Emerald Insight

Competitiveness Review

The role of clusters in the global innovation strategy of MNEs: Theoretical foundations and evidence from the Basel pharmaceutical cluster

Philippe Gugler Michael Keller Xavier Tinguely

Article information:

To cite this document:
Philippe Gugler Michael Keller Xavier Tinguely , (2015),"The role of clusters in the global innovation strategy of MNEs", Competitiveness Review, Vol. 25 Iss 3 pp. 324 - 340
Permanent link to this document:
http://dx.doi.org/10.1108/CR-09-2014-0033

Downloaded on: 14 November 2016, At: 20:42 (PT)
References: this document contains references to 102 other documents.
To copy this document: permissions@emeraldinsight.com
The fulltext of this document has been downloaded 354 times since 2015*

Users who downloaded this article also downloaded:

(2015),"Insights into the creation of a successful MNE innovation cluster", Competitiveness Review, Vol. 25 Iss 3 pp. 288-309 http://dx.doi.org/10.1108/CR-08-2014-0026

(2015),"Complementing clusters: a competitiveness rationale for infrastructure investments", Competitiveness Review, Vol. 25 Iss 3 pp. 242-257 http://dx.doi.org/10.1108/CR-12-2014-0040

Access to this document was granted through an Emerald subscription provided by emerald-srm:563821 []

For Authors

If you would like to write for this, or any other Emerald publication, then please use our Emerald for Authors service information about how to choose which publication to write for and submission guidelines are available for all. Please visit www.emeraldinsight.com/authors for more information.

About Emerald www.emeraldinsight.com

Emerald is a global publisher linking research and practice to the benefit of society. The company manages a portfolio of more than 290 journals and over 2,350 books and book series volumes, as well as providing an extensive range of online products and additional customer resources and services.

Emerald is both COUNTER 4 and TRANSFER compliant. The organization is a partner of the Committee on Publication Ethics (COPE) and also works with Portico and the LOCKSS initiative for digital archive preservation.

*Related content and download information correct at time of download.

Downloaded by TASHKENT UNIVERSITY OF INFORMATION TECHNOLOGIES At 20:42 14 November 2016 (PT)

The current issue and full text archive of this journal is available on Emerald Insight at:
www.emeraldinsight.com/1059-5422.htm

Received 17 September 2014
Revised 17 September 2014
Accepted 17 September 2014

Downloaded by TASHKENT UNIVERSITY OF INFORMATION TECHNOLOGIES At 20:42 14 November 2016 (PT)

The role of clusters in the global innovation strategy of MNEs

Theoretical foundations and evidence from the Basel pharmaceutical cluster

Philippe Gugler, Michael Keller and Xavier Tinguely
Center for Competitiveness, University of Fribourg, Fribourg, Switzerland

Abstract

Purpose – This paper aims to focus on the role of clusters as home and host country-specific advantages for multinational enterprises ("MNEs") in the organization of their internal and external networks to optimize the diffusion and generation of new knowledge. Strategic asset-seeking investment has been a major driver of the internalization of innovation activities performed by MNEs abroad. This paper demonstrates the attractiveness of foreign clusters in the global innovation process of MNEs. The main assumption is that location within innovative clusters may foster the ability of firms to generate new innovations.

Design/methodology/approach – This paper illustrates the theoretical developments through the example of firms located in the Basel pharmaceutical clusters which have invested in other clusters abroad.

Findings – The results are based on an in-depth patent data analysis and confirm the importance of clusters in an innovation-driven industry.

Originality/value – This paper focuses on the role of clusters as home and host country-specific advantages for "MNEs" in the organization of their internal and external networks to optimize the diffusion and generation of new knowledge. Strategic asset-seeking investment has been a major driver of the internalization of innovation activities performed by MNEs abroad. This paper demonstrates the attractiveness of foreign clusters in the global innovation process of MNEs. The main assumption is that location within innovative clusters may foster the ability of firms to generate new innovations. This paper illustrates the theoretical developments through the example of firms located in the Basel pharmaceutical clusters which have invested in other clusters abroad. The results are based on an in-depth patent data analysis and confirm the importance of clusters in an innovation-driven industry.

Keywords Clusters, Innovation, Pharmaceutical industry

Paper type Research paper

1. Introduction

The evolution of the global economy and improved access to goods and resources from distant locations have placed knowledge at the core of firms' competitive advantages (Zander and Kogut, 1995, p. 76; Jensen and Szulanski, 2007, p. 1716; Sala-I-Martin *et al.*, 2012, p. 7). As a result of their ability to supersede the market and internalize the benefits of the geographic distribution of their activities, multinational enterprises (MNEs) have distributed their value chain around the world and implemented a global network of subsidiaries that allow them to take advantage of the specific profile of different environments (Sölvell, 2002, p. 3; Ketels, 2008, p. 124; Mudambi and Swift, 2011, p. 1).

Although the literature on knowledge generation has provided important insights on the effects of agglomeration, few studies have analyzed the role of clusters in the global

Competitiveness Review
Vol. 25 No. 3, 2015
pp. 324-340
© Emerald Group Publishing Limited
1059-5422
DOI 10.1108/CR-09-2014-0033

Downloaded by TASHKENT UNIVERSITY OF INFORMATION TECHNOLOGIES At 20:42 14 November 2016 (PT)

innovation strategy of knowledge-intensive MNEs (Dunning, 1998, p. 60; Birkinshaw and Sölvell, 2000, p. 3; Tavares and Teixeira, 2006, p. 1; De Beule *et al.*, 2008; p. 224; Asmussen *et al.*, 2009; Mudambi and Swift, 2010, p. 463). This research contributes to this strand of literature by focusing on the specific role of clusters in the competitiveness of MNEs.

Our paper includes six sections. Section 2 describes the competitive framework for knowledge-intensive MNEs. Section 3 analyzes the role of clusters as "country-specific advantages" ("CSAs") of host regions and sources of MNE's "firms-specific advantages" ("FSAs"). Section 4 focuses on the MNEs' strategic management of knowledge-cluster portfolios as powerful drivers of FSAs. Section 5 exposes the methodology and data used in our empirical study, and Section 6 presents the results of our analysis[1].

2. Competitive framework for knowledge-intensive MNEs

Knowledge and innovation are the main drivers of a firm's competitiveness in today's economy (Zander and Kogut, 1995, p. 76; Jensen and Szulanski, 2007, p. 1716). Firms from "innovation-driven economies" have to constantly generate new knowledge to maintain a competitive edge (Sala-I-Martin *et al.*, 2012, p. 7). As noted by Tinguely (2013, p. 110):

> […] this necessity to innovate and to find new sources of knowledge is reflected by the increasing internationalization of R&D activities, which is part of the broader process of internationalization of innovation (see also Cantwell, 1999, p. 72; Cantwell *et al.*, 2004, p. 58; Cantwell and Piscitello, 2005, p. 3).

The important role of the internationalization of R&D has been studied in detail since the 1990s (Kuemmerle, 1997; Cantwell *et al.*, 2004, p. 58; Criscuolo, 2004, p. 39). Following, inter alia, Vernon's model of the internationalization of R&D activities (Vernon, 1966, 1977), the literature has documented the role of innovation activities executed abroad and provided insights on the strategic importance of the internationalization of R&D within the MNE network (Kotabe *et al.*, 2007).

The goal of knowledge-intensive MNEs is not only to capitalize on their existing ownership advantages ("O-advantages") but also to develop new O-advantages based on the activities performed abroad (Birkinshaw, 1996, p. 476, Kogut and Zander, 1993, p. 625; Mudambi and Navarra, 2004, p. 385).

Knowledge competitive advantages resulting from R&D activities executed at home are no longer sufficient to foster the competitiveness of knowledge-based firms. The evolution of the global economy and the increasing importance of knowledge as a source of competitive advantage have triggered a shift in the nature of investments undertaken by MNEs (Dunning, 1998, p. 45). Although resource- and market-seeking investments have long been the main drivers of firms' foreign direct investment activities, strategic asset-seeking investments have progressively become central in the global growth strategy of MNEs, explaining the increased internationalization of R&D (Dunning and Narula, 1995; Dunning, 1998, p. 50).

The success of strategic asset-seeking investments relies on the capacity of MNEs to connect their O-advantages to the host country's location advantages ("L-advantages") in situations in which internalization is the most efficient mode of foreign activity (Dunning and Lundan, 2008, pp. 72-74; Rugman and Verbeke, 1992, p. 762). The theory of "internalization" (Buckley and Casson, 1976, Rugman, 1981, 2010, p. 4) together with

Downloaded by TASHKENT UNIVERSITY OF INFORMATION TECHNOLOGIES At 20:42 14 November 2016 (PT)

the resource-based view provides a rich background to understand the strategies that MNEs use to benefit from the strategic interactions between O- and L-advantages.

In-depth analyses of these interactions should consider "the firm as the unit of analysis" and rely on a rigorous framework to address the different types of FSAs and CSAs (Rugman, 1981). Rugman (1981; Rugman and Verbeke, 1992) distinguished between "location-bound FSAs" ("LB-FSAs") and "non-location-bound FSAs" ("NLB-FSAs"), which interact with the CSAs of home and host countries. This analytical framework represents a powerful tool to consider the "internal organizational structures of the firm" and the "interfirm linkages" of firms (Collinson and Rugman, 2011, p. 32). Knowledge-intensive MNEs may be conceptualized as a "network" (Rugman and Verbeke, 2001). Such network comprises internal linkages among an MNE's entities (Noorderhaven and Harzing, 2009) and external linkages between the MNE's entities and external firms and institutions (Giroud and Scott-Kennel, 2009).

As highlighted by Noorderhaven and Harzing (2009), the important role of internal linkages in the competitiveness of MNEs has been analyzed using several models, such as the "sender-receiver model" (Gupta and Govindarajan, 2000) and the "social learning approach" (Fox, 2000). The seminal work of Ghoshal and Bartlett (1998) on the internal organization of firms showed the importance of the internal coordination of knowledge sharing within firms as a driver of technological competitiveness. In one of their contributions, Rugman and Verbeke (2001) specifically analyzed the "development and the diffusion of FSAs within the MNE network". As noted by Collinson and Rugman (2011, p. 32):

> […] essentially, the basic IB strategic decision is to recombine FSAs developed in conjunction with the parent MNE home country CSAs with the host country CSAs that can be utilized by its subsidiaries.

External linkages comprise links between foreign subsidiaries and local enterprises, educational institutions, R&D institutes, private or public agencies (chambers of commerce) and other stakeholders that may play a role in the activities of affiliates (Giroud and Scott-Kennel, 2009, p. 556). As noted by Rugman and Verbeke (2001, p. 240):

> […] only firms with affiliates located within the national borders (and often even within narrowly defined geographic regions in a country) then have direct and full access to the accumulated specialized resource pools and positive externalities of the national knowledge development system.

The next section concentrates on the role of clusters as specific CSAs of the recipient country and enhancers of MNEs' FSAs based on technology absorption, diffusion and generation. Section 4 then analyzes the specific strategies developed by MNEs to combine LB-FSAs and NLB-FSAs through their activities between home and host country clusters.

3. Clusters as CSAs of host regions and sources of MNEs' FSAs

The strengthening of competition resulting from the globalization of the economy and the emergence of new players on the international stage have forced MNEs to extend their network of subsidiaries to tap into the specific profile of different types of environments (Ketels, 2008, p. 120). Because MNEs have the ability to internalize the benefits of the geographic dispersion of activities, they can significantly improve their competitive advantages by spreading their activities across locations and taking

Downloaded by TASHKENT UNIVERSITY OF INFORMATION TECHNOLOGIES At 20:42 14 November 2016 (PT)

advantage of the specificities of different business environments (Sölvell, 2002, p. 3; Dunning, 2008, p. 83).

As emphasized by many authors, innovation particularly benefits from the agglomeration of economic activities (Jaffe *et al.*, 1993; Audretsch and Feldman, 1996; Feldman, 2000; Iammarino and McCann, 2006). The importance of location for innovation activities is explained by the inherent characteristics of the innovation process (Lissoni, 2001, p. 1480; Moreno *et al.*, 2005, p. 716). Innovation scholars have analyzed the tendency of innovative activities to concentrate spatially (Kline and Rosenberg, 1986; Freeman, 1991; Nelson, 1993; Malmberg *et al.*, 1996). As noted by Maskell and Malmberg (1999, p. 172) and Asheim and Gertler (2005, p. 292), tacit knowledge represents a key ingredient in the development of unique capacities and innovations. Based on these observations, clusters appear to be a unique source of knowledge dissemination and generation and may play an important role in the global innovation strategy of MNEs (Birkinshaw and Sölvell, 2000; Tavares and Teixeira, 2006; Mudambi and Swift, 2010). Defined as "geographic concentrations of interconnected companies, specialized suppliers, service providers, firms in related industries, and associated institutions in particular fields" (Porter, 1998, p. 197-198), clusters provide an environment that is particularly conducive to innovation (hereafter referred to as "Porterian clusters").

In addition to the positive influence of clusters on productivity and new business creation, empirical studies have confirmed the role of clusters in the stimulation of innovation (Jaffe, 1989; Feldman, 1994; Baptista, 2001; Audretsch *et al.*, 2005; Breschi *et al.*, 2005; Cumbers *et al.*, 2008; De Beule *et al.*, 2008). Clusters provide not only significant CSAs in regions but also unique FSAs for MNEs. They are therefore particularly attractive for strategic asset-seeking investments in the global innovation strategies of MNEs and could be labeled as "CSA-cluster".

4. Strategic management of knowledge-cluster portfolios as powerful drivers of FSAs

Since the beginning of the 1990s, MNEs have progressively developed a vast global network of subsidiaries designed to take advantage of the specific profile of different types of environments. Although MNEs established subsidiaries in labor- or resource-intensive regions to rationalize their production process or to secure specific resources, the growing importance of knowledge as a source of competitive advantage has prompted these enterprises to spread their research activities to capitalize on the specific knowledge that can be created within certain regions (Kogut and Zander, 1993, p. 625; Birkinshaw *et al.*, 1998, p. 221; Dunning, 1998, p. 54; McCann and Mudambi, 2005, p. 1866; Ketels, 2008, p. 124; Mudambi, 2008, pp. 699-700; Meyer *et al.*, 2011, p. 236). In other words, MNEs have gradually disaggregated their entire value chain across the world and scattered their research activities into the world's most innovative regions to access location-bound knowledge and capabilities.

As highlighted above, strategic asset-seeking investments in research activities aim to acquire new knowledge and develop new capabilities that will in turn strengthen an MNE's competitive position (Dunning and Narula, 1995; Kuemmerle, 1997; Dunning and Lundan, 2008, p. 369). However, because the most valuable knowledge is often tacit and embedded in the numerous working relationships that are developed within a defined environment, capturing foreign knowledge implies the development of absorptive

Downloaded by TASHKENT UNIVERSITY OF INFORMATION TECHNOLOGIES At 20:42 14 November 2016 (PT)

capacities (Polanyi, 1966; Cantwell, 1991). As tacit knowledge plays a crucial role in innovation-related tasks, integration and connection with various actors in the foreign environment are necessary to benefit from knowledge spillovers (Dunning and Lundan, 2008, p. 371).

Accessing and acquiring tacit knowledge has therefore increasingly become a central preoccupation of knowledge-intensive MNEs (Mudambi and Swift, 2011; Burnett and Williams, 2012). These companies have progressively implemented complex business models based on the above-mentioned internal linkages (headquarter–subsidiary and subsidiary–subsidiary relationships) and external linkages (embeddedness within the business environments in which they are implanted) (Hallin *et al.*, 2011; Collinson and Wang, 2012; Sala-I-Martin, 2012; see also Verbeke, 2009, p. 187). These linkages and their management have tremendous importance for knowledge-absorptive capacities, knowledge transfers, innovation and creation activities of MNEs (Segarra-Cipres *et al.*, 2013). As highlighted by Rugman and Verbeke (2001, p. 240):

> […] an FSA may be developed internally from three possible geographic locations, each associated with particular CSAs: a home country operation, a host country operation, or an internal network whereby operations in various countries are involved.

These three dimensions are particularly important for knowledge-intensive MNEs to improve their FSAs. According to Dunning:

> […] the ease at which MNEs can transfer intangible assets across national boundaries is being constrained by the fact that the location of the creation and use of these assets is becoming increasingly influenced by the presence of immobile clusters of complementary value-added activities (Dunning, 1998, p. 48).

The acquisition and generation of new knowledge through home and host cluster relationships may constitute a unique source of knowledge and innovation for MNEs (Park, 2011; Yao *et al.*, 2013; Nell and Andersson, 2012). In other words, clusters represent a strategic component of CSAs: firms can take advantage of clusters as CSAs in their home country (home-CSA-cluster) and in their host locations (host-CSA-cluster) and develop FSAs at the headquarter level (FSA-headquarters) and at the affiliate level (FSA-affiliate).

This new reality witnesses the rise of "competence-creating" R&D subsidiaries that result from the greater independence of MNE affiliates within the MNE global network (Cantwell and Piscitello, 1999; Pearce, 1999; Zander, 1999). For instance, Cantwell and Mudambi (2005, p. 1109) observed that a greater level of freedom allows subsidiaries to be more creative and to develop capabilities that are more adequate for the environment in which they interact, compared to subsidiaries with less freedom. This emancipation of MNEs' subsidiaries within the MNE network and as the main source of new knowledge and innovation has been analyzed in the literature on "centers of excellence" (Holm and Pedersen, 2000). Global knowledge and innovation management is a key issue for MNEs. The management of knowledge on an international scale appears to be the core of the competitive advantages of knowledge-intensive MNEs (Mudambi, 2002, p. 1; Kyläheiko *et al.*, 2011, p. 511; Valkokari *et al.*, 2012; Mudambi and Swift, 2010, p. 472). As noted by Nohria and Ghoshal (1997), finding a structure that allows MNEs to manage the disaggregation of their value chain across locations and to tap into foreign location-bound resources is one of the most important challenges for MNEs (please also

Downloaded by TASHKENT UNIVERSITY OF INFORMATION TECHNOLOGIES At 20:42 14 November 2016 (PT)

refer to Doz, 1986; Hedlund, 1986; Porter, 1986; Ghoshal and Bartlett, 1998; Kogut and Zander, 1993; Tracey and Clark, 2003).

MNEs aim to improve their innovation capacities by organizing and internalizing the specific comparative advantages (CSAs) that are offered by different locations. The growing dispersion of MNEs' research activities in turn strengthens their FSAs and their innovation performance if they can efficiently manage their increasingly complex networks of subsidiaries.

5. Methodology and data

Our analysis aims to illustrate the links between "home country" CSAs and "host country" CSAs as well as the ability of firms to strengthen their FSAs through the management of internal and external networks of innovative activities. To illustrate this issue, we performed a thorough descriptive analysis of the global innovation system of MNEs established in the Basel pharmaceutical cluster. The choice of the Basel pharmaceutical cluster is motivated first by the fact that this cluster comprises world-leading MNEs and second because the pharmaceutical industry is widely recognized as a patent-intensive industry (Cooke, 2005, 2006; Keller, 2009; Metrobasel, 2009; PWC, 2010; European Cluster Observatory, 2013).

We constructed our database using the OECD REGPAT database, which registers patent applications at the European Patent Office ("EPO") since 1977. Patents are commonly used to evaluate the innovative output of firms, regions and countries, although, as recognized by previous studies, they cannot be viewed as a perfect measure of innovation (Jaffe *et al.*, 1993; Feldman, 1994; OECD, 2006; Cantwell and Mudambi, 2005; Griliches, 1990). Nevertheless, most authors conclude that patent statistics remain a "unique source for the analysis of the process of technical change" because of the "quantity of available data, accessibility, and the potential industrial, organizational, and technological details" that they offer (Griliches, 1990, p. 1702).

Although the OECD REGPAT database records patent applications since 1977, this paper mainly reports results over the period 2005-2010, which covers a total of 2,336 patent applications and 10,227 inventors linked to the Basel employment basin.

6. Results

According to our theoretical framework, a strong home cluster is associated with increasing internationalization of R&D activity. We first identified the most innovative actors in the cluster in terms of patent applications. As shown in Table I, a vast majority (almost 80.1 per cent) of the inventors of patents demanded by applicants located in the Basel employment basin were linked to the globally active pharmaceutical giants Novartis and Roche for the 2005-2010 period. The dominance of these two MNEs appears even more evident when we consider that the smaller firms Ciba, Sandoz and Syngenta share their history with Novartis.

To illustrate the process of the increasing internationalization of inventive activities, we used our database to identify the residence of the inventors of patents demanded by applicants established in the Basel pharmaceutical cluster for the years 1985, 1995 and 2005. In an approach similar to that used by Cantwell (1992) and Le Bas and Sierra (2002), we considered the region of residence of the inventor(s) to be consistent with the geographic allocation of the invention.

Downloaded by TASHKENT UNIVERSITY OF INFORMATION TECHNOLOGIES At 20:42 14 November 2016 (PT)

As shown in Figure 1, two trends are revealed by the data. First, we observed a significant increase in the total number of inventors in the Basel pharmaceutical cluster. Second, we identified remarkable growth in the level of internationalization.

As illustrated, the number of inventors of patents demanded at the EPO by applicants established in the Basel pharmaceutical cluster in the Basel employment basin grew from 341 in 1985 to 584 in 1995 and 2,634 in 2005. This growth can be partly explained by the increasing propensity to patent at the EPO as a result of the institutional changes that altered the political characteristics of Europe (e.g. the creation of the European Economic Area ["EEA"] in 1994) (Paci and Usai, 2000), a trend that is also reflected by the growth in the number of patent applications by Swiss applicants in all industries and regions (1,721 in 1985; 2,140 in 1995; and 4,954 in 2005). Nevertheless, the increase in the inventive activity of the Basel pharmaceutical cluster is obvious. In

Table I.
Distribution of inventors of the pharmaceutical patents demanded at the EPO in the Basel employment basin by applicants, 2005-2010

Applicant	No. of patent applications	No. of invts	% in total invts
Novartis	983	4,143	40.5
Roche	849	4,045	39.6
Actelion	98	493	4.8
Syngenta	102	441	4.3
Sandoz	58	206	2.0
Santhera	29	151	1.5
Ciba	28	99	1.0
Speedel experimenta	14	91	0.9
Lonza	24	87	0.9
Others	147	471	4.7
Total	2,332	10,227	100.0

Source: Authors' elaboration based on OECD REGPAT database (August 2014)

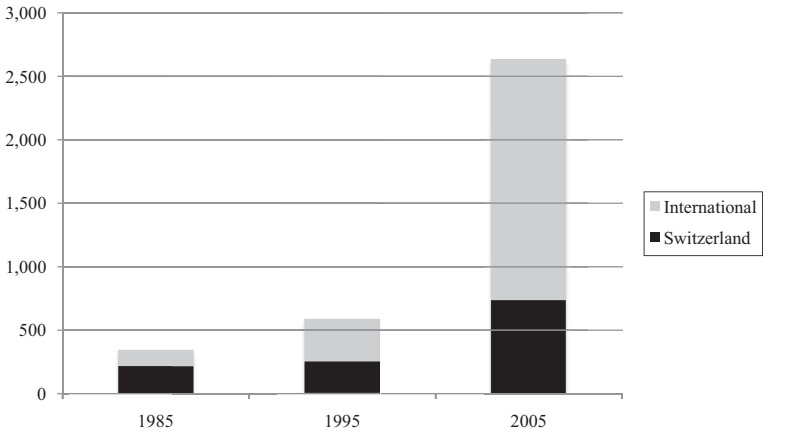


Figure 1.
Number of inventors of pharmaceutical patents demanded at the EPO in the Basel employment basin in 1985, 1995 and 2005 according to inventors' residence

Source: Authors' elaboration based on OECD REGPAT database (August 2014)

Downloaded by TASHKENT UNIVERSITY OF INFORMATION TECHNOLOGIES At 20:42 14 November 2016 (PT)

fact, the percentage of pharmaceutical patent applications out of the total number of patent applications by applicants in the Basel employment basin increased from approximately 32.0 per cent in 1985 to 35.0 per cent in 1995 and 47.0 per cent in 2005.

Table II shows the data for 1985, 1995 and the 2005-2010 period in more details. It reveals a constant increase in the level of internationalization of inventive activity. Over the 1985-2010 period, patents demanded by applicants in the Basel pharmaceutical cluster were increasingly developed abroad. In 1985, 37.8 per cent of the inventors of patents resided outside of Switzerland and this rate rose to 57.4 per cent in 1995 and 71.8 per cent over the 2005-2010 period. Switzerland was even replaced by the USA as the main country of residence of inventors over the 2005-2010 period (i.e. 31.0 per cent of the inventors located in the USA vs 28.2 per cent in Switzerland). Over the period under review, the main foreign sources of invention for the Basel pharmaceutical cluster were the USA, Germany, France, the UK, Austria, Canada and Japan. The most recent developments highlight the emerging importance of China and India in the global knowledge sourcing process. In 2008, China and India together accounted for 2.9 per cent of the inventors residing outside Switzerland. *The descriptive evidence presented above supports our hypothesis of the increasing internationalization of pharmaceutical R&D activities among companies established in the Basel pharmaceutical cluster.*

To conduct a more detailed examination of the research networks impelling the internationalization of R&D activity in strong home clusters such as the Basel pharmaceutical clusters, we used the detailed spatial split of our database. For the 2005-2010 period, we allocated each inventor to its region of residence at the NUTS 2 level of the European Commission or at an equivalent level for other continents[2]. Inventors of patents demanded at the EPO by applicants established in the Basel pharmaceutical cluster were located in 164 different regions. In our attempt to emphasize the role of host clusters in the global innovation process, we then classified each of these regions as a "pharmaceutical-cluster region" or a "non-pharmaceutical cluster region". This classification was conducted in accordance with different sources: European regions were classified based on the cluster mapping undertaken by the European Cluster Observatory (2013)[3]; USA regions were classified according to data from the cluster mapping project for the USA by the Institute of Strategy and Competitiveness, Harvard Business School (2013)[4]; and other regions were classified using academic sources. Despite some potential shortcomings regarding the identification of clusters whose definition may differ from a continent to another, our data strongly support the idea of solid inter-linkages between strong home and host clusters. Out of the 10,227 inventors of the 2,336 pharmaceutical patents demanded by applicants in the Basel pharmaceutical cluster over the period 2005-2010, 84.2 per cent were located in regions identified as "pharmaceutical cluster regions".

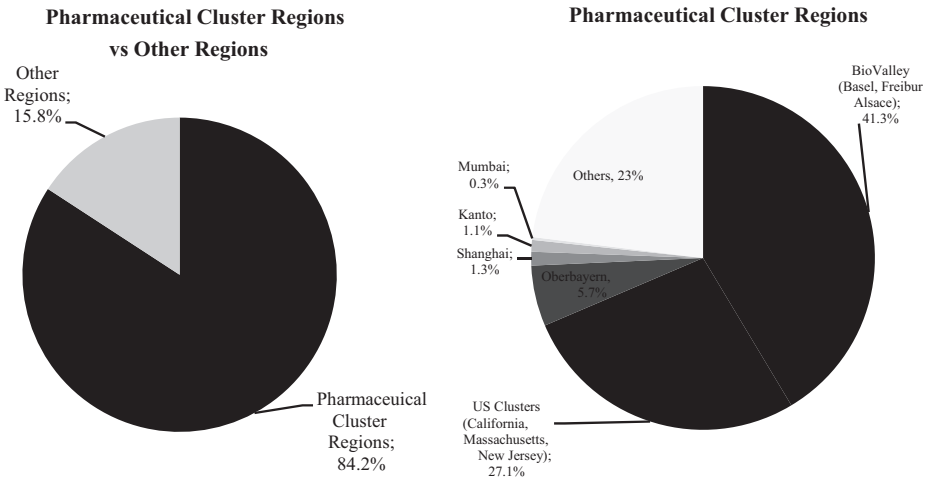
With respect to the distribution between specific clusters, nearly all of the inventors were established in globally leading pharmaceutical clusters. More specifically, 41.3 per cent of the inventors were located in the BioValley region (i.e. Northwestern Switzerland, Alsace [France] and Freiburg [Germany]); 27.1 per cent were located in California, Massachusetts and New Jersey in the USA; and approximately 5.7 per cent were located in Oberbayern, Germany. In addition, we observed the presence of emerging Asian clusters, with 1.3 per cent of the inventors located in Shanghai, China; 1.1 per cent located in the Kanto region, Japan; and 0.3 per cent located in the Mumbai region, India. These results are represented in Figure 2.

Downloaded by TASHKENT UNIVERSITY OF INFORMATION TECHNOLOGIES At 20:42 14 November 2016 (PT)

Table II.
Countries of residence of the inventors of the pharmaceutical patents demanded at the EPO in the Basel employment basin in 1985, 1995 and in the 2005-2010 period

1985				1995				2005-2010			
Country	No. of invts	% in total invts	% in total foreign invts	Country	No. of invts	% in total invts	% in total foreign invts	Country	No. of invts	% in total invts	% in total foreign invts
CH	212	62.2	–	CH	249	42.6	–	US	3,176	31.1	43.3
US	57	16.7	44.2	US	114	19.5	34.0	CH	2,888	28.2	–
DE	34	10.0	26.4	DE	98	16.8	29.3	DE	1,801	17.6	24.5
JP	10	2.9	7.8	GB	34	5.8	10.2	FR	790	7.7	10.8
FR	9	2.6	7.0	FR	32	5.5	9.6	GB	496	4.9	6.8
GB	8	2.4	6.2	JP	12	2.1	3.6	AT	274	2.7	3.7
AT	4	1.2	3.1	AT	10	1.7	3.0	CA	56	2.1	2.9
NL	3	0.9	2.3	SE	8	1.4	2.4	IT	26	1.0	1.4
CA	2	0.6	1.6	CA	7	1.2	2.1	CN	19	0.7	1.0
IN	1	0.3	0.8	DK	4	0.7	1.2	JP	17	0.7	0.9
SE	1	0.3	0.8	IN	3	0.5	0.9	IN	13	0.5	0.7
				BE	2	0.3	0.6	SE	9	0.3	0.5
				BG	2	0.3	0.6	ES	7	0.3	0.4
				IT	2	0.3	0.6	NL	14	0.1	0.2
				MX	2	0.3	0.6	AU	8	0.08	0.1
				NL	2	0.3	0.6	DK	7	0.07	0.1
				CZ	1	0.2	0.3	BE	7	0.07	0.1
				SK	1	0.2	0.3	KR	7	0.07	0.1
				SI	1	0.2	0.3	SI	7	0.07	0.1
								NO	6	0.06	0.08
								IE	4	0.04	0.05
								GR	3	0.03	0.04
								IL	3	0.03	0.04
								HU	1	0.01	0.01
Total	341	100.0	100.0	Total	584	100.0	100.0	Total	10,227	100.0	100.0

Source: Authors' elaboration based on OECD REGPAT database (August 2014)



Source: Authors' elaboration based on OECD REGPAT database (August 2014)

Figure 2. Importance of clusters in the global innovation strategy of pharmaceutical MNEs located in the Basel cluster: per cent of inventors localized in the 2005-2010 period

These results are reflected by the examination of the distribution of inventive activity for the two main players in the Basel pharmaceutical cluster, Novartis and Roche. Table III shows the detailed geographical distribution of the pharmaceutical patents demanded at the EPO in the Basel employment basin by Novartis and Roche. In fact, 78.8 per cent of the inventors of patents demanded by Novartis and 87.5 per cent of the inventors of patents demanded by Roche were located in pharmaceutical cluster regions. These empirical evidence tends to confirm the assertion that the applicants of pharmaceutical patents established in the Basel pharmaceutical cluster aim to enhance their global knowledge assets by taking advantage of cluster specificities, using multiple R&D development locations and building cross-cluster relationships between strong host clusters.

7. Conclusion

With this paper, we contribute to raising awareness and providing new insight into the relationship that MNEs maintain with clusters in their global innovation strategies. Built on a theoretical framework that emphasizes the benefits of clusters and cross-cluster linkages for innovative activities, we empirically assessed the significance of what we label "CSA-cluster" as a source of new knowledge for knowledge-intensive MNEs located in the Basel region in Switzerland.

This paper demonstrated that MNEs located in a Porterian cluster do not exclusively rely on local sources of knowledge but weave links with foreign locations and draw new knowledge from specific host clusters to maintain a competitive edge. Consequently, this article developed a powerful knowledge-creation framework for MNEs based on the combination of internal and external linkages emphasizing the importance of clusters and cross-cluster relationships (CSA-cluster) in the improvement of an MNE's FSA position.

Because this paper focuses on the specific case of pharmaceutical firms located in the Basel region, it establishes a foundation for further research on the relationship between

Downloaded by TASHKENT UNIVERSITY OF INFORMATION TECHNOLOGIES At 20:42 14 November 2016 (PT)

Downloaded by TASHKENT UNIVERSITY OF INFORMATION TECHNOLOGIES At 20:42 14 November 2016 (PT)

Company	Country	Region	No. of invts	(%)
Novartis	CH	*Northwestern Switzerland*	980	23.7
	US	*California*	601	14.6
	US	*Massachusetts*	549	13.3
	US	*New Jersey*	360	8.7
	DE	*Freiburg*	311	7.5
	GB	Surrey, E and W Sussex	255	6.2
	FR	*Alsace*	204	4.9
	IT	Toscana	133	3.2
	AT	Wien	81	2.0
	JP	*Kanto*	71	1.7
	CH	Espace Mittelland	60	1.5
	CA	British Columbia	50	1.2
	DE	*Oberbayern*	26	0.6
	–	Other Regions	448	10.9
Roche	US	*California*	764	19.4
	CH	*Northwestern Switzerland*	731	18.6
	DE	*Oberbayern*	545	13.8
	US	*New Jersey*	459	11.7
	DE	*Freiburg*	458	11.6
	FR	*Alsace*	292	7.4
	CA	Ontario	109	2.8
	CN	Shanghai	98	2.5
	GB	Berkshire	90	2.3
	DE	Karlsruhe	45	1.1
	US	Wisconsin	40	1.0
	CH	Espace Mittelland	26	0.7
	JP	*Kanto*	21	0.5
	–	Other regions	260	6.7

Table III.
Geographical distribution of the pharmaceutical patents demanded at the EPO in the Basel employment basin by Novartis and Roche, 2005-2010

Note: Regions in italics have been identified as "pharmaceutical cluster regions"
Source: Authors' elaboration based on OECD REGPAT database (August 2014)

MNEs and clusters. In today's knowledge economy, optimizing innovation management is vital for MNEs to sustain high level of growth and justifies further research on the role of clusters in this process.

Notes

1. The empirical part of this paper is based on Tinguely (2013).
2. "Nomenclature des unités territoriales statistiques" ("NUTS") is the European standard for referencing regions for statistical purposes.
3. www.clusterobservatory.eu
4. http://clustermapping.us/

References

Asheim, B.T. and Gertler, M.S. (2005), "The geography of innovation – regional innovation systems", in Fagerberg, J., Mowery, D.C. and Nelson, R.R. (Eds), *The Oxford Handbook of Innovation*, Oxford University Press, Oxford, pp. 291-317.

Downloaded by TASHKENT UNIVERSITY OF INFORMATION TECHNOLOGIES At 20:42 14 November 2016 (PT)

Asmussen, C.G., Pedersen, T. and Dhanaraj, C. (2009), "Host-country environment and subsidiary competence: extending the diamond network model", *Journal of International Business Studies*, Vol. 40 No. 1, pp. 42-57.

Audretsch, D.B. and Feldman, M.P. (1996), "R&D spillovers and the geography of innovation and production", *The American Economic Review*, Vol. 86 No. 3, pp. 630-640.

Audretsch, D.B., Lehmann, E.E. and Warning, S. (2005), "University spillovers and new firm location", *Research Policy*, Vol. 34 No. 7, pp. 1113-1122.

Baptista, R. (2001), "Geographical clusters and innovation diffusion", *Technological Forecasting and Social Change*, Vol. 66 No. 1, pp. 31-46.

Birkinshaw, J. (1996), "How multinational subsidiary mandates are gained and lost", *Journal of International Business Studies*, Vol. 27 No. 3, pp. 467-495.

Birkinshaw, J. and Fry, N. (1998), "Subsidiary initiatives to develop new markets", *Sloan Management Review*, Vol. 39 No. 3, pp. 51-62.

Birkinshaw, J. and Sölvell, Ö. (2000), "Preface", *International Studies of Management and Organization*, Vol. 30 No. 2, pp. 3-9.

Breschi, S., Lissoni, F. and Montobbio, F. (2005), "The geography of knowledge spillovers: conceptual issues and measurement problems", in Breschi, S. and Malerba, F. (Eds), *Clusters, Networks, and Innovation*, Oxford University Press, Oxford, pp. 343-376.

Buckley, P.J. and Casson, M.C. (1976), *The Future of Multinational Enterprise*, Macmillan, London.

Burnett, S. and Williams, D. (2012), "The role of knowledge transfer in technological innovation: an oil and gas industry perspective", *Knowledge Management Research & Practice*, Vol. 12 No. 2, pp. 1-12.

Cantwell, J. (1991), "The theory of technological competence and its application to international production", in McFetridge, D.G. (Eds), *Foreign Investment, Technology and Economic Growth*, University of Calgary Press, Calgary.

Cantwell, J. (1992), "The internationalization of technological activity and its implications for competitiveness", in Granstrand, O., Hakanson, L. and Sjölander, S. (Eds), *The Internationalization of R&D and Technology*, John Wiley, Chichester, pp. 75-95.

Cantwell, J. (1999), "From the early internationalization of corporate technology to global technology sourcing", *UNCTAD Transnational Corporations*, Vol. 8 No. 2, pp. 71-92.

Cantwell, J., Glac, K. and Harding, R. (2004), "The internationalization of R&D – the Swiss case", *Management International Review*, Vol. 44 No. 3, pp. 57-82.

Cantwell, J. and Mudambi, R. (2005), "MNE competence-creating subsidiary mandates", *Strategic Management Journal*, Vol. 26 No. 1, pp. 1109-1128.

Cantwell, J. and Piscitello, L. (1999), "The emergence of corporate international networks for the accumulation of dispersed technological competences", *Management International Review*, Vol. 39 No. 1, pp. 123-147.

Cantwell, J. and Piscitello, L. (2005), "Recent location of foreign-owned research and development activities by large multinational corporations in the European regions: the role of spillovers and externalities", *Regional Studies*, Vol. 39 No. 1, pp. 1-16.

Collinson, S.C. and Rugman, A.M. (2011), "Relevance and rigor in international business teaching: using the CSA-FSA matrix", *Journal of Teaching in International Business*, Vol. 22 No. 1, pp. 29-37.

Collinson, S.C. and Wang, R. (2012), "The evolution of innovation capability in multinational enterprise subsidiaries: dual network embeddedness and the divergence of subsidiary specialisation in Taiwan", *Research Policy*, Vol. 41 No. 9, pp. 1501-1518.

Downloaded by TASHKENT UNIVERSITY OF INFORMATION TECHNOLOGIES At 20:42 14 November 2016 (PT)

Cooke, P. (2005), "Regionally asymmetric knowledge capabilities and open innovation exploring 'globalization 2' – a new model of industry organization", *Research Policy*, Vol. 34 No. 8, pp. 1128-1149.

Cooke, P. (2006), "Global bioregional networks: a new economic geography of bioscientific knowledge", *European Planning Studies*, Vol. 14 No. 9, pp. 1265-1285.

Criscuolo, P. (2004), *R&D Internationalisation and Knowledge Transfer: Impact on MNEs and their Home Countries*, Maastricht Economic Research Institute on Innovation and Technology, Maastricht.

Cumbers, A., MacKinnon, D. and Chapman, K. (2008), "Innovation, collaboration and learning in regional clusters: a study of SMEs in the Aberdeen oil complex", in Karlsson, C. (Eds), *Handbook of Research on Innovation and Clusters*, Edward Elgar, Cheltenham, pp. 300-317.

De Beule, F., Van Den Bulcke, D. and Zhang, H. (2008), "The reciprocal relationship between transnationals and clusters: a literature review", in Karlsson, C. (Eds), *Handbook of Research on Cluster Theory*, Edward Elgar, Cheltenham.

Doz, Y.L. (1986), *Strategic Management in Multinational Companies*, Pergamon, Oxford.

Dunning, J.H. (1998), "Location and the multinational enterprise: a neglected factor?", *Journal of International Business Studies*, Vol. 29 No. 1, pp. 45-66.

Dunning, J.H. (2008), "Space, location and distance in IB activities: a changing scenario", in Dunning, J.H. and Gugler, P. (Eds), *Foreign Direct Investment, Location and Competitiveness*, Elsevier, Oxford, pp. 83-110.

Dunning, J.H. and Lundan, S. (2008), *Multinational Enterprises And The Global Economy*, 2nd ed., Edward Elgar Publishing, Cheltenham.

Dunning, J.H. and Narula, R. (1995), "The R&D activities of foreign firms in the US", *International Studies in Management Organization*, Vol. 25 Nos 1/2, pp. 39-73.

European Cluster Observatory (2013), "Cluster mapping", available at: www.clusterobservatory.eu

Feldman, M.P. (1994), *The Geography of Innovation*, Kluwer Academic Publishers, Dordrecht.

Feldman, M.P. (2000), "Location and innovation: the new economic geography of innovation, spillovers, and agglomeration", in Clark, G.L., Feldman, M.P. and Gertler, M.S. (Eds), *The Oxford Handbook of Economic Geography*, Oxford University Press, Oxford, pp. 373-394.

Fox, S. (2000), "Communities and practice, foucault and actor-network theory", *Journal of Management Studies*, Vol. 37 No. 6, pp. 853-867.

Freeman, C. (1991), "Networks of innovators: a synthesis of research issues", *Research Policy*, Vol. 20 No. 5, pp. 499-514.

Ghoshal, S. and Bartlett, C.A. (1998), "Creation, adoption and diffusion of innovation by subsidiaries of multinational corporations", *Journal of International Business Studies*, Vol. 19 No. 3, pp. 365-388.

Giroud, A. and Scott-Kennel, J. (2009), "MNE linkages in international business: a framework for analysis", *International Business Review*, Vol. 18 No. 6, pp. 555-566.

Griliches, Z. (1990), "Patent statistics as economic indicators: a survey", *Journal of Economic Literature*, Vol. 28 No. 4, pp. 1661-1707.

Gupta, A.K. and Govindarajan, V. (2000), "Knowledge flows within multinational corporations", *Strategic Management Journal*, Vol. 21 No. 4, pp. 473-496.

Hallin, C., Holm, U. and Sharma, D.D. (2011), "Embeddedness of innovation receivers in the multinational corporation: effects on business performance", *International Business Review*, Vol. 20 No. 3, pp. 362-373.

Downloaded by TASHKENT UNIVERSITY OF INFORMATION TECHNOLOGIES At 20:42 14 November 2016 (PT)

Hedlund, G. (1986), "The hypermodern MNC – a heterarchy?", *Human Resource Management*, Vol. 25 No. 1, pp. 9-35.

Holm, U. and Pedersen, T. (2000), *The Emergence and Impact of MNC Center of Excellence*, Macmillan, Basingstoke.

Iammarino, S. and McCann, P. (2006), "The structure and evolution of industrial clusters: transactions, technology and knowledge spillovers", *Research Policy*, Vol. 35 No. 7, pp. 1018-1036.

Jaffe, A.B. (1989), "Real effects of academic research", *The American Economic Review*, Vol. 79 No. 5, pp. 957-970.

Jaffe, A.B., Trajtenberg, M. and Henderson, R. (1993), "Geographic localization of knowledge spillovers as evidenced by patent citations", *The Quarterly Journal of Economics*, Vol. 108 No. 3, pp. 577-598.

Jensen, R.J. and Szulanski, G. (2007), "Template use and the effectiveness of knowledge transfer", *Management Science*, Vol. 53 No. 11, pp. 1716-1730.

Keller, M. (2009), *Swiss Cluster-Mapping Project: An Empirical Report*, Center for Competitiveness, University of Fribourg.

Ketels, C.H.M. (2008), "Microeconomic determinants of location competitiveness for MNEs", in Dunning, J.H. and Gugler, P. (Eds), *Foreign Direct Investment, Location and Competitiveness*, Elsevier, Oxford, pp. 111-131.

Kline, S.J. and Rosenberg, N. (1986), "An overview of innovation", in Landau, R. and Rosenberg, N. (Eds), *The Positive Sum Strategy: Harnessing Technology for Economic Growth*, National Academy Press, Washington, DC, pp. 275-304.

Kogut, B. and Zander, U. (1993), "Knowledge of the firm and the evolutionary theory of the multinational corporation", *Journal of International Business Studies*, Vol. 24 No. 4, pp. 625-645.

Kotabe, M., Dunlap-Hinkler, D., Parente, R. and Mishra, H.A. (2007), "Determinants of cross-national knowledge transfer and its effect on firm innovation", *Journal of International Business Studies*, Vol. 38 No. 2, pp. 259-282.

Kuemmerle, W. (1997), "Building effective R&D capabilities abroad", *Harvard Business Review*, Vol. 75 No. 2, pp. 61-70.

Kyläheiko, K., Jantunen, A., Puumalainen, K., Saarenketo, S. and Tuppura, A. (2011), "Innovation and internationalization as growth strategies: the role of technological capabilities and appropriability", *International Business Review*, Vol. 20 No. 5, pp. 508-520.

Le Bas, C. and Sierra, C. (2002), "Location versus home country advantages' in R&D activities: some further results on multinationals' locational strategies", *Research Policy*, Vol. 31 No. 4, pp. 589-609.

Lissoni, F. (2001), "Knowledge codification and the geography of innovation: the case of Brescia mechanical cluster", *Research Policy*, Vol. 30 No. 9, pp. 1479-1500.

Mccann, P. and Mudambi, R. (2005), "Analytical differences in the economics of geography: the case of the multinational firm", *Environment and Planning A*, Vol. 37 No. 10, pp. 1857-1876.

Malmberg, A., Sölvell, Ö. and Zander, I. (1996), "Spatial clustering, local accumulation of knowledge and firm competitiveness", *Geografiska Annaler*, Vol. 78 No. 2, pp. 85-97.

Maskell, P. and Malmberg, A. (1999), "Localized learning and industrial competitiveness", *Cambridge Journal of Economics*, Vol. 23 No. 2, pp. 167-186.

Metrobasel (2009), *Metrobasel Report 2009: Perspective 2020 Pour la Région Métropolitaine de Bâle*, Metrobasel, Basel.

Downloaded by TASHKENT UNIVERSITY OF INFORMATION TECHNOLOGIES At 20:42 14 November 2016 (PT)

Meyer, K.E., Mudambi, R. and Narula, R. (2011), "Multinational enterprises and local contexts: the opportunities and challenges of multiple embeddedness", *Journal of Management Studies*, Vol. 48 No. 2, pp. 235-252.

Moreno, R., Paci, R. and Usai, S. (2005), "Geographical and sectoral clusters of innovation in Europe", *The Annals of Regional Science*, Vol. 39 No. 4, pp. 715-739.

Mudambi, R. (2002), "Knowledge management in multinational firms", *Journal of International Management*, Vol. 8 No. 5, pp. 1-9.

Mudambi, R. (2008), "Location, control and innovation in knowledge-intensive industries", *Journal of Economic Geography*, Vol. 8 No. 5, pp. 699-725.

Mudambi, R. and Navarra, P. (2004), "Is knowledge power? Knowledge flows, subsidiary power and rent-seeking within MNCs", *Journal of International Business Studies*, Vol. 35 No. 5, pp. 385-406.

Mudambi, R. and Swift, T. (2010), "Technological clusters and multinational enterprise R&D strategy", in Devinney, T., Pedersen, T. and Tihany, L. (Eds), *The Past, The Present and The Future of International Business and Management*, Vol. 23, Emerald Group Publishing, Bingley.

Mudambi, R. and Swift, T. (2011), "Leveraging knowledge and competencies across space: the next frontier in international business", *Journal of International Management*, Vol. 17 No. 3, pp. 186-189.

Nell, P.C. and Andersson, U. (2012), "The complexity of the business network context and its effect on subsidiary relational (over-) embeddedness", *International Business Review*, Vol. 21 No. 6, pp. 1087-1098.

Nelson, R.R. (1993), *National Systems of Innovation: A Comparative Study*, Oxford University Press, Oxford.

Nohria, N. and Ghoshal, S. (1997), *The Differentiated Network: Organizing Multinational Corporation for Value Creation*, Jossey-Bass, San Francisco.

Noorderhaven, N. and Harzing, A.-W. (2009), "Knowledge-sharing and social interaction within MNEs", *Journal of International Business Studies*, Vol. 40 No. 5, pp. 719-741.

OECD (2006), *Global Overview of Innovative Activities from the Patent Indicators Perspective*, OECD, Paris.

Paci, R. and Usai, S. (2000), "The role of specialisation and diversity externalities in the agglomeration of innovative activities", Working Paper CRENoS, CRENoS – Centre For North South Economic Research, Cagliari, No. 199915.

Park, B.I. (2011), "Knowledge transfer capacity of multinational enterprises and technology acquisition in international joint ventures", *International Business Review*, Vol. 20 No. 1, pp. 75-87.

Pearce, R.D. (1999), "Decentralized R&D and strategic competitiveness: globalized approaches to generation and use of technology in MNEs", *Research Policy*, Vol. 28 Nos 2/3, pp. 157-178.

Polanyi, M. (1966), *The Tacit Dimension*, Routledge and Kegan Paul, London.

Porter, M.E. (1986), *Competition in Global Industries*, Harvard Business School Press, Boston, MA.

Porter, M.E. (1998), *On Competition*, Harvard Business School Press, Cambridge, MA.

PWC (2010), *Bio Valley – Cluster Report*, PricewaterhouseCoopers, Frankfurt am Main.

Rugman, A.M. (1981), *Inside the Multinationals*, Columbia University Press, New York, NY.

Rugman A.M. (2010), "Reconciling internalization theory and the eclectic paradigm", *Multinational Business Review*, Vol. 18 No. 2, pp. 1-12.

Downloaded by TASHKENT UNIVERSITY OF INFORMATION TECHNOLOGIES At 20:42 14 November 2016 (PT)

Rugman, A.M. and Verbeke, A. (1992), "A note on the transactional solution and the transaction cost theory of multinational strategic management", *Journal of International Business Studies*, Vol. 23 No. 4, pp. 761-771.

Rugman, A.M. and Verbeke, A. (2001), "Location, competitiveness, and the multinational enterprise", in Rugman, A.M. and Brewer, T. (Eds), *The Oxford Handbook of International Business*, Oxford University Press, Oxford, pp. 150-177.

Rugman, A.M. and Verbeke, A. (2001), "Subsidiary-specific advantages in multinational enterprises", *Strategic Management Journal*, Vol. 22 No. 3, pp. 237-250.

Rugman, A.M. and Verbeke, A. (2002), "Edith Penrose's contribution to the resource-based view of strategic management", *Strategic Management Journal*, Vol. 23 No. 8, pp. 769-780.

Sala-I-Martin, X., Bilbao-Osorio, B., Blanke, J., Crotti, R., Drzeniek Hanouz, M. and Santangelo, G.D. (2012), "The tension of information sharing: effects on subsidiary embeddedness", *International Business Review*, Vol. 21 No. 2, pp. 180-195.

Segarra-Cipres, M., Roca-Puig, V. and Bou-Llusar, J.C. (2013), "External knowledge acquisition and innovation output: an analysis of the moderating effect of internal knowledge transfer", *Knowledge Management Research & Practice*, Vol. 12 No. 2, pp. 1-12.

Sölvell, Ö. (2002), "The multi-home based multinational – combining global competitiveness and local innovativeness", paper presented at the Symposium in honor of John Stopford, London.

Tavares, A.T. and Teixeira, A. (2006), "Introduction", in Tavares, A.T. and Teixeira, A. (Eds), *Multinationals, Clusters and Innovation: Does Public Policy Matter*, Palgrave Macmillan, New York, NY.

Tinguely, X. (2013), *The New Geography of Innovation: Clusters, Competitiveness and Theory*, Palgrave Macmillan, Houndmills.

Tracey, P. and Clark, G.L. (2003), "Alliances, networks and competitive strategy: rethinking clusters of innovation", *Growth and Change*, Vol. 34 No. 1, pp. 1-16.

Valkokari, K., Paasi, J. and Rantala, T. (2012), "Managing knowledge within networked innovation", *Knowledge Management Research & Practice*, Vol. 12 No. 1, pp. 27-40.

Verbeke, A. (2009), *International Business Strategy*, Cambridge University Press, Cambridge.

Vernon, R. (1966), "International investment and international trade in the product life cycle", *Quarterly Journal of Economics*, Vol. 80 No. 5, pp. 190-207.

Vernon, R. (1977), *Strom over Multinationals: The Real Issues*, Macmillan, London.

Yao, Z., Yang, Z., Fisher, G.J., Ma, C. and Fang, E. (2013), "Knowledge complementarity, knowledge absorption effectiveness, and new product performance: the exploration of international joint ventures in China", *International Business Review*, Vol. 22 No. 1, pp. 216-227.

Zander, I. (1999), "How do you mean 'global'? An empirical investigation of innovation networks in the multinational corporation", *Research Policy*, Vol. 28 Nos 2/3, pp. 195-213.

Zander, U. and Kogut, B. (1995), "Knowledge and the speed of the transfer and imitation of organizational capabilities: an empirical test", *Organization Science*, Vol. 6 No. 1, pp. 76-92.

Further reading

China (2004), in Henderson, J.V. and Thisse, J.F. (Eds), *Handbook of Regional and Urban Economics*, Vol 4, Elsevier, Amsterdam.

Economic Literature, American Economic Association, Vol. 28 No. 4, pp. 1661-1707.

Freeman, S., Hutchings, K., Lazaris, M. and Zyngier, S. (2010), "A model of rapid knowledge development: the smaller born-global firm", *International Business Review*, Vol. 9 No. 1, pp. 70-84.

Institute For Strategy and Competitiveness, Harvard Business School (2014), "Cluster mapping", available at: http://clustermapping.us/

Porter, K., Whittington, K.B. and Powell, W.W. (2005), "The institutional embeddedness of high-tech regions: relational foundations of the Boston biotechnology community", in Breschi, S. and Malerba, F. (Eds), *Clusters, Networks, and Innovation*, Oxford University Press, Oxford.

Corresponding author
Philippe Gugler can be contacted at: philippe.gugler@unifr.ch

Downloaded by TASHKENT UNIVERSITY OF INFORMATION TECHNOLOGIES At 20:42 14 November 2016 (PT)

For instructions on how to order reprints of this article, please visit our website:
www.emeraldgrouppublishing.com/licensing/reprints.htm
Or contact us for further details: **permissions@emeraldinsight.com**

Downloaded by TASHKENT UNIVERSITY OF INFORMATION TECHNOLOGIES At 20:42 14 November 2016 (PT)

This article has been cited by:

1. Philippe Gugler Universite de Fribourg Faculte des sciences economiques et sociales Fribourg Switzerland Philippe Gugler University of Fribourg Fribourg Switzerland Philippe Gugler University of Fribourg Fribourg Switzerland . 2016. Emerging countries' country-specific advantages (CSAs) and competitiveness of emerging market multinational enterprises (EMNEs). *Competitiveness Review* **26**:5. . [Abstract] [PDF]
2. MomayaKirankumar S. Kirankumar S. Momaya Kirankumar S. Momaya is a Professor of technology management and competitiveness at Shailesh J. Mehta School of Management, Indian Institute of Technology Bombay (IITB), Mumbai. He earned his PhD (1996) from the University of Toronto. His research interests are in the fields of technological and business competitiveness, IB, cooperative strategies for organizational and innovation capabilities, growth and sustainability. He serves on editorial boards of the Journal of Advances in Management Research and other emerging journals. He, often with GoC members, has contributed more than 40 papers in peer review journals including IIMB Management Review, Vikalpa, JFSM, Competitiveness Review, Journal of Management Development and a leading MoT journal of Asia, JSSPRM. Shailesh J. Mehta School of Management, Indian Institute of Technology Bombay, Mumbai, India . 2016. City clusters and break-out in corporate competitiveness. *Competitiveness Review* **26**:4, 415-434. [Abstract] [Full Text] [PDF]