

# SMEs and Open Innovation: Global Cases and Initiatives

Hakikur Rahman  
*University of Minho, Portugal*

Isabel Ramos  
*University of Minho, Portugal*

Managing Director: Lindsay Johnston  
Senior Editorial Director: Heather Probst  
Book Production Manager: Sean Woznicki  
Development Manager: Joel Gamon  
Development Editor: Michael Killian  
Acquisitions Editor: Erika Gallagher  
Typesetter: Jennifer Romanchak  
Print Coordinator: Jamie Snavelly  
Cover Design: Nick Newcomer

Published in the United States of America by  
Business Science Reference (an imprint of IGI Global)  
701 E. Chocolate Avenue  
Hershey PA 17033  
Tel: 717-533-8845  
Fax: 717-533-8661  
E-mail: [cust@igi-global.com](mailto:cust@igi-global.com)  
Web site: <http://www.igi-global.com>

Copyright © 2012 by IGI Global. All rights reserved. No part of this publication may be reproduced, stored or distributed in any form or by any means, electronic or mechanical, including photocopying, without written permission from the publisher. Product or company names used in this set are for identification purposes only. Inclusion of the names of the products or companies does not indicate a claim of ownership by IGI Global of the trademark or registered trademark.

Library of Congress Cataloging-in-Publication Data

SMEs and open innovation: global cases and initiatives / Hakikur Rahman and Isabel Ramos, editors.  
p. cm.

Includes bibliographical references and index.

Summary: "This book unites knowledge on how SMEs can apply open innovation strategies to development by incorporating academic, entrepreneurial, institutional, research, and empirical cases"--Provided by publisher.

ISBN 978-1-61350-519-9 (hardcover) -- ISBN 978-1-61350-520-5 (ebook) -- ISBN 978-1-61350-521-2 (print & perpetual access) 1. Small business--Case studies. 2. Research, Industrial--Case studies. 3. Diffusion of innovations--Case studies. 4. Technological innovations--Management--Case studies. 5. Strategic alliances (Business)--Case studies. I. Rahman, Hakikur, 1957- II. Ramos, Isabel, 1966-  
HD2341.S6236 2012  
658.02'2--dc23

2011038370

British Cataloguing in Publication Data

A Cataloguing in Publication record for this book is available from the British Library.

All work contributed to this book is new, previously-unpublished material. The views expressed in this book are those of the authors, but not necessarily of the publisher.

# Chapter 1

## Research and Practices on Open Innovation: Perspectives on SMEs

**Hakikur Rahman**

*University of Minho, Portugal*

**Isabel Ramos**

*University of Minho, Portugal*

### **ABSTRACT**

*Innovation has become a recognized driver of economic prosperity of a country through sustained growth of its entrepreneurships. Moreover, recently coined term open innovation is increasingly taking a lead in enterprise management in terms of sustained profitability. Foci of researchers and practitioners are revolving around innovation methods, processes, and strategies. This chapter seeks to find out open innovation researches and practices that are being carried out circumscribing development of small and medium enterprises (SMEs) through a longitudinal study. Along this context the study is investigating into researches that are being carried out by leading researchers and research houses across the globe, and at the same time, it also investigates open innovation practices that are being carried out for the development of SMEs. Before its conclusion, the chapter attempts to develop a framework for future research practices.*

### **INTRODUCTION**

Innovation is no more just a research topics but became a significant driver for prosperity, growth and sustained profitability to global entrepreneurships). Furthermore, due to opening up the

innovation processes and combining internally and externally developed technologies and strategies to create economic value the innovation has crossed the boundary of closed innovation to open innovation (Chesbrough 2003a; 2003b; Rahman & Ramos, 2010), which gained interest of researchers and practitioners favoring special

DOI: 10.4018/978-1-61350-519-9.ch001

issue of publication, dedicated conferences and growing literature (Fredberg, Elmquist & Ollila, 2008).

As mentioned above and also found in contemporary literatures that innovation is shifting from the closed and controlled environment of the corporate entrepreneurs towards more open and flexible model, based on cooperation and coordination among various parties. Knowledge and new technologies are no longer remaining sole properties of major corporations. In this aspect, SMEs are playing important role in networking and making innovation clusters in association with universities and research houses, being recognized as major driving forces in the open innovation paradigm (European Union, 2005).

SMEs also play a crucial role in raising investments in R&D and making countries more competitive, which is true for not only the European Union but also in other countries (European Union, 2005). Moreover, the majority of the transitional economies have acknowledged that SMEs are potential engine of economic growth and source of sustainable development, which are essential for industrial restructuring, new job creation, and income generation of the population at large (Koyuncugil & Ozgulbas, 2009). However, as this research has found and being supported by many researchers, utilization of open innovation strategies for the development of small and medium enterprises (SMEs<sup>1</sup>) remains low in terms of researches and practices (Chesbrough 2003a; 2003b; ; Lichtenthaler & Ernst, 2009; Lindermann, Valcareel, Schaarschmidt & Von Kortzfleisch, 2009; Van de Vrande, de Jong, Vanhaverbeke & de Rochemont, 2008; 2009; West, Vanhaverbeke & Chesbrough, 2006). This study has tried to synthesize researches and practices in this aspect by carrying out a longitudinal study. In doing so, a thorough literature review has been conducted emphasizing researches conducted by leading researchers and practitioners, though hardly these could be recognized as cent percent contribution towards SMEs growth. While investigating into

the open innovation aspects of SMEs, the study covered characteristics of individual firms, group of firms or taken at regional or national contexts. The intention is to serve as a basis to commence researches and or practices along the route to enrich knowledge of small and medium scale entrepreneurs cluster among the various business clusters segmented by recognized agencies or institutes engaged in this field of study.

## **BACKGROUND**

Innovative entrepreneurship is a function, accountability, or task which can be fulfilled by an individual alone or by teaming up with one or more partners, or with the support of a small firm or similar venture. Or in a collaborative platform, even a large firm can function as an entrepreneur. The main point here is that the entrepreneur is the one who brings together the necessary resources (financial, logistic, managerial and personal) that the innovation calls for. The entrepreneur is the one who finds the place of application and directs the execution of the change. Sometimes a long time passes before a promising invention is taken up by a true entrepreneur. Probably it may happen that an invention or discovery and an entrepreneur do not find each other. Fortunately in the realm of technology advancement, it is quite frequent that the match is made easily. However, in most cases the Schumpeterian entrepreneur drives the innovation process during the first realization of the revolutionary innovation. Furthermore, the process following the pioneering innovation (also known as diffusion), is also mostly driven by entrepreneurs and majority of the initiative appears at the beginning of the entrepreneurship sequence (Kornai, 2010). The entire process can be familiarized as a process of innovation.

Innovation is essential for enterprises and entrepreneurships, especially surviving the current economic conditions or planning sustainable growth relative to their competitors, locally and

globally. Though not plenty, but tools exist to assist the entrepreneurs to measure their propensity to innovate and increase their capability for innovation or their innovation performance. However, this research finds that the situation is scanty for SMEs, as there is a lack of awareness and capacity which causes apprehension about innovation, open innovation, intellectual property and other strategies (Gassmann, 2006; Van de Vrande, de Jong, Vanhaverbeke & de Rochemont, 2009). Furthermore, amongst SMEs who have been subjected to related research there is persuasive evidence that innovation tends to be a domestic affair with more developments coming from existing resources than from outside sources (Bevis and Cole, 2010).

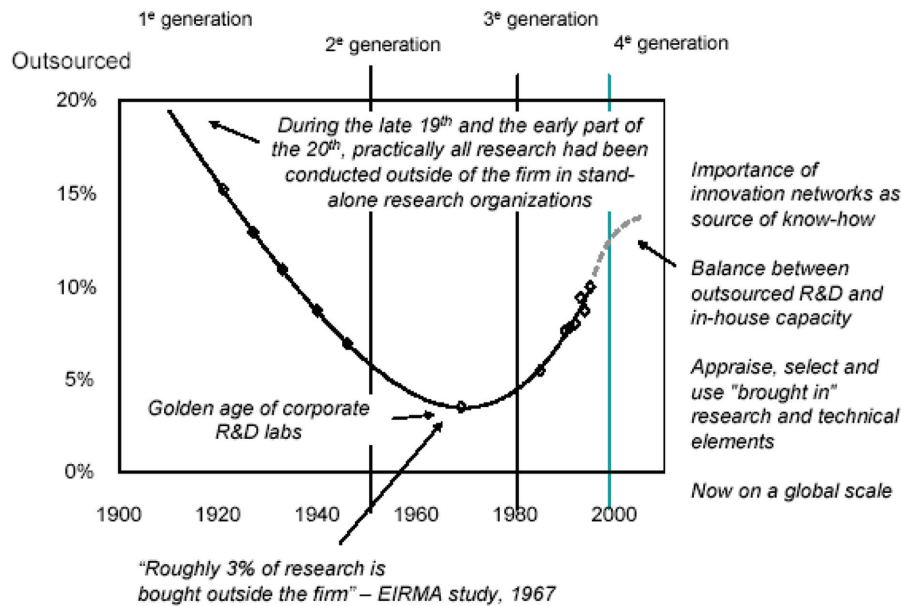
In this context, most of the researches on open innovation remain restricted towards targeting common stakeholders through major global entrepreneurs or their alliances. In addition, it is a fact that a few of those global business houses are controlling the entire market or system of open innovation development through process modification and or diversification of resources. Moreover, despite immense potentiality to reach out the stakeholders at the grass roots through open ended demand, diversity of product variation, and scale of economic capacity major contemporary researches are confined towards generic pattern-oriented clients (Rahman & Ramos, 2010).

But, the scenario is rapidly changing in the recent decade. Innovation is no longer remains within a vertically integrated company with everything in-house. With the advent of open innovation concept, open and flexible cooperation among business houses, research centers and universities is regarded as the most beneficial approach for business development. In this new business model different actors are applying their principles in addition to other partners through interactive participations to bring out an acceptable outcome for value gain (Chesbrough, 2003a; Majjers, Vokurka, van Uffelen, & Ravensbergen, 2005; Wijffels, 2009).

As mentioned earlier, SMEs are the global drivers of technological innovation and economic development and represent the deep, broad and fertile platform that nourishes, sustains and regenerates the global economic ecosystem (Kowalski, 2009). At the same time, to engage the open innovation strategies, R&D (a key innovation indicator) is increasingly being outsourced to lower the cost of production (Dehoff & Sehgal, 2006; 2008). Figure 1 shows that there has been a shift over time towards the ever increasing cooperation in the area of innovations among businesses themselves, and between businesses and knowledge institutions.

Apart from the cooperation, coordination and collaboration, open innovation strategies involve vigorous networking with partner companies; interaction with start-up ventures, public research institutes, universities and external suppliers; sharing and accessing of outside information and technology; IP management; knowledge management; creative entrepreneurship thinking; and above all to be global visionary (Kowalski, 2009). The current section serves as a broad background on the concept of open innovation that has been seen by this research along with other researchers. However, the research hypothesis is to find out contemporary researches and practices following a respectable search from a dependable repository. The study has taken various approaches in this aspect, but mainly depended on contents from the ScienceDirect, a concern of Elsevier B.V. Furthermore, due to the subscription status of the researchers own institute, it was easy to obtain cross reference materials easily from other subscribed sources. The main literature review has been conducted across issues of researches and practices, as mentioned earlier and they have been presented in the next section. The next section has been divided into two threads; one on researches that have been carried out by contemporary researchers in the field of open innovation for the development of SMEs, and the other one on practices that have been adopted by global leaders in the field of open innovation for the development of SMEs.

Figure 1. Changes of patterns in R&D outsourcing (adopted from EIRMA, 2005; 2009)



## RESEARCHES AND PRACTICES: THE REVIEW

In the eyes of an open innovator on entrepreneurship development, economic prosperity is anticipated to result from exploiting innovation capacity, improving competitiveness, and enhancing productivity (BVCA, 2005). By far the open innovation and collaborative innovation are becoming the central topics in recent years surrounding business strategy and innovation (Huizingh, 2009) and open innovation is being claimed to be the new breed of innovation requiring enterprises to look beyond the boundaries of their organizations, thus using external and internal actors and knowledge for successful value creation (Thoben, 2008). However, as evident from this longitudinal study, open innovation has so far been adopted mainly in high-tech and multinational enterprises. Though open innovation has received increasing attention in the scientific research arena, but so far it has mainly been analyzed in corporate and high-tech multinational enterprises (MNEs) based on

in-depth interviews and case studies (Chesbrough, 2003b; Kirschbaum, 2005; Lichtenthaler, 2010). Moreover, when looking for cases or examples, most of them focus on very specific industries, for example open source software (Henkel, 2006) or tabletop role-playing games (Lecocq & Demil, 2006) or crafts industries (Santisteban, 2006) or tourism (Novelli, Schmitz & Spencer, 2006; Hjalager, 2010). Even if a large sample of enterprises is being explored, the focus remains on specific issues rather than the full open innovation model (Van de Vrande, de Jong, Vanhaverbeke & de Rochemont, 2009). Perhaps, open innovation strategies depend on the very specific cases, applications and environments, and cannot be generalized, as such.

However, a few studies have demonstrated that open innovation also exists in smaller organizations (Van de Vrande, de Jong, Vanhaverbeke & de Rochemont, 2009) and this trend is increasing (Gassmann, Enkel & Chesbrough, 2010; Saarikoski, 2006; Dahlander & Gann, 2010; Fredberg, Elmquist & Ollila, 2008). To find out

## **Research and Practices on Open Innovation**

further about the researches and practices on open innovation for SMEs development, as mentioned before several searches were conducted among the contemporary researchers, their researches, research and research practices carried out by reputed organizations like OECD, European Union, European Commission and others in the field of open innovation, especially targeted for SMEs development. Following the search methodology of Saarikoski (2006:24) and supported by similar methodology on structured literature review of Fredberg, Elmquist and Ollila (2008:10), a search into the Internet with the search string ‘open innovation AND SMEs development’ (empirical setting of the research) was conducted and it yield 192,000 hits (though the string [“open innovation” AND “SMEs development”] resulted only 260 hits). These hits included contents on this aspect incorporating all those mentioned entities (researchers, researches, research organizations, and academia, national and international organizations). At the same time, Google scholar search for the same key words also yields 40,800 hits accommodating the mentioned entities. However, to keep the search less generalized and focused to specific search settings and foremost to have an overview on the contemporary research works including practices on open innovation, the search for this study was conducted on a content provider namely, ScienceDirect. In future as this research continues, similar search will be conducted on other content providers like, SCOPUS (subjected to be subscribed) and ‘the ISI Web of Knowledge’, or other subscribed entities utilizing additional search methodologies. This search has been carried out using the search formulae set\_1 for researches on open innovation and search formula set-2 for practices on open innovation.

The Search Formulae set\_1:

1. (open AND innovation for all fields and research AND SMEs for all fields) [All Sources(All Sciences)]

2. (open AND innovation for all fields and research AND SMEs for all fields) [All Sources(Business, Management and Accounting)]
3. (open AND innovation AND research for all fields and SMEs for all fields) [All Sources(Business, Management and Accounting)]
4. (open AND innovation for titles and research AND SMEs for all fields) [All Sources(Business, Management and Accounting)]

The search string (1) brings 1,694 counts; search string (2) brings 1,244 counts and search string (3) brings 1,079 counts; while search string (4) brings only 10 counts.

Search string (3) (with 1,079 counts) has been taken as the entry point of this longitudinal study and among them 940 were journal articles and 139 books. Table 1 shows their publication pattern considering major number of publication (here the minimum is 40) and Table 2 shows their years of publication (here the data has been given from 2000 till the date of the search, which is October 21, 2010). Noteworthy to mention that the search was conducted applying to all fields. But, when the search was modified with ‘open innovation’ in the title and ‘research+smes’ within the fields, the result returned only 10 journal articles and books.

The Search Formulae set\_2:

5. (open AND innovation for all fields and practice AND SMEs for all fields) [All Sources(All Sciences)]
6. (open AND innovation AND practice for all fields and SMEs for all fields) [All Sources(All Sciences)]
7. (open AND innovation for all fields and practice AND SMEs for all fields) [All Sources(Business, Management and Accounting)]
8. (open AND innovation for titles and practice AND SMEs for all fields) [All

*Table 1. Number of entries in different journals (with minimum count of 40)*

<b>Search string # 3 with minimum count of 40</b>	<b>Name of Journal</b>	<b>Number of entries</b>
	Technovation	154
	Research Policy	144
	Technological Forecasting and Social Changes	50
	European Management Journal	45
	Industrial Marketing Management	41

*Table 2. Number of publications in various years on OI researches for SMEs*

<b>Search string # 3</b>	<b>Year of publication</b>	<b>Number of publications</b>
	2011	3
	2010	160
	2009	124
	2008	124
	2007	103
	2006	96
	2005	91
	2004	57
	2003	53
	2002 and earlier since 1991	268

(counts were taken since 2003 till the date of the search, which is October 21, 2010)

Sources(Business, Management and Accounting)]

Similarly, the search formulae set<sub>2</sub> gives the hit counts for the key words incorporating ‘practices’. The search string (5) brings 1,447 counts; search string (6) brings 1,447 counts and search string (7) brings 937 counts; while the search result for string (8) returned only 8 journal articles and books for practices (‘open innovation’ in the title and ‘practice+smes’ within all fields). This evidently is confirming the low number of researches and practices in the area of open innovation, specifically for the SMEs. Furthermore, Table 3 shows their publication pattern considering major number of publication (here the minimum is 30) and table-4 shows their years of publication

(here the data has been given from 2000 till the date of the search, which is October 21, 2010).

As evident from Tables 1 through 4 is that the trend of researches and practices using open innovation strategies for SMEs development is growing after the term ‘open innovation’ being coined by Prof. Henry Chesbrough. These tables also reveal that the trend of using OI strategies was there as number of articles before 2002 with the available data from the ScienceDirect is significant (see Table 2 and 4). However, the main purpose of this study is to find out thematic patterns or themes of researches and practices obtained from most relevant contents of these searches. To be more specific, the most relevant contents were separated from these search using search string (3) and (4). Also, the main notion



## Research and Practices on Open Innovation

Table 3. Number of entries in different journals (with minimum count of 30)

Search string # 6 with minimum count of 30	Name of Journal	Number of entries
	Technovation	129
	Research Policy	117
	Technological Forecasting and Social Changes	46
	Industrial Marketing Management	40
	Journal of Business Venturing	39
	European Management Journal	38

of using ScienceDirect is to provide the first impression of freely available content without being subscribed, notwithstanding other arguments.

Another set of search was carried out among the publication of the leading researchers and practitioners in this field. Among them, the book, “Open Innovation: The New Imperative for Creating and Profiting from Technology” (Chesbrough, 2003a, being the most cited author on ‘open innovation’ (Fredberg, Elmquist & Ollila, 2008)); “Open Innovation: Practice, Trends, Motives and bottlenecks in the SMEs” (De Jong, 2006); “Open Innovation: Researching a new Paradigm” (Chesbrough, Vanhaverbeke & West, 2006); Journal articles written by Van de Vrande, de Jong, Vanhaverbeke & de Rochemont, 2008; 2009; De Jong, Vanhaverbeke, Kalvet & Ches-

brough, 2008; Gassman, 2006; and Gasmann, Enkel & Chesbrough, 2010 were included. The first book was selected as the most cited book in this sector, the second article was selected as the most relevant search return each time made on search engines, and the rest were selected by the authors.

As a third check, contribution of forerunners in the concept of open innovation were also included in the categorization, such as Schumpeter (1934; 1942; 1950), Von Hippel (1986; 1988) and Davenport (1993a; 1993b). Noteworthy to mention that there were several others books (available in the references), but they are not being included here, as separate entities. And, unless they provide fundamental concepts on open innovation, literatures earlier than 2003 were less emphasized.

Table 4. Number of publications in various years on OI practices for SMEs

Search string # 6	Year of publication	Number of publications
	2011	2
	2010	142
	2009	111
	2008	113
	2007	91
	2006	85
	2005	79
	2004	48
	2003	47
	2002 and earlier since 1991	219

(counts were taken since 2003 till the date of the search, which is October 21, 2010)

*Table 5. Synthesized research themes on OI carried out for/by the SMEs*

Research themes	Literatures from the search
Conceptualization of open innovation	Chesbrough, 2003a; Lee, Park, Yoon & Park, 2010; Savioz & Blum, 2002; Amara, Landry, Becheikh & Ouimet, 2008
Establishment of research model	Chesbrough, 2003b; 2006; Raymond & St-Pierre, 2010; Edwards, Delbridge & Munday, 2005; Thorgren, Wincent & Örtqvist, 2009; Lawson, Longhurst & Ivey, 2006; Major & Cordey-Hayes, 2000; Rhee, Park & Lee, 2010
Development of business model	Chesbrough, 2006; De Jong, 2006; Partanen, Möller, Westerlund, Rajala & Rajala, 2008; Freel & De Jong, 2009; Cooke, 2005; Belussi, Sammarra & Sedita, 2010
Opportunities and challenges of open innovation	Groen & Linton, 2010; Knudsen & Mortensen, 2010; Hoffman, Parejo, Bessant & Perren, 1998; Tödting & Trippel, 2005; Levy, Powell & Galliers, 1999; Del Brio & Junquera, 2003; Rahman & Ramos, 2010
Adoption of OI strategies and technologies	Van de Vrande, de Jong, Vanhaverbeke, & Rochemont, 2009; Zeng, Xie & Tam, 2010; Ferneley & Bell, 2006; Bougrain & Haudeville, 2002; Izushi, 2003; De Jong & Marsili, 2006; Lichtenthaler, 2010; Lee & Lan, 2011; Leiponen & Byma, 2009; Mention, 2010; Dickson, Weaver & Hoy, 2006; Hjalager, 2010; O'Regan, Ghobadian & Sims, 2006; Laforet, 2008; De Jong & Hippel, 2009
Measuring the impact of OI strategies	Massa & Testa, 2008; Woodhams & Lupton, 2009; Grupp & Schubert, 2010; Huang, Soutar & Brown 2004
Development of tools or instruments based on OI strategies	Kohn & Hüsigg, 2006; Kaufmann & Tödting, 2002

Finally, to avail the information about open innovation practices in SMEs, this study looked at various publications from international organizations like, OECD, European Union, and European Commission; individual organizations like, Vinnova, Vision Era-Net; portals like, OpenInnovation dot net; and articles from special issues from journals like, MIT Sloan Management Review, Technovation, Research Policy, and Harvard Business Review.

After several round of iterations, the following research themes and practice areas were taken into consideration for further exploration, pending further research impact on these themes and extended debate on their substances in relation to the development of smaller firms serving at the grass roots. Table 5 are showing the selected research themes and Table-6 are showing the practice areas, which are being discussed in the next sub-section in terms of their relevant in the mentioned references in these tables.

**Researches and Researchers:  
Research Themes**

Ranging from the conceptualization, establishment of research model to development of business model, adaptation of strategies, measurement of the impact and development of tools for use and dissemination of the strategies, this study emphasizes on seven distinct research themes. One may argue about this setting of the research theme, but this study observed that without the conceptualization of a process, it cannot be established, and similarly next stages are dependent on the previous stage, such as without learning about the opportunities and challenges behind the strategies, the methodologies cannot be adopted, and so forth. Another school of thoughts could be how much these themes are relevant to the SMEs. These researchers argue that adoption of open innovation strategies to small scale enterprises are yet to reach maturity in even developed nations or nations who are leaders in doing so, hence these themes are also need to be experimented at the

*Table 6. Synthesized practice areas on OI carried out for/by the SMEs*

Areas of practices	Literatures from the search
Venturing	Van de Vrande, de Jong, Vanhaverbeke & Rochemont, 2009; Kaivanto & Stoneman, 2007
Technology licensing	Bidault, 2004; Kollmer & Dowling, 2004; Grindley & Teece, 1997; Ziedonis, 2007; Lichtenthaler, 2007; Nagaoka & Kwon, 2006
Licensing of intellectual property (IP),	Van de Vrande, de Jong, Vanhaverbeke & Rochemont, 2009; Bianchi, Cavaliere, Chiaroni, Frattini & Chiesa, 2010; Lichtenthaler, 2010
Customer and supplier integration	Van de Vrande, de Jong, Vanhaverbeke & Rochemont, 2009; Van Hemel & Cramer, 2002; Bayraktar, Demirbag, Koh, Tatoglu & Zaim, 2009; Alshawi, Missi & Irani, 2010; Fernández-Viñé, Gómez-Navarro & Capuz-Rizo, 2010; De Jong & von Hippel, 2009
External networking and external participation	Van de Vrande, de Jong, Vanhaverbeke & Rochemont, 2009; Zeng, Xie & Tam, 2010; Mention, 2010; Tödtling & Tripl, 2005; Partanen, Möller, Westerlund, Rajala & Rajala, 2008; Van Hemel & Cramer, 2002; Spithoven, Clarysse & Knockaert, 2010; Jones & Macpherson, 2006

grass roots situation and call for extensive research, especially in marginal socio-economic situations.

### Conceptualization of Open Innovation

Though the concept of open innovation was in the market for many years before the term was being popularized by Prof. Henry Chesbrough, this study finds many researchers are researching on modernizing the concepts of open innovation strategies or advancing the degree of novelty of innovation. With the adoption of OI strategies in the entrepreneurship researchers initiated extended studies to reach out to the market by breaking the boundary of the firm. Terms like, innovation merchants, innovation architects, innovation missionaries, innovation intermediaries, or outsourcing R&Ds, use of venture capital, technology intelligence, licensing management, intellectual property management started gaining their acceptance and popularity to fill an ever-existing gap between the producer and the user (Chesbrough, 2003a; Lee, Park, Yoon & Park, 2010; Savioz & Blum, 2002; Amara, Landry, Becheikh & Ouimet, 2008). Apart from the mentioned terms, ‘Users-as-innovators’, ‘customers-as-innovators’, ‘suppliers-as-innovators’ (von Hippel 1986; 1988), ‘networked coordination’ (Powell, 1990),

‘co-opetition’ (Brandeburger & Nalebuff 1996), ‘communities of practice’ (Wenger 1998), and the ‘private-collective innovation model’ (Von Hippel & Von Krogh 2003) are other concepts which have been developed to describe the changing modes of entrepreneurship coordination. At the same time the research dimension has also shifted from ‘closed boundaries to networked paradigm’ (Livieratos & Papoulias, 2009; Rahman & Ramos, 2010).

### Establishment of Research Model

With the term ‘open innovation’ being popularized, majority of the researchers are trying to establish various research models, especially incorporating the role of external partners (SMEs, academia, research house, universities and intermediaries) to achieve improved performance and efficiency on product, process, service and organizational innovation. Along the path to the paradigm shift, as indicated by majority of the researchers, research models have tried to validate the role of internal R&D, effect of the firm’s size, the link between R&D activities and innovation exposition, and various channels of open innovation thus mainstreaming open innovation research in the entrepreneurships through illustrating the

conceptual arguments and conceptual frameworks incorporating various drivers of innovativeness (Chesbrough, 2003b; 2006; Raymond & St-Pierre, 2010; Edwards, Delbridge & Munday, 2005; Thorgren, Wincent & Örtqvist, 2009; Lawson, Longhurst & Ivey, 2006; Major & Cordey-Hayes, 2000; Rhee, Park & Lee, 2010).

## Development of Business Model

Since the mid-1980s a new systemic model of innovation has emerged by incorporating a number of factors, such as externalities, transferability, modularity, network structure, and others, which are not included in the previously dominant linear model (Livieratos & Papoulias, 2009). In this respect, innovation is viewed as a systemic, path dependent and knowledge-centric social process influenced by the institutional environment (Chesbrough, 2003a). Livieratos and Papoulias (2009) argue that, within the open innovation model the innovation process becomes more complex and fragmented, actors are increasingly heterogeneous and more interdependent, and the period from conceptualization to commercialization is shorter. Livieratos and Papoulias (2009) further argue that, this model has created porous boundaries between the innovative company and its surrounding environment, changing the inter- and intra-organizational modes of coordination and triggering new answers to Coase's (1937) question as to, 'what determines the boundaries of the organization'.

While investigating the existence and the performance of an Open Regional Innovation System (ORIS model) characterized by the firms' adoption of an open innovation strategy Belussi, Sammarra and Sedita (2010) argue that in terms of adopting open innovation strategies, it overcomes not only the boundaries of the firms but also the boundaries of the region. Furthermore, Damaskopoulos and Evgeniou (2003) find that open innovation strategy based business models adopt frameworks comprising three interrelated

levels of analysis, such as the level of the firm, the level of the market and industrial structures and the regulatory environment.

Literatures depicted adoption of framework or business model incorporating OI strategies, such as Triple Helix or ORIS, Open Business Model articulating value creation by emphasizing the role of social capital (Wang, Jaring & Wallin, 2009; West, 2006; Chesbrough, 2006; De Jong, 2006; Partanen, Möller, Westerlund, Rajala & Rajala, 2008; Freel & De Jong, 2009; Cooke, 2005; Belussi, Sammarra & Sedita, 2010).

## Opportunities and Challenges on Adopting Open Innovation Strategies

The successful establishment and management of an effective innovation network often remain as a critical challenge for SMEs (Lazzarotti, Manzini & Pizzurno, 2008). SMEs are more open to open innovation because of their limited size and resources. At the same time, intense competition and more demanding customers are found to be the major motivation for open innovation. The most important bottleneck for open innovation is differences in organization and culture between the individual partners (De Jong, 2006).

While researchers are carrying out researches to develop innovation opportunity framework (Levy, Powell & Galliers, 1999; Wang, Jaring & Wallin, 2009; Rahman & Ramos, 2010), the review finds some other researchers find open innovation as throwing challenges for the SMEs development. Groen and Linto (2010) raised a challenge, as whether the term open innovation hindering growth in research and understanding and if so should the term be used as it is currently? Knudsen and Mortensen (2010) chart an unnoticed theme in the current debate on open innovation, as a foundational question whether increasing openness is beneficial? They further investigate that, with increasing degrees of openness the product development projects are slower than the average in the industry, slower than what is usual for the

firm's projects and had higher cost than the average in the industry and the firm's usual projects.

Hoffman, Parejo, Bessant and Perren (1998) mention that, despite the strong commitment to support innovation within SMEs at both regional and local level, the actual processes whereby small firms undertake innovative activity remain unclear. In this context, Tödtling & Trippel (2005) argue that, there is no "ideal model" for innovation policy as innovation activities differ strongly between central, peripheral and old industrial areas.

### **Strategies and Technologies**

Majority of the research documents discuss on adoption of open innovation strategies in the form of practices or applications incorporating innovation technologies. They focus on inter-firm cooperation, cooperation with intermediary institutions, cooperation with research organization (Zeng, Xie & Tam, 2010; Izushi, 2003; Leiponen & Byman, 2009; Mention, 2010); management attitude, planning and external orientation (De Jong & Marsili, 2006); R&D alliances (Dickson, Weaver & Hoy, 2006) and find these are providing significant impact on the innovation performances for SMEs. There are researches on the introduction of tools, for example, bricolage (Ferneley & Bell, 2006); or taxonomies, for example, fruit flies approach (De Jong & Marsili, 2006); or terminologies, for example, technology exploitation (van de Vrande, de Jong, Vanhaverbeke, & Rochemont, 2009; Lichtenthaler, 2010) or technology exploration (van de Vrande, de Jong, Vanhaverbeke, & Rochemont, 2009). In these contexts, O'Regan, Ghobadian and Sims (2006) state that close association between strategy, organizational culture, leadership and innovation plays important role in achieving successful innovation.

Lee and Lan (2011) argue that adoption of knowledge management is becoming an emerging agenda in developing business strategies. They further argue that, implementation depends on a harmonious amalgamation of infrastructure and

process capabilities, including technology, culture and organizational structure. However, based on a random sample of 500 South Yorkshire non-hi-tech manufacturing SMEs, Laforet (2008) finds that the size, strategy and market orientation are associated with innovation.

### **Measuring the Impact of OI Strategies**

As the adoption of OI strategies are being increased at all levels of the entrepreneurs, especially for the SMEs, researchers engaged themselves in finding the ultimate benefits of utilizing OI strategies by measuring their impact. Messa and Testa (2008) points on various indicators of the innovation measurements. Rejeb, Morel-Guimarães, Boly and Assiélou (2009) argue that innovation, as a competitive economic factor, is a process that compels a continuous, evolving and mastered management. Therefore, innovative companies need to measure their innovation capacity. In this aspect, innovation indicators have been used largely by "innovation scholars", a community that consists of researchers from a variety of disciplines (ranging from engineering to sociology and political science), who have a common research focus on technological innovation (Grupp & Schubert, 2010). However, Huang, Soutar and Brown (2004) indicated that four factors underline the commonly used success measurement: financial performance, objective market acceptance, subjective market acceptance and product-level measures. They also mention that these four factors are related to each other and can be used to well predict the overall measurement.

### **Tools and Instruments**

Regarding employment of software in the innovation process in SMEs, Kohn and Hüsigg (2006) during their investigation have found that a large variety of software products are available in the market. Their research while trying to address the question of how far these products are specifically

used in practice, they find that these software products are rarely used to support the innovation process in German SMEs. Kaufmann and Tödtling (2002) mention that, the problem that most SMEs hardly interact with knowledge providers from outside the business sector (for example, universities or intermediaries) and the interaction is not reduced by the support instruments. SMEs perform insufficiently the function of interfaces to innovation-related resources and information from outside the environment. Kaufmann and Tödtling (2002) also argue that, there is a lack of proactive consultancy concerning strategic, organizational and technological weaknesses which is necessary because most of the time, the firms are not aware of such deficiencies within themselves.

### **Practices and Practitioners: Areas of Practices**

Despite the emergence of outsourcing R&D and it's emphasize by early introducers of open innovation in the entrepreneurship enhancement, this study does not find significant contributions from the researchers or practitioners illustrating the application of R&D outsourcing for SMEs development. There is a visible gap in applying OI strategies in practice, especially for SMEs. Van de Vrande, de Jong, Vanhaverbeke and Rochemont (2009) conducted a study, which they claim as a first, explorative one to address this gap by focusing on SMEs. Their study tried to measure the extent of application of OI practices by SMEs and find out whether there is a positive trend on adoption of OI model over the time. However, by looking up at the most frequently applied areas of researches from the most relevant literatures encountered during the review, the following areas are being put forward by this study:

#### **Venture**

Venturing implies to starting up of new organization through spin-off or spin-out processes, includ-

ing getting support from the parent organization in the form of finance, human capital, legal advice or administrative service. But, most OI studies have primarily targeted to venture activities in large enterprises (Van de Vrande, de Jong, Vanhaverbeke & Rochemont, 2009). Van de Vrande, et al. (2009) in their study finds a stable perceived trend of venturing among their surveyed SMEs. However, a distinctive and encouraging fact that governments (in Europe and elsewhere) get involved to stimulate innovation in the SME sector and as SMEs face financial constraints predominantly, governments encourage the provision of debt and equity (venture capital) finance to such firms (Kaivanto & Stoneman, 2007).

#### **Technology Licensing**

Technology licensing usually provides monetary and strategic benefits (Bidault, 2004; Kollmer & Dowling, 2004). The monetary benefits refer to generating licensing revenues, and equally important are the strategic benefits from technology licensing that, the firm does not attempt to directly generate licensing revenues, but tries to improve its competitive position, which indirectly affects its financial performance (Grindley & Teece, 1997; Ziedonis, 2007). The strategic benefits fall into two categories: licensing to reinforce a firm's product market position and licensing to augment a firm's technological position (Lichtenthaler, 2007; Nagaoka & Kwon, 2006). Lichtenthaler (2010) shows that technology licensing offers important strategic benefits beyond generating licensing revenues, which underscore the need for an integrated management of technology licensing activities. However, as this study observes, there is a research gap to find out the impact of technology licensing in SMEs.

#### **Licensing of Intellectual Property**

Emerged from the very basic notion of open innovation, thus being coined as the result of pur-

positive inflows and outflows of knowledge, and can be termed as the flow of intellectual property (IP). Van de Vrande et al. (2009) defined this as selling or offering licenses or royalty agreements to other organizations to gather profit from the intellectual property, such as patents, copyrights or trademarks. Similarly, they mentioned about buying or using IP of other organizations to benefit from external knowledge. Van de Vrande et al. (2009) find stable perceived trend among their surveyed SMEs, with increased number of inward IP licensing than outward IP licensing. To cite another example, though hardly be treated as SMEs, but Bianchi et al. (2010) find in their study that bio-pharmaceutical firms are successfully using licensing agreements aiming to acquire (inbound OI) or commercially exploit (outbound OI) technologies and knowledge.

### **Customer and Supplier Engagement**

Customer integration has been found as the most influential external stimulus of open innovation (Van Hemel & Cramer, 2002). Empirical research by innovation scholars has clearly documented that many of the innovative products are in fact developed, prototyped, tested and improved by “lead users” (De Jong & von Hippel, 2009).

Van Hemel & Cramer (2002) find that among others, customer demand is the most influential external stimuli for ecodesign of product development. In this aspect, close relationship with customers based on mutual trust is an essential element for developing eco-efficiency of SMEs (Fernández-Viñé, Gómez-Navarro & Capuz-Rizo, 2010). Firms may benefit from their customers’ ideas and innovations by proactive market research, providing tools to experiment with and/or develop products similar to the ones that are currently offered in the market, or by producing products based on the designs of customers and evaluating what may be learned from general product development (Van de Vrande, de Jong, Vanhaberbeke & Rochemont, 2009).

Alshawi, Missi and Irani (2010) referred that, there is a shift from product-oriented business strategy to customer focused relationship strategy has been identified as a major change agent in companies. Alshawi, Missi and Irani (2010) further argue that like large organizations, many SMEs have implemented Customer Relationship Management (CRM), so that they can compete effectively in today’s highly changeable economic and market climate. Bayraktar, Demirbag, Koh, Tatoglu and Zaim (2009) support the previous argument by indicating that the forward-looking enterprises today are dynamic; they work in partnership with suppliers, customers and even with competitors; share information and knowledge aiming to create a shared supply chain that is capable of competing if not leading a particular industry.

### **External Networking and External Participation**

Innovation is perceived as a broad and multi-dimensional concept, and can be differentiated as the capacity to innovate now, also in the future, along the entire innovation process of ongoing learning, searching and exploring, resulting in making of new products and processes, establishment of new forms of organization and creation of new markets (Lundvall, 1995). More specifically, as innovation intrinsically involves doing something different, successful innovation is increasingly likely to require sources of complementary competence that lie outside the innovating firm (Freel, M. & de Jong, J.P.J. (2009). Thereby, the place of innovation is not for any single company alone, but for more and more companies to be embedded in a larger network (Kühne, Vanhonacker, Gellynck & Verbeke, 2010), and the complexity of innovation processes led to a tremendous growth in the use of external networks by SMEs (Zeng, Xie & Tam, 2010).

The ability to absorb external knowledge has become a major driver for competition (Spithoven,

Clarysse & Knockaert, 2010), and external organizations can play an active role by ‘intertwining’ knowledge to support the development of processes, systems and routines that distribute and institutionalize learning throughout the organization (Jones & Macpherson, 2006).

External networking may need to focus on accumulating external knowledge or human capital, leading to external participation through equity investment in order to gain access to the external knowledge or to obtain other synergies (Van de Vrande, de Jong, Vanhaberbeke & Rochemont, 2009).

An analysis made by Mention (2010) shows that firms provided with information from market sources and from internal sources as well as firms involved in science-based collaboration for their product innovations are more likely to introduce new market innovations. Moreover, with respect to the innovation networks of firms, there is a widespread consensus nowadays that local connections do not suffice to sustain innovativeness

(Tödtling & Trippl, 2005). Evidence from SMEs and entrepreneurship studies suggests that a key condition for small firms to be innovative and grow is that they should have network mobilization capability; i.e. the ability to establish interactive networks of partners as external stimuli and proactively seek for external assistance (Van Hemel & Cramer, 2002; Jones & Macpherson, 2006; Partanen, Möller, Westerlund, Rajala & Rajala, 2008; Spithoven, Clarysse & Knockaert, 2010).

## **FUTURE RESEARCH DIRECTIONS**

Along the practice areas of open innovation, the timely identification of opportunities for out-licensing of a firm’s technologies outside the core business process is essential for its business success. This is particularly challenging for SMEs due to their lack of specialized knowledge base and also limited financial resources that can be devoted

*Table 7. Summarization of future research framework*

<b>Future research framework</b>
Future researches may need to improve the current understanding of open innovation in SMEs
Focus of future researches may be in the nature of innovation and the extent to which open innovation is embedded in SMEs
Future researches may investigate how entrepreneurs engage in open innovation during their growth phases, and particularly what managerial implication can be derived
Future researches may find out the characteristics of SMEs that are more likely to get benefit from collaboration, particularly via an intermediary
Future researches could be carried out by minimizing the screening questions which may opt out, especially start-ups and micro-enterprises, as these enterprises have been identified as the sources of breakthrough innovations and challengers of contemporary innovation actors
Future researchers could attempt to survey open innovation in broader samples of enterprises in more detailed and exploratory way
Focus of future research could be on the requirement of OI on differences in culture, structure and decision making among partners of different sizes and sectors
Future studies may incorporate findings of OI strategies in improving innovation cooperation for SMEs in emerging economies and developing countries and extend the generalizations of the findings
Future research could be focused on identifying different segments within the population of every stakeholder (the entrepreneurs could be segmented by industry or geographic location and the academics by discipline)
Future researches could pay more attention to the outflows of knowledge, which is intellectual property management
Ref: Van de Vrande, de Jong, Vanhaberbeke & Rochemont, 2009; Lee, Park, Yoon & Park, 2010; Zeng, Xie & Tam, 2010; Massa & Testa, 2008



to innovation activities (Bianchi, Campodall'Orto, Frattini & Vercesi, 2010).

Despite the vast growth in research on open innovation, there are several openings of further research that this study have observed; such as linking open innovation research with other management areas, like marketing, human resources, change process, etc (Van de Vrande, Vanhaverbeke & Gassman, 2010). Moreover, to match the global demand and supply of innovation, businesses need to internationalize their innovation activities through collaboration with external partners (for example, customers, suppliers, universities, and intermediaries) (De Backer & Cervantes, 2008). Foremost, the understanding of open innovation at the outer periphery of the business chain, driving factors of global innovation networking across different SMEs sub-sectors, accessibility and relationship of open innovation strategies with the implementing firms deserves further attention and research.

As mentioned in the problem statement, and also within the texts in the literature review, it is worthy to mention for sake of future research that the concentration on open innovation researches are primarily focused to corporate businesses and it is unclear whether these findings can be generalized to SMEs (Pedersen, Sondergaard & Esbjerg, 2009). A small size pilot project may be initiated in a few countries of similar social and economic patterns to learn about the incubation of OI strategies before making a further leap to standardize a common platform for a larger number of countries in a region.

Based on the study findings, this research would like to establish a future research framework involving products, processes, services and organizational transformations. Table 7 summarizes the framework.

## CONCLUSION

The small firms that do innovate successfully increase their chances of survival (Cofis & Mar-

sili, 2003) and growth (De Jong, Vermeulen & O'Shaughnessy, 2004). The behavior of small firms can vary substantially. Some small firms survive by competing in a market niche, while others pursue more radical innovations and eventually, themselves become market leaders (De Jong & Marsili, 2006).

This study finds the evidence of clustered researches in various segments of SMEs sectors, but a continued research covering major categories of SMEs sectors is demanding. Along the study, the significant research themes and their practices have been explored, including their nature, number, exposition and potency. The study concludes that a research gap exists at the periphery where most of the entrepreneurship nourishes among the developed economies, which are the SMEs. The study also concludes that there is a broadening gap in terms of applying researches in the form of practices aiming at SMEs in the arena of open innovation.

## REFERENCES

- Alshawi, S., Missi, F., & Irani, Z. (2010). (in press). Organisational, technical and data quality factors in CRM adoption — SMEs perspective. *Industrial Marketing Management*.
- Amara, N., Landry, R., Becheikh, N., & Ouimet, M. (2008). Learning and novelty of innovation in established manufacturing SMEs. *Technovation*, 28(7), 450–463. doi:10.1016/j.technovation.2008.02.001
- Bayraktar, E., Demirbag, M., Koh, S. C. L., Tatoglu, E., & Zaim, H. (2009). A causal analysis of the impact of information systems and supply chain management practices on operational performance: Evidence from manufacturing SMEs in Turkey. *International Journal of Production Economics*, 122(1), 133–149. doi:10.1016/j.ijpe.2009.05.011

- Belussi, F., Sammarra, A., & Sedita, S. R. (2010). Learning at the boundaries in an “Open Regional Innovation System”: A focus on firms’ innovation strategies in the Emilia Romagna life science industry. *Research Policy*, 39(6), 710–721. doi:10.1016/j.respol.2010.01.014
- Bevis, K. I., & Cole, A. (2010). *Open innovation readiness: A tool*. ISPIM XXIth International Conference, Bilbao, June 2010, International Society for Professional Innovation Management.
- Bianchi, M., Campodall’Orto, S., Frattini, F., & Vercesi, P. (2010). Enabling open innovation in small- and medium-sized enterprises: How to find alternative applications for your technologies. *R & D Management*, 40(4), 414–431. doi:10.1111/j.1467-9310.2010.00613.x
- Bianchi, M., Cavaliere, A., Chiaroni, D., Frattini, F., & Chiesa, V. (2010). (in press). Organisational modes for open innovation in the biopharmaceutical industry: An exploratory analysis. *Technovation*.
- Bidault, F. (2004). Global licensing strategies and technology pricing. *International Journal of Technology Management*, 27(2/3), 295–305. doi:10.1504/IJTM.2004.003959
- Bougrain, F., & Haudeville, B. (2002). Innovation, collaboration and SMEs internal research capacities. *Research Policy*, 31(5), 735–747. doi:10.1016/S0048-7333(01)00144-5
- Brandenburger, A., & Nalebuff, B. (1996). *Co-opetition*. New York, NY: Doubleday.
- BVCA. (2005). *Creating success from university spin-outs. A Review: BVCA (British Venture Capital Association)*. Library House.
- Chesbrough, H. W. (2003a). The era of open innovation. *MIT Sloan Management Review*, 44(3), 35–41.
- Chesbrough, H. W. (2003b). *Open business models: How to thrive in the new innovation landscape*. Boston, MA: Harvard Business School Press Books.
- Chesbrough, H. W. (2006). *Open innovation: The new imperative for creating and profiting from technology*. Boston, MA: Harvard Business School Press.
- Chesbrough, H. W., Vanhaverbeke, W., & West, J. (Eds.). (2006). *Open innovation: Researching a new paradigm*. London, UK: Oxford University Press.
- Coase, R. (1937). The nature of the firm. *Economica*, 4(16), 386–405. doi:10.1111/j.1468-0335.1937.tb00002.x
- Cofis, E., & Marsili, O. (2003). *Survivor: The role of innovation in firm’s survival*. No. 03-18. WPT. Koopmans Institute, USE, Utrecht University.
- Cooke, P. (2005). Regionally asymmetric knowledge capabilities and open innovation: Exploring Globalisation 2 - A new model of industry organisation. *Research Policy*, 34(8), 1128–1149. doi:10.1016/j.respol.2004.12.005
- Dahlander, L., & Gann, D. M. (2010). How open is innovation? *Research Policy*.
- Damaskopoulos, P., & Evgeniou, T. (2003). Adoption of new economy practices by SMEs in Eastern Europe. *European Management Journal*, 21(2), 133–145. doi:10.1016/S0263-2373(03)00009-4
- Davenport, T. H. (1993a). *Process innovation*. Boston, MA: Harvard Business School Press.
- Davenport, T. H. (1993b). *Process innovation: Re-engineering work through information technology*. Ernst & Young. Harvard Business School Press.
- De Backer, K., & Cervantes, M. (2008). *Open innovation in global networks*. OECD.

- De Jong, J. P. J. (2006). *Open innovation: Practice, trends, motives and bottlenecks in the SMEs (Meer Open Innovatie: Praktijk, Ontwikkelingen, Motieven en Knelpunten in het MKB)*. Zoetermeer: EIM.
- De Jong, J. P. J., & Marsili, O. (2006). The fruit flies of innovations: A taxonomy of innovative small firms. *Research Policy*, 35, 213–229. doi:10.1016/j.respol.2005.09.007
- De Jong, J. P. J., Vanhaverbeke, W., Kalvet, T., & Chesbrough, H. (2008). *Policies for open innovation: Theory, framework and cases*. Research project funded by VISION Era-Net, Helsinki, Finland.
- De Jong, J. P. J., Vermeulen, P. A. M., & O’Shaughnessy, K. C. (2004). Effects of innovation in small firms. *M & O*, 58(1), 21-38.
- De Jong, J. P. J., & von Hippel, E. (2009). Transfers of user process innovations to process equipment producers: A study of Dutch high-tech firms. *Research Policy*, 38(7), 1181–1191. doi:10.1016/j.respol.2009.04.005
- Dehoff, K., & Sehgal, V. (2006). Innovators without borders. *strategy+business*, Autumn 2006.
- Dehoff, K. & Sehgal, V. (2008). Beyond borders: The global innovation 1000. *strategy+business*, Winter 2008.
- Del Brío, J. Á., & Junquera, B. (2003). A review of the literature on environmental innovation management in SMEs: Implications for public policies. *Technovation*, 23(12), 939–948. doi:10.1016/S0166-4972(02)00036-6
- Dickson, P. H., Weaver, K. M., & Hoy, F. (2006). Opportunism in the R&D alliances of SMES: The roles of the institutional environment and SME size. *Journal of Business Venturing*, 21(4), 487–513. doi:10.1016/j.jbusvent.2005.02.003
- Edwards, T., Delbridge, R., & Munday, M. (2005). Understanding innovation in small and medium-sized enterprises: A process manifest. *Technovation*, 25(10), 1119–1127. doi:10.1016/j.technovation.2004.04.005
- EIRMA. (2005). *Responsible partnering: A guide to better practices for collaborative research and knowledge transfer between science and industry*. EIRMA, EUA, EARTO, ProTon Europe, version 1.0 January 2005.
- EIRMA. (2009). *Joining forces in a world of open innovation: Guidelines for collaborative research and knowledge transfer between science and industry*. EIRMA, EUA, EARTO, ProTon Europe, version 1.1 October 2009.
- European Union. (2005). *EU-Summary*. The joint Japan-EU Seminar on R&D and Innovation in Small and Medium size Enterprises (SMEs), Tokyo, November 18, 2004.
- Fernández-Viñé, M. B., Gómez-Navarro, T., & Capuz-Rizo, S. F. (2010). Eco-efficiency in the SMEs of Venezuela. Current status and future perspectives. *Journal of Cleaner Production*, 18(8), 736–746. doi:10.1016/j.jclepro.2009.12.005
- Ferneley, E., & Bell, F. (2006). Using bricolage to integrate business and information technology innovation in SMEs. *Technovation*, 26(2), 232–241. doi:10.1016/j.technovation.2005.03.005
- Fredberg, T., Elmquist, M., & Ollila, S. (2008). *Managing open innovation: Present findings and future directions. Report VR 2008:02*. VINNOVA - Verket för Innovationssystem/Swedish Governmental Agency for Innovation Systems.
- Freel, M., & De Jong, J. P. J. (2009). Market novelty, competence-seeking and innovation networking. *Technovation*, 29(12), 873–884. doi:10.1016/j.technovation.2009.07.005

- Gassmann, O. (2006). Opening up the innovation process: Towards an agenda. [Blackwell Publishing Ltd.]. *R & D Management*, 36(3), 223–228. doi:10.1111/j.1467-9310.2006.00437.x
- Gassmann, O., Enkel, E., & Chesbrough, H. (2010). The future of open innovation. *R & D Management*, 40(3), 213–221. doi:10.1111/j.1467-9310.2010.00605.x
- Grindley, P. C., & Teece, D. J. (1997). Managing intellectual capital: licensing and cross-licensing in semiconductors and electronics. *California Management Review*, 39, 1–34.
- Groen, A. J., & Linton, J. D. (2010). Is open innovation a field of study or a communication barrier to theory development? *Technovation*, 30(11-12), 554. doi:10.1016/j.technovation.2010.09.002
- Grupp, H., & Schubert, T. (2010). Review and new evidence on composite innovation indicators for evaluating national performance. *Research Policy*, 39(1), 67–78. doi:10.1016/j.respol.2009.10.002
- Henkel, J. (2006). Selective revealing in open innovation processes: The case of embedded Linux. *Research Policy*, 35, 953–969. doi:10.1016/j.respol.2006.04.010
- Hjalager, A.-M. (2010). A review of innovation research in tourism. *Tourism Management*, 31(1), 1–12. doi:10.1016/j.tourman.2009.08.012
- Hoffman, K., Parejo, M., Bessant, J., & Perren, L. (1998). Small firms, R&D, technology and innovation in the UK: A literature review. *Technovation*, 18(1), 39–55. doi:10.1016/S0166-4972(97)00102-8
- Huang, X., Soutar, G. N., & Brown, A. (2004). Measuring new product success: An empirical investigation of Australian SMEs. *Industrial Marketing Management*, 33, 117–123. doi:10.1016/S0019-8501(03)00034-8
- Huang, X., Soutar, G. N., & Brown, A. (2004). Review and new evidence on composite innovation indicators for evaluating national performance. *Research Policy*, 39(1), 67–78.
- Huizingh, K. R. E. (2009). The future of innovation. *Proceedings of The XX International Society for Professional Innovation Management - ISPIM Conference 2009*, (p. 21).
- Izushi, H. (2003). Impact of the length of relationships upon the use of research institutes by SMEs. *Research Policy*, 32(5), 771–788. doi:10.1016/S0048-7333(02)00085-9
- Jones, O., & Macpherson, A. (2006). Inter-organizational learning and strategic renewal in SMEs: Extending the 4I framework. *Long Range Planning*, 39(33), 155–175. doi:10.1016/j.lrp.2005.02.012
- Kaivanto, K., & Stoneman, P. (2007). Public provision of sales contingent claims backed finance to SMEs: A policy alternative. *Research Policy*, 36(5), 637–651. doi:10.1016/j.respol.2007.01.001
- Kaufmann, A., & Tödtling, F. (2002). How effective is innovation support for SMEs? An analysis of the region of Upper Austria. *Technovation*, 22(3), 147–159. doi:10.1016/S0166-4972(00)00081-X
- Kirschbaum, R. (2005). Open innovation in practice. *Research on Technology Management*, 48, 24–28.
- Knudsen, M. P., & Mortensen, T. B. (2010). (in press). Some immediate – but negative – effects of openness on product development performance. *Technovation*.
- Kohn, S., & Hüsig, S. (2006). Potential benefits, current supply, utilization and barriers to adoption: An exploratory study on German SMEs and innovation software. *Technovation*, 26(8), 988–998. doi:10.1016/j.technovation.2005.08.003

- Kollmer, H., & Dowling, M. (2004). Licensing as a commercialization strategy for new technology-based firms. *Research Policy*, 33, 1141–1151. doi:10.1016/j.respol.2004.04.005
- Kornai, J. (2010). *Innovation and dynamism: Interaction between systems and technical progress*. Working Paper No. 2010/33, UNU-WIDER.
- Kowalski, S. P. (2009). *SMES, open innovation and IP management: Advancing global development*. A presentation at the WIPO-Italy International Convention on Intellectual Property and Competitiveness of Micro, Small and Medium-Sized Enterprises (MSMEs), Rome, Italy, December 10-11, 2009.
- Koyuncugil, A. S., & Ozgulbas, N. (2009). Risk modeling by CHAID decision tree algorithm. *ICCES*, 11(2), 39–46.
- Kühne, B., Vanhonacker, F., Gellynck, X., & Verbeke, W. (2010). Innovation in traditional food products in Europe: Do sector innovation activities match consumers' acceptance? *Food Quality and Preference*, 21(6), 629–638. doi:10.1016/j.foodqual.2010.03.013
- Laforet, S. (2008). Size, strategic, and market orientation affects on innovation. *Technovation*, 25(10), 1119–1127.
- Laursen, K., & Salter, A. (2006). Open for innovation: The role of openness in explaining innovation performance among UK manufacturing firms. *Strategic Management Journal*, 27, 131–150. doi:10.1002/smj.507
- Lawson, C. P., Longhurst, P. J., & Ivey, P. C. (2006). The application of a new research and development project selection model in SMEs. *Technovation*, 26(2), 242–250. doi:10.1016/j.technovation.2004.07.017
- Lazzarotti, V., Manzini, R., & Pizzurno, E. (2008). Managing innovation networks of SMEs: A case study. *Proceeding of the International Engineering Management Conference: Managing Engineering, Technology and Innovation for Growth (IEMC Europe 2008)*, Estoril, Portugal, (pp. 521-525).
- Lecocq, X., & Demil, B. (2006). Strategizing industry structure: The case of open systems in low-tech industry. *Strategic Management Journal*, 27, 891–898. doi:10.1002/smj.544
- Lee, M. R., & Lan, Y.-C. (2011). Toward a unified knowledge management model for SMEs. *Expert Systems with Applications*, 38(1), 729–735. doi:10.1016/j.eswa.2010.07.025
- Lee, S., Park, G., Yoon, B., & Park, J. (2010). Open innovation in SMEs—An intermediated network model. *Research Policy*, 39(2), 290–300. doi:10.1016/j.respol.2009.12.009
- Leiponen, A., & Byma, J. (2009). If you cannot block, you better run: Small firms, cooperative innovation, and appropriation strategies. *Research Policy*, 38(9), 1478–1488. doi:10.1016/j.respol.2009.06.003
- Levy, M., Powell, P., & Galliers, R. (1998). Assessing information systems strategy development frameworks in SMEs. *Information & Management*, 36(5), 247–261. doi:10.1016/S0378-7206(99)00020-8
- Lichtenthaler, U. (2007). The drivers of technology licensing: an industry comparison. *California Management Review*, 49, 67–89.
- Lichtenthaler, U. (2010). Technology exploitation in the context of open innovation: Finding the right job for your technology. *Technovation*, 30(7-8), 429–435. doi:10.1016/j.technovation.2010.04.001

- Lichtenthaler, U., & Ernst, H. (2009). Opening up the innovation process: The role of technology aggressiveness. *R & D Management*, 39(1), 38–54. doi:10.1111/j.1467-9310.2008.00522.x
- Lindermann, N., Valcareel, S., Schaarschmidt, M., & Von Kortzfleisch, H. (2009). SME 2.0: roadmap towards Web 2.0- based open innovation in SME-network- A case study based research framework. In Dhillon, G., Stahl, B. C., & Baskerville, R. (Eds.), *CreativeSME2009, IFIP International Federation for Information Processing, IFIP AICT 301* (pp. 28–41).
- Livieratos, A. D., & Papoulias, D. B. (2009). *Towards an open innovation growth strategy for new, technology-based firms*. National Technical University of Athens. Retrieved October 30, 2010, from <http://www.ltp.ntua.gr/uploads/GJ/eK/GJeKw8Jf5RqjCO9CWapm4w/Growth.pdf>
- Lundvall, B. (1995). *National systems of innovation: Towards a theory of innovation and interactive learning*. London, UK: Biddles Ltd.
- Maijers, W., Vokurka, L., van Uffelen, R., & Ravensbergen, P. (2005). Open innovation: Symbiotic network, knowledge circulation and competencies for the benefit of innovation in the horticulture delta. *Presentation IAMA Chicago 2005*.
- Major, E. J., & Cordey-Hayes, M. (2000). Engaging the business support network to give SMEs the benefit of foresight. *Technovation*, 20(11), 589–602. doi:10.1016/S0166-4972(00)00006-7
- Massa, S., & Testa, S. (2008). Innovation and SMEs: Misaligned perspectives and goals among entrepreneurs, academics, and policy makers. *Technovation*, 28(7), 393–407. doi:10.1016/j.technovation.2008.01.002
- Mention, A.-L. (2010). (in press). Co-operation and co-opetition as open innovation practices in the service sector: Which influence on innovation novelty? *Technovation*.
- Nagaoka, S., & Kwon, H. U. (2006). The incidence of cross-licensing: A theory and new evidence on the firm and contract level determinants. *Research Policy*, 35(9), 1347–1361. doi:10.1016/j.respol.2006.05.007
- Novelli, M., Schmitz, B., & Spencer, T. (2006). Networks, clusters and innovation in tourism: A UK experience. *Tourism Management*, 27(6), 1141–1152. doi:10.1016/j.tourman.2005.11.011
- O'Regan, N., Ghobadian, A., & Sims, M. (2006). Fast tracking innovation in manufacturing SMEs. *Technovation*, 26(2), 251–261. doi:10.1016/j.technovation.2005.01.003
- Partanen, J., Möller, K., Westerlund, M., Rajala, R., & Rajala, A. (2008). Social capital in the growth of science-and-technology-based SMEs. *Industrial Marketing Management*, 37(5), 513–522. doi:10.1016/j.indmarman.2007.09.012
- Pedersen, M., Sondergaard, H. A., & Esbjerg, L. (2009). Network characteristics and open innovation in SMEs. In K. R. E. Huizingh, S. Conn, M. Torkkeli, & I. Bitran (Eds.), *Proceedings of The XX ISPIM Conference*.
- Powell, W. (1990). Neither market nor hierarchy: Network forms of organization. In Stow, B., & Cummings, L. L. (Eds.), *Research in organizational behavior*. Greenwich, CT: JAI Press.
- Rahman, H., & Ramos, I. (2010). Open innovation in SMEs: From closed boundaries to networked paradigm. *Issues in Informing Science and Information Technology*, 7, 471–487.
- Raymond, L., & St-Pierre, J. (2010). R&D as a determinant of innovation in manufacturing SMEs: An attempt at empirical clarification. *Technovation*, 30(1), 48–56. doi:10.1016/j.technovation.2009.05.005

- Rejeb, H. B., Morel-Guimarães, L., Boly, V., & Assiélou, N. G. (2009). Measuring innovation best practices: Improvement of an innovation index integrating threshold and synergy effects. *Technovation*, 28, 838–854. doi:10.1016/j.technovation.2008.08.005
- Rhee, J., Park, T., & Lee, D. H. (2010). Drivers of innovativeness and performance for innovative SMEs in South Korea: Mediation of learning orientation. *Technovation*, 30(1), 65–75. doi:10.1016/j.technovation.2009.04.008
- Saarikoski, V. (2006). *The odyssey of the mobile Internet- The emergence of a networking attribute in a multidisciplinary study*. Academic dissertation, TIEKE, Helsinki.
- Santisteban, M. A. (2006). Business systems and cluster policies in the Basque country and Catalonia (1990-2004). *European Urban and Regional Studies*, 13(1), 25–39. doi:10.1177/0969776406059227
- Savioz, P., & Blum, M. (2002). Strategic forecast tool for SMEs: How the opportunity landscape interacts with business strategy to anticipate technological trends. *Technovation*, 22(2), 91–100. doi:10.1016/S0166-4972(01)00082-7
- Schumpeter, J. A. (1934). *The theory of economic development*. Cambridge, MA: Harvard University Press.
- Schumpeter, J. A. (1942). *Capitalism, socialism, and democracy*. New York, NY: Harper & Row.
- Schumpeter, J. A. (1950). *Capitalism, socialism, and democracy* (3rd ed.). New York, NY: Harper & Row.
- Spithoven, A., Clarysse, B., & Knockaert, M. (2010). Building absorptive capacity to organize inbound open innovation in traditional industries. *Technovation*, 30(2), 130–141. doi:10.1016/j.technovation.2009.08.004
- Thoben, K. D. (2008). A new wave of innovation in collaborative networks. *Proceedings of the 14th International Conference on Concurrent Enterprising: ICE 2008*. Lisbon, Portugal, 23-25 June 2008, (pp. 1091-1100). Nottingham, UK: University of Nottingham, Centre for Concurrent Enterprise.
- Thorgren, S., Wincent, J., & Örtqvist, D. (2009). Designing interorganizational networks for innovation: An empirical examination of network configuration, formation and governance. *Journal of Engineering and Technology Management*, 26(3), 148–166. doi:10.1016/j.jengtecman.2009.06.006
- Tödting, F., & Trippel, M. (2005). One size fits all? Towards a differentiated regional innovation policy approach. *Research Policy*, 34(8), 1203–1219. doi:10.1016/j.respol.2005.01.018
- Van de Vrande, V., de Jong, J. P. J., Vanhaverbeke, W., & de Rochemont, M. (2008). *Open innovation in SMEs: Trends, motives and management challenges. SCALES-initiative (SCientific AnaLysis of Entrepreneurship and SMEs): SMEs and Entrepreneurship Programme*. Zoetermeer: Netherlands Ministry of Economic Affairs.
- Van de Vrande, V., de Jong, J. P. J., Vanhaverbeke, W., & de Rochemont, M. (2009). Open innovation in SMEs: Trends, motives and management challenges. *Technovation*, 29(6-7), 423–437. doi:10.1016/j.technovation.2008.10.001
- Van de Vrande, V., Vanhaverbeke, W., & Gassman, O. (2010). Broadening the scope of open innovation: Past research, current state and future directions. *International Journal of Technology Management*, 52(3-4), 221–235. doi:10.1504/IJTM.2010.035974
- Van Hemel, C., & Cramer, J. (2002). Barriers and stimuli for ecodesign in SMEs. *Journal of Cleaner Production*, 10(5), 439–453. doi:10.1016/S0959-6526(02)00013-6

Von Hippel, E. (1986). Lead users: A source of novel product concepts. *Management Science*, 32(7), 791–805. doi:10.1287/mnsc.32.7.791

Von Hippel, E. (1988). *The sources of innovation*. New York, NY: Oxford University Press.

Von Hippel, E., & Von Krogh, G. (2003). Open source software and the private–collective innovation model: Issues for organization science. *Organization Science*, 14(2), 209–223. doi:10.1287/orsc.14.2.209.14992

Wang, L., Jaring, P., & Wallin, A. (2009). Developing a conceptual framework for business model innovation in the context of open innovation. *Proceedings of the Third IEEE International Conference on Digital Ecosystems and Technologies (IEEE DEST 2009)*, (pp. 460-465).

Wenger, E. (1998). *Communities of practice: Learning, meaning and identity*. Cambridge University Press.

West, J. (2006). Does appropriability enable or retard open innovation? In H. Chesbrough, W. Vanhaverbeke & J. West (Eds.), *Open innovation: Researching a new paradigm*. London, UK: Oxford University Press.

West, J., Vanhaverbeke, W., & Chesbrough, H. (2006). Open innovation: A research agenda. In H. Chesbrough, W. Vanhaverbeke & J. West (Eds.), *Open innovation: Researching a new paradigm*. London, UK: Oxford University Press.

Wijffels, H. (2009). *Leadership, sustainability and levels of consciousness*. A speech at the Conference on the Leadership for a Sustainable World, June 5, 2009, Grote Kerk, Den Haag, the Netherlands.

Woodhams, C., & Lupton, B. (2009). Analysing gender-based diversity in SMEs. *Scandinavian Journal of Management*, 25(2), 203–213. doi:10.1016/j.scaman.2009.02.006

Zeng, S. X., Xie, X. M., & Tam, C. M. (2010). Relationship between cooperation networks and innovation performance of SMEs. *Technovation*, 30(3), 181–194. doi:10.1016/j.technovation.2009.08.003

Ziedonis, A. A. (2007). Real options in technology licensing. *Management Science*, 53, 1618–1633. doi:10.1287/mnsc.1070.0705

## ADDITIONAL READING

Chesbrough, H.W. (2003) The Era of Open Innovation. *Sloan Management Review*, 44, 3 (Spring): 35-41.

Chesbrough, H.W. (2003) “Open Innovation: How Companies Actually Do It,” *Harvard Business Review*, 81, 7 (July): 12-14.

Chesbrough, H.W. (2003) “Open Platform Innovation: Creating Value from Internal and External Innovation,” *Intel Technology Journal*, 7, 3 (August): 5-9.

Chesbrough, H.W. (2004), “Managing Open Innovation: Chess and Poker,” *Research-Technology Management*, 47, 1 (January): 23-26.

Chesbrough, H. W. (2006). Open Innovation: A New Paradigm for Understanding Industrial Innovation. In Chesbrough, H., Vanhaverbeke, W., & West, J. (Eds.), *Open Innovation: Researching a New Paradigm* (pp. 1–12). Oxford: Oxford University Press.

Chesbrough, H. W. (2006). New Puzzles and New Findings. In Chesbrough, H., Vanhaverbeke, W., & West, J. (Eds.), *Open Innovation: Researching a New Paradigm* (pp. 15–34). Oxford: Oxford University Press.

Chesbrough, H. W. (2006). *Open Business Models: How to Thrive in the New Innovation Landscape*. Boston: Harvard Business School Press.



Chesbrough, H.W. (2007) "The market for innovation: implications for corporate strategy." *California Management Review*, 49, 3 (Spring): 45–66.

Chesbrough, H. W. (2007). Business model innovation: it's not just about technology anymore. *Strategy and Leadership*, 35(Iss: 6), 12–17. doi:10.1108/10878570710833714

Chesbrough, H.W. and A. K. Crowther (2006) "Beyond high tech: early adopters of open innovation in other industries," *R&D Management*, 36, 3 (June): 229-236

Davenport, T. H. (1994, July). Reengineering: Business Change of Mythic Proportions? *Management Information Systems Quarterly*, 121–127. doi:10.2307/249760

Davenport, T.H. (1998) Putting the enterprise into the enterprise system, *Harvard Business Review*, July–August, 76(4): 121–131

Davenport, T. H., & Beers, M. C. (1995). Managing Information About Processes. *Journal of Management Information Systems*, 12(1), 57–80.

Davenport, T. H., & Harris, J. G. (2005). Automated decision making comes of age. *MIT Sloan Management Review*, 46(4), 83–89.

Davenport, T. H., & Short, J. E. (1990, Summer). The New Industrial Engineering: Information Technology and Business Process Redesign. *Sloan Management Review*, 11–27.

Tilley, F., & Tonge, J. (2003). Introduction. In Jones, O. & Tilley, F. (Eds.). *Competitive Advantage in SME's: Organising for Innovation and Change*, John Wiley & Sons, pp. 1-12.

## KEY TERMS AND DEFINITIONS

**Open Innovation Concepts:** Concept that uses the purposive inflows and outflows of knowledge to accelerate internal innovation and expand the markets for external use of innovation.

**Open Innovation Practices:** Practices carried out by the entrepreneurs incorporating open innovation researches.

**Open Innovation Researches:** Researches utilizing open innovation concepts and strategies.

**Open Innovation Strategies:** Strategies that incorporate fresh perspectives, knowledge and inspiration from the inside and outside of an entrepreneurship, thus allowing to go beyond day-to-day thinking and opens up the way to entirely new possibilities.

**SMEs Development:** Development of the small and medium enterprises in terms of economic, knowledge, human skills and other value additions.

## ENDNOTE

- <sup>1</sup> Small and Medium scale Enterprises (SMEs) by definition are small firms with a small number of headcounts and the turnover fall below a certain limit. In terms of headcounts, they vary from country to country and regions to regions. In Europe, the headcounts are less than 250 and the turnover is less than 50 million Euros; [http://ec.europa.eu/enterprise/policies/sme/facts-figures-analysis/sme-definition/index\\_en.htm](http://ec.europa.eu/enterprise/policies/sme/facts-figures-analysis/sme-definition/index_en.htm). The study has adopted this definition.