

Understanding knowledge sourcing in young companies: The case of German Biotechnology Industry

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Abstract

This study investigates external knowledge sourcing activities of young companies in terms of leveraging external experts, collaboration partners and informal contacts. Based on recent research a preliminary model of knowledge sourcing is developed and tested drawing on survey data of German Biotechnology Industry. More specifically, the study analyzes the influence of CEOs' management experience, geographic proximity of external parties, the type of company foundation and company age as influencing factors on young companies' knowledge sourcing activities. Based on this discussion, several suggestions for further empirical and conceptual research in the area of knowledge sourcing are described.

1. Introduction

One of the merits of the resource and capability based view of the firm is that it shifted attention to knowledge and expertise as major drivers of competitive advantage (Argote and Ingram 2000; Makadok, 2001). According to this view, young companies need to continuously learn and embed up to date knowledge in their processes and structures in order to thrive and grow in increasingly competitive environments and further develop their organizational capabilities (Tidd et al., 1997). Knowledge is even considered to be the major building block of organizational capabilities (Al-Laham, 2003). While internal projects are the primary venue of innovation and (idiosyncratic) knowledge creation (Nonaka and Takeuchi, 1995), knowledge is also sourced through external channels. Recent studies on knowledge sourcing highlight the importance of various sources, like informal ties and cooperation partners (Kang and Kang, 2009), chamber of commerce, banks or consultants in the early stages of company development (Bennett and Robson, 1999; Sexton et al., 1997). But, the factors that influence knowledge sourcing activities in the context of young business ventures are not understood very well so far.

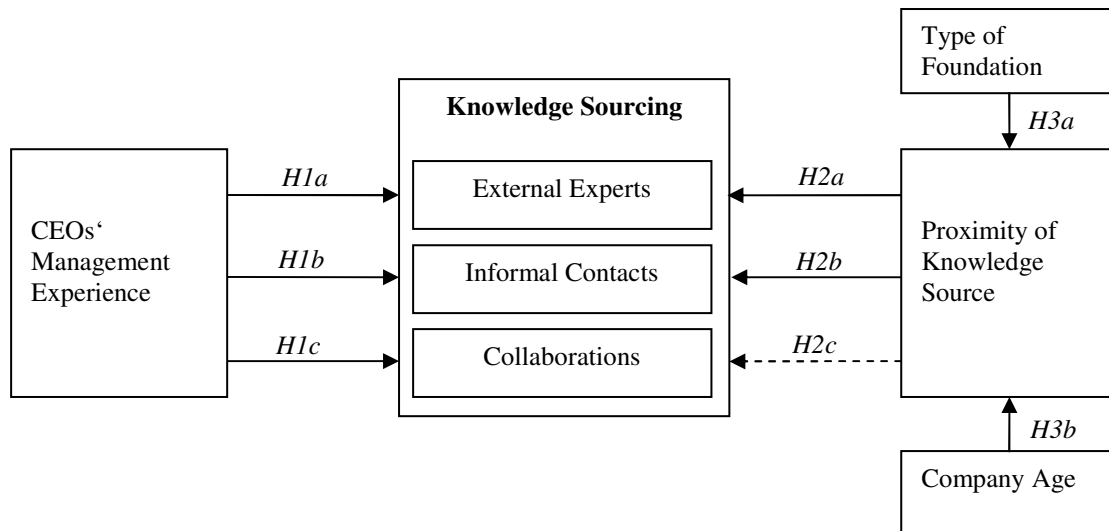
In this study, knowledge sourcing is defined as knowledge acquisition through external experts (e.g. consultants), informal contacts and collaboration partners. Drawing on recent research on knowledge sharing, industry clusters, entrepreneurship and social capital, a model of knowledge sourcing is suggested identifying especially CEOs management experience and the geographic proximity of sources as important influencing factors. It is hypothesized that the role of proximity is mediated by company age and the type of company foundation. This model is then tested based on survey data of German Biotechnology industry. After a discussion of major findings the paper concludes with limitations of the study and suggestions for further research.

2. A preliminary model of knowledge sourcing

Knowledge sourcing comprises the external acquisition of knowhow, which is critical for the development of a young company's organizational capabilities. It can be obtained via external

experts (e.g. consultants, customers, competitors, etc.) that are engaged in a formal (i.e. contractual) way, via informal contacts, or via collaborations with other companies. Drawing on recent research, especially two influencing factors on knowledge sourcing are highlighted as summarized in Figure 1: CEO's Management experience and the geographic proximity of the knowledge source.

Figure 1: Preliminary model of knowledge sourcing



The development, strategy and success of a new venture are significantly shaped by the skills and experience of the founder / CEO (Baum and Locke, 2004; Colombo and Grilli, 2005; Lee and Tsang, 2001). Research on entrepreneurial learning indicates, that learning and knowledge acquisition of young companies is characterized both by experiential and cognitive learning (Lumpkin und Bergmann Lichtenstein, 2005) with companies in dynamic environments placing greater emphasis on external ties (Hazy et al., 2003). Moreover, recent research shows that prior management experience provides the CEO with a reputation in the respective industry and a broad network to tap into (McPherson et al., 2001; Ucbasaran et al., 2003). Further, recent studies reveal that CEOs use these networks for knowledge sourcing especially in dynamic and turbulent environments (McGee and Sawyer, 2003). This leads to the following hypotheses in regard to knowledge sourcing in young Biotech companies:

H1a: The importance of external experts as knowledge sources is positively influenced by CEOs' prior management experience

H1b: The importance of informal contacts as knowledge sources is positively influenced by CEO's prior management experience

H1c: The importance of collaborations as knowledge sources is positively influenced by CEOs' prior management experience

The literature on industry clusters suggests that cluster set-ups support networking, collaboration (Saxenian, 1994) and the exchange of knowledge among these companies (Wolter, 2001) due to low geographical distance. Porter (1998) argues that these characteristics lead to higher productivity and innovation. But, more recent research increasingly shows that knowledge sharing between organizations, especially in dynamic and innovation driven industries like the Biotech industry, is not contingent on low geographic distance (Al-Laham and Amburgey, 2006). McKelvey et al. (2003) show in regard to the Biotechnology industry in Sweden that the interchange with local companies and companies abroad is equally important. This result is also confirmed in a study of SME in New Zealand

(Davenport, 2005). Lorentzen (2007) shows by case study analysis of manufacturing companies in Poland, that knowledge sourcing could be realized over long distances. Relations between companies were characterized by ‘technological’ proximity. Based on these findings the following hypotheses are formulated:

H2a: Geographic distance of external experts is not important for young companies’ knowledge sourcing

H2b: Geographic distance of informal contacts is not important for young companies’ knowledge sourcing

H2c: Geographic distance of collaboration partners is not important for young companies’ knowledge sourcing

But, the role of geographic proximity for knowledge sourcing might be mediated by other variables. Arundel and Geuna (2004) show in regard to knowledge sourcing from public research institutes, that the importance of proximity increases with the quality and of the institute but decreases with companies’ total R&D spending. Drawing on research on social networks two other influencing factors on the importance of proximity are suggested. Schutjens and Stam (2003) show that the number of network ties a company can tap into increases with company age and a study of Almeida et al. (2003) reveals, that knowledge sourcing via geographically close contacts decreases with increasing company size. This leads to the assumption, that older and bigger companies compared to younger companies, have a broader and geographically more dispersed network to tap into. In analogy, this argument also applies to spin-offs vs. independent foundations. Spin-offs are already closely connected within an industry at the date of foundation (e.g. existing customers, suppliers, contacts to banks, venture capitalists etc.) as members bring in their existing ties (Jones, 2001), making proximity less important for these companies than for independent foundations.

H3a: Proximity of knowledge sources is more important for younger companies than for older companies

H3b: Proximity of knowledge sources is more important for independently founded companies than for university spin-offs

3. Methodology

This paper is based survey data of CEOs of German Biotechnology companies in 2006 that assessed the practice of capability management in young companies (Friesl, 2008). The Biotechnology industry in Germany constitutes a good venue to investigate knowledge sourcing in young companies as the industry mainly has its origins in the Bio Regio project of the German Government in 1995. The questionnaire was sent out by Email to 489 companies in Germany, representing 100% of the dedicated Biotechnology companies as reported by the German Federal Ministry for Education and Science at that time. In total 88 CEOs answered the questionnaire, equaling a response rate of roughly 18%. The sample is representative for the industry in terms of geographic distribution, firm size, turnover per company, number of employees, company age and business models.

All variables are measured by single items with a 5-point Likert scale. The hypotheses are tested using the T-Test in order to test for significant mean differences, except for the importance of proximity. In this case, the percentage of agreement (values 4 or 5) regarding the items on the importance of proximity of external experts and informal contacts were used. Based on the data available, H2c could not be tested, which is indicated by a dotted line in Figure 1. For more detailed information on the questionnaire used, please refer to the author.

4. Results

Table 1 shows the descriptive statistics regarding the general importance of external experts, informal contacts and collaborations for knowledge sourcing. The results show that collaborations (3.80) and informal contacts (3.44) are rated highest.

Table 1: Variables of knowledge sourcing

Variable	N	Min	Max	Mean	s.d.	Acc.. % (4,5)	Rej. % (1,2)
External Experts	87	1	5	2.16	1.190	11.4	60.9
<i>Proximity is important</i>	83	1	5	1.77	1.016	5.7	77.1
Informal Contacts	87	1	5	3.44	1.128	47.7	17.2
<i>Proximity is important</i>	87	1	4	1.56	0.773	2.3	87.4
Collaborations	87	1	5	3,80	1,055	63,6	13,7

H1a,b,c assume that CEOs' management experience influences external knowledge sourcing. The T-Test reveals no significant mean differences, except for knowledge sourcing through collaborations (Table 2). For CEOs with management experience in the Life Science sector knowledge sourcing by collaborations is significantly ($p < 0.1$) more important (3.91), than for those without such experience (3.61).

Table 2: Influence of management experience on knowledge sourcing (T-Test)

Knowledge Source	Mean		Management experience		Management experience in Life Sciences		Scientists with Management experience	
			N	Mean	N	Mean	N	Mean
Collaborations	3,80	yes			48	3.91 ⁺		
		no			31	3.61 ⁺		
Informal Contacts	3.44	yes						
		no						
External Experts	2.16	yes						
		no						
Suppliers	2.23	yes						
		no						
Customers	4.33	yes						
		no						
Competitors	3.36	yes						
		no						
Consultants	1.66	yes						
		no						
Universities / Institutes	3.60	yes	40	3.95**	31	3.81*	24	3.88*
		no	46	3.30**	46	3.30*	39	3.33*
Chamber of Commerce	1.44	yes						
		no						
Venture Capitalists	1.56	yes	40	1.85**	31	1.74*		
		no	46	1.30**	46	1.30*		
Cluster Organizations	2.14	yes					24	1.67*
		no					39	1.26*

* $p < 0.05$; ** $p < 0.01$; + $p < 0.1$ ('yes' and 'no' indicate if the respondents have the degree of management experience referred to in the columns)

In regard to *H1a* the data allows a closer look by running the analysis for a selection of different external experts. The data shows that the importance of Universities/Research Institutes, Venture Capitalists and Cluster Organizations for knowledge sourcing is significantly more important for experienced CEOs. For the latter source (Cluster Organizations) significant mean differences could only be found for scientists that assume the

role as CEO. All in all, customers and universities are regarded to be the two top most important external experts.

H2a,b suggest that knowledge sourcing using external experts and informal contacts is not influenced by proximity. Both hypotheses are verified as only 5.7% of the respondents in regard to external experts and 2.3% in regard to informal contacts agreed to the respective item (Table 1).

Table 3: Influence of foundation type and company age on proximity (T-Test)

	Proximity of external experts		Proximity of informal contacts	
	N	Mean	N	Mean
Type of Foundation				
Independent Foundation	18	2.22*	18	1.83+
Spin-off	69	1.65*	69	1.49+
Company Age				
Age ≤ 5 years	29	1.89*	29	1.66*
Age ≥ 10 years	21	1.25*	21	1.33*

* p<0.05; ** p<0.01; + p<0.1

It was further hypothesized that the role of proximity is mediated by the type of foundation (*H3a*) and company age (*H3b*). In regard to *H3a* data shows (Table 3) that close geographic distance of external experts and informal contacts is significantly (p<0.05; p<0.1) more important for independently founded companies (2.22; 1.83) then for spin-offs (1.65; 1.49). *H3b* could also be verified. Proximity of external experts and informal contacts are significantly (p<0.05) more important (although on a fairly low level) for companies younger than 5 years (1.89; 1.66) than for companies older than 10 years (1.25; 1.33).

5. Discussion and summary

This study extends the body of research on external knowledge sourcing activities of young companies drawing on survey data of German Biotechnology industry. In this section the empirical findings are discussed in greater detail taking into account the limitations of the study. Based on these findings possible questions for future research on knowledge sourcing are suggested.

The influence of CEO's management experience on the importance of external knowledge sources turned out to be not as clear as hypothesized. Significant results could only be found in regard to collaborations and partly for external experts. For collaborations, this results makes sense given their strategic importance for young companies in terms of learning, financing, obtaining the proof of concept for their product or service and build a reputation (Komar, 2005; McEviliy and Marcus, 2005; Mildenberger, 2001). Prior management experience is assumed to raise CEOs awareness of this potential. Also, the positive impact of management experience on the importance of consultants, universities, venture capitalists and cluster organizations seems plausible not only in regard to the personal ties of CEOs mentioned above. Management experience most probably influences CEOs' cost awareness. In this respect, Liebeskind et al. (1996) show that external knowledge acquisition can be a means to reduce the cost of internal hierarchy in rapidly changing industries. Hiring a consultant or involving a research institute for a specific problem can be more cost effective, taking into account the opportunity cost of internal knowledge creation.

But, unlike recent research suggests, no significant influence of CEOs' prior management experience on the importance of informal contacts for knowledge sourcing could be identified. For external experts the data available allowed to differentiate between several

experts, leading to significant results for some of those. Regarding informal contacts, only the item 'We acquire relevant knowledge by informal contacts' is available. Thus, the rejection of *H2c* might have methodological reasons.

Moreover, this study contributes to an enhanced understanding of the role of geographic proximity in external knowledge sourcing. In line with recent research, the data shows that geographic distance is not considered important by CEOs of young companies. The data presented further indicates that the importance of proximity is mediated by company age and the type of company foundation. The latter aspect has not been considered in respect to knowledge sourcing so far. The identification of mediating variables helps to further clarify the arbitrary status of geographic proximity in current research.

The results presented are subject to several limitations. First, the relatively small sample size influences the quality of statistical testing. Second, the analysis is completely based on self rating scales, which rests on the assumption that CEOs of young companies can make valid judgments regarding their companies' knowledge sourcing activities.

Based on the findings presented, several implications for future research can be identified. The preliminary model could be a starting ground to further investigate the concept of absorptive capacity (Cohen and Levinthal, 1990) in the context of young companies by analyzing, which internal and external factors support knowledge sourcing. Moreover, future research could have a closer look on the relation of externally acquired vs. internally generated knowledge, especially regarding its usage. This could also include an analysis of the strategic significance of externally acquired knowledge and the specific knowledge source used. A deeper understanding of the dynamics of knowledge sourcing does not only contribute to the knowledge and capability based view of the firm. It has also the potential to shape and support the practice of management in young companies.

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