovation strategy is carried out by the company.

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Entrepreneurship and Venture Creation in Brazil: Key Policy Issues

Renata Lèbre La Rovere, Pedro Menezes Vilarinhos, and Tainá Albuquerque Bravo de Souza

Abstract Recent research on entrepreneurship and venture creation suggests that there are several elements that frame the entrepreneurial ecosystem which may influence the decision to engage in entrepreneurial activities. The aim of this chapter is to present the results on Brazil of a research project whose main purpose is to identify the main elements of the entrepreneurial ecosystem in the BRIC countries. We first made a survey among ICT entrepreneurs concerning their perceptions on the relative importance of key elements of the entrepreneurial ecosystem that are: individual and personal characteristics; socio-cultural context; Government programs and policies; access to finance; access to information, opportunities for knowledge and skill building and exposure to global markets. We then made the same survey among non-ICT and non-entrepreneurs, to assess the specificities of knowledge-intensive entrepreneurs such as those in the ICT sector. We combined these quantitative surveys with a qualitative research where we interviewed entrepreneurs and policy-makers engaged in entrepreneurial support. Based on these results we propose some key policy issues to support entrepreneurship in Brazil.

Keywords Entrepreneurship • Development • Policies of support

1 Introduction

The importance of institutional and social factors for the success of enterprises is a subject that has been discussed by several scholars. Some of them, like Casson (2003) highlight the importance of individual capabilities of entrepreneurs. Most of the studies that focus on entrepreneurial capabilities, however, assume that the entrepreneur is a rational agent that will maximize gains obtained with allocation of resources, in line with the assumptions of the economic neoclassical theory (Brandão et al. 2011).

A different path of research related to the rationale of entrepreneurs is proposed by Sarasvathy and Dew (2005); these authors propose that entrepreneurs, as agents

R.L. La Rovere (✉) • P.M. Vilarinhos • T.A.B. de Souza
Institute of Economics, Universidade Federal do Rio de Janeiro, Rio de Janeiro, Brazil
e-mail: renata@ie.ufrj.br; pedromvilarinhos@gmail.com; tainaalbuquerquebravo@gmail.com

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with procedural rationality,[1] set decision-making principles in a context of uncertainty, that leads them to focus on their own capabilities and use them to reach satisficing objectives framed by the business environment. In this same path, Aldrich and Yang (2014) suggest that the process where entrepreneurs learn how to deal with the challenges and opportunities of setting a business is continuous, starting with family influences in childhood and adolescence and continuing as entrepreneurs engage in setting their enterprises.

Other authors like Julien (2007) suggest that as institutions have an important influence on the decisions of entrepreneurs, it is important to consider the *milieu*[2] in order to understand how entrepreneurs act and position themselves in the market. Working with the concept of entrepreneurial ecosystem – that encompasses all elements of the *milieu* important to entrepreneurship – Manimala (2008a, b), divides the main elements conducting to entrepreneurship in six main groups, that are:

1. Individual and personal characteristics
2. Socio-cultural context
3. Government programs and policies
4. Access to finance
5. Access to information, opportunities for knowledge and skill building
6. Exposure to global markets

The objective of this chapter is to present the results on Brazil of a research project that is investigating how these elements are perceived by entrepreneurs and what are the main policy implications of these perceptions. In fact, our research suggests that perceptions from Brazilian entrepreneurs on how to be successful are different from perceptions of policy-makers. The cognitive distance[3] between firms and support institutions leads to challenges that will be discussed in this chapter.

Support to entrepreneurs in Brazil has been deemed as important by Brazilian institutions because most Brazilian firms are small and have limited resources that inhibit their innovation capabilities. Feldens et al. (2012) suggest that in Brazil there is a mix of individual and institutional characteristics that limits innovation activity by Brazilian small firms. As for individual characteristics, several entrepreneurs regard their business as alternatives to jobs and not necessarily pursue innovative activities. Those who search innovation frequently have a technical education and limited managerial capabilities and there is a tendency among entrepreneurs to centralize decisions and be resistant to new partners. As for institutional characteristics, Universities, especially public Universities that attract

[1] See Simon (1996).

[2] Milieu may be considered as a grouping of economic, cultural, political and social elements. See Maillat and Perrin (1992).

[3] Although most authors propose the concept of cognitive distance to explain how firms differ in their attitudes towards innovation, we believe that this concept may be applied to explain differences between firms and support institutions as well.

the best students, do not promote an entrepreneurial culture, a fact that was also observed by Campelli et al. (2011).

In addition, Government norms and regulations are a hindrance to create a new business and to get credit. It may also be noted that the domestic market is so huge that firms do not feel the need to export and thus be exposed to strong competition. Feldens et al. (2012) suggest that incubators fail to train start-ups in managerial capabilities. In fact, a survey made by Guimarães (2011) with high-tech firms located in incubators in the south of Brazil found that most entrepreneurs considered innovation costs, reduced access to finance and high economic risk as obstacles to innovation. Sarfati (2013) suggests that most public policies to support entrepreneurs in Brazil are in fact policies to give credit to SMEs and to support clusters and not policies to support innovation in SMEs. In his view Brazil should try to follow other countries such as Canada and Ireland that have specific policies of support to high-tech firms that have high rates of growth (gazelles).

Data compiled by the National Science Foundation (NSF) and the World Economic Forum (WEF) illustrate the challenges for Brazilian policy makers. According to NSF's National Science Indicators 2014, Brazil's R&D expenditures share in GDP was 1.16 % in 2010, the highest ratio among Latin American countries and the second ratio among BRIC countries, behind China. The share of knowledge and technology industries in total industry (around 21 %) is lower than the share of developed countries (32 % on average) but similar to the other BRICS countries. However, the country ranks very poorly in some of WEF's indicators published in the Global Information Technology Report 2013, such as business and innovation environment (126 in 144 countries) and skills (91 in 144 countries). In a study that compared institutional conditions for entrepreneurs from Brazil, China, India and South Korea, Brazil ranks last in general institutional environment, perception of institutional environment and regulatory environment (Gupta et al. 2014).

Despite this unfavourable environment, most entrepreneurs in Brazil open their business motivated by an opportunity (Scarpin et al. 2012) and entrepreneurs keep opening firms in high-technology sectors in Brazil. For example, the number of Brazilian companies in the Information Services and Software Industry grew 11.7 % per year between 2007 and 2010, reaching a total of 73,387 enterprises in 2010. Of those, only 3.3 % have more than 20 employees (Duarte 2013).

2 Methodology

The research started in 2010 and was conducted in several steps. The first was to apply a pilot in-depth questionnaire with questions related to the six factors mentioned above to a group of 12 ICT enterprises. Of those, six enterprises were chosen between the 200 SMEs that had the largest growth rates in Brazil between 2007 and 2009 and six were start-ups located in Rio de Janeiro. ICT enterprises were chosen because, as they are in a knowledge-intensive sector, they tend to have

shorter cycles of innovation than traditional industries, therefore suffering a strong competitive pressure.

Based on the in-depth questionnaires we devised an on-line questionnaire that was applied to 120 ICT enterprises that were contacted in large ICT conferences, by email and through social networks. Entrepreneurs had to classify elements linked to each factor as very important, medium importance, no importance or no opinion. In addition to the questions related to the six factors mentioned above, we also asked entrepreneurs to mention the three most important factors of success and the three most important factors of failure. After the process of validation we got 76 valid questionnaires. As a second round of validation further eliminated more 26 questionnaires, this chapter will present results of 50 questionnaires answered by ICT entrepreneurs.

Results of these questionnaires raised several interesting questions. We noted a strong bias of entrepreneurs towards considering their own capabilities as the most important for success in entrepreneurial activities. We also noted that elements that are considered in the literature as important for entrepreneurs such as entrepreneurial education, incubator activities and start-up programs were not deemed relevant. The questions that arose from this observation were the following:

1. Is the limited importance attributed to institutions a result of different perceptions of what is important for entrepreneurship when we consider entrepreneurs and policy-makers?
2. Is the focus on individual capabilities a specific result for knowledge-intensive entrepreneurs such as the ICT entrepreneurs?

In order to answer these questions, the next steps of the research were, first, to make in-depth interviews with institutions that may influence the decisions of ICT entrepreneurs and second, to apply the same online questionnaire to a group of 50 non-ICT entrepreneurs. We also applied the questionnaire to a control group of young non-entrepreneurs, to identify which of the elements of the entrepreneurial ecosystem listed above are perceived as important by potential entrepreneurs.[4]

As we already presented the results of the interviews with institutions elsewhere (La Rovere and Melo 2012), this chapter will focus on the results of the online questionnaires, applied to ICT and non-ICT entrepreneurs and the control group. It will also discuss key policy issues related to these results.

[4] The control group consisted of undergraduate students in the last year of Economics and Management courses of the Federal University of Rio de Janeiro.

3 Results

3.1 ICT and Non-ICT Entrepreneurs

As mentioned before, the first question we raised was about how ICT entrepreneurs see themselves in the milieu. We asked entrepreneurs to state whether their individual abilities were important for success. The results revealed a strong perception among Brazilian entrepreneurs that individual characteristics are the main factor that guarantees success (see Figs. 1 and 2). While taking risk is more important for non-ICT entrepreneurs, ability to organize the resources for start-ups are more important for ICT entrepreneurs.

This result may be explained by difficulties reported by the group of in-depth interviewees concerning organization of resources. According to this group, most entrepreneurs in the sector had difficulties to select employees, get financial

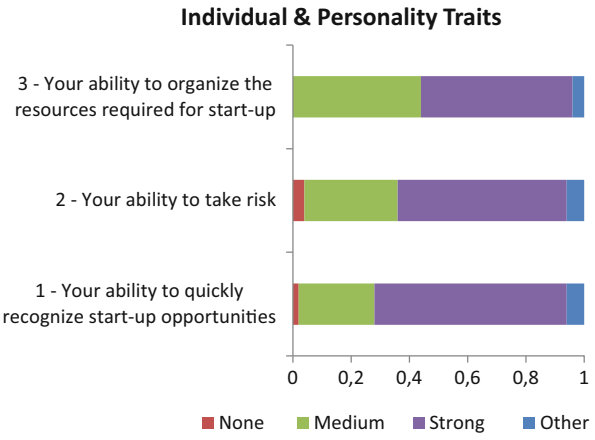

Fig. 1 Importance of individual and personality traits – ICT entrepreneurs

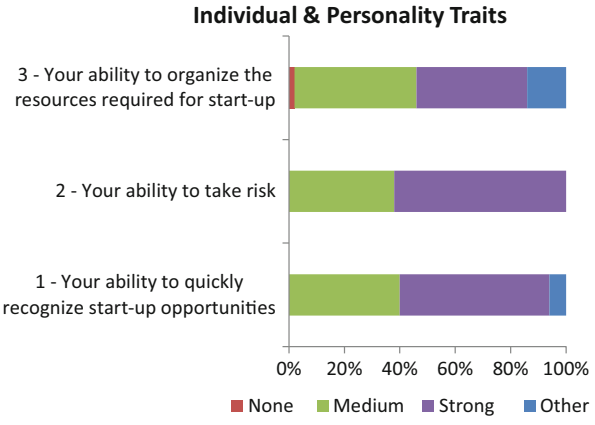

Fig. 2 Importance of individual and personality traits – non-ICT entrepreneurs

resources and establish networks. Therefore, the entrepreneur ends up making decisions individually and in a daily basis and if he is successful he tends to believe that this stems from his own capabilities.

In contrast, a survey conducted by Vicenzi and Bulgacov (2013) with entrepreneurs from the south of Brazil showed that the most important individual characteristic for them is motivation and determination. On the other hand, taking risk had the lowest scores among all the possible answers, a fact that surprised the authors.

When asked about the importance of the socio-cultural context, both ICT and non-ICT entrepreneurs gave more importance to opportunities for new venture creation and culture for encouraging innovation. However, they reckoned that Brazil is not a country where entrepreneurship is considered a good career choice; this result poses a challenge to policies to support entrepreneurs (Figs. 3 and 4).

These results are in line with the ones obtained by Gupta et al. (2014) in their research, which compared the entrepreneurial environment of the so-called Rapidly

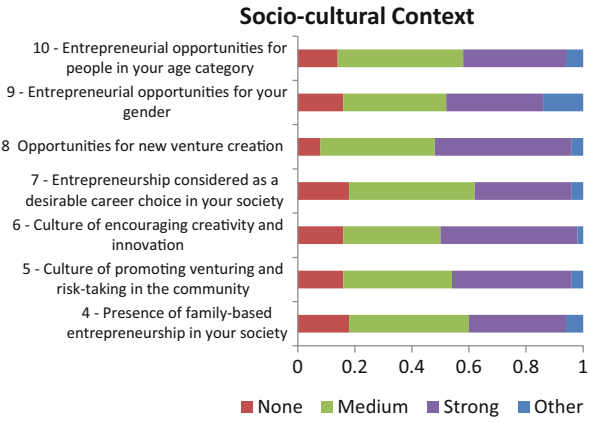

Fig. 3 Importance of socio-cultural context – ICT entrepreneurs

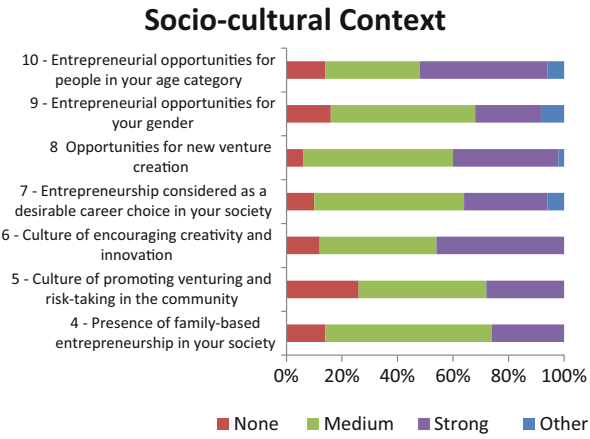

Fig. 4 Importance of socio-cultural context – non-ICT entrepreneurs

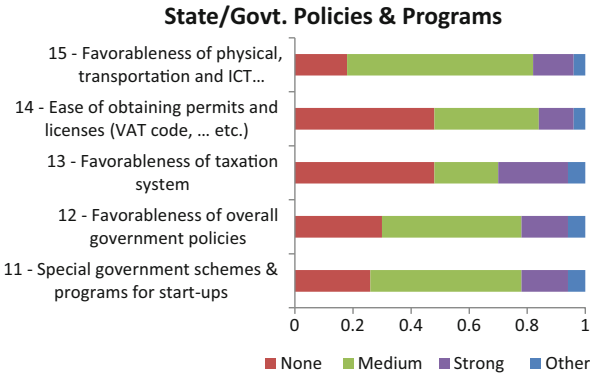

Fig. 5 Importance of government programs and policies – ICT entrepreneurs

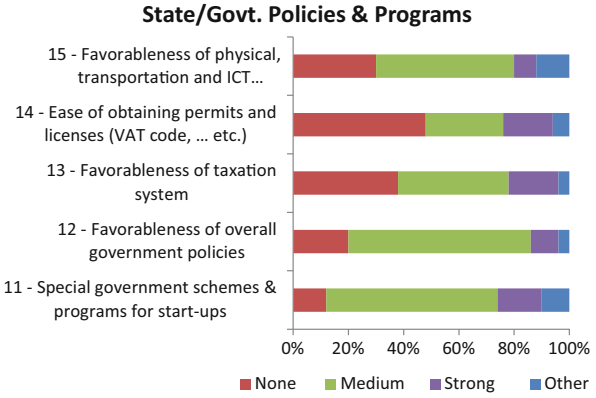

Fig. 6 Importance of government programs and policies – non-ICT entrepreneurs

Emerging Major Economies (REMEs): Brazil, China, India and South Korea. They collected surveys from business students from the four countries and the results showed that Brazil, compared to the others REMEs, has the worst environment for the creation of new ventures.

While access to institutions such as Government agencies and banks could improve capabilities of entrepreneurs, institutions are not considered important (see Figs. 5 and 6). Among the in-depth interviews, most entrepreneurs said that Government policies were not important; to our surprise, this was not mentioned only by very small entrepreneurs (which have limits to access institutions due to size) but also from entrepreneurs from medium-sized companies. Entrepreneurs seem to be very critical of the favourableness of Government policies.

It is important that Brazilians policy-makers can understand what is leading entrepreneurs to ignore the importance of Government support, so that they can work on new policies to help boost entrepreneurship. Lerner (2010) pointed out three main reasons why Government should support entrepreneurship: importance of innovations in economic growth; impact of entrepreneurship for developing innovations; and the historical evidence that shows that Government can in fact play an important role in developing entrepreneurial activity.

When it comes to access to finance, the in-depth interviews revealed that most entrepreneurs from this group had used money from relatives and friends to start their businesses and just two companies had access to private equity financing. This reliance in their own resources explains why entrepreneurs do not view financial institutions as important, because companies try to keep growing with their own resources or by partnerships with customers and suppliers. As a result, they attribute a limited importance to access to bank loans and do not consider important access to Government subsidies (see Figs. 7 and 8). This behaviour is coherent with the proposition of Blumberg and Letterie (2008) that most SMEs tend to get credit from commercial banks as this type of credit is given in an individual basis and does not affect the control of the entrepreneur over his business (differently from private equity operations, for instance).

Concerning access to information for creating knowledge and skill building, results showed that surprisingly, entrepreneurs do not reckon the importance of

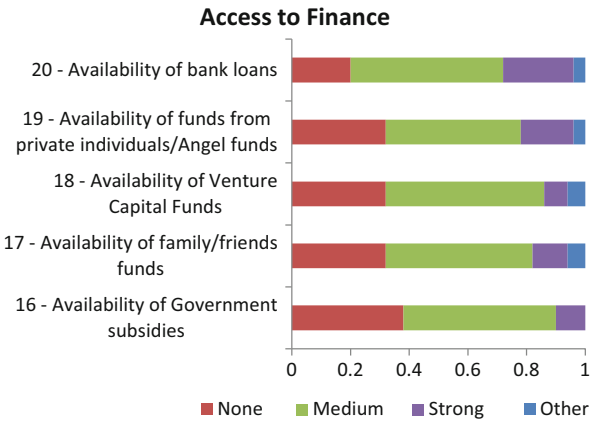

Fig. 7 Importance of access to finance – ICT entrepreneurs

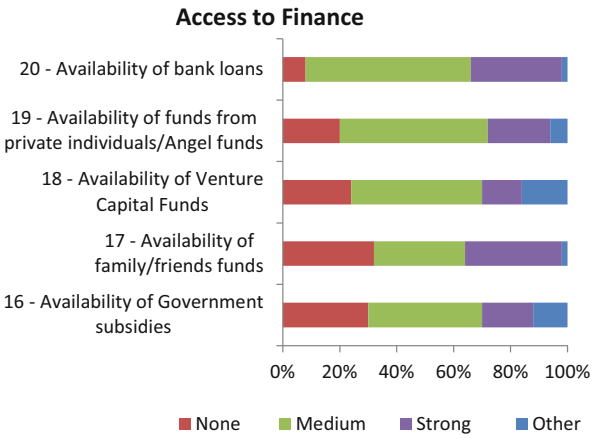

Fig. 8 Importance of access to finance – non-ICT entrepreneurs

interaction with educational institutions and with public agencies. The only training institutions considered relevant were industry associations and incubators (see Figs. 9 and 10).

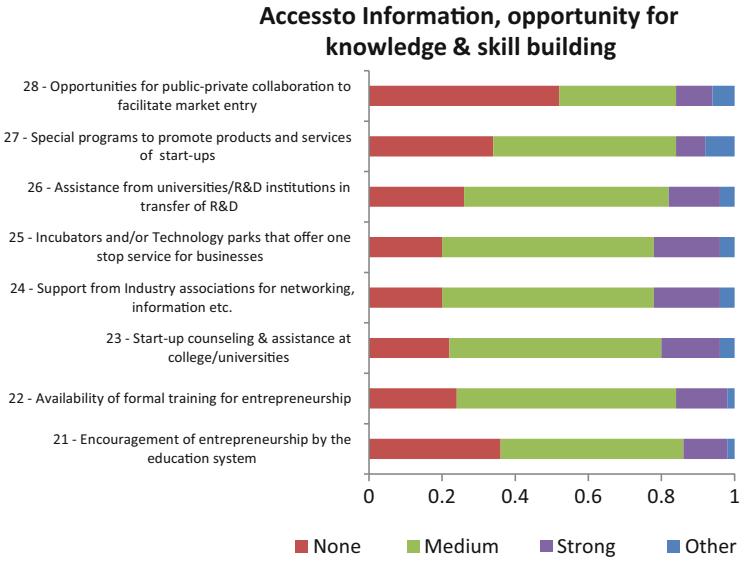

Fig. 9 Importance of access to information – ICT entrepreneurs

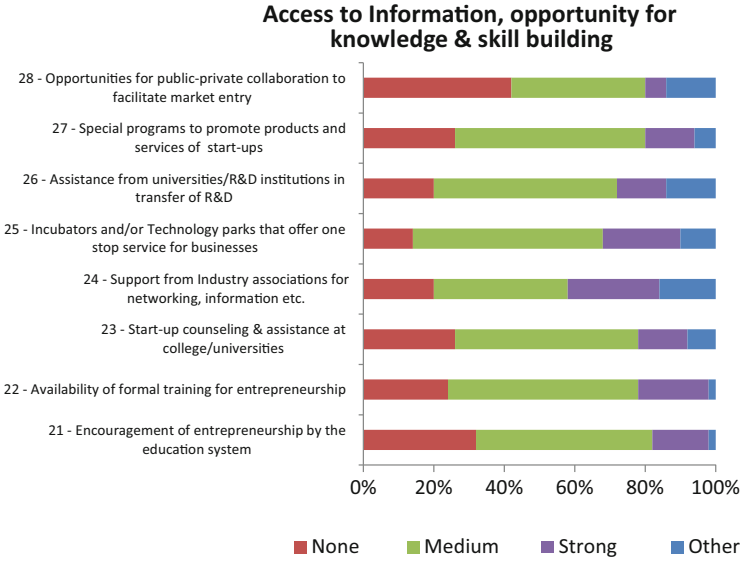

Fig. 10 Importance of access to information – non-ICT entrepreneurs

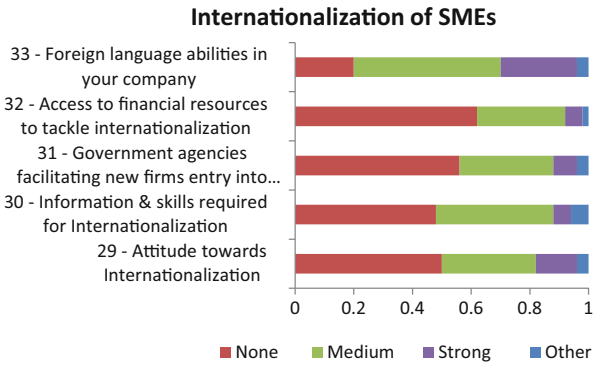

Fig. 11 Importance of internationalization – ICT entrepreneurs

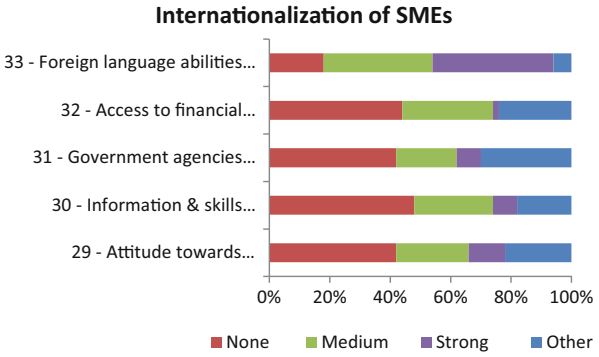

Fig. 12 Importance of internationalization – non-ICT entrepreneurs

Our results also suggest that Brazilian SMEs have a limited access to the external market. This may be explained by the fact that in recent years the internal market in Brazil has been expanding quickly, therefore SMEs do not feel stimulated to go to the external market (see Figs. 11 and 12).

3.2 The Control Group

The control group showed interesting results. Similar to the group of entrepreneurs, people from the control group attributed a great importance to individual traits. They also pointed opportunities of new venture creation and culture favourable to innovation as the more important elements of the socio-cultural context (see Figs. 13 and 14). Like the entrepreneurs, they do not consider that Brazilian society praises careers linked to entrepreneurship. However, the perception on Government policies is remarkably different (see Fig. 15).

Concerning access to finance, the only element deemed relevant is access to bank loans, a result similar to the result of the group of entrepreneurs (see Fig. 16).

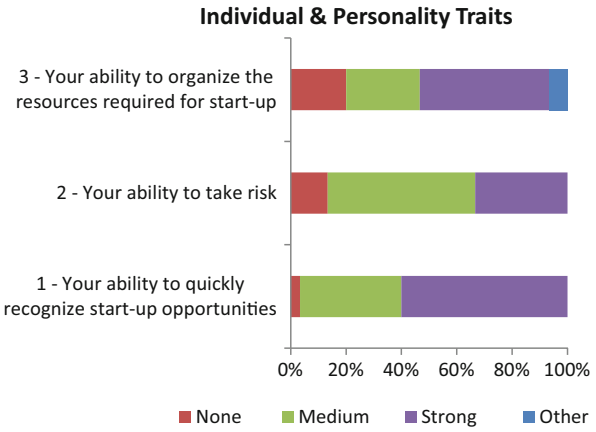

Fig. 13 Importance of individual and personality traits – control group

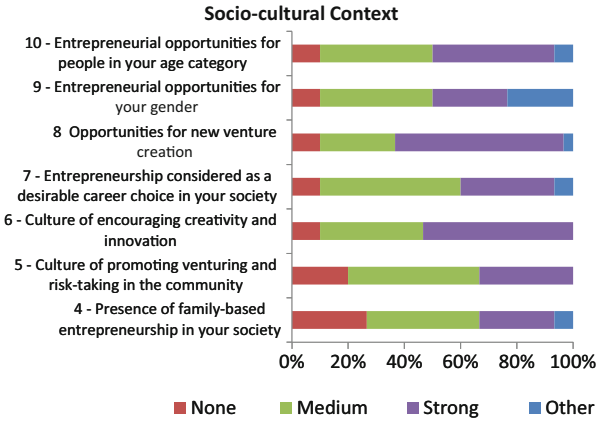

Fig. 14 Importance of socio-cultural context – control group

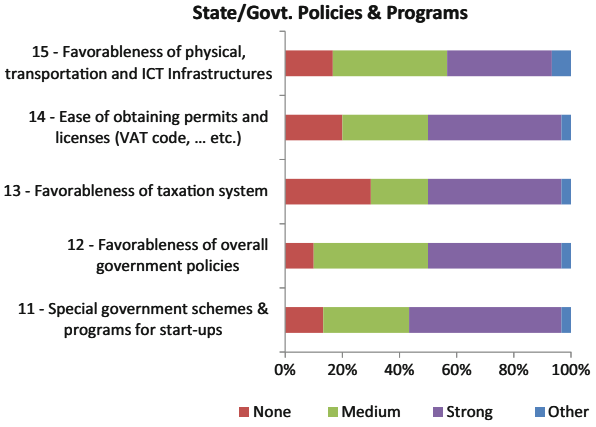

Fig. 15 Importance of government programs and policies – control group

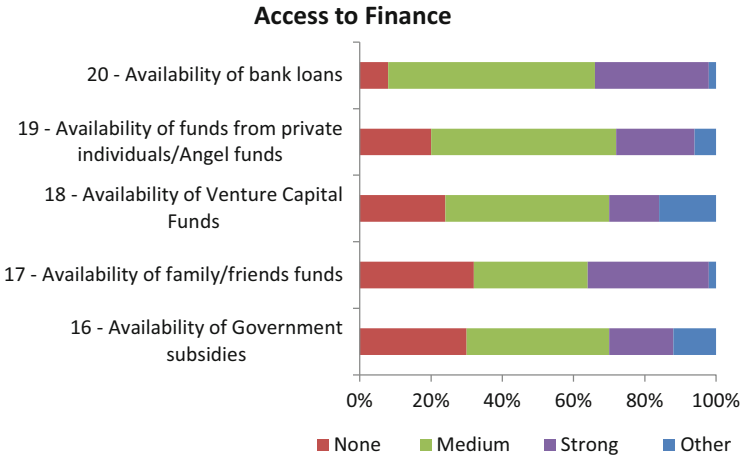

Fig. 16 Importance of access to finance – control group

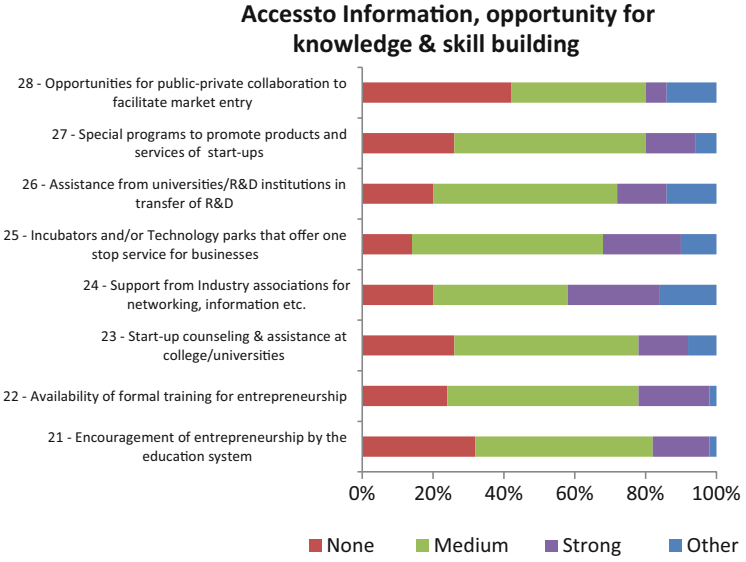

Fig. 17 Importance of access to information – control group

Results concerning importance of access to information and internationalization were also similar to the results of the group of entrepreneurs. The most important elements for promoting entrepreneurship are support from industry associations and incubators. Internationalization is not considered important for success of a business (see Figs. 17 and 18).

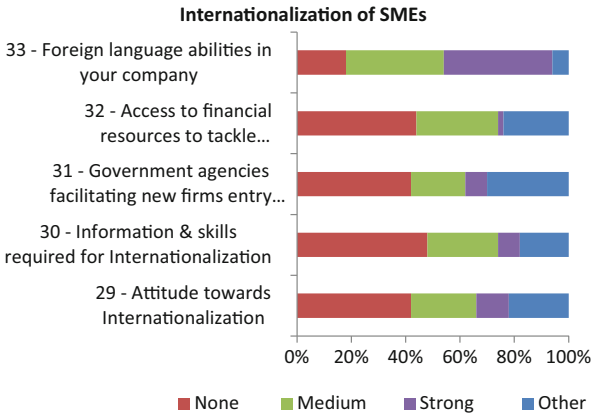

Fig. 18 Importance of internationalization – control group

4 Discussion

The results show that there are few differences between ICT entrepreneurs and entrepreneurs from other sectors. Both groups attribute a stronger importance to individual traits and rely on their own resources. They recognize few elements of the socio-cultural environment that may be important for their business and are sceptical about the possibilities of getting relevant support from Government. They also do not attribute much importance to interaction with universities and training institutions (excepting incubators) and do not seem much interested in globalization. The control group confirmed all these results, with the exception of the perception of Government policies. Whether this is related from the specificity of the control group is a question that deserves further investigation.

The picture that emerges from the questionnaires may lead to the conclusion that policy-makers in Brazil have not been attentive to the support of entrepreneurs. However, this is not the case. On the contrary, Brazil has many programs to support entrepreneurship, at the federal, state and local levels (La Rovere and Melo 2012). When we had only the results from the ICT entrepreneurs, some specialists suggested that this self-made man culture was typical of the sector. Nevertheless the results of the non-ICT entrepreneurs show that this culture prevails also among entrepreneurs from other sectors.

The interviews we made with policy-makers revealed that they believe this culture is related to the very difficulties enterprises have to get support. For instance, as many programs of support in Brazil focus on the concession of credit lines, policy-makers from credit institutions indicated that entrepreneurs lack the necessary training to get appropriate lines of credit; they also believe that it is the Government agency's role to provide the necessary training so that more entrepreneurs get credit and use this credit toward innovation. Policy-makers from incubators, on the other hand, told us that the main difficulties entrepreneurs faced, in addition to difficulties to get credit, were related to the formation of partnerships with other businesses and to the low managerial capability. However, this is not

what entrepreneurs apparently expect from the Government. Rather, what seems to emerge from the results of the questionnaires is that entrepreneurs would prefer to have a friendlier environment to operate.

It is a well-known fact that in Brazil the cost of opening a business is higher than in other countries. However, this cost is not only related to high rates of interest: the bureaucracy involved in getting credit is also discouraging. A recent study by Carvalho (2013) concluded that the entrepreneurs that get credit lines approved by FINEP[5] face several transaction costs and among these the higher cost is the average time to get the credit line (more than 4 months).

There is, therefore, a cognitive distance between support institutions and firms concerning how to promote entrepreneurship in Brazil. Policy-makers tend to reflect the realities of their own institutions, enhancing the role of credit (when they are from development agencies) or of networking (when they are from incubators), while entrepreneurs seem to act according to Saraswathy and Dew's model: they focus on their own capabilities and on how those capabilities may provide satisficing results by interaction with the environment. The key policy issue, therefore, is not on providing more resources to entrepreneurs. Rather, it is to render the business environment friendlier so that resources can be used more effectively.

Other key policy issue that appeared in the statements of all support institutions is the importance to focus on strategic learning. Vicenzi and Bulgacov (2013) found, on a survey among 100 Brazilian entrepreneurs, that few of those incorporate strategic planning in their routines.

Strategic planning is just part of a program of entrepreneurial education, which should be provided in all levels, from schools to universities. Entrepreneurial education before entering Universities is important because, as observed by Obschonka et al. (2012) entrepreneurial competencies developed during adolescence do have a positive influence on an adult's entrepreneurial activity. As suggested by Lugar-Brettin (2013), entrepreneurial education must also focus on innovative culture, acquisition of competitive advantage and innovation capabilities.

Entrepreneurial education should consist of formal and practical training combined, as suggested by Zampier and Takahashi (2011) and by Elmuti et al. (2012). Chen et al. (2013) made a survey among Chinese University students and concluded that offering formal entrepreneurial education does not induce University students to become entrepreneurs; they stress that entrepreneurial education cannot be offered using conventional methods and the involvement of mentors that may offer practical training is essential. In addition, Theodorakopoulos and Figueira (2012) stress the importance of communities of practice to entrepreneurial learning, therefore a focus on practical training and networking is essential for entrepreneurial education.

[5] FINEP is the financial arm of Brazil's Ministry of Science and Technology. See www.finep.gov.br

Conclusions and Limitations of the Study

In conclusion, there are some policy recommendations that arise from our discussion

- Development Agencies should try to minimize the transaction costs involved in support lines by reducing bureaucratic procedures;
- Industry Associations and Incubators, that were mentioned as important elements for entrepreneurship by all groups, should increase their training activities in managerial capabilities and promote joint actions with Development Agencies so that entrepreneurs can use resources offered more effectively;
- Entrepreneurs should be more open to opportunities derived from interaction with institutions and with the external market;
- Universities should promote entrepreneurial education across all levels of education.

These policies should be mixed following the suggestions of Lerner (2010): policy-makers must refrain to intervene too much in the market and focus on enhancing innovative capabilities by supporting scientific research, networking and entrepreneurial education.

Although this research provided us with some clues on the main challenges faced by policies to support entrepreneurs, many questions still have to be developed. Nevertheless, the key policy issues can be summarized in two lines of action – providing a friendlier business environment and focusing on strategic learning – how to transform these lines of action in concrete policy measures should be a subject of further studies. Also, as observed by Dennis Jr (2011), an assessment of policy impediments and supports leads to a better understanding on the better policy mix to promote entrepreneurship in given regions.

The main limitations of the study relate to the small size of the sample and to the concentration of the sample on entrepreneurs and policy-makers of the southeast region of Brazil. We hope to see studies such as these replicated in other regions to improve our understanding of the challenges of policies to support entrepreneurship in Brazil.

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Key Elements of the Entrepreneurial Ecosystem Facilitating the Growth of ICT Entrepreneurs in Russia

Elena Pereverzeva

Abstract This exploratory study examines the perceptions of Russian entrepreneurs about their experiences with their own new venture creations in Russia. The study utilizes the Ecosystem approach to examine the drivers of entrepreneurship. Integrating the theory from economics, sociology, and psychology, we argue that both the individual personality traits and the environment impact entrepreneurial activity. We used a mixed method approach with in-depth interviews and surveys, followed by interviews with the Control Group.

Keywords Entrepreneur • Russia • New venture creation • ICT

1 Introduction and Background

The complexity of today's global economic environment has made it more important than ever before to recognize and encourage entrepreneurship as one of the prime movers of economic growth. In light of the multiple challenges facing global economy, there is lot of interest among policy makers and researchers to explore the factors that promote entrepreneurship and innovation in a country, as well as the barriers that prevent innovative SMEs and entrepreneurship from playing their full potential role.

There are many determinants driving entrepreneurship. Understanding the factors behind this process has occupied the minds of economists for hundreds of years, engendering theories ranging from Adam Smith's focus on specialization and the division of labor to neoclassical economists' emphasis on investment in physical capital and infrastructure, and, more recently, interest in other mechanisms such as education and training, technological progress, macroeconomic stability, good governance, firm sophistication, and market efficiency, among others.

In light of the changing world dynamics, a multi-country research group has been formed in 2009, comprising of management scholars from Italy, Brazil, Russia, India and China, aimed at achieving two sets of goals:

E. Pereverzeva (✉)
Business School, Moscow International High Business School MIRBIS, Moscow, Russia
e-mail: pereverzeva@mirbis.ru

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– To study the emergence of entrepreneurial ventures in each of these countries, as a function of several elements in the 'Entrepreneurial Ecosystem', namely: the legal-political and economic ideologies, social and cultural norms, government policies and programs, education and training systems, technology development, transfer and absorption, availability of finance, and opportunities for cross-national interactions and business relations.
– To conduct a comparative analysis of the situations of the five countries, with specific reference to the ICT industry, which is playing a relevant role in all of them

The underlying idea is that it is crucial for researchers and policy makers to understand the quality of such elements in any economy, as well as their potential in supporting or inhibiting new venture creation. It will also give an idea about the sustainability of the high levels of entrepreneurial activities in the different contexts.

Whereas a number of individually relevant determinants of entrepreneurship are widely explored (Parker 2004; Grilo and Irigoyen 2006), differences across Europe and the growing BRIC countries have still not been compared. Of late, the BRIC countries are observed to have high levels of entrepreneurial activity, the sustainability of which can be assessed by studying the quality of the entrepreneurial ecosystem. Of course, entrepreneurship determinants and policies differ considerably among the 4 BRIC countries, owing to different socio-economic, cultural and political scenario and the policy needs, but it is of utmost relevance today to understand the underlying factors, using a reference country model to identify key elements of the ecosystem (environment) that have encouraged and supported entrepreneurship. In this reference, Russia (as one of BRIC) has its own distinctive features but in spite of very high level economics the entrepreneur activity is low. This study retains that, in Russia, every 23rd citizen (4.3 %) that is of working age is an early entrepreneur (meaning that his activity was funded less than 3 years ago). According to these numbers, Russia is behind the rest of the BRIC countries, where every 8th resident opens his own business, and also behind other Eastern European countries, where the number is every 11th.

In addition, the Russian Federation's low entrepreneurial activity is affected by the fact that many companies, having opened their business, never manage to overcome the first stage of development.

The activity index of established entrepreneurs in the country equals 2.1 %, and this represents 33 % of the total number of entrepreneurs. In industrialized countries, on the other hand, the number of established companies (i.e. functioning for more than 3.5 years) exceeds the number of the newly created ones.

According to the authors of the study, the reason why the level of entrepreneurship is so low in the Russian Federation is because of the structural economy and the population's negative outlook on opportunities to start their own business. Only 13 % of Russians called the conditions favourable.

The study's experts therefore believe that a significant growth in the entrepreneurial sector in Russia should not be expected in the near years. Only 3 % of

Russian respondents are planning to open a business in the next three years, while in other BRIC countries these figures go up to 21 %.

In light of our cross-cultural research on "Entrepreneurship and New Venture Creation", this paper aims to analyse the Entrepreneurial Ecosystem, supporting and harnessing the growth of Knowledge Intensive ICT entrepreneurs in Russia. As the knowledge economy is maturing, there is an urgent need to equip SMEs with the capabilities and skills to grow and prosper. Unfortunately, even today early-stage businesses are constrained by a number of factors.

The paper is structured in five sections. After this brief introduction, review of the literature is presented. Next, theoretical model is explained. Thereafter, the methodology of the research is presented, followed by main findings. Finally, we end with a discussion of the study's limitation and implications for future research.

2 Entrepreneurship and the Environment

The environment in which business is conducted plays a crucial role in fostering or weakening entrepreneurial activities in terms of firm creation, firm expansion and implementation of process, product and management innovation within a firm. Issues such as the fiscal environment, labour market regulations, administrative complexities, intellectual property rights, bankruptcy law, education and skill upgrading, etc. are understandably crucial in determining the entrepreneurial dynamism of an economy.

The term "Environmental factor" refers to those environmental attributes that surround the individual (Grundsten 2004). Environment, in this sense, is encompassing of such factors as infrastructure, cultural, economic, social and political environments. These environmental forces have been found to be capable of either impeding or facilitating entrepreneurial activities in any society. Gnyawali and Fogel (1994) define the entrepreneurial environment as "the overall economic, sociocultural and political factors that influence people's willingness and ability to undertake entrepreneurial activities". According to Luthje and Franke (2003), "environmental factors can facilitate or impede entrepreneurial activity, and it plays an important role in the formation of an individual's intention to create new venture." There has been an array of perspectives put up to examine the connections between entrepreneurial activity and the environment.

Entrepreneurship begins with first and foremost individual characteristics of entrepreneurs. For example, psychologists have hypothesized about the psychological traits associated with entrepreneurs, such as a personal need for achievement (McClelland 1961), belief in the effect of personal effort on outcome (McGhee and Crandall 1968; Lao 1970), attitudes towards risk, and individual self-confidence (Liles 1974). Personal characteristics of entrepreneurs is also a major theme of a recent work of Lazear (2004), who concludes that individuals who become entrepreneurs have a special ability to acquire general skills, which they then apply to their own businesses.

2.1 Entrepreneurship in Russia

Russia is the world's largest country, a nuclear superpower with unsurpassed energy resources. It also is a country which finds itself at the crossroads of possible development paths. Market oriented mechanisms have been introduced but Soviet era laws remain on the books. Corruption has become a way of life and freedom of the press has been gradually eliminated in early 2000s. Within this backdrop, private entrepreneurship has emerged, albeit in a distorted way. To understand Russia's current situation, one needs to understand the dramatic developments that have characterised its recent history.

As the heart of the Soviet empire, Russia had tremendous control of enormous amounts of natural resources and human capital. Yet, 20 years ago, in the late 1980s, it was a country where entrepreneurship was marginal, the economy was stagnant and the ruling communist hierarchy had no clear formula for solving the deepening crisis. Unfortunately, the reforms characterising Russia's attempts at rebuilding statehood after the collapse of the Soviet Union in the 1990s, first under M. Gorbachev and then Boris Y'eltsin were inconsistent and did not foster macroeconomic stabilisation.

However, under the leadership of V. Putin (since 2000), macroeconomic stabilisation as well as institutional stability has been achieved. In addition, unprecedented increase in the price and demand for oil and gas resources has resulted in a rapid growth of Russia's GDP. Russia now has a large private sector, though not without its limitations. At first glance, 'de jure' regulations often seem reasonable, yet it is the selective and arbitrary manner by which they are enforced that results in a lack of consistency or stability for firms (Aidis and Adachi 2007; Aidis et al. 2008). In addition, the inadequacies of the Soviet system resulted in Russians becoming accustomed to a corrupt and malfunctioning legal environment (Gelman 2004). Unfortunately, this negative legacy continues to characterise the business environment today. As a result, large, politically connected enterprises dominate Russia's business landscape. Moreover, the lack of universal property rights is reflected by the uneven distribution of income, and Russia is plagued by some of the most extreme social differences and pockets of dire poverty (Glaeser et al. 2003; Gerry et al. 2008; Buccellato and Mickiewicz 2009).

Overall, despite numerous policy announcements oriented towards entrepreneurial development, entrepreneurs in Russia face a hostile business environment characterised by the weak rule of law and widespread corruption. As formal structures in Russia fail, they are complemented by informal networks, which form 'intangible assets' for certain well-connected entrepreneurs that allow them to overcome environmental barriers (Aidis et al. 2008). However, though some businesses learn to cope, the lack of a level playing field for businesses in general seriously distorts the development of a thriving business environment. The crucial issue is not the existence and number of small businesses, but rather the fact that most of them have either no incentive to grow or are severely restricted in doing so given that if they are successful they face a serious risk of expropriation or forced

takeover by those better connected to the intertwined economic and political structures of power.

2.2 Knowledge-Intensive Entrepreneurship

The term "Knowledge-Intensive Entrepreneur" lacks a very rigorous definition. It has been coined because of the need to emphasize knowledge as the basis for technological innovation and new firm development.

A variety of recent studies have shown that Knowledge Intensive Entrepreneurship has the potential to contribute to economic development in several ways: as an important channel to connect innovative ideas into economic opportunities, as a basis for competitiveness through the revitalization of social and productive networks, as a source of new employment, and as a way to increase productivity. These findings have led to the implementation of different types of initiatives and policies designed to encourage entrepreneurship, including the introduction of education and training programs, the promotion of consulting support for entrepreneurs and the facilitation of access to finance.

For the purpose of this chapter, we have used the following working definition: "Knowledge Intensive Entrepreneur is defined in dynamic terms as the entrepreneur of normally small and medium sized enterprise (SME) that focus on the discovery, innovation or interpretation of knowledge. Such individuals typically maintain a business focus while continuously innovating."

Our focus on Knowledge-intensive ICT entrepreneurship is based on our understanding of its relevance: (i) as a major factor affecting innovation; (ii) as a core transformative mechanism for translating knowledge into growth, (iii) as a stock of capital or factor of wealth generation which can be used in the production of other goods; (iv) as important dynamic property of different systems of innovation and institutional setting.

2.3 ICT Market Development in Russia

In Russia's ICT market there are several market trends that are of great global market impact. According to the expert forecast, by the period of 2020–2030 Russia will become the knowledge-based economy. Besides natural resources, labour force and assets, knowledge technology will become one of the main factor of industrial success. There will be the growth of knowledge-based services. The human capital will play even more significant role in manufacturing then before, and therefore, there will be an increase in investment in education and training.

In the transition to the knowledge-based economy the usage of ICT will be doubled. Innovation will become the main resource of economic growth and business competitiveness.

In the near future it is forecasted that centres of development and competence and manufacturing will shift outward the developed countries. According to the experts, it is expected that the share of the OECD countries will drop from 80 to 60 % of the global ICT sector. For instance, in 2011 the growth of the ICT market in the BRIC countries will slightly exceed 13 %. The volume in its market is close to €497.9 billion. On the contrary, there are great prospects for China to become an IT-power with its government support of high technology industry. The volume of the ICT market in China has reached €204 billion, with growth in 2011 of 11 %. In Russia, with the same growth of ICT market in 2011, it amounted to only €57 billion.

By the period of 2015–2020, the increase in the ICT impact on social processes will at its zenith. It is expected that the development of the Web can lead to de-socialization of the working population. This will require the creation of new forms of psychological and social support for citizens. It will also require the adoption of legislative and technical measures against destructive forms of socialization (organized riots, —twitter revolutions, totalitarian groups, and so on).

During the period of 2015–2020, the experts forecast an acceleration of scientific and technological revolution driven by active integration and the widespread use of Internet networks that implement the new principles of the organization. The new type of networks will provide flexibility and sustainability of network infrastructure in compliance with evolutionary development of the network security with the development of technological and organizational principles. This will reduce the cost of network infrastructure by automatic adjusting the network settings for the user tasks. Network infrastructure and resources of different physical nature will be transformed into a single system. Pessimistic forecasts are associated with these trends.

By the end of the period of 2020–2030 years, such global trends as a significant increase in negative impact of ICT on the environment will perform the largest effect in Russia. For instance, the ICT sector is responsible for 2 % of world carbon emissions and this figure will double by 2020. According to the survey results of Harvard university scholar Alex Wissner-Gross, two Web searches in any browser generate about 20 mg of CO_2 per second.

The disposal of E-waste is the fastest growing problem. In 2020, old computer waste is predicted to rise in China by 200–400 % and by 500 % in India. Similarly, waste from discarded mobile phones is forecasted to be astounding 7 times higher in China and 18 times higher in India in comparison to 2007.

Increase in share of ICT of the total industrial production will enhance the value of creating green IT-devices. Measures for improvement of the environmental performance include, for instance, life cycle management of IT products, the use of data-centres' heat to heat the water, etc. The negative impact of the ICT sector on the environment will be decreased by introduction of green ICT and a shift from the goods consumption to the consumption of content.

This global ICT trend provides Russia with two options – either to focus on developing green technologies or to keep developing fewer technologies.

One of the biggest problems is the global game for the highly qualified human resources. Russia's goal is to keep the maximum number of Russian specialists in the ICT field and also to attract foreign professionals. Number of highly qualified specialists in the field of ICT, produced annually in Russia, hardly exceeds 2,000 graduates. The number of experts who can implement a responsible job with high dedication is even less. Therefore, most of business elites keep complaining on shortage of ICT staff.

Thus, all of the major global trends will have a significant impact on Russia as part of the global community. Proper response to these trends by state and business elite needs will strengthen the competitive position of Russia on the global ICT market.

3 Theoretical Model

The development of entrepreneurship in a particular milieu depends not on a single over-riding factor but rather on a 'constellation of factors' at the individual, societal and national levels (Tripathi, *Business Communities of India – A Historical Perspective*, 1984). These factors could be ranked either as "General Environmental factors" – stemming from economic, political and socio-cultural conditions prevailing in a region or "Task Environmental factors" – such as financial assistance, infrastructural facilities, government policies, R&D Support and so on. The General Environmental factors are formative in nature in the sense that they mould the competencies, attitudes, and values of an individual. The Task Environmental factors on the other hand are facilitative in nature, as they help an individual in channelizing his competencies into a particular field, which in the present case is entrepreneurship and new venture creation (Mathew J. Manimal).

In order to understand the factors that support or hinder an entrepreneur, we have used the Entrepreneurial Ecosystem framework model in our research, instrumental in gaining insight into factors (individual, society, state) which enable growth performance among the entrepreneurs in the knowledge intensive ICT Sector.

An ecosystem refers to the complex of organisms and their environment interacting as a unit. Organisms – human and otherwise – are affected by their environments. The systematic study of environment is rooted in the biological science where the term "ecology" is most commonly applied to the natural habitats of animals. "Human ecology" is a more recent term extending to the domain of geographers and sociologists who are interested in the distribution of human populations. From this perspective, an "ecosystem approach" to the study of human behaviour posits a framework for reviewing the interaction that occurs between individuals and their environment.

Thus, the term "entrepreneurial ecosystem" (EE) refers to a combination of factors that play a role in the development of entrepreneurship.

In order to gain insight into the Entrepreneurial Ecosystem, the research group evolved the following six framework conditions that foster entrepreneurship, which have been found to be applicable in Russia and the BRICs.

1. Individual Personality Traits: refers to the personal qualities of an individual pre-disposing him/her to entrepreneurial activity. The development of these traits could arise from early socialization, parenting, socio-cultural norms, early education and familial care etc., which are the components of the general environment.
2. Socio-cultural Context: refers to the social and cultural norms that influence individual's behaviour and attitude towards entrepreneurship.
3. Government Policies and Programs: refers to the extent to which government policies as reflected in tax or regulations are capable of facilitating new venture creation, and presence of adequate government programs in assisting firms in their start-ups, survival and growth
4. Access to Finance: refers to availability and affordability of various types of finance such as bank loans, equity, venture capital, angel funding, subsidies and grants.
5. Access to Information, Opportunity for Knowledge and Skill-building: refers to the availability of information on business opportunities and access to data required by entrepreneurs for managing their business. Also includes availability of opportunities for acquiring knowledge and learning that helps them in developing relevant skills required for managing their businesses.
6. Internationalization: refers to entry into the international market and meeting the challenges of existing players. For this an entrepreneur should have access to knowledge on international markets, procedures, have partners in the international markets for exports, imports, foreign direct investment, international subcontracting and international technical co-operation. They should also have access to appropriate training, and support services.

The model on Fig. 1 comprises the various determinants as mentioned above, which can facilitate and support the growth of an entrepreneur and thus influence entrepreneurial performance. Within each of the six main variables of this model, several sub-variables are identified to elaborate on the overall framework.

While the entrepreneurial ecosystem framework is presented here in a linear fashion, it is explicitly recognized that there are complex relationships among the different main variables and their sub-variables. They tend to reinforce each other, and weakness in one area often has a negative impact on other areas.

3.1 Research Questions and Methodology

The study is guided by the following broad research question: 'What factors influence the support and development of ICT new venture creation in Russia?'

INDIVIDUAL	SOCIO-CULTURAL	STATEGIC/GOVT. PILICIES AND PROGRAMS	ACCESS TO FINANCE	KNOWLEDGE & SKILL BUILDING	INTERNATIONALIZATION
Education	Socialization	Infrastructure	Self finance	Business skills	International approach
Motivation	Risk-taking	Government policies	Bank credit	Training centers	International knowledge
Skill set	Family background	Incentives programs	Interest rates	Counseling services	Government agencies facilitations
Role models	Attitude	Taxation	Angel investors	Research & development	Access to financial resources
Opportunity	Support	Inflation	Venture capital	Business Incubators	Foreign languages abilities
Ability to manage		Min. entry barrier	Private equity	Networks	Intercultural skill
		Corruption			

Fig. 1 The entrepreneurial ecosystem

The study utilizes an exploratory, theory building approach (Strauss and Corbin 1998; Eisenhardt 1989; Yin 2003). A mixed method approach of data collection strengthens the study by providing both quantitative and qualitative perspectives on the phenomena being examined (Miles and Huberman 1994).

Primary data collection was done through:

- 50 on-line questionnaires sent out to the ICT Entrepreneurs of small, medium and large scale enterprises;
- 50 on-line questionnaires sent out to the non-ICT Entrepreneurs of small, medium and large scale enterprises;
- 30 questionnaires sent out to control group.

The survey data were collected from 50 ICT entrepreneurs and 50 entrepreneurs from other economy sectors across small and medium enterprises (SMEs) in Russia. The selection of ICT firms was based on the definition of ICT sector developed by OECD and includes the ICT sector industries based on products and services under these four branches – ICT manufacturing, ICT services, telecommunication and digital media.

A structural questionnaire composed mainly of closed-ended and rating questions was used as a data collection instrument. The questionnaire was first developed in Russian as a common methodological tool to be used across the 4 BRIC countries and Russia. Country specific changes were incorporated to suit the cultural variations. The questionnaire was then translated in Russian and was pretested in order to ensure that the survey content and measurement scales were clear, valid, and appropriate. Based on the pre-test responses, some demographic items were modified. The owner/founders of the firms were the target respondents

of the survey to ensure the validity of the data collected since the study is based on personal experiences of the entrepreneurs affecting his/her growth potential.

We used the selective database of member ICT companies of Moscow region to send out the online questionnaire for the respondents to answer. Along with this, Social media was also used to reach out to the entrepreneurs.

To maximize the response, personalized cover letters were sent, with promise of feedback and confidentiality. In total, 400 ICT entrepreneurs across SMEs were randomly selected and identified as meeting the selection criteria. Questionnaire link was sent out to the entrepreneurs along with e-mail reminders and in some cases also telephonic reminders. Finally, we received 50 questionnaires which were relevant for the inclusion in the sample, resulting in a response rate of 16.25 %.

4 Research Findings

Results of the findings are shared corresponding to each variable. First, the findings of the interviews are presented, followed by findings of the survey questionnaire. These findings are then co-related with the findings of the Control Group.

4.1 Individual and Personality Traits

1.	Your ability to quickly recognize start-up opportunities
2.	Your ability to take risk
3.	Your ability to organize the resources required for start-up

The questions focused at understanding the personality traits of the entrepreneurs facilitating new venture creation as perceived by the ICT and Non-ICT entrepreneurs (Fig. 2).

The most favourable factors were ability to recognize start-up opportunity, ability to take risk and ability to organize the resources for start-up

Our findings from survey data for 50 ICT and 50 non-ICT SMEs reveal the following differences:

1. Almost 75 % of the respondents across non-ICT sector consider they have good ability to recognize the start-up opportunities comparing to only 56 % in ICT sector.
2. Ability to take risk for non-ICT respondents is also significantly higher. 62 % of non-ICT considered they have good and 36 % have average ability to take risk, when for ICT respondents these figures are 52 % and 26 % respectively.
3. 66 % of non-ICT and only 40 % of ICT perceive themselves as having the ability to organize resources for start-up.

Fig. 2 Individual and personality traits in Russia

In general, the study confirmed that the entrepreneurs in Russia highly value individual and personal traits. However, the finding also revealed that the entrepreneurs in non-ICT sector and more self-confident and perceive higher all three abilities. This also means that ICT entrepreneurs have higher tendency to doubt their abilities and to be more accurate and well planned. To sum up the argument, the findings are in line with recent reviews and evaluations of entrepreneurship personality research suggesting that personality traits of entrepreneurs are important for entrepreneurship.

4.2 Socio-cultural Contexts (Supporting/Hindering)

4.	Presence of family-based entrepreneurship in your society
5.	Culture of promoting venturing and risk-taking in the community
6.	Culture of encouraging creativity and innovation
7.	Entrepreneurship considered as a desirable career choice in your society
8.	Opportunities for new venture creation
9.	Entrepreneurial opportunities for your gender
10.	Entrepreneurial opportunities for people in your age category

When we asked entrepreneurs across ICT and non-ICT sectors about the socio-cultural context supporting entrepreneurship, the key findings were (Fig. 3):

In knowledge-based growing economies, individuals face the following decision: should they deploy their creative effort in some company or should they leave to establish a new organization? In this situation, cultural and social norms play significant role as they might encourage and strengthen entrepreneurial behaviour of its members. The most favourable factors mentioned to us were culture encouraging creativity and innovation and opportunities for new venture creation.

Our findings from survey data for 50 ICT and 50 non-ICT SMEs reveal the following:

1. There is a significant gap in results for ICT and non-ICT respondents on social aspects; but the general attitude is highly positive;
2. Only 40 % of ICT respondents fell high presence of family-based entrepreneurship and 22 % respond that this is poor. While in non-ICT sector 56 % responded that they see good presence of family-based businesses and only 4 % – low. This can be explained by the specific of ICT industry, which is young and doesn't have time to build family-based companies;
3. 66 % of non-ICT as against only 50 % of ICT respondents perceive their culture encouraging creativity;
4. Non-ICT respondents also better fell opportunities for new venture creation 60 % of respondents comparing to 50 % in ICT sector, but even 50 % is high value;

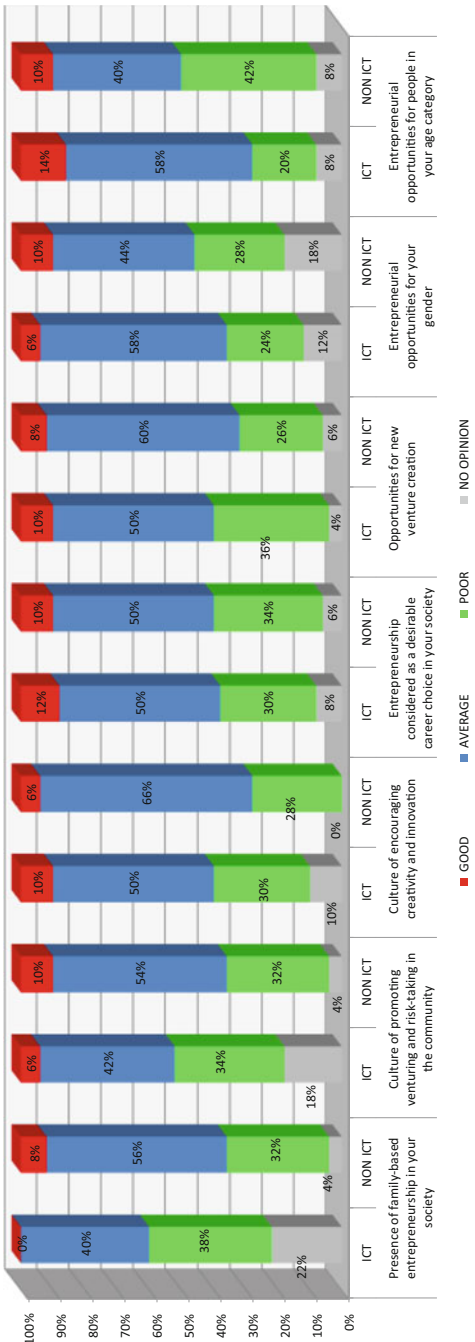

Fig. 3 Socio-cultural context supporting entrepreneurship

5. 58 % of the respondents across ICT evaluated as "good" entrepreneurial opportunities for both their gender and their age category. Only 40 % of non-ICT entrepreneurs stated the same;
6. 50 % of the respondents across ICT and non-ICT sectors consider becoming an entrepreneur as a desirable career choice.

Socio-cultural contexts in Russia are very supportive for entrepreneurs and new venture creation. Family-based entrepreneurship is not so popular in Russia, especially in comparison to European countries because of different culture and political background; nevertheless, it was still positively evaluated by both groups. At the same time we have strong encourage for creativity and innovations in Russian culture. Serious actions taken by the government reflected with positive attitude of the respondents towards opportunities in the society for new venture creation, especially in Moscow region, where the research was held. Summarizing the argument socio-cultural contexts were positively evaluated by both ICT and non-ICT respondents.

4.3 Government Policies and Procedures

11.	Special government schemes and programs for start-ups
12.	Favourableness of overall government policies
13.	Favorableness of taxation system
14.	Ease of obtaining permits and licenses (VAT code, . . . etc.)
15.	Favourableness of physical, transportation and ICT Infrastructures

This section focused on understanding the government policies and programs supporting new venture creation as perceived by ICT and non-ICT entrepreneurs (Fig. 4).

Doing business requires supportive government policies and programs in particular, easy-to-obtain licenses and permits, better information, simplification of regulations, favourableness of taxation system and lower degree of regulatory and administrative opacity. The most favourable factors cited were Physical, transportation and ICT infrastructure. The least favourable factor cited was Ease of obtaining licences and permits.

The findings from our survey data for 50 ICT and 50 non-ICT SMEs reveal the following:

1. 48 % of the ICT and 34 % of non-ICT respondents estimated at the average level special government programs for start-ups, and 34 % and 28 % respectively gave high evaluation to the existing schemes;
2. Only 20 % of the ICT respondents and 16 % of non-ICT consider overall government policies as unfavourable for them. 40 % of ICT and 44 % of non-ICT consider it as favourable;

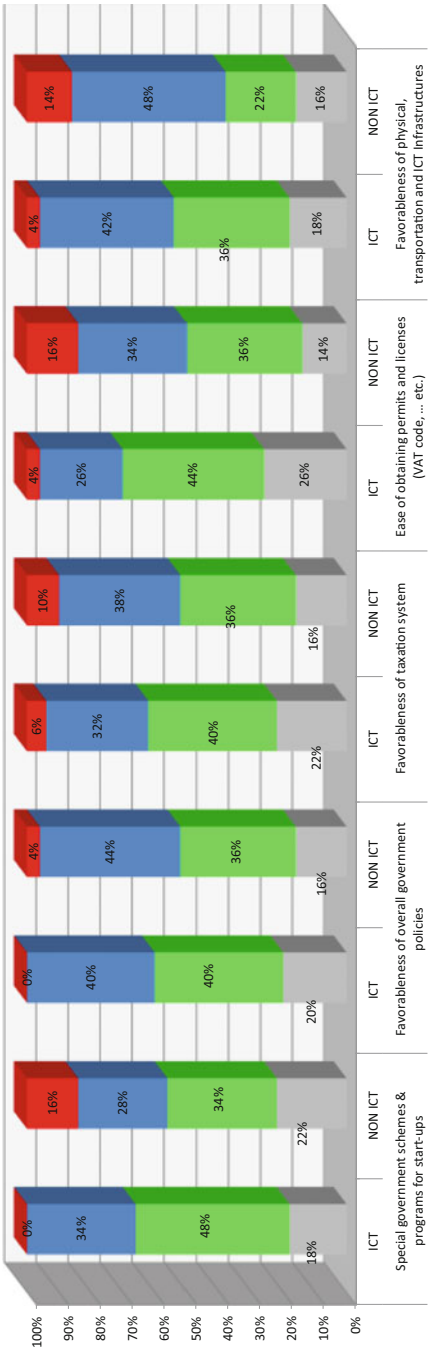

Fig. 4 Government programs and policies to support entrepreneurs

3. Taxation system was considered as less friendly in comparison to overall policies. Only 32 % of ICT and 38 % of non-ICT perceive it as favourable. And 22 % of ICT respondents estimated taxation system as burdensome for the start-ups;
4. 26 % of ICT and 34 % of non-ICT respondents perceive that it is easy to obtain licenses and permits at the time of start-up; same 26 % of ICT estimate that it's not easy;
5. Physical, transportation and ICT infrastructure were considered as favourable by 42 % of ICT and 48 % of non-ICT respondents.

Recently, in Russia, state registration of small businesses and entrepreneurs has facilitated significantly. All over the country a simple and user-friendly "one-window" format was introduced, which became a lump sum for registration of a legal entity, getting an individual taxation account and registration in statistics services. These actions led to significant facilitation of registration procedure.

Another factor is stable economic situation so that an entrepreneur can forecast his/her revenues and tax assignments for a few coming years. Moreover, there are fiscal benefits available for the first year of operations, which are perceived by entrepreneurs as small, and there is still a way for government policies for further development. In the conclusion of the section we have to note that general attitude of young entrepreneurs towards legislation and taxation procedures is mostly positive or neutral.

4.4 Access to Finance

16.	Availability of Government subsidies
17.	Availability of family/friends funds
18.	Availability of Venture Capital Funds
19.	Availability of funds from private individuals/Angel funds
20.	Availability of bank loans

This section focused on understanding the ease of access to finance as perceived by the ICT and non-ICT entrepreneurs (Fig. 5).

Access to finance is indispensable for growth, but many entrepreneurs have difficulties having access to finance. In order to better understand the credit markets, we analysed through our sample the ease of access to different sources of financing as perceived by entrepreneurs in the ICT and non-ICT sectors, our findings reveal the following scenario:

1. Government subsidies can play a very important role in the start-up phase for the young technology based firms. 36 % of the ICT and 44 % of non-ICT respondents perceive availability of government subsidies at the time of start-up, as against 24 % in ICT and 18 % in non-ICT who feel that there are no government subsidies available for start-ups.

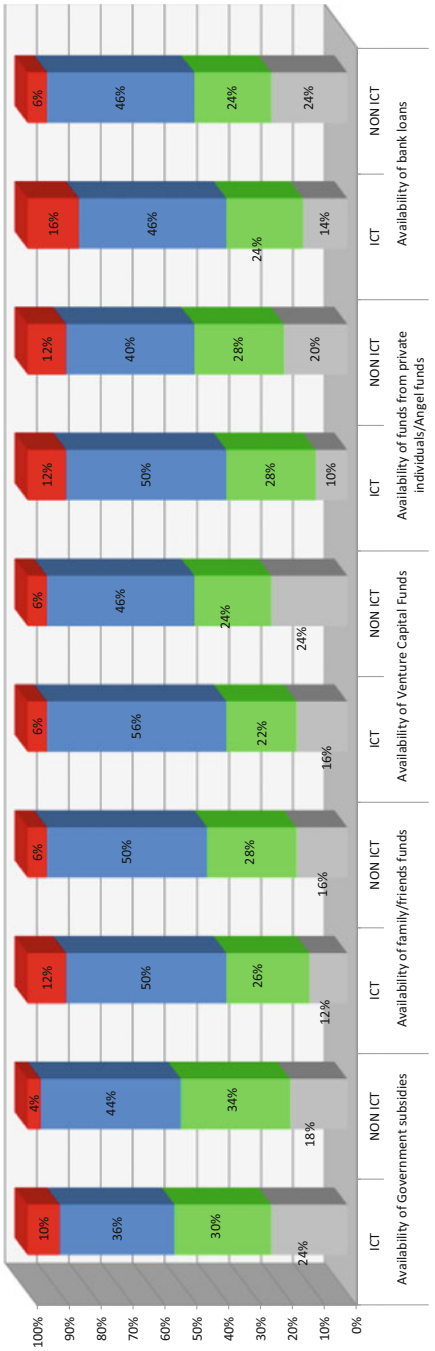

Fig. 5 Access to finance

2. 50 % of both groups stated that they have access to family or friends funds.
3. Only 18 % of ICT and 24 % of non-ICT entrepreneurs reflected that they have good availability of venture capital funds. Most of the respondents (50 % in ICT and 46 % in non-ICT) perceive venture capital as not available. Russian entrepreneurs in general miss mechanisms of venture capital financing due to the fact that venture capital funds are interested in large innovative projects and reluctantly finance small businesses in other sectors (including IT);
4. Angel funds and private investors are considered as a good financial source for 50 % of ICT and 40 % of non-ICT respondents. And only 10 % of ICT and 20 % of non-ICT start-ups perceive poor availability of angel funds;
5. 46 % of both ICT and non-ICT respondents state that there is a good access to bank loans to start the enterprise.

The most favourable factors cited were Availability of funds from family and friends and angel investors. The least favourable factor cited was Availability of venture capital funds.

Conclusion Despite of the fact that entrepreneurs participated in the survey stated that there is high availability of different financial resources, it actually doesn't mean that start-ups aim to use them. According to the GEM National Report 2012 for Russia (the most recent available), early stage business is mostly constrained by the lack of financial resources for new entrepreneurs. Most entrepreneurs rely on informal funding sources, like family or angel investors.

4.5 Opportunity for Knowledge and Skill Building

21.	Encouragement of entrepreneurship by the education system
22.	Availability of formal training for entrepreneurship
23.	Start-up counselling and assistance at college/universities
24.	Support from Industry associations for networking, information etc.
25.	Incubators and/or Technology parks that offer one stop service for businesses
26.	Assistance from universities/R&D institutions in transfer of R&D
27.	Special programs to promote products and services of start-ups
28.	Opportunities for public-private collaboration to facilitate market entry

This section aimed at understanding the availability of access to information, opportunity for knowledge and skill building support as perceived by the ICT and non-ICT entrepreneurs (Fig. 6).

Education and training contribute to encouraging entrepreneurship by fostering the right mind-set, awareness of career opportunities. It is essential in the creation of new business. Our findings from survey data reveal the following:

1. 40 % of ICT and 42 % of non-ICT respondents perceive average encouragement of entrepreneurship by the education system in Russia, while 38 % of both ICT

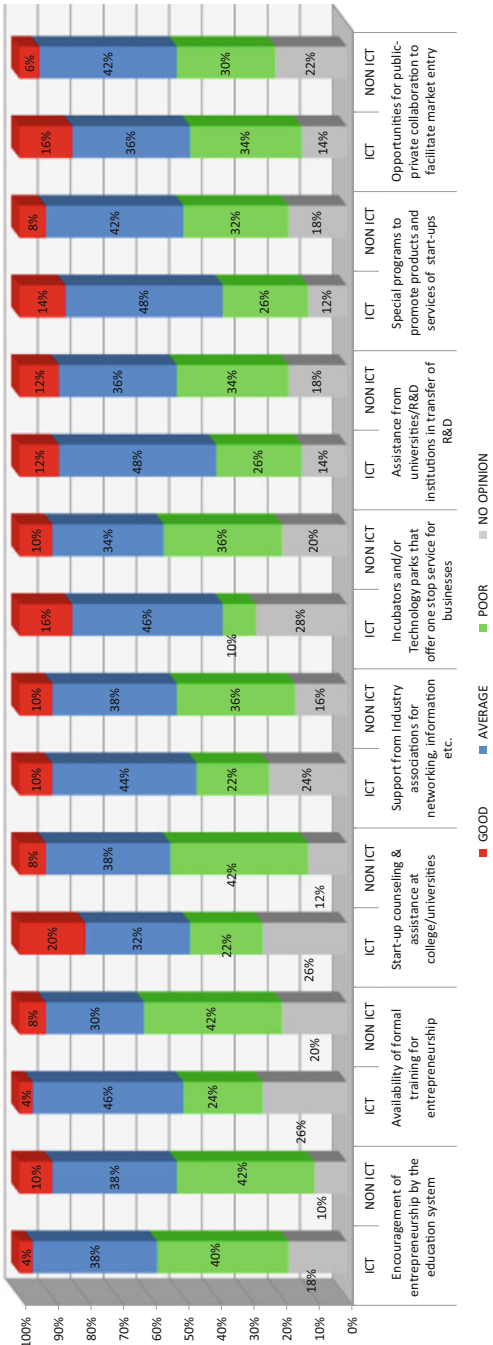

Fig. 6 Opportunity for knowledge and skill building

and non-ICT participants perceive it as good. This can be explained by the fact that recently in high schools and universities there are options to study entrepreneurship courses and/or case studies.
2. 46 % of ICT sector perceive that there are formal trainings for entrepreneurship and 24 % says that there is average availability, while in non-ICT sector 42 % respondents perceive average availability and only 30 % perceive it as good.
3. Start-up assistance at colleges/universities were higher evaluated by non-ICT respondents – 38 % described it as good. While ICT representatives responded "good" only in 32 % and "poor" in 26 %, that means that universities have to take more actions to assist for ICT start-ups, for example attract R&D projects in this area.
4. Industry associations were evaluated as supportive for networking by 44 % of ICT and 38 % of non-ICT entrepreneurs.
5. One-stop services by business incubators or technological parks were perceived well by 46 % of ICT and only 34 % of non-ICT respondents. At the same time 28 % of ICT sector perceive it as poor, there was almost no average results in ICT.
6. 48 % of ICT sector also high valued assistance from universities in R&D transfers. In non-ICT sphere, this figure is only 36 %, which is still high value for the economy.
7. 48 % of ICT and 42 % of non-ICT respondents perceive that there are special programs to promote products and services of the start-ups;
8. Opportunities in private/public collaboration are perceived as "good" by above 36 % in both groups and as "average" by above other 30 % in both groups that means that these opportunities are observed and considered in the society.

All the factors were evaluated approximately in similar manner as favourable. Most favourable for ICT respondents were R&D transfer and special programs to promote start-ups. Most favourable for non-ICT entrepreneurs were special programs to promote start-ups and opportunities for private/public collaboration.

To sum up the argument, setting up a business calls for drive, creativity and persistence, whereas developing a business gradually requires more managerial skills, such as efficiency, effectiveness and reliability. Considering that both personality and management skills are key elements for success, personal skills relevant to entrepreneurship should be taught from an early stage and be maintained up to university level, where the focus can concentrate on building management capacity. Russia, after turn to market economy is now committed to promoting the teaching of entrepreneurship in their education system.

4.6 Internationalization

29.	Attitude towards internationalization
30.	Information and skills required for internationalization
31.	Government agencies facilitating new firms entry into domestic and international markets
32.	Access to financial resources to tackle internationalization
33.	Foreign language abilities in your company

This section aims to estimate the support available for Internationalization to ICT and non-ICT entrepreneurs (Fig. 7).

In the present world being international entrepreneur means to gather higher benefits and larger sources. In order to find their niche, compete and finally get success in the international global market entrepreneurs need support, knowledge and innovations. The most favourable factors cited were Foreign language literacy, positive attitude toward Internationalization.

Our findings from survey data for 50 ICT SME and 50 non-ICT SMEs reveal the following:

1. 62 % of ICT and 56 % of non-ICT respondents state to have a good knowledge of foreign language.
2. 58 % of ICT and 52 % of non-ICT respondents reflect a favourable attitude towards Internationalization.
3. 50 % of ICT respondents as against only 38 % of non-ICT respondents perceive that they have skills and information required for Internationalization.
4. 54 % ICT and only 38 % of non-ICT perceive the support from Government agencies facilitating new firms entry into domestic and international markets.
5. Only 44 % of ICT and 40 % of non-ICT respondents perceive that it is possible to access finance for internationalization.

In the global business scenario, markets are becoming increasingly fast paced. This requires greater skill to develop and manage innovation, which is a strategic tool to manage competiveness at all levels. Combining innovation, quality and competiveness into a multi-dimensional set of objectives and tools is absolutely instrumental for companies to operate in international markets. It is necessary to capitalize on innovation to improve products and services, but in particular, to redefine the corporate "mission", to integrate different sectors, to identify innovative market niches, to develop partnership networks and to exchange experience in a structured way. To reap the benefits of the Internal Market and to meet the challenge of fiercer competition, entrepreneurs should be encouraged to innovate and to Internationalize.

Fig. 7 Internationalization

In order to support the entrepreneurs in internationalization, there are local and regional networks in Russia supported by government and industry to advice entrepreneurs and help them develop new markets. There is focus on promotion of regional networks or clusters in order to help entrepreneurs mutually share their experiences and knowledge.

4.7 Control Group Findings (Fig. 8)

In order to get the perception of non-entrepreneurs towards the entrepreneurial framework we distributed questionnaires within our focus group.

The first section – Individual and Personality Traits – revealed approximately the same results as we met with those of ICT and non-ICT entrepreneurs.

In the second section – Socio-cultural environment – our survey findings were in line with most of questions, but still there were some differences. For example, 30 % of control group state that there is poor family-based business, and only 23 % says opposite, when real entrepreneurs (ICT for 40 % and non-ICT for 56 %) felt better presence of family-based start-ups. Another difference is that entrepreneurial career choice was overestimated by our control group in comparison with real entrepreneurs.

In the third section – Government Programs and Policies – our control group turned out to be not informed of special governmental programs for start-up and general favourableness of its policies. Thirty-seven percent of respondents stated that they have no opinion on the two important issues. However, at the same time other respondents, who had opinion, were significantly more optimistic about state programs and policies in Russia (almost in two times in comparison with ICT and non-ICT respondents).

In the fourth section – Access to Finance – there were discrepancy again. The findings reveal that for the access to finance entrepreneurs may rely for governmental subsidiaries, which occurred to be the most favourable factor according to control group. Also, contribution of venture capital funds was overestimated. When actual entrepreneurs do not consider the funds, people from other spheres perceive it very high. Opportunity for Knowledge and Skill Building section was, again, overestimated by control group.

In the last section – Internationalization – the findings reveal that the control group is a little bit more optimistic that Russian entrepreneurs, but generally answers were in line. There is high attitude towards internationalization and around 60 % of all respondents have foreign language skills.

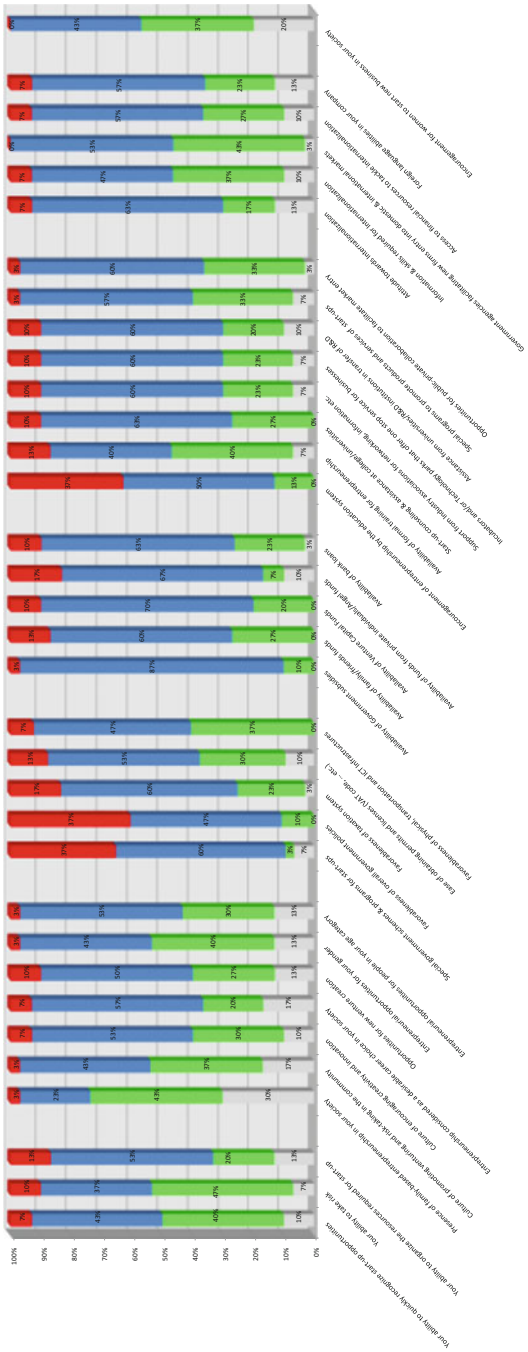

Fig. 8 Control group findings

Discussion and Conclusions

This chapter is based on the result of a survey aimed to establish relationship and reveal differences in perception on starting business in Russia between ICT and non-ICT entrepreneurs. The survey was based on an Ecosystem Model with an emphasis on six determinants that influence entrepreneurial behaviour. Each of the factors is essential for successful entrepreneurs and during the survey, 50 ICT and 50 non-ICT entrepreneurs were surveyed in order to identify framework conditions established for star-ups in Russia.

This survey is very important because despite of the fact that Russian economy is driven primarily by heavy industrial businesses, the development of small and medium-sized enterprises is a priority for furthering economic growth. In the last 3–5 years, serious steps were taken to facilitate business start-up and its development. Results of the survey shows that these efforts do not pass unnoticed.

The survey revealed that fundamental difference between ICT and non-ICT companies cannot be traced, despite of the efforts taken to establish special conditions for innovative and high-tech projects by the Government and business associations such as, "Opora Rossii (Russia Reliance)," "Business Russia".

Active support of high-tech enterprises by specific private entities, like business-accelerators and private investment funds, is distinctive feature of the past 3 years. Due to this fact, the dynamics of the creation and development of ICT entrepreneurs significantly improved. However, these funds usually are foreign companies or companies listed by Russian citizens abroad, and that's companies supported by these funds are often registered abroad as well. That's why this new start-ups cannot affect statistics inside Russia.

We hope that support for ICT entrepreneurs and the conditions created in the country will reverse the negative trends in the business development and this will be reflected in official statistics.

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Entrepreneurship and New Venture Creation in China: Focusing on ICT Sectors

Youzhen Zhao and Yang Yang

Abstract This study is to shed light on new venture creation issues in China, primarily focusing on ICT sectors. Adopting mainly qualitative method, it explores the factors that foster or hinder the process of Chinese new venture creation in Information and Communication Technology domain. Besides discussing with entrepreneurs, the authors also took one step further to interview a control group, which consists of scholars, partners from private equity firms, incubator officers and managers from commercial banks. Voices from different sources not only contribute to a comprehensive perspective but also provide implications for future research.

Keywords Entrepreneur • Venture creation • ICT • China

1 Introduction

China has economically emerged after decades of high economic growth. In 2012, China was listed as the second largest recipient of inward FDI, second only to the United States and Chinese outward FDI flow ranked No. 3 worldwide (UNCTAD 2013). The path of Chinese economy's rise is different from those of western countries, so the underlying drivers of economic upsurge have been widely discussed.

Chinese entrepreneurs have been recognized as an important force in accelerating China's economic growth since 1978, the starting year of China's "Reform and Open-up Policy". In the past few years, the spring of venture capital investment and private equity firms has provided entrepreneurs with diverse financing choices. Due to the pressure of employment for the young generation, college graduates in China are encouraged by government to start their own business. In 2005, Chinese central government officially announced that it was critical to improve awareness of

Y. Zhao (✉)
School of Management, Fudan University, Shanghai, China
e-mail: yzzhao@fudan.edu.cn

Y. Yang
Graduate School of Arts and Sciences, Columbia University, Graduate School of Arts and Sciences, New York, NY, USA
e-mail: yy2504@columbia.edu

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entrepreneurship and venture creation skills for college graduates.[1] In 2009, China Growth Enterprises Market (GEM) board was established to assist fund-raising for small high-growth, high-technology firms in stock market. At the end of 2010, there were above 11 million officially registered Small and Medium-sized Enterprises (SMEs) in China, and more than 34 million privately or individually-owned business.[2]

According to The Global Entrepreneurship Monitor,[3] the general expectation of venture creation in China is increasing with the high growth rate of Chinese economy, while the improvements of innovation and international reach are not as optimistic. Though internationalization is encouraged by policy, among all the 54 countries included in 2011 GEM report, China was ranked No. 51 in the index "Percentage of Early-Stage Entrepreneurs (TEA) with More Than 25 % of International Customers". The Chinese institutional context for entrepreneurship makes the new venture creation issue more intriguing.

The development of Information and Communications Technologies (ICT) industries enhances the overall infrastructure for a country's economic growth.[4] The activity of venture creation in ICT industries was concentrated in advanced areas in China, such as Shanghai, Beijing and Shenzhen. The purpose of facilitating such cities as ICT clusters is to create spillover effects on nearby regions, which ultimately accelerates the progress of high-technology, high value-added industries.[5] The recently released "National Industrial Technology Policy" aims to promote the industrialization and information infrastructure, thus further improve innovation capability and finally realize industrial structure and technology upgrade. This is regarded as a way to enhance international competitiveness of industries in China.[6]

In China, different criteria for SMEs apply to different industries. According to the official document of central government[7] released in 2011, the definition of SMEs in ICT sectors can be concluded as enterprises with less than 300 employees or less than RMB 100 million in terms of yearly revenue. More specifically, enterprises with no less than 100 employees and no less than RMB 10 million's yearly revenue are identified as medium enterprises; enterprises with no less than 10 employees and yearly revenue of no less than RMB 0.5 million are recognized as small enterprises; enterprises with less than 10 employees or yearly revenue of less than RMB 0.5 million are called micro enterprises.

In this study, we use the Chinese criteria of SMEs in ICT industries and explore the social environment for venture creation, especially the incentives and obstacles

[1] Suggestions on guiding and encouraging college graduates' employment, July 2005, Central Government Office.

[2] 12th Five Year Plan of SMEs' Development, Industrial and Information Ministry.

[3] The Global Entrepreneurship Monitor 2011.

[4] The Global Competitiveness Report 2010–2011, World Economic Forum.

[5] Venture Creation and Industry Cluster Analysis, Jianluan Guo, Suli Yu, cnki.net.

[6] National Industrial Technology Policy, Central Government Office.

[7] SMEs Definition in China. Industrial and Information Ministry 2011.6.18.

in this process. The aim of this study is to present a comprehensive perspective and uncover the complexity of venture creation in ICT sectors of China today.

2 Methodology

This research adopts mainly qualitative methodology. The qualitative methodology takes the leading role in order to pursue in-depth understanding of Chinese entrepreneurship and to portrait business environment for new venture creation. Qualitative method, such as interviews, can better present the richness of context comparing with quantitative method.

The qualitative research is divided into two parts: entrepreneur interviews and control group interviews. Those semi-structured interviews were all conducted in Mandarin, for the interviewees were more comfortable and able to communicate more precisely by using their native language. The quotations of transcript were translated into English. The average interview time was controlled between 90 and 120 minutes, according to the availability of interviewees. Two researchers joined all interviews and both took notes in order to make sure a more comprehensive and accurate understanding will be achieved. Before each interview, researchers explained confidential issue with interviewees. In order to encourage them to tell truth, audio record was not used during the interviews. The confidentiality of their personal identity encouraged them to express freely. After each interview, two researchers edited the interview notes individually and exchanged their notes. In case of any ambiguity in understanding, we went back to the interviewees to make clarifications within the same day.

2.1 Entrepreneur Interviews

Entrepreneur interview guide consists of six main parts: Individual Personality Traits; Socio-Culture Contexts; Government Programs and Policies; Access to Finance; Access to Information and Opportunities for Knowledge and Skill Building; Internationalization.

All the 12 interviewees are founders or major partners of firms, so they all have direct personal experiences of new venture creation and can release first-hand information about themselves and their ventures. Except for 1 female interviewee, the rest are males. Two of them were between 20 and 25 years old, six of them were in the age range of 26–30, two were 30–40 and two were beyond 40. Ten of the companies were from Shanghai and two from Beijing. Except for one Shanghai local entrepreneur, most entrepreneurs migrated to Shanghai. Seven of them were in the process of their first venture, while five of them had more than one entrepreneurial experience (Table 1).

Table 1 Interview sample detail

Interviewee ID	Business coverage	Founding year	Age
XQ	E-business platform	2011	27
JX	Data application technology	2011	23
TZH	Accessories for communication devices	2011	27
SY	Social network	2012	28
FXG	Management software	2011	36
WHB	Online catering service	2011	28
SSS	Agriculture products online distribution	2011	23
YT	Game developer and distributor	2011	32
WQ	Integrated Circuit and Chip	2009	27
RY	Cloud technology	2009	30
AGZ	IT related products	1993	40+
KY	Information Technology	1999	40+

2.2 Control Group Interviews

Control group in this study provides various sources of information and perspectives. The criteria for selecting control group informants are: Having direct working experience with Chinese entrepreneurs for at least 3 years; Understanding the organization they represent; Willing to share their opinions on new venture creation environment in China.

We conducted eight interviews in control group, including two scholars, one partner and one manager from two private equity firms, one officer of an Association of Angel Funds, and two managers from two commercial banks (Table 2). The interview guide is designed to focus on the social support mechanism for ICT start-ups in China. To adapt to the diverse background of control group, the emphasis of each interview was slightly altered accordingly. In general, the control group informants were invited to respond to three main topics during the face-to-face interviews:

1. What role does your organization play in influencing new venture creation?
2. What is your opinion on macro environment for Chinese entrepreneurship, and your attitude toward the emerging trend of ICT start-ups?
3. What kind of resource does your organization provide to ICT entrepreneurs, if applicable? Explain the incentives for your organization, both financially and non-financially.

Table 2 Control group detail

Interviewee ID	Description
JTBank	Manager in commercial bank A, sub-branch manager
GSBank	Manager in commercial bank B, branch manager
Angel	Association of Angel Funds, nourishing in ICT start-ups
IM	For-profit incubator, focusing on ICT start-ups
PE1	Partner from Private Equity firm A
PE2	Investment Manager Private Equity firm B
ScholarD	Professor focusing on IT venture creation in China
ScholarS	Professor specializing in SMEs development in China

3 Research Findings

During the interviews, the discussion about the environment for start-ups in China and their personal experiences was well developed. In this section, the results of qualitative study are presented in the six main parts in sequence.

3.1 Personality Traits, Capability Assessment and Motivations

Positive Self-Assessment During the interviews, the entrepreneurs expressed their start-ups and themselves in positive tones. They were confident of their technology, idea and work.

Diverse Experiences The majority of the entrepreneurs interviewed had a few years' working experiences in established companies before starting their own businesses. For instance, RY had worked for a multinational technology giant in its Beijing research center for 3 years before creating his own technology firm. The reason for RY to leave the MNC was the limitation of his career development, as the multinational company delegated only simple and obsolete tasks for China division. There were few chances for him to get the core of the technology. The new venture he created was closely related to his previous experience, and he has also published a book on cloud technology (in Chinese) recently. XQ is another interesting case as he had changed six jobs during 2 years after his college graduation, mainly because he was not satisfied with the culture of those companies he worked for. In his last job as an employee, he started an unofficial reading club with his colleagues, where they read management books, got inspired by business stories and following discussion. Finally, he decided to start his own company. FXG started his current business at his mid-30s, after years of working experience in a major state-owned enterprise, by leveraging his understanding of management to his new venture.

Motivation and Passion Though their motivations were not identical, the entrepreneurs shared some key words, such as "freedom", "independence", "financial rewarding", "self-actualization", and "the pursuit of life". Some thought being an entrepreneur would bring more income, as JX said, "I need to make more money to financially support my parents". Most of them had the entrepreneurial idea during high school or university days. Some of them started their informal entrepreneurial projects in university, like JX, TZH and YT. Three of the interviewees started their own business immediately after graduation from university, and each entrepreneur has at least Bachelor's degree. Five out of 12 interviewees had more than once venture creation experience, as WHB said, "It's so much fun to create different business." WQ previously ran a pharmaceutical sales firm, but that firm got problematic due to some changes in policy, so he had to change the industry to start a business again. RY mentioned that "it is great that we can make some changes in creating new business, and even small changes are valuable."

3.2 Socio-cultural Context

Regarding socio-cultural context for entrepreneurship, most entrepreneurs assessed negatively the cultural support in promoting venturing and risk-taking, while the impact of family business and gender equality were considered favorable. Risk-taking is not a cherished characteristic in traditional Chinese moral system. The entrepreneurs also showed lack of risk-taking capability. More than half of them started their first entrepreneurial project part-time, while working full time in another firm. It seems that people from an affluent family or those who have earned the initial capital by themselves are more likely to take risks. They mentioned financial support and general social welfare accounted for their risk-taking attitude. For some entrepreneurs, their parents would encourage them to find a "stable" job. Though some expressed their families' concern, none of the interviewees had received serious objection from their family. For those who were married or engaged, the attitude of their spouses was all supportive.

In the interviews, entrepreneurs indicated that socio-cultural context was different across regions and cities, which partly explains why they chose large cities to start ICT business. Shanghai is a leading city in China and it has attracted young entrepreneurs from different places of the country. Among the ten interviewees in Shanghai, RY was the only local Shanghai resident, while nine entrepreneurs were born in Tier 2 or 3 cities, small towns or villages. Some of them first came to Shanghai or nearby cities for university education while others came to Shanghai directly to create ventures since Shanghai is considered as a city with "opportunities".

In terms of equal opportunity for female entrepreneurs, ScholarD mentioned that "Traditional IT industry has more male entrepreneurs, but nowadays female entrepreneurs can take advantage of their understanding of society and customer needs to discover opportunities in designing suitable business models. Moreover, more

young women are taking ICT related education, and academically they perform even better than their male classmates in universities." However, he also said that "Usually females can work as core members in a venture creation team but they can't stand the pressure alone." The entrepreneurs did not express obvious discrimination when talking about female entrepreneurs; in addition to that some of the interviewees were able to mention a few outstanding female leaders in this industry.

ICT industries are featured as "low fixed cost, high value added" and "technology-oriented". It is perceived that more opportunities nowadays are for young people. They believe the old generation and the younger ones have different understanding and use different business models in ICT industries.

3.3 Government Programs and Policies

There are many official documents from central and local Chinese government that are promoting new venture creation, especially in ICT industries. The support of ICT start-ups and SMEs is also a part of the 12th five-year plan in China. The number of governmental incubators and venture funds has been increasing nowadays. For example, the officer of Association of Angel Funds we interviewed told us that this association was initiated by government officials and a university president. In 2006, Shanghai Technology Entrepreneurship Foundation for Graduates was set up as a non-profit foundation to promote venture creation among university graduates.[8] Besides, the central government also listed "providing fund for SMEs" as part of its fiscal policy in recent years.

However, the availability of government support through special programs and policies in ICT industry was generally perceived as undesirable. Although the influence of government is very strong in doing business in China, not all of the entrepreneurs knew the supporting programs and favorable policies. The information flow was not smooth, and many entrepreneurs who were qualified for incubator residents got relevant information through personal contact, instead of public channels. Thanks to some university-based technology parks, those who created their ventures right after graduation were able to take advantage of the resources.

ScholarS mentioned that "In China, government was the most important factor. It encourages entrepreneurship in certain industries while setting limits for a few specific industries. . . some industries are very restrictive for private venture". ICT industries are considered as being supported by government, with "banks being encouraged to provide SMEs with low interest loan" (JTBank and GSBank), "non-profit incubators funded by government and universities" (Angel), "establishment of technology park" (SSS), and "decreasing administrative process for start-ups in certain type of technology incubators" (SY). However, the effect of these policies

[8] Shanghai Technology Entrepreneurship Foundation for Graduates website http://www.stefg.org/index.aspx

and programs is far from satisfactory. The problems of rent-seeking, hidden cost and inefficiency are mentioned by interviewees. For example, despite that government officially announced to improve administrative efficiency, half of the entrepreneurs complained about their experience of being engaged in tedious and expensive administrative process for registering and operating their business. It took the game developer YT 3 months to wait for the Municipal Cultural Department to review his company registration. To speed up some of the processes, YT was required to pay extra administrative fees. WQ was required to take an expensive and unnecessary training course to accomplish taxation registration.

3.4 Access to Finance

The availability of funds was conceived as problematic for SMEs. Lack of fund or financial pressure has become one of the largest obstacles in venture creation process in China.

Bank Loan Not many of the entrepreneurs have ever borrowed money from banks. Some of them commented: "it is not necessary for us to spend so much effort to get loan at this moment. . .maybe we will consider it later" (JX); "Although the public statistics shows interest rate as 7–8 %, adding the service fee and other various costs, the real interest rate could be as high as 15 %"; "It is not possible for me to get loans, as I have no fixed asset for mortgage" (WQ). It seems that it is difficult for the entrepreneurs to get trust from banks, as "it is more risky to lend to SMEs than large companies" (JTBank). Assisting SMEs is part of social responsibility evaluation for many banks, as the policy makers encourage banks to provide SMEs with necessary help. JTBank is now dealing with loans to university graduates who have got support from "Shanghai Technology Entrepreneurship Foundation for Graduates". However, banks are profit-driven and there was no specific policy on relaxation for default rate of SMEs, which set banks into a dilemma. Of course, Chinese banks still lend money to SMEs, and "this business belongs to retailing rather than wholesaling division in our bank", as one banker said (GSBank), "we have a rating system for small firms' entrepreneurs rather than looking at the financial reports of these small firms. According to the evaluation result, we differentiate these applicants for loans: Firms operating in industries that our government encourages, having core-technology, and boasting a credible entrepreneur will get a high score and definitely get our support; those scoring medium may get the loan with required mortgage; while others with low score will get rejected."

PE/VC/Angel It is widely accepted that the roles of VC and PE are almost homogeneous in China currently. Most of the interviewees did not successfully attract venture capital while very few got angel investments; moreover, some of them were averse to venture capitals. For example, XQ said some project evaluator from VC did not really understand ICT industries or technology: "They understood

little about my industry, while pretending to be an expert... They were not even respectful." The common voice was that PEs and VCs cared too much of their own financial benefits, although the management advice, especially expertise in corporate finance, provided by PE and VC was viewed as a plus for a start-up. On the other hand, the investment entities were not thoroughly satisfied about the quality of start-ups despite that the market of PE and VC has been boosted in the last decade. According to the control group informants, the amount of business proposals they receive was very high, and PE2 said that his company need to meet different entrepreneurs every other day, while less than 1 % of the program would meet the investment requirement. PE1 said, "We review 100–300 projects every year and usually select 3 to 5 to invest. We pay a lot attention to the management team, growth prospect of the industry, core technology or patents of the prospective firms", and "in China, VC and PE has no significant difference. At earlier stage of the project, VC has often invested in biotech firms in China. Angels usually invests at the early stage". The secretary-general of an Association of Angels said, "I get 80–100 project proposals every month and usually I choose one or two of them to visit, paying a lot to human resources as well as industry prospect. If these firms are qualified after first round of due diligence, I will involve VC to see whether they are interested or not" (Angel).

Other Fundraising Methods Direct investment from incubators is limited, however, the incubators provide the start-ups with low-cost office space. The initial fund for the start-ups was mostly through private savings or family support. In the later stage, among those who had successfully attracted investment, most of the significant capital influx was through personal contact. Without a strong network, WHB sent his business proposal to more than 200 angel funds, while only one of them replied him. However, YT was able to trade 50 % of his start-up for 5 million RMB with his rich private partners, as he said, "5 million for those people was a piece of cake". The requirement for IPO was strict in China, and it took a company a long period to be reviewed as a qualified IPO candidate. KY got listed in Chinese stock market in 2008 and the abundant financial support enhanced KY's progress profoundly: in 2005, KY had around 10 employees, whereas in 2008, the number of employee increased to around 100, and 2 years after IPO, there were more than 800 employees in KY.

3.5 Access to Information and Opportunities

Recently, the development of entrepreneurship education and the promising ICT industries have encouraged the creation of more and more new ventures. However, the commercialization of R&D was still regarded as limited. None of the individuals interviewed had this kind of learning opportunity. Moreover, the information access was very diverse. SY was an example of being inspired by an entrepreneur training class offered by a leading university in China during his PhD study. In

addition to the formal training and seminar, the majority of our interviewed entrepreneurs mentioned the interaction between entrepreneurs via micro-blog. More than half of them talked about the effect of personal network and mentorship offered by experienced entrepreneurs. The idea of "learning by doing" is also repeatedly raised up.

3.6 Internationalization of SMEs

The opinions on SMEs' internationalization were heterogeneous. Thanks to the global economic integration, the concept of internationalization was accepted by many of the entrepreneurs. However, except that YT promoted his locally developed game abroad via licensing, the rest of the entrepreneurs were not able to expand their business abroad. Most of them believed that it was important to explore the market in China first before going abroad. Capability of oversea management, instead of language, was the biggest concern.

Discussion and Conclusion
Factors that influence new venture creation in the ICT industry in China are widely discussed in this exploratory study. All the interviewees were asked to summarize the most important supportive and inhibitive factors. The answers tend to concentrate on a few factors that can be considered as features of China's entrepreneurship environment in the ICT industry.

Support from Family Some entrepreneurs believed that their family support was the primary source of encouragement, but some families were reluctant to accept their children's career choice as entrepreneurs after university graduation. In some cases, the initial capital was raised from family, but more than half of the interviewees didn't accept financial support from parents, mostly because their parents were not rich. However, even the entrepreneurs from affluent families hesitated to risk too much of their family fund in start-ups, which implies that entrepreneurs would only accept money from family without threatening its financial security. Understanding and emotional support from family were valued by entrepreneurs.

Support from Social Network Network with individuals and government was mentioned through all the interviews. Entrepreneurs believed that social network provided them with business opportunity, personal lending, management experience, information exchange and so on. Network is also considered by control group members as the one form of resources that PE or VC is able to bring to the company. Moreover, the relationship with government was considered as one of the most critical factor of venture creation success.

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ScholarS referred to his research results that "relationship with government was one of the most accurate indicators of a start-up's success".

Promising Macro Environment Many of the ICT entrepreneurs attributed their achievement to the macro environment in China, including the improved IT infrastructure, business opportunities, and the government's recognition of importance of ICT industry in China since the 11th five-year plan. Not many of them were able to clarify a specific policy or program that benefited them significantly, but they regarded the recent improvement of general environment in China as helpful and inspiring.

Financial Pressure For SMEs, financial pressure is a long standing problem. Despite various means of fund-raising in today's China, financial resource is still difficult to attain for start-ups. In order to understand the financial issues of new ventures, the roles of the following types of organization in SMEs' growth should be taken into consideration.

- Banks. In response to the policy of assisting SMEs, the nominal interest rate for some nascent business is lower than the market price, while actual cost of finance was high. It is because many companies in ICT industries do not meet the mortgage requirements, so entrepreneurs borrow from banks as individuals with unlimited liability. In this case, if the company fails, the entrepreneur will need to pay back debt to the banks personally. Banks are very cautious on SME loans so that they evaluate the company (especially the financial credibility of the founder) carefully before lending.
- Incubators. Governmental and private incubators all bear the responsibilities of supporting entrepreneurs, mainly through providing low-cost office space. Since ICT industries are regarded as important for economic development in the 11th five year plan, some technology parks serve only ICT start-ups. The incubators claimed their devotion to mentoring, helping the entrepreneurs to get PE/VC in the later period, but the effect of incubator service was perceived low by entrepreneurs.
- PE/VC. It is widely known that PE and VC are almost the same in nature nowadays in China, for they both invest in companies during relatively mature period. The capital market in China has been developing these years, but IPO is still the main form of exit for PEs/VCs. In this sense, PEs/VCs have general inclination to invest in the companies in pre-IPO period.
- Angel Fund. Some experienced successful entrepreneurs play the role of angels in China now. They invest in ideas and entrepreneurs, so it is difficult to identify a common approach to attract angel fund. Most of the angels are reached by the entrepreneurs through personal contact or network. Those angels are not closely involved in the daily operation of

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companies, but they provide the entrepreneurs with not only capital but also intangible resources such as social network, professional expertise and advices.

Administrative Inefficiency The time and money spent on fulfilling administrative requirement is a burden to the entrepreneurs. It sometimes takes several months to accomplish a certain step of establishing a new firm. The communication between entrepreneurs and government officials is far from smooth. For example, WQ was forced to visit an administrative office three times to reach its documentation requirement and RY was asked to change their company's name without being provided with any explicit reason. The administrative inefficiency makes things more difficult for entrepreneurs.

Lack of Talents The entrepreneurs have realized the importance of suitable business partners and capable employees. Inadequate talent force in dealing with sales, finance, legal issues and general affairs were frequently mentioned. For the nascent and small business, this problem is more serious. We noticed that the companies at the early stage preferred to hire part-time employees to avoid cost pressure. In many companies, besides partners, there was no full time employee at all. Some of the nascent enterprises depended on PE and experienced investors to cope with sophisticated managerial issues, while others sought for help from their personal network.

Policy Impact on Entrepreneurs The attitude toward government was quite complicated. AGZ and KY, as owners of middle-sized enterprise, established their understanding of the political philosophy, and were able to take advantage of various favorable policies and circumvent the harsh requirements. For the companies at nascent stage, they very often perceived government policies merely in terms of taxation, incubator, governmental foundation for supporting entrepreneurial activities, university and high-technology parks. Though some of the nascent companies are not profitable so that they have not been required to pay income taxes, the cost of starting a business was still considerable for them. Another concern was that some government policies were not properly carried out, indicating that entrepreneurs didn't benefit as much as the written policies. It is ironic that some entrepreneurs considered policy as one of the most important supportive factors while others asserted that it was one of the most serious constrains for their business development. PEs also expressed that the industrial guidance from government influenced their investment decision profoundly. From all the points of view, the impact of policy is significant on the venture creation in China.

Issues on Entrepreneur Partnership Ten out of 12 entrepreneurs tried or maintained partnership. The main reasons for establishing partnership were to

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obtain funding, critical technology and network. In some companies, not all the partners are engaged in the daily company management, but in some other companies, every partner has a function that is not able to be substituted by other partners. From our observations, the development of partnership is dynamic, as some entrepreneurs invited partners to join to strengthen the company at the early stage, while others bought back their company shares to get more control at a later stage. The problem of partnership occurred mainly due to issues on distribution of profit and disagreement on control. This is a topic that deserves further study in the future.

In conclusion, the impact of policies and programs on entrepreneurs in China is tremendous. In general, the government supports venture creation in ICT industries, resulting in more and more incubators these days. The cooperation between technology-park and universities is widely expanded. However, entrepreneurs are still under the pressure of administrative formalities and fund-raising issues. Through the interviews with entrepreneurs and the control group, this study unveiled the comprehensiveness and complexity of the social environment for start-ups in ICT industries in China.

Perception of Entrepreneurial Ecosystem in India: Influence of Industrial Versus Personal Context of Entrepreneurs

Mathew J. Manimala, Princy Thomas, and P.K. Thomas

Abstract Decisions on new-venture creation are likely to be influenced by the entrepreneurs' perception of the business environment. Hence it is important, especially for policy-makers, to understand the perceptions of entrepreneurs on the business environment of a country. The BRIC countries being the hub of a vibrant group of emerging economies, a group of researchers from these countries and Italy have initiated a study to understand the general perceptions of the entrepreneurial ecosystem in these countries. The present paper uses a part of the data collected by the India research team in order to understand the Indian entrepreneurs' perception of the business environment of the country. Based on the responses of 282 entrepreneurs on 11 dimensions of the entrepreneurial ecosystem, it was observed that the more favourable perceptions are on the individual competencies, professional peer-group support and the socio-cultural support. The industry and demographic sub-group analyses have also yielded interesting results. Compared to the industry context, there is a greater number of dimensions being different for the demographic subgroups. However, these are concentrated on the age and age-related variables. It seems that the generation-gap is the major influencer of perceptions.

Keywords Entrepreneurial ecosystem • Indian Entrepreneurs • ICT Entrepreneurs • Personal context and perception • Industry context and perception

1 Introduction

Entrepreneurship and innovation are globally recognized as the principal means to foster economic development of nations. Entrepreneurs create enterprises (Gartner 1988) and these enterprises play a key role in the economic development by creating new job opportunities and wealth. According to Bruton et al. (2008: 5) "Entrepreneurship is the engine that will push the emerging economies forward as the states of the developing world quickly grow to be major economic forces".

M.J. Manimala (✉) • P. Thomas • P.K. Thomas
Organization Behaviour and Human Resource Management, Indian Institute of Management, Bangalore, India
e-mail: manimala@iimb.ernet.in; princythomas2000@gmail.com; thomaspk@outlook.com

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The quality of entrepreneurial ecosystem affects the overall entrepreneurial performance of the economy and its innovativeness (Koellinger 2008). Many studies show the importance of entrepreneurial environment in facilitating entrepreneurship (Bruno and Tyebjee 1982; Gartner 1985; Manimala 2002; Amorós and Bosma 2013) and new venture success (Gartner and Liao 2012). Moreover, as observed by Giannetti and Simonov (2004) it is a combination of individual characteristics and business environment that would explain entrepreneurial choices. In fact, a new venture can be conceptualized as a product of the symbiotic interaction between the entrepreneurial capabilities of the individual and the opportunities available in the environment. Hence it is not unreasonable to suggest that new venture creation is primarily a function of the perceptions of the business environment by the entrepreneurial individual. It is with this perspective that we have launched a study to understand the perceptions of entrepreneurs on the entrepreneurial ecosystem, which is a combination of the entrepreneurial capabilities available in the society and the business environment prevailing there.

Entrepreneurial environment (often used interchangeably with 'entrepreneurial ecosystem', as is done here) is combination of factors that play a role in the development of entrepreneurial activities, which according to Gnyawali and Fogel (1994), fall into two major categories: (1) a combination of factors such as overall economic, socio-cultural and political factors that influence people's willingness and ability to undertake entrepreneurial activities; and (2) the availability of assistance and support services that facilitate the start-up process (entrepreneurial and business skills as well as financial and non-financial assistance). The Global Entrepreneurship Monitor (Manimala 2002; Amorós and Bosma 2013) researchers have elaborated these into the following nine factors: Financing, Government policies, Government programs, Education and training, Research and development transfer, Commercial infrastructure, Internal market openness, Physical infrastructure and Cultural & social norms. The dimensions of the entrepreneurial environment identified by the GEM researchers are collectively designated as the 'Entrepreneurial Framework Conditions' (EFCs). While they appear to be conceptually distinct from one another, they are likely to be inter-correlated and operating under the influence of one another. Besides, the governments' choice of the strategic focus for the development of business environment is determined partly by the stage of the country's economic development and partly by the ideologies being followed by the concerned political parties. Hence it is possible to have country-specific differences in the perceived definitions of factors and their inter-correlations in a specific country. It was, therefore, considered appropriate to take a relook at these dimensions in the Indian context using the data collected from India as part of a larger study on the entrepreneurial environment in the BRIC countries.

The India team of researchers collected data from 611 respondents – comprising 100 ICT entrepreneurs, 182 non-ICT entrepreneurs, 315 non-entrepreneurs, and 14 entrepreneurs whose sector of operation was not specified – on their perceptions on various aspects of business facilitation in the country. Factor analysis performed on these responses gave rise to 11 dimensions of the Entrepreneurial Environment (Manimala et al. 2013), which largely corresponded to the GEM list, but also had

some differences reflecting the country-specific situations. For example, the Indian respondents apparently did not make a distinction between 'government policies' and 'government programs', but combined them, which we called 'government support'. This may be because government agencies in India are actively involved in the implementation of policies through various programmes. While the combination of two of the 'GEM-dimensions' would have reduced the number of factors from nine to eight, it has in fact gone up to 11 because of the addition of three new factors, which are: Support for Internationalisation (SI), Facilitation for Women's Entrepreneurship (FWE), and Access to Information (AI). Though these factors are also closely associated with government initiatives, they are perceived as separate dimensions probably because of their recent emergence from the economic liberalization process which is apparently not in the complete control of the government.

The 11 dimensions identified in the larger study were named as: (1) Government Support (GS), (2) Education & Training Support (ETS), (3) Support for Internationalisation (SI), (4) Market Entry Facilitation (MEF), (5) Facilitation for Women's Entrepreneurship (FWE), (6) Physical Infrastructure Support (PIS), (7) Professional and Technology Support (PTS), (8) Entrepreneurial Capabilities (EC), (9) Socio-Cultural Support (SCS), (10) Funding Support (FS) and (11) Access to Information (AI). (The order in which these dimensions are listed is the same as the order of their appearance in the factor-analysis, and not according to the size of their mean-scores in the respondents' perception – see Table 2 and Fig. 1 for the mean-score based ordering of factors). It may be noted that Item no. 8 (Entrepreneurial Capability) is not an EFC, but it is perhaps the most critical part of the entrepreneurial ecosystem. The influence of the perceived entrepreneurial capabilities on the new venture creation decisions has been highlighted by several studies (Lucas 1978; Murphy et al. 1991; Gimeno et al. 1997). This is especially true of factor-driven economies like many of the emerging economies (Amorós and Bosma 2013). The sub-group analyses reported in this paper are based on the 11 dimensions identified in the larger study, and they are listed in the order in which they have emerged in the factor analysis.

As mentioned above, entrepreneurial action depends largely on entrepreneurs' perceptions of the environment. It would therefore be a useful exercise to investigate if there are differences in the perceptions of ICT and non-ICT entrepreneurs on the business environment in the country. The comparison is particularly relevant because ICT, being a new type of industry, may require different kinds of support systems compared to the traditional industries. While it is logical to hypothesize that the specific requirements of the sector of industry could have an impact on the perceptions of the entrepreneurs, prior studies have shown that their demographic characteristics may also influence their perceptions. Some demographic variables that have been investigated by prior researchers in this regard are: gender (Gatewood et al. 2003; Reynolds et al. 2004; Langowitz and Minniti 2007; Kaneria 2012; Zwan et al. 2012); age (Reynolds and White 1997; Kautonen 2008); educational qualifications (Verheul et al. 2002; Kuip and Verheul 2003); and prior work experience (Gartner 1985; DeTienne and Chandler 2004).

Fig. 1 Perception of entrepreneurial ecosystem by entrepreneurs: Graph of means

2 Objectives and Hypothesis

The major objective of the present study was to understand the perception of entrepreneurs on the entrepreneurial ecosystem of the country and to test if the differences, if any, among the sample-subgroups in terms of their perception are guided more by their industry context rather than their personal circumstances. Perception being a complex phenomenon, our hypothesis is that the personal circumstances may have a greater impact on the environmental perception rather than the realities of their industry sector. To test this hypothesis, the process adopted was to test the differences based on the industry context (represented by the 'sector' and the 'legal form') as well as on the various demographic characteristics. If there are more dimensions of the entrepreneurial ecosystem different for the demographic groups compared to those for the industry sectors, it would be legitimate to infer that our hypothesis is supported.

3 Methodology

As mentioned above, this paper is based on the data collected for a larger study on the entrepreneurial ecosystem prevalent in BRIC countries as perceived by entrepreneurs as well as non-entrepreneurs. The original study used a 72-item questionnaire, where the items relating to various aspects of the business environment were rated on a 5-point Likert scale ranging from 1 to 5 (1 = Very Poor; 2 = Poor; 3 = Average; 4 = Good; 5 = Excellent). Data were collected from 611 respondents, of whom 296 were entrepreneurs (comprising 100 ICT and 182 non-ICT entrepreneurs, with 14 respondents not specifying the sector of their operation) and 315 non-entrepreneurs.

Since the present paper aims at studying the perceptions of entrepreneurs with a view to finding out if the differences in perceptions are more due to the organizational

Table 1 Demographic profile of 282 entrepreneur-respondents

Category	No. of respondents
Business sector	
ICT	100
Non-ICT	182
Legal form of the venture	
Proprietorship	109
Partnership	60
Private limited	76
Not specified	37
Gender	
Male	230
Female	52
Age[a]	
Less than 24 (adolescent)	44
24–30 (youth)	102
31–45 (middle-aged)	99
45 and above (senior-middle and old)	34
Not specified	3
Marital status	
Single	122
Married	160
Educational qualification	
Graduates (G)	94
Post-graduates (PG)	178
Not specified	10
Urbanization of native place	
Rural	52
Urban	126
Metropolitan	64
Not specified	40
Prior work experience	
No work experience (NEW)	25
Work experience (WE) <10 years	139
Work experience (WE) ≥ 10 years	72
Not specified	46

[a]Age categories are based on the commonly accepted life-cycle stages

or personal circumstances, the sample used for the subsequent analyses is only 282 (100 ICT plus 182 non-ICT), which is the number of entrepreneurs whose sector of operation is also specified. Within this total of 282, there are a few whose sub-group affiliations are not specified. Accordingly, the total number available for each sub-group analysis may be slightly different. Hence the number (N) applicable for each sub-group analysis is shown in the respective tables. The demographic profile of the 282 entrepreneur-respondents is available in Table 1.

It may be noted that the numbers in the different categories are quite uneven. Since the sampling was not random, these differences in the group-sizes cannot be taken as the proportions of the subgroups in the population. However, in the cases of extremely skewed proportions, one could sense a relative shortage of some segment. For example, in the gender-based subgroups, women constitute less than 20% of the total. Though there are research findings that the number of women entrepreneurs has increased dramatically in recent years (e.g.: De Bruin et al. 2006), there is equally strong research evidence suggesting that the rate of entrepreneurship among women remains much lower than among men (Reynolds et al. 2004; Acs et al. 2005). India is not different from the global scenario, as was observed by Manimala (2002) in the GEM India Report, which found that the proportions of men and women in entrepreneurship are in the ratio of two-thirds and one third. The proportions in the present sample, therefore, are not unrealistic.

The subsequent analyses in this paper are based on the above classification. As the demographic and other sub-groups of the respondents were large enough for separate analysis, ANOVA or *t*-test were conducted for identifying the differences in their perceptions. We tested the significant differences in the perceptions of the different sub-groups. As the purpose of this paper is to test the relative importance of the organizational versus personal context, the two categories for these were identified as: ICT versus Non-ICT groups and the three legal forms of the organization, for the organizational context; and the gender, age, marital status, educational qualification, and prior workexperience-based sub-groups, for the personal context.

4 Data Analysis and Findings

The first step in the process of analysis was to get a comparative view of the different dimensions of the ecosystem as perceived by entrepreneurs as a group. The means and standard deviations of the dimensions of the entrepreneurial ecosystem (see Table 2) show that all of them (except one) are rated above the midpoint of the scale, which would imply that the perception is generally positive. For an inter-dimensional comparison, it was necessary to compute the mean of the means, which is about 3.3. Hence it could be stated that there are 4 items with average ratings of 3.3 and 3.2 (FEW, AI, FS and PIS). It should be noted that 'Financial support' and 'Infrastructure support', which are often considered to be poor in emerging economies, are rated as average. 'Access to information' has improved because of the 'internetization' that is happening all over the world. Similarly, women's business has emerged as a priority area of support in the current policies of the Indian government who, along with the commercial banks, have launched a large number of special schemes for women entrepreneurs.

The lowest rated dimensions are: Market entry facilitation, Government support, Education and training support, and Support for internationalization, which (like the average-rated ones) are to be provided by specific agencies designated for the purpose. On the contrary, the highest rated items (Entrepreneurial capabilities,

Table 2 Perceptions on the dimensions of entrepreneurial ecosystem by entrepreneurs: Mean and SD

Factor	Mean	SD
Entrepreneurial capabilities (EC)	4.0	0.58
Professional and technical services (PTS)	3.8	0.59
Socio-cultural support (SCS)	3.5	0.52
Facilitation of women's entrepreneurship (FWE)	3.3	0.84
Access to information (AI)	3.3	0.72
Financial support (FS)	3.2	0.71
Physical infrastructure support (PIS)	3.2	0.87
Support for internationalization (SI)	3.1	0.68
Education and training support (ETS)	3.1	0.90
Government support (GS)	3.0	0.67
Market entry facilitation (MEF)	2.9	0.70

Professional and technical services, and Socio-cultural support) are emanating from the individuals and the society. The combination of these three in the top bracket appeals to logic, especially because there are studies that highlight the role of socio-cultural norms in developing professional and entrepreneurial capabilities in the society (Begley and Tan 2001; Robaro and Mamuzo 2012; Manimala et al. 2013). The results point to a system where the individuals feel that their capabilities and inclinations are trying to overcome the perceived inadequacies of the other agents in the entrepreneurial ecosystem.

4.1 Sector Based Differences in Perception: ICT vs Non-ICT

The analysis of differences in the perceptions of ICT and non-ICT entrepreneurs is given in Table 3. As expected, the differences were limited – there were only three EFCs on which they significantly differed: (1) Education and training support ($t = -2.05$, $p = 0.04$); (2) Physical infrastructure support ($t = -2.03$, $p = 0.04$); and (3) Funding support ($t = -2.27$, $p = 0.02$). On all these dimensions, ICT entrepreneurs score lower than the non-ICT ones (see also the graphical representation of these three differences in Fig. 2). On the 'Education and Training Support', ICT entrepreneurs could face problems because the technology is new and evolving fast, and therefore many educational and training institutions may not be equipped with the latest knowledge in the field to produce 'industry-ready' graduates. On the Physical Infrastructure Support', it is possible that the ICT may have higher expectations, as their business is more sophisticated and fast-paced than the traditional 'brick and mortar' companies. On the issue of funding support, it is often alleged that the financial institutions have a traditional mind-set and would lend only against collateral security. ICT companies may not own physical assets, and their knowledge assets and software will not be treated as 'solid' collaterals. Hence they may find it more difficult than others to get funding support.

Table 3 Test of difference (*t*-test) for the ICT and Non-ICT entrepreneurs' perceptions

Factor	ICT Vs Non-ICT	N	Mean	SD	t	df	Sig.
GS	ICT	100	2.91	0.68	−1.4	280	0.157
	Non-ICT	182	3.03	0.66			
ETS	ICT	100	2.91	0.86	−2.1	280	0.041**
	Non-ICT	182	3.14	0.92			
SI	ICT	100	3.03	0.65	−1.3	280	0.192
	Non-ICT	182	3.14	0.7			
MEF	ICT	100	2.87	0.72	−0.8	280	0.411
	Non-ICT	182	2.94	0.68			
FWE	ICT	100	3.27	0.79	−0.1	280	0.896
	Non-ICT	182	3.28	0.86			
PIS	ICT	100	3.01	0.87	−2.0	280	0.043**
	Non-ICT	182	3.23	0.86			
PT&S	ICT	100	3.8	0.58	−0	280	0.971
	Non-ICT	182	3.8	0.59			
EC	ICT	100	4.01	0.62	−0.2	280	0.877
	Non-ICT	182	4.02	0.55			
SCS	ICT	100	3.45	0.49	−0.6	280	0.575
	Non-ICT	182	3.49	0.54			
FS	ICT	100	3.11	0.78	−2.3	280	0.024**
	Non-ICT	182	3.31	0.66			
AI	ICT	100	3.25	0.67	−0.3	280	0.806
	Non-ICT	182	3.27	0.74			

SD standard deviation
$^{**}P \leq 0.05$

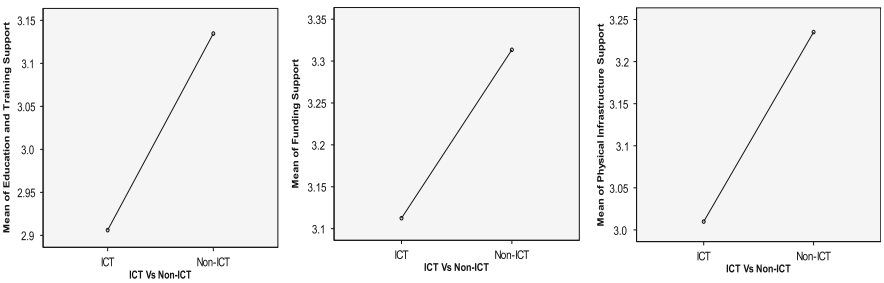

Fig. 2 Perceptual differences between ICT and Non-ICT entrepreneurs: Graphical representation

It may be noted that all the *t*-values are negative, implying that on all dimensions (including the non-significant ones) the ICT entrepreneurs scored lower than their non-ICT counterparts. The ratings obtained from the ICT group are rather surprising, as the general perception is that they are a pampered lot. A possible explanation for their relatively greater dissatisfaction with the system is that their business is based on a new and fast-changing technology whereas almost all the dimensions of the entrepreneurial ecosystem are originally designed for the traditional industry and may have a greater mismatch with the requirements of the ICT sector.

4.2 Legal-Form Based Differences in Perception

Among the sub-groups based on the legal forms of the organization, there are some differences in perceptions (see Table 4). The significant ones among them are: Education and training support ($t = 2.60$, $p = 0.07$), Market entry facilitation ($t = 3.12$, $p = 0.046$), Facilitation of women's entrepreneurship ($t = 2.98$, $p = 0.053$), and Physical infrastructure support ($t = 6.64$, $p = 0.002$). In all these cases, proprietors have given the most favourable ratings, which is difficult to explain. One possibility is that it is a self-selection process, where people having favourable perceptions about the business environment may have felt confident about starting up as a proprietorship concern (without feeling the need for collaboration with other entrepreneurs).

4.3 Gender-Based Differences in Perception

It is rather surprising that in a 'traditional' society like India there is hardly any difference between the gender-groups in their perception of the entrepreneurial ecosystem (see Table 5). The '+/−' signs before the t-value show that one group has a higher/lower mean-score than the other, but the differences are not significant. Between the two genders, male entrepreneurs have more favourable views on the facilitation for women's entrepreneurship, professional and technology support, physical infrastructure support and funding support, but the differences are not significant. Similarly, they feel slightly more confident about their entrepreneurial capabilities, but that difference is also not significant.

On a majority of dimensions (7 out of 11), however, women have more favourable perceptions than men. All these differences are non-significant except one; the perception on education and training system ($t = -2.80$, $p = 0.005$) is significantly different for male and female entrepreneurs. It is more favourably perceived by women, probably because in India many special training schemes are available exclusively for women entrepreneurs (MSME 2014).

The perceptual similarities between male and female entrepreneurs may be explained by the fact that both the groups are entrepreneurs – the experience of being in the entrepreneurial filed has probably equalized their perceptions. Had they been potential entrepreneurs, it is possible that their perceptions would have shown some gender-based differences. The similarity in ratings found in the present study offers some challenge to the findings of prior researchers (such as Hisrich and Brush 1984) that the traits and skills possessed by male and female entrepreneurs are different. Apparently, the perceptions of the environment are not influenced by the gender, as the types of qualities and orientations required for starting and managing a new venture are the same, irrespective of the gender of the entrepreneur.

Table 4 Test of difference (ANOVA) in perceptions based on the legal form of the organization

Factor	Legal form	N	Mean	SD		df	F	Sig.
GS	Proprietorship	109	3.09	0.61	Between Groups	2	1.799	.168
	Partnership	60	2.96	0.59	Within Groups	242		
	Private Ltd	76	2.91	0.71	Total	244		
ETS	Proprietorship	109	3.17	0.92	Between Groups	2	2.602	.07*
	Partnership	60	3.11	0.92	Within Groups	242		
	Private Ltd	76	2.88	0.84	Total	244		
SI	Proprietorship	109	3.20	0.61	Between Groups	2	1.389	.251
	Partnership	60	3.03	0.68	Within Groups	242		
	Private Ltd	76	3.08	0.81	Total	244		
MEF	Proprietorship	109	3.05	0.62	Between Groups	2	3.116	.046**
	Partnership	60	2.80	0.61	Within Groups	242		
	Private Ltd	76	2.87	0.77	Total	244		
FWE	Proprietorship	109	3.41	0.80	Between Groups	2	2.978	.053**
	Partnership	60	3.32	0.89	Within Groups	42		
	Private Ltd	76	3.11	0.78	Total	244		
PIS	Proprietorship	109	3.35	0.80	Between Groups	2	6.641	.002***
	Partnership	60	3.14	0.77	Within Groups	242		
	Private Ltd	76	2.89	0.98	Total	244		
PTS	Proprietorship	109	3.85	0.50	Between Groups	2	.723	.486
	Partnership	60	3.75	0.68	Within Groups	242		
	Private Ltd	76	3.77	0.62	Total	244		
EC	Proprietorship	109	4.02	0.55	Between Groups	2	1.31	.271
	Partnership	60	3.94	0.55	Within Groups	242		
	Private Ltd	76	4.10	0.64	Total	244		
SCS	Proprietorship	109	3.51	0.50	Between Groups	2	.921	.399
	Partnership	60	3.40	0.54	Within Groups	242		
	Private Ltd	76	3.47	0.53	Total	244		
FS	Proprietorship	109	3.35	0.72	Between Groups	2	2.005	.137
	Partnership	60	3.33	0.59	Within Groups	242		
	Private Ltd	76	3.16	0.71	Total	244		
AI	Proprietorship	109	3.38	0.68	Between Groups	2	2.217	.111
	Partnership	60	3.16	0.73	Within Groups	242		
	Private Ltd	76	3.21	0.74	Total	244		

SD standard deviation
*$P \leq 0.10$; **$P \leq 0.05$; ***$P \leq 0.01$

4.4 Age-Based Differences in Perception

The 'generation-gap' is clearly visible from Table 6, which presents the ANOVA results for the four age-groups. On all the dimensions, the younger generation has a more favourable view than the older ones, and a large number of these differences (6 out of 11) are statistically significant. The six significant differences are for the following dimensions: Government support ($t = 6.53$, $p = 0.00$), Education and

Table 5 Test of difference (*t*-test) in perceptions for male and female entrepreneurs

Factor	Gender	N	Mean	SD	t	df	Sig.
GS	Male	230	2.98	0.68	−0.45	280	.650
	Female	52	3.03	0.65			
ETS	Male	230	2.98	0.89	−2.80	280	.005***
	Female	52	3.37	0.91			
SI	Male	230	3.09	0.70	−0.63	280	.530
	Female	52	3.16	0.62			
MEF	Male	230	2.91	0.70	−0.07	280	.946
	Female	52	2.92	0.68			
FEW	Male	230	3.25	0.81	−1.05	280	.292
	Female	52	3.39	0.95			
PIS	Male	230	3.17	0.86	0.69	280	.488
	Female	52	3.08	0.90			
PTS	Male	230	3.82	0.56	1.04	280	.301
	Female	52	3.72	0.68			
EC	Male	230	4.03	0.56	0.91	280	.363
	Female	52	3.95	0.66			
SCS	Male	230	3.45	0.51	−1.29	280	.197
	Female	52	3.56	0.57			
FS	Male	230	3.26	0.72	0.88	280	.381
	Female	52	3.16	0.69			
AI	Male	230	3.25	0.72	−0.49	280	.626
	Female	52	3.30	0.73			

SD standard deviation
***$P \leq 0.01$

training support ($t = 11.28$, $p = 0.00$), Market entry facilitation ($t = 2.65$, $p = 0.05$), Facilitation of women's entrepreneurship ($t = 7.08$, $p = 0.00$), Funding support ($t = 3.43$, $p = 0.017$) and Access to information ($t = 4.48$, $p = 0.004$), many of which are influenced by the liberalization policies of the government and the technological advancements happening in recent times. Naturally, the younger generations have grown with these changes and are probably able to derive better benefits out of them.

4.5 Marital Status Based Differences in Perception

It is intriguing how marital status of a person can affect his/her perception of the business environment (see Table 7). Family responsibilities may have dampening effect of the perception of one's own entrepreneurial capabilities, but that is not seen in the present analysis – in fact, the mean scores on EC are almost the same for the two groups (4.02 and 4.01). As the number of significant variables are fairly

Table 6 Test of difference (ANOVA) in perceptions based on age-groups of entrepreneurs

Factor	Age	N	Mean	SD		F	df	Sig.
GS	Less than 24	44	3.36	0.56	Between Groups	3	6.53	.000***
	24–30	102	3	0.63	Within Groups	275		
	31–45	99	2.85	0.69	Total	278		
	Above 45	34	2.93	0.67				
ETS	Less than 24	44	3.65	0.89	Between Groups	3	11.28	.000***
	24–30	102	3.09	0.84	Within Groups	275		
	31–45	99	2.92	0.89	Total	278		
	Above 45	34	2.59	0.79				
SI	Less than 24	44	3.26	0.62	Between Groups	3	1.1	0.351
	24–30	102	3.07	0.72	Within Groups	275		
	31–45	99	3.11	0.66	Total	278		
	Above 45	34	3.01	0.7				
MEF	Less than 24	44	3.14	0.56	Between Groups	3	2.65	.049**
	24–30	102	2.92	0.66	Within Groups	275		
	31–45	99	2.88	0.76	Total	278		
	Above 45	34	2.71	0.72				
FEW	Less than 24	44	3.8	0.92	Between Groups	3	7.08	.000***
	24–30	102	3.18	0.81	Within Groups	275		
	31–45	99	3.2	0.82	Total	278		
	Above 45	34	3.17	0.62				
PIS	Less than 24	44	3.82	0.63	Between Groups	3	0.32	0.808
	24–30	102	3.83	0.54	Within Groups	275		
	31–45	99	3.79	0.64	Total	278		
	Above 45	34	3.72	0.5				
PTS	Less than 24	44	4.01	0.62	Between Groups	3	0.14	0.936
	24–30	102	4.03	0.52	Within Groups	275		
	31–45	99	3.98	0.61	Total	278		
	Above 45	34	4.02	0.62				
EC	Less than 24	44	3.55	0.53	Between Groups	3	1.18	0.318
	24–30	102	3.49	0.53	Within Groups	275		
	31–45	99	3.47	0.52	Total	278		
	Above 45	34	3.33	0.51				
SCS	Less than 24	44	3.46	0.81	Between Groups	3	3.44	.017**
	24–30	102	3.32	0.62	Within Groups	275		
	31–45	99	3.1	0.7	Total	278		
	Above 45	34	3.12	0.78				
FS	Less than 24	44	3.52	0.8	Between Groups	3	8.74	.000***
	24–30	102	3.28	0.78	Within Groups	275		
	31–45	99	2.83	0.92	Total	278		
	Above 45	34	3.22	0.78				
AI	Less than 24	44	3.41	0.51	Between Groups	3	4.48	.004***
	24–30	102	3.37	0.71	Within Groups	275		
	31–45	99	3.21	0.74	Total	278		
	Above 45	34	2.91	0.79				

SD standard deviation
**$P \leq 0.05$; *** $P \leq 0.01$

Table 7 Test of difference (*t*-test) in perceptions based on marital status

Factor	Marital status	N	Mean	SD	t	df	Sig.
GS	Single	122	3.11	0.63	2.73	280	.007***
	Married	160	2.89	0.68			
ETS	Single	122	3.34	0.89	4.74	280	.000***
	Married	160	2.84	0.86			
SI	Single	122	3.14	0.68	0.70	280	.486
	Married	160	3.08	0.68			
MEF	Single	122	3.03	0.66	2.49	280	.013**
	Married	160	2.82	0.71			
FWE	Single	122	3.42	0.92	2.53	280	.012**
	Married	160	3.17	0.76			
PIS	Single	122	3.43	0.79	4.87	280	.000***
	Married	160	2.94	0.87			
PTS	Single	122	3.86	0.59	1.55	280	.121
	Married	160	3.75	0.58			
EC	Single	122	4.02	0.56	0.16	280	.874
	Married	160	4.01	0.60			
SCS	Single	122	3.45	0.53	−0.62	280	.537
	Married	160	3.49	0.51			
FS	Single	122	3.33	0.73	1.81	280	.071*
	Married	160	3.17	0.69			
AI	Single	122	3.41	0.65	3.01	280	.003***
	Married	160	3.15	0.75			

SD standard deviation
*$P \leq 0.10$; **$P \leq 0.05$; ***$P \leq 0.01$

high (5 out of 11), it is difficult to attribute them to chance variation. One possible explanation would be the possible confounding of age and marital status, as the married individuals are likely to be older than the singles. The 'generation-gap' seen in the section above may be operating here too. This inference is supported by the fact that the significantly different dimensions are exactly the same seven for both the sub-groups.

4.6 Education Based Differences in Perception

It is rather strange that the educational levels have no influence on the perceptions of the entrepreneurial ecosystem (see Table 8). The reason for this may be that there are no respondents in our sample, who are really low in education. They are graduates or above, and the difference between graduates and post-graduates in terms of their knowledge, especially of the business environment which is not

Table 8 Test of difference (*t*-test) in perceptions based on educational qualification

Factor	Qualification	N	Mean	SD	t	df	Sig.
GS	G	94	2.93	0.65	−1.450	270	.148
	PG	178	3.05	0.65			
ETS	G	94	2.96	0.88	−1.468	270	.143
	PG	178	3.13	0.91			
SI	G	94	3.04	0.71	−1.338	270	.182
	PG	178	3.16	0.66			
MEF	G	94	2.90	0.71	−.211	270	.833
	PG	178	2.92	0.69			
FWE	G	94	3.23	0.77	−.878	270	.381
	PG	178	3.32	0.86			
PIS	G	94	3.11	0.81	−.900	270	.369
	PG	178	3.21	0.89			
PTS	G	94	3.83	0.57	.450	270	.653
	PG	178	3.80	0.60			
EC	G	94	4.06	0.64	1.093	270	.275
	PG	178	3.98	0.53			
SCS	G	94	3.47	0.52	−.017	270	.987
	PG	178	3.47	0.51			
FS	G	94	3.18	0.72	−1.241	270	.216
	PG	178	3.29	0.71			
AI	G	94	3.24	0.68	−.397	270	.692
	PG	178	3.28	0.74			

SD standard deviation, *G* graduate, *PG* post graduate

derived from their subject of study but are gained from the general exposure to the world around them may not be large.

4.7 Birth-Place Based Differences in Perceptions

Before we discuss the analysis of this subsection, it should be clarified that the item under consideration is the native place of the entrepreneurs, not the place of their operations. There are four dimensions Government support ($t = 3.70$, $p = 0.026$), Support for internationalization ($t = 3.82$, $p = 0.023$), Market entry facilitation ($t = 3.03$, $p = 0.050$), and Entrepreneurial capabilities ($t = 2.62$, $p = 0.075$) on which the perceptions are significantly different (see Table 9). In general, it is the rural people who have given higher ratings for the dimensions. This is probably because of the differences in facilities experienced by them when they moved from

Table 9 Test of difference (ANOVA) in perceptions based on the urbanization of birth-place

Factor	Area	N	Mean	SD		df	F	Sig.
GS	Rural	52	3.12	0.56	Between Groups	2	3.705	.026**
	Urban	126	3.11	0.64	Within Groups	239		
	Metropolitan	64	2.85	0.74	Total	241		
ETS	Rural	52	2.93	0.99	Between Groups	2	1.776	.172
	Urban	126	3.21	0.80	Within Groups	239		
	Metropolitan	64	3.09	0.97	Total	241		
SI	Rural	52	3.20	0.56	Between Groups	2	3.824	.023**
	Urban	126	3.20	0.68	Within Groups	239		
	Metropolitan	64	2.93	0.75	Total	241		
MEF	Rural	52	2.84	0.70	Between Groups	2	3.037	.050**
	Urban	126	3.06	0.65	Within Groups	239		
	Metropolitan	64	2.84	0.76	Total	241		
FWE	Rural	52	3.28	0.72	Between Groups	2	.966	.382
	Urban	126	3.38	0.90	Within Groups	239		
	Metropolitan	64	3.21	0.83	Total	241		
PIS	Rural	52	3.37	0.82	Between Groups	2	1.215	.298
	Urban	126	3.22	0.90	Within Groups	239		
	Metropolitan	64	3.11	0.89	Total	241		
PTS	Rural	52	3.79	0.62	Between Groups	2	.111	.895
	Urban	126	3.83	0.61	Within Groups	239		
	Metropolitan	64	3.83	0.58	Total	241		
EC	Rural	52	4.17	0.43	Between Groups	2	2.620	.075*
	Urban	126	4.00	0.55	Within Groups	239		
	Metropolitan	64	3.96	0.55	Total	241		
SCS	Rural	52	3.37	0.49	Between Groups	2	1.471	.232
	Urban	126	3.51	0.53	Within Groups	239		
	Metropolitan	64	3.48	0.55	Total	241		
FS	Rural	52	3.27	0.69	Between Groups	2	1.858	.158
	Urban	126	3.34	0.72	Within Groups	239		
	Metropolitan	64	3.13	0.67	Total	241		
AI	Rural	52	3.22	0.68	Between Groups	2	.906	.406
	Urban	126	3.35	0.66	Within Groups	239		
	Metropolitan	64	3.25	0.77	Total	241		

SD standard deviation
*$p \leq 0.10$; **$p \leq 0.05$

the rural to the urban locations. It should also be noted that the rural-born individuals rate their entrepreneurial capabilities higher than the urban-born. Since the facilitation of life in general is lower in the rural settings, it is likely that individuals hailing from those areas have to be more self-dependent and enterprising.

4.8 Work-Experience Based Differences in Perceptions

Most of our entrepreneur respondents had work experience before they started their ventures. Since the number (25) of respondents with no work experience (NWE), though low, was very close to the minimum (30) recommended for parametric statistical tests, it was decided to include them as a separate group along with two others, namely, those having less than 10 years' experience (WE <10) and those having 10 years or more (WE ≥ 10). On all the seven dimensions where there are significant differences, it is the group with less than 10 years' experience that has given the most favourable rating (see Table 10). The result may suggest that some work experience may be needed for people to come to know of the environment relevant for their field of operation. Then the question arises as to why the group with more than 10 years' experience has a less favourable perception. This may be because their experience about the environment was not very favourable and hence they postponed their venture start-up. Those who started without any work experience may have jumped into the fray, attracted by the allurements of the government schemes, and so may have given a more favourable rating to 'government support'. While the length of prior experience is showing some differences in the respondents' perception of the business environment, the explanations we have attempted above may be treated as propositional.

Discussion and Conclusion

Though perceptions are susceptible to 'self-serving biases', they are the inevitable basis for human decision-making. It was for this reason that we undertook this evaluation of the entrepreneurial ecosystem in India as part of a larger study in BRIC countries – the group of countries that are considered to be entrepreneurially active in recent times. The rating of the dimensions of the ecosystem showed an interesting bias in the fact that the highest rated three dimensions were related to self, other professionals and the larger society, whereas the average and below-average ratings were given to services being rendered by other agencies, especially the government. This could be due to a self-serving bias reflecting an 'I am OK, you are not OK' syndrome. Since the respondents are entrepreneurs who have already taken the plunge, it could also mean that the inadequacies of the extrinsic support system could be compensated by the individual competencies and peer-level/societal support.

Among the demographic characteristics of the individual, the most differentiating one seems to be the age of the person. The age-categories showed significant differences in seven dimensions. The other two variables which showed differences in a similar number (7) of variables – marital status and length of work experience – are apparently surrogates of age. For all these

(continued)

Table 10 Test of difference (ANOVA) in perceptions based on length of prior work experience

Factor	Age	N	Mean	SD		df	F	Sig.
GS	NWE	25	2.9	0.72	Between Groups	2	2.725	0.068*
	WE <10	139	3.06	0.69	Within Groups	233		
	WE ≥10	72	2.83	0.7	Total	235		
ETS	NWE	25	2.97	0.89	Between Groups	2	5.654	0.004***
	WE <10	139	3.18	0.91	Within Groups	233		
	WE ≥10	72	2.75	0.8	Total	235		
SI	NWE	25	2.75	0.9	Between Groups	2	4.332	0.014***
	WE <10	139	3.17	0.71	Within Groups	233		
	WE ≥10	72	3.01	0.59	Total	235		
MEF	NWE	25	2.82	0.82	Between Groups	2	0.8	0.451
	WE <10	139	2.94	0.74	Within Groups	233		
	WE ≥10	72	2.82	0.69	Total	235		
FWE	NWE	25	3.19	0.82	Between Groups	2	1.812	0.166
	WE <10	139	3.33	0.89	Within Groups	233		
	WE ≥10	72	3.11	0.71	Total	235		
PIS	NWE	25	3.18	0.76	Between Groups	2	4.223	0.016**
	WE <10	139	3.23	0.89	Within Groups	233		
	WE ≥10	72	2.86	0.89	Total	235		
PTS	NWE	25	3.67	0.65	Between Groups	2	2.86	0.059*
	WE <10	139	3.88	0.61	Within Groups	233		
	WE ≥10	72	3.7	0.54	Total	235		
EC	NWE	25	3.97	0.72	Between Groups	2	0.793	0.454
	WE <10	139	4.07	0.55	Within Groups	233		
	WE ≥10	72	3.98	0.52	Total	235		
SCS	NWE	25	3.52	0.54	Between Groups	2	1.251	0.288
	WE <10	139	3.51	0.51	Within Groups	233		
	WE ≥10	72	3.39	0.55	Total	235		
FS	NWE	25	2.91	0.63	Between Groups	2	8.138	0***
	WE <10	139	3.36	0.68	Within Groups	233		
	WE ≥10	72	3.02	0.74	Total	235		
AI	NWE	25	3.03	0.85	Between Groups	2	5.152	0.006***
	WE <10	139	3.37	0.73	Within Groups	233		
	WE ≥10	72	3.08	0.66	Total	235		

SD standard deviation, *NWE* no work experience, *WE* work experience
*$P \leq 0.10$; **$P \leq 0.05$; ***$P \leq 0.01$

subgroups it was more or less the same dimensions that had significant differences.

There were no differences based on the level of education, perhaps due to the homogeneity in the sample with respect to education, which contained

(continued)

only graduates and post-graduates. Similarly there were hardly any gender-based differences in the respondents' perception, with only one dimension – education and training support – showing a difference in favour of women. This could be explained by the relatively greater number of entrepreneurship training programs being offered for women in India in recent times. Contrary to expectation, the demographic sub-category based on the birth-place was also not a differentiator, as there were significant differences only on three dimensions, which may be explained as a contrast effect.

If one were to make a comparison between the industry context and the personal context, the result is rather ambiguous. While it is true that age and age-related variables differentiated almost double the number of dimensions than the industry subgroups on an average, other demographic characteristics like education, gender and birth-place did not differentiate as many. The results are therefore inconclusive, although it is possible to say that the younger generation is definitely more positive about the business environment of the country, which augurs well for the country's future economic development.

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Entrepreneurship and New Venture Creation in Italy: Key Issues and Policy Directions

Fabio Corno, Richa Lal, and Stefano Colombo

Abstract This exploratory study examines the perceptions of Italian entrepreneurs about their experiences with their own new venture creations in Italy. The study utilizes the Ecosystem framework to examine the drivers of entrepreneurship. Our Ecosystem framework stresses the fact that Entrepreneurship is pre-conditioned within the context of favourable policies, financial and institutional support along with individual and personality traits of the entrepreneurs. We used surveys across ICT and non-ICT entrepreneurs, followed by survey with the Control Group. The findings suggest entrepreneurial spirit in Italy is high, and the socio-cultural environment is perceived as encouraging entrepreneurship. The business environment challenges confronting ICT and non-ICT entrepreneurs are related to government policies and programs, access to finance, perceived need for support towards knowledge and skill building and, finally, to exploring International markets. Theoretical and practical implications are discussed along with directions for future research.

Keywords Entrepreneurial Ecosystem • Italian enterprises • ICT

1 Introduction

The complexity of today's global economic environment has made it more important than ever before to recognize and encourage entrepreneurship as one of the prime movers of economic growth. In light of the multiple challenges facing global economy, there is lot of interest among policy makers and researchers to explore the factors that promote entrepreneurship and innovation in a country, as well as the barriers that prevent innovative SMEs and entrepreneurship from playing their full potential role.

There are many determinants driving entrepreneurship. Understanding the factors behind this process has occupied the minds of economists for hundreds of years, engendering theories ranging from Adam Smith's focus on specialization and the division of labour to neoclassical economists' emphasis on investment in

F. Corno (✉) • R. Lal • S. Colombo
Department of Sociology, Milano-Bicocca University, Milan, Italy
e-mail: fabio.corno@unimib.it; richalal2006@gmail.com; stefano.colombo@unimib.it

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physical capital and infrastructure, and, more recently, interest in other mechanisms such as education and training, technological progress, macroeconomic stability, good governance, firm sophistication, and market efficiency, among others.

The underlying idea is that it is crucial for researchers and policy makers to understand the quality of such elements in any economy, as well as their potential in supporting or inhibiting new venture creation.

Our research focused on Italy. Italy has a diversified industrial economy. The great strength of its economy lies in the presence of a multitude of SME (95 % of Italian Companies have less than 10 employees), many founded in the period of the "Economic Miracle", when everything had to be rebuilt and there existed immense opportunity for everyone. Today this system, characterized by the claim "Small is Beautiful", is facing many challenges: the economic crisis, globalization, credit crunch, changes in the world trade and so on. All this requires a new class of entrepreneurs who are competent, technologically strong, understand customer needs, possess information and skills to reach out to foreign markets and develop international networks.

For the same Italian SMEs need to be better assisted to fully unlock their potential of long-term sustainable growth and more job creation. To implement effective entrepreneurial policies, it is necessary to understand the determinants of and the obstacles to entrepreneurship.

2 The Crucial Role of Policies

Entrepreneurship is now at the centre of many policy questions. Recent documents by the European Commission (2008) have emphasized the importance of entrepreneurship to promote the development of member countries. The consequence is that, in recent years, governments have placed a great deal of policy emphasis on the development of a "culture" of entrepreneurship, which is considered to be crucial for creating flexible economies that are capable of coping with the challenges of globalization. The policy interest in entrepreneurship has been accompanied by growing academic research into its dynamics and processes.

The scientific debate on these issues has shown that willingness and ability of individuals to identify and implement new business opportunities depend on a number of personal, social and economic factors.

Recent empirical surveys about entrepreneurial activity showed that Italy has one of the lowest entrepreneurial rates among industrialized countries, and this rate has declined specially during the last decade. Generally would-be entrepreneurs in Italy find themselves in a tough environment: education does not offer the right foundation for an entrepreneurial career, difficult access to credits and markets, difficulty in transferring businesses, the fear of punitive sanctions in case of failure, and burdensome administrative procedures. The Annual Growth Survey 2013 of European Commission has recently emphasized the need to improve the business environment to increase the competitiveness of Italian economy.

There is strong political willingness to recognize the central role of SMEs in the Italian economy. Italy being part of EU is signatory to the Small Business Act, based on which, commits to working towards responsive public administration, cut bureaucracy and increase clarity, less late payment of invoices, access to more help with finance, innovation and training, lower VAT for services supplied locally, improve efficiency of labour market, and extend support for internationalization. Such measures can influence the entrepreneurial environment to create a high performance entrepreneurial economy that fuels growth. This means providing the right platform for growth through effective policies, regulation and incentives.

3 Theoretical Model

The development of entrepreneurship in a particular milieu depends not on a single over-riding factor but rather on a 'constellation of factors' at the individual, societal and national levels (Tripathy, Business Communities of India – a Historical Perspective, 1984).

In order to understand the factors that support or hinder an entrepreneur, we have used the Entrepreneurial Ecosystem framework model in our research, instrumental in gaining insight into factors (individual, society, state) which enable growth performance among the entrepreneurs in the knowledge intensive ICT as well as non-ICT sectors.

The term "entrepreneurial ecosystem" (EE) refers to a combination of factors that play a role in the development of entrepreneurship.

In order to gain insight into the Entrepreneurial Ecosystem, we identified six main thematic determinants of entrepreneurship described above in Fig. 1, which are affected by many different policy areas that can facilitate and support the growth of an entrepreneur and thus influence entrepreneurial performance. Within each of the six main variables of this model, several sub-variables are identified to elaborate on the overall framework (Table 1).

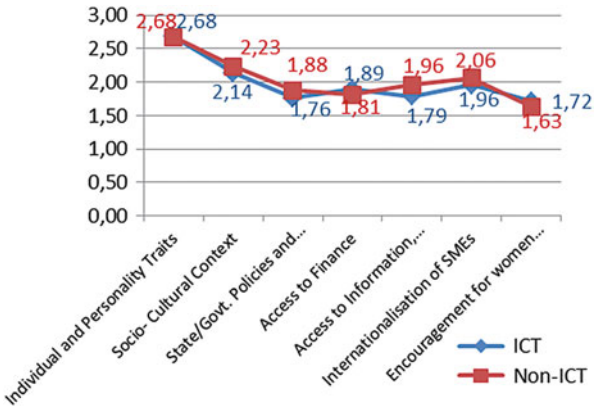

Fig. 1 Graphic representation of perceptual differences between ICT and non-ICT entrepreneurs

Table 1 The entrepreneurial ecosystem

Individual	Socio-cultural	Stategic/Govt. policies and programs	Access to finance	Knowledge and skill building	Internationalization
Education	Socialization	Infrastructure	Self finance	Business skills	International approach
Motivation	Risk-taking	Government policies	Bank credit	Training centers	International knowledge
Skill set	Family background	Incentives programs	Interest rates	Counseling services	Government agencies facilitations
Role models	Attitude	Taxation	Angle investors	Research and development	Access to financial resources
Opportunity	Support	Inflation	Venture capital	Business Incubators	Foreign languages abilities
Ability to manage		Min, entry barrier	Private equity	Networks	Intercultural skill
		Corruption			

We have attempted to make the list exhaustive, in an attempt to cover the most important policy areas. The elaboration and development of this Ecosystem framework can be considered as a starting point, allowing additions and changes to occur over time as our knowledge on entrepreneurship expands.

1. Individual Personality Traits: refers to the personal qualities of an individual pre-disposing him/her to entrepreneurial activity. The development of these traits could arise from early socialization, parenting, socio-cultural norms, early education and familial care etc, which are the components of the general environment.
2. Socio-cultural Context: refers to the social and cultural norms that influence individual's behaviour and attitude towards entrepreneurship.
3. Government Policies and Programs: refers to the extent to which government policies as reflected in tax or regulations are capable of facilitating new venture creation, and presence of adequate government programs in assisting firms in their start-ups, survival and growth
4. Access to Finance: refers to availability and affordability of various types of finance such as bank loans, equity, venture capital, angel funding, subsidies and grants.
5. Access to Information, Opportunity for Knowledge and Skill-building: refers to the availability of information on business opportunities and access to data required by entrepreneurs for managing their business. Also includes availability of opportunities for acquiring knowledge and learning that helps them in developing relevant skills required for managing their businesses.

6. Internationalization: refers to entry into the international market and meeting the challenges of existing players. For this an entrepreneur should have access to knowledge on international markets, procedures, have partners in the international markets for exports, imports, foreign direct investment, international subcontracting and international technical co-operation. They should also have access to appropriate training, and support services.

While the entrepreneurial ecosystem framework is presented here in a linear fashion, it is explicitly recognized that there are complex relationships among the different main variables and their sub-variables. They tend to reinforce each other, and weakness in one area often has a negative impact on other areas.

4 Research Questions

The study is guided by the following three broad research questions:

- 'What factors influence the support and development of ICT new venture creation in Italy?'
- 'Are there any similarities & differences in the factors supporting new venture creation between ICT and non-ICT entrepreneurs?'
- 'Are there any similarities & differences in the responses on factors supporting new venture creation between Entrepreneurs (both ICT and non-ICT) and Non-Entrepreneurs (Control Group)?'

5 Methodology

The study utilizes an exploratory, theory building approach (Strauss and Corbin 1998; Eisenhardt 1989). Primary data collection was made through survey method:

- 50 survey questionnaires sent out to ICT entrepreneurs of small, medium and large scale enterprises.
- 50 survey questionnaires sent out to non-ICT entrepreneurs of small, medium and large scale enterprises.
- 30 survey questionnaires sent out to non-entrepreneurs, serving as Control Group

The "survey" data was collected from 50 ICT entrepreneurs across small and medium enterprises (SMEs) in Italy. The selection of firms was based on the definition of ICT sector developed by OECD and includes the ICT sector industries based on products and services under these 4 branches- ICT manufacturing, ICT services, telecommunication and digital media.

A structural questionnaire composed mainly of closed-ended and rating questions was used as a data collection instrument. The questionnaire was pretested in

order to ensure that the survey content and measurement scales were clear, valid, and appropriate. Based on the pre-test responses, some demographic items were modified.

The owner/founders of the firms were the target respondents of the survey to ensure the validity of the data collected since the study is based on personal experiences of the entrepreneurs affecting his/her growth potential.

We used the selective database of member ICT companies of Confindustria Monza-Brianza, Innovhub, Milan Chamber of Commerce and Fondazione Distretto Green High Tech Monza Brianza to send out the online questionnaire for the respondents to answer. Along with this, Social media was also used to reach out to the entrepreneurs.

To maximize the response, personalized cover letters were sent, with promise of feedback and confidentiality. In total, 400 ICT entrepreneurs across SMEs were randomly selected and identified as meeting the selection criteria.

Questionnaire link was sent out to the entrepreneurs along with e-mail reminders and in some cases also telephonic reminders. Finally, we received 50 questionnaires that were relevant for the inclusion in the sample, resulting in a response rate of 12.23 %.

In order to understand and validate the findings of ICT entrepreneurs, the same survey questionnaire was then administered on non-ICT entrepreneurs. The "survey" data was collected from 50 non-ICT entrepreneurs across small and medium enterprises (SMEs) in Italy.

6 Data Analysis and Results

The data were analysed using the following statistical techniques:

- Exploratory factor-analysis to identify the dimensions of the EFCs.
- Correlation analysis among the factors to identify the patterns of interconnectedness among them.
- ANOVA or t-test for identifying the significant differences in the perceptions of different sub-groups, such as: ICT versus Non-ICT entrepreneurs, Entrepreneurs versus Non-entrepreneurs

6.1 Survey Findings from ICT and Non-ICT Entrepreneurs (Table 2)

Individual & Personality Traits The findings reveal that entrepreneurs in Italy possess individual and personality traits favouring entrepreneurship.

The mean values (2.68) indicate there is no difference in the perception of entrepreneurs across ICT and non-ICT sectors with regard to this variable.

Table 2 Perception of the entrepreneurial ecosystem by ICT and non-ICT entrepreneurs

	Clusters	N	Mean	SD	t	df	Sig
Individual and Personality Traits	ICT	50	2.68	0.36	0.05	98	0.96
	Non-ICT	50	2.68	0.29			
Socio-Cultural Context	ICT	50	2.14	0.33	−1.49	98	0.14
	Non-ICT	50	2.23	0.30			
State/Govt. Policies and programs	ICT	50	1.76	0.35	−1.37	98	0.17
	Non-ICT	50	1.88	0.48			
Access to Finance	ICT	50	1.89	0.38	0.98	98	0.33
	Non-ICT	50	1.81	0.42			
Access to Information, Opportunities for Knowledge and Skill Building	ICT	50	1.79	0.39	−1.94	98	0.06
	Non-ICT	50	1.96	0.46			
Internationalisation of SMEs	ICT	50	1.96	0.42	−1.13	98	0.26
	Non-ICT	50	2.06	0.51			
Encouragement for Women Start-ups	ICT	46	1.72	0.58	0.70	90	0.49
	Non-ICT	46	1.63	0.61			

Socio-cultural environment Cultural and social norms constitute an important determinant of entrepreneurship, indicating the degree to which a society considers as desirable entrepreneurial behaviours, such as risk taking and independent thinking.

Findings reflect that in Italy – the 9th largest economy in the world, with 98 % of the firms being small and medium enterprises – the socio-cultural environment seems to supporting entrepreneurship by encouraging creativity and innovation and to some extent risk-taking.

The role of the family is particularly strong in Italy as perceived by the entrepreneurs from the non-ICT sectors. This also has an impact on entrepreneurs' performance.

The same was reinforced in the GEM 2008 Report for Italy. GEM experts highlighted the fact that becoming an entrepreneur in Italy is a desirable career choice, that there is a capacity for entrepreneurship (in terms of skills and abilities) among the population, fostering entrepreneurship, as well as support for innovation, both among consumers and among firms.

There is no significant difference in the perception of entrepreneurs across ICT (overall mean 2.14) and non-ICT (overall mean 2.23) sectors with regard to this variable.

State/Govt. policies & Programs Doing business requires supportive government policies and programs in particular, easy-to-obtain licenses and permits, better information, simplification of regulations, favourableness of taxation system and lower degree of regulatory and administrative opacity.

The overall mean score for ICT 1.76 and overall mean score for non-ICT 1.88 indicate that entrepreneurs consider support from government towards favourableness of policies, taxation, ease of obtaining permits and licence as far from satisfactory.

Policy wise, in 2010, Italy has taken a number of policy measures aimed at improving the environment for SMEs and at reducing the administrative burden resulting from their interaction with the administration. The recently appointed government reinforces its commitment towards further interventions in providing supporting programs and schemes, tax incentives for start-ups and simplifying administrative procedures.

Access to Finance In order to have a better understanding about the credit markets, we analysed through our sample the ease of access to different sources of financing as perceived by entrepreneurs in the ICT and non-ICT sectors, our findings reveal the overall mean score of ICT as 1.89 and non-ICT as 1.81.

Access to finance has been exacerbated by the financial and economic crisis, as SMEs and entrepreneurs have suffered the dual shock of: a drastic reduction in demand for goods and services, and a tightening of credit terms, both of which are severely affecting their cash flows.

As revealed by our findings, with lack of government subsidies and bank lending increasingly risk averse, entrepreneurs especially from ICT sector are turning toward business angels, venture capital (VC) and private equity funding. About one fourth of the high-tech ICT start-ups perceive that it is easy to have access to funding from private equity, i.e. venture capital funds and angel investors as against only 14 % of non-ICT who perceive as funding available from Angel Investors.

Presence of credit constraints from banks is very worrisome, due to the key role allegedly played by SMEs in assuring innovation and growth in the economic system. Even though the findings should be interpreted with caution due to the relatively small size of the sample, nevertheless they provide an important insight into the existing financial scenario.

According to the Global Competitive Report 2012–2013 of World Economic Forum, Financial markets in Italy are not sufficiently developed to provide needed finance for business development (Italy ranked as 111th in the category availability of finance for SMEs). European Commission's SBA factsheet for 2010–2011 ranks Italy below the EU average in entrepreneurs having access to venture capital funds and willingness of banks to provide loans.

The Report 'Global Venture Capital and Private Equity Attractiveness Index 2011 drafted by IESE Business School in association with Ernst & Young reveals that Italy ranks 32nd in the world for attracting investments (due to risk aversion, labour market conditions, taxation system, ineffective public interventions, etc). On the positive side, government is proactive on this. Many policy measures have been taken lately to improve the situation in Italy.

According to a public consultation launched by the Commission in July 2012, access to finance constitutes one of the most significant constraints on growth and entrepreneurship in Europe.

Access to information, opportunities for knowledge and skill building Education is fundamental in the creation of new business. Knowledge, skills and competencies have become more and more important for (successful) entrepreneurship, given the increasingly knowledge intensive character of OECD economies. In order to better understand the opportunity for knowledge and skill building available for ICT as well as non-ICT entrepreneurs, our findings from survey data reveal statistically significant variance in the response from ICT and non-ICT entrepreneurs.

ICT respondents perceive more the lack of support available from Universities for research & development, which is especially very crucial for the ICT sector. High-tech ICT start-ups need to invest themselves for R&D as well the support available from Industry associations for getting information, networking, training needs. The support available from Incubators and technology parks is also perceived as minimal.

This is the only variable on which the two groups differ ($t = -1.94$, $p = 0.06$), where the perception is more positive by the Non-ICT entrepreneurs and the difference is significant at 94 % confidence level. This may be because the facilitation schemes are already in place for the traditional industries, whereas for ICT they are being developed and customized for the needs of the new industry (Fig. 2).

Internationalization To reap the benefits of the Internal Market and to meet the challenge of fiercer competition, entrepreneurs need to be encouraged to innovate and to Internationalize. For this, they should have access to knowledge, relevant contacts, training and business support services

Our findings from survey data for ICT and non-ICT entrepreneurs reveal that they significantly lack information and skills required for Internationalization. As perceived by them, there is clearly no support from Government agencies facilitating new firms entry into domestic & international markets and no access to finance.

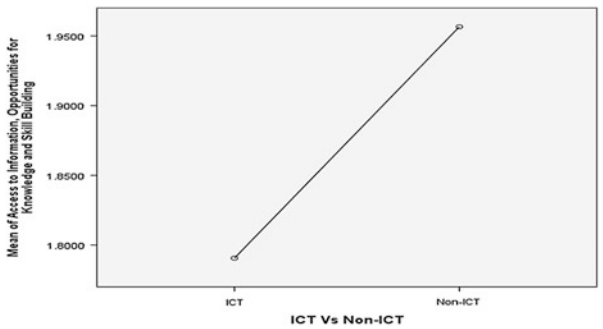

Fig. 2 Perceptual difference on by "ICT" and "NON-ICT" Entrepreneurs

The data reveals no significant difference in the perception of ICT (mean score 1.72) and non-ICT (mean score 1.63) entrepreneurs.

In light of the above findings, we held interviews with Chambers of Commerce, Business Associations (like ASSINFORM, ASSINTEL), some leading Venture Capitals to understand the role being played by these bodies in supporting Entrepreneurs in finding lead markets and developing competency to Internationalize. As revealed, there is a lot of support being rendered especially to high tech SMEs for Internationalization in terms of finding the lead markets, networking opportunities through participation in international events & fairs, accessing finance, finding the potential business partners and conducting training programs to equip the knowledge and skill level of entrepreneurs. The entrepreneurs do not perceive this reality.

6.2 Survey Findings from Non-entrepreneurs (Table 3)

The findings reveal the following:

Individual & Personality Traits: The findings are in line with those of ICT and non-ICT entrepreneurs.

Socio-cultural environment: The findings highlight that the cultural in Italy supports entrepreneurship, which is in line with the perception of ICT and non-ICT entrepreneurs.

Govt. Programs & Policies: the findings reveal poor support from government for promoting entrepreneurial programs and policies.

Access to Finance: The findings reveal that for the access to finance entrepreneurs rely mainly on family/friends and that there are VC and Private equity funds relatively more available. The findings are in close proximity to those of the ICT and non-ICT entrepreneurs.

Opportunity for Knowledge & Skill Building: The findings are in line with those of ICT and non-ICT entrepreneurs.

Table 3 Perception of the entrepreneurial ecosystem by entrepreneurs and non-entrepreneurs

	Non-enterpreneurs	N	Mean	SD	t	df	Sig
Individual and Personality Traits	NE	30	2.56	0.40			
Socio-Cultural Context	NE	30	2.25	0.31			
State/Govt. Policies and Programs	NE	30	1.93	0.53			
Access to Finance	NE	30	2.00	0.39			
Access to Information, Opportunities for Knowledge and Skill Building	NE	30	1.89	0.4			
Inernationalisation of SMEs	NE	30	1.94	0.35			
Encouragement for Women Enterpreneurship	NE	27	1.96	0.76			

Internationalization: The findings reveal that the entrepreneurs have a positive attitude towards internationalization, but lack the other necessary support measures to do so. This validates the perception of the entrepreneurs.

6.3 *Survey Findings Between Entrepreneurs (Both ICT and Non-ICT) and Non-entrepreneurs (Control Group) (Table 4)*

The perception of non-entrepreneurs is rated higher in most of the cases except for "individual and personality traits" and "internationalization of SMEs".

The higher ratings given by the non-entrepreneurs may suggest an actor-observer bias. They may also indicate a perceptual bias because the "grass is greener on the other side" in general. As the differences are not statistically significant except in the case of three variables, it is not legitimate to make any strong conclusions in this regard.

The three variables on which the differences are significant at 90 % confidence level are: Individual and personality traits ($t = 1.73$, $p = 0.086$), where entrepreneurs score higher than non-entrepreneurs; Access to finance ($t = -184$, $p = 0.067$); and Encouragement of women's entrepreneurship ($t = -2.08$, $p = 0.040$). For the latter two, the ratings of the non-entrepreneurs are higher than those of the entrepreneurs.

Table 4 Perception of the entrepreneurial ecosystem by entrepreneurs and non-entrepreneurs

	Entrepreneurs vs. non-entrepreneurs	N	Mean	SD	t	df	Sig
Individual and Personality Traits	E	100	2.68	0.32	1.73	128	.086
	NE	30	2.56	0.40			
Socio-Cultural Context	E	100	2.19	0.32	−0.92	128	.360
	NE	30	2.25	0.31			
State/Govt. Policies and Programs	E	100	1.82	0.42	−1.21	128	.228
	NE	30	1.93	0.53			
Access to Finance	E	100	1.85	0.40	−1.84	128	.067
	NE	30	2.00	0.39			
Access to Information, Opportunities for Knowledge and Skill Building	E	100	1.87	0.43	−0.18	128	.858
	NE	30	1.89	0.4			
Internationalisation of SMEs	E	100	2.01	0.47	0.80	128	.425
	NE	30	1.94	0.35			
Encouragement for Women Entrepreneurship	E	92	1.67	0.60	−2.08	117	.040
	NE	27	1.96	0.76			

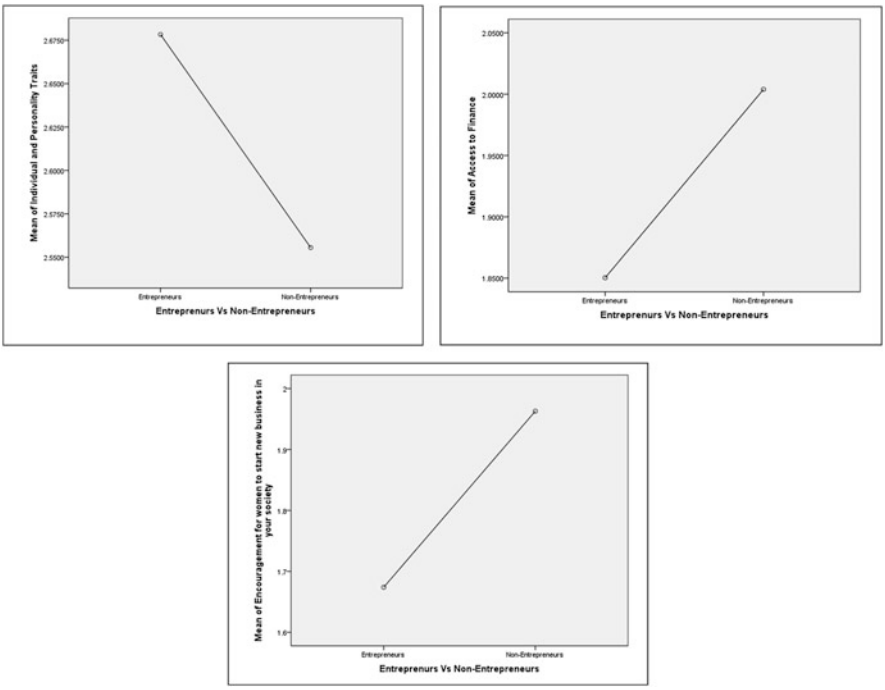

Fig. 3 Perception of the entrepreneurial ecosystem by entrepreneurs and non-entrepreneurs

It is but natural that entrepreneurs have greater confidence in their own competencies and skills – which is why they have chosen the entrepreneurial career. On the other two variables, the higher ratings by non-entrepreneurs may be due to the actor-observer bias (Fig. 3).

6.4 Discussion and Limitations

This chapter reports the findings of a perception survey study on 50 entrepreneurs in the knowledge intensive ICT sector and 50 entrepreneurs from non-ICT sectors in Italy with respect to six framework conditions, based on the Ecosystem Model, which comprises of several determinants which influence entrepreneurial performance. Within each of the six framework conditions, several subcategories were identified to broaden the overall framework and make it more explicit for analysis.

The overall aim was to analyse the interaction between the key factors which contribute to the success of Knowledge Intensive Entrepreneurs, with particular reference to the ICT sector in Italy. The findings were then co-related with survey data from non-ICT entrepreneurs to understand the similarities and differences perceived by the two categories with regard to the Entrepreneurial Ecosystem in Italy.

The key findings of this study reveal that broadly there is no significant difference in the findings across ICT and non-ICT entrepreneurs with regard to the six main variables. Overall, the entrepreneurial spirit in Italy is high, and the sociocultural environment is perceived as encouraging entrepreneurship.

The business environment challenges confronting both ICT and non-ICT entrepreneurs are related to the government policies and programs, where entrepreneurs indicate administrative formalities towards new venture creation as bureaucratic, time consuming and expensive. Tax burden is felt as high. Access to finance is largely dependent on self-financing or using informal sources of funding.

Banks refrain from funding SMEs. Entrepreneurs are aware of the possibilities connected with venture capital funding for SMEs in the knowledge intensive ICT as well as non-ICT sectors, yet few of them have direct access. Non-ICT entrepreneurs perceive Angel Investor funds as non-existent for them. Non-ICT Entrepreneurs reflect a more positive attitude towards internationalization as compared to ICT, but both face practical difficulties in having access to knowledge, relevant contacts, training, business support services etc.

Last, the education system in Italy needs to stimulate the entrepreneurial mindsets amongst young people and provide knowledge and skill building support to young entrepreneurs through its universities, science parks and incubation centres.

The above findings are in line with recent studies by World Bank Ease of Doing Business Report 2011, Global Competitiveness Report 2010–2011 World Economic Forum, OECD Eurostat Entrepreneurship Indicators – performance for Italy or GEM Report 2008 for Italy.

Italy's economy is driven by a vast resource of micro and small firms. The share of micro and small firms in the overall number of firms is substantially higher in Italy than the EU average. In the light of the current economic challenges confronting Italy, it needs to decisively tackle the structural weaknesses and improve the business environment in order to promote and support entrepreneurship. These reforms are essential for Italy to succeed in the immense challenge of simultaneously putting public finances on a sounder track, reviving and modernizing its economy, restoring competitiveness and finally promoting entrepreneurship.

Our findings have implications for both theory and practice.

- **For researchers**, the study provides empirical evidence on the determinants of entrepreneurship. While our approach touches many of the bases that a detailed measurement framework will need to incorporate, we acknowledge that establishing such a framework is beyond the scope of a single report. Instead, it will require a sustained, multi-year research process. Moreover, the measurement framework is likely to be dynamic, requiring adjustment over time to reflect new technologies and structural changes to the business environment.
- **For entrepreneurs**, the findings not only provide an insight into various factors that play a role in sustenance and growth of their ventures, but also what entrepreneurs can do to seize opportunities presented by the environment in which they operate.

- **For policy makers**, it proposes a vision of co-existence and inter-dependence of factors enabling and disabling entrepreneurship. Entrepreneurs and government both stand to benefit from long-term enterprise growth if better coordinated support is offered. Government should take a holistic approach, which fosters the strengthening of the entire entrepreneurship environment. However, doing this first requires accurately measuring the determinants of entrepreneurship, as well as understanding the impact of a host of different factors on the level of entrepreneurship in a country. Our report is an endeavour in this direction. The findings focused on Entrepreneurial Ecosystem framework aim to provide insight to government to evaluate the effectiveness of existing measures, identify leading practices, focus on the enablers that will make a difference and increase the impact of their incentives.

The study does have limitations. The sample size is small and is not representative of all regions across Italy. The sample has not been analysed based on performance of ICT entrepreneurs backed by services like having access to Venture capital funding or in incubation as against those not backed by these services. The ecosystem model comprising of six framework conditions is not exhaustive to cover all aspects of the entrepreneurial environment. The study provides a macro view of the factors supporting ICT and non-ICT entrepreneurs, without giving a micro account of specific sub-variables. These are all dimensions that can be taken up in subsequent researches.

Despite the limitations, the study at this stage contributes to the understanding of the determinants of entrepreneurship which support and harness the growth on knowledge intensive ICT entrepreneurship in Italy. Comparison of the same with non-ICT entrepreneurs validate the findings and highlight the need for creating an enabling environment for entrepreneurs by putting them at the heart of business policy and practice, and revolutionizing the culture of entrepreneurship.

It is time for action to enable Italy's entrepreneurs to be more adaptable, creative and to have greater impact in globalized competition that is more demanding and more rapid than ever before.

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Part II
Social Entrepreneurship

Business Model Innovation in Emerging Economies: Leveraging Institutional Voids

Manas Puri, Ernesto Tavoletti, and Corrado Cerruti

Abstract The role of entrepreneurship as an agent of innovation and economic growth has drawn considerable attention in the literature on strategy and emerging economies. An uncertain institutional environment has been argued to impede opportunities for innovation. In many cases, large, resource-rich business groups fill these voids. However, what has been unclear is how resource-poor entrepreneurs, who do not have a large resource base, mitigate the challenges posed by a weak institutional environment. The present study focuses on how entrepreneurs in emerging economies exploit institutional voids and develop business model innovation. Additionally we investigate if all types of institutional voids can potentially become opportunities for entrepreneurs or is there a distinction between the types of institutional voids that may exist. We follow an inductive, multiple case research design. The research setting is the energy industry in India. The chapter endeavors to link the literature on institutional voids and innovation and propose a framework explaining how institutional voids represent opportunities for business model innovation.

Keywords Institutional voids • Emerging economies • Base of the pyramid • Business model innovation

1 Introduction

Entrepreneurship as the main source of innovation has been identified to play a strong role in the economic development of nations. As emerging economies take centre stage in the global economy, understanding the entrepreneurial environment in these countries becomes exceedingly important (Bruton et al. 2008). Nevertheless, the research on and hence, our understanding of, entrepreneurship in emerging

M. Puri (✉) • C. Cerruti
Department of Studies on Business Government Philosophy, Faculty of Economics, University of Rome 'Tor Vergata', Rome, Italy
e-mail: puri@economia.uniroma2.it; conrado.cerruti@unirom2.it

E. Tavoletti
Department of Political Sciences, Communication and International Relations, Faculty of Political Sciences, University of Macerata, Macerata, Italy
e-mail: ernesto.tavoletti@unimc.it

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economies remains limited. Even when studies on emerging economies have been done, mostly they have been criticized for merely applying notions developed for rich economies, without considering the socio-economic, cultural and institutional differences (Bruton et al. 2008; Kiss et al. 2012).

The literature on entrepreneurship has evolved rapidly over the last 15 years. Consequently, the role of entrepreneurship as an agent of innovation and economic growth has also drawn considerable attention in the literature on strategy and emerging economies. A distinctive feature of emerging economies is the evolving nature of its institutions that support efficient market functioning (Meyer 2001). They are characterized by a dynamic transition in governance, policies and institutions. Due to the long-term nature of such institutional transformations, various 'voids' appear in the short-term, hampering entrepreneurial activity (Tracey and Phillips 2011). Traditionally such institutional inefficiencies have been referred to as 'institutional voids' (Mair and Martí 2009; Mair et al. 2012; Puffer et al. 2010).

Traditionally, an uncertain institutional environment in emerging economies has been argued to impede opportunities for entrepreneurship due to increased risk and complexity (Aidis 2005). In the recent scholarship however, the focus has shifted to understand if such institutional voids can actually spur entrepreneurial activity in emerging economies (Tracey and Phillips 2011). In many cases where the institutions are weak, large, resource-rich business groups fill in these voids by encouraging self-regulation together with other mechanisms of trust, in order to help markets to function (Khanna and Palepu 1997; Mair and Martí 2009; Mair et al. 2012). However, what has been unclear is how resource-poor entrepreneurs who do not have a large resource base, mitigate the challenges posed by weak institutional environment. Therefore we investigate how *entrepreneurs spot opportunities in institutional voids* and examine *if they represent entrepreneurial opportunities for business model innovation* (Lambert and Davidson 2013; Malhotra 2000). Scholars have studied how large resource-rich conglomerates or affiliated business groups deal with institutional voids (Khanna and Palepu 2010) but little attention is paid to developing an understanding of how resource-poor organizations navigate around institutional inefficiencies.

As a response to this gap within the literature, this chapter presents an empirical, inductive study to expand the understanding of how institutional voids act as opportunities for entrepreneurs. The objective of the present chapter is to investigate empirically the relatively unexplored side of institutional voids: their role as opportunities for business model innovation at the bottom of the pyramid (Prahalad 2006; Prahalad and Hammond 2002) (hereafter referred to as BoP). The BoP is especially relevant here since most of the institutional voids are faced by the rural and urban poor in emerging economies who constitute a large BoP population.

The present study focuses on how entrepreneurs in emerging economies exploit institutional voids and develop innovative business models that perform on three fronts:

(a) Fulfil an institutional void caused by poor governance;
(b) Are a for-profit effort;
(c) Bring benefit by providing basic products or services where these are missing.

In order to conduct this investigation we have chosen the Indian energy industry as our research setting. We have chosen India, as it is one of the most significant emerging economies in the world, with a large BoP. We have chosen the energy sector, as it is a very relevant sector in any national economy.

The rest of the chapter is organized as follows. The next section presents the theoretical background. The following one describes the methodology of the research and data collection. The fourth section contains the data analysis. The last section discusses the results, points out limitations and draws conclusions.

2 Theoretical Background

In his seminal work, Schumpeter (1934) identified entrepreneurship as a process of creating new products, business models and also new markets that disrupt the existing ones in a way that creates value and wealth. Along similar lines, Kirzner (1973) further elaborated on that idea by defining entrepreneurship as a process of identifying opportunities embedded in disequilibrium and inefficiency, thereby bringing the systems back to equilibrium (Hill and Mudambi 2010; Israel 1973). Both these definitions, in effect, identify disequilibrium and inefficiency as the main drivers of entrepreneurship. Successful entrepreneurs identify opportunities within disequilibrium and then build around them to develop value propositions that are unique and transform the system towards equilibrium. Nonetheless, despite the recognition that institutional voids are widespread in emerging economies, the understanding of their role in entrepreneurial activity has been rather limited.

There is agreement that state action and rules are the main source of market institutions (North 1990), such as property rights and the effective economic freedom of individuals (Campbell and Lindberg 1990). There is also evidence that weak or absent market institutions reinforce existing social inequalities (Crow 2001). On the other hand it can be argued convincingly that even standard western market institutions can produce inequality and exclusion (Mair et al. 2012)

The literature on institutional voids has mainly focused on how institutional voids inhibit smooth business strategy formulation by making interactions expensive and difficult (Aidis 2005; Fogel 2006; Luthans and Ibrayeva 2005). As a response to this observation, some scholars focused on investigating how businesses navigate through and deal with institutional uncertainty in emerging economies. However, most scholars (Carney et al. 2009a, b; Chu 2004; Gaur and Delios 2006; Ma et al. 2006) do this by studying large conglomerate or group affiliated corporations, which either surpass, substitute or replace institutional voids by leveraging their vast resource base. Indeed a search on EBSCO ("institutional voids" in Author supplied abstract OR "institutional voids" in Author supplied keywords) returned 41 studies out of which 18 directly studied institutional voids. Out of these 18, five directly studied large group affiliated corporations or conglomerates and how they deal with institutional voids. Another four were published as Harvard Business School cases or in Harvard Business Review and one on

European Business Forum that dealt with the practitioner's aspect of spotting institutional void, but they all fall short of treating them as opportunities for new business development and also do not discuss how small resource-poor firms can leverage institutional voids. A further four studies directly link entrepreneurship to institutional voids, out of which two examine an NGO in Bangladesh as an institutional entrepreneur (Mair and Martí 2009; Mair et al. 2012). Two others discussed the discourse on market development and the role of innovation in product and delivery systems amidst institutional voids (Chakravarthy and Coughlan 2012; Prokopovych 2011). The last two papers discuss the future of Asian business in uncertain institutional context and develop a framework on institutional theory of the firm (Carney 2008; Carney et al. 2009a, b). In fact, institutional voids are always analysed as obstacles to economic development or "drivers of market exclusion" (Mair et al. 2012). However, while we share the view that institutions are essential for market building, market efficiency and social inclusion, we also make the case that if they are missing, they can provide business opportunities to some entrepreneurs, as well. These opportunities can be especially significant for entrepreneurs serving the bottom of the pyramid (Prahalad 2006) and can be beneficial for their customers facing a situation of institutional voids.

Tracey and Phillips (2011) theorize about the strategies for venture creation in uncertain institutional contexts and develop a typology of three institutional strategies for entrepreneurs in developing economies: institutional brokering, institutional spanning and bridging institutional distances. For the purposes of this paper, we focus on institutional spanning which is central to developing entrepreneurial initiatives in institutional, governance and infrastructural constraints. Tracey and Phillips (2011) define institutional spanning as the process of '*solving a given institutional problem to become the standard taken-for-granted solution*.' A classic example of such an initiative is the Grameen bank, which identified the lack of any form of mechanism that would allow for the rural poor in Bangladesh to access capital. This can be linked to Scott's work in which he proposed that, among other things, institutional building and its legitimization depend on the cultural-cognitive aspect of the actors involved (Scott 1991). Hence, the way in which an institutional spanner interprets the socio-economic and cultural underpinnings of the environment becomes central. This may translate into identifying and then *working with* (instead of *over*) informal institutions to develop alternative institutions. Bjerregaard and Lauring point out the importance of informal institutions but also contend that while they do provide alternative institutions, where formal institutions do not exist, they also potentially '*hamper market activity by sanctioning norm-deviating behavior*' (Bjerregaard and Lauring 2012). Teagarden and Schotter (2013) discuss the positive role of favour in emerging markets. Favour is, in fact, a medium of exchange for social capital (Teagarden and Schotter 2013) and the authors follow the classification by Khanna, Palepu and Sinha (2005) in which institutional voids are regarded as '*the absence of specialized intermediaries, regulatory systems, and contract-enforcing mechanisms in emerging markets…*' (Khanna and Palepu 1997; Khanna et al. 2005). Webb et al. (2009) focus on the impact of institutional voids on entrepreneurship in markets at the BoP and

highlight how institutional incongruence and weak enforcement of formal institutions facilitate entrepreneurial activity, by reducing uncertainty (Webb et al. 2009). Other researchers have investigated the positive role of partnerships between for profit corporations and local social entrepreneurs and NGOs in order to reach the BoP and implement BoP business models (Seelos and Mair 2007: 49).

To this end, the most relevant study on the subject is done by Mair et al. (2012) who investigate, through a case study, the process of market development in and around institutional voids. Their theoretical point of departure is the new institutional economics and agency theory. The authors base their work on past research focusing on large conglomerates in emerging economies to contend that large business groups substitute missing institutions to ensure market function in the event of market failures caused by institutional voids (Khanna and Palepu 1997). They propose that institutional voids can serve as a *problem sensing* tool, which could then be used to understand and address bottlenecks that hinder market development. Additionally, a key finding of their study, which we take forward in this paper, is the idea that in places with low levels of institutionalism, markets should be developed *along with* rather than *on top of* existing local institutions (Mair et al. 2012). However, the study falls short on one account. It studies an NGO whose *raison d'être* differs significantly from that of a for-profit, private enterprise, and limits itself to institutional entrepreneurship (Dacin et al. 2010).

3 Methodology

The paper follows an inductive, multiple case study research design (Eisenhardt and Graebner 2007; Yin 1994), through a two-staged process: the descriptive stage and the normative stage (Carlile and Christensen 2004; Christensen 2006). We seek to extend the current theory and create new insights by studying entrepreneurship in environments with weak institutional settings. We examine the micro-process of spotting institutional voids and turning them into business opportunities.

3.1 Research Setting

The research setting is the energy industry in India. Even after 67 years of being independent, India still has a chronic shortage of electricity. We chose the electricity sector in India for two main reasons. First, because of the huge impact it has on the BoP population, as millions of people in India are still not linked to the electricity grid.

Secondly, the electricity industry has been an experiment laboratory for business models. In fact, with the easing of restrictions on power generation in India, some entrepreneurs have managed to establish energy production SMEs.

The cases of two such enterprises, operating in the renewable energy industry in India, have been selected. In doing business predominantly in rural areas where

Table 1 Case studies

Name	Prior firm industry	Main capability	Founding year
SELCO India Pvt. Ltd.	Solar Energy Provider	Linking financial institutions to the poor	1995
		Customized, context dependent lighting systems	
Husk Power System	Waste to Energy	Forming linkages with the community	2007
	Electricity provider	Incorporating local people in production and distribution of electricity	

various institutional voids exist, they offer a perfect setting to study and develop and understand how entrepreneurs leverage institutional voids to build businesses that build value for the community at large. The two case studies are the following:

(a) Husk Power System
(b) SELCO India Pvt. Ltd

3.2 Data Collection and Analysis

The evolution of both these companies has been well documented. The study relies on secondary data. Published interviews and company documentation form the bases of data analysis. We began data collection by gathering extensive archival data from both internal and external resources. The internal resources included press releases and reports. The external sources included media articles about each firm, analyst reports, books and other articles about competitors and the respective industries. The data were then studied and examined individually and a longitudinal history of each firm was mapped, including important milestones, both strategic and operational. Particular attention was paid to the various institutional interfaces that the firms had to develop in order to legitimize their operations (Table 1).

We then began a cross-case analysis, looking for similar constructs and themes in the two cases. The analysis and the resulting propositions are in the following paragraph.

4 Analysis

4.1 Spotting Institutional Voids

Starting from Schumpeter (1934), and Kirzner (1973), the cases were analysed keeping in mind the importance of disequilibrium and inefficiency as potential pointers towards an entrepreneurial opportunity for business model innovation.

Both SELCO and HPS were established with just such differing notions about the poor as underserved consumers and the electricity industry in India. For instance, the very basis on which SELCO was established was counter-intuitive to most businesses at the time of its establishment in 1995. As the founder, Harish Hande, expressed in an interview:

> We set up SELCO to bust three myths – the poor people cannot afford technology, the poor people cannot maintain technology and it is not possible to run a commercial venture that fulfils a social objective (Mukherji 2010).

While institutional voids are rampant in developing countries, they do not immediately appear as business opportunities, but rather as business hurdles. The formal institutional and governance inefficiency, such as the lack of information exchange and dissemination mechanisms, lack of physical infrastructure and electricity etc., along with complex informal institutions including strong cultural and religious habits and beliefs, makes rural India a complex system in which to do business; so much so that most villages in India have been untouched by its ongoing economic transformation. The aforementioned complex system has prevented large and small businesses from expanding into the rural areas due the lack of physical infrastructure, institutional voids, and complex societal institutions and norms. Additionally, the incidence of extreme poverty and low buying power prevents most businesses from entering this sphere of society, as they believe it to be unprofitable. This not only limits regional economic development but also prevents the rural poor from moving up the economic ladder by limiting business exposure and hence, preventing them from becoming small-scale entrepreneurs themselves.

Lack of access to dependable electricity in the rural parts of India is one such constraint, which results from a combination of institutional voids, governance inefficiency as well as infrastructural limitations. The state of Bihar for instance is one of the poorest states in India with 80 to 90 % of its villages are without access to energy. Many of the villages are so remote that the government has declared them unreachable with the conventional electrical grid system, consigning millions of people to darkness and poverty (Dichter et al. 2013). While most businesses would, and historically have, stayed away from Bihar as a potentially profitable market, Gyanesh Pandey, Ratnesh Yadav and Manoj Sinha saw opportunity in these institutional voids and established Husk Power System (HPS), a decentralized energy production and distribution company which produces electricity from rice husks at village level.

However, not all institutional voids can possibly become business opportunities. Certain institutional uncertainties are restrictive and sanctioning, which limits the potential possibility for private businesses to leverage them. For example, a slow or inefficient judicial system is an institutional inefficiency where private companies can hardly intervene to make it more efficient. Political instability in a country is another such institutional constraint, which does not provide a potential opportunity to businesses. We term such institutional voids as *Absolute Institutional voids*

(*AIV*). A key characteristic of AIV is the fact that they often do not interface with the market and, hence, are not appealing to private businesses, as they do not offer any market opportunity. However, they do, in various ways, affect the way markets function and are regulated, so they do have an impact on private businesses indirectly. For instance, a slow judicial system or political instability can severely limit market operations, make businesses unprofitable or, even worse, eradicate the market completely. In that context, the concept was used to justify the existence of large conglomerates in emerging markets while the mantras of core competences and focus were dominant in western countries.

However, these constraints can act as inputs to the business model development and may guide operational strategy. For example, how to design an organization that reduces the number of contracts to be enforced, in a country where the judiciary system is not effective?

On the other hand, we refer to institutional voids, which offer business opportunity as *Relative Institutional voids* (*RIV*). These are the ones that offer business opportunities to entrepreneurs. In the following section, we present our analysis of how successful institutional entrepreneurs work with formal and informal institutions to build ventures that are financially sustainable as well as beneficial for the rural consumers.

4.2 Working with Formal and Informal Institutions

4.2.1 Understanding the Local Context

As was the case with SELCO, the major business opportunity arose from the lack of state and national government's capability to connect the many rural villages in India to the national electricity grid. However, while SELCO identified this opportunity that stemmed from an institutional void, it realized that there was an extreme lack of business supporting informal institutions at village level. Most importantly, SELCO devised customized solar energy systems, which were deemed to be too expensive, and technology intensive for the rural population. In fact, financial support to the companies or to the customers was missing in rural areas, either because financial institutions were non-existent or, where they were present, they did not lend money for solar technology. Harish Hande expressed in an interview:

> ..Like anything else, which costs multiple times your annual income, financing is needed to afford it. Many of the financial institutions were not aware of the technology and did not know if the technology made sense.[1]

During the course of its operations, SELCO understood that the product as such was not the centre of the business, but rather, understanding the local needs, customs and traditional occupations in a rural setting. Consequently, connecting

[1] http://www.sramanamitra.com/2007/05/12/social-entrepreneur-harish-hande-part-3/

the banks to the rural population became central to their operations. In this sense, SELCO was transforming itself into a combination of an *institutional spanner* and an *institutional broker* (Tracey and Phillips 2011). It was performing the task of an institutional broker by connecting the rural financial institutions to the rural poor who needed the financing to purchase solar lighting systems. At the same time it was acting as a quasi-spanner by becoming a preferred, taken for granted solution, for obtaining financing from the banks for the rural poor. We refer to it as a quasi-spanner because SELCO itself was not providing the financing but rather, facilitating and playing the role of a trustworthy partner for both the banks and the rural poor. Additionally while most businesses standardize their product to sell to as many people as possible at the lowest possible cost, they often miss out on understanding the needs of the customer and rather end up targeting the wants. However, at the BoP, the need of the consumer becomes more important than the want. As Harish Hande explained in an interview:

> It is important to clearly differentiate between a want and a need. You can scale by standardization for a want. For a need, you have to customize based on the context, which takes time.[2]

This presents an added challenge for entrepreneurs doing business in environments with low levels of formal institutionalism. Due to a lack of market research and other such business intermediaries, gaining access to information essentially means actually spending time in the market with consumers. Harish Hande expressed in an interview: "*I lived for two years without access to electricity to understand what the customer really wants and what he/she goes through…*"[3]; "*Our teams understand the clients' needs very well because often they eat meals together*!"[4]

Proposition 1 *Being locally embedded in the BoP cultural and social spheres positively affects the capability to develop a product/service that is acceptable and effective for the BoP consumer.*

4.2.2 Legitimizing the Proto-institutions Through Partnerships with Formal Institutions

It has been pointed out in the literature that entrepreneurial efforts often lead to "proto-institutions," new practices, rules, and technologies that transcend a particular collaborative relationship and may become new institutions if they diffuse sufficiently (Lawrence et al. 2002). While SELCO did manage to build initial partnership with banks, it needed to legitimatize itself as a proto-institution at the

[2] http://social.yourstory.in/2009/09/tc-i-changemakers-a-conversation-with-dr-harish-hande-of-selco/

[3] http://blog.ennovent.com/2010/02/optimizing-energy-solutions-for-bop-selco-solar/

[4] http://blog.ennovent.com/2010/02/optimizing-energy-solutions-for-bop-selco-solar/

rural level. To do this, it started expanding its relations with large financial institutions and trying to convince them to finance solar lighting systems to the poor who did not have any collateral to offer against the loans. SELCO did convince banks to lend money to the poor for solar lighting systems, which at the time was not considered as a financeable product. As Harish Hande pointed out:

> . . .in late 1996, Malaprabha Grameen Bank was the first one to start financing. [..] After that, banks opened up. That was our biggest code to crack, since our entire model is based on banks providing the financing.[5]

In another interview, Harish explained how difficult it was to convince the banks to provide financing solutions to rural customers for solar technology. Also at that time, SELCO itself had to provide the bank with the guarantee amount on behalf of the rural consumer.

> SELCO has created a sustainable model, working closely with regional banks and lending institutions, devising propositions for the low income customers at the BoP. We also had to keep a guarantee amount with the bank initially, which over time has evolved into a sustainable model, making it easier for people to have access to funds and schemes.[6]

While partnerships with regional rural banks such as the Malaprabha Grameen Bank helped SELCO to legitimize itself in the villages, for both the customers and the rural banks, it realized that in order to become the preferred institution of choice for the customers and establish itself as an alternative institution, it had to be a company that could provide electricity to the rural consumer but also help them obtain financing to buy the product.

Following this belief, SELCO formed partnerships with several rural banks, most notably the SEWA Bank and became its technology partner. SELCO also forged partnerships with various organizations and institutions in rural Karnataka. The SEWA bank was established in 1974 as an offshoot of SEWA (Self Employed Women's Association) to provide financial services to its members. SEWA Bank initiated Project Urja for its 300,000 members to have access to reliable and affordable sources of energy. It estimated that chronic shortage of cooking fuel, reliable lighting and electric power were the key reasons why the underprivileged were unable to break the vicious circle of illiteracy, unemployment and poverty and they chose SELCO to provide it with technological solutions to address the energy needs of their members. This helped SELCO to transform itself from a solar lighting company to an energy solutions company. SELCO diversified into other areas of energy services and established an innovation department and incubation laboratory that develops innovative solutions for rural populations to enhance productivity.

Proposition 2 *Though many formal, business supporting institutions are generally missing at the BoP, identifying and leveraging the ones that do exist positively affects business operations, by giving them legitimacy and a sense of dependability.*

[5] http://www.sramanamitra.com/2007/05/12/social-entrepreneur-harish-hande-part-3/

[6] http://blog.ennovent.com/2010/02/optimizing-energy-solutions-for-bop-selco-solar/

4.2.3 Engaging with the Community and Informal Institutions

On the other hand, the socio-economic and cultural norms that govern the local rural areas also give rise to several implications for business operations. Understanding the local socio-economic norms, which determine their behaviour, becomes essential in order to design products and services that would be acceptable to them, not only economically but also socially. Informal institutions can be identified as unwritten rules, norms, attitudes, traditions and morals prevalent in societies. Such informal institutions can provide the smooth functioning of processes that are essential for business, such as hiring human resources. In both our case studies, we realized that hiring human resources posed the biggest problem for entrepreneurs operating in rural parts of the country. Both SELCO and HPS recruit local people in rural villages as business representatives. This helps them to keep in touch with the local customs and behavioural norms, electricity needs and challenges based on which they develop their solutions. Consequently they work with informal local institutions to understand specific needs and build inclusive local institutions to run and maintain the electricity infrastructure.

Through our analysis we also suggest that parallel to developing partnerships with formal institutions, forming partnerships with local informal institutions also positively affects the firm spanning institutional voids. In India, local informal institutions govern the day-to-day activity of the village. This can in the form of local *panchayats* (village level governing body comprised of several elders of the village). The panchayat practice has immense power over the village and how individuals behave and also acts as a grievance addressing body. Successful institutional entrepreneurs work with these informal institutions to legitimize their operations and establish new processes, practices, norms and proto-institutions to develop successful produces and services. HPS does it by working with panchayats in rural India. As an HPS executive explained:

> First, we seek out the elders, the panchayat and sit with them and talk. If they buy into our value proposition, we train operators and materials handlers; we set up an electricity council in each village, which is responsible for administering the payments. . .[7]

Additionally, the lack of proper accessible labour market in rural areas in India restricts proper recruitment and training of human resources. However, in order to truly understand the local context and needs, it becomes imperative to remain embedded into the local socio-economic context. Both the studied cases did this by recruiting locally available human resources, even though by MNC standards they were unskilled. In both the cases, they spanned the institutional voids of a non-existent formal labour market in rural India by decentralizing their recruitment and establishing training centres as proto-institutions for human resource development at the village level. In both the cases, the recruitment and training of staff is

[7] http://www.nextbillion.net/blogpost.aspx?blogid=1241

done at the village level and no transfers to other places are done. Chip Ransler (Chief strategy officer) of HPS explained:

> My business partners, Manoj, Ratnesh and Gyanesh, all come from villages and small towns in Bihar. Our process is all-local; we have hired only 1 person (besides me) who is non-local.[8]

In addition to this, local occupations and energy needs follow a social pattern. During the analysis, HPS learnt that energy needs depend on occupation and usage. Hence, a case by case analysis of financial as well as energy need is done prior to developing a solar lighting or electricity supply solution for the village. This involves calculating the direct costs as well as indirect benefits from increased business hours due to availability of lighting and electricity. As Ratnesh Yadav (co-founder) of HPS explained:

> On an average every household spends at a minimum Rs.150-200/month ($3-$4.50 which can constitute as much as 30 % of their monthly income) just to light a kerosene lamp for 2 hours. We charge Rs.80 ($1.70) for two 15 watts CFL's/month and mobile charging is free. These villages had cell phones even before they had electricity and they had to go to a nearby town to recharge their battery @ Rs.5/recharge ~ ($0.11).[9]

SELCO also conducts a need vs. cost vs. benefit analysis for each customer prior to designing its lighting solutions. Harish Hande (Managing Director SELCO) explained:

> Our strength is that we assess the need and hence create solutions which are the real requirements of the customer. We don't satisfy wants or desires. It's the right assessment that creates the most optimized solution.[10]

The selling process starts with an understanding of how much money the customer can pay as a loan instalment every month, as opposed to the cost of the system. A SELCO technician explains to the customer the cost of the system as well as the benefits. All expenditures are taken into account including the money spent monthly on kerosene that most households procure for lighting purposes in rural India. Additional income from increased hours of work that the lighting system can provide is also taken in to account to calculate the payable monthly instalment. Once this is done, the lighting system is developed according to the needs of the customer and bank financing through partner banks is arranged. In addition to its house lighting systems, SELCO designs lighting systems for specific communities. It doesn't have a standardized solar lighting product but designs them on a case-by-case basis. It targets groups of rural workers engaged in a particular economic activity as prospective customers. For instance, SELCO designed solar powered caps for the flower picking community in Karnataka, which plucks flowers from midnight until 3 a.m. Before that the flower picker would balance a kerosene lamp

[8] http://www.nextbillion.net/blogpost.aspx?blogid=1241

[9] http://sierraclub.typepad.com/compass/2011/01/powering-india-with-rice-husks-an-interview-with-ratnesh-yadav-from-husk-power-systems.html

[10] http://blog.ennovent.com/2010/02/optimizing-energy-solutions-for-bop-selco-solar/

in one hand and pluck the flower with the other, thus reducing their efficiency and hence in turn their income. With solar headlamps, they are now able to pluck double the quantity of flowers in the same time frame. This exemplifies how much the company is rooted in the local context, in addition to understanding the traditional occupations which are normally passed on from one generation to the next in rural India. Harish Hande explains:

> For example we noticed how jasmine flowers are collected in Tamil Nadu. They are collected between 3 and 5 in the morning by 7 and 8 year old girls. How? Do you know why those girls have long hair? Not because of beauty. It's so that they can balance a kerosene light. Would you allow your 5-year-old daughter or cousin or niece to go out at 1'o clock in the night balancing a kerosene light to pluck flowers? That is the situation of our country. So we designed a head lamp, a solar powered head lamp for these families. That's the value that we look at rather than just looking at solar.[11]

In addition to providing solutions to specific, context-dependent local problems relating to energy needs, SELCO also appoint an entrepreneur who rents out solar lamps to midwives and flower pickers on a daily or hourly basis, ensuring higher usage of the lamps and greater income generation. Such a strategy helps in filling institutional voids and develops an inclusive market place by positioning itself as an alternative institution. We found similar strategies pursued by HPS that, though the company operates in a different business, it acts as a proto-institution, where important institutions, which provide electricity and employment, are missing.

The business model of HPS is dependent on its engagement with the rural community. HPS developed an innovative biomass gasification technology capable of generating electricity efficiently from biomass on a micro scale. The company is present in 250 villages and employs around 350 people. It generates electricity through small-scale systems and sells at an affordable price to the BoP customer. Most HPS customers earn the equivalent of $2 a day or less.

Apart from providing electricity, HPS provides substantial economic benefits for farmers and local businesses in the entire value chain. Increased lighting has also indirectly helped the community by increasing the business hours in the market area, reducing thefts, improving health conditions and encouraging new business developments such as computer shops and photo studios. Moreover, lighting has increased the possible number of study hours, as children are now able to study after dark.

In addition to this, the HPS initiative has provided employment opportunities to thousands of rural women by giving them training and raw material to manufacture incense sticks (using rice husk char which is left after the burning of rice husks). More than 1,200 women have been trained (at two plant sites) in the manufacturing of incense sticks. This enables households to earn up to Rs. 1,000 per month and save Rs. 150 on kerosene costs while paying only Rs. 80 for electricity.

Discarded husks (which used to go waste before HPS) are procured at an average cost of 1 Rs. per Kg, providing additional income/savings to farmers. Each HPS

[11] http://www.scholarsavenue.org/2013/02/interview-with-dr-harish-hande/

system consists of a 30–50 kilowatt (kW) power plant that runs entirely on rice husks, generating electricity through biomass gasification, and a simple distribution micro-grid connecting subscribers directly to the plant. Low cost pre-paid meters have been installed that can efficiently regulate the flow of low-watt electricity and reduce electricity theft to less than 5 %.

Systems are sited only in locations where rice husks are plentiful. HPS plants offer competitive prices for husks all year round, approximately $0.02–0.03 per kg, and farmers have an incentive to supply them in order to ensure that electricity remains available in their villages. The typical plant can serve two to four villages—approximately 500 households within a radius of 1.5 km, depending on size and population.

A typical rural household pays a base rate of $2.20 per month, which includes 40 W of electricity for 6–8 h every evening, enough to power two (CFL) bulbs and recharge a cell phone. For the business subscribers who use more electricity (60–70 W), they pay an average of $4–4.50 per month. HPS' service compares favourably with the cost of alternatives such as candles, kerosene lamps, and LED lanterns, which serve only lighting needs.

Proposition 3 *Engaging with community and leveraging the local informal institutions with entrepreneurial initiatives can fill the relative institutional voids at the BoP.*

Discussion and Conclusions

In emerging markets the "community and societal sphere", the "political sphere" and the "religious sphere" have a deep impact on property rights and economic freedom, two essential institutions of market economies (North 1990). This is especially true among women and tends to limit opportunities for both entrepreneurs and consumers (Mair et al. 2012). Limitations on property rights and institutional voids regarding property rights can be especially harmful for entrepreneurship.

Therefore, informal institutions occupy a key role in supporting business activity in rural areas. Nevertheless, bridging the institutional divide between the formal and the informal institutions could be a complementary strategy positively affecting and enabling the business environment. As in the case of SELCO, which successfully brokered as well as spanned the lack of financial institutions in rural areas, at the same time connecting groups of rural customers to rural banks (Fig. 1).

As with HPS, the key idea of SELCO was that of connecting with the rural population and the local informal institutions (such as the panchayats). HPS excelled in forming relationships and recruiting and training the locals to develop, run and maintain the power plants. This helped them in keeping costs down as well as becoming locally embedded in order to be agile in both their operation and understanding of the local environment. Additionally,

(continued)

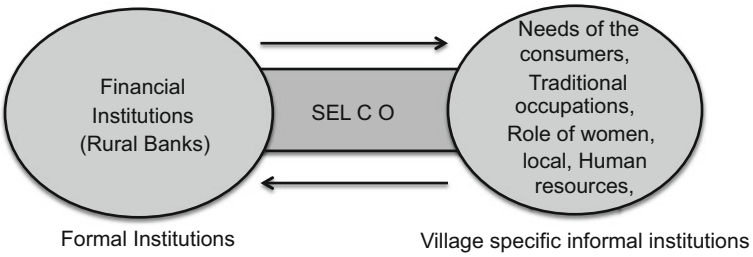

Fig. 1 SELCO business model

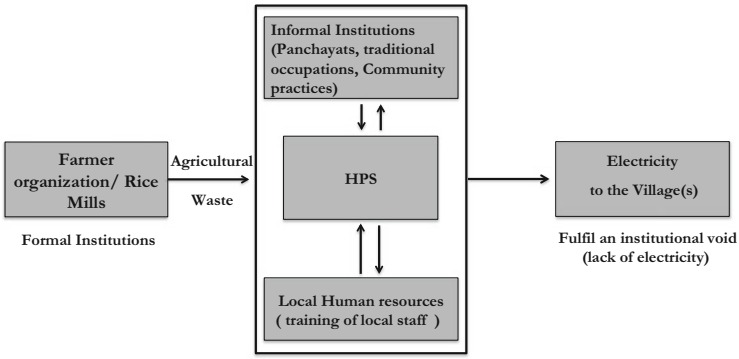

Fig. 2 HPS business model

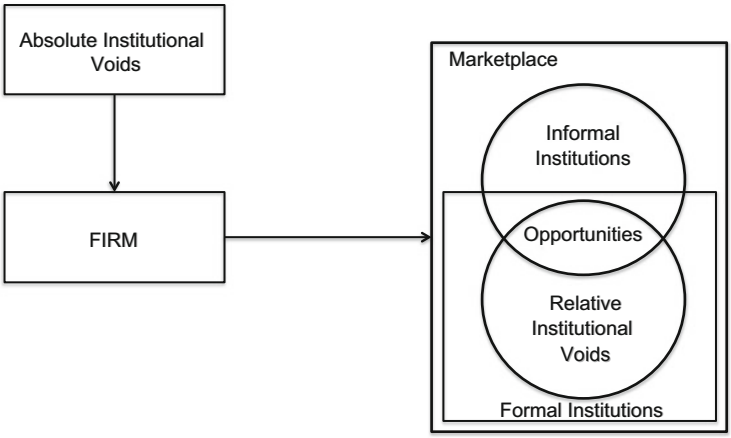

Fig. 3 Theoretical model

HPS displayed an exemplary practice of bricolage where a waste product (rice husk) was used to produce electricity, a function that was initially not expected from rice husks (Fig. 2).

Through the analysis of the two cases, we tried to identify the various institutional interfaces in which SELCO and HPS had to function. Once this was done we then tried to map where opportunities for business model innovation lie amidst the various *institutional spheres* (Mair et al. 2012). Our analysis suggests that relative institutional voids are a part of formal institutions that present business opportunities to entrepreneurs. However, due to the fact that they are normally embedded in strong local socio-economic and cultural and often religious contexts makes them difficult to leverage. Such informal institutions are often built on social and hierarchical layers. Additionally, the inefficiency of capital, labour and product markets makes it difficult to gather data about consumer preferences and recruitment of human resources, as well as organize modern financial support for the company as well as for the consumer. In addition to this, gaining the trust of the local population becomes important in order to legitimize operations and initiatives. In this chapter, we have explored how entrepreneurs can spot institutional voids and turn them into opportunities.

Through our analysis, we suggest that business opportunities are embedded within inefficient or absent formal institutions. However, these opportunities are also intertwined with local informal institutions, culture and habits and hence the entrepreneurial opportunity arising from institutional uncertainty stands at the cusp of relative institutional voids, formal institutions and informal institutions. Indeed, not all such opportunities are available to all the actors. As in any business environment, a match between the core competency of the actor and the opportunity is essential. In the case studies, such a match was the initial thrust. In the case of SELCO, it was an innovative use of solar technology coupled with innovative financial service that enabled it to transform an institutional void into a business opportunity. For HPS, years of R&D that developed a new gasification technology for electricity production helped them develop a business model based on decentralized power plants which work in close cooperating with the local community. Hence, relative institutional voids present themselves as entrepreneurial opportunities for business model innovation, which in fact are embedded within formal institutions that are inefficient, or non-performing. However, they also overlap with informal institutions, which may have developed in the absence of formal institutions. Depending on the country or the region, and on the local traditions, culture, religious practices and stratification of society, these informal institutions can be very strong. Hence, while identifying the opportunity may seem easy and straightforward, developing an intimate knowledge of informal institutions could be complex, but

(continued)

may affect positively a firm's ability to operate in an environment crowded with informal institutions which are often unwritten yet understood by the locals (Fig. 3).

In conclusion, the study aims to further build on the understanding of the role of institutional voids in business engagement in developing economies. A model is presented which could help companies identify business opportunities within institutional voids. Given the fact that the study was based on secondary data, further research with primary data and applying the three drafted propositions should be the next step.

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Entrepreneurship in Rocinha: A Non Goal-Driven Activity

Isabella Nunes Pereira and Roberto Bartholo

Abstract Analysing the behaviour of entrepreneurs from low income regions we noticed that their entrepreneurial actions do not follow traditional prescriptions. Despite of that, a solid entrepreneurial activity is found on those communities, such as Rocinha, one of the largest favela in Rio de Janeiro, and keeps a success rate above expectation.

This article reveals the preference for a type of rationality different from what is normally recognized as "business", but quite similar to the theory developed by Saras Sarasvathy, defined as "effectual reasoning". This theoretical framework is applied to an empirical study on the profile of entrepreneurs in Rocinha. One key element identified in our analysis is the power of stakeholder's commitment, driven by a very strong influence of the social environment on entrepreneurial activity.

Our findings may have important consequences for public policies if they prove to be more effective in other cases beyond Rocinha. It would then be reasonable to suggest that it could be waste of resources attempting to impose a general formula of "best practices" for success on entrepreneurship in the "pacified" favelas of Rio de Janeiro.

Keywords Entrepreneurial behaviour • Stakeholders • Best practices

1 Introduction

Entrepreneurship has never before been given the attention that it receives today. National social and economic development policies are designed by taking into consideration the contributions and impacts of policies that support entrepreneurship. Recognized as a driver of economic dynamism, job creation and innovation (Ahmad and Seymour 2008), entrepreneurship is an important aim of public policy. However, in practice these policies do not always achieve their objectives. This stimulates dialogue between the public and private sectors and the academic community.

I.N. Pereira (✉) • R. Bartholo
LTDS – Laboratory of Technology and Social Development/COPPE, Universidade Federal do Rio de Janeiro, Rio de Janeiro, Brazil
e-mail: inunesp@gmail.com; bartholo.roberto@gmail.com

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In Brazil, the federal government and the institutions specialized in supporting entrepreneurs maintain an expressive set of initiatives, programs, and projects aimed at supporting new businesses, especially micro and small businesses. Stimulating entrepreneurship is seen as an important tool for creating jobs and generating income, as an instrument for fighting urban poverty (SAE 2013). In this sense, initiatives that support entrepreneurial activity in low-income areas are gaining prominence. Knowing the profile of this type of entrepreneur, his characteristics, his behaviour, habits, values, and aspirations are questions that should be answered in order to advance the development of public policies, to understand this economic phenomenon, and more importantly, its social significance.

Rocinha is a favela located in the South Zone of Rio de Janeiro, between the neighbourhoods with the highest per capita income in the city. The geographical location is favourable to the abundant flow of commerce, particularly services. Rocinha is the largest of the city's 763 favelas (IBGE 2010), and between 2000 and 2010, its population increased by 23 %, a rate almost four times the average growth of the city (7.9 %). With nearly 6.529 commercial enterprises counted in the Business Census of 2010 (EGEP-RIO 2010), Rocinha is known for its entrepreneurial profile. Today, this activity is undergoing a transformation that includes fast food chains and large retail stores in the domestic appliance and computer businesses, such as Casas Bahia and Ricardo Eletro, as well as concert halls, restaurants, gyms, dental clinics, and four large commercial banks. Recently the community has received increased federal public investment flows geared toward urbanization projects, such as the Growth Acceleration Program (PAC I e II) and the unprecedented public security policy, the Pacifying Police Unit (UPP). These efforts have stimulated greater exchange, principally among those who come from outside of the favela, thereby reducing the negative stigma that resulted from decades of violence and drug dealing. On the one hand, this has contributed to the increased growth of local businesses, yet on the other, it has triggered an immediate effect of gentrification, which also has direct implications for local entrepreneurs.

Saras D. Sarasvathy builds an entrepreneurial theory, called effectuation (Sarasvathy 2001a), where entrepreneurs' perceptions of their businesses evolve through a life cycle starting with their initial resources (Who I am? What I know? Who I know?).

We have conducted a qualitative study investigating the profile of the local entrepreneurs in Rocinha, and the results reveal a behavioural logic divergent from the behaviour considered to be entrepreneurial by the established institutional norms. In this work we show how the entrepreneurial practices found in Rocinha follow the supporting principles of the effectual reasoning as stated by Sarasvathy.

2 Theoretical Background

2.1 Reassessment of Homo Economicus as a Behavioural Model

In the field of economics, the assumption that economic agents are rational, in every sense, has been the fundamental argument for explaining human behaviour. This idea that humans are capable of rational thinking has become the base of many theories in diverse areas of economics, in special the theories associated with the neoclassical school. The weakness of this theoretical field, with regard to its capacity to interpret reality, has frequently led to resistance. Principally, critics hone in on the fact that it falls short of reality. Milton Friedman (1953) responds to these critiques by arguing that the lack of realistic premises matters less than the forecasting power of the models based on these assumptions "because the alternative would be almost an infinite number of considerations that would have to be incorporated into the models of human behaviour".

Human behaviour throughout the decision making process within organizations was the central theme of Herbert A. Simon's research. The author, by publishing his classic works, Administrative Behaviour, 1947 and The Sciences of the Artificial, 1969, demonstrated that the understanding of rationality in human behaviour is essential to developing a technical body of work. Building on the idea that scarcity is a fundamental fact of human life (Simon 1996, p. 25), Simon alerts that it is the job of rationality to better allocate scarce resources to meet a certain objective, within the limits of inevitable conditions and restrictions. For Simon, the assumption of unlimited rationality is idealistic, mainly because he dedicates a large part of his attention to the external branch of human thought, namely decisions that are favourable to achieving the objectives of an adaptive system, such as profit maximization or utility. In the words of the author: "Economic theory's treatment of limits of rationality imposed by the inner environment – by the characteristics of the physical symbol system – trends to be pragmatic and sometimes even opportunistic". (Simon 1996, p. 23).

In the model of limited rationality, which Simon defines as procedural, decisions are satisfactory, but not optimal. For the author, the optimization of decisions is unrealistic, for they are limited or influenced by the human limitations to access and cognitively process all of the options. The concept of rationality proposed by Simon endorses an innovative way of understanding the external uncertainties in decision-making models by verifying how cognitive aspects can affect the behaviour of the actors involved in the process..

Simon's critiques of the postulate of maximized rationality are a decisive step towards the establishment of a new paradigm. In the Simonian approach, decision making is first and foremost a human activity, guided by the sense of value. In this process, subjectivity is always present and acts as the driver of the decision. For Simon, it is impossible to neglect the subjective factors and different cognitive styles of decision making.

2.2 *Understanding Entrepreneurship Through the Lens of Procedural Rationality*

The literature on entrepreneurship proposes a few possible interpretations. Economic theory's definition frequently associates entrepreneurial capacity with starting a business,. As such, it is based on statistical models of regression, and the process of starting a business, with regards to its development, is eliminated (Audrestch and Thurik 2001; Acs et al. 2005; Audrestch and Mosen 2005). This appears to be the view shared by Louis Jacques Filion, in his plan to develop entrepreneurship: "the idea of entrepreneurship, and more specifically the idea of starting a business, constitutes a key part of the development of society and the basis of its wealth creation" (Filion 2003). Another possible classification has a sociological bias and posits a holistic theory (Bygrave and Hofer 1991; Bull and Willard 1993; Julien 2010; Sarasvathy 2003). This literature understands that entrepreneurs are important actors in development, but takes into consideration that each entrepreneur will realize entrepreneurship differently and that the conditions for performing entrepreneurship will depend on the context. As the ecosystem has an important role, then entrepreneurship does not depend solely on personal characteristics, as Filion asserts: "An entrepreneur is a person who imagines, develops, and realizes their visions" (Filion 1999).

The work of Sarasvathy (2001a, b) demonstrates that the logic of entrepreneurial expertise makes an important inversion (Duarte et al. 2011, p. 11), instead of asking: "given my pre-defined objective, what are the means I need to mobilize to attain it?"(causation), the question would be "given the means that I can control, what are the possible outcomes I can achieve?"(effectuation), as illustrated at Fig. 1. The author studies the logic of entrepreneurs with a history of success and coins the neologism effectuation. She states that entrepreneurial expertise is largely based not on mere causation, but rather on the logic of effectuation.

In her article from 2001a, Sarasvathy defines these concepts in the following way (i) the process of causation begins with the definition of a pre-defined goal and concentrates on the selection of various resources capable of achieving that goal (ii) the process of "effectuation" begins with the set of basic resources that can be controlled and focuses on the generation of possible outcomes from these resources.

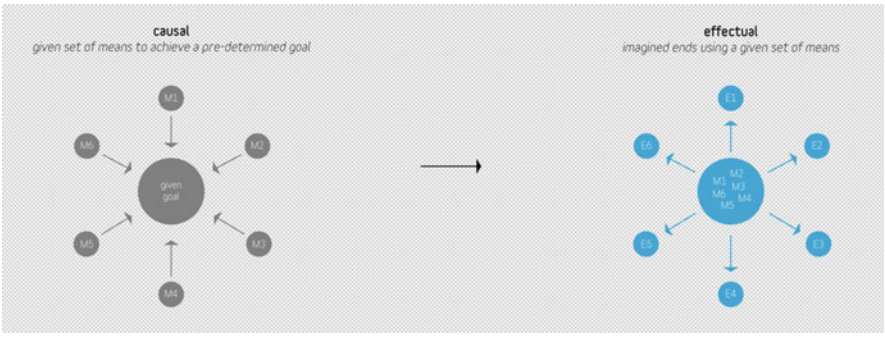

Fig. 1 What makes entrepreneurs entrepreneurial? (Adapted from Sarasvathy (2001a, p. 3))

In her research, Sarasvathy (2001b) sought to identify how experienced entrepreneurs and MBA students reacted to a hypothetical problem of starting a business by responding to just five questions. Sarasvathy selected 27 entrepreneurs that she considered experts. Her selection criterion was to identify entrepreneurs that had taken a business from its original idea to an initial public offering, and were still active in the management of the company. On the other hand, she interviewed 37 MBA students and asked them the same questions. The methodology she employed to come to her conclusion consisted mainly of applying the Think Aloud Protocols (Ericsson and Simon 1993) methodology, seeking to identify the logic that the interviewees used to start a new business. Specifically, the author seeks verbal excerpts from the interviewees that could be attributed to the existence of the process of effectuation, contrary to the process of causation. An analysis of her results reveals that 89 % of entrepreneurs employ effectuation reasoning and 81 % of MBA students demonstrate preference for causation reasoning.

The effectuation process could be translated as a set of principles that entrepreneurs use to make decisions in an uncertain environment. The main principles of the two lines of thinking can be compared in the Table 1.

Sarasvathy and Dew (2005) presents the cognitive model of effectuation for the creation of new markets, as a result of entrepreneurs' decision making processes within their companies. In this approach, the role of relational networks gains prominence in the creation of new markets and products by reducing uncertainty and increasing the set of initial resources.

This model proposes a process that begins with initial resources, such as (1) the entrepreneur's characteristics, preferences, and skills (who I am?) (2) his education, training, experience (what I know?) (3) his relational network (who I know?). From there, entrepreneurs begin to brainstorm the possible results that can be achieved, moving directly to action without previous planning, as depicted in Fig. 2. Special attention is given to the moment when commitments are established due to the bond they create to the business.

Plans are made and undone and initial resources are increased through action and interaction with other people, taking into consideration eventualities to redefine objectives. Therefore dynamic entrepreneurial projects seen as learning processes almost always change previously designed plans. The individuals that face the

Table 1 Effectuation versus causation main principles

Categories of differentiation	Causation process	Effectuation process
Practice	Start with goals	Start with their means (who I am, what I know, who I know)
Logic	Predictive	Control
Money	Expected return	Affordable loss
Strategy	Competition	Partnerships
Perception	Exploitation of pre-existing knowledge	Leveraging of contingencies

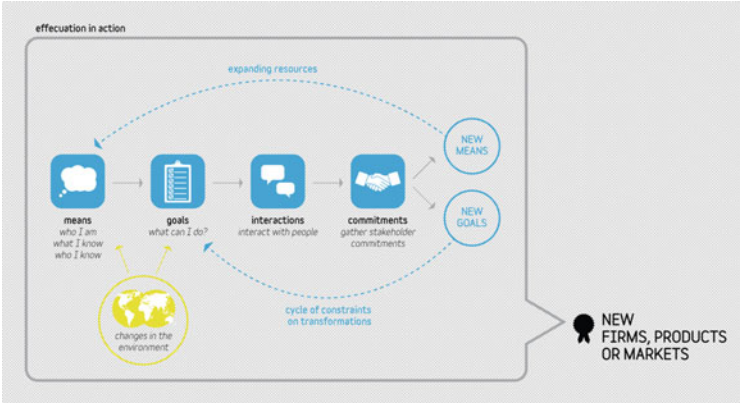

Fig. 2 A dynamic model of the effectual network (Reproduced from Sarasvathy and Dew (2005))

current changes and challenges should be apt to adapt quickly. This adaption can take place in various forms, and one of them is by the capacity to learn constantly, as the logic of effectuation suggests.

In the article "Entrepreneurship as a Science of the Artificial", Sarasvathy (2003) presents a series of similarities between her theory of effectuation and the work of Simon (1996), which affirms the existence of an internal environment in interface with a determined external environment. Entrepreneurs' perceptions of their own ventures and the learning curve of opening a business will always be influenced by context, making it impractical to prescribe universal instruments capable of increasing the potential success of start-ups.

3 Methodology

In this study we opted to use two distinct sources: (a) the database of the Demographic Censuses of 2010 and (b) the empirical results obtained through a qualitative survey directed towards entrepreneurs and residents between 2012 and 2013. In utilizing the data from the Census, one is faced with the limitations of economic research, since it does not emphasize topics pertinent to entrepreneurial activity such as the motives and whys behind the launch of the venture. Nevertheless, it is appropriate to attempt to work with the Censuses data, as the access to this database allows one to paint a portrait of socioeconomic conditions, to the extent that (i) it captures the ample spectrum of entrepreneurs, both formal and informal, in a more recent setting, and (ii) it has territorial scope that allows the analysis to be applied to Rocinha. The study considers entrepreneurs to be a group of the population – self-employed workers and employers – who self-defined as such when asked about their occupation, in the month of execution of the study, July 2010. The qualitative data was collected in semi-structured interviews with local entrepreneurs in Rocinha.

3.1 Case Description

The study was conducted in Rocinha, a favela located in the South Zone of Rio de Janeiro, known for its entrepreneurial profile. According to the 2010 Census, between 2000 and 2010 its population increased by 23 %, a rate almost four times the average growth of the city (7.9 %).

Over the last decade, changes took place that altered the make-up of the community, highlighting new habits and new lifestyles, and supposedly, the strong presence of a 'new middle class'.

The size, geographical location, and history of this site are factors favourable to the abundant flow of information, especially services, between residents of Rocinha and the city's highest-income neighbourhoods. These factors appear to be decisive in the process of building interactive networks.

Although the slum space is known by its informality, the majority of the working population in Rocinha, age 15 and above, is formally or informally employed. Of the 33,809 persons employed, 87 % are employees, reaching 29,698 individuals. The entrepreneurs make up the remaining 12.2 %, where 12 % correspond to self-employed workers and just 0.2 % correspond to employers. This employment distribution is depicted by Table 2.

The majority of entrepreneurs in Rocinha are men (65.1 %), mostly between 30 and 49 years old, and 51.6 % either have no formal instruction or have not completed high school. This percentage is also high among employees (49.7 %), yet

Table 2 Distribution of persons 15 years old and more by status in employment in main work

	Rocinha	
Character	Employed	Entrepreneurs
Total	87.8	12.2
Gender		
Male	52.4	65.1
Female	47.6	34.9
Age groups		
15 to 17 years old	1.5	1.5
18 to 19 years old	3.8	1.8
20 to 29 years old	34.7	16.5
30 to 39 years old	29.3	28.3
40 to 49 years old	17.7	22.5
50 to 59 years old	9.4	19.4
60 years old or more	3.5	9.9
Level of education		
Without instruction/Incomplete school	49.7	51.6
Complete school/Incomplete high school	26.4	28.8
Complete high school/Incomplete college/university	21.3	19.6
Complete college/university	2.1	

Source: IBGE, Demographic Census (2010)

Table 3 Value of the average monthly income selected by region in real (R$)

Status in employment	Brazil	Rio de Janeiro	Rocinha
Average	R$ 1,350.61	R$ 2,093.66	R$ 802.30
Employee	R$ 1,232.26	R$ 1,911.93	R$ 783.51
Own account	R$ 1,375.30	R$ 2,194.85	R$ 923.78
Employer up to 5 employees	R$ 3,748.59	R$ 4,846.64	R$ 1,677.62
Employer more than 6 employees	R$ 7,843.97	R$ 10,189.42	R$ 5,500.00

Source: Department of Research, Demographic Census (2010)

in this category the gender distribution is more equal, as 52.4 % are men and 47.6 % are women, and 64.0 % are between 20 and 39 years old, a younger age range than the entrepreneurs.

Although the employee percentage in Rocinha are high (87.8 %) it does not ensures higher incomes. Due to labour market barriers, employment can mainly be found at low income jobs. Table 3 shows that the average income of employees at Rocinha (R$ 783.51) is below the entrepreneurs average income, be it self-employed (R$ 923,51), be it entrepreneurs with up to 5 employees (R$ 1,677.62) or with 6 or more employees (R$ 5,500.00). This behaviour can also be noticed throughout Brazil and Rio de Janeiro. For the sake of clarity, whenever we mention Rio de Janeiro in this work we mean the metropolitan region of the Rio de Janeiro city (RMRJ).

3.2 Data Handling

In this work, four in-depth interviews were selected from an expansive group of testimonies. An approach like the one we seek here requires the formation of a unique methodology, which is not limited to the mere collection and tabulation of data. The idea was not just to interview, but to obtain information about their behaviour and habits with regards to the problems they face to start a business, through the narrative accounts of their lives. As Goldenberg suggests (2004, p. 43), "the biographical method can increase the subjective view of the examined institutional processes, as real people experiment with these processes and raise questions about the ample experience".

In the formation, execution, and analysis of the interviews, we adopted the procedures proposed by Ana Maria Nicolaci-da-Costa (2007), as synthesized in the Method of Explaining

Underlying Discourse (MEDS). In this method, the script for the interviews is previously structured and well-detailed, but very flexible in its application (with

caution, however, to cover the same set of topics with all of the interviewees). The questions are not read, but inserted naturally into the conversation in a way that bears any kind of response, and then interspersed with new clarification questions (Nicolaci-da-Costa 2007, p. 68).

Among the valuable aspects of MEDS, we highlight the principle of free association, or "that which is important to someone with respect to a specific theme or subject inevitably arises in their spontaneous discussion of it" (Nicolaci-da-Costa 2007, p. 67), in addition to influencing their non-verbal communication.

The selection of the sample was intentional, following the procedure known as snowballing, when one interviewee recommends another and so forth. The basic requirement for inclusion in the sample was the fact that the interviewee is a resident and runs a business in Rocinha.

All of the interviews were fully transcribed, preserving their subjective and informal aspects such as hesitations, long pauses, emotions, grammatical errors, and curse words. In this spoken material, we seek to find significant references to the main assumptions that guide our study, such as relational networks within a specific context.

4 Results

Here we present four cases that best demonstrate that the entrepreneurial practices found in Rocinha follow the supporting principles of the effectual reasoning as stated by Saras Sarasvathy. We conclude this section with a table that summarizes the adherence of each case to those principles.

The first interview we would like to highlight regards an entrepreneur who funded her business with an unforeseen restitution she received from her previous job. She really enjoyed her previous job but the working conditions changed and she had to sue her employers in order to receive her legal rights. From them on she managed to find an informal job on a LAN house but the owner was trying to sell the business. As she states, when she received the restitution, despite of her initial lack of skills, she eventually got some technical knowledge and then decided to buy the business. Nonetheless she got surprised when she received the fully committed support from the LAN house manager that came to be a valuable stakeholder of the business. As she states:

> Here I have learned a lot. Everything I know, I did no computer course, gotcha? I have learned day after day from the people I came to know, mainly from that friend of mine (the manager).

Here we can easily identify the presence of the 5 principles that characterize the effectual reasoning. Her entrepreneurial practice begun with her basic knowledge

and she chose to control her present by partnering with a skilled stakeholder. Her unforeseen restitution was an affordable risk and her strategy to partner with the manager together with detecting the entrepreneurial opportunity characterized her effectual reasoning.

Another interviewee tells us how she rebuilt her life after two tragedies that interrupted her potentially successful previous business. At that time, her relatives had to move to live with her due to her mental depressive state and her unpaid bills started accumulating. After financially sinking her relatives with the tragic ending of her previous business she managed to get authorization to start a new drinking food kiosk at the main avenue in Rocinha. Her sisters were fully committed with her and turned to be valuable stakeholders of the new business. As she states:

> I still can cook! Let's go down till the square and ask to the drug lord if he lets us uses a corner somewhere and we go there and sell bone soup, something to let us make some money and pay our debts.

From the kiosk she started a new restaurant that currently employs 8 people. Her entrepreneurial practice begun with her cooking knowledge and she controlled her present by partnering with her sisters in a family business strategy after a solid perception of the surrounding environment where she was able to grant an authorization to run her business.

Our third case is a candy wholesale distributor. His professional history has begun as an employee at a bakery out of Rocinha where he got his knowledge on the business. On the other hand, during his childhood his father used to sell candies as a travelling salesman at the northeast part of Brazil. Afraid of dying on the many assaults that used to happen at the bakery he worked, he decided to move to Rocinha and started to informally sell food market remains. Eventually the county surveillance started to repress this activity. He then remembered that his father was able to support 12 kids selling candies and then decided to follow the same path. Beginning with a kiosk with 6 cookie boxes, after 1 week he was selling more than 20 cookie boxes. As the business grew up he found an opportunity to buy a place and open a new store with his wife. He managed to get with friends some money that allowed him to buy the place. From then on, he could stock products and started his wholesale business by selling products to restaurants in the vicinity of Rocinha after recommendations his friends gave of him. The proximity from his customers allowed him to provide them with a just in time supply channel with lower logistic costs what gave to him a competitive advantage over his competitors. Besides that he started a cash only low price candy shop that attracted the best customers from his competition. This cash only business provided him with the initial money he needed to build a stock to feed the just in time supply channel. As he states:

> Something that I knew that could sweeten my mouth was that my competitors used to give credit for their customers to pay in 10 or 15 days. Thus I had an idea. I'll start a cash only shop with lower prices. When people have money they buy with me, when don't they go there. So I made this strategy to attract the best customers. I studied my competitors and did the opposite.

His entrepreneurial practice begun with his candy selling family history empowered by a very innovative wholesale market creation strategy and an accurate perception of his competitors deficiencies.

Our last presented interview tells the history of a graphic designer that funded his studies with social scholarships and then partnered with a photographer to start a photo studio funded with family money. Their studio was built on a room passed by a sister with far from ideal dimensions. After noticing that every female teenager in the neighbourhood dreamed to be a model star they started to offer a free photo for those who accepted to take part in a contest where the first prize was a photo book. With these contests they managed to understand the limitation of their space and learned to control their range of products and quality assurance. Providing a high quality product they soon have differentiated their business from their competition being many times hired by them to perform high skilled services. Currently they just want grow their market share in order to afford restricting their product portfolio to those services they enjoy the most. As he states:

> We realized that everybody here in Rocinha that has a child wants to make photo book and it was not possible in Rocinha. The few places where it could be done did not offer the quality we could.

His entrepreneurial practice begun with his professional knowledge and he controlled his present adapting his portfolio to a limited space with a family funding and mutual partnership strategy based on the perception of the absence of a differentiated product in the market.

We can summarize on Table 4 how the effectual principles manifest themselves on the empirical findings from the presented cases.

Table 4 Effectual principles occurrence

Effectual principles/cases	LAN house	Food kiosk	Candy wholesale	Photo studio
Means (w. I am/know)	Day-by-day knowledge	Cooking knowledge	Candy business knowledge	Formal knowledge
Affordable Loss (focus on downsinde)	Restitution	Zero investment	Low income previous activity	Family money
Partner ships (crazy quilt)	LAN manager	Sisters and mom	Wife	Photographer
Leverage Contingencies (lemonade)	Previous job disappointment	Two tragedies and point authorization	Country surveillance repression	Non ideal space
World view (control × predict)	Start environment setup	Start a soup kiosk	Start a cookie kiosk	Photo contest

Conclusion

The analysis of the results of the behaviour of entrepreneurs from Rocinha reveals the preference for a type of rationality different from what is normally recognized as "business", but quite similar to the theory developed by Saras Sarasvathy, defined as "effectual reasoning".

While traditional knowledge promote the importance of predictive logic that highly values sticking to a plan, a well-structured business plan, analysis of return of investment, analysis of market potential, niche, and trends like strategies to reduce barriers and increase business opportunities, entrepreneurial practices observed in Rocinha show exactly the opposite. For these entrepreneurs, future is not faced in a predictive manner striving for optimal solutions but rather they seek a better control over the risks of their present lives. Through a satisfactory decisions making process they face contingencies not as a detour from the "right" path, but as part of their business process.

Survival logics talks to them louder than the market one. Low literacy is always identified on the literature and by government actions as a barrier for success on the entrepreneurial activity. Here either, empirical evidences from our research do not seem to reinforce this concept. Stakeholder commitment seems to be the most critical success factor for entrepreneurship in Rocinha. Going beyond credit availability and management skills, the effectual reasoning come out as the most powerful explaining variable on enterprises success.

Revisiting the theory that served as a foundation for observing the phenomenon of entrepreneurship in Rocinha, it becomes clear that the utilitarian model based on principles of homo economicus does not offer realistic explanations. On the contrary, proposals that introduce an innovative logic of reasoning are worth considering. As entrepreneurial activities actually have a dynamic similar to learning processes, as described by Sarasvathy, and confirmed by this empirical study, it could be fallacious to attempt to impose a general formula of "best practices" for success in entrepreneurship.

This picture becomes even more critical if we consider that this model is still very prominent in the programs proposed by the funding agencies and business incubators. These findings may have important consequences for public policies if they prove to be more effective in other cases beyond Rocinha.

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Part III
Innovation Environments

A Literature Review of E-Entrepreneurship in Emerging Economies: Positioning Research on Latin American Digital Startups

Gerardo Quinones, Brian Nicholson, and Richard Heeks

Abstract This chapter critically reviews literature on e-entrepreneurship in order to position future empirical research with a focus on emerging markets (The terms "emerging economies", "emerging countries", or "developing economies" are used interchangeably and refer to the list of countries named as such by the International Monetary Fund (World Economic Outlook. Washington, DC: International Monetary Fund, 2013)) in general and in Latin America in particular. The term 'e-entrepreneurship' has been used to describe the creation of different e-businesses by both start-ups and established companies. Thus, the concept of Digital Start-up (DS) as a specific unit of study of e-entrepreneurship is presented. DSs are defined as start-ups born on the internet to sell only digital products/services exclusively online. The emergence of this new breed of enterprises is opening doors for entrepreneurs to enter new markets with an explosive potential for growth, as demonstrated by the cases of Facebook, Twitter, Instagram and others. This phenomenon acted as a catalyst for a new entrepreneurial ecosystem in emerging markets supported by both private and public entities. However, there are still very limited signs of success outside of the United States, Israel, and Europe. The literature reveals that the lifecycle and ecosystems of DSs have been extensively researched in developed countries; however, there is a relative paucity in the context of emerging economies. E-entrepreneurship research is grouped into six categories: e-business models, digital economy, entrepreneurship, business ecosystems, innovation, and e-entrepreneurship. Relevant theoretical frameworks and their application to DSs are explored. The chapter concludes that gaps remain in the literature on e-entrepreneurship in the context of emerging economies and questions for future research are presented.

Keywords Digital start-up • Business ecosystems • E-business • E-entrepreneurship • Innovation • Emerging economies • Latin America

G. Quinones (✉) • B. Nicholson
Centre for Development Informatics, Manchester Business School, University of Manchester, Manchester, UK
e-mail: gerardo.quinones@postgrad.manchester.ac.uk

R. Heeks
Centre for Development Informatics, University of Manchester, Manchester, UK

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1 Introduction

As the internet matured, and infrastructure development allowed a larger number of people to be connected, a multitude of ventures were developed to capture a new potential for creating wealth during what was known as the "dot com" era (Zhu et al. 2006). A handful of academics tracked the growing trend of new companies being "born in the internet" (Lockett and Brown 2000), but it was not until the last decade that the terms "e-entrepreneurship" (Matlay 2004) and "Digital Entrepreneurship" were used in reference to a new discipline (Hull et al. 2007; Kollmann 2006). In the last ten years, the explosion of wireless data networks and the ubiquitous presence of smart phones (Berman 2012) has accelerated the number of new businesses that have emerged on the Internet to sell digital products/services exclusively online (Barnes et al. 2004a; Lockett and Brown 2000; Taylor and Murphy 2004; Wall et al. 2007). Hence, several studies have emerged with the purpose of understanding the lifecycle of this new breed of start-ups, which are referred to as digital start-ups (DSs) (Asghari and Gedeon 2010; Effaha 2013; Kollmann 2006; Matlay and Westhead 2005). There are several definitions of a start-up; some are based on the age of the organization (Zahra and Nambisan 2012), while others look at their potential (Arruda et al. 2013). For the purpose of this study, start-ups are defined, according to Ries (2011), as organizations created to build something new under 'extreme uncertainty'.

E-commerce adoption is still increasing and the number of economic transactions executed digitally, the so-called digital economy, is expected to continue growing exponentially to US $4.2 trillion in 2015 (Dean et al. 2012). Such growth is in contrast to flat projections for the overall global economy (UN 2013). For this reason, private investors and governmental agencies across the globe are supporting e-entrepreneurs through grants, digital incubators (Stam and Buschmann 2011), and programs such as the United States' Start-up America, the United Kingdom's Tech City, Start-up Chile, and Brazil Startup, just to mention a few. However, although there is evidence that these efforts in some regions are starting to pay off, almost all of the examples of DSs that have grown to become successful enterprises[1] are still concentrated in the United States, Europe and Israel (Herrmann et al. 2012). The fastest growth in consumers entering the digital economy is expected to come from emerging markets (Nottebohm et al. 2012). However, unless DSs in emerging countries are able to grow and compete in the global digital economy, there will be limited benefit of this new way of creating wealth for emerging countries.

In the particular case of Latin America, the entrepreneurial ecosystem is underdeveloped in comparison with other regions (Kantis and Federico 2012). Therefore, policymakers in several Latin American countries have been very interested in supporting technology-based entrepreneurship, as evidenced by the programs that have been launched in the region (e.g., Brazil Startup, Start-up Chile, Innpulsa

[1] A company valuation over $100 M is a commonly accepted threshold to define a successful venture (Callahan et al. 2014).

Colombia, and Mexico Digital). These government-supported efforts have also been followed or anticipated, in some cases, by private investment funding (Kantis et al. 2012). However, there are insufficient case studies of successful Latin American DSs (tecnolatinas.com) to enable an evaluation of the effect of the public and private sector investment. Thus, it is necessary to improve our understanding of what is impeding the growth of Latin American DSs. The focus of this chapter is to explore existing literature relevant to e-entrepreneurship in emerging economies in order to position the need for future empirical research.

The chapter begins with a section that explains the method employed for the literature selection and review. It is then followed by a presentation of results structured by themes, and it concludes with a discussion of findings and proposed research questions.

2 Method

The literature review was based on keywords related to e-entrepreneurship, e-business and digital start-ups. Adding a focus on small and medium enterprises (SME) seemed relevant because start-ups, by virtue of being in the early stages of development, are micro and small enterprises.[2] Furthermore, terms that have been previously used to refer to a business with an e-business model were included in the search, such as digital start-up, digital enterprise, Internet-based enterprise, online business, and technology-based enterprise. The following searches were executed:

1. Digital business model OR e-business model AND small medium enterprise.
2. Digital economy OR e-commerce OR e-business AND small medium enterprise.
3. Digital entrepreneurship OR e-entrepreneurship
4. Entrepreneurship ecosystems OR business ecosystems
5. Digital start-up OR digital enterprise OR Internet-based enterprise OR online business OR technology based enterprise.
6. A second round of searches was done by adding the keywords 'emerging economies' or 'Latin America' to each of the above terms.

In addition to Google Scholar, the following databases were consulted: ProQuest, Business Source Premier, and Emerald. No filter was applied with respect to the year of publication. This was done in order to identify not only the newest resources, but also those that could be considered seminal within the different fields of study.

[2] Micro and small enterprises definitions vary, but for the purpose of this study they are considered formally established businesses with less than 100 employees and US$3,000,000 annual turnover (Ayyagari et al. 2011).

3 Results

The first search resulted in 310 documents. After looking at the abstracts and skimming through them, 175 were chosen to be further analysed based on the following criteria: (i) documents related to a theoretical framework of a wider academic discipline from which more specialised papers have been drawn, (ii) documents relevant to the unit of analysis, (iii) accessibility of the documents to be coded. Thereafter, each document was analysed and coded by its main theme following a grounded theory method technique (Urquhart 2013). This approach allowed for the categorization of the literature into six main themes. Table 1 shows the number of documents, which included research papers, reports and books per category. After studying the literature of entrepreneurship, a subcategory specialised in incubators was created because it seemed particularly relevant to the phenomenon of DSs, as it will be discussed later on.

The coding process also revealed that the phenomenon of e-entrepreneurship has been studied from four research perspectives:

- Growth process – Refers to literature that looks at the different stages of development that start-ups follow since their creation. It is also referred to in the literature as lifecycle.
- Resources – Provides a description, classification, or availability of resources employed by start-ups and their impact on their growth process. Examples of such resources include, but are not limited to, human, financial, or internal infrastructure.
- Context – Literature with a focus on the effect that external infrastructure and organizations, either private or institutional, have on start-ups. This is the case of literature on business ecosystems, entrepreneurial ecosystems, and systems of innovation.
- Actions – These studies are concerned with the actions and behaviour of e-entrepreneurs and their impact on the success of the start-up. The unit of study in such cases was the entrepreneur and/or the company.

Table 1 Thematic categories and number of documents

Theme	# of documents	Papers	Reports	Books
E-business models	18	15	1	2
Digital economy	44	40	2	2
Entrepreneurship	20	15	1	4
Innovation	25	18	2	5
Business ecosystems	35	29	2	4
E-entrepreneurship	33	29	1	3
Total	**175**	**146**	**9**	**20**

Fig. 1 Thematic categories and research perspectives

Figure 1 illustrates which research perspectives were found in each of the categories. The following sections will present the results of the literature review per category.

3.1 Digital Economy

DSs were defined as newly created enterprises that only produce digital products/services and are born, trade, and operate exclusively online. Therefore, from a contextual perspective, their immediate economic context is not necessarily subject to the constraints of the physical, or traditional, economy (Gopal et al. 2003). In a purely digital context, concepts such as marginal contribution and network effects have a greater impact; for this reason, economic activity must be measured differently (Brynjolfsson and Kahin 2000). Hence, the term 'digital economy', which was first introduced by Tapscott (1996), has been widely used by practitioners and academics alike to encompass an economic system with its own set of attributes (Tapscott 1996).

At the centre of the digital economy is the digital enterprise, or e-business, described by Barr (2001) as a "qualitatively different entity" living in a different environment. In the literature, both e-commerce and e-business are terms that are commonly used interchangeably to refer to a business transaction that is executed electronically (Wall et al. 2007). Therefore, a digital enterprise or a digital business could also be defined as an enterprise executing e-commerce transactions. In this chapter, to avoid confusion, the term e-commerce will be used in reference to a

business transaction and the term e-business to the business or enterprise executing such a transaction.

Much of the focus of academic papers in e-business in the 1990s and early 2000s was actually on how e-commerce could offer existing enterprises an alternative to a traditional way of doing business that allowed them to transform themselves into digital enterprises (Barr 2001; Fillis et al. 2004; Gopal et al. 2003; Tapscott 1996; Zimmerman 2000). However, some of the literature also acknowledged the existence of a new category of digital enterprise, which has remained purely digital since its inception (Barnes et al. 2004a; Lockett and Brown 2000; Taylor and Murphy 2004; Wall et al. 2007). This situation made the term 'digital business' or 'e-business' a wider one, encompassing both traditional businesses that implemented an alternative e-business strategy (e.g., Nike Online, Walmart online), and enterprises with e-business operations only (e.g. Google, Facebook).

Since the uptake of e-commerce in late 1990s, researchers have recognised the opportunity that e-commerce opened for SMEs to enter new markets and to level the playing field with their larger counterparts (Fariselli et al. 1999). However, contrary to what was originally anticipated, SME e-commerce adoption seemed to occur at a slower pace (Fillis et al. 2004; Taylor and Murphy 2004). Therefore, several studies seeking to better understand information and communication technologies (ICT) and e-commerce adoption barriers in SMEs emerged. As shown in Table 2, the literature specialising in the adoption of e-commerce by SMEs is abundant. This literature can be divided into two periods: 2002–2006 and 2007–2012. During the former, the authors seemed more interested in understanding the barriers and success factors (SFs) for SMEs to adopt e-commerce; during the latter, attention shifted towards understanding how SMEs were using e-commerce, what applications have already been implemented with a certain level of success, and what opportunities still remained for SMEs to further leverage e-commerce. From a resource perspective these studies are relevant to the study of DSs because they provide an initial framework with which to understand possible barriers for entrepreneurs to use ICTs as a vehicle for new e-business creation.

Some papers have studied readiness, SFs, and the potential benefits of e-commerce adoption in Latin America. Those concentrated on readiness exhibit primarily a contextual perspective, including infrastructure, laws, government support, education, culture, and competitive forces. As shown in Table 3, the literature indicated different levels of focus in Latin America with country, regional, and emerging markets settings. Papers with a regional approach have performed comparisons among Latin American countries, while those focused on emerging economies compared Latin American countries with other emerging markets. In general, the authors seem to agree on some common barriers/SFs shared between mature and emerging markets, as well as on the fact that there are significant differences (e.g., infrastructure plays a more important role as a barrier in emerging markets). However, barriers/SFs among emerging markets seem to be fairly consistent. Thus, it is anticipated that such differences and similarities between mature and emerging markets can be extrapolated to DSs.

Table 2 Literature on SMEs and e-commerce by focus

Period	Literature	Focus
Main focus on e-commerce use, adoption and application	Al-Weshah and Al-Zubi (2012)	Barriers/SF/Adoption/Application
	Hanafizadeh et al. (2012)	Adoption/Application
	Ghobakhloo et al. (2011)	Adoption/Application
	Li et al. (2011)	Adoption/Application
	Woon Kian et al. (2011)	Barriers/SF
	Wymer and Regan (2011)	Adoption/Application
	Zakaria and Janom (2011)	Adoption/Application
	Alzougool and Kurnia (2010)	Adoption/Application
	Awa et al. (2010)	Adoption/Application
	Wielicki and Arendt (2010)	Barriers/SF
	Mohamad and Ismail (2009)	Adoption/Application
	Chitura et al. (2008)	Barriers/SF
	Hamilton and Asundi (2008)	Adoption/Application
	Chong and Pervan (2007)	Barriers/SF/Adoption/Application
	Elia et al. (2007)	Adoption/Application
	Kartiwi and MacGregor (2007)	Barriers/SF
Main focus on SME e-commerce barriers and success factors (SF)	Stockdale and Standing (2006)	Barriers/SF/Adoption/Application
	Fernando Alonso and Fitzgerald (2005)	Barriers/SF/Adoption/Application
	Fillis and Wagner (2005)	Barriers/SF
	Gengatharen and Standing (2005)	Barriers/SF
	Heeks et al. (2005)	Barriers/SF
	Kaynak et al. (2005)	Barriers/SF
	E. E. Grandon and Pearson (2004)	Barriers/SF
	Houghton and Winklhofer (2004)	Adoption/Application
	Jennex et al. (2004)	Barriers/SF

(continued)

Table 2 (continued)

Period	Literature	Focus
	MacGregor (2004)	Adoption/Application
	Simon (2004)	Barriers/SF
	Simpson and Docherty (2004)	Barriers/SF
	Stockdale and Standing (2004)	Barriers/SF
	Taylor and Murphy (2004)	Barriers/SF
	E. Grandon and Pearson (2003)	Adoption/ Application
	Matlay and Addis (2003)	Barriers/SF
	Daniel et al. (2002)	Barriers/SF
	Fariselli et al. (1999)	Barriers/SF/Adoption/Application

Table 3 Literature with different levels of focus on Latin America

Latin American countries	Latin America region	Emerging markets in general
Knight (2011)–Brazil	Rohm et al. (2004)	Simon (2004)
Travica (2002)–Costa Rica	Gutierrez (2004)	Martinez and Williams (2010)
García-Murillo (2004)–Mexico	Montealegre (2001)	Jobs (2012)
E. Grandon and Pearson (2003)–Chile		

Several authors believe that a higher SME e-commerce adoption rate could have positive effects for the overall economy, in terms of increased productivity and new market opportunities (Boateng et al. 2008; García-Murillo 2004; Hinson et al. 2008). Although this has been found to be generally true for ICT adoption (Middleton and Byus 2011), studies have found mixed results on the intensity of the impact for SMEs in emerging markets (Foley and Ram 2002; Kenny 2003; Rangaswamy and Nair 2012; Zahir 2008). Some authors include recommendations to be implemented by governments, non-governmental organisations (NGOs), or the private sector to improve SMEs' ICT and e-commerce adoption (Kenny 2003; Knight 2011; Ngwenyama and Morawczynski 2009). Nevertheless, there are very few studies with a longitudinal approach that would validate whether such recommendations indeed offer the expected results (Hitt and Brynjolfsson 1996; Nair et al. 2005). Most of the papers reviewed in this category followed a qualitative inductive methodology and there is a paucity of quantitative empirical research to measure the economic effect of e-commerce adoption in emerging economies and what strategies or initiatives may have the largest impact. Although the relationship between ICT and economic impact in general is a topic for research, the current evidence points to a potential positive economic impact of DSs in emerging markets.

3.2 E-Business Models

The term 'business model' is used in the literature in different ways by associating to it more or less scope. However, in all cases it included specific actions expected to be performed by a company, and a specific way to manage its resources. For example, on one hand Timmers (1998, p. 2) defines a business model as follows: "(i) An architecture for the product, service and information flows, including a description of the various business actors and their roles; and (ii) A description of the potential benefits for the various business actors; and (iii) A description of the sources of revenues." Though he intentionally leaves out any marketing activities, he later points out that, in order to have a clearer picture of the way an enterprise will realise its business mission, it is critical to talk not about a *business model*, but a *marketing model*, which is defined as a "business model; and the marketing strategy of the business actor under consideration" (Timmers 1998, p. 3).On the other hand, Sako (2012, p. 23) states that "a business model articulates the customer value proposition; it identifies a market segment; it specifies the revenue generation mechanisms; it describes the positioning within the value network or ecosystem; and it also elaborates on competitive strategy by which the firm gains and holds advantage over rivals." Therefore, Sako (2012) gives a larger set of attributes to the term than Timmers (1998).

Furthermore, some authors point out that a company may have a different business model when applied to a purely digital context (e-business model), than when applied to a traditional brick-and-mortar context (Berman 2012; Weill and Woerner 2013). Therefore, Osterwalder et al. (2002) and Osterwalder and Pigneur (2002) present a framework to explain the elements of an e-business model with a deep level of detail on the conceptualization of terms, components, and relationships among them. Building from them, as well as other authors in the field, Pateli and Giaglis (2003, p. 1) build "a framework that further decomposes the research area of Business Models into specific research sub-domains" that includes definitions, components, taxonomies, representations, change methodologies and evaluation models.

Particularly influential to e-entrepreneurship is the work of Osterwalder et al. (2002) on e-business models. From this original work, the concept of the business model canvas was developed and introduced in the book *Business Model Generation* (Osterwalder and Pigneur 2010). Practitioners have applied this concept to dynamically create e-business models during the entrepreneurial process (Blank and Dorf 2012). Moreover, recently introduced by Ries (2011), the *lean start-up* method coupled the business model canvas with agile development. This amalgamation preaches the benefits of short and fast cycles of product development in order to coach e-entrepreneurs to aim for having a minimum viable product in the least possible time and quickly test related products or services with customers. It also calls for entrepreneurs to incrementally readjust a start-up's e-business model, resulting in reduced risk and increased chances of success during the start-up's early stage (Blank 2013a; Breuer 2013). This method has picked up a great number

of follower practitioners around the world (Blank 2013b). However, it is just in the last two years that some academic empirically grounded research has been done to test the applicability and consequences of this method in DSs, but none within a Latin American context (Breuer 2013; Hui 2013; Lalic et al. 2012; May 2012; Qvillberg and Gustafsson 2012; Yau and Murphy 2013).

3.3 Entrepreneurship

Bhupatiraju et al. (2012) researched the relationship between innovation, entrepreneurship, and technology scientific studies, showing that entrepreneurship as an academic discipline was born in close connection to the study of innovation. Probably the most referenced author within the literature that was analysed, Schumpeter (1934) defines the entrepreneur as the one who undertakes the innovation process with the purpose of creating business value. However, the term 'entrepreneurship' has evolved in different ways, thus creating some ambiguity in the way it is used (Gartner 1990; Morris et al. 2012; Shailer 1994). McQuaid (2002) summarises such different interpretations of the term 'entrepreneurship' in the following five distinctions: a function in the economy, a new business start-up; an owner-manager of a small business; a set of personal characteristics; and a form of behaviour.

Recent entrepreneurship literature is abundant and covers a broad spectrum of areas. Nonetheless, it seems that recent studies in the context of technology adoption converge on the assumption that innovation is indeed part of technology-based entrepreneurial activity. Table 4 summarises the findings of a sample of papers, which were relevant to DSs.

Of particular interest is the work of Morris et al. (2001), since their proposed 'framework of frameworks' provides a detailed theoretical model explaining the lifecycle of start-ups including factors that influence the entrepreneurship process. The model covers a multitude of perspectives grouped in six variables: the organizational context, the environment, the business concept, the resources, the entrepreneur, and the entrepreneurial process. Since the work of Morris et al. (2001) is grounded in literature rather than empirical evidence, and the prior studies upon which they draw are situated within a developed economies context, future research may empirically test the authors' propositions and their applicability to entrepreneurship in emerging economies.

A relevant subcategory of entrepreneurship literature focuses, from an actions and resources perspective, on the role that incubators play in the creation, development and growth of technology ventures. Incubators follow different models, depending on whether they are publicly or privately funded or whether they are based on mature or emerging markets (Carayannis and von Zedtwitz 2005; Stam and Buschmann 2011). Incubator-oriented literature usually refers to the entrepreneur as a new small business owner in the early process of business creation. Carayannis and von Zedtwitz (2005) provide the following definition: "incubators

Table 4 Sample of literature with focus on entrepreneurship and ICT

Literature	Perspective	Findings
McDaniel (2000)	Actions Resources	Entrepreneurship definition is linked to innovation as a function of technology change/development. The entrepreneur is different from a small business owner, or capitalist.
D. Miller and Garnsey (2000)	Actions Resources	Place the entrepreneur as the unit of analysis within a technology diffusion framework to better understand technology advances.
Klepper (2001)	Actions Resources Growth Process	Propose an evolutionarily based theory to explain the creation of employee high-tech start-ups.
Morris et al. (2001)	Actions Resources Growth Process Context	Presents a comprehensive theory of entrepreneurship through the integration of different frameworks.
McQuaid (2002)	Action Resources	Presents five views on the meaning of entrepreneurship are considered. Each of them has differing implications for policies to promote entrepreneurship.
Hindle and Yencken (2004)	Action Resources Growth Process	Propose that entrepreneur's culture and knowledge derived from research are the keys to technological innovation and the creation of new technology-based firms (NTBFs).
Doganova and Eyquem-Renault (2009)	Action Resources	Suggest that business models are market devices that allow entrepreneurs to communicate with stakeholders, thus enabling the economic network necessary for technology innovation.
Martinez and Williams (2010)	Action Context	Explore institutional policies and entrepreneurial activity in the adoption of e-commerce. Concludes that institutions are a strong driver, while entrepreneurship is a weak one.
Chandra and Leenders (2012)	Action Context	Through a study of user innovation and entrepreneurship in a virtual environment, the authors justify a proposition that links their findings to real-world entrepreneurial theories.
Soriano and Huarng (2013)	Resources	Summary of 2012 Global Innovation and Knowledge Academy conference papers. ICT innovations are considered essential instruments of knowledge based entrepreneurship.

are in the business of facilitating entrepreneurs and early-stage start-up companies; and compete with consulting firms, real-estate agents, and other companies for the most interesting and valuable start-ups. Incubators differentiate themselves through their particular competitive scope, strategic objective, and service package." According to their focus and strategic objectives, there are five archetypes of

incubation, including regional business incubators, university incubators, independent commercial incubators, company-internal incubators, and virtual incubators.

An accelerator is known as an evolution of the incubator that responds to the needs of entrepreneurs for more personalised and specialised support. According to P. Miller and Bound (2011), accelerators have some specific characteristics that differentiate them from the original incubator version:

- Accelerators accept open applications for support from entrepreneurs, but are highly competitive;
- They participate in the start-up with pre-seed or seed investment in exchange of equity;
- They usually support only entrepreneurial teams instead of single entrepreneurs;
- They offer time-limited support in the form of methodical development programs, which are 'boot camps' designed to develop maturity and test the start-up business model; they are also often accompanied with mentoring;
- They take several start-ups through this development program in parallel.

Incubators and accelerators must distribute a limited amount of funds among a large number of applicant entrepreneurs (Carayannis and von Zedtwitz 2005; Stam and Buschmann 2011; Thewarapperuma 2013); therefore, sophisticated approaches decide how to select the best prospects. The level of innovativeness is regarded as a determinant that reduces risk and increases the potential of returns (McDaniel 2000). For this reason, innovation weighs heavily in the process of capital allocation (Carayannis and von Zedtwitz 2005). Doganova and Eyquem-Renault (2009) state that possibly one of the entrepreneur's most important objectives in using business models is to reduce the risk perception of venture capitalists or, in this case, incubator managers, who need to decide how to allocate their resources. Stam and Buschmann (2011) suggests that a key element of incubator support is directed towards the creation of a business model based on innovation differentiation. Hence, it could be proposed, subject to future research, that incubated or accelerated DSs exhibit more innovation-based differentiation than their non-incubated counterparts.

Another discourse in the literature on entrepreneurship with a context and resources perspective is focused on technology clusters as a unit of analysis. Pitelis (2012, p. 1371) proposes that "clusters are a form of economic organizations that can involve [inter-firm cooperation], with net advantages that can render it superior to integration, even when cluster firms are involved in similar and complementary activities." For example, La Rovere (2003) proposed that, assisted by ICTs, SMEs in Brazil could be organised in local productive systems to better face the challenges of globalisation. Oakey (2007) looked at the effect that policy assistance has had in what he defines as high-technology small firms (HTSFs); he concludes that policy assistance oriented in the development of clusters of HTSFs has a limited effect in improved R&D collaboration between different firms, given the confidentiality that R&D in high technology entails. However, Oakey (2007) recognises that some potential benefits for HTSFs may arise from these clusters in areas other than R&D, very similar to those offered by incubators, such as shared real estate,

marketing, legal, and other business functions. Finally, it is important to differentiate between high-tech clusters and entrepreneurial ecosystems. The former involves cooperation around an industry and the concentration of firms in a geographic area (Pitelis 2012) while the latter, as will be discussed in the following section, rejects the industry as a unit of analysis.

3.4 Business Ecosystems

The earlier business and entrepreneurial ecosystems literature had a clear contextual and resource perspective, while most recent studies have also incorporated an actions perspective. The idea that entrepreneurship requires a supportive environment was recognised by several authors (Bull and Willard 1993; Carroll 1984; Van de Ven et al. 1984), but it was Moore (1993) who developed the concept of business ecosystems applying the natural ecosystems model to analyse the complex competitive business environment. Since then, the model has been adapted to explain different business phenomena, including entrepreneurship.

Drawing a comparison between the business context and natural science, Moore (1993) refers to the following main constructs: ecological contributors as leaders or followers, ecosystem stages (birth, expansion, leadership, self-renewal), co-evolution, and competition. Moore provides the following definition: "'Business ecosystem' and its plural, 'business ecosystems' refer to the intentional communities of economic actors whose individual business activities share in some large measure the fate of the whole community... A business ecosystem... can also be conceived as a network of interdependent niches that in turn are occupied by organizations. These niches can be said to be more or less open, to the degree to which they embrace alternative contributors." (Moore 2006, p. 3).

Moore applies the notion of ecosystem to describe the actors that influence the business activity of a firm mainly to present the business ecosystem as the unit of analysis in substitution of the industry (Moore 1996). For Moore (1996), the analysis of the competitive environment should be done at an ecosystem, rather than firm, level. In his model, more attention is placed in the structure of the business ecosystem than in the interactions between its components.

Other authors have adopted the ecology model to the study of entrepreneurial context. For example, Van de Ven et al. (1984) look at entrepreneurship with three foci:

- focus on the characteristics of the entrepreneur,
- an organisational focus on the structure and network of people,
- an ecological focus on the population of organizations.

In the latter, Van de Ven et al. (1984, p. 88) frame ecology at an industry level: "The ecological approach is linked with the population ecology perspective, which emphasises that it is the distribution of resources in society, not the motives,

decisions, or behaviour of individuals, that is the driving force which determines whether organizations will be created."

Similarly, Carroll (1984) presents three levels of analysis and approaches to organisational evolutions: organisational level, population level, and the community level. The community ecology is seen as "the collection of all the populations that live together in some region. . . is primarily concerned with the emergence and disappearance of organizational forms." Clearly, with a deterministic perspective, these approaches reduced the importance of the actions that an individual firm may take and emphasised the role of the context and the resources.

Other authors have levelled the playing field between the context and the actions of the entrepreneur. For example, Birley (1986, p. 107) looks at "the extent to which the entrepreneur interacts with the networks in his local environment during the process of starting a new firm."Van de Ven (1993, p. 218) states that "it is the entrepreneur who constructs and changes the [industrial] infrastructure." Neck et al. (2004) studied high-tech new venture creation and pinpointed the lack of research on the relationships between actors of the entrepreneurial system and its context. They looked at the environmental factors conducive to entrepreneurship and proposed six components of the entrepreneurial system: incubators, spin-offs, informal networks, formal networks, physical infrastructure, and culture. Within formal networks, they included university, government, professional and support services, capital services, talent pool and large corporations. In a similar line of argument, Corallo and Protopapa (2007) explored the limitations of Moore's models and used the concept of niche construction to emphasise the interaction of individuals with their environment. For them, niche construction is "the process whereby organisms, through their activities and choices, modify their own and each other's niches" (Corallo and Protopapa 2007, p. 4).

Recently, several authors have tried to offer a more solid theoretical framework to study high-tech entrepreneurship, also adding an actions perspective. Sipola et al. (2013) look at start-up ecosystems through the competence bloc theory and cultural-historical-activity theory in search of the economic actors that are part of the ecosystem. In their approach, the ecosystem is the unit of analysis instead of the start-up. Zahra and Nambisan (2012) follow Moore's business ecosystem framework, but combine it with entrepreneurial strategic thinking to propose four models of business ecosystems from a firm perspective: orchestra, creative bazaar, jam central, and MOD station.

Another clearly contextual approach taken by researchers of university-based entrepreneurial ecosystems is to the triple helix model. For example, Etzkowitz et al. (2013) define such a model as interactions between university, industry and government to build entrepreneurial regions. Within their study, they draw parallels between some elements of Silicon Valley and the Brazilian entrepreneurial ecosystem.

The only paper analysed that concentrates on specific desired outcomes from the ecosystem is presented by Bailetti and Bot (2013). Based on a case from Canada, the authors explore the process in which public funds are converted into jobs.

However, it is presented more in an industry report rather than an academic research format.

Table 5 shows a comparative analysis of the most recent studies found on entrepreneurship ecosystems with a focus on Latin America. Some of them have been influenced by the work of Isenberg (2010), who observed that entrepreneurial ecosystems outside of the United States have different characteristics. On that basis, Isenberg offers nine propositions to foster a local or national entrepreneurial ecosystem. He does not limit his recommendations to high-tech entrepreneurship, but recognises the predominance of this sector in the modern world. Isenberg (2011) also offers a detailed model for entrepreneurial ecosystems by introducing what he defines as the 'entrepreneurship ecosystem strategy'. He positions it as a replacement or "at least a necessary complement, or even pre-condition to, cluster strategies, innovation systems, knowledge based economies, and national competitiveness policies" (Isenberg 2011, p. 1). Similarly, Feld (2012), following an approach similar to Isenberg's, identifies some critical components and common factors found in successful start-up ecosystems. Neither Isenberg nor Feld refer to a specific research method, but both have been very popular with practitioners in the field because of their track record as entrepreneurs and their active sponsorship of entrepreneurship development.

3.5 Innovation

As discussed earlier, innovation as a field of study evolved parallel to the study of entrepreneurship with a perspective mainly on actions and resources. Drucker (2002, p. 5) captures the definition elegantly: "Innovation is the specific function of entrepreneurship, whether in an existing business, a public service institution, or a new venture started by a lone individual in the family kitchen. It is the means by which the entrepreneur either creates new wealth-producing resources or endows existing resources with enhanced potential for creating wealth. Moreover, Drucker (2002) looked for the sources of innovation and concluded that a systematic process of innovation relies on a continuous analysis of the sources of innovation and must be adjusted to each business context.

For the last five years, innovation studies have also incorporated a perspective on the context. For example, there has been a rise in research around how innovation targeting the 'bottom of the pyramid' may incorporate this segment of the population into the digital economy with the dual purpose of expanding the market and alleviating socio-economic pressures (Boateng et al. 2008; Foster and Heeks 2013; Nair et al. 2005; Rangaswamy and Nair 2012). For example, Foster and Heeks (2013) explain how the systems of innovation (SoI) and technology diffusion frameworks can be used to study new forms of innovation in emerging markets through the conceptualisation of what they define as 'inclusive innovation'. According to them, SoI has been successfully used by several authors to model factors affecting innovation in the context of emerging economies. It could be

Table 5 Recent entrepreneurship ecosystems studies in Latin America

Literature	Perspective	Contributions
Borges Lemos (2011)	Context	Applies the triple-helix model in combination with Moore's work to look at a case of a Brazilian University research-based entrepreneurial ecosystem. His study is empirically grounded, following a mixed method approach and should inform future research on this area. Probably the most important limitation is its narrow focus on a specific university-based ecosystem which substantially limits it generalizability.
(Cervantes 2013; Cervantes and Nardi 2012)	Context Resources Actions	The study looks at Mexico's infrastructure to support Internet-based start-ups. He followed an ethnographic method and, based on cultural historic activity-based theory, analysed his empirical findings and provided several recommendations to improve what he calls the 'Innovation Infrastructure' of Mexico and other 'middle income countries'.
Arruda et al. (2013)	Context Resources	The authors reference the work of (Isenberg 2011) and OECD (2011) as the models for the study. They build upon six entrepreneurship determinant categories set by the OECD (i.e., regulatory framework, market conditions, access to finance, creation and diffusion of knowledge, entrepreneurial capabilities and entrepreneurship culture) to explore the actors of the Brazilian entrepreneurship ecosystem and what role they play as they operate and evolve. They claim to have identified the 'characteristics, strengths and weaknesses of the Brazilian entrepreneurship environment'. They also compare the Brazilian state of development with that of the U.S. and Israel. They used interviews with the actors in the Brazilian entrepreneurship environment and quantitative analysis using secondary data from official institutions.
Kantis et al. (2012) and Kantis and Federico (2012)	Context Resources Growth Process	The authors build upon the work of Cohen (2006), Isenberg (2011) and Neck et al. (2004) to propose a national system of an entrepreneurship development model to study Latin American entrepreneurial policies based on five countries: Brazil, Mexico, Argentina, Chile and Uruguay. They refer to the ecosystem as a "a set of different interconnected actors within a specific area, which includes at least the following building blocks: universities and R&D institutions, qualified human resources, formal and informal networks, governments, angel investors and venture capitalists, professional service providers, and an enterprising culture which connects all of these factors in an open and dynamic way." The main focus of their study is the policies in these countries that are used to foster the entrepreneurial system in general, and not the start-ups. They conduct a systematic analysis of the state and development of the Latin American entrepreneurial ecosystem based on qualitative and quantitative methods, resulting in a map of the ecosystem components, a model for the development stages of start-ups, a classification of the policies followed to foster the ecosystem and the interactions among all of these elements.

argued that SoI frameworks draw some parallels to the framework of frameworks proposed by Morris et al. (2001), in the sense that both model the macro relationships among the different elements of the system that are, in themselves, looked at through their own sub-framework.

Edquist (2005) explains the framework of national SoI in which the components of the system are organisations and institutions that are interrelated and collaborate in order to promote innovation. These include entities such as firms, suppliers, customers, universities, schools and government ministries, as well as laws, norms, practices and culture, as the institutions that set the rules with which the components operate. In contrast with the entrepreneurial business ecosystem model that focuses on the entrepreneurial process, the function of the SoI is the innovation process itself, whether it is performed by established or new firms.

Edquist (2005, p. 185) explains some the virtues of the SoI model: "it has a holistic and interdisciplinary perspective, it employs historical and evolutionary perspectives, it emphasises interdependence and non-linearity, it uses a comprehensive innovation concept including both products and processes and their subcategories, and it emphasises the role of institutions." Therefore, the SoI model seems to be a strong candidate to study DSs and their interactions with their context. Notwithstanding Edquist (2005, p. 186) recognises some limitations, such as that there is no clear boundary in the definition of the system making it possible to include or leave out any components depending of the system to be analysed, and that SoI "is not considered a formal theory... SoI should be labelled an approach or a conceptual framework rather than a theory."

Finally, innovation can be looked from a technology diffusion framework (Rogers 1962) which, in the context of emerging economies, is highly dependent on achieving low prices that are accessible to low-income consumers (Crespi and Zuñiga 2012; Daude 2010; Hilbert 2010; Lastres and Cassiolato 2003). However, there are many challenges to developing and implementing effective policies in Latin America that facilitate technology diffusion, as shown by the studies summarised in Table 6. The analysis of these papers revealed that existing innovation theoretical frameworks have been successfully used in, and adapted to, both emerging economies and Latin American contexts.

3.6 E-Entrepreneurship

As the digital economy developed, a new breed of companies operating solely on the Internet was born. At the early stages, academics studied the phenomenon under a variety of terms: Internet-based businesses, Internet ventures, Internet start-ups, online businesses and e-businesses, among others. During the second half of the 1990s and early 2000s, the rapid success of companies such as Netscape, Amazon, Google and eBay triggered a wave of studies focused on the particular challenges and opportunities of operating a business solely in the Internet (Afuah and Tucci 2000; Barnes et al. 2004b; Pateli and Giaglis 2003; Souitaris and Cohen 2003;

Table 6 Technology innovation in Latin America; frameworks, challenges, recommendations

Author	Frameworks	Challenges	Findings
Lastres and Cassiolato (2000)	SoI	Information/knowledge economy challenging traditional economies of emerging markets.	The global knowledge economy imposes new competitive dynamics for SMEs in emerging economies.
	Technology Diffusion	How can emerging markets take advantage of new ICT paradigms?	Government has a key role
		Foster local and national innovation and learning policies to incorporate developing economies into the Learning Economy.	
Daude (2010)	Development Accounting	Latin American countries growing slower than other emerging economies.	Low total factor productivity (TFP) as the main reason for slower growth than other emerging economies.
	Technology Diffusion	Barriers to innovation and technology adoption.	Low technology diffusion is due to weak regulatory frameworks and institutions.
		Latin American innovation is low-tech in general.	
Hilbert (2010)	Income Distribution and Technology Diffusion	Digital divide among mature and emerging markets result in lower innovation and productivity.	Neither the real price reduction of ICT nor demand subsidy can be a solution by itself.
			The challenge has to be faced with a sophisticated combination of both options in close public-private cooperation.
Crespi and Zuñiga (2012)	CDM Structural Recursive Model of Innovation and Productivity	Lack of significance of innovation for productivity in Latin America.	Firms that received public financing for innovation invest significantly more.
		In many Latin American economies, firms' innovations consist basically of incremental changes with little or no impact on international markets, and are mostly based on imitation and technology transfer.	Absence or weak development of innovation networks.
			The results of the three variables concerning 'sources of information' differ markedly across countries.
			Company size matters for technological innovation.
			Size is not related to productivity.
			The impact of innovation is far beyond those reported previously for firms in industrialised countries.
			Determinants of innovation are not the same across Latin American countries.

Timmers 1998). However, Matlay (2004) was one of the first authors to use the term 'e-entrepreneurship' specifically in reference to SMEs created to trade exclusively in the digital economy. Other terms, such as Internet entrepreneurship (Batjargal 2005) and digital entrepreneurship (Hull et al. 2007), have been used with a similar meaning. However, it seems that e-entrepreneurship has been more widely used in recent literature than the others. Nonetheless, the definitions of e-entrepreneurship vary and do not seem to solely refer to DSs since, in some cases, they also include SMEs that produce physical products that are traded both offline and online.

As a new discipline, e-entrepreneurship is still in the process of developing theoretical frameworks that are, in most cases, based on those of the related disciplines as shown in Fig. 1. However, since the appearance of works from Afuah and Tucci (2000), Matlay and Westhead (2005), Gundry and Kickul (2006) and Kollmann (2006), among others, research has been building up. Table 7 offers a summary of the areas of contribution of each of the papers analysed and their research perspective.

Table 7 shows that the field of e-entrepreneurship has been developing with a peak of papers making specific reference to e-entrepreneurship, or its synonyms, in the period of 2004–2006, and that it has continued to evolve in recent years. There was a wide variety of perspectives, but with a predominance of actions and resources. Of the papers analysed, nine were empirically grounded, four of them followed a longitudinal approach, four of them were based on surveys of 100 samples or more, and five of them followed case studies. Those studies that followed a quantitative methodology based on surveys included in the sample both companies that mixed traditional businesses with an e-business branch and DSs; so, no definitive conclusion may be derived for the sub-segment of DSs that took part in these studies. Of the studies following a case study approach, only Effaha (2013) and de Medeiros Bezerra et al. (2012) had an exclusive focus on a DS. Matlay and Westhead (2005) and Matlay and Martin (2009) mentioned that the companies studied were e-businesses but, given that they were related to the tourism industry, it is not clear if the sample was related to SMEs solely operating on the Internet or if it also included traditional SMEs who also had an e-business strategy.

In relation to e-entrepreneurship in emerging economies, only de Medeiros Bezerra et al. (2012) performed a study within a Latin-American context with a focus on Brazil. Batjargal (2005) studied Internet entrepreneurship in China, but the sample of companies included a wide range of Internet-related companies and was not focused on DSs. Furthermore, this research, though enlightening, was narrowly focused on the effect of social networks on the survivability of Internet based start-ups. Similarly, Mahmood and Cheng Ming (2005) position their research in the context of Asia Pacific economies, which have a blend of both mature and emerging markets; though informed by the literature and public statistics, their research lacks empirical grounding. All other studies, 17 out of 20 analysed in Table 7, were done within a European or North American context.

Table 7 Summary of Research contribution on e-entrepreneurship

Area	Research	Perspective
Position current and future research	Waesche (2003)	Context, Resources, Growth Process
	Matlay (2004)	Actions, Resources, Context
	Sinkovics and Bell (2005)	Resources, Context
	Asghari and Gedeon (2010)	Actions, Context, Resources, Growth Process
Typology	Timmers (1998)	Actions, Resources
	Matlay (2004)	Actions, Resources, Context
	Lumpkin and Dess (2004)	Actions, Resources
	Hull et al. (2007)	Actions, Resources
Theoretical framework	Afuah and Tucci (2000)	Actions, Resources, Growth Process
	Lumpkin and Dess (2004)	Actions, Resources
	Kollmann (2006)	Actions, Context, Resources, Growth Process
	Gundry and Kickul (2006)	Actions, Resources, Context
	Asghari and Gedeon (2010)	Actions, Context, Resources, Growth Process
Empirical research	Souitaris and Cohen (2003)	Actions, Resources, Context
	Batjargal (2005)	Actions, Resources
	Matlay and Westhead (2005)	Actions, Resources
	Arenius et al. (2005)	Actions, Resources, Growth Process
	Lasch et al. (2007)	Actions, Resources, Growth Process
	Matlay and Martin (2009)	Actions, Resources
	de Medeiros Bezerra et (al. 2012)	Actions, Context, Growth Process
	Effaha (2013)	Context, Resources
Drivers of e-entrepreneurship	Souitaris and Cohen (2003)	Actions, Resources, Context
	Mahmood and Cheng Ming (2005)	Actions, Resources, Growth Process
	Kollmann (2006)	Actions, Context, Resources, Growth Process
	Gundry and Kickul (2006)	Actions, Resources
	Lasch et al. (2007)	Actions, Resources, Growth Process
	Matlay and Martin (2009)	Actions, Resources

Conclusion

This chapter shows how studies in digital economy, e-business models, entrepreneurship, innovation and business ecosystems contribute to our understanding of the recently created field of e-entrepreneurship. Four research perspectives were introduced to define how these disciplines view DSs. In some cases, the role of context was emphasised (vg. business ecosystems), while in others DSs' action and resources played a predominant role (vg. e-business models). Thus, future research must understand these different perspectives and how they can be interrelated.

Innovation and entrepreneurship studies are closely interlinked, and, though they have continued to evolve for several decades, two conceptual frameworks were mentioned as candidates to guide future empirical research: SoI, and entrepreneurship framework of frameworks. It can also be concluded that, given their increasing impact in the practice, entrepreneurial ecosystems and lean start-up models must be considered in future e-entrepreneurship studies in emerging markets. Digital economy studies found that e-commerce adoption barriers and SFs among emerging markets are fairly consistent, and that there are significant differences between mature and emerging markets. This proposition could justify both adapting existing e-entrepreneurship theoretical propositions to accommodate the particulars of Latin American, and expecting commonalities between Latin America and other emerging economies. Actually, it has already been partially supported by some relevant research in entrepreneurship ecosystems, innovation, and incubators in Latin America and other emerging countries. However, notwithstanding the work already done up to the present, Table 8 summarises several gaps that remain in the literature around Latin American DSs as a unit of analysis.

Thus, this literature review has identified the lack of a single comprehensive framework to study DSs through their context, actions, resources and growth process. Entrepreneurship ecosystems literature has proven to be useful in understanding the context in which DSs operate but relegates the study of the DSs as a unit of analysis. Cabrera and Soto (2012) research could be seen as a middle ground, using an ecosystem framework in conjunction with a resource-based theory of the firm. Such an approach may be more suitable to integrate both the influence of the ecosystem and the DS's own resources and actions as critical variables affecting their growth.

Although the available conceptual frameworks should inform and support any future research, the lack of a commonly accepted theory of e-entrepreneurship leaves enough room open for the creation of new models, or the adaption of current ones, to accommodate the specificities of emerging economies. In order to do so, it seems that an empirical approach would be better suited to ground such new frameworks and cover existing gaps.

(continued)

Table 8 Gaps in the literature according to their research perspective

Perspective	Gaps
Resources	Studies in the digital economy provide an initial framework to understand possible barriers for entrepreneurs to use ICTs as a vehicle for new e-business creation; however, they are still to be linked to studies incorporating a context and growth process perspective.
	Only one paper analysed looked at the specific process through which investment of public funds were converted into new jobs. More academic studies are needed that take into account the conversion of public resources into benefits for DSs and their stakeholders.
Context	The overall relationship between adoption of e-commerce and economic impact in general is still an open topic for research. Though the current evidence points to a potential positive economic impact of DSs in emerging markets, it has not yet been thoroughly measured.
	Literature on entrepreneurial ecosystems may have already provided an explanation for why successful DSs are concentrated in the U.S. and Europe, but such models have been built at the cost of dismissing what actions individual DSs can do by themselves to overcome the limitations of their own context.
	The entrepreneurial framework of frameworks was grounded on literature rather than empirical evidence, and the prior studies they draw on are situated within a developed economies context; thus, future research may be done deductively to empirically test the authors' propositions and their applicability to entrepreneurship in emerging economies.
	It was discussed that the main difference between research on high-tech clusters and entrepreneurial ecosystems lies in the unit of analysis; however, there has not been enough research that engages in a reconciliation of the two approaches.
Actions	Some academic, empirically grounded research has been done in the last two years to test the applicability and consequences of a lean start-up method in the growth process of DSs, but none of these studies has been found within a Latin American context.
	The proposition that accelerated DSs are more innovative than their non-incubated counterparts should be empirically tested in future research.
	In business and entrepreneurial ecosystems models, the unit of analysis is the ecosystem, not the start-up. Therefore, in these models, more attention is given to the structure and resources of the ecosystem than the actions of the start-up and how such actions can shape the interactions with the ecosystem.
Growth process	Only 3 out of 11 e-entrepreneurship studies that looked at the growth process of DSs were done in the context of emerging economies, and only one in a Latin American setting.

Therefore, the two research questions that are proposed remain open for future studies:

1. What are the interactions between actions, resources and contexts during the Latin American DS growth process?
2. How can Latin American DSs manage such interactions to improve their ability to grow?

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A Study on Entrepreneurial Support Environment in Educational (Technical) Institutions

Savitha G. Lakkol, Nalina K.B., and Aruna Adarsh

Abstract The educational institutions play a key role in creating future entrepreneurs. They impart necessary skills to the students and enhance the chances of their employability. The developing economies need to nurture entrepreneurship and manage the students to pursue entrepreneurship as a career choice. The Knowledge Commission Report on entrepreneurship (2008) has rightly identified the effective nexus between education, innovation and entrepreneurship initiative.

The premiere institutes in India such as IITs and IISC's have already taken steps to nurture entrepreneurship (Goswami et al. 2008) and have a proven success record. The similar initiatives are taken up by other educational institutions. The success factors and the conditions, contributing to the entrepreneurship needs to be identified. The proposed study attempts to explore the entrepreneurial initiative support environment extended by the technical educational institutions. The study is carried out in two phases.

In the first phase an interview of Entrepreneurship-Cell (E-Cell) coordinators was carried out to explore the institutional initiative to nurture entrepreneurship amongst technical graduates; identifies the profiles of the plans, business viability of the plans and success rate. In the second phase a survey of E-Cell members was carried out to identify the factors influencing entrepreneurship as a career choice.

The study was carried out in those technical educational institutions in the city of Mysore having their own entrepreneurship cell/incubation centre. The study brought out the functioning of E-Cell, the challenges faced and the initiatives taken. The survey data indicated that both personal strength and support environment affect the student's choice for entrepreneurship as a career choice.

Keywords Entrepreneurship education • Support environment • Entrepreneurship Cell • Incubation Centre

S.G. Lakkol (✉) • Nalina K.B. (✉) • A. Adarsh
JSS Centre for Management Studies, Sri Jayachamarajendra College of Engineering, JSS Technical Institution Campus, Mysore, India
e-mail: savitalakkol@gmail.com; kbnalina@yahoo.co.in; aaruna900@gmail.com

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1 Introduction

Entrepreneurship has accelerated the growth of economies and pace of industrialization in developed countries. Entrepreneurship also contributes income, jobs, Research and Development and innovation (Van Praag and Versloot 2007; Sluis and Van Praag 2008). India as a developing economy and dominated by agriculture sector has realized the prominence of Entrepreneurship eco system to boost the economic growth.

The role of education, in particular, has long been recognized as the cornerstone of entrepreneurship (Singh et al. 2011; Chiu 2012). Of late, the field of higher learning has witnessed the burgeoning of training programs, business seminars and business networking opportunities, institutional incubators, B-plan writing support and other end-to-end solutions for getting the start-ups off the ground. These attempts were triggered by the policy initiative.

1.1 Policy Initiatives to Encourage Entrepreneurship

The Policy initiatives in India to create Entrepreneurship eco system started with policies supporting Small and Medium Sectors in 1956 (Industrial Policy Resolution 1956). In 1960s and 1970s Entrepreneurship education was initiated in the form of training programs, under the aegis of state and Central Governments and by Financial Institutions funded by the Government. In 1980s the entrepreneurship education was focused on creating self-employment ventures to make individuals self-employed.

The 1980s witnessed the entry of entrepreneurship education into technology and Management Institutions, majorly the premier institutions such as IIMs and IITs. In the post reform period the growth of Indian economy created multiple opportunities for both jobs and entrepreneurship. The emergence of Information Communication Technology and the available skilled resources in India has opened up the new entrepreneurial avenues. The Government of India has initiated the establishment of Science and Technology Entrepreneurship Parks (STEP), Incubation Centers at few reputed Technical Institutions. The country as a whole saw a growing interest in entrepreneurship during 1990s fuelled by growth factors such as global success of Indian firms, large market, and opportunities in different sectors etc. (Knowledge Commission Report) and Somasekhar M (2001).

Along with premier institutions the next decade saw a major change as the education regulatory bodies such as AICTE and UGC have also identified the need to create entrepreneurship cell across various technical institutions in India. The current dimension of Entrepreneurship education in Technical Institutions has taken the form of:

1. Entrepreneurship Cell
2. Training and Diploma Programs
3. Courses on Entrepreneurship

4. Research and Consulting projects
5. Incubation, Networking and mentoring facilities
6. Conferences, seminars and workshops
7. Journals, newsletters and publication

Along with government initiatives the private participation has also been witnessed since 2003 with the establishment of National Entrepreneurship Network (NEN). NEN is a non-profit organization with a mission to create and support high growth entrepreneurs driving job creation and economic growth in India.

Considering all these developments the present study attempts to explore the entrepreneurial initiative support environment extended by the technical educational institutions. Various studies have identified the growth of Incubation, nexus with universities and Institutions and entrepreneurship education. The same is summarized in the following review.

2 Studies on Technology Business Incubators (TBIs) and Universities

The early studies on incubation were mostly descriptive explaining the concept of incubation, its functions (Allen 1985; Allen and Levine 1986; Smilor and Gill 1986). The studies suggested the infrastructure facilities at a cost lower than the markets rates to support entrepreneurship in tech business. Allen and Bazan, 1990 extends the idea of TBI and suggests the intellectual and consulting resources availability in addition to the physical infrastructure. These resources help entrepreneurs in developing business and marketing plans, building management teams, obtaining funds, and provide access to professional and administrative services (Von Zedtwitz and Grimaldi 2006). The success of TBI facility is largely associated with their interaction with Universities and technical institutions by the later studies. Several research findings confirm the positive impacts of university linkages for technology-based ventures. TBI have been found to increase the survival rate of new ventures, promote higher growth than in off-incubator firms, and accelerate time-to-market and likelihood of successful innovations. These extensions are mainly observed in the developed markets.

O'Neal (2005) highlights the success factors that facilitate TBI to develop new ventures, emphasises the role of external funding sources, access to funding, university resources, community/local government economic development agencies, and other entrepreneurial support organizations. Links with universities are underlined in the literature as a decisive factor for success.

2.1 Technology Parks and Universities

Colombo and Delmastro (2002) show that ventures in science parks in Italy that are linked to universities demonstrate higher growth rates than their off-park counterparts. The main advantages observed here are the R&D facilities and the establishment of collaborative arrangements, especially with universities.

The similar study carried out by Ferguson and Olofsson (2004) at Swedish science parks linked to universities and compared with their off-park ventures shows that the on-park ventures have significantly higher survival rates than their off-park counterparts.

Rothaermel and Thursby (2005) also confirm the success of strong ties which will reduce the likelihood of firm failure but retard graduation from the incubator. McAdam and McAdam (2008) prove that university linkages are useful in terms of facilitating and developing networks with third parties and providing access to research and technology, particularly to biotechnology and information technology.

2.2 Entrepreneurship Education

Many have considered entrepreneurship education as a growing strategy in socio economic and political circles (Liñán 2004). The nexus between education and entrepreneurship is considered as a quintessential approach to growth oriented economy. Entrepreneurship education prevailed predominantly in science and technology education in the early stages (Blackman and Thompson 1987; Ashmore 1990). Growth of manufacturing sector bestowed tremendous opportunities for entrepreneurship. As the economies developed the service sector growth also promised varied opportunities. Today even in services sector the technology has overpowered the service delivery and customer interface.

Guzman and Liñán (2005) identified the different perspective of entrepreneurial education in America and Europe. US emphasised on training needs and Europe on building entrepreneurial personality. The objective of entrepreneur education is to create enterprise both in US and Europe. In its most general application, it would include the development of knowledge, capacities, attitudes and personal qualities identified with entrepreneurship. Anis ur Rehman, Dr. Yasir Aeafat Elahi (2012) focused on the evolution of Entrepreneurship Education in India and discuss the role of Entrepreneurship in Indian Economy. The study oriented on B – Schools and their role in increasing the knowledge base, by identifying the opportunities and overcoming the barriers. The above studies have clearly indicated the growing needs of entrepreneurship education and positive eco system in universities and Institutions. The review identifies that no conclusive study focussing on the E-Cell and student expectation from E-Cell has not been carried out. The present study bridges this gap.

3 Study Objectives, Design and Methodology

The study was conducted to explore the entrepreneurial support initiatives extended by the technical education institutions in two phases. In the first phase an exploratory interview was carried out in four technical institutions situated in the Mysore city, to identify the institutional initiative to nurture entrepreneurship amongst the technical graduates through E-Cell. The interview focused on the profile of the plans, role of teachers and students, business viability of the plans and success rate.

In the second phase the 'student members of the cell' were asked to identify the factors influencing the entrepreneurship as a career choice and support expectations of graduates from E-Cell. The student related data is collected through a survey and a questionnaire consisting of thirty eight questions was used. The instrument was developed considering the factors focussed by Kopycinska et al. (2009); Manjunath T and Nagesh N (2012); Mansor and Othman (2011). The items of the survey instrument was finalised based on the review and interaction with E-Cell coordinators. The interview outcome is presented descriptively.

The questionnaire focused on four variables, first part of the questionnaire focused on ***course strength*** leading to entrepreneurship choice containing eight questions. The second part contained five questions and focused on ***economic factors***. Third part focused on ***intrinsic capabilities to innovate, lead and take risk***, which contained fifteen questions. The last part included ten questions and focused on ***students expectations*** from the Institute. A convenient sample size (101) was considered to collect data. The factor analysis is carried out to extract the principal components based on factor scores and identify the common variables using a 'principal factors extraction'. The dimensions of the study drew clues from Kuratko (2005).

4 Interview Outcome

The interview of the E-Cell coordinators revealed that the overall objectives of the cell is to

1. Conduct entrepreneurship awareness programmes for students to enable them to consider entrepreneurship as a career option
2. Identify and select promising students to undergo more intensive, 'entrepreneurship Development Programmes', and 'Certificate Courses', in promising business areas
3. Provide interested candidates with information of procedural formalities, finance, infrastructure, marketing etc.

4.1 Profile of the Colleges

Out of the four colleges considered second, third and fourth college are autonomous institutions enjoying the autonomy in framing curriculum and evaluation of

Table 1 Student enrolment and E-Cell activity

Institute	Year of inception of E-Cell	Annual intake	Average enrolment to E-Cell	Active participation in E-Cell activities	Number of students proposing viable business projects
First	2010	450	250 (55 %)	50–60	8–10 p.a
Second	2005	700	250 (35 %)	50–60	10–20 p.a
Third	2008	800	400 (50 %)	50–60	5–6 p.a
Four	NA	700	NA	NA	NA

students. These are the colleges who have celebrated their golden jubilee too. The fourth college has incubation facility but did not have specific E-Cell. Out of the eight engineering colleges in this region only four of them have E-Cell and out of four only two of them are found actively engaging in their activities. The profile of the cell is as follows in Table 1.

The students are normally briefed about the E-Cell and its activities during the orientation programme while inducting the students to the first semester of the engineering course. Normally on an average 35–55 % of the students enrol themselves to the cell paying a nominal fee. Though the membership initially is good the active participation by the students in the E-Cell activities is low (ranges from 7 to 20 % of the enrolled number to the cell) in spite of the membership on paper for the 4 year course is nearly 1,000 at any given point of time. The first college is found very active in promoting E-Cell activities through a separate website, social media group and a newsletter.

4.2 Faculty Involvement

The E-Cells are coordinated by a faculty member and assisted by one or two. The coordinators expressed that these initiatives are guided by the university guidelines and now assisted by the NEN. Department of Science and Technology (DST) is also funding five most innovative projects which are identified and evaluated by an independent committee. It is observed that in the first and second college the product/service ideas are carried out with a committed effort, attempts are made to guide, monitor and provide funding assistance to develop prototypes and validate them (Table 2).

The coordinators have undergone the entrepreneurship training offered by either NEN, DST funded workshops etc. Except in the first college (It comprises the faculty representatives from various departments of the college and found vibrant in their support) the faculty involvement in encouraging entrepreneurship is found to be very low. Voluntary engagements of the faculty members other than the designated coordinators are absent. All the coordinators have expressed clearly that the coordinating activity is an additional responsibility without compromising their regular academic expectations. The responsibility is not incentivised monetarily. Lack of industry interaction and consultancy has resulted in lack of interest in

Table 2 Faculty involvement

Institute	First	Second	Third	Fourth
Faculty involvement	Representatives of key departments are actively engaged	Partly engaged on a project basis	Low	Low
Faculty training	Coordinator + few faculties	Coordinator	Coordinator + few faculties	NA
Coordination with E-Cell	High	Not directly	No interaction	NA

Table 3 Courses/training and workshops

Institute	First	Second	Third	Fourth
Entrepreneurship as a paper	Yes	Yes	Yes	Yes
Student training	Through NEN	Through NEN	No	No
Workshops	Yes	Yes	No	No

guiding the students. Moreover it is observed that the faculties are also not equipped with necessary skills.

4.3 Courses/Training and Workshops

All the institutes are offering a course on entrepreneurship in later semesters which may guide them to think of entrepreneurship as a career choice. Unfortunately these courses are offered by the faculties of the respective discipline without adequate prior training. The coordinators observe that the course has been reduced to a passing requirement for obtaining degree and defeated in its spirits. The training programs and workshops are also facilitated by the E-Cell with the help of NEN in first and second Institute (Table 3).

4.4 How the Idea Is Taken Forward

The ideas are normally taken forward with the help of NEN. Monitoring, prototyping, incubating and testing business viability is hand held by the E-Cell and NEN. In most of the cases out of 60–70 active members about 10 % of them come up with innovative ideas and express entrepreneurial interest. The students normally showcase their projects in college level exhibitions/competitions and then inter collegiate competitions organised by NEN (E-Week). After this stage the projects are not pursued further on a business scale. Only in case of the first college four projects are currently taken up as a business venture and other coordinators have concluded that the ideas will remain as projects. In the second college the number of proposed innovative ideas are more in number which were explained to the interviewer as 'impressive and need of the hour ideas' (Table 4).

Table 4 The coordinators' remarks on future plans of E-Cell, profile of ideas and business viability

College	Future plans	Profile of the ideas	Business viability
First	To create entrepreneurship hub in the region to connect all students from various disciplines	More from mechanical and electronics discipline	Yes, many projects have business scalability
Second	Working on incubation facility	Mechanical, IT, renewable energy, electrical and electronics	Possible with continued research on the proposed idea
Third	To develop more faculty resource internally	Mostly mechanical	No, not up to the mark
Fourth	Proposing an E-Cell	Nil	Nil

5 Survey Results

Survey data was analysed using appropriate statistical tools. The sample adequacy and reliability of the instrument was estimated to carry out further statistical analysis.

5.1 Student Profiles

The respondents were drawn from almost in equal numbers from all the institutes considered. Respondents profile is explained in the following tables (Tables 5 and 6).

5.2 Family Background and Support

The respondents belonged to varied family backgrounds. Considering parents' occupation background is categorised into Government Service, Business, Teaching, Agriculture and others. 'Others' included lawyers, doctors, private sector employees (managers, supervisors and technicians). The results indicate that the parents having business background are supportive for considering entrepreneurship as a career choice. Parents from agriculture background and teaching respectively are not considered as 'supportive' by their wards (Tables 7 and 8).

Reliability statistics is well above the acceptable level. The questionnaire is fairly good to explore what is intended to be studied.

Table 5 Gender of the respondents

Gender of the student	Number	Percentage (%)
Male	72	71
Female	29	29
Total	101	100

Table 6 Respondents' branch in engineering

Branch	Number	Percentage (%)
Mechanical	29	29
Computer science	23	22.7
Information science	12	11.8
Electronics and electrical	18	17.8
Civil	7	6.9
Industrial production	12	11.8
Total	101	100

Table 7 Family background and support

Family background		Family support		Total
		Yes	No	
Government service	Count	23	9	32
	Family support	**71.9** %	**28.1** %	
Business	Count	20	3	23
	Family support	**87.0** %	**13.0** %	
Teaching	Count	4	2	6
	Family support	**66.7** %	**33.3** %	
Agriculturist	Count	8	5	13
	Family support	**61.5** %	**38.5** %	
Others	Count	23	4	27
	Family support	**85.2** %	**14.8** %	
Total	Count	78	23	101
	Family support	**77.2** %	**22.8** %	

Table 8 Reliability statistics

Variables	Cronbach's alpha	N of items
Course strength	.717	8
Economic factors	.706	5
Capabilities to innovate, lead and take risk	.839	15
Student expectations from the institute	.741	21

5.3 Sample Adequacy and Reliability Statistic (Table 9)

The sample adequacy which is indicated by the KMO measure (0.72) is high indicating the proportion of variance in observed variable (entrepreneurship as a career choice), that might be caused by underlying factors.

5.4 Factor Analysis Results

The factor analysis using a 'principal factors extraction' uncovered eleven latent factors that describe relationships between variables. These factors are explained below (Table 10).

Table 9 KMO and Bartlett's test result

KMO measure of sampling adequacy.		.720
Bartlett's test of sphericity	Approx. chi-square	1,701.460
	Df	703
	Sig.	.000

Table 10 Total variance explained

	Initial eigenvalues			Extraction sums of squared loadings		
Component	Total	% of variance	Cumulative %	Total	% of variance	Cumulative %
1	7.935	20.883	20.883	7.935	20.883	20.883
2	3.666	9.647	30.529	3.666	9.647	30.529
3	2.822	7.426	37.955	2.822	7.426	37.955
4	2.081	5.476	43.432	2.081	5.476	43.432
5	1.765	4.646	48.077	1.765	4.646	48.077
6	1.493	3.928	52.006	1.493	3.928	52.006
7	1.379	3.629	55.634	1.379	3.629	55.634
8	1.330	3.500	59.134	1.330	3.500	59.134
9	1.208	3.179	62.312	1.208	3.179	62.312
10	1.178	3.101	65.413	1.178	3.101	65.413
11	1.127	2.966	68.379	1.127	2.966	68.379
12	.977	2.572	70.951			
13	.936	2.463	73.414			
14	.810	2.131	75.545			
15	.799	2.103	77.648			
16	.736	1.936	79.584			
17	.719	1.892	81.477			

The factor analysis result extracted 11 factors explaining 68.37 % of variance in the observed variable. Table 11 summarises the 11 factors extracted.

The above four factors are renamed as adaptability, assistance requirement, confidence and academic support. Table 12 presents the factor 5–8.

The above factors are renamed as training needs, updated skills, innovativeness and course inputs (Table 13).

The above factors are renamed as market forces, uncertainty factors and stress tolerance. The above are explained in detail.

Adaptability The first factor that is identified which influences entrepreneurship as a career choice is adaptability which is explained by the five items such as ability to understand the demand changes, market changes, absorb and implement it effectively.

Assistance Requirement The second factor that is extracted is assistance required by the students to consider entrepreneurship as a career choice is explained by three elements funding assistance, guidance and training requirements.

Table 11 Rotated component matrix – factor 1–4

No	Items	1	2	3	4
1	Adapting to demanding situations quickly	0.77			
2	Observing the market changes to understand an opportunity	0.761			
3	Understand the market trends and foresee future business possibilities	0.752			
4	Engage a group in creative works	0.658			
5	Work with teams effectively	0.576			
6	Need for assistance from the institute to identify funding options		0.653		
7	Continuous guidance to wet the business idea from the industry counterparts		0.589		
8	Need for training programs to fine tune our entrepreneurial capabilities		0.577		
9	Even in difficult circumstances focusing on goal			0.782	
10	Consider challenges as opportunities			0.692	
11	Confidence to pursue a business project			0.683	
12	Initial hiccups in any task will not break confidence			0.677	
13	Confidence to achieve anything due to capabilities			0.58	
14	Knowledge to pursue business plan			0.556	
15	Need for R&D assistance from our faculties				0.7
16	Continuous support and guidance from faculties				0.675
17	The course need to be redesigned to equip the students to pursue entrepreneurship				0.601
18	Courses to update with the technology trends				0.503

Table 12 Factor 5–8

No	Items	5	6	7	8
19	Need for entrepreneurship workshops to motivate	0.773			
20	Need for training in preparation of business plan	0.725			
21	Current knowledge to learn new technologies		0.789		
22	Understand and use latest technology systems		0.619		
23	Able to connect to the current developments in technology		0.391		
24	Applying existing knowledge to generate new ideas, products or processes			0.766	
25	Creating original works individually			0.526	
26	Ability to own and solve problems			0.398	
27	Course curriculum gives confidence to take up independent projects				0.697
28	Current courses are in line with current technology trends				0.647
29	The course aids in solving complex systems and issues				0.517

Table 13 Factor 9–11

No	Items	9	10	11
30	Bad economic conditions and entrepreneurship to create jobs	0.755		
31	Bad job market and entrepreneurship as a career	0.735		
32	The loan commitments on education makes job as a primary choice over entrepreneurship	0.488		
33	Investment is a constraint to pursue entrepreneurship	0.435		
34	High uncertainty of business success		0.841	
35	Job and economic security		0.667	
36	Luck and business success		0.836	
37	Risk in entrepreneurship is high		0.727	
38	Consistency in pursuing an idea till it reaches a logical end			0.574
39	Working under stress			0.474

Confidence Confidence of the student is identified as a third factor influencing entrepreneurship as a career choice which is explained by six items. It includes goal orientation, accepting challenge, confidence in idea, capabilities and knowledge.

Academic Support The students are expecting more support and inputs from their faculties and their course. Four items identified above are renamed as Academic and Research Support (fourth factor). Students expect research assistance and guidance from faculties. They expect upgrading of the course

Training Needs Training Needs is the fifth factor identified, represented by two items such as need for motivating workshops and to prepare business plans.

Updated Skills Keeping pace with technology changes influences the entrepreneurship as a career choice. The sixth factor identified is explained by three items.

Innovativeness Ability to generate new ideas, original works and finding solution are renamed as innovativeness and identified as the seventh factor.

Course Inputs Course curriculum, coverage and course inputs to solve problems are regrouped under Course Inputs and identified as eighth factor.

Market Factors The ninth factor represents 'Monetary and economic conditions', which influence entrepreneurship as a career choice. Both market and individual conditions are represented by this factor.

Uncertainty Factors The students associate high risk with the entrepreneurship represented in four items such as high uncertainty of business, job security, luck factor etc. These four items are renamed as 'Uncertainty factors'.

Stress Tolerance The 11th factor is renamed as 'Stress tolerance' considering the two items.

Conclusion

To conclude the outcome from the interview, considering the stated objectives of the cell, there is a gap in its achievement. The coordinators have clearly indicated that they have not been able to convert the ideas into business ideas due to limited resources, lack of interest on the part of students to pursue entrepreneurship and students mind-set that the ***'education is for jobs'***. The overall training and orientation of the course is also towards campus placements and in the process entrepreneurship is underplayed. They have also expressed the system of education and training methods are exam oriented. Lack of research hampered innovation and excellence which calls for a systematic change coupled with attitude changes. Amongst the institutes observed it may be concluded that the vibrancy of the cell depends on the E-Cell coordinator and faculty involvement. In most of the cases it is coordinated by a very small group of faculty (2 or 3) and responsibility lies on one. E-Cell activities are perceived as an intrusion in the regular academic activity. Institutions engaged in entrepreneurial education feel that there is no support from the top management. Entrepreneurial education is closely linked to the amount of resources available and may be a natural barrier.

At present the E-Cell activities are restricted for preparing an innovative student project as a prerequisite to course completion. Conceiving an innovative idea happens at the later semesters of the course. The focus remains short lived and the prototype designed will not be market ready. Most of the works need continued research on the prototype. Based on the five points mentioned above if the orientation starts early in their course through training, workshops and introducing entrepreneurship course in early semesters

(continued)

(as they are offered in the later semesters now) may help in channelize the attention towards entrepreneurship. This may spark interest early in their course. It will also initiate conceiving an idea and research early in their course.

Survey data clearly points out that the present course needs to be strengthened to equip the students better. Major factors emerged may be regrouped into two as personal strengths and supportive environment. Personal strength includes adaptability, confidence, updated skills, and innovativeness and stress tolerance. Supportive environment includes factors such as assistance from E-Cell, academic support, training needs, course inputs, market factors and uncertainty factors.

Lack of research and consultancy from the faculty side also widens the gap between what is being taught and what is practiced. Students have expectations of research support and guidance from their faculties. Though the E-Cell exists in the institutes the spirit of entrepreneurship is not nurtured by the courses taught. The students require more focussed training programs, skill development courses and workshops to channelize their interest. The monetary aspects also play a crucial role in choosing entrepreneurship as a career choice. The uncertainty of venture success is also a deterrent.

Entrepreneurship is a field that has to fight for its reputation. The lack of academic credibility surrounding entrepreneurship can also make it difficult for entrepreneurship activities to be accepted by people and especially non-business class. This belief is supported by the response regarding the family support for entrepreneurship.

The students expectation from the institutes can be summarized into five main points; (1) Strengthening the courses in such a way that they evoke exploratory thinking amongst students (2) Active involvement of faculty (3) Supportive training and workshops (4) Interaction with industry experts (5) Encouraging ecosystem for launching the ideas and funding

Educational Institution is an ideal setting to promote entrepreneurship as there is a right blend of *'student's enthusiasm'*, *'research experience of faculty'*, and '*scope to build on available infrastructure'*. Thus it is a 'model place to nurture entrepreneurship' which needs a serious focus.

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Resource Endowment from Parent Organization to Academic Spin-Offs: The Case of the COPPE/UFRJ

Thiago Renault and José Manoel Carvalho de Mello

Abstract How spin-offs access resources from their parent organization along the process of setting up of the new venture? This is the main question explored in this article. We use an institutional perspective and the resource based view to analyse resource endowments received for 30 spin-offs from the Federal University of Rio de Janeiro, in Brazil. Our findings shows that the spin-offs studied have accessed a set of resources from the parent organization and that the profile of these resources changes within the entrepreneurial orientation of the university. We could identify different configuration of resource endowments for academic spin-offs, in different institutional and organizational contexts.

Keywords Spin-offs • Academic entrepreneurship • Resource endowments

1 Introduction

The analysis of the relationship between academic spin-offs and their parent organization has been studied by several authors, with different points of view. Special attention was paid to the analysis of how the parent organization can influence the number and type of the spin-offs created and it's propensity for growth (Wright et al. 2007). In this paper we have used the resource based view to shed a light in this issue, analysing the resource endowments that the spin-offs receive from their parent organization. The analysis is performed from 30 case studies of firms created between 1994 and 2010 by researchers from a particularly academic unit in a Brazilian university, the Federal University of Rio de Janeiro.

Mustar et al. (2006) presented an extensive review of the literature on the creation of research based spin-offs, and identified a set of studies whose focus is the relationship between the spin-offs and their parent organization, called the

T. Renault (✉)
Management Department, Universidade Federal Rural do Rio de Janeiro (UFRRJ), Seropédica, Brazil
e-mail: thiagorenault@gmail.com

J.M.C. de Mello
Production Engineering Department, Universidade Federal Fuminense (UFF), Niterói, Brazil
e-mail: josemanoel.carvalhodemello@gmail.com

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institutional perspective. These authors sought to correlate the institutional context and the organizational profile of the parent organization with the number and the type of spin-offs created. The institutional perspective is based on the recognition that spin-offs are typically embedded in a parent organization, although the nature of the embeddedness may vary.

Strategic choices made by the parent organization might have a lasting effect on the spin-offs that are created. Debackere (2000) notes that universities can stimulate the creation of spin-offs, managing their academic R&D as a business. The author argues that universities can take advantage of the economic opportunities of their R&D programs using the appropriate strategies, organizational structures and management processes. Jacob et al. (2003) performed a similar study, describing the entrepreneurial university support system of Chalmers University in Sweden. Rasmussen and Borch (2010) analyzed how the university context impacts the entrepreneurial process. The authors identified a set of university capabilities that facilitate the venture formation.

Moray and Clarysse (2005) argue that each organization has its culture, system of incentives and specific rules and that these characteristics affect the type of spin-offs created. The authors concluded that the level of formalization of technology transfer affects the resource endowments of science-based entrepreneurial firms. The work is based in a useful framework that combines an institutional perspective with the resource based view. According to this study there is an interconnectedness of institutional context and resource endowments to spin-offs from public research organizations. The institutional context is formed by the characteristics of the social and economic environment including funding and law systems. The universities are embedded in this institutional environment.

Resource based view is widely used in studies about the creation and development of academic spin-offs (Mustar et al. 2006). The works based on this approach focuses its analysis on resources identified in the creation and development of spin-offs that gives them a competitive advantage. The authors that pursue this conceptual approach define resources broadly, encompassing all tangible and intangible assets and competences linked to the firms in a "semi-permanent" way. Moray and Clarysse (2005) consider human, financial and technological resources in their analysis. Other works use a widely view considering technology, human, social capital, financial, physical and organizational resources (Brush et al. 2001; Landry et al. 2006).

As argued by Moray and Clarysse (2005), although different authors have proposed stage models providing insight into the dynamic interrelated activities connected to spinning of ventures (Vohora et al. 2004; Clarysse and Moray 2004), few have looked into the specifics of internal strategies enacted by universities and how these can influence the commercialization of research results by setting up ventures.

Our case study was held in the Coordination of the Graduate Programs in Engineering (COPPE) from the Federal University of Rio de Janeiro (UFRJ). The university campus houses the research center of Petrobras (CENPES) and a technology park that attracted important companies like Schlumberger, Halliburton,

Siemens, BG Group and General Electric. This is the biggest infrastructure for teaching and research in engineering in Latin America.

Our findings show that the spin-offs studied have accessed a set of resources from the parent organization in their process of setting up and development. We could identify two different generations of academic spin-offs, with different resource endowments from the university. The existence of this two generations is connected with the organizational transformations and entrepreneurial capabilities developed at COPPE. The institutional environment has an important influence in the resource endowment received by the spin-off from its parent organization.

This chapter is structured as follows: the Sect. 2 presents the research methods, in Sect. 3 we present the academic entrepreneurship context in Brazil, an overview about the organizational transformation in COPPE/UFRJ and the resource endowments to spin-offs created from 1994 to 2010. We also analyse in Sect. 3 the relationship between COPPE/UFRJ and its spin-offs from the perspective of the institutional context and the resource based view. In Sect. 4 we present the conclusions.

2 Research Design: Data Collection and Methods

The approach taken to data collection for this study has been qualitative. A longitudinal case-study was chosen to key into resource endowments available to spin-offs along the period of setting up and development. This approach provides a richer contextual insight and an in-depth understanding of this dynamic and complex analysis.

The study attempted to answer the following questions: Do spin-offs access resources from the parent organization? Witch resources do the spin-offs access? How the spin-offs access resources from the parent organization?

2.1 Case Selection and Sample

Select COPPE/UFRJ as a single case is appropriate for different reasons. First, the analysis proposed in this study requires a detailed intra organizational understanding of the process involved. With this perspective we can raise data from organizational level at the university and in the firm level in their spin-offs. Second, COPPE is the biggest infrastructure of teaching and researching of engineering in Latin America. The specialized literature recognizes that there is a stronger impetus of spin-offs formation at Universities that perform science of excellence (Wright et al. 2007). The fact that this academic unit focuses on one field of knowledge, engineering, enhances the unit of homogeneity in the case design. Third, other researches have successfully used single site studies to increase

understanding about particular issues related to technology transfer and spinning out ventures (Shane and Stuart 2002; Jacob et al. 2003; Moray and Clarysse 2005).

The data we have analysed includes the population of 57 innovative firms that were created between 1994 and 2010 with the support of the business incubator from COPPE/UFRJ. The definition of spin-offs used in this study is a new venture created to exploit a technology or technical skills developed in research activity inside the academic environment. We used the professional background of founder's team to identify those that were involved in research activities in UFRJ. We have found 35 companies that fit in this definition. These companies were created by researches (Post-doc, PhD students, MSc students, researches and professors). In 2012, 30 spin-offs from COPPE/UFRJ were active in the marketplace; those were analysed in this study. From the five remain; two pass through market mergers and three decide to close the business.

2.2 Methods and Research Steps

Primary and secondary data were used to develop the case studies (Yin 1989). Data triangulation including several sources of data was used to map out the situation and critical events that influence the resource endowments available for the spin-offs. From 2004 to 2010 people from various positions were interviewed, including company founders and entrepreneurial team members, researches, university managers and staff involved in the commercialization process.

Our study starts with data collection in secondary sources about the university and its spin-offs. In this phase we analyse the web sites of the university, the business incubator, the technology transfer office and the technology park. In addition we also checked the web sites of the 57 companies. In the database of the business incubator we could find a small brief of each company and the name of the founders.

We have interviewed the three key persons from the management team of the business incubator and the coordinator of the technology transfer office. In these interviews we could identify the 35 companies that fit in our concept of spin-off and we had an overview about each one of these companies. We have used a narrative approach, were the interviewer ask the informant to describe his or her view about the spin-offs and the entrepreneurial process at COPPE/UFRJ.

From the 35 spin-offs identified we collect data and analyse 30 cases. We conducted interviews with the founders of 25 spin-offs, had access to 20 business plans and 17 funding applications for Brazilian government agencies. Archival data from other sources like magazines, newspapers, and websites were widely used. This material covers all the 30 cases.

3 Data and Findings

3.1 Academic Entrepreneurship Context in Brazil

In fact, only in the 1990s is that the creation of academic spin-offs emerges in the Brazilian innovation policy as a relevant topic. Until then the emphasis was on training of highly qualified human resources to work in existing companies. Most of the science and technology infrastructure in Brazil is concentrated in public universities; academic entrepreneurship is one strategy to promote technology transfer. From 1996 to 2008 around 87,000 of PhD were formed in Brazil, 90 % in public universities, 12 % in engineering. The biggest part (71 %) work in educational activities, only 2 % work in the industry and other 4 % work in the scientific consulting sector (CGEE 2010).

The change in the Brazilian innovation institutional environment has been very intense over the decades of 1990 and 2000. The law that regulates intellectual property was approved in 1998 and in 2004 it was approved the innovation law, that regulates the public and private interface regarding to science, technology and innovation activities. The Brazilian innovation law has three central pillars: (i) all federal universities must establish a technology transfer office that is responsible for managing intellectual property in the academic context; (ii) sharing of infrastructure, physical and human resources, between public universities and private enterprises is allowed; (iii) public agencies can grant investments for R&D activities in private companies.

In 1999 comes into operation a new funding policy for science, technology and innovation activities, the "sectorial funds". These are funds focused on specific sectors such as petroleum, electricity power, telecommunications, and mineral resources, among others. The resources that feed these funds come from taxes paid by companies in each sector. There is a commission formed by members from the industry, university and government that defines the guidelines for the investments. There is also one fund that promotes cross sector projects in cooperation between universities and companies. This new funding system is a milestone of the Brazilian innovation policy because it links the science and technology within industrial policy. The annual budget for science and technology activities in Brazil have significantly increased between 2000 and 2010, from U$ 5 to U$ 16 billion (MCT 2012).

In 2002 the Brazilian government starts a new funding program aiming to stimulate R&D activities in technology based small and medium enterprises (SMEs). Nowadays there are four different grant programs focused in SMEs. Every year some 300 technology based SMEs all over the country receive grants that vary from U$ 70,000 to U$ 300,000. The government is also stimulating the creation of seed capital funds, since 2006 seven funds were created with total capital of some U$ 100 million.

In this context Brazilian universities are passing through organizational transformations such as the establishment of business incubators, technology transfer

offices and technology parks (Etzkowitz et al. 2005). The case of COPPE/UFRJ is a successful one and illustrates the change of an academic institution towards an entrepreneurial model.

3.2 Organizational Transformation in COPPE/UFRJ: Towards an Entrepreneurial Model

COPPE (Graduate School and Research in Engineering) is the largest academic unit at the Federal University of Rio de Janeiro (UFRJ). The UFRJ is the largest federal university in the country, with 28 teaching units offering 145 courses to 33,300 undergraduate students. It has about 3,800 professors, of whom approximately 2,200 have doctorate degrees. Scientific activities are part of the routine of the university, with its 85 graduate programs offering 85 MSc and 74 PhD courses. Through these research activities, 1,500 MSc and 720 PhD degrees are awarded each year (UFRJ 2012).

COPPE hosts 12 graduate programs in engineering: Biomedical, Civil, Chemical, Electrical, Computer, Metallurgy/Materials, Nuclear, Mechanical, Transportation, Production, Energy Planning and Oceanic. All 12 graduate programs earn good ratings in the national ranking carried out by the Ministry of Education (CAPES 2012). Moreover, the university has the largest infrastructure for teaching and research in engineering in Latin America, with about 2,800 graduate students (1,600 MSc and 1,200 PhD), 350 collaborators (325 full-time researchers) working in 116 research laboratories. In 2010, roughly 176 PhD and 344 MSc students earned degrees at COPPE. Since it was founded, in 1963, COPPE has awarded degrees to some 12,000 MSc and PhD engineering students (COPPE 2012).

The Graduate School and Research in Engineering was set up at the Federal University of Rio de Janeiro in the 1960s, as a result of an effort to improve the level of human resources in technology based areas. That same period saw the establishing on the UFRJ campus of the R&D center of the government oil company Petrobras (CENPES) and the Nuclear Engineering Institute (IEN). In the following decade, another two R&D centres were established on the university campus, one for the government power company Eletrobras (CEPEL), in 1974, and the other for mining and mineral technology (CETEM) in 1978.

During the 1970s and 1980s, the engineers at COPPE were provided consulting services, mainly to government companies in the utilities and strategic sectors, such as oil, electricity, nuclear, and mining, among others. These consulting services led to the creation, in 1970, of a department specializing in project management. COPPETEC (Technological Projects, Research and Studies Coordination) was converted into a foundation in 1993 (TERRA 1999). Since COPPETEC was founded, some 10,000 projects have been managed by the foundation. In 2012, there were 600 projects in course, with a total budget of US$ 135 million (COPPETEC 2012).

In the mid-1980s, a project was conducted by the CNPq (National Council for Scientific and Technological Development) with the aim of creating centres for technology-based innovation at certain universities. COPPE was one of those that received the support of the CNPq. At that time it was not clear what the role of the university would be in the innovation process or what its scope of action would be. In that same period, FINEP (Funding Agency for Studies and Projects) started a project to map initiatives related to technology parks and business incubators in Brazil, and COPPE participated in that project. These two government projects, carried out in the mid-1980s, were the roots of the business incubator, the technology park and the technology transfer office at the university.

In parallel with the project supported by CNPq and FINEP in the mid-1980s, two COPPETEC collaborators (Mauricio Guedes and Regina Faria) started a new project to set up a business incubator at COPPE. The COPPE Business Incubator was founded in 1994, after eight difficult years of preparation. There was some resistance inside the university and the process to officially set up the business incubator was a very bureaucratic one. In 1992, before the official launch, the members of COPPETEC involved in the business incubator project decided, with the support of the COPPE board, to announce the first call for incubation projects.

Because the physical infra-structure of the business incubator wasn't ready, incubation of the first project was begun within the administrative facilities of COPPE. Once the first start-ups were in place, the incubator team began looking for resources for the construction of suitable infra-structure. In the early 1990s, Mauricio Guedes visited several potential project partners, such as FINEP (Brazilian Funding Agency for Studies and Projects) and the Rio de Janeiro municipal government. He managed to get the funds to build the facilities by integrating public policy initiatives from different sources.

After getting through this first phase of the incubator, concerns about the sustainability of the project started to emerge. The challenge was to find a way to keep a team working on a full time basis to provide better support for the start-ups. The solution came with support from Sebrae (Brazilian Service for the Support of Small Enterprises), which decided to invest in the initiative. The incubator now has facilities covering 1,900 m^2 of floor space and there are 15 start-ups under incubation; it has supported 58 start-ups since it was founded. The operational model used in the incubation process involves the provision of physical infrastructure and consulting services in the areas of finance, accounting, law, marketing and design.

The technology park was established in 1997, as an extension of the business incubator project, and was run by the same team. The university board ceded 347,000 m^2 within the campus area. From 1997 to 2003, the date of the park's inauguration, the efforts were concentrated on raising funds for development of the area. The year of the inauguration coincided with the inauguration of the technology park's first laboratory, the Ocean Technology Laboratory (LabOceano). It is linked to the university and was designed to provide specialized services to the oil industry. From 2003 to 2007, the technology park team worked to attract small companies from the Energy, Information Technology and Environmental sectors,

but the strategy wasn't successful, since the small companies didn't have the resources to invest in constructing R&D centres within the technology park.

In 2007, the Brazilian government announced the discovery of new oil reserves in deep waters. There was no technology available to pump this oil and a series of technology challenges emerged from this market scenario. Petrobras announced the investment of US$ 250 billion and many other private companies started to show interest in setting up their R&D labs on the UFRJ campus, near COPPE and near the Petrobras R&D centre, CENPES. In this new context, the technology park team managed to raise new funds from multiple public and private sources; the city hall, the state government, the federal government and the companies that wanted to establish their R&D centres inside the technology park. Between 2008 and 2012, several companies announced investments in the technology park, including Petrobras, Schlumberger, Halliburton, FMC Technologies, Siemens, the BG Group, General Electric, and others.

According to the interviews with the technology park team, this was a key moment in the university's move towards an entrepreneurial vocation. It was the first time that there had been private company interest in investing in R&D initiatives within the university. Some conflicts emerged from this new scenario. The companies that wanted to establish their R&D labs inside the technology park had to build the facilities without having ownership of the land, since it was public property. Instead, they got a 20-year concession. These negotiations were very tough and completely new for the university managers. Another conflict that emerged from this scenario was the overlapping of the university infrastructure and human resources and the private laboratories that the companies were setting up on the campus. The management of intellectual property becomes much more complicated in such a scenario.

Historically, the discussion about an official intellectual property policy wasn't restricted to COPPE; it was a discussion taking place within the UFRJ as a whole. According to the interviews, COPPE's proposal of having its own intellectual property policy wasn't acceptable to the central administration of the UFRJ. Since the 1980s there had been discussions about this issue, but only in 2001 was the Coordination of Intellectual Property Activities created, only to be replaced in 2004 by the Intellectual Property and Technology Transfer Division (DPITT). The main difference between the two was that the former was focused in the protection of intellectual property within the university, while the latter was also concerned with the licensing of intellectual property and its capitalization in the market.

In 2007, the UFRJ Innovation Agency was created, with a broader scope of action; in addition to knowledge protection and licensing, the Innovation Agency also seeks to promote a culture of innovation inside the university. Another additional task is proactively seeking funding and new partners for the innovation activities. In this new approach, the Innovation Agency is more closely connected with the business incubator and the technology park, participating on the boards of both initiatives. Another important achievement of the UFRJ Innovation Agency was the approval of an official intellectual property policy. Despite having a specific division devoted to intellectual property since 2001, UFRJ didn't have an

official policy until 2011. Currently, the UFRJ Innovation Agency has a portfolio of some 270 patents, of which eight are licensed. However, the revenue obtained from these licenses is still not enough to cover the operational costs.

3.3 The Relationship Between COPPE and Its Spin-Offs: Resource Endowments

We have analysed 30 spin-offs that were created from 1994 to 2010. We could identify three key elements of the entrepreneurial model of COPPE/UFRJ that affect the resource endowments to its spin-offs: (i) incubation process; (ii) funding system; (iii) technology transfer. The evolution of each of these three elements impacts in the resource endowment configuration available for the spin-offs.

3.3.1 Incubation Process

In the early 1990s, when starts the debate of establishing a business incubator at COPPE, the entrepreneurial culture was very weak. In order to find innovative start-ups the business incubator staff had to be very active, searching inside and outside the university. In these early years there was a big part of the companies supported by the business incubator that was originated outside the university. From 1994 to 2002, 24 innovative start-ups were supported by the business incubator, 11 were spin-offs. From 2002 to 2010, there were 24 spin-offs out of 33 ventures supported by the business incubator. In 2009 the business incubator receives more than 20 proposals out of which 5 were selected for the incubation process, 4 were spin-offs.

Among the research laboratories from COPPE, there are few that have an entrepreneurial orientation, every year new proposals for spin-offs flourish from this research environment. In 2008 the business incubator starts a technology foresight program, in cooperation with the technology transfer office. Around 30 technologies with market potential were identified. The incubation process at COPPE in the last two decades have evolved from a model centred in the provision of physical space to one that is centred in consulting and coaching services focused in the development of the innovative start-ups.

With this evolving approach the business incubator starts to provide stronger resource endowments for the start-ups. Among the 30 cases studied it was possible to identify that in the early phase the main resource that the business incubator provides for the companies was the physical space. With the evolution of the incubation process, consulting services start to be provided in 2002, there was an increase of organizational resources. In 2008 the business incubator starts to promote network activities among the spin-offs and companies installed in the

technology park, government agencies and venture capital investors. This activity increases the social capital resources endowments for the spin-offs.

3.3.2 Funding

In 2002 the Brazilian government starts a funding program focused in innovative small and medium enterprises (SMEs). All the spin-offs created at COPPE after this have received government grants. From 2002 to 2006 the funding program available was focused in the financing of human resources working as researchers in R&D projects carried by innovative SMEs. The national research and development council (CNPq) grants scholarships for MSc, PhD and postdoc students to develop their research inside companies. After 2006, with the innovation law, government starts granting finance resources direct for the companies. Also in 2006 the first seed capital fund starts to operate. There was a significant increase of the finance resources.

In this context, the business incubator starts a sort of activities to help incubated companies to access finance resources. They launch courses about funding opportunities and start to support the development of funding proposals for government agencies and for venture capitalists. The business incubator starts promoting meetings between the spin-offs and venture capitalists (seed capital and business angels), in 2010 the first spin-off from COPPE was invested by venture capitalists. In 2009 the business incubator starts a partnership with the Brazilian innovation agency (FINEP) that grant to the incubator U$ 8.7 million to invest in innovative start-ups. Four of the spin-offs studied have received investments from the university in a grant basis.

The funding process of the spin-offs at COPPE evolves from a scenario with scarce resources to one where there were significant changes in the finance system, with abundance of financial resources. The business incubator moves from a passive profile to a more proactive one, helping the development of funding proposals and acting as an investor itself.

3.3.3 Technology Transfer

From the analysis carried in this study we could realize that the human resources are the main technology transfer channel at COPPE regarding to start-up firms. Every year some 500 MSc, PhD and postdoc students that participate in research activities in the university laboratories go to the market, bringing with them the scientific knowledge available at the university environment. Some of these students decide to start companies; this was the case of most of the spin-offs studied.

In 2001 the university establish a department of intellectual property that was responsible for manage the protection of the knowledge produced in its research activities. In 2007 it was created the innovation agency, with a wider scope of action. In addition to the protection of the knowledge, the agency also cares about

its transfer to the market and with the promotion of an innovation culture inside the university. The shift in the technology transfer policy in the university increases the formalization of the relationship between the spin-offs and the university laboratories.

The technology transfer policy at COPPE moves from a passive strategy centred in the flow human resources to the market to another one focused in intellectual property and in the formalization of the relationship between the university and companies. With this new scenario several professors start to be partners in the spin-offs created, what seems to strength the relationship between these spin-offs and the university. With this increase formalization of the relationship between the spin-offs and its parent organization the resource endowments available for these new ventures had a considerable increase.

Summary and Conclusion

Analysing the spin-offs created at COPPE/UFRJ we could identify different configurations of resource endowments over time. There is an interconnectedness of institutional context of academic entrepreneurship in Brazil, the organizational transformation faced by COPPE in order to perform a more entrepreneurial role and the resource endowments to its spin-offs. We could identify two clear different generations of spin-offs at COPPE/UFRJ. These different generations are characterized by different institutional contexts, in the first generation there wasn't finance resources available for technology based start-ups and there wasn't clear rules for the technology transfer process between public universities and private companies.

During the decade of 2000 public funding programs aiming technology based start-ups and enhance of university – industry relationship were gradually established. The availability of finance resources for innovation activities was considerably improved and the Innovation law was approved by the congress in 2004 establishing clear rules for the public and private interface regarding to innovation actives. The university as an organization embedded in this institutional context has improved it's entrepreneurial capability with three key elements of its entrepreneurial model: incubation process, funding and technology transfer.

The first generation encompasses ventures created from 1994 to 2002. In the first generation the three key elements of the entrepreneurial model of COPPE were immature. Business incubation process was centred in the provision of physical space close to the university laboratories. The funding system was very week, there wasn't funding programs focused in innovative start-ups. The scientific policy wasn't connected with industrial policy. The technology transfer process was centred basically in human resources that flow to the market. All the relationship between the spin-offs and the university was informal.

(continued)

The spin-offs in this generation recognize the physical space close to the research laboratories as an important resource endowment received in their process of setting up. All the 11 cases of spin-offs in this generation were created by MSc and PhD students, witch considered important to be close to the university in this phase of their career that they were studying and starting a new venture at the same time. None of these 11 spin-offs had the direct involvement of their research laboratory, they haven't kept their links with their parent research laboratory. All the technology transfer process was informal, there wasn't any intellectual property involved. The three most successful cases from this generation had the university as their first client; the social capital was restricted to the academic environment.

The second generation encompasses ventures created from 2003 to 2010, in this generation the three key elements of the entrepreneurial model of COPPE were more mature. The incubation process starts to provide consulting and coaching services that increase the availability of social capital and organizational resources. The funding system change in quantitative and qualitative terms, the business incubator develops a fund attractiveness capability that increases the finance resources for the companies. The business incubator moves from a passive profile to a more proactive one, helping the development of funding proposals and acting as an investor itself. The technology transfer process moves from a passive strategy centred in the human resources flowing to the market to another one focused in intellectual property and in the formalization of the relationship between the university and the spin-offs.

In this phase the spin-off formation process at COPPE was intensified, there were 24 spin-offs out of 33 start-ups (in the first generation there was 11 out of 24). The spin-offs created at this phase considered social capital and funding attractiveness as key resource endowment. All the spin-offs from this generation have received research and development grants from the Brazilian government agencies. One spin-off has been invested by venture capitalists. One case from this generation involves formal technology transfer of intellectual property assign to the university. The social capital starts to involve venture capitalists and important global companies located at the technology park (Petrobras, Schlumberger, Halliburton, Siemens, BG Group and General Electric). The evolution of the resource endowments for the spin-offs at COPPE is connected with the institutional context and the maturity of the entrepreneurial strategy of the university.

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Development, Entrepreneurial Activity and Industrial Extension

Heitor Soares Mendes and Lia Hasenclever

Abstract This chapter analyzes the contribution offered by Brazilian industrial extension programs for the economic development to support the entrepreneurial capacity of industrial micro, small and medium size enterprises (MSME). The methodology utilized will be the study of literature that analyses the impact of entrepreneurship on economic development, as well as the one that analyses the role of industrial extension programs for the improvement of the entrepreneurial capacity of MSMEs. The results of analysis point out to a possible positive impact of extension activities on economic development, based on the effective utilization of this support tool to the MSMEs to enable them to pursue technological innovation, a present requirement for the competitiveness of the markets where they operate; these extension activities, since they relate to the institutional system in which they are inserted nationally, are not replicable, representing an instrument dependent on the industrial policy model adopted by each country. Also, critical elements are pointed out for analysis, envisaging the creation of new capability programs for MSMEs through extension activities.

Keywords Development • Entrepreneurship • Industrial extension • Innovation • Public policies

1 Introduction

The discussion concerning development issues had a new incentive after the Consensus of Washington. In this new scenario, the role played by States and institutions in this process is again being focused, in the pursue of a new 'design' of development strategies for emergent and developing countries, based on the

H.S. Mendes (✉)
CEFET/RJ and Institute of Economics, Universidade Federal do Rio de Janeiro, Rio de Janeiro, Brazil
e-mail: heitor.mendes5@gmail.com

L. Hasenclever
Institute of Economics, Universidade Federal do Rio de Janeiro, Rio de Janeiro, Brazil
e-mail: lia@ie.ufrj.br

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critical analyses of development processes of more developed countries (Evans 2004, 2010; Chang 2009).

Starting in the 1980's, in the developed countries there was a broader understanding of the central role played by the innovation variable as a key-element for both entrepreneurial and national States' competitiveness. In 1980, the OECD innovation policy document, "Technical change and economic policy", links empirical results[1] to the innovation policies proposals, emphasizing the role of new technologies to overcome economic crises. The innovation systems ideas (Dosi et al. 1988), discussed academically, are found in the OECD policies documents (1992), with the introduction of concepts on: the formation of cooperation networks, strategic partnerships, spillovers, as well as the importance given to tacit knowledge. And, also, the introduction of the national system of innovation concept, considering the role of innovation as the most important strategic development component (Cassiolato and Lastres 2005).

This approach, known as neo-schumpeterian, emphasizes the relation issue of economic agents, focusing on the appropriation of knowledge through interactive learning (learning by interacting), both within the industry and in its external relations (Lundvall 1988) as forms of innovation capability. In fact, industrial economics literature emphasizes the cooperation theme between industries and, presently, one can observe that there is a convergence to focus analytically the competitive behavior of industries through intra and inter entrepreneurial relations and with the other innovation system institutions.

In this context, the network structure concept has become relevant, given its "capacity to gather the growing sophistication of interindustrial relations which characterizes the contemporaneous economic dynamics" (Britto 2002, p. 346), constituting itself as a reference framework applied to cooperation relations phenomena between agents and the coordinating action. In this sense, the role of industrial extension can be mentioned, acting in the entrepreneurial capacity, focusing on the micro, small and medium size enterprises (MSMEs), as a form of support in the strengthening of its capabilities and the maintenance of these industrial enterprises' competitiveness. Industrial extension can represent an important tool not only to assist MSMEs in seeking knowledge, but also to generate other innovations resulting from unexplored technological opportunities.

Thus, the objective of this chapter is to analyse the contribution offered by industrial extension programs to support the strengthening of entrepreneurial capability of industrial MSMEs, and to generate a positive impact on economic development. As a specific focus, it analyses the propositons of Acs et al. (2005), Hernández et al. (2008) and Hernández and Dewick (2011) which show the importance of enterprises networking to encourage the diffusion of knowledge. Based on these authors' findings, one intends to analyse whether extension programs indicate a possible way to technological diffusion in the MSMEs,

[1] Research conducted by Chris Freeman – project SAPPHO –, in the university of Sussex and Yale Innovation Survey were the fundamental milestones for the development of a theory of innovation.

confirming that these enterprises in Brazil lack the minimum capabilities to pursue a technological catching up to secure a competitive space in the present environment.

The chapter is divided into three sections, besides this introduction and the conclusion. In the second section, the Brazilian MSMEs environment is analysed, through representation indicators on the characteristics and difficulties faced by this group of enterprises, and the perspective of theoretical and empirical studies developed by Acs et al. (2005), Hernández et al. (2008) and Hernández and Dewick (2011) are presented. These authors discuss how the entrepreneurial capacity of more developed companies as opposed to the less developed ones can benefit the latter, through a knowledge spillover. The third section presents and analizes Brazilian case of industrial extension compared with the international experience, concerning North-American and Japanese industrial extension systems. The fourth section presents the recent evolutions of the Brazilian industrial extension programs.

2 Industrial MSMEs: Characteristics, Difficulties and Power to Overcome

In 2009, in accordance with the annual industrial research (PIA), the 299 thousand industrial enterprises were responsible for a total revenue of R$1.91 trillions, with a net sales income of R$ 1.54 trillions. The gross value of industrial production (VBP) reached R$1.53 trillions, but the value added was of less than R$ 680 billions. The participation of micro and small size enterprises in these amounts was of approximately 10 %, smaller than the medium size enterprises (14 % of the Gross income and 12 % of the value added). Such result shows the small representative role of MSMEs in the creation of value for the Brazilian economy, as compared to large enterprises, responsible for the generation of more than 75 % of all these economic indicators (La Rovere et al. 2012).

As far as exports are concerned, in 2010, out of the 19,275 firms that exported, contributing with a trade surplus of US$ 20.2 billions, the number of Brazilian exporting MSMEs was of 15,831, representing 72.2 % of the total exporting firms.[2] However, as opposed to the value exported, this participation was of only 5.1 %, indicating that in Brazil the participation of the MSMEs in terms of value exported is not expressive yet.

In the industrial sector, MSMEs are significant only in terms of the absolute number of companies and jobs: more than 295 thousand companies (98 % of the total of sector), employing four million people (51.6 % of the total of sector).

[2] Data on exports consolidated (MDIC 2011).

Based on La Rovere et al. (2013), one can observe that small and medium size enterprises represent the majority of companies researched (96.4 %), but in qualitative terms, from the standpoint of the innovating activities, one sees that large enterprises are relatively more innovating (60 %) than the small and medium size ones (38 %).

Based on these indicators, the difficulties faced by the MSMEs to obtain satisfactory economic results become clear, whether due to their production scale (size), their participation in exports, or due to their innovative activities. Joseph Schumpeter called the attention to the importance of entrepreneurship and innovation for development, however, we have observed that most part of MSMEs, in Brazil, are not entrepreneurial, in the Scuhmpeter's sense, but practice it basically due to necessity.[3]

In 2002, 55 % of the new enterprises endeavored in entrepreneurial activities were necessity-based firms (GEM 2002). Throughout the years, we have been observing a slow evolution in this scenario. However, even with the rate of initial opportunity-based entrepreneurs as a percentage of total early-stage entrepreneurial activity (TEA) reaching 69.2 % (GEM 2012), Brazil is still far from attaining the results of countries with an economy stimulated by innovation, being still classified in the group of countries with an efficiency-driven economy. And, even in this group of countries, it is still distant from other countries, like Mexico and Chile, which reached a TEA percentage of, respectively, 85.2 and 82.2 %.

Even if Schumpeter's (1911, 1942) focus has been placed on the entrepreneur, and the enterprise, respectively, this author does not analyse the relation of companies and the possibility of an innovation spillover of large enterprises and opportunity-based entrepreneurial activities for the MSMEs. This chapter will consider below the studies of Acs et al. (2005) and Hernández and Dewick (2011) to verify to what extent the MSMES are capable of overcoming their problems.

Acs et al. (2005), with the objective of building a bridge between entrepreneurship and literature in respect of economic opportunities, proposed the use of a new entrepreneurship theory: the "Knowledge Spillover Theory of Entrepeneurship" – KSTE, devised over Schumpeter's initial study, but, now, with focus on the origins of the opportunities, which is the object of the authors' research. According to the KSTE approach, "the creation of new knowledge expands the technological opportunity set. Therefore, entrepreneurial activity does not involve simply the arbitrage of opportunities, but the exploitation of new ideas not appropriated by incumbent firms" (Acs et al. 2005, p. 23).

This theoretical model also suggests that the stock of knowledge produces a knowledge spillover and that there is a strong relationship between spillover and

[3] Necessity-driven Entrepreneurs initiate an autonomous endeavor to generate income for themselves and their families, due to the lack of better work options. Opportunity-driven Entrepreneurs are those who start a new business by choice, even having job and income alternatives, or yet, to maintain or increase their income or for the desire of being independent. See GEM (2012).

entrepreneurial activity. They also affirm (Acs et al. 2005) that the fact that there is a positive relationship between R&D investments and entrepreneurship indicates that at least a part of this investment spillover fell on new participants, which is already an explanation for the origin of businesses opportunities.

Hernández et al. (2008), Hernández and Dewick (2011), on their turn, discuss the need of an institutional change – not only based on trade and labour contracts, but also on the generation of organizational capabilities for the construction of coherent, trustworthy and inclusion – to integrate necessity-based enterprises in the opportunity-based enterprise networks. They propose that the latent and emergent entrepreneurial strength existing in the small and medium size enterprises can be utilized through a social entrepreneurship by the generation of capabilities networking.

The problem is to understand why and how the enterprises emerge and how they can better integrate in a dual economy context, where advanced enterprises connected to world markets and a mass of manufacturers struggling to survive with low resources coexist. Hernández et al. (2008) research seeks an exact answer to this question. They study about the function and role played by each type of enterprise (necessity/opportunity) in a developing society which seeks a technological catch up for more complex activities and a higher value added by transferring knowledge and its dissemination.

One of the results of model simulation (Hernández and Dewick 2011) suggests that each enterprise, both necessity or opportunity-based, play an important role, especially in the case of developing countries, in the maintenance of a pattern or in the country's catching up. The opportunity-based enterprises contribute to reduce the 'cognitive myopia', since they are capable of a better information absorption, resulting from external technologies, representing key-institutions in the process of technological accumulation. As to the necessity-based enterprises, they are more effective in exercising the basic function of intraorganizational learning, dissemination of tacit knowledge and in the control of competitive-opportunist behavior and in fostering cooperation within the company, as key-institutions in the technology assimilation process. It becomes clear that there is not an 'optimal' enterprise, but that each one holds relative advantages in accordance with context and time. These structures are complementary. Figure 14.1 represents this complementary scenario. The authors also present the strong relationship between technological accumulation and assimilation.

For Hernández et al. (2008), the opportunity-based enterprises are particularly important in the innovation accumulation phase, where the investment directed to human capacity, physical capital and innovation is dominant (physical technologies), while necessity-based enterprises comply with the role of linking manufacturers and users, and to have as usual practice the use of technologies as innovations enter the dissemination phase (social technologies). Therefore, physical technologies would be more associated with the accumulation phase while the technological assimilation phase is more associated with organization and financial innovations.

This possibility of MSMEs taking advantage of knowledge spillover with such specificities, however, does not occur automatically, requiring a concrete action on

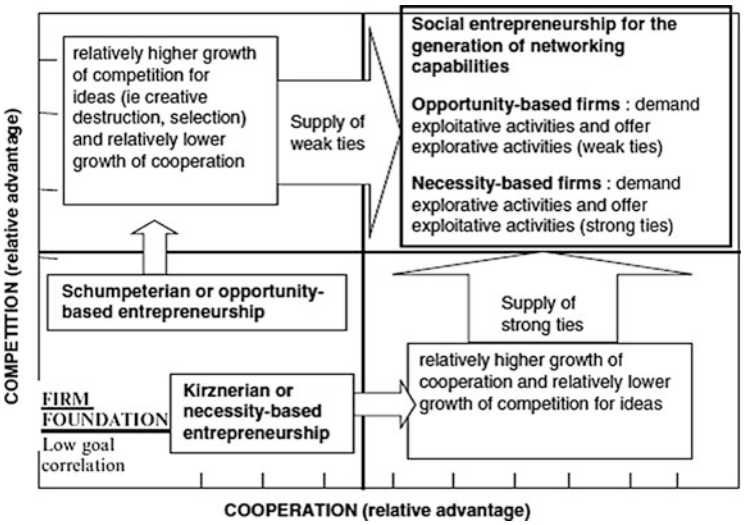

Fig. 14.1 Presents the dynamics or interface between opportunity and necessity-based firms (Source: Hernández and Dewick (2011, p. 230))

the part of the State through support mechanisms and the coordination of efforts, envisaging the capacity of MSMEs, so that the less entrepreneurial companies are capable of absorbing new knowledge and information to enable them to pursue their technological catching up. This is the content of the next section.

3 Industrial Extension: International Experience and the Brazilian Case

The difficulties faced by Brazilian MSMEs, pointed out in section two, are shared by other countries, not only by those with an economic condition similar to Brazil, but were also present in the now developed countries, such as the United States and Japan. According to Madeira (2009), several studies on the American model analyse the path of the extension activity applied to industrial enterprises (Rogers et al. 1976; Shapira 1990; Combes 1992),[4] with actions which started at the end of the XIX century, but were given more national relevance after the creation of the National Institute of Standards and Technology (NIST), in 1988, through which the government seeked to coordinate extension activities with the creation of the Manufacturing Extension Partnership (MEP), in 1989, to promote the capabilities and dissemination of new technologies for small and medium size enterprises

[4] Madeira (2009) offers an extended revision of the North-American and Japanese industrial extension models.

(SMEs), especially the access to new production and management technologies, difficulties regarding innovation, improvement of productive processes performance, productivity and quality (NAPA 2003; Madeira 2009).

An important aspect of these programs, particularly useful in the Brazilian case, is that one can improve the behavior of the SMEs by transferring simpler technologies, such as basic management aspects, production technologies already mature, available in the market, but new to the SMEs (Madeira 2009), as pointed out by Acs et al. (2005) and Hernández and Dewick (2011).

A similar action occurred with the Japanese extension system, that now seeks to comply with the demand for new technologies, especially more complex technologies envisaging technology-based SMEs. In fact, according to Shapira (1996), the second phase of the Japanese extension model and the indicators of its positive impact over SMEs competitiveness would have contributed to make the model a main reference for the expansion of the North-American extension system in the 1990's, when that country had to face a lack of competitiveness as opposed to the Japanese companies.

Based on the comparative analysis developed by Madeira (2009), concerning North-American and Japanese industrial extension systems, it becomes clear that the programs, in general, are focusing on the SMEs, with a view on technological capacity, knowledge dissemination and information, and a more recent emphasis on technological innovation, after the 1990's. Another aspect to mention is the large number of companies' networks formed by the action of extension programs, to solve problems, for the interaction between groups and other cooperation initiatives. In the North-American case, in the MEP context, from 150 to 200 networks have been formed and, in the Japanese case, 2,500 networks have been created. Another inference generated by Madeira's (2009) study is that the extension systems indicate a model that is not replicated, dependent on each country's institutional system, on its construction process of national industrial policies.

In the Brazilian case, extension started with experiences in agriculture, in the 1930's, and had a national impulse only after 1975, with the organization of public extension companies, linked to the Ministry of Agriculture. As to industrial extension, it is believed that this was inspired by the agricultural experience, in the mid-1980's with the creation of the first industrial policy initiatives, such as the Basic Industrial Technology Program, of 1985, and the Brazilian Program of Quality and Productivity, in 1986.[5]

The main programs with industrial extension characteristics at a special and national continuing level are: the Exporting Industrial Extension Project – Projeto Extensão Industrial Exportadora – PEIEX; the Technological Consultation Program of SEBRAE – Programa SEBRAE de Consultoria Tecnológica – SEBRAETEC; the Program of Mobile Units –Programa de Unidades Móveis – PRUMO; the Program of Support to Exports – Programa de Apoio à Exportação –

[5] The presentation of national programs, throughout the section, is based on Madeira's (2009) dissertation, with the specific references, where relevant, in the section text.

PROGEX; and the Program Innovate to Compete – Inovar para Competir. These are broad programs, from the standpoint of performance areas and forms of intervention. As to the institutional role, three of them are directly linked to the Federal Government Ministries (PROGEX and PRUMO, to the Ministry of Science, Technology and Innovation – MCTI; and PEIEX, to the Ministry of Development, Industry and Foreign Trade – MDIC); two are institutions of the "S" System[6]: the SEBRAETEC is coordinated by SEBRAE; the "Innovate to Compete" is coordinated by the National Service of Industrial Learning – Serviço Nacional de Aprendizagem Industrial (SENAI).

Out of these, in order to evidence some key-points mentioned in section two concerning MSMEs' difficulties – innovation and exportation -, SEBRAETEC and, in more detail, PEIEX will be presented.

SEBRAETEC is coordinated at a national level by SEBRAE, with actions distributed throughout the country. Its aim is to render long-term services so as to better comply with the larger investment demands, including the purchase of equipment and large scale and technological projects. After 2001, it started to be entirely managed by SEBRAE, offering services also to trade, agriculture and industrial, agriculture and cattle breeding sectors. It was structured into four activity areas: technological support, business support; technological modernization; and technological innovation (Magalhães 2004).

In 2003, SEBRAETEC starts to focus on collective actions to support the companies' productive groups, adjusting its line of activity to the new guidelines concerning industrial public policies for the organization of the so-called local productive arrangements (APL) or local production systems (SLP), indicating the recognition about enterprise networking importance for the compliance of its objectives as discussed above. After that, a new logic is formed regarding SEBRAETEC services, with a central role addressed to the collective diagnosis. The evaluation of this program is periodically carried out, but only by SEBRAE, through the preparation of a performance report and satisfaction researches gathered from the companies served and by third party companies for the assessment of the program's impact, but the results are not made available for public information.

A study analysing the efficiency of SEBRAETEC services in the State of Minas Gerais (Magalhães 2004) has identified positive results, such as the increase in productivity, improvement of processes and products quality, reduction of waste and sales increase. But, according to Madeira (2009), the scarcity of evidences on the impact of this nationwide program, makes one doubtful on its broader efficiency, also considering that it is a program which has been historically based on

[6] Term defining the set of organizations of corporative entities involved in professional training, social assistance, consultation, research and technical assistance which, besides having their name beginning with the letter "S", have common roots and similar organizational characteristics, supported by the companies' social contributions.

frequent alterations, due more to the Brazilian industrial policy institutional changes than to a virtuous continuing improvement process of the extension services rendered to the MSMEs. Another aspect to point out is the focus placed on partnerships between institutions and enterprises and not between enterprises.

PEIEX, another nationwide extension program coordinated by the MDIC since 2005, is a fostering and qualification program involved in the solution of managerial-technical and technological problems of small size companies located in the SLPs. Its methodology is composed of three main phases: diagnosis, implementation of services and project assessment by the entrepreneurs served. It is one of the structural projects of the "APL Program", within the framework of the Brazilian industrial policy, with the objective of increasing the competitiveness level in the APLs.

As to this program – PEIEX –, Madeira (2009) carried out an empirical study with the local production system of Franca, an industrial cluster of shoe manufacturers, located in the State of S. Paulo, then considered as the second largest footwear production center in Brazil. Its choice is due to the fact that in this SLP there is a predominanceof MSMEs (of a total of 760 companies, 552 were micro-size, 130 were small-size, 65 were medium-size and 13 were large-size enterprises). The purpose of the research was to understand how the extension actions and the SLP interact and influence the productive improvement of the MSMEs located in the industrial clusters.

The results of research indicate that there are different impacts by the PEIEX, according to the companies' characteristics. As far as "size" is concerned, the effects were more significant in the micro-size enterprises, involving a larger number of services rendered in the different areas that were mutually related. Madeira (2009) also considers that the reduced size facilitated the identification of problems, leading to a greater possibility of achieving positive results. As to the "state of development", another variable considered, the PEIEX has generated more expressive results in the less advanced companies, in which management techniques were less mature as opposed to other companies, which was regarded as being due to the characteristics of program, aiming at a larger number of companies in a shorter time of execution. Besides, it has been observed, based on interviews held with the extension people involved, that the services offered were 'semi-standard', based on ready teaching materials, informative CDs, teaching publications and computer spreadsheets.

This standard feature generates negative consequences, having in mind the unique characteristic involved in the amount of resources held by each company (Penrose 2006), with different needs, and that many times received the same standard services. This fact "compromises one of the most important theoretical principles on the definition of industrial extension programs, which is the need to adapt to each company's requirements, in accordance with its specific characteristics" (Madeira 2009, p. 188).

Madeira (2009) concludes that: 1- the impact of program is directly influenced by the interference methods utilized; 2- intensive and more extended services permit to utilize more adequately the method which tends to produce a longer duration and more significant effect for the enterprises; 3- programs with less intensive characteristics, and shorter duration, tend to produce a more peripheral impact on the companies' development, requiring complementation by other programs.

In respect of the Brazilian industrial extension programs, the author identifies that their non-continuity represents one of the negative points of extension programs, which places them far from North-American and Japanese international experiences, where the programs are permanent and funded on a firm institutional framework, lasting for years, serving as a basic element for the development of the national productive structure. In those countries, the main success factor was exactly the continuity and stability of the extension programs throughout the years. Besides, the fact that the programs are not continuous has endangered the generation of results due to the lack of continued improvement on the scope of services offered, which had a direct impact on the evolution of local producers' knowledge base (Fauré and Hasenclever 2005).

The restriction of scope regarding services rendered is also pointed out as one of the program's deficiencies for limiting the reach of projects due to the different profiles of the beneficiaries. Another difficulty is that the programs offer similar services, with a double offer, which shows the lack of articulation among the existing extension alternatives.

4 Recent Evolutions of the Industrial Extension System

This section presents the evolution of Brazilian industrial extension programs after Madeira's (2009) research. In 2007, to offer a better view and understanding on the micro and small-size enterprises segment situation, the Committee on Technology and Innovation, of the Permanent Forum of Micro and Small Size Enterprises, in the context of the MDIC, prepared a document to provide "a better knowledge on the main characteristics of this segment of companies and the facts which influence their technological development and capacity of innovation" (MDIC 2007, p. 7). This document was structured into five questions: the characteristics of micro and small size enterprises; the capacity to obtain financial resources; the factors that make it difficult to reach technological development and innovation; the construction of a favourable environment and the support institutions.

In this document (MDIC 2007), 50 % of the factors pointed out as main difficulties are connected to questions in which the role played by industrial extension programs is relevant, in the sense of qualifying the micro and small size enterprises to enable the absorption of new technologies, as well as assisting them in terms of organizational structure capable of creating conditions for a longer

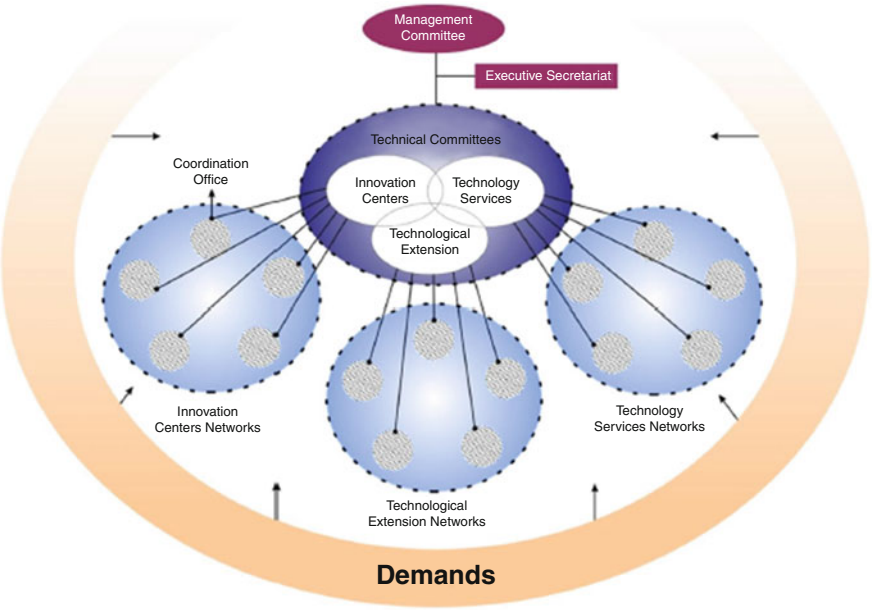

Fig. 14.2 MDIC: SIBRATEC structure (Source: Ministry of Development, Industry and Foreign Trade – MDIC)

duration in the management of new knowledge, keeping a continued learning dynamics as part of the organizational culture.[7]

In the same year of 2007, by Decree 6.259 of November 20, 2007, the Brazilian Technology System (SIBRATEC) was created. Operated by the Financing Agency of Studies and Projects (FINEP), it aimed at complying with the objectives contained in the Action Plan for Science, Technology and Innovation for the National Development (PACTI 2007–2010) and the priorities of the Productive Development Policy (PDP). The structure of SIBRATEC is illustrated by Fig. 14.2. Its objective is to support technological development of Brazilian companies, acting like an articulation and approximation instrument of the scientific and

[7] Among the factors pointed out are: low support to the establishment of a state research center or institution; lack of managerial structure; lack of definition about the micro and small enterprises' technological problems requiring solution; lack of technology-based innovation culture; lack of physical infrastructure and qualified human resources; lack of knowledge of entrepreneurial and technological managing processses; lack of support to consultation services in innovation, rationalization, technology and management; lack of qualification for the innovating management.

technological community with the enterprises, offering conditions to improve their innovation rates, thus contributing to increase the added value of sales, productivity and competitiveness in the internal and external markets (MDIC 2013).

SIBRATEC is organized in the form of three types of networks named as components: Innovation Centers, Technological Services and Technological Extension, as suggested by the authors Acs et al. (2005), Hernández et al. (2008) and Hernández and Dewick (2011) mentioned in section two.

The "Innovation Centers" Thematic Networks are formed by development units or groups which are part of the technological research institutes, research centers or universities, with experience in interacting with the enterprises. Their objective is to generate and transform scientific and technological knowledge into products, processes and prototypes with commercial feasibility to promote radical or growing innovations.

The SIBRATEC Thematic Networks of "Technological Services" are formed by accredited laboratories and entities or laboratory quality management, to support the infrastructure of calibration services, trials and analysis and conformity evaluation, both mandatory and voluntary, the qualification of human resources, the improvement of laboratory quality management, proficiency analysis programs, as well as activities of normalization and technical regulation to meet the needs for the companies' market access.

The State 'Technological Extension' Networks gather specialized entities in technological extension acting in the region, through the organization of an institutional arrangement, formed by local entities of technical, managerial and financial support, in which the S&T State Secretariat or the State entity responsible participate, as well as representative entities of the economic sectors, Regional Development Bank, Foundation for the Support of Research (FAP), SEBRAE, Euvaldo Lodi Institute (IEL) and R&D Institutions. Their objective is to foster technological extension to solve small obstacles to technological management, the adaptation of products and processes and to improve production management of MSMEs.

This represents a new approach to the problem of companies' qualification to increase competitiveness, which already contemplates, in its institutional character, the network approach, a concept that can offer a better analytic capacity to the government system of productive support, in association with the other economic agents involved, in the sense of overcoming the flaws pointed out by Madeira (2009) in the previous section about SEBRAETEC and PEIEX Programs. However, a difference observed, and already mentioned in the previous section, is that these networks are formed between institutions and companies and not between companies, as in the American and Japanese programs.

Conclusion

Development is closely related to entrepreneurship and innovation, but this depends on the companies' capacity which, in the case of the MSMEs is very restricted, both in terms of capacity to innovate and to export. Thus, it is observed that the contribution for the development of this type of company strongly depends on industrial extension programs for qualification.

The analysis conducted on the Brazilian programs has shown that they went from an individualized to a collective type of service, through networking formation. In this sense, the lessons pointed out by Acs et al. (2005), Hernández et al. (2008) and Hernández and Dewick (2011) to take advantage of knowledge spillover seems to have been considered. However, some characteristics of Programs and the Brazilian industrial structure seem to have hindered the performance of industrial extension programs in achieving better results.

Considering the concrete operational situation of companies' networks, one can mention three potential impacts involved in the consolidation of arrangements. The first one is direct, associated with the technical-productive cooperation existing in the network, linked to the gain of operational efficiency originated from technical saving actions and to the reduction of production and business costs. This is associated with work division and to the specialization pattern of agents, and there is still gain associated with the increase of productive flexibility, allowing a greater response speed of the productive system to market changes. In this aspect, it seems that industrial extension programs still leave much to be desired since they do not emphasize the relations between enterprises, but between enterprises and institutions.

The second impact concerning networks interorganizational coordination involves the capacity of these structures to face the environment's lack of stability, being related to the size of network agents and to the degree of centralization of internal relations in terms of their design. This impact is related with the transactions regime and the contract basis regulating this structure, their incentive mechanisms, control and level of mutual trust. In this chapter, it can be observed that there is low efficiency in the interorganizational coordination process, due to the internal network characteristics and the degree of centralization of the authority flow in coordinating the respective arrangements. Besides, the fact that most part of the programs are standardized shows a low network flexibility to conform, funded on environment stimulations, adapting to changes in the network members functions based on the adjustment struture alterations.

The third impact is related to the technological cooperation in the companies' networks, reinforcing their competitiveness by strengthening their innovative capacity, encouraged by the creation and circulation of knowledge and information in a collective learning process, involving each agent's

(continued)

incorporation of learning to a social pool of knowledge – commercial, technological, managerial etc. – generated by the network. The absence of major innovations in large companies and a weak scientific and technological infrastructure make this virtuous process of companies' qualification difficult through knowledge spillover.

As discussed in this chapter, interaction between enterprises results in the consolidation of collective coordination mechanisms concerning decisions. Such result is not natural, given the multiple and specific role played by the actors involved, which evidences the importance of extension program in this respect. Here the liaison between industrial extension programs of government agencies and of the several institutional partnerships becomes clear, as its application utilizing technological networks, as well as their specific role in collective coordination, especially when dealing with MSME networks, which is the focus of these extension programs. However, many improvements still need to be carried out so that these extension programs may reach their objectives.

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About the Authors

Aruna Adarsh is pursuing her PhD at Visvesvaraya Technological University (VTU), Belgaum, India. Currently, she works as Assistant Professor at JSS centre for management studies, SJCE campus, Mysore. She got her bachelor's degree in Business Management and master's degree in Business Administration from Mysore University. She started her carrier as HR executive in a manufacturing industry. In the year 2006, she co-founded People Edge Consulting, a recruitment firm to cater to the growing manpower needs of companies in Mysore and Bangalore region based in Mysore, India, and also partnered with Ranstad, one of the largest HR service providers in the world. She realised her dream career of teaching by visiting various management institutes in Mysore. Email: aaruna900@gmail.com

Carlos Arruda is Professor of Innovation and Entrepreneurship at Fundação Dom Cabral, where he is presently the Associate Dean for Business Partnership and Director of the FDC Innovation and Entrepreneurship Center. He has a PhD in International Business from the University of Bradford (UK), an MA in Business and Administration from University Federal of Minas Gerais UFMG (Brazil) and a bachelor's degree in Mechanical Engineering from UFMG. Email: arruda@fdc.org.br

Nalina K.B. is currently an Assistant Professor for post-graduate programme at the department of management, Visvesvaraya Technological University (VTU), Belgaum, India. She got a bachelor's degree in Industrial and Production Engineering at PES college of Engineering, University of Mysore, in 1999, a master's degree in management specialized in Finance from Sri Jayachamarajendra College of engineering at VTU in 2002 and a Ph.D degree in management at the University of Mysore in 2012. She has 12 years of industry and academic experience; between 2002 and 2005, she has worked in industry, and in 2005, she became a lecturer for a post-graduate degree at the department of business administration in Mahajana PG center, University of Mysore. After she got her Ph.D, she is giving research guidance in the field of management. She has also worked as coordinator for

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Post-graduate diplomas in Healthcare Management and M.tech in Information communication technology (ICT) at VTU. Email: kbnalina@yahoo.co.in

Roberto Bartholo is an Associate Professor at the Production Engineering Program at Alberto Luiz Coimbra Institute – Graduate School and Research in Engineering at the Federal University of Rio de Janeiro, Brazil, where he coordinates the Laboratory for Technology and Social Development. He got a bachelor's degree in Economics at the Federal University of Rio de Janeiro, Rio de Janeiro, Brazil, in 1974, a M.Sc. degree in Production Engineering at the Federal University of Rio de Janeiro, Brazil, in 1976, and a Dr. degree in Economics and Social Sciences at the Friedrich-Alexander Universität Erlangen - Nürnberg, Germany, in 1981. Email: bartholo.roberto@gmail.com

Daniel Silveira Barreto currently holds a manager's position in the Industrial Area of the Brazilian Development Bank – BNDES, acting in grant funding for the capital goods sector, including innovation projects. He got a degree in Production Engineering at Fluminense Federal University – UFF, in Rio de Janeiro, Brazil, in 2002 and a master's degree in Economics, focusing on public policy and financing innovation, at the Brazilian Institute of Capital Market – Ibmec, Rio de Janeiro, Brazil, in 2014. He began his career in Junior Enterprise Movement as a consultant and advisor of Meta Consulting at UFF Engineering. He also worked in medium-size companies such as WEBB and Haztec as well as large corporations like ExxonMobil and Petrobras. Email: daniel.barreto@bndes.gov.br

Corrado Cerruti is Full Professor of Management at the Department of Studies on Business Government Philosophy, Faculty of Economics of the University of Roma 'Tor Vergata'. He got a bachelor's degree in Economics and Trade at the University of Genova, an M.B.A. at INSEAD Fontainebleau (France) and a Ph.D. at the University of Cranfield School of Management. He is Director of the Master of Science in 'Business Administration', Deputy Director of PhD in 'Management' (specialization in 'Enterprise Management and Accounting') and Member of the Directing Board of the Master in 'Procurement Management' at the University of Roma "Tor Vergata". He is a member of the Scientific Committee of the Master's programme in 'Innovation in the Public Administration' organised by the University of Macerata and a member of the European Board of the Supply Chain Council. Courses taught: Innovation Management; Advanced Management; Management Consulting; Procurement and Supply Chain Strategy. Major areas of research: Innovation Management, Management Consulting, Logistics, Information Systems and SMEs. Email: corrado.cerruti@unirom2.it

Stefano Colombo is an Adjunct Professor of Accounting at Bocconi University, a Teaching Assistant of Business Administration at Milano-Bicocca University, and a Teaching Assistant of Business Strategy and Finance Strategy at Universitá Cattolica del Sacro Cuore, Italy. He is also a founder of the ARTforEconomy Project whose goal is "to represent and show economic theories underlying the current political-social-economic situation through ART, so as to enable everyone to better understand the importance of these concepts, often seem far from everyday

life". His main research interests are on family business, systems dynamics and networking. Email: stefano.colombo@unimib.it

Fabio Corno is the founder and Director of a Triple Credential Joint Master Program in International Business Development (MAIB) being launched at Milano-Bicocca from October 2014 (www.maib.unimib.it). He is also the founder of the International Consortium for Innovation and Entrepreneurship Research and managing director of the "BRICS summer school project" of Milano- Bicocca University project courses which involve the following faculties: Sociology, Economics, Law, Statistics, Education Sciences. He is head of the courses in business administration and financial accounting in the following degrees: Tourism Management and Organizational Science at the Department of Sociology, Milano-Bicocca University. He was Associate Professor of Business Administration, Cattaneo University/LIUC – Castellanza between 1998 and 2005. He got his PhD. in Business Economics at Bocconi University, Italy, in 1983. He also got an MBA from Columbia University in 1981 and got his bachelor's degree in International Business at the George Washington University in 1979. His main research areas are entrepreneurial knowledge, values and internationalization. Email: fabio.corno@unimib.it

Vinícius Santos Goulart da Costa is a graduate student of Industrial Engineering at the Pontifical Catholic University of Minas Gerais (PUC MINAS) and worked as a fellow researcher at the Innovation and Entrepreneurship Center of Fundação Dom Cabral in Belo Horizonte/Minas Gerais, Brazil, between 2013 and 2014. He is currently working as intern in the Human Resources department of Petronas Lubrificants International in Contagem/Minas Gerais, Brazil. His main research interests and publications are on high-impact entrepreneurship and startups failure in Brazil. Email: vinicius.costa@fdc.org.br

Afonso Cozzi is currently Associate Professor and researcher of the Innovation and Entrepreneurship Center of Fundação Dom Cabral – Brazil. He is also Chairman of the Board of Confrapar, a Brazilian Venture Capital Company in partnership with Truffle Capital, and member of the board of startups and small companies in Brazil. He got a bachelor's degree in Mechanical Engineering and a Master in Business Administration at PUC – MG, Pontifical Catholic University of Minas Gerais, Brazil, a specialization degree in Business Administration at Insead – The European Institute of Business Administration and HEC – Haute Étude Commercial, France, and at Kellogg Graduate School of Business, USA. He is a former Director of The Brazilian Center of Support to Small and Medium Size Companies (Sebrae Brazil) – from 1974 to 1978 and Associate Dean of Fundação Dom Cabral – Brazil – from 1992 to 1999. His main research interests and publications are on high-impact entrepreneurship in Brazil and causes of startup failure. Email: acozzi@fdc.org.br

Claudio D'Ipolitto is the coordinator of FGV's MBA on Cultural Management and Production, where he teaches Innovation in Cultural Production and Business Model Design for Creative Industries. He got an undergraduate degree in

Mathematics at USP, University of São Paulo, Brazil, in 1977, a Master's degree in Informatics (applied to Education) at PUC Rio, Pontifical Catholic University of Rio de Janeiro, Brazil, in 1984, a Doctor's degree focusing on Innovation and Strategy Interactions at PEP/UFRJ, Production Engineering Program of UFRJ, Federal University of Rio de Janeiro, Brazil, in 2003, and a Post-doctoral research work in PACC/UFRJ, Advanced Program on Contemporary Culture, focusing on the 'increasing dialogues between Culture and Innovation'.

His doctoral research at PEP/COPPE/UFRJ has focused on the co-evolution of technology and business decisions during the startup trajectory. His post-doctoral work focuses on methods and tools for generating innovation when developing new creative business models. He also coordinates the executive programme 'The Audiovisual Business in Changing Times' for Firjan and ECDR – Darcy Ribeiro Film School. He teaches New Business Modeling for technology startups at the COPPE/UFRJ Business Incubator. D'Ipolitto is an associate researcher in Games Studies at LUDES/PESC, Ludology and Engineering Lab, at the Systems Engineering and Computer Science Program of COPPE/UFRJ. He has been a papers' referee for the Scientific Committee of SBGames Conference. Between 2009 and 2013, he worked on Business Game development at the Educational Games Group of the COPPE/UFRJ Business Incubator. Email: claudiodipolitto@gmail.com

Lia Hasenclever is currently an Associate Professor at the Economics Institute at the Federal University of Rio de Janeiro, where she teaches both Undergraduate and Post-Graduate Programmes: the Industrial and Technological Economics and the Public Policies, Strategies and Development; Microeconomics and Industrial Economics are her main disciplines. She is a member of the Economics Innovation Research Group at the Federal University of Rio de Janeiro, which originated in 1995. She obtained her Ph.D. in Production Engineering from the Graduate School and Research in Engineering (COPPE) at the Federal University of Rio de Janeiro in 1997.

She has eight published books (as organiser and author) and several papers in Brazil and abroad. Her current research projects focus on (i) Innovation process within the enterprise and the different interaction among the agents of National Innovation Systems to build the technological competencies in biotechnology; and (ii) Technological vocation, interaction and diffusion of economic regions and the detection of opportunities for business improvement or new enterprise incubation, focusing on economic and sociological aspects of the local leadership about the socio-economic development. Email:lia@ie.ufrj.br

Richard Heeks is Professor of Development Informatics at the Institute for Development Policy and Management, University of Manchester, and Director of the Centre for Development Informatics (http://www.manchester.ac.uk/cdi). He has been consulting and researching on information systems and development for 30 years. His book publications include *India's Software Industry* (1996), *Reinventing Government in the Information Age* (1999), *Implementing and Managing eGovernment* (2006), and *ICTs, Climate Change and Development* (2012). His research interests are IT industry development, IT social enterprise, informatics

and innovation and ICTs and climate change. He has a PhD in Indian IT industry development and runs the ICT for Development blog: http://ict4dblog.wordpress.com. Email: richard.heeks@manchester.ac.uk

Renata Lèbre La Rovere is currently an Associate Professor at the Institute of Economics at the Federal University of Rio de Janeiro (UFRJ) since 1993, where she teaches in both Undergraduate and Graduate Programmes. She is a researcher of the Economics of Innovation Research Group at the Institute of Economics since 1995. She is also coordinator of the Graduate Program in Public Policies, Strategies and Development of the Institute of Economics since September 2013.

She got a bachelor's degree in Economics at the Pontifical Catholic University of Rio de Janeiro, Brazil, in 1983, a specialization degree in Industrial Economics at the Federal University of Rio de Janeiro, Brazil, in 1985, a Diplôme d'Etudes Approfondies (D.E.A.) in Productive Structures and Global Systems at the Université Paris 7, France, in 1996 and a Ph.D. in Economic Sciences at the Université Paris 7, France, in 1990. After she got her PhD, she worked as an invited researcher at the Management of Information Systems Department and at the Latina American Studies Center of the University of Arizona, U.S.A, between 1991 and 1992.

She did a post-doctoral study on Technology Policies for Small and Medium-Sized Enterprises at the Management of Information Systems Department at Rostock Universitaet, Germany, between 1995 and 1996. Her main research interests and publications are on innovation and knowledge creation in enterprises, dynamics of the ICT sector, entrepreneurship and local development. Email:renata@ie.ufrj.br

Richa Lal is an Associate Researcher at the Sociology Department at the University Milano Bicocca, Italy. She has an MSc. Degree in Development Studies at Delhi University and a Bachelor's Degree in Sociology at Delhi University. Currently, she coordinates a Master Course at Milano Bicocca University. Her main areas of research are entrepreneurship, emerging markets, internationalization and corporate social responsibility and sustainability. Email; richalal2006@gmail.com

Savitha G. Lakkol is currently working as Associate Professor for post-graduate programmes at the JSS Centre for Management at Sri Jayachamarajendra College of Engineering, Mysore. She has a bachelor's degree in commerce and masters in business administration from Mangalore University, Mangalore, India. Specializing in finance, she got her Ph.D from Kuvempu University, Shimoga, India. Her research interests are Mergers Acquisition and Restructuring, Entrepreneurship and Banking. Currently, she is guiding doctoral students under Visvesvaraya Technological University, Belgaum, India. She has been teaching post-graduate Management courses at various Institutes since 1997. Email: savitalakkol@gmail.com

Mathew J. Manimala is currently a Professor of Organization Behaviour and Chairperson-OBHRM Area at the Indian Institute of Management Bangalore (IIMB), India. Prior to joining IIMB, he has served as Senior Member of Faculty and Chairman, Human Resources Area, at the Administrative Staff College of India (ASCI), Hyderabad, India. At IIMB, he has worked closely with the N S Raghavan

Centre for Entrepreneurial Learning (NSRCEL) primarily to build the research competencies of the Centre during its early years when he served as the Jamuna Raghavan Chair Professor of Entrepreneurship for two terms and as the Chairperson of NSRCEL for one term. Currently, he is also a Senior Enterprise Fellow of the School of Entrepreneurship and Business (SEB), University of Essex, UK, and is the Chairman of the ICIER-India Trust, which is a constituent of the International Consortium for Innovation and Entrepreneurship Research (ICIER), a research and consultancy network among institutions in Europe and BRIC countries.

Professor Manimala obtained an MBA degree from the University of Cochin, an MBSc degree from the University of Manchester and the Fellow in Management (doctoral) degree from Indian Institute of Management, Ahmedabad (IIMA). He has received several academic honours including a Certificate of Distinction for Outstanding Research in the Field of New Enterprise Development (Heizer Award) from the Academy of Management. He is the recipient of research fellowships from several prestigious international agencies and has been the India team leader of many research projects including the Global Entrepreneurship Monitor (GEM) project. He has published several research papers and a few books in the areas of Entrepreneurship and Organizational Behaviour. He is a member of the editorial board of several journals and the Editor of *South Asian Journal of Management*. Email: manimala@iimb.ernet.in

José Manoel Carvalho de Mello is Visiting Professor of the Graduate Program in Production Engineering, Research Associate at the Center for Studies in Innovation, Knowledge and Work – NEICT and advisor to the Innovation Agency, Federal Fluminense University. He holds a Ph.D. degree in Engineering Production at the University of Birmingham, UK (1973). He was Research Fellow at the Management Center, University of Bradford, England, in 1974; Postdoctoral Fellow at the Centre Science, Technologie et Société, Conservatoire National Arts et Métiers, Paris (1984–1985); Researcher at Centre de Sociologie des Arts, Ecole des Hautes Etudes en Sciences Sociales, Paris (1987); Visiting Scholar, Science Policy Institute, State University of New York, Purchase College (1997–1998); Visiting professor, Lund University, Sweden (2011).

Member of INNRED – Network of Centers of Innovation Support, Subprogram CYTED XVI (2002–2006). Founding member of Triple Helix Association (Turin, 2009); Vice President of Triple Helix Association (2009–2013). Member of Scientific Technical Committee of the Centre of Science and Technology Policy (S & T), Fondazione Rosseli, Torino, Italy; Member of the Scientific Committee of the Symposium for the Management of Technological Innovation and Symposia of the Latin American Association Technology Management – ALTEC; Reviewer CYTED Program; Member of Editorial Board of International Journal of Technology Management journals and Sustainable Development and International Journal of Technology and Globalization; Member and leader of the Brazilian team in Unidev Project – Developing Universities since 2005, he is the author of numerous papers on Triple Helix Culture; Innovation, Sustainability and Social Inclusion and Academic Entrepreneurship. Email: josemanoel.carvalhodemello@gmail.com

Leonardo de J. Melo is currently Institutional Relations Coordinator at Science Park of the Federal University of Rio de Janeiro (UFRJ). He is an expert in project management, strategies and innovation promotion. He has been working since 2003 as a project manager related to innovation and interaction between universities, government and society. He was also Logistics Coordinator at the State Government of Rio de Janeiro and Project Manager at PUC-Rio Incubator's.

He is also a researcher at INCT/PPED of CNPq and of the Economics of Innovation Research Group at UFRJ. He is a PhD candidate in Public Policy, Strategy and Development at Institute of Economics of the Federal University of Rio de Janeiro, where he holds an MSc. in Innovation Economy. He got a BA in Business Administration from the Catholic University of Rio de Janeiro (PUC-Rio) and has advanced studies in urban sociology. He also had professional experience in public and business administration. His main research interests are in the following areas: public policy (innovation), urban studies (smart cities) and innovation environments (high-tech clusters, business incubators and science parks). Email: leojmelo@gmail.com

Heitor Soares Mendes is, since 2008, an Assistant Professor at the Federal Center of Technological Education of Rio de Janeiro, where he teaches several disciplines in the technical Course of Mechanics. He got a bachelor's degree in Mechanical Engineering at the Federal Center of Technological Education of Rio de Janeiro, Brazil, in 1985, a specialization degree in Production Engineering at the Federal University of Rio de Janeiro, Brazil, in 2000, and his MSc in Production Engineering in Technology at the Federal Center of Technological Education of Rio de Janeiro in 2010. He is currently preparing his doctoral thesis on the Graduate Program in Public Policies, Strategies and Development of the Institute of Economics at the Federal University of Rio de Janeiro. He worked as mechanical engineer since 1985 until 2008, specialist – operation management – in metal packaging manufacturing. His research project is focusing on industrial/technological extension public policies and technological and organisational capabilities of SMEs. Email: heitor.mendes5@gmail.com

Brian Nicholson teaches courses related to IT in developing countries, outsourcing and offshoring at Master's level and is a director of the University of Manchester Centre for Development Informatics. He holds a PhD degree in Information Systems and Management from University of Salford. His research and consultancy work revolves around outsourcing and offshoring of services and various aspects of IT for development. He is a regular presenter in international conferences and conventions and has published in numerous journals including *MISQ Executive*, *Journal of Information Technology, Information and Organization* and others. He is the co-author of *Global IT Outsourcing* and acted as guest editor for several journal special issues. Email: brian.nicholson@mbs.ac.uk

Vanessa Silva Nogueira is currently an Associate Professor at Fundação Dom Cabral, where she teaches Entrepreneurship in Post-Graduate courses. She got a bachelor's degree in Journalism at the Education and Culture Foundation of Minas Gerais (FUMEC), Brazil, in 2006, a specialization degree in Business

Administration with focus on Marketing at the Brazilian Institute of Capital Markets of Minas Gerais (IBMEC/MG), Brazil, in 2009 and an MSc in Social Research at the London Metropolitan University, United Kingdom, in 2011. After she got her MSc, she worked as a researcher at the Innovation and Entrepreneurship Center of Fundação Dom Cabral in Belo Horizonte/Minas Gerais, Brazil, between 2012 and 2013. She is also responsible for the strategic management of Mano Consulting, a Brazilian engineering company. Her main research interests and publications are on high-impact entrepreneurship in Brazil and causes of startup failure. Email: vanessanog@gmail.com

Luiz de Magalhães Ozório is an Associate Professor of the Economics Faculty of IBMEC Rio de Janeiro. He got an MSc in Production Engineering at the Federal University of Rio de Janeiro in 2003 and a PhD in Production Engineering at the Pontifical Catholic University of Rio de Janeiro in 2010. His main research interests are Asset Evaluation, Economics and Finance of the Energy Sector, Infrastructure Investments and Corporate Finance. Email: lmozorio@ibmecrj.br

Isabella Nunes Pereira is currently working at the Indicators of the Brazilian System of Entrepreneurship, a pioneer initiative to create, organize and harmonize a database of economics statistics. She got a bachelor's degree in Economics at the Pontifical Catholic University of Rio de Janeiro, Brazil, in 1984 and an M. Sc. degree in Production Engineering at the Federal University of Rio de Janeiro, Brazil, in 2001.

Currently, she is a PhD student of Production Engineering at Production Engineering Program at Alberto Luiz Coimbra Institute – Graduate School and Research in Engineering at the Federal University of Rio de Janeiro, Brazil. Isabella Nunes acts as analyst of statistics at IBGE, the Brazilian Institute of Geography and Statistics. From 2003 to 2010, she was the manager of the Monthly Industry Survey – Physical Production. Email: inunesp@gmail.com

Elena I. Pereverzeva is currently Professor of MIRBIS and Dean of Business School (MBA and Executive MBA). She got a bachelor's degree in Chemistry at the Tashkent State University, Tashkent, Uzbekistan, in 1986. She got a postgraduate study in 1990 and a PhD in Chemistry in 1994. She has 10 years experience as scientific researcher in Tashkent State University. From 1996, she was owner of the LLC Company 'NUFUZ TALIM' and took a lot of business courses of Business Planning, Finance and Development of small business. In 1998 she graduated in Project Financing and Foreign Investments Course at the Oklahoma University, USA. She had 8 years experience at a UNDP Project as National Expert on Trainings and Investment Projects in the Expansion of Business Incubators Net-work in the Republic of Uzbekistan. She also worked at UN as a Project Manager at the Sustainable Income Generation Project. From June 2006 to May 2014, Elena has held the position of Director of the Youth Entrepreneurship Center in the Moscow International Higher Business School (MIRBIS). Her main research interests and publications are in entrepreneurship, small business development, startups, entrepreneurial ecosystem and business education. Email: pereverzeva@mirbis.ru

Manas Puri has been working with the natural resource and climate change division of the Food and Agriculture Organization (FAO) of the United Nations based in Rome since March 2014, where he primarily focusses on the use of bioenergy from crop residues and in developing a Water-Energy-Food Nexus assessment methodology.

He received his bachelor's degree in Physics at the University of Pune, India, in 2007. Thereafter, he obtained a fellowship to pursue his Master's degree in Management from LUISS Guido Carli University, Rome, and a subsequent fellowship to pursue his PhD in Economics and Management of Enterprises form the University of Rome Tor Vergata in 2010 and 2013, respectively. His main research interests include innovation at the bottom of the pyramid, the use of renewable energy for local development and agro-energy systems. Email: puri@economia.uniroma2.it

Gerardo Quinones is currently a member of the Centre for Development Informatics at the University of Manchester (http://www.manchester.ac.uk/cdi) and of the Doctorate in Business Administration programme at the Manchester Business School. He got a bachelor's degree in Electronics and Computer Systems at the Instituto Tecnologico de Estudios Superiores de Monterrey in Mexico in 1993 and a Master in Business Administration at the University of Texas at Austin in 2003. He has been a practitioner in the Latin American Information and Communications Technology sector for almost 20 years, during which he has held executive positions in Avaya, MCI, Lucent Technologies, and Telefonica. Email: gerardo.quinones@postgrad.manchester.ac.uk

Thiago Renault is an Associate Professor at the Management and Accounting Department of the Federal Rural University of Rio de Janeiro; Associate Researcher at the Center for Studies in Innovation, Knowledge and Work – NEICT at the Federal Fluminense University; Economist with master's and PhD in industrial engineering; Post-doc in the Research Policy Institute at Lund University, Sweden; Research fellow at the University of Havana, Cuba; Member of the Innovation Advisory Panel from the Innovation Hub, which designs innovation policies for the Gauteng Province in South Africa and Member of the Brazilian team in Unidev Project – Developing Universities since 2005. He is also a consultant of the Brazilian Service for Supporting of Small and Medium enterprises (Sebrae) since 2003 and of the National Council of Scientific and Technological Development (CNPq) since 2012. Email: thiagorenault@gmail.com

Tainá Albuquerque Bravo de Souza is finishing her undergraduate studies in Economics at the Federal University of Rio de Janeiro. She was a member of Ayra Consultoria, the junior enterprise of the Center for Law and Economic Studies of this University in 2012, and worked as a research assistant of the Economics of Innovation Group of the Institute of Economics in 2013. Her current research interests are in public policies for entrepreneurial education and entrepreneurship support. Email: tainaalbuquerquebravo@gmail.com

Ernesto Tavoletti has been, since 2006, a tenured Assistant Professor of Economics and Management of Enterprises and International Marketing at the University of Macerata, where he has also been coordinator of the Master's Degree in International Economic and Trade Relations from 2011 to 2014.

He received a degree in Economics and Commerce cum laude from the University of Bologna in 1997, followed by a PhD in Economics and Management of Enterprises and Local Systems at the University of Firenze in 2004. From 2004 to 2006, he served as a research fellow at the University of Macerata. From 2011 to 2012, he served as a board member of the PhD in Management at the University of Rome Tor Vergata. From 2005 to 2011, he has been a board member of the international Master in Relations with Eastern Countries. He is a member of the European Academy of Management and the Academy of International Business as well as a member of the editorial board of the *Transition Studies Review*, the *Journal of Global Policy and Governance*, and the *International Journal of Euro-Mediterranean Studies*.

In 2013, he got the national scientific 'abilitazione' as Associate Professor in Economics and Management of Enterprises. His research interests focus on international business, higher education management, case study research methodology and innovation management. Email:ernesto.tavoletti@unimc.it

P.K. Thomas has worked in the industry for over 20 years before moving into Academics. His corporate experience covered a wide range of national and multinational companies such as Delta Consultancy Services, New Delhi; The One LLC, Abu Dhabi; Cisco WebEx, Bangalore; and Team Lease Services, Bangalore. After a two-decade-long stint with the corporate sector, Thomas decided to venture on his own in 2010 by launching Accort Services, a company engaged in staffing business. Besides, he also serves as the Director of Streamsource Services, which is into Human Resource Consulting and Process Streamlining for Small and Medium Enterprises.

Along with his entrepreneurial pursuits, Thomas keeps his academic interest alive. He is a visiting faculty with a few business schools in Bangalore and teaches courses in Entrepreneurship and International Business. Besides, he also organises and conducts workshops, training programmes, international exchange programmes, conferences, entrepreneurship development programmes and faculty development programmes for various academic and corporate organisations.

In order to supplement his teaching activities, Thomas has also taken active part in research projects. He was associated with the Indian Institute of Management Bangalore (IIMB) for a cross-national research project on Entrepreneurship and New Venture Creation in BRIC Countries initiated by Milano-Bicocca University. As part of this research initiative, he co-founded ICIER-India, the India chapter of International Consortium for Innovation and Entrepreneurship Research (ICIER), a professional network of internationally reputed researchers and consultants engaged in the development of entrepreneurial individuals and organisations through research, consultancy and training in innovation, entrepreneurship and entrepreneurial management. He has also been active in developing academic

papers based on his research activities and presented them in various national and international conferences. Email: thomaspk@outlook.com

Princy Thomas is currently working with the Indian Institute of Management Bangalore (IIMB), India, as an Academic Associate. She got a PhD from Visvesvaraya Technological University (VTU), Bangalore, India. At the Master's level, she has specialised in Management Science, Human Resource Management and Computer Applications. She has more than 12 years of experience in teaching and research with top-rated business schools in India. Prior to her position in IIMB, she has worked as lecturer with three Bangalore-based B-schools, namely, Xavier Institute of Management and Entrepreneurship (XIME), Nitte Meenakshi Institute of Technology (NMIT) and Raja Rajeswari College of Engineering (RRCE).

Princy's teaching and research interests are in the areas of performance management, compensation strategies and entrepreneurship. One of the major research projects she worked with is the cross-national study on Entrepreneurship and New Venture Creation in BRIC Countries initiated by Milano-Bicocca University, Italy. She has coordinated several academic activities such as faculty development programmes, case workshops and international student exchange programmes. She has presented papers in various national and international conferences, published papers in national and international journals, and developed case studies on Management and Entrepreneurship–related issues besides reviewing manuscripts for academic journals. Email: princythomas2000@gmail.com

Pedro Menezes Vilarinhos is currently a research assistant of the Economics of Innovation Group at the Institute of Economics of the Federal University of Rio de Janeiro. He is finishing his undergraduate studies in Economics at the Federal University of Rio de Janeiro, and he was a member of Ayra Consultoria, the junior enterprise of the Center for Law and Economic Studies of this University in 2013. His current research interests are in public policies for entrepreneurial education and entrepreneurial learning. Email: pedromvilarinhos@gmail.com

Yang Yang is a graduate student of Quantitative Methods in the Social Sciences programme at Columbia University. Her focus is data science. She got a Bachelor's Degree in Business Administration in 2010 at Fudan University, China, and dual Master's Degrees in International Management in 2012 from Bocconi University, Italy, and Fudan University, China. She is passionate about applying her knowledge in statistics and data visualization, together with state-of-the-art methodologies to research and business analytics. Her current research involves application of machine learning and data mining. She performs text analysis, visualizes analytical results and prototypes for product innovations. Her research also covers entrepreneurship, venture creation, economic policy and cross-border M&As. She explores the world by studying, tasting and working in North America, Europe and Asia. She is a cofounder and director of the Society for Quantitative Approaches to Social Sciences at Columbia University, aiming to promote the understanding and utilization of quantitative approaches in social sciences. Email: yy2504@columbia.edu

Youzhen Zhao is Associate Professor of International Business and Strategy at School of Management, Fudan University in Shanghai, China. She got a Bachelor's Degree in Science in 1993, a Master's Degree in Economics in 1996 and a PhD in Management in 2003 at Fudan University, China. She was a visiting professor at Bocconi University (2010), MIT (2005), University of Oregon (2004) and Washington University in St. Louis (2000). She participated in the PCMPCL (Program on Case Method and Participant-Centered Learning) at Harvard Business School in 2008 and at Nanyang Technological University in 2009. She also visited LUISS, Italy (2010 and 2012); Payap University, Thailand (2012); Yeungnam University, South Korea (2010); Norwegian Business School (2006, 2007, 2008, 2009, 2010, 2013 and 2014); FDC, Brazil (2009); Columbia University (2007 and 2008); Danjiang University, Taiwan (2008); University of Pennsylvania (2007); Appalachian State University (2007); Aoyama Gakuin University, Japan (2006) and University of Hong Kong (2005) for short-term academic exchange. Her recent research interests include Cross-border M&As of Chinese firms, International New Ventures from China, Regional Headquarters and R&D centers of MNEs in China. She is member of the Academy of International Business, China International Association of Management Research and the Chinese Institute of Certified Public Accountants. Email: yzzhao@fudan.edu.cn