Technology Innovation Management Review

August 2014

Image licensed under CC BY-SA Ranjith

Innovation and Entrepreneurship in India

Welcome to the August 2014 issue of the *Technology Innovation Management Review*. This month's editorial theme is Innovation and Entrepreneurship in India. We welcome your comments on the articles in this issue as well as suggestions for future article topics and issue themes.

Carleton UNIVERSITY

www.timreview.ca

Publisher

The *Technology Innovation Management Review* is a monthly publication of the Talent First Network.

ISSN

1927-0321

www.timreview.ca

Overview

The *Technology Innovation Management Review* (TIM Review) provides insights about the issues and emerging trends relevant to launching and growing technology businesses. The TIM Review focuses on the theories, strategies, and tools that help small and large technology companies succeed.

Our readers are looking for practical ideas they can apply within their own organizations. The TIM Review brings together diverse viewpoints – from academics, entrepreneurs, companies of all sizes, the public sector, the community sector, and others – to bridge the gap between theory and practice. In particular, we focus on the topics of technology and global entrepreneurship in small and large companies.

We welcome input from readers into upcoming themes. Please visit timreview.ca to suggest themes and nominate authors and guest editors.

Contribute

Contribute to the TIM Review in the following ways:

- Read and comment on articles.
- Review the upcoming themes and tell us what topics you would like to see covered.
- Write an article for a future issue; see the author guidelines and editorial process for details.
- Recommend colleagues as authors or guest editors.
- Give feedback on the website or any other aspect of this publication.
- Sponsor or advertise in the TIM Review.
- Tell a friend or colleague about the TIM Review.

Please contact the Editor if you have any questions or comments: timreview.ca/contact

Editorial: Innovation and Entrepreneurship in India

Chris McPhee, Editor-in-Chief

Kalyan Kumar Guin, Guest Editor

From the Editor-in-Chief

Welcome to the August 2014 issue of the *Technology Innovation Management Review*. This month's editorial theme is **Innovation and Entrepreneurship in India**. It is my pleasure to introduce our guest editor, **Kalyan Kumar Guin**, Dean and Professor in the Vinod Gupta School of Management (www.som.iitkgp.ernet.in) at the Indian Institute of Technology Kharagpur, who has assembled a diverse team of authors from India to offer their perspectives on the past, present, and future of innovation and entrepreneurship in India.

Our September issue will be unthemed, after which we will revisit the theme of **Cybersecurity**. For future issues, we welcome submissions of articles on technology entrepreneurship, innovation management, and other topics relevant to launching and growing technology companies.

Please contact us (timreview.ca/contact) with article topics and submissions, suggestions for future themes, and any other feedback.

We hope you enjoy this issue of the TIM Review and will share your comments online.

Chris McPhee
Editor-in-Chief

From the Guest Editor

Empirical evidence suggests a positive correlation between economic growth, innovation, and entrepreneurship development. In India, with the liberalization of the economy over the last two decades, the interactions between these factors have generated considerable interest, particularly among the key stakeholders: government, industry, and academia.

In this issue of the TIM Review, our authors collectively provide an overview of various issues relevant to Indian entrepreneurship and innovation, and the role of stakeholders in promoting it. The issues addressed by the researchers are of national and international importance across all aspects including theoretical perspectives, policy development, and practical applicability. This issue explores the perspective of a few selected researchers who will provide a deep insight into how the stakeholders of the innovation ecosystem represented by the government, industry, and academia can best be leveraged to optimize value for all stakeholders and citizens.

In the first article, **Rituparna Basu** provides her critical assessment as an entrepreneurship exponent into the growth prospects and challenges to entrepreneurship education in India. The article emphasizes the value of entrepreneurship education for students and not just for those planning a startup.

Next, **Ravindra Abhayankar** highlights the Government of India's role in promoting innovation through policy initiatives for entrepreneurship development. He also identifies gaps in the Indian innovation ecosystem and suggests an agenda for researchers based on his experience as the advisor to the Government of India for innovative product development

Shiv Tripathi provides new insights and evidence from India on the role of managers as agents in successful service-based innovations based on a three-year study of 70 business executives belonging to 20 large organiz-

Editorial: Innovation and Entrepreneurship in India

Chris McPhee and Kalyan Kumar Guin

ations operating in India. The article also compares the practices followed by Indian organizations with global organizations operating in India to understand the contextual issues of service innovations.

Susmita Ghosh, **Bhaskar Bhowmick**, and **Kalyan Kumar Guin** emphasize the challenges faced by entrepreneurs due to perceived environmental uncertainty. The authors, while highlighting the Indian perspective, examine the means of measuring and addressing uncertainty in an emerging country context.

Punit Saurabh, **Phrabha Bhola**, and **Kalyan Kumar Guin** highlight the roles of important stakeholders of knowledge systems in the creation of innovation ecosystems. Through a pictorial representation of the knowledge system landscape, they illustrate and review existing models of knowledge systems, and they provide recommendations for each of the three major stakeholders in the proliferation of innovation and entrepreneurship in India: government, industry, and higher-education institutions.

Finally, **Ritu Dubey** answers the question "What is the future of entrepreneurship in India?" by identifying the challenges and opportunities for innovation and entrepreneurship in India and by describing the Government of India's measures and programs designed to support an emerging startup ecosystem in India.

Although there are several interesting and divergent views and methodologies represented in this issue, the authors all agree that there is an urgent need to promote the values of innovation and entrepreneurship in a developing nation such as India, because it will bring many benefits in the long run. I hope that you find the issue to be beneficial and will gain interesting insights into the nature of entrepreneurship being practiced in India.

Kalyan Kumar Guin
Guest Editor

About the Editors

Chris McPhee is Editor-in-Chief of the *Technology Innovation Management Review*. Chris holds an MASc degree in Technology Innovation Management from Carleton University in Ottawa and BScH and MSc degrees in Biology from Queen's University in Kingston. He has over 15 years of management, design, and content-development experience in Canada and Scotland, primarily in the science, health, and education sectors. As an advisor and editor, he helps entrepreneurs, executives, and researchers develop and express their ideas.

Kalyan Kumar Guin is Dean and Professor at the Vinod Gupta School of Management, Indian Institute of Technology Kharagpur, India. He is an alumnus of IIT Kharagpur and Banaras Hindu University in Varanasi, India, and he is a Fellow of the Indian Institute of Management Bangalore. His teaching interests cover marketing and operations management, and he has a special interest in quantitative modelling of strategic issues in management.

Citation: McPhee, C., & Guin, K. K. 2014. Editorial: Innovation and Entrepreneurship in India. *Technology Innovation Management Review*, 4(8): 3–4. http://timreview.ca/article/816

Keywords: innovation, entrepreneurship, India, startups, government support, policy, university, education, service innovation, uncertainty, knowledge systems, stakeholders

Entrepreneurship Education in India: A Critical Assessment and a Proposed Framework

Rituparna Basu

> *"While entrepreneurship classes are designed to give budding entrepreneurs the tools to turn a new idea into reality, their value may be even greater than that: I think it gives all students the ability to view their careers and opportunities in a different light. It's so important that the benefits of an entrepreneurial-focused education are available to all students and not just those planning on entering the startup world."*
>
> John Dearborn
> President, JumpStart Inc.

Entrepreneurship education is considered as one of the most influential forces that determine the health of the economy. Hence, ignoring controversies on whether entrepreneurship can be taught, the majority of the top business schools in India offer entrepreneurship education with tailored elective courses to inculcate a wide range of skills encompassing a multi-disciplinary approach among mature management students. However, considering the basic synergies of core management subjects such as marketing and entrepreneurship, both of which provide an opportunity to develop unique solutions to satisfy customer needs, the study of entrepreneurial aspects as a prerequisite for management education and research seems indispensable when specifically catering to the growing entrepreneurial intent in developing economies. This approach necessitates a compulsory initiation of entrepreneurship courses early in the curricula of contemporary business schools. In this context, the present article aims to qualitatively review the current entrepreneurship education regime in India to propose an effective ecosystem for integrating and promoting entrepreneurship education as fundamental to mainstream business education in India.

Introduction

There has never been a definite answer to the question of whether entrepreneurship can be taught (Harrison, 2014). Although many would argue that the entrepreneurial spirit is innate, the credence on effective entrepreneurial education to foster the right entrepreneurial attitude with requisite training is gaining ground (Drucker, 1985; Trivedi, 2014). The development of entrepreneurship as a field of study in business courses has been largely inspired by the acceptance of entrepreneurship as a legitimate tool for economic growth (Arthur et al., 2012). The growth of corporate entrepreneurship as a valuable antecedent to the revitalization and enhanced performance of corporations, especially those in the developed markets, add to its merit (Bhardwaj & Sushil, 2012). Nevertheless, the effectiveness of entrepreneurship education is largely driven by the type and design of such education, as defined by the materials and modes of rendering the programs (Arthur et al., 2012).

Considering the importance of the right entrepreneurship culture and education for the growth and development of an emerging economy such as India (Todd & Javalgi, 2007), the present article aims to comprehend the nature of entrepreneurship as a field of study in comparison to a more fundamental business management subject such as marketing. The article also explores and assimilates various qualitative evidences to assess the prevalent status of imparting entrepreneurship education in India. The article culminates in the

Entrepreneurship Education in India

Rituparna Basu

development of a proposed working framework for an effective entrepreneurship education ecosystem in India. More specifically, the article is structured to systematically explore the evidence base of concurrent practices in the country to map out a thematic system for fostering and promoting a sustainable entrepreneurial education system that can serve as a solid foundation for relevant business education in modern times.

Entrepreneurship as a Field of Business Study: Synergies and Topical Relevance

At the outset, it is important to note that, within the definition of entrepreneurship education, the focus is largely on the premise of higher education rather than that on educating entrepreneurs (Pittaway & Cope, 2007). Entrepreneurship as a domain of business education has an eclectic nature where the content is derived from diverse disciplines including those of strategy, finance, or marketing (Albornoz-Pardo, 2013). Given its cross-functional and cross-sectoral orientation (Venkatachalam & Waqif, 2005), the structure and content of the course is often faculty driven and is primarily aimed at the twin objectives of increasing the awareness of entrepreneurship as a career option and developing the understanding of the process of creating new business (Albornoz-Pardo, 2013).

For instance, despite the common propensity to reflect on entrepreneurship as more of practical than theoretical subject, a careful introspection reveals that the core concepts of marketing are intimately intertwined with those of entrepreneurship (Swami & Porwal, 2005). In fact, much of its basic subject design deals with elementary marketing concepts such as the philosophy of customer value (Drucker, 1985). Although this view makes the relevance of marketing knowledge a prerequisite for entrepreneurship education, the opposite could be equally true. The application of effectuate entrepreneurship thinking in the marketing discourse has significant strategic and critical marketing implications (Hultman & Hills, 2011). A metaphor of "the dancer and the dance" by McAuley (2011) clearly establishes the natural linkages between the disciplines of entrepreneurship and marketing. This finding strengthens the argument in favour of integrating entrepreneurship into the compulsory curricula for students of business management (Venkatachalam & Waqif, 2005). Concurrent exposure of business students to core courses in marketing or finance along with entrepreneurship would not only reinforce their cross-functional linkages, but would also ensure more synergistic learning from the very outset. This approach would also negate the possibility of excluding the pertinent coverage of entrepreneurial concerns and approaches in the content of related core courses from the very basic level of business education (Venkatachalam & Waqif, 2005). Thus, such initiation at earlier levels (Arthur et al., 2012) would put business thinking on an operative trajectory that could be more appropriate (Hultman & Hills, 2011) for determining the success of entrepreneurial or even corporate entrepreneurship practices (Swami & Porwal, 2005) in the long run.

Entrepreneurship Education in India: A Contemporary Review

Indeed, entrepreneurship education has truly earned a global status for itself, given that it now pursued with equal passion even in the developing countries (Arthur et al., 2012). Having established the idea of entrepreneurship as basic to business education and its synergies with the core curricula, it becomes imperative to delve into the reality of how entrepreneurship is taught specifically in an emerging economy such as India.

Methodology

Owing to the dearth of data available on entrepreneurship education in Asia and more specifically in India, a qualitative case-based methodology was adopted to explore the prevalent regime of entrepreneurship education in the country. The purpose was two-fold:

1. To understand how entrepreneurship is integrated in the business school curricula of the top business schools in India

2. To understand the popularity of entrepreneurship as a field of study among students in Indian business schools

In-depth interviews with academic deans of 10 reputed business schools across India were conducted to collect the qualitative information. The business schools were selected from the top business schools in India, as listed by the popular press. The information given on the curricula or specifically relating to the popularity of the courses are confidential therefore the names the schools have not been disclosed here. However, the whole majority of the schools contacted (7 out of 10) are top-league schools, including several Indian Institutes of Management (IIMs) (see Box 1). The other three schools were emerging in nature (including a newer IIM), having been in operation for less than 10 years.

Entrepreneurship Education in India

Rituparna Basu

Unstructured telephone interviews were carried out, allowing open-ended responses to questions such as:

- Does entrepreneurship feature in your business-education curriculum as a course?
- How is it incorporated in the curriculum? (e.g., Single course or not? Offered as a core or elective course? In which term is it offered?)
- Approximately how many students opt for entrepreneurship as an elective course?
- What is the basic pedagogy that is followed for the course?

Qualitative findings and insights

The qualitative responses from the 10 cases suggested a largely uniform approach to incorporating and approaching entrepreneurship education across reputed business schools in India. An entrepreneurship course is currently offered in all but one of the schools. Out of these nine schools offering entrepreneurship as a course, eight are offering it as an elective meant for the final year students. The instance of an emerging business school offering it as a core compulsory course for its final year students was a notable departure.

Although one of the three emerging business schools is offering entrepreneurship as a core compulsory course for their final year students at present, one of the other two had already tried the same approach in the initial two years of its operation before later making the course an elective. While two of the top-league schools are offering two or more elective courses on entrepreneurship (e.g., "Entrepreneurship", "Entrepreneurial Finance", "Entrepreneurial Strategy", "Entrepreneurship and HR". or even an unconventional "Entrepreneurial Motivation Laboratory"), the rest of the lot chose to offer only one elective along the lines of "Entrepreneurship" or "Entrepreneurship and New Ventures".

Over the last five years, an average of 15% of the students pursuing a post-graduate diploma in management (PGDM) have been opting for entrepreneurship as an elective course, which is rather low compared to other electives. However, one exception is a top-league business school that treats the entrepreneurship course as a priority course over other electives that have low enrolment, where the average can rise up to 35% of students opting for the course after dropping other elective courses that fall short of minimum class size. For a single top-league school offering more than two electives, the popularity of the courses are much higher, with enrolment around 60% to 70%.

Box 1. Indian Institutes of Management

Currently, the country has 13 Indian Institutes of Management (IIMs; tinyurl.com/37elhf), which are autonomous public institutes of management education and research. The first IIMs were set up in Calcutta and Ahmedabad in the year 1961 followed by Bangalore and Lucknow in the year 1973 and 1984 respectively. Seven of the newer IIMs have been created in the last 10 years. For all the IIMs, the flagship course is the two-year Post Graduate Diploma in Management (PGDM), which is the focus of the present study.

In terms of the pedagogy, the focus is on reality-based learning combined with academic knowledge across all business schools.

The Entrepreneurship Education Ecosystem: A Conceptual Framework

The literature indicates that, although the inclination to pursue entrepreneurship is comparatively strong in India, the educational support for its development is still a far cry from the agenda (Raichaudhuri, 2005). Entrepreneurship still has a long way to go in terms of earning the status of a preferred course among management students in India. Perhaps, this status acts as reason enough to only offer entrepreneurship as an extra-curricular or co-curricular program in the majority of the colleges and universities in India (Shankar, 2012).

Shankar (2012) classifies six primary obstacles to teaching entrepreneurship in India as:

1. Lack of institutionalization
2. Lack of indigenous experience
3. Lack of trained teachers
4. Short-term focus on results
5. Limitations with pedagogy
6. Subject not considered as core

Even at the top institutes in India that offer technical or management education with their popular support programs for student entrepreneurship, called "entrepreneurship cells" or "E-cells" (Mutsuddi, 2012), the

Entrepreneurship Education in India

Rituparna Basu

educational framework for inculcating the entrepreneurial spirits seems far from being satisfactory (Dutta, 2012). The contextual differences between developed and developing economies that necessitate the advance of indigenous standards for appropriate entrepreneurial education with relevant knowledge on related sociopolitical governance, infrastructure, unorganized competition, chronic shortages, or sensitivity to local culture adds to the concern (Bhardwaj & Sushil, 2012).

In the present scenario, the challenge is to outgrow the prevalent myopic treatment of entrepreneurship education and categorically shift the focus from its short-term objectives. The key is to develop entrepreneurship as a foundation course in business education, especially one that covers the managerial aspects of new ventures as well as corporate entrepreneurship or intrapreneurship. Given the obstacles of teaching or developing entrepreneurship in the realm of management education, the need for an effective entrepreneurial ecosystem seems to be the only solution. Hence, drawing insights from the literature and the qualitative evidence presented earlier in this article, the proposed diamond framework illustrated in Figure 1 is an attempt to develop a working structure for such an ecosystem.

The proposed diamond framework is based on qualitative evidence and expert opinions, which presuppose that the initiation of entrepreneurship as a core course does have the potential to drive the development and promotion of an effective entrepreneurship education ecosystem, particularly among management students in India. Such initiation, apart from encouraging the practice of entrepreneurship in the short run, should push the overall knowledge abstraction based on research and practice pertaining to the specific emerging economies. Such knowledge creation should in turn add to the pedagogical wealth, thereby increasing the rigour and effectiveness of the course that should lead to further development of entrepreneurship as a core discipline. Over time, the framework is designed to work as a virtuous cycle with an inherent regenerative character. Developments in entrepreneurship, in theory as well as in practice, will fuel its growth. Given that more practice would mean more instances of introspection, adding to the existing knowledge base and simultaneous development of the theoretical precision should be automatic. The framework works at both ends by pushing entrepreneurial intentions and pulling higher levels of knowledge creation to support the needs of a core business course.

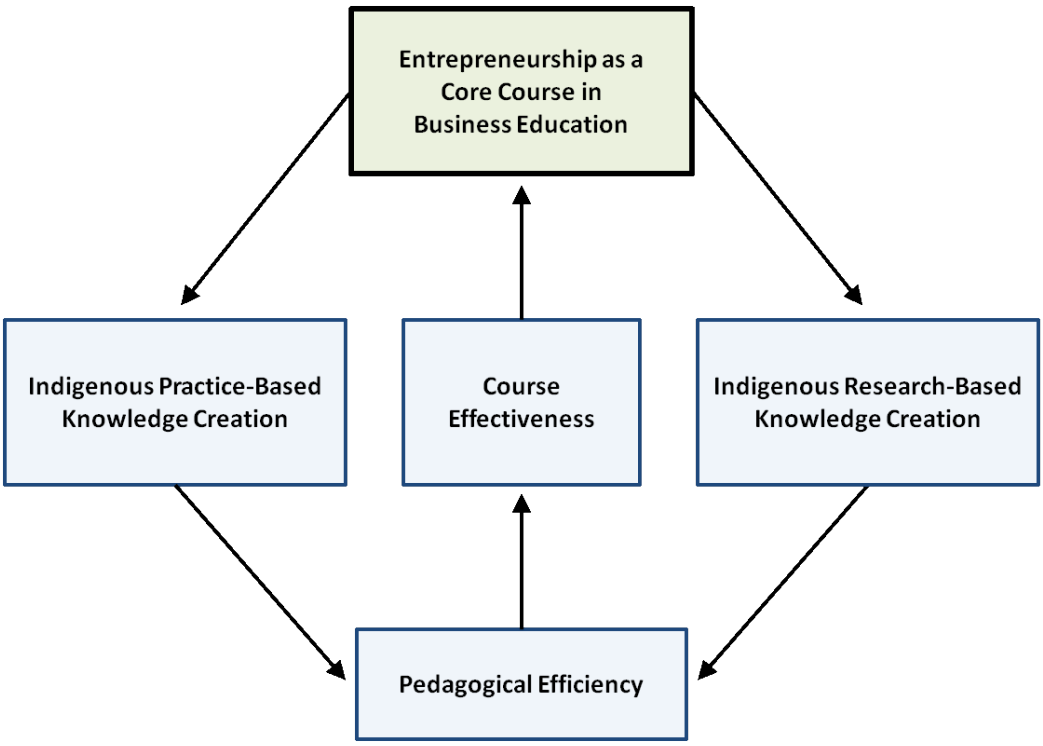

Figure 1. The proposed diamond framework for an effective entrepreneurship education ecosystem in emerging economies

Entrepreneurship Education in India

Rituparna Basu

Conclusion

The growing reliance on entrepreneurship as an antecedent to sustainable economic growth in developing nations seems to have passed the test of time. Historically, the many cases of failure scoring over the relatively few success stories with respect to the practice of entrepreneurship across the globe establish that, at a micro level, simply motivating the spirit of entrepreneurship is just not enough. Sound knowledge on the ways and means of doing business coupled with the right perspectives on the practice of innovation and cutting-edge ideas increases the probability that we will hear more success stories about business ventures in this fiercely competitive domain.

In emerging economies such as India, there is an urgent call for the development and promotion of effective indigenous entrepreneurship education systems. Although entrepreneurship is a practice-driven subject, the need to supplement it with contemporary theoretical knowledge is of paramount importance. Furthermore, the synergies of entrepreneurship as a field of study with other fundamental business management courses, such as marketing, necessitate a framework for developing entrepreneurship as a core course for students of business management to ensure an integrated learning platform. The need to develop such a course with the purpose of introducing this platform at foundation levels becomes imperative under such circumstances. A framework for building this effective entrepreneurship education ecosystem is surely the need of the hour and it requires a greater focus on knowledge creation to support the framework.

Thus, this attempt to develop a working framework for an entrepreneurship education ecosystem in India, supported by preliminary inputs and evidence, should therefore be considered as a conceptual beginning to work out an improvised design with further validation of the concepts. Future research ideas to facilitate the adoption and further development of the framework with empirical results and confirmations will not only add to the existing research base on entrepreneurship but will also aid the policy makers of a developing nation.

About the Author

Rituparna Basu is Assistant Professor in Marketing, Retail, and Entrepreneurship at the International Management Institute in Kolkata, India. She earned her PhD in Management from the Indian Institute of Technology (IIT) Kharagpur. She holds a BSc in Economics from St. Xavier's College, Kolkata, and she received a gold medal for her MBA degree. Dr. Basu has over 10 years of industry-academia experience, and she has worked with some of the best-known media companies as well as a startup niche magazine in national sales and marketing profiles for around five years prior to joining IIT.

References

Albornoz-Pardo, C. 2013. Is Business Creation the Mean or the End of Entrepreneurship Education? A Multiple Case Study Exploring Teaching Goals in Entrepreneurship Education. *Journal of Technology Management & Innovation*, 8(1): 1-10. http://dx.doi.org/10.4067/S0718-27242013000100001

Arthur, S. J., Hisrich, R. D., & Cabrera, Á. 2012. The Importance of Education in the Entrepreneurial Process: A World View. *Journal of Small Business and Enterprise Development,* 19(3): 500-514. http://dx.doi.org/10.1108/14626001211250180

Dearborn, J. 2012. The Unexpected Value of Teaching Entrepreneurship. *Huffington Post.* June 11, 2014: http://www.huffingtonpost.com/john-dearborn/entrepreneurship_b_1881096.html

Drucker, P. F., & Drucker, P. F. 2007. *Innovation and Entrepreneurship: Practice and Principles*. Routledge.

Dutta, S. 2012. Entrepreneurship and Global Competitiveness: A Study on India. *Indian Journal of Industrial Relations,* 47(4): 617-33.

Harrison, J. D. 2014. Can You Really Teach Entrepreneurship? *Washington Post.* June 11, 2014: http://www.washingtonpost.com/business/on-small-business/can-you-really-teach-entrepreneurship/2014/03/21/51426de8-a545-11e3-84d4-e59b1709222c_story.html

Hultman, C. M., & Hills, G. E. 2011. Influence from Entrepreneurship in Marketing Theory. *Journal of Research in Marketing and Entrepreneurship,* 13(2): 120-125.

Mutsuddi, I. 2012. Relevance of Entrepreneurship Cells in Technical Institutes and Business Schools. *The IUP Journal of Entrepreneurship Development,* 9(3): 58-71.

Pittaway, L., & Cope, J. 2007. Entrepreneurship Education: A Systematic Review of the Evidence. *International Small Business Journal,* 25(5): 479-510. http://dx.doi.org/10.1177/0266242607080656

Entrepreneurship Education in India

Rituparna Basu

Raichaudhuri, A. 2005. Issues in Entrepreneurship Education. *Decision (0304-0941)*, 32(2): 73-84.

Shankar, R. 2012. *Entrepreneurship: Theory and Practice*. India: Tata McGraw Hill

Swami, S., & Porwal, R. K. 2005. Entrepreneurship, Innovation and Marketing: Conceptualization of Critical Linkages. *Journal of Advances in Management Research*, 2(2): 54-69. http://dx.doi.org/10.1108/97279810580000378

Todd, P. R., & Javalgi, R. R. G. 2007. Internationalization of SMEs in India: Fostering Entrepreneurship by Leveraging Information Technology. *International Journal of Emerging Markets*, 2(2): 166-180. http://dx.doi.org/10.1108/17468800710739234

Venkatachalam, V. B., & Waqif, A. 2005. Outlook on Integrating Entrepreneurship in Management Education in India. *Decision (0304-0941)*, 32(2): 57.

Citation: Basu, R. 2014. Entrepreneurship Education in India: A Critical Assessment and a Proposed Framework. *Technology Innovation Management Review*, 4(8): 5–10. http://timreview.ca/article/817

Keywords: entrepreneurship, management education, marketing, qualitative research, India

The Government of India's Role in Promoting Innovation through Policy Initiatives for Entrepreneurship Development

Ravindra Abhyankar

> *"Innovation is the specific instrument of entrepreneurship. The act that endows resources with a new capacity to create wealth."*
>
> Peter F. Drucker (1909–2005)
> Author and management consultant

In spite of having a large publicly funded science and technology infrastructure and a sizeable education base, India has not been able to realize its innovative potential due to a fragmented innovation ecosystem. The government of India has taken many initiatives towards strengthening the innovation ecosystem, the most important of which are: i) the establishment of the National Innovation Council, whose mandate is to coordinate various innovation-related activities, and ii) the new Science, Technology and Innovation Policy 2013, which is intended to promote entrepreneurship and science-led solutions for sustainable and inclusive growth. With a focus on this new policy initiative, this article describes the current innovation ecosystem and the challenges it faces, and it discusses the efforts made by the government towards the promotion of innovation for entrepreneurship development and sustainable growth. With the implementation of this new policy the early indications are that India is poised to take a big leap towards innovation-led growth.

Introduction

India is a country with over 1.2 billion people, 379 million (31%) of which are between the ages of 18 and 35 (Census of India, 2011). And, many of these young people are in search of jobs, despite being educated. For example, only one in every four urban males under 29 years is employed even though they hold at least a certificate or diploma (National Sample Survey Office, 2013). The aim of the government has been to create employment opportunities for youth while focusing on rapid economic growth. Entrepreneurship development is one of the mechanisms adopted by the Government of India towards the creation of job opportunities. The government's assumption is that support for innovation will enhance entrepreneurship development, which will in turn accelerate economic growth.

In March 2010, Mrs. Pratibha Patil, 12th President of India, announced the government's vision by declaring the current decade as the "Decade of Innovation" (Nation Innovation Council, 2010). Several challenges to the desired creation of an ecosystem for innovation and entrepreneurship development are a cause for concern. However, there have been notable efforts taken by the government by announcing conducive policies and also efforts by various government departments towards fulfilling the above vision.

This article provides the necessary background to place the current innovation ecosystem within the Indian context, highlights some of the related challenges facing India today, and describes efforts made by the government towards the promotion of innovation for entrepreneurship development.

The Government of India's Role in Promoting Innovation

Ravindra Abhyankar

The Indian Context

The roots of India's current economic systems extend back to the time of colonial rule and its autocratic and fragmented structure. The country was made to forcefully serve as a market to its colonial bosses and their industrial products. Independence in 1947 brought many changes, but the country did not have to start "from scratch". The foundations of the today's legal, financial, educational, bureaucratic governance systems were inherited from the colonial period. Even the roots of publicly funded research structures, which have grown large today, date back to the colonial days. However, one key area of change following independence involved the adoption of a closed economy that relied heavily on central planning, restricted imports, and nationalization of industries. Not until 1991 did India open its economy, which led to real competitiveness and a need for innovation in all industries.

India today is a vast democratic country with a population of over 1.2 billion people with diverse ethnicities, religions, and languages. Nearly 70% of Indians live in rural areas (Census of India, 2011), and over past 20 to 30 years there has been a continuous flow of people from villages towards cities, mainly in search of work (Vinayakam & Sekar, 2013). The Indian economy is mostly based on agriculture, which depends on the unpredictable South-West monsoon. Given the large population, it is a considerable task for the government ensures adequate and affordable supplies of food, drinking water, clothing, housing, education, and healthcare.

The people of India, especially the young, crave employment. There is a limitation to employment opportunities offered by the various sectors of economy, but the government does provide employment guarantee programs. However, these programs are targeted at providing basic needs and tend to provide labour-intensive jobs that have no link with innovation. There is a realization that, "to sustain rapid growth and alleviate poverty, India needs to aggressively harness its innovative potential, relying on innovation-led, rapid, and inclusive growth to achieve economic and social transformation" (Dutz, 2007). The innovative potential of the young Indian population, if supported through an effective innovation ecosystem, holds potential for developing entrepreneurship and providing the growth and job opportunities that India needs.

India's national innovation system

The current national innovation system in India is a vast and complex system comprised of knowledge producers such as science and technology institutions, academia, and innovating individuals and knowledge users (e.g., industry-production/services in the public and private sectors). Various governments in India have given priority to science, technology, and innovation, and therefore India has evolved a large publicly funded R&D structure. There are various councils and research structures under various ministries, which cater to different research areas and which are distributed around the country. Examples include:

- Council of Scientific and Industrial Research (CSIR; csir.res.in): established in 1941; 39 laboratories
- Indian Council of Agricultural Research (ICAR; www.icar.org.in): established in 1929; 99 institutes and 17 research centres
- Indian Council of Medical Research (ICMR; icmr.nic.in): established in 1911; 30 laboratories
- Defence Research & Development Organisation (DRDO; drdo.gov.in): established in 1958; 48 laboratories

There are many other publicly funded institutions that perform research and technology development for industries related to steel, oil and natural gas, renewable energy, coal, textiles, railways, road transport, electronics and communication, environment and forests, irrigation, and so on. There are also more than 1200 privately or state-funded Scientific and Industrial Research Organizations (SIROs; dsir.gov.in).

In academia, there are 280 universities in the public sector, including institutions of high education such as Indian Institutes of Technology (IITs) and the Indian Institute of Science (IISc), in addition to more than 150 self-financing and deemed universities. There are also more than 2500 in-house R&D centres created by corporations, and there are non-government organizations (NGOs) that use and apply the available knowledge for the benefit of the society.

Furthermore, there are financial institutions such as the Industrial Development Bank of India (IDBI) and the Small Industries Development Bank of India (SIDBI), which lend support for innovation and also for commer-

The Government of India's Role in Promoting Innovation

Ravindra Abhyankar

cialization of innovative technologies besides entrepreneurship. Also, various fiscal incentives are offered by the Department of Scientific and Industrial Research (dsir.gov.in) towards the R&D activities performed by institutions, academia, and industry for supporting, nurturing and leading their innovations towards fruition.

All of these institutions were working mostly in a standalone mode prior to linearization of the economy in the 1990s. Since then, strong efforts have been made to harness the innovative capabilities of these structures by connecting them to one another and to industry and society, forming an innovation ecosystem.

India's innovation ecosystem

Broadly speaking, an innovation ecosystem is a combination of two distinct but largely separated economies: i) the knowledge economy (comprised of knowledge producers), which is driven by fundamental research, and ii) the commercial economy (comprised of knowledge users), which is driven by the marketplace (Jackson, 2013). In India, the innovation ecosystem includes the entire national innovation system described in the previous section, plus individual innovators and entrepreneurs; mentors; government policies; angel, venture capital, institutional, and industrial funding mechanisms, intellectual property rights mechanisms; technology transfer mechanisms; market inputs; and incentives, awards, and other innovation-recognition mechanisms, among others. Ideally, these various structures and mechanisms facilitate the smooth translation of innovations through the various segments of a complex innovation chain that takes ideas from "mind to market".

Thus, the functional goal of the innovation ecosystem is to enable technology development and innovation. But, how well is India's innovation ecosystem performing today? According to the Global Innovation Index (WIPO, 2014), India ranks 76th among the 143 countries surveyed, having fallen 10 positions since the last report and having fallen relative to other BRIC economies (tinyurl.com/lglu9ho). A smaller slide of one position down the rankings of the Global Competitive Index leaves India in 60th position among 148 countries (Schwab, 2013). As per OECD (2007) sources:

"India's GERD [gross domestic expenditure on R&D] was 0.76% in 2007, essentially unchanged since 2000... India's innovation system is dominated by universities and PRIs [public research institutions]... Government R&D expenditures accounted for 0.47% of GDP [gross domestic product]; Some 73% of public research is funded by block grants which are allocated on the basis of national research priorities... 95% of business research and development activities are funded by firms themselves, public financial support is negligible."

Together, these indicators suggest that, in spite of a large national innovation system, the current performance of the Indian innovation ecosystem appears weak. One may speculate that the reasons for this poor performance may be related to fragmentation and a lack of focus: the legacies and mindsets of the pre-economic liberalization era are still being carried forward by some of its constituent stakeholders. At least, this speculation finds support in the government's attempts to address many of these challenges in its recent policy on innovation (Ministry of Science and Technology, 2013). The policy initiatives undertaken by the Government of India to improve the innovation ecosystem are described below; but first, the following section presents the author's view of the current challenges facing India's innovation ecosystem.

Current Challenges

The author's view of the key challenges faced by India's innovation ecosystem and entrepreneurship in general are listed and described below:

1. *Fragmented policy and policy implementation:* There has been no comprehensive policy focusing on innovation and entrepreneurship so far. Also, the mechanisms to operate existing, fragmented policies were not uniform, which resulted in gaps in understanding and failure to achieve the desired effects of such policies.

2. *Inadequate funding of R&D:* Little national funding is available for R&D: from 2011 to 2012 it was only 0.88% of gross domestic product (NSTMIS, 2013). Consequentially, even less funding is available to the academic and R&D institutions. Out of the total R&D expenditure incurred in the country, about 63% of the expenditure is incurred by the government itself and the total R&D expenditure incurred by industry altogether is equivalent to the amount just one global multinational spends on its in-house R&D (NSTMIS, 2013).

3. *Difficult and lengthy funding procedures:* Although funding is available from banks and public sources the procedures for accessing such funding are often complex, cumbersome, lengthy, and bureaucratic, in other words, not conducive to innovation and entre-

The Government of India's Role in Promoting Innovation

Ravindra Abhyankar

preneurship. Moreover, despite these difficult and lengthy procedures, the system seeks immediate returns. However, the returns from innovation are often uncertain, late, or not quantifiable immediately.

4. *Angel, venture capital, and seed funding:* Despite 100 angel networks operating in India (e.g., Indian Angel Network: indianangelnetwork.com; Mumbai Angels: mumbaiangels.com), only tens of deals are made each year, according to the "Report of the Committee on Angel Investment & Early Stage Venture Capital" (Planning Commission, 2012). For such a populous country, this magnitude of deals is very low compared to the numbers from abroad and fall short of India's requirements. The report also indicates low levels of early-stage venture capital investment: around US$ 240 million per year. And, here also, there are only few hundred deals per year. Indian angels are constrained by regulations that make investment and exit cumbersome (Planning Commission, 2012).

5. *Weak linkages between stakeholders:* The linkages between industry, especially medium and small-scale enterprises and R&D or academic institutions are weak. Industry requires proven technologies, but the institutions can only offer technologies at considerably earlier stages (i.e., at mostly a laboratory or pilot scale), meaning there is still much work to be done to bring the technologies to market. There is also considerably less funding and mentorship support available from the private sector. There is no easy exchange of manpower between the industries and academia or R&D institutions, which limits their capacity for mutual understanding and technology transfer.

6. *Non-conducive education system:* The general education system is still too focused on grades and careers and is not oriented toward innovation and entrepreneurship. This situation is further worsened by the inherent problems of lack of infrastructure and good facilities in the educational institutions; delays in the funding system; and delays in the funds or other support reaching innovation projects. While industry craves solutions to their problems, the academic institutions are generally too busy performing routine academic exercises, churning out educated manpower that is often ill suited to either innovative industries or entrepreneurship. However, exceptions to this general view include a few high-end academic institutions such as Indian Institutes of Technology and similar institutions.

7. *Poor infrastructure facilities in villages:* Basic infrastructure facilities such as electricity, Internet, roads and rail, and even the availability of a skilled workforce, are not evenly distributed in India and often weak in smaller cities or towns and rural parts of the country. Thereby, there is less scope for innovation and entrepreneurship to flourish in such areas. In most cases, innovators and entrepreneurs must travel long distances – at their own expense – to receive mentorship or other support.

8. *Risk aversion among entrepreneurs:* Indian entrepreneurs often seek established technology as a basis for starting their business; they are hesitant to take on innovative ideas because of the risks involved, including the low availability and high cost of funds that often arrive too late. As a result, they look for minimum risk and quick returns. The potentially higher returns from innovation take time to realize, and not enough entrepreneurs are willing (or able) to accept the risks.

9. *Inadequate protection of intellectual property rights:* In India, the intellectual property regime is weak. Innovators do not generally seek protection for their intellectual property unless forced to. For most entrepreneurs, patents and other forms of protection take too long and cost too much. Patent literacy is very low, even among educated innovators, and there is a lack of expert help available, except in the medicine and pharmaceutical industry.

New Policy Initiatives

As mentioned earlier, the Government of India declared 2010-2020 as the "Decade of Innovation", for which the roadmap would be prepared by the newly established National Innovation Council (NInC; innovationcouncil.gov.in). The National Innovation Council is "the first step in creating a crosscutting system which will provide mutually reinforcing policies, recommendations and methodologies to implement and boost innovation performance in the country" (Nation Innovation Council, 2010). *The Science, Technology and Innovation Policy 2013* outlines the major policy initiatives to strengthen the innovation ecosystem and give a boost to the development of innovation-led entrepreneurship in India:

"The guiding vision of aspiring Indian STI [Science, Technology, and Innovation] enterprise is to accelerate the pace of discovery and delivery of science-led solutions for faster, sustainable and inclusive growth. A

The Government of India's Role in Promoting Innovation

Ravindra Abhyankar

strong and viable Science, Research and Innovation System for High Technology-led path for India (SRISHTI) is the goal of the new STI policy." (Ministry of Science and Technology, 2013).

Below, the key initiatives of this policy are explored in light of the challenges identified in the previous section:

1. *Funding:* The policy announces an increase in the gross expenditure in research and development (GERD) from less than 1% to 2% of the gross domestic product over the next five years. It also states that a National Science, Technology and Innovation Foundation will be established "as a public-private partnership (PPP) initiative for investing critical levels of resources in innovative and ambitious projects" (Ministry of Science and Technology, 2013), thus attracting private sector investments in R&D. It further announces the establishment of a fund for innovations for social inclusion, "small idea-small money", and a "risky idea fund". These funds are designed to address the funding-related challenges described in the previous section. The policy does not mention angel or venture capital funding but the above measures will fulfill some of the requirements of innovators and entrepreneurs and the innovation ecosystem overall. It also addresses the "rigidities" in centrally developed plans for investment and assures a flexible approach that allows fine tuning of the government's five-year plans in response to rapidly changing science and technology, and it addresses the challenge of outdated procedures adopted for funds disbursement for innovative projects.

2. *Strengthening the linkages between stakeholders:* The policy calls for "special and innovative mechanisms for fostering academia–research–industry partnerships" and facilitating the "mobility of experts from academia to industry and vice versa" (Ministry of Science and Technology, 2013). This initiative should help address the challenge related to linkages and should facilitate understanding within such partnerships.

3. *Promotion of science:* The policy promotes the spread of scientific interest and understanding across all sections of society. The policy will "further enable school science education reforms by improving teaching methods, science curricula, motivating science teachers and schemes for early attraction of talent to science" (Ministry of Science and Technology, 2013). In these ways, the policy addresses the need for educational reforms.

4. *Risk taking ability:* The policy accepts risk as an integral part of a vibrant innovation system. The policy emphasizes risk sharing by the government, which is slated to "significantly increase private sector investment in R&D and technology development" and "new financing mechanisms would be created for investing in enterprises without fear of failure" (Ministry of Science and Technology, 2013).

5. *Intellectual property:* The policy will seek to "establish a new regulatory framework for data access and sharing [and for the] creation and sharing of intellectual property. The new policy framework will enable strategic partnerships and alliances with other nations through both bilateral and multilateral cooperation in science, technology and innovation. Science diplomacy, technology synergy and technology acquisition models will be judiciously deployed based upon strategic relationships" (Ministry of Science and Technology, 2013). Thus, this initiative is very important for international collaborations.

6. *Addressing the innovation value chain:* The policy also enables a holistic approach to the complex value chain of innovation by providing science and technology interventions at all levels of research, technology and manufacturing, and services in the areas of socioeconomic importance. In this way, the policy has a very positive note and expresses a desire to shape the future of India. With the advantages of a "large demographic dividend" and a "huge young talent pool", the policy foresees the achievement of national goals for sustainable and inclusive growth (Ministry of Science and Technology, 2013).

7. *Participation in global R&D infrastructure:* The policy proposes the creation of "high-cost global infrastructure in some fields through international consortia models. Indian participation in such international projects will be encouraged and facilitated to gain access to facilities for advanced research in cutting edge areas of science. This will also enable the Indian industry to gain global experience and competitiveness in some high-technology areas with spin-off benefits" (Ministry of Science and Technology, 2013).

The *Science, Technology and Innovation Policy 2013* thus tries to join the fragmented pieces of the Indian innovation ecosystem and bring it into the sharper focus. It addresses the need to enhance scientific understanding and skills among the young and aspires to position India among the top five global scientific powers by 2020. It also links the contributions of science, research,

The Government of India's Role in Promoting Innovation

Ravindra Abhyankar

and innovation with an inclusive growth agenda with the aim of forming a robust and focused national innovation system. Importantly the policy supports entrepreneurship driven by science, technology, and innovation with viable and highly scalable business models. A key mechanism is investment in young innovators and entrepreneurs through education, training, and mentoring. This positive signs indicate that the government has fulfilled its role on the policy front. Now, it will be up to all the departments of the government to build innovative delivery mechanisms to take the fruits of this policy to the people of the country.

Other Government Initiatives

In this section, other government initiatives beyond the scope of the *Science, Technology and Innovation Policy 2013* are described.

Lead paper on technology and innovation for the current five-year plan
India follows five-year plans for planning and implementation, and the 12th Five Year Plan (2012-2017) includes a lead paper on "Technology and Innovation" (Planning Commission, 2011), which says that:

"Strengthening the innovation ecosystem requires a platform for information sharing and dissemination to ensure: (1) improved access to knowledge and (2) support in the form of resources, linkages, mentoring and outreach. Greater knowledge of innovations can stimulate their adoptions on a longer scale. This decentralized, open and networked model would enable information sharing on innovations and collaboration among stakeholders."

India Inclusive Innovation Fund
The India Inclusive Innovation Fund (tinyurl.com/m5n6864) is designed to "combine innovation and dynamism of enterprises to solve the problems of the bottom of the pyramid in India" (National Innovation Council, 2014). The initial investment of INR 500 crores (approximately $83 million USD) is slated to expand 10 times. The government will contribute 20% of the fund, and the rest will come from financial institutions, insurance companies, multilateral/bilateral development agencies, and Indian and global corporations. The life of the fund is nine years, and it will focus on healthcare, food and nutrition, agriculture, education energy, financial inclusion, and environment technology, among other areas.

Initiatives from the Ministry of Science and Technology
The following initiatives have been undertaken by the Ministry of Science and Technology:

1. Biotechnology Industry Research Assistance Council (birac.nic.in)

2. India Innovation Growth Program (www.indiainnovates.in)

3. National Innovation Foundation (nif.org.in)

4. Promoting Innovation in Individuals, Start-ups and MSMEs (PRISM; www.dsir.gov.in/12plan/prism/prism.htm)

5. Council of Scientific and Industrial Research Innovation Complexes (www.csir.res.in)

6. Patent Assistance Programs operated by the Technology Information, Forecasting and Assessment Council (tifac.org.in) and the National Research Development Corporation (nrdcindia.com)

7. Technology Business Incubators operated by the Department of Science and Technology (dst.gov.in)

8. Small Business innovation Research Initiative (sbiri.nic.in)

9. Technology Development and Demonstration Program (tinyurl.com/mbfxedv)

Programs by other ministries
There are other schemes created by various other ministries, including the following:

1. Various programs from the Ministry of New and Renewable Energy (mnre.gov.in)

2. The Information Technology and Research Academy (medialabasia.in/itra/itra/) from the Ministry of Communication and Information Technology

Conclusion

India has a large, demographically diverse population, with many young people seeking employment. The country is on a path to growth, but the rate of growth has been slow. The government has realized the roots of the basic problems and made appropriate reforms,

The Government of India's Role in Promoting Innovation

Ravindra Abhyankar

mainly in the areas of administration, economy, and labour, as it tries to free itself from negative aspects of its colonial legacy. There has been a substantial thrust toward science, technology, and innovation in past 20 years, and many initiatives have been undertaken in that direction. However, the investments in science, technology, and innovation are not yet translating into the desired reality. Realizing that the innovation-led entrepreneurship development holds promise for growth, the government has taken major policy initiatives with a strong innovation agenda.

There are formidable challenges in realizing the goal, but as this article has shown, the *Science, Technology and Innovation Policy 2013* is a big step in the right direction, because it addresses most of the key challenges in developing an effective innovation ecosystem. The main initiatives are provision of funds and removing the sluggishness in the ecosystem for innovations by improving linkages and making it vibrant in a comprehensive way. The policy is in place; now, its success depends on its implementation. Some time will needed before conclusions can be drawn about the policy's ultimate effects on the growth path. However, the new direction reflects strong growth aspirations and resonates with the zeal and zest of the youth who wish to journey on the risky path of innovation-based entrepreneurship.

About the Author

Ravindra Abhyankar is an Electrical Engineer who has worked in the Government of India in various capacities. After working for 17 years in the Ministry of Defense (1974–1990) in the field of quality assurance, technical development, and indigenization of various fighter aircraft and other aeronautical systems, he joined the Ministry of Science and Technology in the Department of Scientific and Industrial research (DSIR). In this ministry, he handled various responsibilities such as administering fiscal incentives for R&D and supporting innovation at the individual and industrial levels for over 20 years (1990–2011). He was the nodal officer in the Government of India for the Asian and Pacific Center for Transfer of Technology (APCTT), which is a United Nations initiative dedicated to capacity building of Asia-Pacific countries to nurture and promote national innovation systems and also to create enabling environments for the development and transfer of technology and R&D management. He has also functioned as an Adviser to the Science and Technology Minister of Mozambique (2012–2014) in the creation of a publicly funded R&D system for the benefit of Mozambican industry.

References

Census of India. 2011. *Population Enumeration Data.* Government of India: Office of the Registrar General & Census Commissioner.

Dutz, M. A. 2007. *Unleashing India's Innovation: Towards Sustainable and Inclusive Growth.* Washington, DC: The World Bank.

Jackson, D. J. 2013. *What Is an Innovation Ecosystem?* Arlington, VA: National Science Foundation.

Ministry of Science and Technology. 2013. *Science, Technology and Innovation Policy 2013.* Delhi: Government of India.

National Innovation Council. 2010. *Decade of Innovation.* Government of India: National Innovation Council.

National Innovation Council. 2014. *Government to Launch India Inclusive Innovation Fund - Press Note.* Government of India: National Innovation Council.

National Sample Survey Office. 2013. *Key Indicators of Employment and Unemployment in India 2011–12, 68th Round.* Government of India: National Sample Survey Office.

NSTMIS. 2013. *Research and Development Statistics at a Glance 2011-12.* Government of India: National Science and Technological Management Information System.

Planning Commission. 2011. *Twelfth Five Year Plan: Technology and Innovation.* Government of India: Planning Commission.

Planning Commission. 2012. *Creating a Vibrate Entrepreneurial Ecosystem in India: Report of the Committee on Angel Investment & Early Stage Venture Capital.* Government of India: Planning Commission.

Schwab, K. (Ed.). 2013. *The Global Competitiveness Report 2013-2014: Country Profile Highlights.* Geneva: World Economic Forum.

WIPO. 2014. *The Global Innovation Index 2014: The Human Factor in Innovation.* Fontainebleau, Ithaca, and Geneva: Cornell University, INSEAD, and the World Intellectual Property Organization (WIPO).

Vinayakam, K., & Sekar, S. P. 2013. Rural to Urban Migration in an Indian Metropolis: Case Study Chennai City. *IOSR Journal of Humanities and Social Science,* 6(3): 32-35. http://dx.doi.org/10.9790/0837-0633235

Citation: Abhyankar, R. 2014. The Government of India's Role in Promoting Innovation. *Technology Innovation Management Review,* 4(8): 11–17. http://timreview.ca/article/818

Keywords: India, innovation, entrepreneurship, government, policy, economic growth, innovation ecosystem

The Role of Managers as Agents in Successful Service Innovations: Evidence from India

Shiv S. Tripathi

> *"One person should not give orders to another person, but both should agree to take their orders from the situation. If orders are simply part of the situation, the question of someone giving and someone receiving does not come up."*
>
> Mary Parker Follett (1868–1933)
> Management theorist and consultant

The article is based on a three-year study of 70 business executives belonging to 20 large organizations operating in India to identify the kind of interventions used by agents (managers) to make service innovations successful. For the purpose of analysis, the subject organizations were classified into highly successful, successful, and unsuccessful organizations on the basis of their growth rate, and their practices were analyzed to identify the role of agents in those processes or related decisions. The article also compares the practices followed by organizations based in India with global organizations operating in India to understand the contextual issues of service innovations.

Introduction

According to Gallouj (2002), services have three distinct features: i) they are processes, ii) they are interactive, and iii) there can be extremely diverse. This complex nature of services sets them apart from products (i.e., goods), whose development is relatively linear and independent. When a service-based organization chooses the path of innovation, it needs to be careful, because the development of successful service innovations requires more careful thought than the development of products. A company can offer an innovative service only when there is a management resolve and the service has a high probability of success in the market (Van de Ven, 1986). The reason is that service innovations are often a result of the demand of market or the clients (Barras, 1986; Pavitt, 1984), co-production (den Hertog, 2000), or close co-operation of the supplier and the client (Tether & Hipp, 2002). Therefore, unlike product innovations, whose acceptance or rejection by the market or the clients is visible almost immediately after the launch, services take a relatively longer time to gain acceptance. Industry-wise, there is also a marked distinction between manufacturing/product-based firms and service-based firms: the latter focus more on organizational innovations as compared to the product or process innovations of the former (Chamberlin et al., 2010). Thus, service innovations have organization-wide effects, whereas product innovations might affect only one line of business or product.

Another difficulty is that the immediate advantage of a service innovation may not be as objectively visible as a product; hence, service-innovation ideas may face increased scrutiny prior to implementation (de Jong et al., 2003). However, once a service innovation is implemented, and the feedback is positive, gaining commercial advantage can be relatively easier.

Thus, if a service-based organization wants to innovate, the agents (managers) have an important role to play in seeing that the service innovation overcomes every hurdle, because it is an organization wide effort that makes a service innovation successful. However, a key question remains as to whether the support provided by these agents really does make service innovations successful or whether these agents knowingly or unknowingly act as an impediment to successful service innovations.

The Role of Managers as Agents in Successful Service Innovations

Shiv S. Tripathi

To help answer this question we look to agency theory. A typical agency relationship is the one where one party (i.e., the principal) delegates work to another (i.e., the agent) who performs that work (Jensen & Meckling, 1976). Agency theory is concerned with solving two problems that might occur in agency relationships. The first problem occurs when the desires and goals of the principal and agent are in conflict with each other and it is difficult for the principal to verify what the agent is actually doing. The second problem occurs when the principals and agents have different attitudes towards risk. The present article focuses on the second issue, where the daily demands of their work cause the agents (managers) to become risk averse and thus curb the real spirit and potential of innovation present in the organization, which often brings them into conflict with the principal (Eisenhardt, 1989). Due to this risk aversion, an agent might apply their discretion in matters related to inputs, processes, and outputs of innovation and will not involve or pay attention to the frontline coworkers (Edgett & Parkinson, 1994, Easingwood, 1986), which might give birth to a "routines" that curb the development of a radically innovative service.

Thus, large organizations are faced with a dilemma as to whether to support innovations or focus on the sustainability of the organization. The solution lies in combining both efforts. The first part of the dilemma is the agency conflict: agents at all levels may not be ready to take risks that the principals might want them to take. The second part of the dilemma is the difficulty in making the organization sustainable, which is a challenge faced not only by startups but also large and established organizations, who may struggle to achieve for sustainable growth (McGrath, 2013). The present research is limited to large organizations only and explores the process of service innovations in large private sector organizations operating in India, including global organizations operating in India.

This article also examines the leadership view of an organization, which suggests that, even if an organization has the requisite resources and dynamic capabilities, it is the leadership that steers the innovative new service towards success (Chandy & Tellis, 2000; Si & Wei, 2012). It has been reaffirmed by researchers that visionary leadership is a necessary ingredient for innovation (Anderson & West, 1998; Thamhain, 2003; Tidd & Bessant, 2009) and therefore, the amount of time spent by senior executives on activities related to innovation is also important. Therefore, this article critically examines the role of executives as agents in successful service innovations.

Research Methodology

The current study is based on 70 in-depth interviews, lasting between 40 minutes and 1 hour and 45 minutes, with experienced executives from 20 organizations either based in India (8 organizations) or operating in India (12 global organizations). Each of these organizations were large (cf. OECD, 2005); each had a turnover of at least $200 million USD and was listed in one or more of the following stock exchanges: New York Stock Exchange, London Stock Exchange, Nasdaq, Bombay Stock Exchange, or the National Stock Exchange (of India).

Only service innovations developed by these subject organizations in the previous two years were considered. These service innovations included incremental or radical innovations but excluded routine process improvements. The idea was to select those service innovations that had a positive impact on revenue growth of the organization.

The organizations were categorized into highly successful, successful, and unsuccessful organizations based on three years of compounded annual growth rate (CAGR) of their net profit after tax. Organizations having a growth rate over 20% were classified as highly successful, those with growth rates between zero and 20% were classified as successful, and those having a negative growth rate were classified as unsuccessful.

Out of 22 items included in the discussion guide for the interviews (Tripathi et al., 2013), 19 analytical items were identified as themes that were discussed in detail with the respondents. The other three items were dropped because they were direct questions. In the following section, the practices followed by each category of organization are listed. A parallel comparison between organizations based in India and their global counterparts operating in India is also made, and discussion of the overall role played by the agents in these organizations is provided. The responses against each type of organization are the actual direct responses of the respondents analyzed through grounded theory methodology following Strauss and Corbin (1998).

Summary of Key Findings

For each of the 19 themes, this section summarizes the typical response from the interview subjects based on the success level of their organization. Also, for each theme, the role of agents in organizations based in India is compared against global organizations based in India.

The Role of Managers as Agents in Successful Service Innovations

Shiv S. Tripathi

Theme 1: Number of innovators in the organization

- *Highly successful organizations:* innovators include top management and the majority of managers, but innovation is encouraged throughout the organization
- *Successful organizations:* top 5–10% of employees; primarily, senior management is the driver; a few other managers also drive innovation
- *Unsuccessful organizations:* only the top management drives innovation; others are not encouraged
- *Role of agents:* only the top management controls the innovation front; employees down the line are not empowered to innovate. In contrast to organizations based in India, the process is more democratized with their global counterparts, where it is not limited to the top management, and employees down the line are encouraged to innovate in services.

Theme 2: Incentives for innovation

- *Highly successful organizations:* primarily non-monetary incentives, such as awards, recognition, job advancements in India or abroad, or implementation of ideas
- *Successful organizations:* no incentives unless there are patents; primarily rewards and recognition for patents
- *Unsuccessful organizations:* monetary incentives such as one-time rewards, gifts (e.g., iPads), or a lump sum . The belief is that monetary incentive is better because, when there is a lot of scope for innovation, the organization cannot recognize everyone.
- *Role of agents: f*or companies based in India, the rewards and recognition systems are typically driven by agents and are often discretionary (and biased). The opposite is true with most of their global counterparts who rely on an open reward system with minimum intervention, often as part of a process of innovation that includes a reward system.

Theme 3: Frequency of change of mission statement

- *Highly successful organizations:* as per the demand of the market or business environment; to stay ahead in the market; as per changing market dynamics
- *Successful organizations:* changed rarely or not changed unless there is a restructuring
- *Unsuccessful organizations:* changed rarely or not changed unless there is a restructuring or crisis
- *Role of agents:* the agents in Indian organizations are not bothered about the internal communication of the change in mission statement because they do not feel it is important. In contrast, their global counterparts are relatively active in communicating any change in the mission statements to employees down the line, because they believe it enables better control and synchronization across all subsidiaries, and maintaining good communication and transparency.

Theme 4: Time to market

- *Highly successful organizations:* instantaneous to maximum of six months in the case of small improvements; in case of a major capital expenditure project, it may take up to one year
- *Successful organizations:* the majority of successful organizations require two to six months for small ideas/projects to reach the market; for large ones, up to one year
- *Unsuccessful organizations:* for small improvements the time to market is two to six months; for large ones, it takes two to five years
- *Role of agents:* if the idea provides a promising business opportunity or competitive advantage, agents in both types of organization take an active interest so that the service is launched in the market. Therefore, both the India-based organizations and their global counterparts are similar in this regard.

Theme 5: Number of ideas pursued by the company in a year

- *Highly successful organizations:* 10 to 15 ideas per year
- *Successful organizations:* two to five ideas in a year; the limitation is the capacity to execute, not the lack of ideas
- *Unsuccessful organizations:* none, one, or two ideas; respondents had no idea what was happening in other departments; execution is a problem
- *Role of agents:* distinctively, the agents in Indian organizations promote two to five ideas per year, out of which they expect one or two ideas to succeed. Their global counterparts allow all potential ideas to pass

The Role of Managers as Agents in Successful Service Innovations

Shiv S. Tripathi

through the stage gates of innovation. However, agents in Indian organizations try to dictate the selection of final ideas, which results in execution problems at a later stage.

Theme 6: Time required in funding innovation

- *Highly successful organizations:* funding is immediate or within six months; whatever time taken (if any) is for the feasibility study
- *Successful organizations:* two to six months in most cases where the scale of implementation is small and one to three years where the scale of implementation is large
- *Unsuccessful organizations:* if the service is successful, there is no problem: adequate funds are available. However, the time depends on the amount of funds required and, at times, it is expedited if the person is a veteran in the company. Thus, employees with less experience find it difficult to negotiate for funds even if their ideas are commercially the best.
- *Role of agents:* although agents in both types of organizations show equal eagerness to fund potential innovations, in Indian organizations, the vision of agents is sometimes coloured by the experience and stature of the person floating the idea, and tend to neglect the ideas of a relatively new employee, at times even at the cost of merit.

Theme 7: Number of services the company is planning to launch in the next year

- *Highly successful organizations:* 20 to 30 service ideas are floated, but ultimately, only one or two merit a feasibility study
- *Successful organizations:* 20 to 100 ideas are floated; 20 to 100 merit a feasibility study
- *Unsuccessful organizations:* 10 to 15 ideas are floated; one merits a feasibility study
- *Role of agents:* both Indian and global organizations promote the ideation of new services; however, when comes to finalizing a new service for the client, the Indian organizations are at times biased towards the past successes and are not willing to accept radical departures from the past. Therefore, the agents in Indian organizations start looking at the background of an innovator as compared to the merit of an idea.

Theme 8: Number of intrapreneurs

- *Highly successful organizations:* at most, 5% of employees might have directly contributed; otherwise they all contribute because it is presumed to be a part of their job.
- *Successful organizations:* around 10 people at the top (i.e., a specific number that can be counted), but others are not empowered to be intrapreneurs
- *Unsuccessful organizations:* maximum 1–3% people at the top
- *Role of agents:* In Indian organizations, intrapreneurs by and large belong to the top management only. In global organizations, an employee even at a junior level has the opportunity to spearhead the service innovation if their idea is accepted.

Theme 9: Number of employees becoming entrepreneurs after leaving the company

- *Highly successful organizations:* one to ten employees (i.e., a specific number that can be counted)
- *Successful organizations:* very few or none; most employees who leave the company join another company
- *Unsuccessful organizations:* very few people leave the organization to become entrepreneurs, they leave to join a better company
- *Role of agents:* due to a limited scope of corporate entrepreneurship owing to agents and at times due to the nature of business, a number of employees leave Indian organizations to start their own business or to take up greater responsibilities in other organizations. However, their global counterparts do not typically leave organizations to start a new business; rather they switch organizations to take up greater responsibilities elsewhere.

Theme 10: Percentage of people trained in innovation

- *Highly successful organizations:* around 30–40% employees are trained in innovation
- *Successful organizations:* around 10-30%; for most of employees, there is no training on innovation per se
- *Unsuccessful organizations:* 1 to 2% of top management people are trained in innovation. Others are

The Role of Managers as Agents in Successful Service Innovations

Shiv S. Tripathi

provided with routine training on services because they are not empowered to innovate.

- *Role of agents:* in Indian organizations, innovation training is typically initiated and given only to the agents (especially the top management); others are provided with the routine training only. However, their global counterparts provide training in innovation not only to the agents but also to key employees, irrespective of their level in the management hierarchy.

Theme 11: Number of people agreeing that there is a focus on strategic innovation

- *Highly successful organizations:* around 75% of employees would agree, but employees are unhappy when they lose out to competition
- *Successful organizations:* 10–30%
- *Unsuccessful organizations:* 60–80%
- *Role of agents:* here, the agents play a positive role in motivating the actors sufficiently so that they believe that the organization is innovating strategically innovations even if it is not actually able to do so. Personal interaction plays a major role in the Indian organizations, whereas in the global counterparts, all service innovations are promoted internally as well as externally so that everybody comes to know about a particular service.

Theme 12: Existence of a process to generate new business ideas within the company or outside the company

- *Highly successful organizations:* in a majority of cases, processes for both directions exist
- *Successful organizations:* idea generation is primarily "in-house"; there is an absence of process in some cases
- *Unsuccessful organizations:* idea generation is primarily "in-house"; implementation is a problem.
- *Role of agents:* the agents in this case act as gatekeepers who may "kill" the idea at one stage or another if they do not believe in it. All organizations based in India lacked a formal process to generate new business ideas either in-house or from outside the organization. Their global counterparts operating in India had processes in place and thus avoided the interference of agents.

Theme 13: Availability of funds for innovation

- *Highly successful organizations:* plenty of funds are available, but there is a lack of good ideas
- *Successful organizations:* sufficient funds are available; outside collaboration is not required for financing; for high-risk projects, collaboration diversifies the risk
- *Unsuccessful organizations:* enough funds are available, but formal processes for innovation and fund allocation are lacking
- *Role of agents:* the agents controlled the sources and allocation of funds, and at times promoted mediocrity by allocating the funds to a favourite and not to the person having the best service innovation. In the global organizations, although the agents controlled the allocation of funds, they could not be biased because there were processes in place where only the winning ideas for service innovation would receive funding.

Theme 14: Responsiveness of top management

- *Highly successful organizations:* top management takes responsibility and is cooperative; it is a part of company culture
- *Successful organizations:* in most cases, top management takes responsibility or provide support
- *Unsuccessful organizations:* in many cases, top management will not take responsibility unless they are liable to take the blame for failure; there is also difficulty in implementing innovations
- *Role of agents:* in the majority of the above themes, there were thorough interventions by agents in Indian organizations; as a consequence, they took the responsibility for failures of innovative services provided unless there was an opportunity to place blame on others. In their global counterparts, because independence was given to the person whose idea of service innovation was implemented, the person heading the project directly held the responsibility for its success or failure, and the agents had no intervening role.

The Role of Managers as Agents in Successful Service Innovations

Shiv S. Tripathi

Theme 15: To launch a new service or revive an existing one

- *Highly successful organizations:* consider launching a new service almost every time
- *Successful organizations:* launch and revival in the ratio of 60:40; would launch new services if able to do so
- *Unsuccessful organizations:* launch new services in most cases
- *Role of agents:* the agents in almost all Indian organizations promoted the revival of existing services as the first option and launching new services as the second; they had limited willingness to take risks. Even when there was a requirement to launch new products, the agents used it as a last resort and therefore "killed" the launch of a new service at the right time in the market. Their global counterparts took calculated risks, although they preferred to launch new service as compared to reviving the old services. However, exceptions to these typical scenarios were found in both types of organizations.

Theme 16: The number of services being deliberately developed since last year

- *Highly successful organizations:* on their own, one to two services; as per the client's demand - 15 to 20; patents were being filed as required by the companies
- *Successful organizations:* in a majority of cases, two to five; patents were being filed as required by the companies
- *Unsuccessful organizations:* deliberately, one to two services; activities in the rest of the organization were not known
- *Role of agents:* the agents of Indian organizations promoted the development of one to two services only, whereas their global counterparts promoted substantially more due to the fact that the new service innovations were directive-driven in the Indian organizations as compared to proactive developments by the global organizations.

Theme 17: Perception of employees about their company innovating to stay ahead in the market

- *Highly successful organizations:* positive; employees perceive that their organization is better able to read industry trends than others
- *Successful organizations:* in a majority of cases, the perception is that their organization is innovating or at least attempting to innovate
- *Unsuccessful organizations:* the perception is that their organization innovates as the market dynamics requires and to stay visible in the market
- *Role of agents:* the agents of both types of organizations were able to create an environment in which the employees thought that their company innovates to stay ahead in the market. This perception was a result of mentoring provided by the agents in Indian organizations and empowerment provided by the agents in the global organizations.

Theme 18: On innovating as required by the client or on its own

- *Highly successful organizations:* in a majority of cases, both drivers of innovation exist
- *Successful organizations:* both drivers of innovation exist, but in a majority of cases, it depends on market need or when the clients demand particular solutions.
- *Unsuccessful organizations:* mostly as required by the market
- *Role of agents:* the agents of most of the Indian organizations promoted the maintenance of status quo and were reluctant to support service innovations on their own unless the technology itself evolved or it was demanded by the client. In contrast, their global counterparts were more involved in supporting the development of service innovations proactively so that they can offer them to their clients before any competing organization does.

Theme 19: The success rate of innovative services launched by the company

- *Highly successful organizations:* 30–50% in most cases
- *Successful organizations:* 30–40% in most cases
- *Unsuccessful organizations:* around 20%
- *Role of agents:* the success rate of service innovations in Indian organizations was similar to their global counterparts due to the quantity of new ideas for ser-

The Role of Managers as Agents in Successful Service Innovations

Shiv S. Tripathi

vice innovations supported by the agents. Although the Indian organizations followed fewer ideas and experienced fewer failures, the global organizations followed more ideas and achieved more successes.

Discussion and Conclusion

The findings suggest that, in Indian organizations, there is a substantial intervention by agents across most of the themes as compared to their global counterparts operating in India. In most cases, the intervention of agents is negative: for example, innovators are limited to a number of agents; awards/rewards for innovation are at the discretion of agents; agents do not feel the need to convey major changes in the direction of company to people down the line; there is a lack of a formal process for fund allocation to innovation projects; agents avoid accepting fresh ideas by relatively inexperienced people; they keep intrapreneurship opportunities to themselves; a formal process for idea generation is absent, giving agents discretionary powers; there is virtually no innovation training except to agents at a certain level; agents are risk averse in terms of launching new services; and there is a lack of interest in proactive service innovation among agents. Since there is a high degree of negative intervention of agents in the service innovation process, it becomes supervisor-driven and not self-driven, and that is why organizations in India tend to follow a kind of "directed innovation". In certain cases, where the agent (or manager) provides mentorship personally to staff at lower levels, it is a positive intervention provided they empower those employees to take decisions on their own.

To understand the cause of these often negative interventions of agents one needs to first understand that India follows a management system that is neither too individualistic, like the United States, nor it is purely collectivist, like Japan; rather, it is somewhere in between. This "in between" position gives substantial discretionary powers to the agents in Indian organizations who generally have an option to go towards any of these two extremes at their discretion. Second, because most of the sectors in the Indian economy have yet not become hypercompetitive as there is still a scope for growth, such negative interventions of agents might affect the innovations but it does not affect the growth or sustainability of the organizations, which can still flourish. However, such interventions will become a deterrent to growth the moment a particular sector becomes completely saturated. In that situation, innovation would be the only route to survival. Yet, in order to create a culture of innovation, there should be processes in place to avoid any bias; this culture would enable an organization to bring out the true potential of its employees.

However, if we compare Indian organizations with their global counterparts operating in India, the element of discretion of agents at various stages of service innovation is limited or absent. The first reason is that most of the organizations whose employees were interviewed had well-defined processes, for example, for idea generation or allocation of funds, and thus minimized the role of agents in positively or negatively affecting the process. Second, the parent organizations of these companies reside in countries where the local market was saturated, and that is why they saw the solution to growth through innovation in a structured manner. There is a very little discretion available to the agents, and their approach is more objective. Third, the large size of these global organizations makes them more likely to have systems and processes in place and reduces the influence of local contextual factors in different parts of the world.

Based on the above discussion there, the following recommendations are provided for organizations wishing to pursue service innovations in India. Although they are targeted at Indian companies, they may also be relevant to global organizations with operations in India:

1. **Have clear processes for innovation:** To minimize the discretion of agents and ensure that there is objective assessment, companies should try to have clear systems and processes for the various components and phases of innovation including incentives, idea generation idea evaluation, and funding. Let the system of processes take over the task of producing successful service innovations and not the agents.

2. **Empower employees and support them in risk-taking:** The agents can mentor the people down the line yet provide them independence and empowerment so that they not only believe that their organization is innovative but also they can see it in action. In this process of empowerment, the employees should not feel alienated.

3. **Get off the fail-safe track:** Indian companies can break free from the fail-safe types of services or the fail-safe image of the agents by inviting fresh ideas and giving them an honest evaluation. In some cases, the same fail-safe idea or service may be selected.

The Role of Managers as Agents in Successful Service Innovations

Shiv S. Tripathi

But, the difference would be that it would be a deliberate and open selection based purely on merit within a culture where everyone feels involved in the process.

Due to the complex nature of services, service innovation require clear cut processes, close co-operation, and interaction between various functional areas and stakeholders so that they have a feeling of ownership in the organization. Agents should always keep the communication channels open to all levels to encourage transparency and feedback in the system, because even a seemingly small issue may curb the success of a service. Agents can always provide positive interventions in the process of service innovations by being approachable; welcoming ideas from any level in the organization; creating and supporting the system to take care of all processes; and acting as a mentor and not as an actor in the process of building successful service innovations.

About the Author

Shiv S. Tripathi is an Assistant Professor in the area of Strategic Management at the Management Development Institute in Gurgaon, India. He holds a PhD degree from Vinod Gupta School of Management at the Indian Institute of Technology Kharagpur. He has published papers in the area of product and service innovations, growth strategies, and innovations in large organizations. He has presented papers at national and international conferences organized by the Indian Institutes of Management, Indian School of Business, and Strategic Management Society, USA. His current research interests include service innovations, open innovations, ambidexterity, and innovation in large organizations.

References

Anderson, N., & West, M. A. 1998. Measuring Climate for Work Group Innovation: Development and Validation of Team Climate Inventory. *Journal of Organizational Behavior*, 19: 235-258. http://dx.doi.org/10.1002/(SICI)1099-1379(199805)19:3<235::AID-JOB837>3.0.CO;2-C

Barras, R. 1986. Towards a Theory on Innovations in Services. *Research Policy,* 15(4): 161-173. http://dx.doi.org/10.1016/0048-7333(86)90012-0

Chamberlin, T., Doutriaux, J., & Hector, J. 2010. Business Success Factors and Innovation in Canadian Service Sectors: An Initial Investigation of Inter-Sectoral Differences. *The Service Industries Journal*, 30(2): 225-246. http:/dx.doi.org/10.1080/02642060802120174

Chandy, R., & Tellis, G. J. 2000. *Leader's Curse: Incumbency, Size & Radical Innovation.* Marketing Science Institute Report No. 00-100. Cambridge, MA: Marketing Science Institute.

den Hertog, P. 2000. Knowledge-Intensive Business Services as Co-Producers of Innovation. *International Journal of Innovation Management,* 4(4): 491-528. http://dx.doi.org/10.1142/S136391960000024X

Easingwood, C. J. 1986. New Product Development for Service Companies. *Journal of Product Innovation Management,* 3(4): 264-175. http://dx.doi.org/10.1111/1540-5885.340264

Edgett, S., & Parkinson, S. 1994. The Development of New Financial Services: Identifying Determinants of Success and Failure. *International Journal of Service Industry Management*, 5(4): 24-38. http://dx.doi.org/10.1108/09564239410068689

Eisenhardt, K. M. 1989. Agency Theory: An Assessment and Review. *Academy of Management Review*, 14(1): 57-74. http://dx.doi.org/10.5465/AMR.1989.4279003

Gallouj, F. 2002. *Innovation in the Service Economy: The New Wealth of Nations.* Cheltenham, UK: Edward Elgar.

Jensen, M. C., & Meckling, W. H. 1976. Theory of the Firm: Managerial Behavior, Agency Costs, and Ownership Structure. *Journal of Financial Economics,* 3(4): 305-360. http://dx.doi.org/10.2139/ssrn.94043

de Jong, J. P. J., Bruins, A., Dolfsma, W., & Meijaard, J. 2003. *Innovation in Service Firms Explored: What, How and Why*? The Netherlands: EIM Business and Policy Research.

McGrath, R. G. 2013. *The End of Competitive Advantage.* Boston: Harvard Business School Press.

OECD. 2005. *OECD SME and Entrepreneurship Outlook.* Paris: Organisation for Economic Co-operation and Development (OECD).

Pavitt, K. 1984. Sectoral Patterns of Technical Change: Towards a Taxonomy and a Theory. *Research Policy*, 13(6): 343-373. http://dx.doi.org/10.1016/0048-7333(84)90018-0

Si, S., & Wei, F. 2012. Transformational and Transactional Leaderships, Empowerment Climate and Innovation Performance: A Multilevel Analysis in the Chinese Context. *European Journal of Work and Organizational Psychology*, 21(2): 299-320. http://dx.doi.org/10.1080/1359432X.2011.570445

Strauss, A., & Corbin J. 1998. *Basics of Qualitative Research: Techniques and Procedures for Developing Grounded Theory* (2nd Ed.). Thousand Oaks, CA: Sage Publications.

Tether, B. S., & Hipp, C. 2002. Knowledge Intensive, Technical and Other Services: Patterns of Competitiveness and Innovation Compared. *Technology Analysis and Strategic Management*, 14(2): 163-182. http://dx.doi.org/10.1080/09537320220133848

Thamhain, H. J. 2003. Managing Innovative R&D teams. R&D Management, 33(3): 297-311. http://dx.doi.org/10.1111/1467-9310.00299

The Role of Managers as Agents in Successful Service Innovations

Shiv S. Tripathi

Tidd, J., & Bessant, J. 2009. *Managing Innovation: Integrating Technological, Market and Organizational Change* (4th Ed.). West Sussex, England: John Wiley & Sons.

Tripathi, S. S., Guin, K. K., & De, S. K. 2013. Product and Service Innovations in Large Organizations Operating in India: A Systems Approach. *IUP Journal of Business Strategy,* 10(3): 32-52.

Van de Ven, A. H. 1986. Central Problems in the Management of Innovation. *Management Science,* 32(5): 590-607. http://dx.doi.org/10.1287/mnsc.32.5.590

Wren, D. A., & Greenwood, R. G. 1998. *Management Innovators: The People and Ideas That Have Shaped the Modern Business.* New York: Oxford University Press.

Citation: Tripathi, S. S. 2014. The Role of Managers as Agents in Successful Service Innovations. *Technology Innovation Management Review*, 4(8): 18–26. http://timreview.ca/article/819

Keywords: service innovation, agents, managers, India, global organizations, entrepreneurship, intrapreneurship

Perceived Environmental Uncertainty for Startups: A Note on Entrepreneurship Research from an Indian Perspective

Susmita Ghosh, Bhaskar Bhowmick, and Kalyan Kumar Guin

> *"Entrepreneurship is "risky" mainly because so few of the so-called entrepreneurs know what they are doing."*
>
> Peter F. Drucker (1909–2005)
> Author and management consultant

In an entrepreneurship environment, understanding uncertainty is critical to startups because it is directly related to the context of decision making. In an emerging country such as India, uncertainties are more predominant due to the very nature of the emerging country, which is characterized by an underdeveloped institutional setup, a lack of protection for legal and intellectual property rights, underdeveloped factor markets, and high transaction costs. In this article, a systematic review of the existing literature on environment and uncertainty in an entrepreneurial, emerging-economy context identifies a gap of a new scale for perceived environmental uncertainty. Three primary contributions are made by this research. First, a literature review for existing uncertainty scales and their evaluation in the context of emerging countries is provided. Second, the research identifies a gap in the uncertainty measurement literature that is relevant to emerging economies. Finally, this study proposes a future research scope that can bridge the identified gap by exploring the factors of uncertainty in emerging countries.

Introduction

"Uncertainty" is currently one of the most important research areas in the management and entrepreneurship literature (Verdu et al., 2012) because it restricts the entrepreneurs from taking entrepreneurial actions such as new product development, entry into new market, etc. (McMullen & Shepherd, 2006).In emerging countries, uncertainty takes on even greater importance because the entrepreneurial environment is often accompanied by opaque and bureaucratic legal systems that fail to protect intellectual property rights and other commercial interests. In India in particular, social, economic, and political shifts following discontinuities have made the situation even more complex (Peng, 2001; Child & Tse, 2001), as described in Box 1.

The term "uncertainty" has sometimes been used interchangeably with "risk" in the literature. However, the uncertainty construct and its closest companion, risk, are discussed by Knight (1921), and LeRoy and Singell (1987), as two possibilities out of three distinct unknown-outcome situations. In the first situation, a priori probability can be assigned by deducing a categorization of instances (e.g., outcome probabilities associated with rolling dice), and the second situation states that statistical probabilities can be assigned with empirical evaluation of relative frequencies (e.g., life expectancy probabilities calculated by life insurance companies). The third situation occurs when there is no valid basis for classifying instances. Knight (1921) defines the first two situations as risk and the third one as uncertainty. LeRoy and Singell (1987) extend the situation of uncertainty to the case of assigning subjective probability to the unknown outcome. Therefore, uncertainty should be studied based on the different components of the environment and not the environment as a whole (Miles & Snow, 1978), to interpret its real contribution to decision making. Uncertainties are firm specific, they may be perceived uniquely by the top management of an organization, and they may take different strategic actions to cope with them (Starbuck, 1976).

Perceived Environmental Uncertainty for Startups

Susmita Ghosh, Bhaskar Bhowmick, and Kalyan Kumar Guin

This environmental uncertainty has direct implications on startups and their decision making, so the important question is how to conceptualize and measure this uncertainty. Previous researchers in this domain have tried to identify and quantify the various environmental factors that contribute to uncertainty (e.g., Lawrence & Lorsch, 1967; Duncan, 1972; Miles & Snow, 1978; Milliken, 1987). However, most of this research has been conducted in developing countries, and the uncertainty conceptualization in emerging countries may be different. Emerging countries are known for their institutional voids in legal and administrative systems in relation to intellectual property rights, etc. Hence, there is a gap in the literature concerning measurement of perceived environmental uncertainty.

This study introduces the background literature relating to environment and uncertainty, and it explores the existing scales and their limitations in measuring environmental uncertainty. Then, it explains the operationalization of perceived environmental uncertainly in an emerging country context. The last section concludes that the existing uncertainty scale must be examined and modified, including factor identification and related measures of environmental uncertainty for startups in emerging countries.

Literature Review

The literature was reviewed systematically using several strategies to locate relevant studies. First, we searched the following databases: Emerald Insights, EBSCO, Science Direct, Wiley Online Library, and Google Scholar. In each of these databases, we used the following search terms: "environmental uncertainty", "entrepreneurial firms", "start-up firms", "emerging country", and "India". Second, we conducted manual searches of journals that publish research on entrepreneurship: *Academy of Management Journal*, *Journal of Business Venturing*, *Entrepreneurship Theory and Practices*, *Journal of Small Business Management*, and *Strategic Management Journal*.

In our search of the environmental uncertainty literature we found 21 studies that dealt with the uncertainty construct towards defining and specifying the meaning of the term in relation to other constructs in the organization theory domain. Multiple definitions of uncertainty were defined in seven studies, whereas six studies discussed various types and sources of uncertainty. The relationship between uncertainty and other constructs and variables in the entrepreneurship environment literature was covered in 41 studies.

Box 1. Historical sources of entrepreneurial uncertainty in India

Since achieving independence in 1947, India has seen four major discontinuities that resulted from different politico-economic reasons (Sibal, 2012). Beginning with its first five-year economic plan, in the first phase (1951–1965), the independent Indian economy saw rapid industrialization guided by the heavy investment from the government coffers to make the nation industrially self sustained. The larger industries were more or less controlled by public sector firms, which created uncertainty of sector choice and opportunity recognition for small and startup firms. The second phase (1965–1981) of the Indian economy was "a period of incoherence between micro- and macro-economic developments" due to political and leadership instability in the country, followed by "anemic growth and extreme volatility" (Sibal, 2012), due to a mismatch between expectation and result in the agricultural output, which led to uncertainty in demand and infrastructure support. In the third phase (1981–1991), the Indian economy succumbed to a fiscally induced debt crisis, which was due to recession in the international market, and which necessitated financing from the International Monetary Fund. The crisis "helped usher in change that seemed impossible merely one or two years earlier" (Sibal, 2012), In the fourth phase (post 1991), the Indian economy saw "a greater separation between the government and the economy" (Sibal, 2012). Although, the state continues to run a number of enterprises, "India took major strides in permitting enterprises to react to market signals but maintained control over India's exposure to the global economy by retaining a tightly controlled capital account" (Sibal, 2012). The current phase is characterized by uncertainty in international competition and increased consumer choices due to globalization, which are the result of the opening up of the economy in 1991 and the entry of international competitors in sectors such as aviation, banking, and manufacturing. Thus, the historical changes in India's economic scenario and the complex linkages of socio-economic, technological, and financial elements have created uncertainty. Startup firms in such an uncertain environment are exposed to resource scarcity, abundant opportunities, and rivalry competitions due to less developed and more costly external environmental factors (Uhlenbruck et al., 2003). Therefore, identifying the factors responsible for environmental uncertainty, as perceived by Indian startups, better positions entrepreneurs to seek opportunities, gain competitive advantage, and pursue better performance.

Perceived Environmental Uncertainty for Startups

Susmita Ghosh, Bhaskar Bhowmick, and Kalyan Kumar Guin

Our search also identified 26 studies measuring the definitional components of perceived environmental uncertainty and external environmental components related to uncertainty. In these studies, uncertainty and its related measures have been linked to different conceptualizations of environment, such as internal and external environments.

Our search for literature relating to environmental uncertainty in entrepreneurial firms or startup firms identified six studies. These studies empirically related the startup uncertainty with technology diffusion, competition, innovation, and entrepreneurial action. Typically, these studies used data from the United Kingdom, Sweden, or other developed countries.

Our search for literature on environmental uncertainty, entrepreneurial firms or startup firms, and emerging countries identified eight studies. These studies related to market opportunity, financial shocks, internationalization, and other growth strategies. The databases used in these studies related to various emerging countries, including Chile, Mexico, Hong Kong, Philippines, Indonesia, Malaysia, South Africa, and South Korea.

Finally, our search for literature on environmental uncertainty, entrepreneurial firms or startup firms, and India identified three studies. These studies relate uncertainty with internationalization, business-to-business market relations, and financial opportunities from an Indian perspective, primarily within the information technology domain, the beverage industry, and business-to-business contexts.

None of the studies replicated the results in an Indian context using quantitative techniques for statistically verifying the relationships and reconfirming the uncertainty measures.

Environment

Environment has been conceptualized in the literature as a multi-dimensional construct (Lawrence & Lorsch, 1967; Duncan, 1972); as a total entity composed of social and physical factors that actively contributes to decision making in an organization (Lawrence & Lorsch, 1967; Duncan, 1972); and as forces that potentially affect the performance of an organization (Porter, 1980). Duncan segmented environment based on the relevance of the social and physical factors comprising it. These factors provide necessary information related to their behavioural characteristics for decision making in an organization. Scott (1987) explained these factors as resource pools and information sources of competitors, potential markets, and regulators. Environmental segments, as discussed by Duncan (1972), Lawrence and Lorsch (1967), and Rice (1963) can be internal and external. The internal environment deals with the interaction between an individual within an organization and the interpersonal relationships between members of an organization. The external environment includes groups, institutions, or individuals outside the boundary of the organization. For example, components of the external environment are socio-political, international, and economic elements, as well as technology, customers, and suppliers (Scott, 1987). Environment has also been discussed by researchers (e.g., Adomako & Danso, 2014; Suarez, 2014; Schultz et al., 2010; Grewal et al., 2013) as having an influence on firm strategy, process, and performance.

We identified two different dimensions of the environment in the literature: the static-dynamic dimension and the simple-complex dimension (Emery & Trist, 1965; Thompson, 1967; Terreberry, 1968).The dimension of the environment known as simple-complex dimension deals with the number of factors involved in decision making (Duncan, 1972). The organization's diversified activities and their degree of heterogeneity is caused by environmental complexity (Aldrich, 1979). Smart and Virtinskey (1984) proposed that one important dimension of environment is its degree of stability, which is in accordance with Duncan's (1972) view. Duncan proposed that the dynamic dimension of environment deals with the factors of decision making that are changing continually. The dynamism in the environment brings a continuous change in the factors that help organization's make decisions. This changing nature of the factors creates difficulty in availing relevant information that is important for decision making in an organization. Due to the dynamism in the environment, organizations should be able to adapt themselves continuously with the changing environment (Duncan, 1972). The related concept of environmental velocity has been recognized as similar to the dynamic nature of the environment due to the change in the rate and direction of the factors such as technology, regulation, demand, and competition (Bourgeois & Eisenhardt, 1988). McCarthy and colleagues (2010) identified that velocity can be categorized as simply high or low, and its different patterns affect the organizations.

The simple-complex dimension and static-dynamic dimension have been identified as the sources of uncertainty in environment literature. However, Mintzberg (1979) extended the list with the concept of environmental hostility being another source of uncertainty;

Perceived Environmental Uncertainty for Startups

Susmita Ghosh, Bhaskar Bhowmick, and Kalyan Kumar Guin

the dimension of munificence and hostility is thus added to the earlier dimensions of static-dynamic and simple-complex as sources of uncertainty. Environmental munificence can be measured by the availability of labour, competitive hostility, and the business cost (Anatan & Radhi, 2007). Changes in the environmental components (e.g., competition, customers, technology) and the complex interconnections among them create environmental turbulence (Emery & Trist, 1965), which initiates environmental uncertainty. Managers or decision units of an organization perceive uncertainty related to these different components of the environment.

Conceptualization of uncertainty

As, the previous sections have shown, a substantial amount of research has focused on an organization's environment, and in most of the studies, uncertainty was the central construct (e.g., Downey & Slocum, 1975; Duncan, 1972; Emery & Trist, 1965; Jauch & Kraft, 1986). A discussion of uncertainty is more pertinent when the decision making is dependent on the future state of the environment, because the future state of it, or the effect of any action based on that decision, is not known.

Environmental uncertainty has multiple definitions (Liao & Gartner, 2006) in the literature, including the unknown probability of outcome (Knight 1921), hesitancy and indecisiveness (Casson, 1982), a lack of information related to environmental components for decision making (Duncan, 1972), "an individual's perceived inability to predict (an organization's environment) accurately" (Milliken, 1987; Cyert & March,1963; York & Venkatraman, 2010), the availability of choice (Child, 1972), a complex combination of environmental components (Galbraith, 1973), and an environmental state (Aldrich, 1979). The inability to predict outcome may be rooted in the availability of information, processing the information toward meaningful knowledge, or simply predicting the final outcome of a decision. Further review of the environmental uncertainty literature suggested that the uncertainty construct has evolved from two theories: i) contingency theory (March & Simon, 1958; Thompson, 1967; Lawrance & Lorsch, 1967; Aldag & Storey, 1975; Starbuck, 1976), which focuses on interpreting the environment and focusing on fitting the organization to the environment and ii) perceptual theory (Duncan, 1972; Child, 1972; Downey & Slocum, 1975; Starbuck, 1976), which relates uncertainty to process-oriented learning or interpreting and noticing the environment and accessing its real meaning.

Although there still remains a conflict between the significant effects of objective or subjective environment on organizational performance, it is believed that perception mediates between the objective environment to make a meaning of it and take necessary action (Terborg, 1981; Jauch & Kraft, 1986). Milliken (1987) tried to aggregate these two concepts and proposed three types of perceived environmental uncertainty: state, effect, and response. State uncertainty is experienced when the changing nature of the environmental factors are unpredictable; effect uncertainty deals with an individual's ability to predict the impact of changing environmental factors on the firm; and response uncertainty arises from a lack of decision-making ability in the firm's decision unit. Galbraith's (1973) earlier work is consistent with Milliken's view that each dimension of uncertainty should be investigated independently. However, there are currently no psychometric measurements for any of these three types of uncertainty (Ashill & Jobber, 2010).

The environmental uncertainty construct is further differentiated by researchers (e.g., Duncan 1972; Jauch et al., 1980; Khandwalla, 1977; Tosi & Slocum, 1984) according to the sources of uncertainty. Miles and Snow (1978) posited that defining uncertainty broadly as "environmental uncertainty" is not sufficient; it is important to identify and measure the various components of the firm's environment that acts as source of uncertainty for the firm. These environmental components (i.e., customer, competitor, supplier, market, technology, government, and resource) differentially affect the operational and strategic decisions of a firm (Song & Weiss, 2001; Matthews & Scott, 1995). An entrepreneurial firm's exploitation of the scale of opportunities depends on the manifested or perceived environmental uncertainty in the environment, whereas an entrepreneur's expertise moderates this relationship (McKelvie, 2011). This study thus focuses on identifying and measuring issues of perceived environmental uncertainty for startups.

Measures of perceived environmental uncertainty

Lawrence and Lorsch' s (1967) method for measuring the uncertainty of an organization was a nine-item Likert scale with questions relating to three sub-scales and three sub-environments: marketing, manufacturing, and research. Each of the respondents is asked to answer three questions about each of the sub-environments, from which uncertainty scores for each sub-environment and a total uncertainty score can be calculated (Gerloff et al., 1991). However, Lawrence and Lorsch's scale was assessed by several researchers, who

Perceived Environmental Uncertainty for Startups

Susmita Ghosh, Bhaskar Bhowmick, and Kalyan Kumar Guin

reported some limitations. Milliken (1987) suggested that the scale does not appropriately assess the general environment of the firm. Tosi and colleagues (1973) reported low sub-scale scores, marginal reliability, low correlation between the sub-scale and total uncertainty scores. Downey, Hellriegel, and Slocum (1975) tested the reliability and validity of the scale and reported that the scales are reliable after modification, but they were unable to find any correlation between the total uncertainty and the sub-scale scores, even after modification. They raised the questions: "Is perceived environmental uncertainty most usefully considered as unidimensional or multidimensional?" and "Is perceived environmental uncertainty most usefully operationalized through a summative approach or by some unitary process?"

The perceived environmental uncertainty scale developed by Duncan (1972) tried to measure the environmental characteristics that contribute a perception of uncertainty for decision makers (Gerloff et al., 1991) on the basis of lack of information, lack of knowledge, or inability to assign probabilities. Duncan investigated 22 decision groups using a 12-item uncertainty scale and concluded that environmental complexity and dynamism impacts the perception of environmental uncertainty. Milliken (1987) reviewed the uncertainty scale developed by Duncan and noted that Duncan's conceptualization of perceived environmental uncertainty does not follow the traditional understanding of component-level uncertainty. He looks at uncertainty as the perceptual inability to access information, arrive at decision outcomes, and assign probability. Downey and colleagues (1975) attempted to assess Duncan's uncertainty scale and posited that the reliability criteria are problematic. Other researchers performed several studies using Duncan's scale and reported that conceptualizing, interpreting, and generalizing the results of a study using Duncan's scale was difficult because the uncertainty definition in Duncan's scale has been conceptualized in a variety of forms (i.e., from predictability to controllability)(Lindsay & Rue, 1980; Smart & Virtinskey, 1984; Dwyer & Welsh, 1985; Buchko, 1994). Others tried to test the measurement properties of both Lawrence and Lorsch's and Duncan's scales and reported significantly weak results and low reliability (Milliken, 1987; Tosi et al., 1973; Downey et al., 1975). Validation of both the Lawrence and Lorsch's and Duncan's scales using "objective measures of environmental volatility" (Tosi et al., 1973; Downey et al., 1975; Buchko, 1994) were insignificant and gave unsuccessful results. Other studies using Duncan's scale (e.g., McCabe, 1990; Anderson & Kida, 1985; Koberg & Ungsen, 1987; Brown & Schwab, 1984), reported that it was difficult to generalize their results using Duncan's scale. Thus, next-generation researchers tried to change their focus from the organization's point of view to the perspective of the external environment, as will be discussed next.

Continuous debate and evaluation of the existing scales questioning their reliability and validity inspired Miles and Snow (1978) to create a new scale for capturing perceived environmental uncertainty. They developed a measure of uncertainty containing 25 items with 6 subscales related to suppliers, competitors, customers, financial markets, government and regulatory agencies, and unions. The instrument consists of seven-point Likert scale using predictable and unpredictable dimensions. Ireland, Hitt, Bettis, and de Porras (1987) performed a reliability test on the scale and its sub-scales developed by Miles and Snow (1978) and found that the reliability was adequate. Buchko (1994) supported this view and explained that the measurement properties of the scale showed internal consistency but the stability of the scale gave inadequate results as obtained from low test-retest correlations over time.

Miller (1992) proposed a perceived environmental uncertainty scale based on uncertainty in the general environment, the industry environment, and the firm-specific environment. The scale consists of 35 items with 6 sub-scales following seven-point Likert scales with predictable and unpredictable dimensions. Werner, Brouthers, and Brourthers (1996) assessed the scale developed by Miller (1993) and reported high internal consistency with samples from manufacturing and service firms. They raised the issue that the subsets of Miller's scale items were "multiple indicators of factors which could be empirically distinguished from one another" (Werner et al., 1996). This finding contradicted the argument made by Miller (1993) that there exists a complex inter-correlation among environmental uncertainty (Miller, 1997). Song and Weiss (2001) commented that an aggregated measure of uncertainty has little impact and hence posited that identifying the uncertainty scale of a specific component of environment may be useful. They introduced a perceived technological uncertainty scale consisting of six items on a 10-point Likert scale. Leug and Borisov (2014) studied the association between the measures of archival environmental uncertainty – understanding of the environment based on historical data – and perceived environmental uncertainty. They found that measures of perceived environmental uncertainty are effective for scanning and decision making, whereas measures of

Perceived Environmental Uncertainty for Startups

Susmita Ghosh, Bhaskar Bhowmick, and Kalyan Kumar Guin

archival environmental uncertainty are effective for evaluating performance.

The conceptualization and operationalization of uncertainty has direct impact on startup firms. This relationship can be traced back to Schumpeter's (1974) idea of stressed innovation with uncertainty as discussed by Knight (1921) and Brouwer (2000). Research has also suggested that perceptions of uncertainties are different in manufacturing and service firms at the level of their innovation (Freel, 2005).The uncertainty perception by startup firms directs inverse linking of strategic and operational planning towards bringing their innovation into product development and marketing activities (Matthews & Scott, 1995).

Operationalization in Emerging Countries

The above discussion is based on research into measures of environmental components related to uncertainty that have been developed extensively for large firms in emerging countries (e.g., Aldrich, 1979; Boulton et al. 1982; Duncan, 1972; Hambrick, 1983; Jauch & Kraft, 1986; Pfeffer & Salancik, 1978). This phenomenon has been largely ignored for startups in an emerging country context. Thus, this study proposes that it is important to identify and measure the environmental components that act as sources of uncertainty for startup firms in emerging countries.

The environment itself is "neither certain nor uncertain" (Downey & Slocum, 1975) because certainty and uncertainty of an environment is perceived by the firms themselves and are not same for all firms (Downey & Slocum, 1975; Pfeffer & Salancik, 1978,). An emerging country perspective offers a substantive context to perceive uncertainty by small and large firms. Startups are exposed to these uncertainties more critically than large firms due to lack of resources, expertise, and information sources. Emerging economies are characterized by high population density, low per capita gross domestic product, and high rates of unemployment (Todd et al., 2007). These factors have direct or indirect impacts on product- or market-related uncertainties for all types of firms. Emerging countries also experience volatile inflation rates, intermittent financial crises, and high dependence on imports (Todd et al., 2007). The impact of a sudden economic crisis leads to delayed recovery in emerging countries after a sudden change in the external environmental factors (Carrière-Swallow & Céspedes, 2013), which has a direct implication on the financial uncertainty and market responses.

Emerging economies in general show rapid growth and feature economic liberalization as a primary engine for this growth (Li et al., 2013). Emerging countries are also characterized by an underdeveloped institutional setup, including for example, a lack of legal protection for intellectual property rights, poor law enforcement, a lack of transparency in judicial systems, underdeveloped factor markets, and high transaction and market costs (Wu & Chen, 2014). These factors lead to uncertainties related to R&D activities and confusion related to protection of intellectual property rights. Market failure due to underdeveloped institutional support adds to the complexity, with additional burdens coming from bureaucracy and high corruption rates. The lack of stable political structures makes the environment more volatile, leading to development of informal institutional constraints with the prominence of informal networks and personalized exchanges (Tracey & Phillips, 2011), which have indirect impacts on competitiveness and scaling-up activities. The complexity and dynamism become pertinent to uncertainty in emerging countries due to information asymmetry and imperfections in the market for capital, labour, and products. So, the firms face higher risk and spend more resources searching for information (Meyer et al., 2008).

This economic state of affairs makes uncertainty a key feature of emerging economies. Uncertainty paves or hinders the path to prosperity for entrepreneurs in emerging countries, leading them to innovate and take risk differently than in developed countries (Radas & Božić, 2009). Thus, we require understanding of the real attributes of uncertainty – at a quantitative level.

Conclusion

We draw three levels of conclusion as future research scopes concerning perceived environmental uncertainty and its measurement. First, the existing uncertainty scales, as discussed in earlier sections, identify contributions from Lawrence and Lorsch (1967), Duncan (1972), Miles and Snow (1978), and Miller (1997). These scales are related to a firm's functional-level activities with their inability to predict the future states, effects, and responses due to lack of information and uncertainties specific to components of the firm's environment. This situation creates confusion in decision making and permeates to lower levels of performance.

Second, the discussion on emerging countries and their relevant uncertainties leads us to conclude that meas-

Perceived Environmental Uncertainty for Startups

Susmita Ghosh, Bhaskar Bhowmick, and Kalyan Kumar Guin

urement of uncertainty should be context specific and the sub-scales should include the typical nature of uncertainty perceived by the firms from different domains. The institutional void in emerging country context proposes uncertainty from regulatory and judicial protection functionalities. These influences are again country specific. These dynamisms in the environment have implications on the internal environment of the firm. Although the existing scale covers government, policies, and economies at a high level, it fails to capture the impact of these factors within the scale parameters.

Third, this study identifies a gap in the literature and commits to develop a new scale of perceived environmental uncertainty specifically in the context of an emerging country such as India. This scale will be further examined and verified to generalize it to other emerging countries. This scale will be developed by identifying and exploring factors from existing literature supported through qualitative understanding of the context by practicing entrepreneurs. The new scale would facilitate startups in emerging countries to identify the dominant sources of uncertainties along with the environmental components.

About the Authors

Susmita Ghosh is a Research Scholar at Rajendra Mishra School of Engineering Entrepreneurship, Indian Institute of Technology Kharagpur. Currently she is pursuing her doctoral degree in Entrepreneurship, with a research focus on uncertainties in decision making for startups. Her other current research interests include entrepreneurial business incubation and uncertainty in product development.

Bhaskar Bhowmick is an as Assistant Professor at Rajendra Mishra School of Engineering Entrepreneurship, Indian Institute of Technology Kharagpur, India. He completed his PhD from the Indian Institute of Management Ahmadabad with a specialization in Business Policy. He has thirteen years of industry experience in sales and marketing. His research interests include strategy-sustenance-succession, leadership strategy, and uncertainty in product development, innovation, and entrepreneurship.

Kalyan Kumar Guin is Dean and Professor at the Vinod Gupta School of Management, Indian Institute of Technology Kharagpur, India. He is an alumnus of IIT Kharagpur and Banaras Hindu University in Varanasi, India, and he is a Fellow of the Indian Institute of Management Bangalore. His teaching interests cover marketing and operations management, and he has a special interest in quantitative modelling of strategic issues in management.

References

Adomako, S., & Danso, A. 2014. Regulatory Environment, Environmental Dynamism, Political Ties, and Performance. *Journal of Small Business and Enterprise Development,* 21(2): 212–230. http://dx.doi.org/10.1108/JSBED-01-2014-0004

Aldag, R. J., & Storey, R. G. 1975. Environmental Uncertainty: Comments on Objective and Perceptual Indices. *Academy of Management Proceedings,* 1975(1): 203–205. http://dx.doi.org/10.5465/AMBPP.1975.4982411

Aldrich, H. 2008. Organizations and Environments. Stanford University Press.

Anatan, L., & Radhi, F. 2007. The Effect of Environmental Factors, Manufacturing Strategy and Technology on Operational Performance: Study Amongst Indonesian Manufacturers. *Jurnal Ekonomi & Bisnis,* 1(3): 119–133.

Anderson, T. N., & Kida, T. E. 1985. The Effect of Environmental Uncertainty on the Association of Expectancy Attitudes, Effort, and Performance. *The Journal of Social Psychology,* 125(5): 631–636. http://dx.doi.org/10.1080/00224545.1985.9712037

Ashill, N. J., & Jobber, D. 2009. Measuring State, Effect, and Response Uncertainty: Theoretical Construct Development and Empirical Validation. *Journal of Management,* 36(5): 1278-1308. http://dx.doi.org/10.1177/0149206308329968

Boulton, W. R., Lindsay, W. M., Franklin, S. G., & Rue, L. W. 1982. Strategic Planning: Determining the Impact of Environmental Characteristics and Uncertainty. *Academy of Management Journal,* 25(3): 500–509. http://dx.doi.org/10.2307/256076

Bourgeois, L. J., & Eisenhardt, K. M. 1988. Strategic Decision Processes in High Velocity Environments: Four Cases in the Microcomputer Industry. *Management Science,* 34(7): 816–835. http://dx.doi.org/10.1287/mnsc.34.7.816

Brouwer, M. 2000. Entrepreneurship and Uncertainty: Innovation and Competition among the Many. *Small Business Economics,* 15(2): 149–160. http://dx.doi.org/10.1023/A:1008147829791

Brown, W. B., & Schwab, R. C. 1984. Boundary-Spanning Activities in Electronics Firms. *IEEE Transactions on Engineering Management,* 31(3): 105–111. http://dx.doi.org/10.1109/TEM.1984.6447517

Perceived Environmental Uncertainty for Startups

Susmita Ghosh, Bhaskar Bhowmick, and Kalyan Kumar Guin

Buchko, A. A. 1994. Conceptualization and Measurement of Environmental Uncertainty: An Assessment of the Miles and Snow Perceived Environmental Uncertainty Scale. *Academy of Management Journal,* 37(2): 410–425. http://dx.doi.org/10.2307/256836

Carrière-Swallow, Y., & Céspedes, L. F. 2013. The Impact of Uncertainty Shocks in Emerging Economies. *Journal of International Economics,* 90(2): 316–325. http://dx.doi.org/10.1016/j.jinteco.2013.03.003

Casson, M. 1982. The Entrepreneur: An Economic Theory. Rowman & Littlefield.

Child, J. 1972. Organizational Structure, Environment and Performance: The Role of Strategic Choice. *Sociology,* 6(1): 1–22. http://dx.doi.org/10.1177/003803857200600101

Child, J., & Tse, D. K. 2001. China's Transition and its Implications for International Business. *Journal of International Business Studies,* 32(1): 5–21. http://dx.doi.org/10.1057/palgrave.jibs.8490935

Cyert, R. M., & March, J. G. 2013. *A Behavioral Theory of the Firm*. Martino Publishing.

Downey, H. K., Hellriegel, D., & Slocum, J. W. 1977. Individual Characteristics as Sources of Perceived Uncertainty Variability. *Human Relations,* 30(2): 161–174. http://dx.doi.org/10.1177/001872677703000205

Downey, H. K., & Slocum, J. W. 1975. Uncertainty: Measures, Research, and Sources of Variation. *Academy of Management Journal,* 18(3): 562–578. http://dx.doi.org/10.2307/255685

Duncan, R. B. 1972. Characteristics of Organizational Environments and Perceived Environmental Uncertainty. *Administrative Science Quarterly,* 17(3): 313. http://dx.doi.org/10.2307/2392145

Dwyer, F. R., & Welsh, M. A. 1985. Environmental Relationships of the Internal Political Economy of Marketing Channels. *Journal of Marketing Research,* 22(4): 397. http://dx.doi.org/10.2307/3151585

Emery, F. E., & Trist, E. L. 1965. The Causal Texture of Organizational Environments. *Human Relations,* 18(1): 21–32. http://dx.doi.org/10.1177/001872676501800103

Freel, M. S. 2005. Perceived Environmental Uncertainty and Innovation in Small Firms. *Small Business Economics,* 25(1): 49–64. http://dx.doi.org/10.1007/s11187-005-4257-9

Galbraith, J. R. 1969. *Organization Design: An Information Processing View*. Working Paper No. 425-69. Massachusetts Institute of Technology.

Gerloff, E. A., Muir, N. K., & Bodensteiner, W. D. 1991. Three Components of Perceived Environmental Uncertainty: An Exploratory Analysis of the Effects of Aggregation. *Journal of Management,* 17(4): 749–768. http://dx.doi.org/10.1177/014920639101700408

Grewal, R., & Dharwadkar, R. 2002. The Role of the Institutional Environment in Marketing Channels. *Journal of Marketing,* 66(3): 82–97. http://dx.doi.org/10.1509/jmkg.66.3.82.18504

Hambrick, D. C. 1982. Environmental Scanning and Organizational Strategy. *Strategic Management Journal,* 3(2): 159–174. http://dx.doi.org/10.1002/smj.4250030207

Ireland, R. D., Hitt, M. A., Bettis, R. A., & De Porras, D. A. 1987. Strategy Formulation Processes: Differences in Perceptions of Strength and Weaknesses Indicators and Environmental Uncertainty by Managerial Level. *Strategic Management Journal,* 8(5): 469-485. http://dx.doi.org/10.1002/smj.4250080506

Jauch, L. R., & Kraft, K. L. 1986. Strategic Management of Uncertainty. *Academy of Management Review,* 11(4): 777-790. http://dx.doi.org/10.2307/258396

Khandwalla, P. N. 1976. Some Top Management Styles, Their Context, and Performance. *Organization and Administrative Sciences,* 7(4): 21–51.

Knight, F. H. 1964. *Risk, Uncertainty and Profit*. Courier Dover Publications.

Koberg, C. S., & Ungson, G. R. 1987. The Effects of Environmental Uncertainty and Dependence on Organizational Structure and Performance: A Comparative Study. *Journal of Management,* 13(4): 725–737. http://dx.doi.org/10.1177/014920638701300412

Lawrence, P. R., & Lorsch, J. W. 1967. *Organization and Environment: Managing Differentiation and Integration*. Boston: Division of Research, Graduate School of Business Administration, Harvard University.

Liao, J., & Gartner, W. B. 2006. The Effects of Pre-venture Plan Timing and Perceived Environmental Uncertainty on the Persistence of Emerging Firms. *Small Business Economics,* 27(1): 23–40. http://dx.doi.org/10.1007/s11187-006-0020-0

Lindsay, W. M., & Rue, L. W. 1980. Impact of the Organization Environment on the Long-Range Planning Process: A Contingency View. *Academy of Management Journal,* 23(3): 385–404. http://dx.doi.org/10.2307/255507

Lueg, R., & Borisov, B. G. 2014. Archival or Perceived Measures of Environmental Uncertainty? Conceptualization and New Empirical Evidence. *European Management Journal,* 32(4): 658–671. http://dx.doi.org/10.1016/j.emj.2013.11.004

March, J. G., & Simon, H. A. 1958. *Organizations*. Cambridge, MA: Wiley-Blackwell.

Matthews, C. H., & Scott, S. G. 1995. Uncertainty and Planning in Small and Entrepreneurial Firms: An Empirical Assessment. *Journal of Small Business Management,* 33(4): 34.

McCabe, D. L. 1990. The Assessment of Perceived Environmental Uncertainty and Economic Performance. *Human Relations,* 43(12): 1203–1218. http://dx.doi.org/10.1177/001872679004301202

McCarthy, I. P., Lawrence, T. B., Wixted, B., & Gordon, B. R. 2010. A Multidimensional Conceptualization of Environmental Velocity. *Academy of Management Review,* 35(4): 604–626.

McKelvie, A., Haynie, J. M., & Gustavsson, V. 2011. Unpacking the Uncertainty Construct: Implications for Entrepreneurial Action. *Journal of Business Venturing,* 26(3): 273–292. http://dx.doi.org/10.1016/j.jbusvent.2009.10.004

McMullen, J. S., & Shepherd, D. A. 2006. Entrepreneurial Action And The Role Of Uncertainty In The Theory Of The Entrepreneur. *Academy of Management Review,* 31(1): 132–152. http://dx.doi.org/10.5465/AMR.2006.19379628

Perceived Environmental Uncertainty for Startups

Susmita Ghosh, Bhaskar Bhowmick, and Kalyan Kumar Guin

Meyer, K. E., Estrin, S., Bhaumik, S. K., & Peng, M. W. 2009. Institutions, Resources, and Entry Strategies in Emerging Economies. *Strategic Management Journal,* 30(1): 61–80. http://dx.doi.org/10.1002/smj.720

Miles, R. E., & Snow, C. C. 1978. *Organizational Strategy, Structure, and Process*. Stanford University Press.

Miller, K. D. 1993. Industry and Country Effects on Managers' Perceptions of Environmental Uncertainties. *Journal of International Business Studies,* 24(4): 693–714. http://dx.doi.org/10.1057/palgrave.jibs.8490251

Miller, K. D. 1997. *Measurement of Perceived Environmental Uncertainties: Response and Extension*. Working Paper. West Lafayette, IN: Krannert Graduate School of Management.

Milliken, F. J. 1987. Three Types of Perceived Uncertainty About the Environment: State, Effect, and Response Uncertainty. *Academy of Management Review,* 12(1): 133–143. http://dx.doi.org/10.5465/AMR.1987.4306502

Mintzberg, H. 1979. *The Structuring of Organizations: A Synthesis of the Research*. Prentice-Hall.

Peng, M. W. 2001. The Resource-Based View and International Business. *Journal of Management,* 27(6): 803–829. http://dx.doi.org/10.1016/S0149-2063(01)00124-6

Pfeffer, J., & Salancik, G. R. 1978. *The External Control of Organizations: A Resource Dependence Perspective*. New York: Prentice-Hall.

Porter, M. E. 1980. *Competitive Strategy: Techniques for Analyzing Industries and Competitors*. Free Press.

Radas, S., & Božić, L. 2009. The Antecedents of SME Innovativeness in an Emerging Transition Economy. *Technovation,* 29(6–7): 438–450. http://dx.doi.org/10.1016/j.technovation.2008.12.002

Rice, A. K. 1963. *The Enterprise and Its Environment: A System Theory of Management Organization*. Tavistock.

Schultz, M. T., Mitchell, K. N., Harper, B. K., & Bridges, T. S. 2010. *Decision Making Under Uncertainty*. No. ERDC TR-10-12. Washington, D.C.: Engineer Research and Development Center: U.S. Army Corps of Engineers.

Schumpeter, J. A. 1974. *Capitalism, Socialism and Democracy*. London: Unwin University Books.

Scott, W. R. 1987. *Organizations: Rational, Natural, and Open Systems*. Prentice Hall.

Sibal, D. R. 2012. The Untold Story of India's Economy. India: The Next Superpower? *IDEAS:* 17–22. London School of Economics.

Smart, C., & Vertinsky, I. 1984. Strategy and the Environment: A study of Corporate Responses to Crises. *Strategic Management Journal,* 5(3): 199–213. http://dx.doi.org/10.1002/smj.4250050302

Song, M., & Montoya-Weiss, M. M. 2001. The Effect of Perceived Technological Uncertainty on Japanese New Product Development. *Academy of Management Journal,* 44(1): 61–80. http://dx.doi.org/10.2307/3069337

Starbuck, W. H. 1976. Organizations and Their Environments. In M. D. Dunnette (Ed.), *Handbook of Industrial and Organizational Psychology:* 1069–1124. Chicago: Rand McNally.

Terborg, J. R. 1981. Interactional Psychology and Research on Human Behavior in Organizations. *Academy of Management Review,* 6(4): 569–576. http://dx.doi.org/10.5465/AMR.1981.4285691

Terreberry, S. 1968. The Evolution of Organizational Environments. *Administrative Science Quarterly,* 12(4): 590. http://dx.doi.org/10.2307/2391535

Thompson, J. D. 1967. Organizations in Action: Social Science Bases of Administrative Theory. New York: McGraw-Hill.

Todd, P. R., & Javalgi, R. (Raj) G. 2007. Internationalization of SMEs in India: Fostering Entrepreneruship by Leveraging Information Technology. *International Journal of Emerging Markets,* 2(2): 166–180. http://dx.doi.org/10.1108/17468800710739234

Tosi, H., Aldag, R., & Storey, R. 1973. On the Measurement of the Environment: An Assessment of the Lawrence and Lorsch Environmental Uncertainty Subscale. *Administrative Science Quarterly,* 18(1): 27–36. http://dx.doi.org/10.2307/2391925

Tosi, H. L., & Slocum, J. W. 1984. Contingency Theory: Some Suggested Directions. *Journal of Management,* 10(1): 9–26. http://dx.doi.org/10.1177/014920638401000103

Tracey, S. L. P., & Phillips, P. N. 2011. Entrepreneurship in Emerging Markets. *Management International Review,* 51(1): 23–39. http://dx.doi.org/10.1007/s11575-010-0066-8

Uhlenbruck, K., Meyer, K. E., & Hitt, M. A. 2003. Organizational Transformation in Transition Economies: Resource-based and Organizational Learning Perspectives. *Journal of Management Studies,* 40(2): 257–282. http://dx.doi.org/10.1111/1467-6486.00340

Verdu, A. J., Tamayo, I., & Ruiz-Moreno, A. 2012. The Moderating Effect of Environmental Uncertainty on the Relationship between Real Options and Technological Innovation in High-Tech Firms. *Technovation,* 32(9–10): 579–590. http://dx.doi.org/10.1016/j.technovation.2012.06.001

Werner, S., Brouthers, L. E., & Brouthers, K. D. 1996. International Risk and Perceived Environmental Uncertainty: The Dimensionality and Internal Consistency of Miller's Measure. *Journal of International Business Studies,* 27(3): 571–587. http://dx.doi.org/10.1057/palgrave.jibs.8490144

Wu, J., & Chen, X. 2014. Home Country Institutional Environments and Foreign Expansion of Emerging Market Firms. *International Business Review,* 23(5): 862–872. http://dx.doi.org/10.1016/j.ibusrev.2014.01.004

York, J. G., & Venkataraman, S. 2010. The Entrepreneur–Environment Nexus: Uncertainty, Innovation, and Allocation. *Journal of Business Venturing,* 25(5): 449–463. http://dx.doi.org/10.1016/j.jbusvent.2009.07.007

Citation: Ghosh, S., Bhowmick, B., & Guin, K. K. 2014. Perceived Environmental Uncertainty for Startups: A Note on Entrepreneurship Research from an Indian Perspective. *Technology Innovation Management Review,* 4(8): 27–35. http://timreview.ca/article/820

Keywords: business environment, startups, uncertainty, emerging economies, India

Reviewing the Knowledge Systems of Innovation and the Associated Roles of Major Stakeholders in the Indian Context

Punit Saurabh, Prabha Bhola, and Kalyan Kumar Guin

> *"For good ideas and true innovation, you need human interaction, conflict, argument, debate."*
>
> Margaret Heffernan
> Entrepreneur and author

In this article, we review various models of knowledge systems and discusses the relationships between various component stakeholders of innovation, namely higher-education institutions, industry, and government. The article uses India as a case study to examine new challenges and opportunities facing its innovation ecosystem. Within this context, we review existing models of knowledge systems through an innovative representation exemplifying the knowledge landscape and the model positioning. We argue for a reinforcing role of major stakeholders in the proliferation of innovation and entrepreneurship, and the need to promote healthy interactions between them.

Introduction

To address the challenge of creating jobs and wealth in modern economies, governments promote innovation because of its perceived contributions to the creation of jobs and wealth (Orhan & Scott, 2001). In particular, to fuel job creation, governments worldwide encourage students in higher-education institutions to consider entrepreneurship as an alternative to traditional employment. Indeed, there has been an increasing emphasis on entrepreneurship as a career option, especially during the recent global economic recession, which provided a boost to the types of course offerings in higher-education institutions and led to an upswing in student enrolment (Solomon, 2007). Recently, higher-education institutions have been offering an increasing number of courses related to entrepreneurship, especially in the United States during the difficult economic periods between 1996 and 1999 (Kuratko, 2005), when student attendance in entrepreneurial courses increased by 92% (Solomon, 2007).

Because of their role in entrepreneurship education, higher-education institutions can be viewed as societal innovation systems. Their task is not only to produce entrepreneurially oriented and competent individuals, but also to foster social mechanisms that underpin and facilitate the birth and growth of businesses and firms at a regional level (Laukkanen, 2000). Through regional innovation-based practices, higher-education institutions are increasingly acting as centers of growth and are poised to play a prominent role in economic development. This new, broader role has also opened up new challenges and opportunities for higher-education institutions, particularly in emerging countries (Gupta, 2005).

Lundvall and colleagues (2002) found that the efficiency of knowledge activities depends on the innovation system and its performance on several aspects of socio-economic and political institutions. They characterized knowledge systems and their relationship with economic development and innovation by interconnecting them with the introduction of knowledge into the economy and the society at large. Numerous researchers (e.g., Edquist et al., 2000; Parikh, 2001) also link knowledge systems to innovation. And, the link between entrepreneurial activity and economic growth has been made by several researchers (Caree & Thurik, 2002), who recognize the relevance of entrepreneurial activity and innovation in the economic development of a nation. Thus, there is a subtle linkage existing

Reviewing the Knowledge Systems of Innovation and the Roles of Major Stakeholders

Punit Saurabh, Prabha Bhola, and Kalyan Kumar Guin

between innovation and knowledge systems. Others (e.g., Lundvall et al., 2002; Reynolds et al., 2002) have also referred to the interconnectivity of innovation and entrepreneurship, and the resultant role of other knowledge system stakeholders, specifically the role of higher-education institutions in economic growth.

In the present article, we use India as a case study to examine new challenges and opportunities facing its innovation ecosystem and the role played by higher-education institutions and other knowledge system stakeholders The Indian context is unique due to its demographic, geographic, and socio-economic positioning. India is the second most populous nation and has a fledgling economy with consumer appetite for all types of market-driven goods and services. It has vast diversities of religion, castes, and sects with a complex mix of problems echoing the severity of sub-Saharan African nations, which often lack the basic necessities of food, health, education, safe drinking water, etc. while in contrast matching the capabilities of developed nations with rapid strides in the field of high technology and software. Yet, the challenges are grave and look insurmountable unless serious remedial actions are initiated.

We provide background information about the Indian context in terms of barriers to innovation and identify a key collaboration gap in the innovation ecosystem: a lack of interaction between innovation stakeholders. As a potential means to fill this gap, we examine the role of knowledge systems by reviewing some of the models available in the literature. The article highlights the role of major stakeholders and points to the perceived gaps of the Indian innovation ecosystem and the role of knowledge systems in an Indian context. The knowledge system landscape indicates the positioning of the existing knowledge system models highlighted in the literature review. The ideal roles of major stakeholders in the innovation construct has been highlighted from an Indian perspective, which is pro-development and all-inclusive, but it is also relevant to other similarly placed economies.

Literature Review: Knowledge Systems

Parikh (2001) describes knowledge systems as consisting of four important knowledge processes: identification, preparation, documentation, and actualization. Primarily, the categorization of knowledge systems aims to support knowledge transformation suitable for its distribution and sharing among stakeholders. Scientific and technological developments have had considerable impact on socio-economic processes of change of technological innovations (Leydesdorff & van den Besselaar, 1994). Correspondingly, socio-economic conditions also play an important role in research and development (R&D) based decision processes within the knowledge systems, especially in the industrial sector. Several conceptual models and approaches to linking innovation to important constituents of knowledge systems and the economy have evolved.

Pol and Carroll (2006) have argued in favour of knowledge system as a critical dimension of economic change with components of innovation, entrepreneurial activities, and market power playing an important role. Comparatively, Drucker (1985) considered innovation as "a specific instrument of the entrepreneur" and an "output of knowledge-based systems". For Lindley (2003), a knowledge system, much like a society, is "a process of structural change leading to the production diffusion and use of knowledge in the economy with a potential to play a major role in wealth creation". Twarog (2003) describes knowledge systems as entities comprised of research systems, higher-education institutions, industries and governments, policy making bodies, and R&D labs that integrate several factors of innovations and its respective aiding mechanisms.

Leydesdorff and Meyer (2006) refer to a knowledge-based innovation system as: "an outcome of interaction among different social coordination mechanisms like markets, knowledge production, and governance at interfaces". Edquist (1997) states that a knowledge system might remain active at different levels (e.g., industrial, local, regional, national, and international). According to Etzkowitz and Leydesdorff (2000), knowledge system models are indication of flux and the rearrangement and widening of the role of knowledge in society and the economy. Nine of these conceptual models and approaches to understanding innovation as an important constituent of knowledge systems and economies are summarized in Table 1.

Representing the Knowledge System Landscape

Notwithstanding the interface of innovation, a need was felt to represent the existing knowledge system models, leading to the conceptualization of the knowledge system landscape. The new construct adds another critical dimension, which provides a wide-angle view of several existing knowledge system processes, models, and stakeholders, in addition to their the sub-divisions and its areas of emphasis.

Reviewing the Knowledge Systems of Innovation and the Roles of Major Stakeholders

Punit Saurabh, Prabha Bhola, and Kalyan Kumar Guin

Table 1. Summary of key knowledge system models

Knowledge System Model	Description
National Innovation System (Lundvall, 1988; Nelson, 1993)	• focuses on flows of knowledge, flow of technology, and information among people, enterprises, and institutions
Post-Modern Research System (Rip & van der Meulen, 1996)	• consists of two systemic aspects of research systems: "steering" (i.e., the degree of sensitivity when implementing an objective) and "aggregating" (the organization of processes of agenda building within the system) • analyzes the infrastructure support, quality of support, and other aspects to determine the quality of research at an institution
Research System in Transition (Rip, 1990)	• refers to the role of R&D systems as the dynamics of change while laying out an agenda for future directions of science policy research
Mode I (Gibbons et al., 1994)	• refers primarily to basic university research organized in a disciplinary structure • describes a mode of knowledge production whose foundations rest on principles of scientific expertise, peer review, and non-interference • differentiates itself from scientific discovery of theoretical, experimental science by an internally-driven taxonomy of disciplines and by the autonomy of scientists and their host institutions (i.e., the higher-education institutions)
Mode II (Carayannis & Campbell, 2012)	• describes the new production of knowledge featuring production, trans-disciplinary work, high reflexivity, and ingenious methods of quality control • varies depending on the context, which could differ significantly due to variations in geographical, historical, social, and cultural settings
Mode III (Carayannis & Campbell, 2012)	• refers to open, adaptive, learning-driven knowledge at the foundational level and innovation, and refers it as "a multilayered, multimodal, multinodal, and multilateral system", encompassing mutually complementary and reinforcing innovation networks and knowledge clusters • comprises clusters of human and intellectual capital, outlined by social capital and underlined by financial capital
Triple Helix (Etzkowitz & Leydesdorff, 2000)	• refers to a spiral model of innovation that captures multiple reciprocal relationships at different points in the process of knowledge capitalization • denotes the university–industry–government relationship as one of relatively equal, yet interdependent and overlapping, institutional spheres
Quadruple Helix (Carayannis & Campbell, 2012)	• highlights the government, higher-education institutions, industry, and civil society as key actors promoting a democratic approach to innovation through which strategy development and decision-making are exposed from the feedback, leading to policies and practices responsible in a social context • offers a future-oriented outlook and vision, addressing the current challenges and introducing a problem-solving approach that emphasizes a sustainable development perspective that brings together innovation, entrepreneurship, and democracy
Quintuple Helix (Carayannis & Campbell, 2010)	• brings together different and complex perspectives to understand, manage, and govern Mode III as well as the Quadruple and Quintuple Helices • identifies open innovation diplomacy as a novel strategy • includes the “media-based and culture-based public” and “civil society”

Reviewing the Knowledge Systems of Innovation and the Roles of Major Stakeholders

Punit Saurabh, Prabha Bhola, and Kalyan Kumar Guin

The knowledge system landscape tries to accommodate various existing models that have not been explored in this way before. It also helps clarify the positioning of the existing models in the knowledge system. For example, there are several existing stakeholders of the knowledge systems, including higher-education institutions, industry, government, R&D labs, funding agencies, venture capitalists, and high-net-worth individuals (HNIs), and civil society. The representation helps clarify the perspectives, functioning, and proximities of differing models as well as their differentiators. In one case, researchers have been able to identify government, higher-education institutions, and industry as major stakeholders of the knowledge systems aptly defined in the Triple Helix model. Referring to this model, Leydesdorff and Meyer (2003) emphasize three different sub-dynamics of knowledge-based innovation systems: economic exchanges in the market, geographical disparities, and the organization of knowledge. Similarly, government, higher-education institutions, industry, and civil society are key actors promoting a democratic approach to innovation emphasized by the Quadruple Helix Model (Carayannis & Campbell, 2012). The knowledge system landscape provides a pictorial representation of the models and their positioning, as shown in Figure 1. It also helps elucidate the important role played by secondary and tertiary knowledge stakeholders, namely the R&D labs, government and private funding agencies, high-net-worth Individuals, social entrepreneurs, nongovernmental organizations (NGOs), and several other crucial stakeholders .

The knowledge system landscape integrates several other associated modules, namely the Post-Modern Research System, Modes I, II, and III, and the National Innovation System, which all have a healthy connectivity with the resources of higher-education institutions and the facilitations of government to aid, promote, and measure research and its outputs. Notably, research and innovation is considered as key to the growth of knowledge systems and hence finds mention in several models, such as the Post-Modern Research

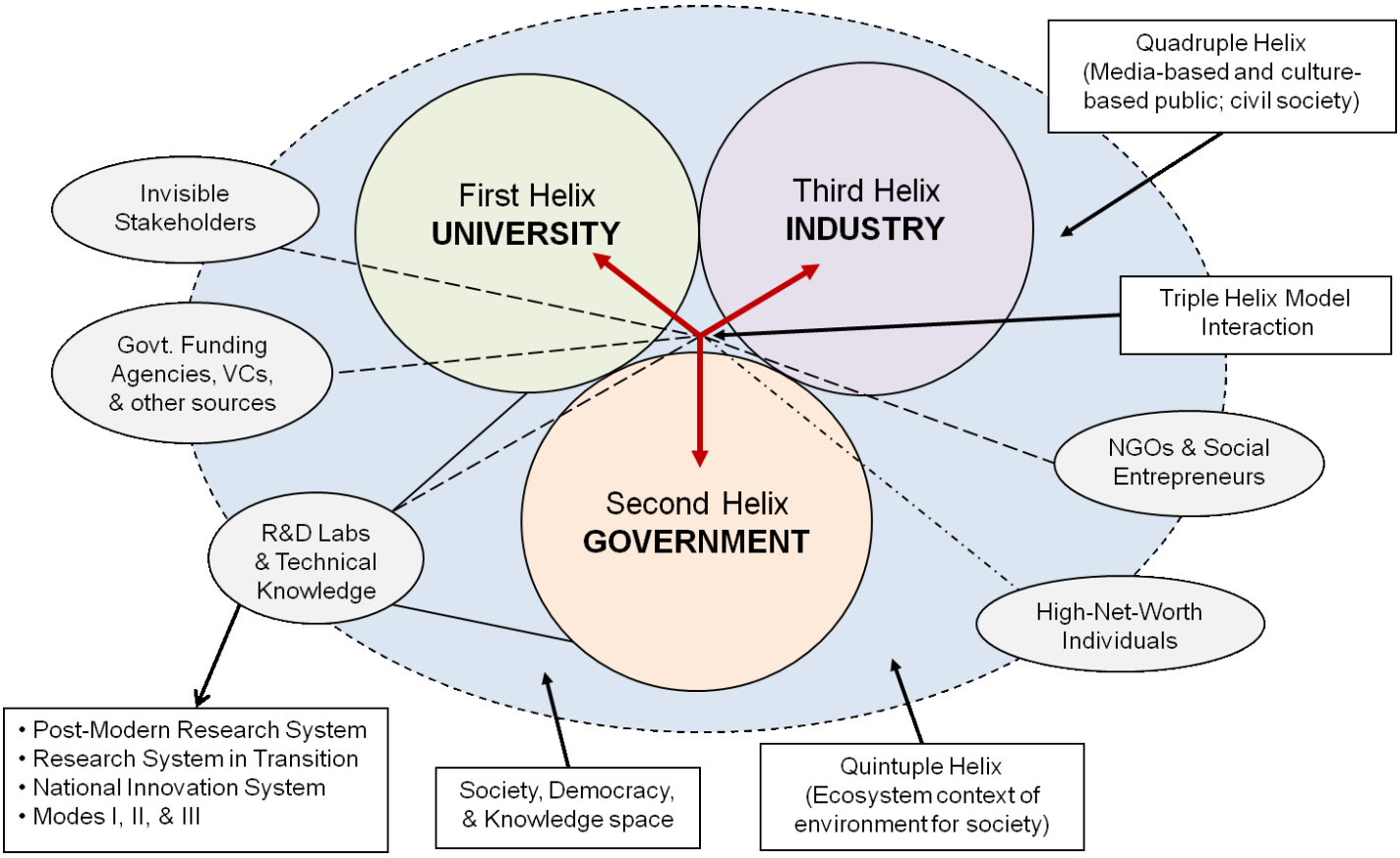

Figure 1. The knowledge system landscape

Reviewing the Knowledge Systems of Innovation and the Roles of Major Stakeholders

Punit Saurabh, Prabha Bhola, and Kalyan Kumar Guin

System, the National Innovation system, and the Research System in Transition. The knowledge system landscape provides adequate representation of the R&D labs, as referred to by Rip (1990), who highlighted the essential role of R&D systems in the Research Systems in Transition model in terms of dynamics of change and a step towards setting an agenda for science policy research. High reflexivity found favor from Nowotny and colleagues (2003) who, while explaining Mode I, note the key role of independence and autonomy provided to researchers at higher-education institutions and research labs in the growth of knowledge systems. The connectivity between the higher-education institutions and research labs is therefore adequately represented. Thus, the knowledge system landscape connects the independent and dependent stakeholders and provides a wider view of the context. In keeping with the construct, we now explore the issues faced by the innovation stakeholders in promoting innovation in an Indian context.

Barriers to Innovation in India within the Context of Knowledge Systems

In India, the growth and quality of innovation has been a subject of debate for some time (e.g., National Knowledge Commission, 2007). New product development through innovation has not happened at the desired pace in India due to myriad factors. These factors include the developing nature of the Indian economy (Sikka, 1997), an overdependence on the government, and inadequate contributions from higher-education institutions, and industry.

Open Innovation accounts for a fair share of the Government of India's initiatives to help create a global innovations and startups originating in India. However, most of the business incubators and innovation programs that have been set up by the Government of India have only been partially successful in promoting collaborations with industry and higher-education institutions. Lately, efforts have been made by successive governments to promote innovation in higher-education institutions with active industry participation, but they have so far met with little success because the role of industry is generally very restricted to core areas of interest. Industry support for "corporate social responsibility" for open innovations is also negligible due to the government's unfavourable taxation policies. Some of the major obstacles that are generally observed between the stakeholders of innovation in an Indian setting are:

- an absence of joint collaboration mechanisms between higher-education institutions and industries in the area of joint product development and research
- a lack of innovations emerging from higher-education institutions, and a failure to commercialize innovations that do emerge
- a failure of products developed by higher-education institutions to meet the expectations of industry
- the dearth of intellectual property sharing mechanisms between industry and higher-education institutions
- inadequate industry sponsorship for research in specific areas of industrial importance
- a deficiency of infrastructure available at higher-education institutions and in industry, which impairs the development of joint research platforms and mutually beneficial collaborative work
- insufficient orientation in innovation and entrepreneurship orientation provided by schools and higher-education institutions
- a scarcity of trained manpower to groom innovators and foster entrepreneurship, especially in technology parks, which are incubators that are generally based within higher-education institutions
- a want of support programs based in higher-education institutions and managed by their staff to help innovators carry out innovation/product commercialization and entrepreneurship

In several cases the role of a higher-education institution is partially or wholly visible, and hence their role in entrepreneurship comes into focus (Saurabh, 2014). From the above discussion, we conclude that there is a key collaboration gap due to a lack of interaction between the stakeholders of innovation and key players participating in the innovation ecosystem. So far, some of the issues identified above have been addressed by the major stakeholders of innovation, namely higher-education institutions, government, and industry. For example, the government has reformatted and re-conceptualized several innovation funding and support programs for product development and commercialization to support incubation of companies through marketing, intellectual property, and monetary support.

Reviewing the Knowledge Systems of Innovation and the Roles of Major Stakeholders

Punit Saurabh, Prabha Bhola, and Kalyan Kumar Guin

These efforts have not yet led to overall improvement, as can be observed by the failure of government programs to motivate entrepreneurs and innovators to come up with product- and service-based innovations and startups. A portion of the failures could be attributed to inadequate management practices as well as communication lapses between the innovators, government agencies, support agencies, etc.

Ideal Roles of Indian Innovation Stakeholders

Several knowledge system models consider higher-education institutions, government, and industry to be the significant stakeholders in innovation creation. In a developing nation such India, the onus for innovation promotion thus lies primarily with the government and the higher-education institutions, with private and public R&D labs and industry playing supporting roles. All three major stakeholders and their roles in creating an innovation ecosystem in India are discussed in the subsections that follow.

Higher-education institutions

Higher-education institutions assume greater responsibility than other stakeholders due to their tacit and close relationship with the government and other stakeholders. According to Mansfield and Lee (1996), the role of the university as a key contributor to wealth generation and economic development has increased in recent decades. In the Indian context, there is an increasing need for economic development through provision of better services and infrastructure support for hospitals, roads, electricity, housing, and transportation, etc., which require a highly trained workforce. All of these requirements can be effectively met with a judicious mix of good educational institutions acting as the baseline for knowledge creation at all levels from kindergarten to higher-education institutions. Sadly, there is a dearth of quality higher-education institutions in India to support the demands of the population. India's 2013 ranking in the Global Innovation Index (Dutta & Lanvin, 2013) for human capital and research stood at a dismal 105th position, which puts it on par with several lower, middle, and underdeveloped economies. The World Bank Institute's (2012) Knowledge for Development report, put India in the 120th position among 145 countries in their knowledge index ranking, which indicates the plight of education and knowledge in India. The need for improving the quality of higher-education institutions is urgently felt.

With growing economic challenges, higher-education institutions in India should no longer remain as factories for producing employees for companies, but should rather focus on nurturing job creators or entrepreneurs. Higher-education institutions should reinvent themselves as potential locations for initiating successful companies by projecting their proximity to industries and advanced research infrastructure. They should focus on innovative research utilizing the available resources, knowledge, and expertise available with faculty members and the student community to promote innovation and entrepreneurial activities within their campuses. Because the vibrant ecosystem around higher-education institutions is rich in technical resources, infrastructure, labour force, and other resources, it is seen as better suited for setting up high-tech industrial clusters, labs, and research centres. Etzkowitz and Leydesdorff (2000) highlight the increasing role of higher-education institutions leading to increased knowledge creation and contributions to economic development. Former Indian Prime Minister Manmohan Singh recently referred to the need for changing the culture in favour of promoting innovation at Indian higher-education and scientific institutions and called for a change in mindsets to promote an innovation culture by aligning with the expectations of the industrial and social sectors (Padma, 2010). He had also emphasized the need to improve the "outward orientation" of higher-education institutions by strengthening links with industry and creating international research partnerships.

Even though India is the second most populous nation in the world, its development in the field of Science and Technology is not visible in its Patent Cooperation Treaty (PCT) rankings in the Global Innovation Index (Dutta & Lanvin, 2013). For example, India ranked 55th and 54th respectively in domestic resident patent applications and PCT resident patent applications. In terms of the context of innovation in India, a lack of proper orientation during initiation days at education institutions for adopting innovative practices is also a valid reason for higher-education institutions in India not producing patents. Effective steps to generate scientific research outputs leading to patents should be implemented. The higher-education institutions should also generate quality research papers to improve its research and innovation culture at their institutions.

India's 99th place ranking in the Global Innovation Index (Dutta & Lanvin, 2013) for new businesses in the

Reviewing the Knowledge Systems of Innovation and the Roles of Major Stakeholders

Punit Saurabh, Prabha Bhola, and Kalyan Kumar Guin

15–64 age group shows the lack of initiative for starting businesses. Higher-education institutions in India do not prepare students for creative thinking, taking on risk, or starting businesses. Hence, entrepreneurial training for students in higher-education institutions should promote a risk-taking attitude, skill development and training, and a general motivation to become entrepreneurial. Higher-education institutions should also provide its student innovators and entrepreneurs with financial support, incubation, technical support, and R&D lab facilities. Furthermore, product innovation and commercialization support, and venture support in the form of grants or soft loans, will encourage students to take up entrepreneurial work. Higher-education institutions should develop technical expertise in administration and encourage students to take up innovative research while assisting students with their creative efforts. The quality of research must be outstanding to create valuable technology companies for which academic excellence should be promoted.

Government

Government supported R&D programs and measures help in escalating economic development. They have the mandate to carry on the activities relating to indigenous technology promotion, development utilization, and transfer. Government-supported R&D programs in India enable stakeholders to acquire a technology base towards producing quality goods of international standard (Sikka, 1997). In India, due to the absence of major industrial players, the support systems and infrastructure support needed for any plan of action or project, including policy decisions, are designed and supported by the government. It is the government that has to plan the development of industrial parks equipped with modern facilities to host hi-tech, environmentally-sensitive new businesses and industries in the priority sectors. Government plays an increasingly important role in providing a regulatory environment and encouraging innovation. The involvement of higher-education institutions is ever-increasing along with industry through consulting, contract research, and company formation from research based in higher-education institutions (Leydesdorff & Etzkowitz, 2001) in which role of government is considered central.

Government agencies should focus on actively fostering product- and service-based innovation with a view to developing indigenous capacity. These agencies should support the higher-education institutions to organize awareness programs, conferences, and events with the aim of promoting the processes that contribute to innovation while helping the institutions become self-reliant in all aspects. Encouragement through awards, titles, and monetary support should be provided to innovators and entrepreneurs because they act as motivating factors for both the recipients as well as others. Entrepreneurship and innovation support programs should be actively promoted using all recognized forms of media communication. Government funding bodies should monitor the their programs to ensure that funding is used effectively. Obstacles and regulations that hinder innovation and entrepreneurship activities should be abrogated.

To promote creative and entrepreneurial thinking among students and faculty members, government bodies can provide support and funding to set up entrepreneurship and innovation centres at higher-education institutions. Marketing support required by innovators who have developed technologies and wish to commercialize should be provided separately. Presently, there is no specific program from the Government of India to support new technologies with marketing and commercialization. The government's efforts should be directed to support commercialization of technologies developed in India. Apart from funding, the government should try to assist the entrepreneurs with demonstration opportunities leading to product orders with public sector companies. Also, technical support is a major constraint; innovators and entrepreneurs should be provided with dedicated resources, such as labs or centres where they can receive support without cost or at low cost.

Industry

Industry provides the necessary push to the advancement of innovations. In India, the role of industry in promoting and encouraging innovation has not been vigorous except for some "big names" such as Reliance Industries, Tata, Wipro, and Mahindra. Within Indian industry, R&D budgets are still lower than the global average.

A combination of differential components creates significant and durable business value for one or more well-defined product platforms or for cost-effective development of processes and products. Technology transfer and innovation platforms can support customers in building highly sophisticated structures needed for efficient R&D collaboration, licensing, and open innovation. Industry should be willing to provide access to research labs and infrastructure for employees willing

Reviewing the Knowledge Systems of Innovation and the Roles of Major Stakeholders

Punit Saurabh, Prabha Bhola, and Kalyan Kumar Guin

to innovate or take up intrapreneurship activities. It should give freedom to its employees to experiment, think creatively, and implement innovative ideas along with their regular work.

The support expected from industry in promoting innovation is rarely provided to higher-education institutions because the level of interaction between industry and these institutions is low. Industry efforts should be geared towards building a strategic knowledge partner through engagement of higher-education institutions and other important stakeholders for joint product development, patent sharing, etc. while helping the higher-education institutions in creating a research base. Efforts are being made by industry organizations to promote innovation and research-related interactions through industry bodies such as the Federation of Indian chambers of Commerce and Industry (FICCI; http://ficci.com/) and the Confederation of Indian Industry (CII; http://cii.in), but these efforts are still in their early stages. An "advanced very large scale integration" (AVLSI) lab at the Indian Institute of Technology Kharagpur (http://conf05.iitkgp.ac.in/avlsi/) is an example of industry–university research collaboration with 15 industry partners and the university participating together in several research projects to generate viable research outputs for the researchers and joint intellectual property and patents for the industry partners.

Globalization has created immense opportunities to leverage high-end technology for developing countries, which can be aptly harnessed through industry collaborations. Industry must change its mindset in favour of innovation. Simultaneously, copyright violation, piracy, and patent infringement should be discouraged.

To promote vigorous collaboration between innovators and industry, industry should create refined products from the R&D developed by the innovators and provide mentorship in commercialization.. It should take bold steps and play a leading role in encouraging path-breaking, home-grown technologies by investing in future technologies such as brain–computer interfaces, autonomous cars, and robotics. This approach would considerably help entrepreneurs with the application of available technology with industry feedback and encourage further innovation.

Industry can help innovators and entrepreneurs with funding, mentoring, commercialization support, technical and lab support, customer feedback, refinement, and marketing support, in part through links to higher-education institutions. Industries should look at providing technical and financial support to innovative students and even hiring key students or researchers with relevant ideas or domain expertise.

Conclusion

On the basis of a new representation of the landscape of various knowledge system models, this article has argued that the promotion of innovation is dependent on the roles of various important stakeholders in the knowledge system, which has been highlighted using the Indian context. With the increasing need for innovation and the new knowledge that is integrated within it, the knowledge system has also become more relevant in the current context. Due to the changing role of knowledge systems, the historical proximities and constituents of the various models and subsystems emphasize different aspects and highlight the importance of understanding the roles played by key stakeholders. Only by promoting healthy interactions between government, industry, and higher-education institutions can innovation and entrepreneurship proliferate to the benefit of the Indian innovation ecosystem.

About the Authors

Punit Saurabh recently completed his PhD in the domain of innovation and entrepreneurship development from the Indian Institute of Technology Kharagpur, India. He has hands-on experience in managing government innovation and entrepreneurship funding programs and is also involved with the academic aspects of entrepreneurship.

Prabha Bhola is an Assistant Professor in the Rajendra Mishra School of Engineering Entrepreneurship at the Indian Institute of Technology Kharagpur, India, where she also received her PhD in Poverty Economics. She has wide range of teaching experience at different institutions.

Kalyan Kumar Guin is Dean and Professor at the Vinod Gupta School of Management, Indian Institute of Technology Kharagpur, India. He is an alumnus of IIT Kharagpur and Banaras Hindu University in Varanasi, India, and he is a Fellow of the Indian Institute of Management Bangalore. His teaching interests cover marketing and operations management, and he has a special interest in quantitative modelling of strategic issues in management.

Reviewing the Knowledge Systems of Innovation and the Roles of Major Stakeholders

Punit Saurabh, Prabha Bhola, and Kalyan Kumar Guin

References

Carree, M., & Thurik, A. R. 2002. The Impact of Entrepreneurship on Economic Growth. In Z. J. Acs & D. B. Audretsch, *International Handbook of Entrepreneurship Research:* 437-471. Boston/Dordrecht: Kluwer Academic Publishers.
http://dx.doi.org/10.1007/0-387-24519-7_17

Carayannis, E. G. & Campbell, D. F. J. 2010. Triple Helix, Quadruple Helix and Quintuple Helix and How Do Knowledge, Innovation and the Environment Relate To Each Other? A Proposed Framework for a Trans-disciplinary Analysis of Sustainable Development and Social Ecology. *International Journal of Social Ecology and Sustainable Development,* 1(1): 41–69.
http://dx.doi.org/10.4018/jsesd.2010010105

Carayannis, E. G., & Campbell, D. F. J. 2012. *Mode 3 Knowledge Production in Quadruple Helix Innovation Systems.* Springer Briefs in Business 7. New York: Springer.
http://dx.doi.org/10.1007/978-1-4614-2062-0_1

Drucker, P. F. 1985. *Innovation and Entrepreneurship: Practice and Principles.* New York: Harper Business.

Dutta, S., & Lanvin, B. (Eds.). 2013. *The Global Innovation Index 2013: The Local Dynamics of Innovation.* Geneva, Ithaca, and Fontainebleau: Cornell University, INSEAD, and WIPO.
http://www.wipo.int/freepublications/en/economics/gii/gii_2013.pdf

Edquist, C. (Ed.). 1997. *Systems of Innovations: Technologies, Institutions, and Organizations.* London: Pinter.

Edquist, C., & Riddell, C. W. 2000. The Role of Knowledge and Innovation for Economic Growth and Employment in the Information and Communication Technology (ICT) Era. In K. Rubenson & H. G. Schuetze (Eds.). *Transition to the Knowledge Society: Policies and Strategies for Individual Participation and Learning:* 29. Vancouver, Canada: Institute for European Studies, University of British Columbia.

Etzkowitz, H., & Leydesdorff, L. 2000. The Dynamics of Innovation: From National Systems and ''Mode 2'' to a Triple Helix of University–Industry–Government Relations. *Research Policy,* 29(2): 109–123.
http://dx.doi.org/10.1016/S0048-7333(99)00055-4

Gibbons, M., Limoges, C., Nowotny, H., Schwartzman, S., Scott, P., & Trow, M. 1994. *The New Production of Knowledge: The Dynamics of Science and Research in Contemporary Societies.* Thousand Oaks, CA: Sage Publications.

Gupta, A. 2005. *International Trends in Private Higher Education and the Indian Scenario.* Research and Occasional Paper Series, CSHE 11.05. University of California, Berkeley: Center for Studies in Higher Education.
http://escholarship.org/uc/item/4ch9m7j0

Kuratko, F. D. 2005. The Emergence of Entrepreneurship Education: Development, Trends, and Challenges. *Entrepreneurship Theory and Practice,* 29(5): 577-97.
http://dx.doi.org/10.1111/j.1540-6520.2005.00099.x

Laukkanen, M. 2000. Exploring Alternative Approaches in High-Level Entrepreneurship Education: Creating Micro-Mechanisms for Endogenous Regional Growth. *Entrepreneurship and Regional Development,* 12(1): 25-47.
http://dx.doi.org/10.1080/089856200283072

Leydesdorff, L., & van den Besselaar, P. (Eds.). 1994. *Evolutionary Economics and Chaos Theory: New Directions in Technology Studies.* London and New York: Pinter.

Leydesdorff, L,. & Etzkowitz, H. 2001. The Transformation of University-Industry-Government Relations. *Electronic Journal of Sociology,* 5(4).

Leydesdorff, L., & Meyer, M. 2003. The Triple Helix of University-Industry Government Relations: Introduction to the Topical Issue. *Scientometrics,* 58(2): 191-203.
http://dx.doi.org/10.1007/s11192-007-0200-y

Leydesdorff, L., & Meyer, M. 2006. Triple Helix Indicators of Knowledge-Based Innovation Systems: Introduction to the Special Issue. *Research Policy,* 35(10): 1441-1449.

Lindley, R.M. 2003. *Knowledge-Based Economies: The European Employment Debate in a New Context.* Coventry, UK: Warwick Institute for Employment Research, University of Warwick.

Lundvall, B.- Å. 1988. Innovation as an Interactive Process: From User–Producer Interaction to the National System of Innovation. In G. Dosi (Ed.). *Technical Change and Economic Theory:* 349. London: Pinter.

Lundvall, B.- Å., Johnson, B., Andersen, E. S., & Dalum, B. 2002. National Systems of Production, Innovation and Competence Building. *Research Policy,* 31(2): 213–231.
http://dx.doi.org/10.1016/S0048-7333(01)00137-8

Mansfield, E., & Lee, J.-Y. 1996. The Modern University: Contributor to Industrial Innovation and Recipient of Industrial R&D Support. *Research Policy,* 25(7): 1047-58.
http://dx.doi.org/10.1016/S0048-7333(96)00893-1

National Knowledge Commission. 2007. *Innovation in India.* Government of India: National Knowledge Commission.

http://www.knowledgecommission.gov.in/downloads/documents/NKC_Innovation.pdf

Nelson, R. R. (Ed.) 1993. *National Innovation Systems: A Comparative Analysis.* New York: Oxford University Press.

Nowotny, H., Scott, P., & Gibbons, M. 2003. Introduction: 'Mode 2' Revisited: The New Production of Knowledge. *Minerva,* 41(3): 179-194.
http://dx.doi.org/10.1023/A:1025505528250

Orhan, M., & Scott, D. 2001. Why Women Enter into Entrepreneurship: An Explanatory Model. *Women in Management Review,* 16(5): 232–247.
http://dx.doi.org/10.1108/09649420110395719

Padma, T. V. 2010. Indian Prime Minister Calls for 'Innovation Ecosystem'. *SciDev.Net.* August 1, 2014:
http://www.scidev.net/en/news/indian-prime-minister-calls-for-innovation-ecosystem--1.html

Parikh, M. 2001. Knowledge Management Framework for High-Tech Research and Development. *Engineering Management Journal,* 13(3): 27-34.

Pol, E. P., & Carroll, P. 2006. *An Introduction to Economics with Emphasis on Innovation.* Innovation Planet.

Reynolds, P. D., Bygrave, W. D., Autio, E., Cox, L. W., & Hay, M. 2002. *Global Entrepreneurship Monitor 2002 Executive Report.* Wellesley, MA/London: Babson College/London Business School.

Reviewing the Knowledge Systems of Innovation and the Roles of Major Stakeholders

Punit Saurabh, Prabha Bhola, and Kalyan Kumar Guin

Rip, A. 1990. An Exercise in Foresight: The Research System in Transition – To What? In S. E. Cozzens, P. Healey, A. Rip, & J. Ziman (Eds.). The Research System in Transition, 387-401. The Netherlands: Kluwer Academic Publishers. http://dx.doi.org/10.1007/978-94-009-2091-0_29

Rip, A., & van der Meulen, B. J. R. 1996. The Post-Modern Research System. *Science and Public Policy*, 23(6): 343-352. http://dx.doi.org/10.1093/spp/23.6.343

Saurabh, P. 2014. *Education-Enterprise Model for Innovation Based Entrepreneurship Development at Higher Education Institutions in India*. Doctoral Thesis, Indian Institute of Technology-Kharagpur.

Sikka, P. 1997. Financing the Development of Indigenous Technology in India. *Current Science,* 73(5): 406-408.

Solomon, G. 2007. An Examination of Entrepreneurship Education in the United States. *Journal of Small Business and Enterprise Development*, 14(2): 168-82. http://dx.doi.org/10.1108/14626000710746637

Twarog, S. 2003. *Preserving, Protecting and Promoting Traditional Knowledge: National Actions and International Dimensions*. Selected Papers on Trade and Development Research Issues for Asian Countries.

World Bank Institute. 2012. *Measuring Knowledge in the World's Economies: Knowledge Assessment Methodology and Knowledge Economy Index*. Washington, DC: World Bank Institute Knowledge for Development Program.

Citation: Saurabh, P., Bhola, P., & Guin, K. K. 2014. Reviewing the Knowledge Systems of Innovation and the Associated Roles of Major Stakeholders in the Indian Context. *Technology Innovation Management Review*, 4(8): 36–45. http://timreview.ca/article/821

Keywords: knowledge systems, innovation ecosystem, innovation system, government, industry, higher-education institutions, university, entrepreneurship, stakeholders, models

Q&A

Ritu Dubey

Q. What is the future of entrepreneurship in India?

A. In India, business was traditionally considered to be the domain of scholarly challenged individuals or the result of natural inheritance within business communities. Gradually, the appetite for risk and the acceptance of failure increased, but only recently have alternate professions and the idea of "following one's dream" gained approval. In particular, entrepreneurship caught the fancy of the Indian middle class after the economy was liberalized. The economic reforms introduced in 1991 reduced the bureaucratic controls, promoted private enterprise, and lowered the barriers to creating new businesses. Coupled with the emergence of knowledge economy, the demand for skilled employees greatly increased and a trend emerged toward technology entrepreneurship in the services sector, which is less capital-intensive than traditional industries.

Indeed, the future of entrepreneurship in India lies in the services sector, and the Government of India is providing support to encourage this trend. However, there are as many challenges as there are opportunities, as will be discussed below.

Government Support

Traditionally, government programs, and support from the banking and finance industry, were largely focused and aligned to the manufacturing sector with its strong product focus. Industry associations such as the Confederation of Indian Industry (CII; cii.in), the Federation of Indian Chambers of Commerce and Industry (FICCI; ficci.com) and the Associated Chambers of Commerce and Industry of India (ASSOCHAM; assocham.org) have existed since the pre-independence era and lobby the government for policy initiatives that favour traditional businesses and industries. With the information technology sector emerging as a rapidly growing segment of Indian industry the National Association of Software and Services Companies (NASSCOM; nasscom.in) was formed in 1988 as the industry association for information technology industry.

In 2000, the National Science & Technology Entrepreneurship Development Board (NSTEDB; nstedb.com) – under the aegis of the Department of Science and Technology (DST; dst.gov.in) – launched the Technology Business Incubation (TBI) program (nstedb.com/institutional/tbi.htm), which is geared towards supporting entrepreneurship in emerging technology areas such as information and communications technology, manufacturing, biotechnology, nanotechnology, and agricultural technology. This program was an extension of the Science & Technology Entrepreneurs' Park program, which was initiated in 1985 by the NSTEDB in academic institutions and research labs of excellence with an objective of promoting self employment for young science and technology graduates. The NSTEDB identified 120 technology business incubators in different technology areas within India (NSTEDB, 2009). Of these, 53 were promoted by the NSTEDB, 40 were software technology parks promoted by the Ministry of Information and Communication Technology, and the remaining 30 were promoted by other government departments, banks, financial institutions, or private companies. The numbers are small for a country as large as India and the geographical distribution is also not uniform: 56% of incubators are located in southern India, 21% are in northern India, 17% are in western India, and only 6% are located in eastern regions (NSTEDB, 2014).

The Government of India promoted and supported small and medium-sized enterprises (SMEs) in India by establishing clusters across the country. District Industry Centres were established in all major cities and towns of India. Cottage industries were established and promoted through various support programs under the Khadi and Village Industries Commission. In 2006, the Government of India established the Ministry of Ministry of Micro, Small & Medium Enterprises (Ministry of MSME; msme.gov.in), which provides support in the form of infrastructure resources, funds, training, and tax benefits.

Besides government initiatives, many private organizations are helping build the entrepreneurial ecosystem

Q&A. What is the future of entrepreneurship in India?

Ritu Dubey

and related support services. A number of private incubators and accelerators have entered the field in the past few years, though most of these are located in the main technology hubs of the country (i.e., Delhi-NCR, Mumbai, Bangalore, Pune, Hyderabad, Chennai, Kolkata) leaving a lot of scope for penetration to less prominent cities and towns.

Challenges and Opportunities

Data from the NASSCOM resource centre paints a clear picture of the emerging startup ecosystem in India (NASSCOM, 2014):

- The number of technology startups has tripled in last six years, from about 1000 to 3000 startups.
- Two-thirds of entrepreneurs are less than 30 years of age.
- Health care, retail, and SMAC (social, mobility, analytics, and cloud) are the hot beds of technology entrepreneurship.
- The number of angel investors has grown from 7 to 32 from 2006 to 2012 while the number of venture capitalists has grown from 43 to 48 in the same period.

Thus, the entrepreneurial journey of an independent India has only just begun and the road ahead is full of promise, provided that a favourable ecosystem continues to develop and give wings to this fledgling trend. There is much to desire in terms of policy reforms and support system available to entrepreneurs. However, numerous challenges and related opportunities remain and can be summarized as follows:

1. *Culture shift:* India has experienced nearly two centuries of colonial influence followed by a half century of socialistic policy leanings, and neither of these contexts favour free private enterprise. The shift to an entrepreneurial culture is a recent phenomenon, which is yet to transform the traditional middle-class mindset of business being "the refuge of the incompetent and the unscrupulous" and of salaried jobs being a secure option in an uncertain world. This culture is gradually changing with social acceptance of new alternatives and growing appetites for risk. The shift to nuclear families and high mobility has also reduced social pressures to conform. In most areas, the gaps are many and competition is limited, hence a large opportunity exists for entrepreneurial initiatives.
2. *Disparity:* The entrepreneurial ecosystem is evolving every day with the birth of new support agencies (both government and private initiatives) to meet the growing needs of entrepreneurs; yet, it has a long way to go to address the needs of a country as large as India. The rapid growth of a support system is concentrated in certain pockets of urban development centres, mainly in the technology hubs limited to metropolitan areas and some state capitals. The distribution of facilities though uneven is fast spreading, and the benefits of the developing economy are gradually percolating to the remote geographies and to the demography at "the bottom of the pyramid" thanks to increased social entrepreneurship. The equitable distribution of the benefits of economic growth and development has caught the attention of many socially inclined entrepreneurs. Hopefully, the glaring disparity in wealth distribution can be made less stark by providing an even playing field.
3. *Foreign influence:* The growth of the Indian economy is service oriented with a heavy dependence on export. The domestic demand is low due to stagnant primary and secondary sectors of the economy. A huge spate of economic reforms are the need of the hour to boost domestic agriculture and the industrial sector to create indigenous demand for services and to develop the domestic markets. A heavy dependence on foreign economies makes growth unstable and vulnerable to external uncertainties. That the need for this balance is being recognized at different levels and that policy reforms for promoting the neglected sectors of the economy are being initiated are good signs. A heavy investment in infrastructure development and business-friendly regulations being planned to improve the country's ratings in terms of the ease of doing business and to attract foreign direct investment and foreign institutional investment, if successfully implemented, can open doors to new possibilities for entrepreneurs.
4. *Lack of success stories:* The success of predecessors opens doors for those who follow. India needs more entrepreneurial success stories to feed on and motivate the next generation to embrace the difficult but rewarding entrepreneurial journey. Rags to riches success stories of early Indian entrepreneurs associated with Infosys, Flipkart, Naukri, Makemytrip, Biocon, Dr. Reddy's, Red Bus, and the like are giving rise to new hopes and aspirations in the masses. The blooming SME sector reflects the strength of a country's economic ecosystem. India needs to recognize and reward its risk takers and promote entrepreneurs

Q&A. What is the future of entrepreneurship in India?

Ritu Dubey

of all hues as the growth engines of the economy. Having tunnel vision about what success consists of and what is considered an achievement for an entrepreneur may restrict the diversity of initiatives. The ecosystem needs to support all segments of entrepreneurial effort without discrimination or bias for set categories.

5. *Social entrepreneurship:* India suffers from inequitable distribution of wealth, with 42% of its large population living below the international poverty line of $1.25 USD per day (UNICEF, 2008). Many are still deprived of the benefits of economic growth and the technology revolution. To achieve inclusive growth for all economic sections of the society, another trend is social entrepreneurship, which aims to create enterprises that will impact the lives at the bottom of demographic pyramid. For example, the penetration of mobile technology to the remotest geographies and the lowest economic strata is proving to be the most helpful tool in reaching out to this segment, and social entrepreneurship funds and incubators are now available with exclusive focus on this sector. Incubators such as Villgro (villgro.org), the Rural Technology and Business Incubator (RTBI; rtbi.in), Periyar Technology Business Incubator (periyartbi.org) are exclusively focused in this area while others such as the Centre for Innovation Incubation and Entrepreneurship (CIIE; ciieindia.org) and the Deshpande Foundation (deshpandefoundation.org) are increasing efforts to identify scalable models in social enterprises. Funds such as Ennovent (ennovent.com), Dasra (dasra.org), and UnLtd India (unltdindia.org) are trying to systematically invest in scalable social enterprises. Because there are large gaps in this sector, the potential and scope for innovation is also high.

6. *Funding:* Although the traditional banking and financial industry has rules and regulations that favour the industrial sector, which is more oriented towards secured debt, new equity-investing arms are coming up in most public and private financial institutions to support the service sector. Private seed and angel funding besides private equity and venture capital funding are fast growing, primarily in funding technology ideas that have a shorter life cycle and rapid scalability potential.

Conclusion

The Indian experience has established that, when the right environment is created by the policy makers, the entrepreneurial spirit of the people finds expression and the economic activity booms. The government and the citizens alike have realized the potential of private initiatives ever since the Indian economy was liberalized in the 1990s. The trend of private enterprise is picking up pace in India and is likely to be supported by all executive and legislative functions of the country irrespective of political ideologies.

Despite many challenges, the entrepreneurial opportunities in India are substantial. A new-found entrepreneurial culture is creating a favourable ecosystem of service and resource providers. Besides government programs and agencies, a number of private funds, mentors, and service providers are entering the arena to further accelerate the trend. There is a long way to go to reach a mature entrepreneurial landscape in India, but the opportunities are sufficiently large and numerous that the future of India will likely be shaped by its entrepreneurs.

About the Author

Ritu Dubey is Senior Manager of the JSSATE Science & Technology Entrepreneurs Park in Noida, India, which is a technology business incubator supported by the Government of India's Department of Science and Technology. For the past four years, she has been active in the development sector in the domain of innovation and entrepreneurship promotion. She has also been managing the incubator's seed fund scheme for technology startups and managed the outreach centre for innovation funding under the Technopreneur Promotion Programme of the government's Department of Scientific and Industrial Research. Before joining JSSATE, she was a commissioned officer of the Indian Army, and she holds a Post-Graduate Diploma in Management from the Institute of Management Technology in Ghaziabad, India.

Q&A. What is the future of entrepreneurship in India?

Ritu Dubey

References

NASSCOM. 2014. Start-up Ecosystem: Innovative, Daring, Futuristic. National Association of Software and Services Companies. August 1, 2014: http://www.nasscom.in/india-startup-ecosystem

NSTEDB. 2009. *Developing Ecosystem for Knowledge to Wealth Creation: Technology Business Incubators.* New Delhi: Government of India, Department of Science and Technology, National Science & Technology Entrepreneurship Development Board (NSTEDB).

NSTEDB. 2014. *Fuelling Entrepreneurship: The Story of Technology Business Incubation in India.* New Delhi: Government of India, Department of Science and Technology, National Science & Technology Entrepreneurship Development Board (NSTEDB).

UNICEF. 2008. *The State of the World's Children 2009: Maternal and Newborn Health.* New York: United Nations Children's Fund (UNICEF).

Citation: Dubey, R. 2014. Q&A. What is the Future of Entrepreneurship in India. *Technology Innovation Management Review*, 4(8): 46–49. http://timreview.ca/article/822

Keywords: entrepreneurship, India, ecosystem, incubators, support agencies, social entrepreneurship

Author Guidelines

These guidelines should assist in the process of translating your expertise into a focused article that adds to the knowledge resources available through the *Technology Innovation Management Review*. Prior to writing an article, we recommend that you contact the Editor to discuss your article topic, the author guidelines, upcoming editorial themes, and the submission process: timreview.ca/contact

Topic

Start by asking yourself:

- Does my research or experience provide any new insights or perspectives?
- Do I often find myself having to explain this topic when I meet people as they are unaware of its relevance?
- Do I believe that I could have saved myself time, money, and frustration if someone had explained to me the issues surrounding this topic?
- Am I constantly correcting misconceptions regarding this topic?
- Am I considered to be an expert in this field? For example, do I present my research or experience at conferences?

If your answer is "yes" to any of these questions, your topic is likely of interest to readers of the TIM Review.

When writing your article, keep the following points in mind:

- Emphasize the practical application of your insights or research.
- Thoroughly examine the topic; don't leave the reader wishing for more.
- Know your central theme and stick to it.
- Demonstrate your depth of understanding for the topic, and that you have considered its benefits, possible outcomes, and applicability.
- Write in a formal, analytical style. Third-person voice is recommended; first-person voice may also be acceptable depending on the perspective of your article.

Format

1. Use an article template: .doc .odt
2. Indicate if your submission has been previously published elsewhere. This is to ensure that we don't infringe upon another publisher's copyright policy.
3. Do not send articles shorter than 1500 words or longer than 3000 words.
4. Begin with a thought-provoking quotation that matches the spirit of the article. Research the source of your quotation in order to provide proper attribution.
5. Include a 2-3 paragraph abstract that provides the key messages you will be presenting in the article.
6. Provide a 2-3 paragraph conclusion that summarizes the article's main points and leaves the reader with the most important messages.
7. Include a 75-150 word biography.
8. List the references at the end of the article.
9. If there are any texts that would be of particular interest to readers, include their full title and URL in a "Recommended Reading" section.
10. Include 5 keywords for the article's metadata to assist search engines in finding your article.
11. Include any figures at the appropriate locations in the article, but also send separate graphic files at maximum resolution available for each figure.

Issue Sponsor