



The paradox of openness in innovative search: Appropriability and the use of external sources of knowledge for innovation

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Outline

- Introduction
- Open innovation – an introduction
- Open innovation “search strategies” (Laursen/Salter, SMJ 2006)
- Open innovation and the knowledge paradox (Laursen/Salter, 2005)
- Organizing the firm to gain from open innovation (Foss/Laursen/Pedersen, 2006)

What is Open Innovation?



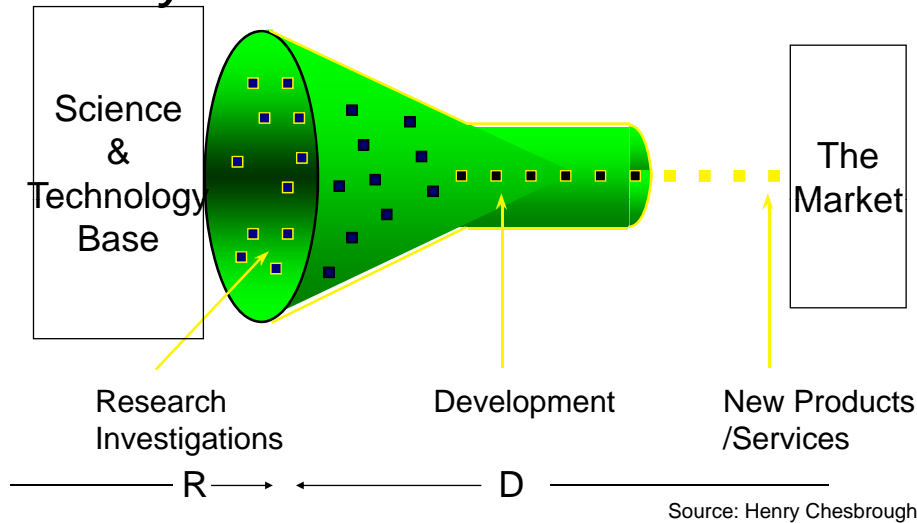
“Open innovation is the use of purposive inflows and outflows of knowledge to accelerate internal innovation, and expand the markets for external use of innovation, respectively.”

Chesbrough, Vanhaverbeke, West
Open Innovation: Researching a New Paradigm
(Oxford, 2006)

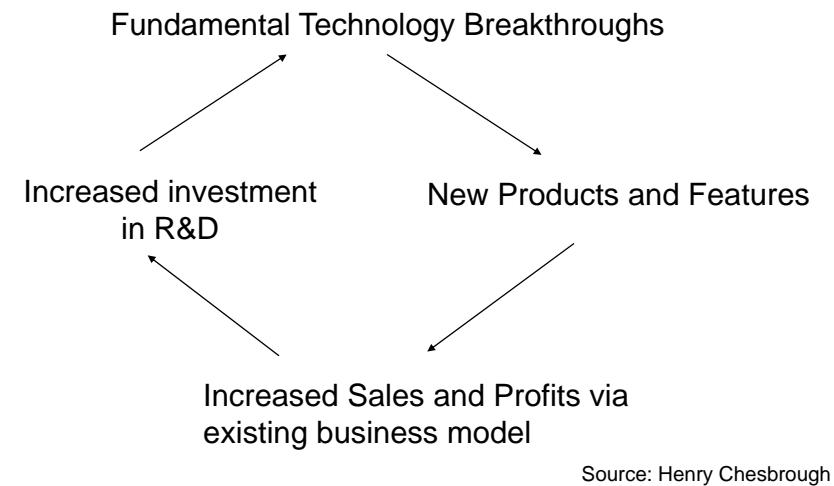
Books on Open Innovation



A Closed Innovation System



The Virtuous Circle for R&D



Great Successes from the Closed Innovation Model

- The Chemicals Industry – Germany and later US
- Edison, GE, and the rise of electrification
- Rockefeller and Standard Oil
- World War II scientific achievements
- Chandler: internal R&D key to the rise of the modern US corporation in 20th century

Source: Henry Chesbrough

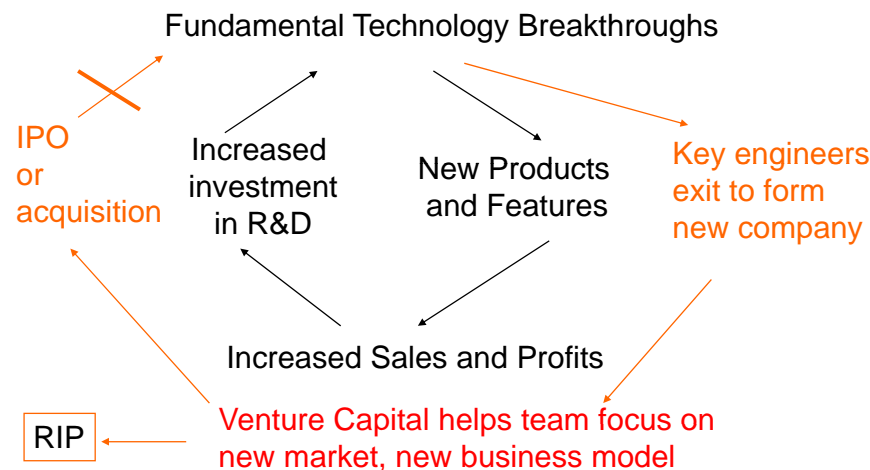
The Logic of "Closed Innovation"

- Is according to Chesbrough:
 - The smart people in our field work for us
 - To profit from R&D, we must discover, develop and ship it ourselves
 - If we discover it ourselves, we will get it to market first
 - If we are the first to commercialize an innovation, we will win.
 - If we create the most and the best ideas in the industry, we will win
 - We should control our IP so that our competitors don't profit from our ideas

What changed? New Division of Innovation Labor

- According to Chesbrough:
 - Increasing mobility of trained engineers and scientists
 - Increased quality of university research
 - Greater dissemination of knowledge throughout the world
 - Increased rivalry between companies in their product markets (EU-market liberalization; competition policy)
 - Increasing importance of Venture Capital

The Virtuous Circle Broken



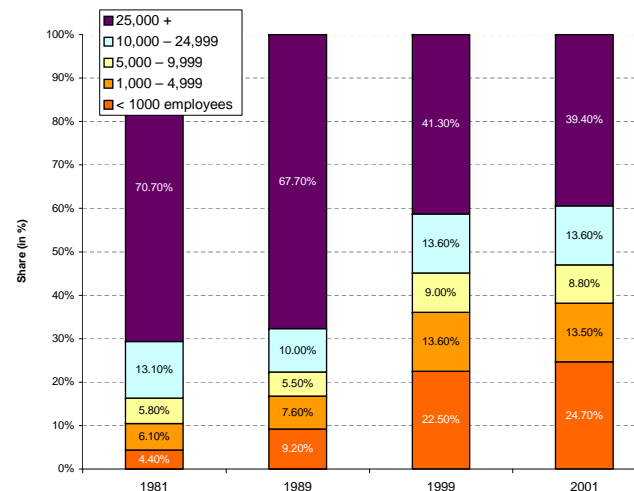
Diminishing Economies of Scale: US Industrial R&D by Size of Enterprise

Company Size	1981	1989	1999	2001
< 1000 employees	4.4 %	9.2%	22.5%	24.7%
1,000 – 4,999	6.1 %	7.6 %	13.6%	13.5%
5,000 – 9,999	5.8 %	5.5%	9.0%	8.8%
10,000 – 24,999	13.1%	10.0%	13.6%	13.6%
25,000 +	70.7%	67.7%	41.3%	39.4%

Sources: National Science Foundation, Science Resource Studies, Survey of Industrial Research Development, 1991, 1999 and 2001.

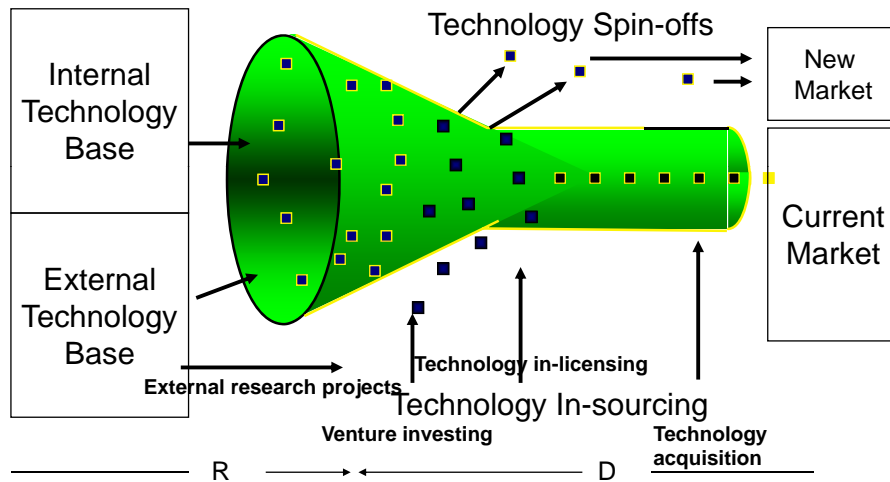
Source: Henry Chesbrough

US Industrial R&D: by Size of Enterprise



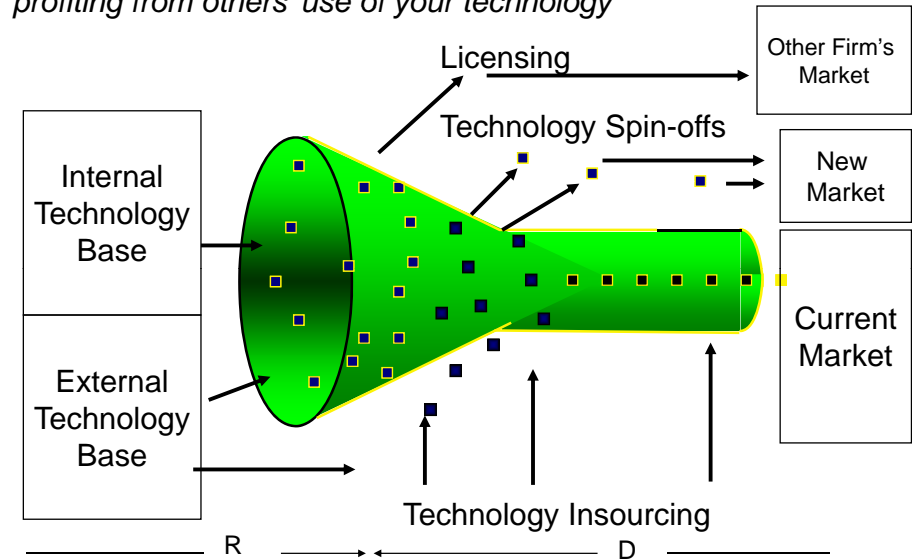
Sources: National Science Foundation, Science Resource Studies, Survey of Industrial Research Development 1999 and 2001.

*Open innovation:
Filling the gaps with external technology*



Source: H. Chesbrough, *Sloan Management Review*, Spring 2003

*Open innovation: Growing new businesses and
profiting from others' use of your technology*



Source: H. Chesbrough, *Sloan Management Review*, Spring 2003

The Logic of "Open Innovation"

- According to Chesbrough:
 - Good ideas are widely distributed today. We must find and tap into the knowledge and expertise of bright individuals outside our company.
 - External R&D can create significant value; internal R&D is needed to claim some portion of that value
 - We don't have to originate the research in order to profit from it
 - Building a better business model is better than getting to the market first
 - If we make the best use of internal *and* external ideas, we will win
 - We must manage IP in order to manage research:
 - need to access external IP to fuel our business model
 - need to profit from our own IP in others' business model

*Closed vs. Open
Innovators*





Open for Innovation:

The role of openness in explaining innovation performance among UK manufacturing firms

(joint with Ammon Salter, ICL)

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Aim

- Issues
 - To explore the relationship between openness of firm's external search strategies and innovative performance.
 - The notion of openness (Chesbrough, 2003) can be argued to have two components:
 - External Search Breadth
 - External Search Depth
- Data
 - UK Innovation Survey 2001 with 2687 manufacturing firms
 - Method – descriptive analysis and Tobit regressions

Previous work (i)



- The early Schumpeterian model of the lone entrepreneur bringing innovations to markets has been superseded...
- ...by a rich picture of different actors working together in iterative process of trial and error to bring about the successful commercial exploitation of a new idea
- These newer models of innovation have highlighted the that the innovators rely heavily on their interaction with lead users, between different functional departments within the firm and with a range of institutions inside the broader innovation system

Previous work (ii)



- A recent example discussed earlier: Chesbrough (2003):
 - The advantages that firm's gain from internal R&D expenditure have declined.
 - Accordingly, many innovative firms now spend little on R&D
 - Yet they are able to successfully innovate by drawing in knowledge and expertise from wide range of external sources.

Previous work (iii)

- Search strategies
 - Ahuja & Katila (2002)/Katila (2002)
 - Internal search strategies
 - Search depth (reuses existing knowledge)
 - Search scope (explores new knowledge)
 - Our focus
 - External search strategies
 - Search breadth (how many sources are used)
 - Search depth (intensity of use of many sources)

Previous work (iv)

- Costs
 - Firms extend themselves too far in efforts to capture external ideas in their innovation processes (Koput, 1997):
 - There may be too many ideas for the firm to manage and choose between (“the absorptive capacity problem”)
 - Many innovative ideas may come at the wrong time and in the wrong place to be fully exploited (“the timing problem”)
 - Since there are so many ideas, few of these ideas are taken seriously or given the required level of attention or effort to bring into implementation (“the attention allocation problem”)
 - Poor allocation of managerial attention can lead to firms engaging in too many (or too little) external and internal communication channels (Ocasio, 1997)

Hypotheses

- *H1. External search breadth is curvilinearly (taking an inverted U-shape) related to innovative performance*
- *H2. External search depth is curvilinearly (taking an inverted U-shape) related to innovative performance*
- *H3. The more radical the innovation, the less effective external search breadth will be on innovative performance*
- *H4. The more radical the innovation, the more effective external search depth will be on innovative performance*
- *H5. The R&D intensity of the firm is complementary to external search breadth and depth in shaping innovative performance*

Data

- UK CIS 3 - 2001
- 2707 manufacturing firms across 13 different sectors
- General and sectoral patterns
- 17 different sources of innovation (we use 16 in this paper)
- Detailed information on expenditure and degrees of innovativeness

Sources of information and knowledge for innovation activities in UK manufacturing firms, year 2000 (n=2707).

Type	Knowledge source	Percentages			
		Not used	Low	Medium	High
Market	Suppliers of equipment, materials, components or software	32	20	32	15
	Clients or customers	34	22	28	16
	Competitors	46	27	20	6
	Consultants	62	22	13	3
	Commercial laboratories/ R&D enterprises	73	18	7	2
Institutional	Universities or other higher education institutes	73	17	8	2
	Government research organizations	82	14	3	1
	Other public sector eg. business links, Government Offices	76	17	6	1
	Private research institutes	82	14	4	1
Other	Professional conferences, meetings	58	27	12	2
	Trade associations	52	28	17	3
	Technical/trade press, computer databases	47	27	22	4
	Fairs, exhibitions	42	28	23	7
Specialized	Technical standards	43	23	23	11
	Health and safety standards and regulations	37	24	27	12
	Environmental standards and regulations	39	26	24	11
Average		55	22	17	6

Means of external search breadth and depth by industry

	Breadth mean	Depth mean	No. of firms
Food, drink & tobacco	7.23	0.84	212
Textiles	6.12	0.59	157
Wood	6.37	0.75	156
Paper and printing	5.87	0.94	249
Chemicals	9.95	1.23	114
Plastics	6.84	1.09	135
Non-metallic minerals	6.17	0.96	71
Basic metals	7.98	1.07	54
Fabric. metal products	5.70	0.72	293
Machinery	8.59	1.27	210
Electrical	8.86	1.15	444
Transport	7.51	1.18	279
Other	6.52	0.77	333
Average	7.21	0.97	

Tobit regression – measures

- Dependent variable
 - Percentage of sales of innovative products (INNWORLD, INNfirm, INNIMP)
- Independent key variables
 - External Search Breadth (just “use” of sources – 0-16)
 - External Search Depth (“high use” of sources – 0-16)
- Independent control variables
 - User interaction
 - Log of firm size (employment)
 - Start-up (recently created 1998 to 2000)
 - R&D intensity for firm (R&D/Turnover – register data)
 - The size of the product market
 - Collaboration on innovation activities

Descriptive stats

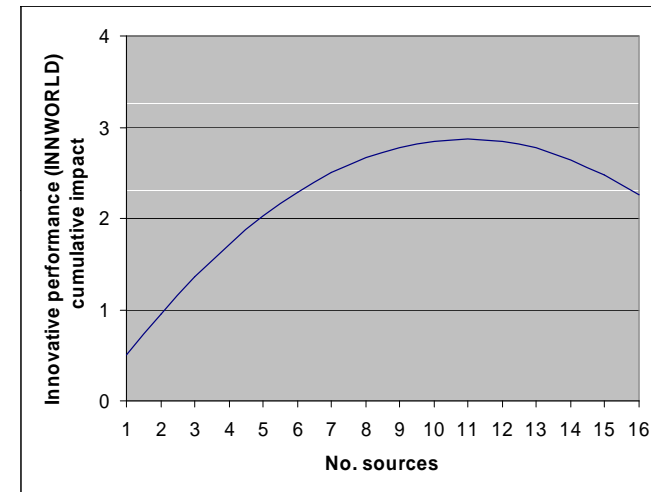
	No. of firms	Mean	Std. Dev.	Minimum	Maximum
INNWORLD	2707	2.81	11.43	0	100
INNfirm	2687	4.94	13.97	0	100
INNIMP	2687	4.72	12.95	0	100
BREADTH	2707	7.22	5.30	0	16
DEPTH	2707	0.96	1.68	0	16
USER	2707	0.16	0.37	0	1
RDINT	2707	0.60	3.82	0	90.6
LOGEMP	2707	4.14	1.42	0	9.0
STARTUP	2707	0.06	0.24	0	1
GEOMARKET	2707	2.78	0.90	1	4
COOP	2707	0.16	0.37	0	1

Tobit regression, explaining innovative performance across UK manufacturing firms

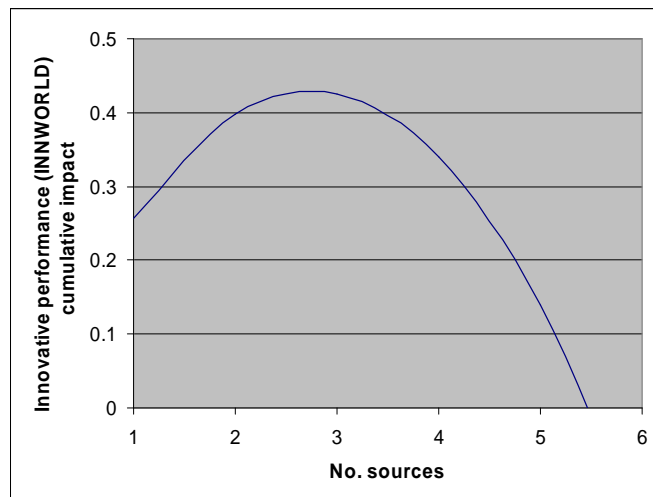
Dependent variables	INNWORLD		INN FIRM		INNIMP	
Independent variables	Coefficient	Std. error	Coefficient	Std. error	Coefficient	Std. error
BREADTH	Decreasing → 0.549 ***	0.091	0.617 ***	0.063	0.795 ***	0.086
BREADTH2	-0.024 ***	0.005	-0.027 ***	0.004	-0.033 ***	0.005
DEPTH	Increasing → 0.370 **	0.167	0.203 *	0.112	-0.029	0.136
DEPTH2	-0.057 **	0.023	-0.031 **	0.015	-0.015	0.018
USER	0.714 **	0.332	0.275	0.236	0.912 ***	0.291
RDINT	0.072 ***	0.023	0.069 ***	0.018	0.037 ***	0.022
LOGEMP	0.026	0.093	0.117 *	0.065	0.196 **	0.081
STARTUP	-0.022	0.518	0.333	0.349	-1.656 ***	0.519
STARTUP x RDINT	22.497	14.561	15.419	11.537	0.263	7.659
GEOMARKET	0.739 ***	0.166	0.546 ***	0.111	0.621 ***	0.140
COOP	1.677 ***	0.287	1.456 ***	0.202	1.565 ***	0.248
Industry dummies	Yes		Yes		Yes	
No. of obs	2707		2687		2687	
No. of left censored obs	2307		1986		2123	
No. of right censored obs	16		21		6	
Log likelihood	-1681.2		-2487.3		-2186.2	
Chi-square	324.4 ***		595.5 ***		533.5 ***	
Pseudo R2	0.09		0.11		0.11	

Note: One-tailed *t*-test applied. **p* < 0.10; ***p* < 0.05; ****p* < 0.01

Impact of Search Breadth



Impact of Search Depth



Hypotheses revisited (i)

- *H1. External search breadth is curvilinearly (taking an inverted U-shape) related to innovative performance*
 - Strong support for this hypothesis, tipping point at 11 sources: Benefits, but also costs of wide search
- *H2. External search depth is curvilinearly (taking an inverted U-shape) related to innovative performance*
 - Strong support for this hypothesis, tipping point at 3 sources: Benefits, but also costs of deep search

Hypotheses revisited (ii)

- *H3. The more radical the innovation, the less effective external search breadth will be on innovative performance*
 - Strong support for this hypothesis – broad search more important for incremental innovation. Incremental innovation is more embedded.
- *H4. The more radical the innovation, the more effective external search depth will be on innovative performance*
 - Support for this hypothesis – deep search more important for radical innovation. A need to focus on a few but important sources of innovation.
- *H5. The R&D intensity of the firm is complementary to external search breadth and depth in shaping innovative performance*
 - No support for this hypothesis; instead the “NIH” syndrome finds support

Conclusions

- Search strategies matter for innovative performance
- External search openness in terms of breadth and depth are beneficial to innovation performance;
- However firms can “over search”; one has to look at the associated costs as well



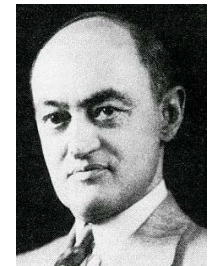
The Paradox of Openness Appropriability and the Use of External Sources of Knowledge for Innovation

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Introduction -- aim

- The paper explores how the ability of firms to be open to external sources of innovation is affected by the firms' legal appropriability strategies
 - Finding “new combinations” involves a resource intensive search process (Nelson & Winter, 1982; Stuart & Podolny, 1996; Fleming & Sorenson, 2004)
 - The search process involved drawing in knowledge from many actors outside the organization, also to reach more distant knowledge domains (March, 1991; Rosenkopf & Nerkar, 2001; Katila, 2002; Laursen & Salter, 2006)
 - The innovation process itself may become more open, distributed and even democratic (Chesbrough, 2003; Coombs, Harvey, & Tether, 2003; von Hippel, 2005)



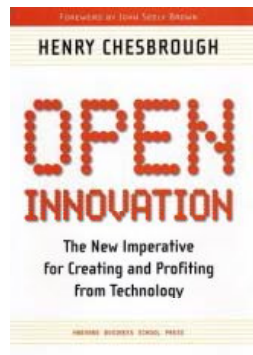
Introduction

- Recent contributions have begun to analyze the need for firms to protect their knowledge when they engage in formal collaboration activities (Cassiman & Veugelers, 2002; Heiman & Nickerson, 2004).
- However, formal collaboration is just one set of activities that may help firms in getting access to skills and knowledge not available to them within the boundary of their organization
- Our approach to openness focuses on explaining **the breadth of firms' external search strategies** by looking at the number of separate search channels, such as suppliers, users, competitors, research organizations and universities, that firms use in their search for innovative opportunities

The paradox of openness

- To conflicting requirements:
 - Being open requires organizations to share or exchange some part of their knowledge with external actors
 - At the same time organizations have to protect their knowledge from being copied by competitors and other actors

Openness meets appropriability: complements, not substitutes



meets the



Data & method

- Data: 4th UK Innovation Survey 2005 with 2,931 manufacturing firms
- Method – fractional response regression model correcting for endogeneity concerns by adopting an instrumental variable approach

Hypotheses

- The paradox of openness
 - In order to gain from formal and informal knowledge trading, firms need to protect their knowledge and innovations to some extent (Gans & Stern, 2003).
 - As such, using an appropriability strategy and being open to external sources of innovation go hand in hand: firms need to disclose some knowledge to be able to gain from being open to external sources of innovation, but firms also need to protect some of the knowledge to gain from the exchange (the “Arrowian” knowledge paradox).
 - Nevertheless, at some point, a strong emphasis on appropriability will lead firms to be less open as their fear theft or leakage forces them to limit their exposure to external sources.

Hypotheses

- H1. The strength of a firms’ legal appropriability strategy is curvilinearly (taking an inverted U-shape) related to the breadth of openness to external sources of innovation.

Hypotheses

- **Openness, Appropriability and New Firms**
- Start-ups depend on one or a few central ideas and have limited resources to draw externally:
 - H2a. R&D active startups will exhibit a lower breadth of openness to external sources of innovation.
 - H2b. R&D active startups that apply a strong legal appropriability strategy will exhibit a higher breadth of openness to external sources of innovation.

Hypotheses

- **Openness, Appropriability and Novelty of Innovations**
 - Radical innovation often involves a significant disruption or break from past sources of knowledge and ways of doing things, while incremental innovations are largely cumulative, and therefore firms are able to draw upon a range of well established relationships and knowledge sources:
 - H3a: Firms that have a stronger orientation towards more radical innovation will exhibit a lower breadth of openness to external sources of innovation.
 - H3b: The inverted U-shaped relationship between the strength of firms’ appropriability strategy and breadth of openness to external sources of innovation is moderated by firms’ orientation towards radical innovation so that the U-shape becomes more pronounced with a stronger orientation towards radical innovation.

Sources of information and knowledge for innovation activities in UK manufacturing firms, year 2004 (n=1931).

Knowledge source	Not used/ low use	Medium use/ High use
	Percentages	
Suppliers of equipment, materials, components or software	34	66
Clients or customers	26	74
Competitors	50	50
Consultants, commercial labs, or private R&D institutes	76	24
Universities or other higher education institutes	85	15
Government or public research institutes	90	10
Conferences, trade fairs, exhibitions	60	40
Professional and industry associations	68	32
Unweighted average	61	39

Breadth of openness by industry

	Openness Mean ^a	Appropriability mean	R&D intensity mean	No. of firms	R&D start-ups
Food, drink & tobacco	3.22	2.48	0.33	289	14
Textiles	2.89	2.87	0.71	133	9
Wood	2.85	1.92	0.33	86	6
Paper and printing	2.80	2.09	0.89	286	12
Refined petroleum products	2.71	2.71	0.14	7	0
Chemicals	3.71	4.97	1.98	151	8
Plastics	3.30	3.73	0.68	215	10
Non-metallic minerals	2.88	2.67	1.56	112	4
Basic metals	2.76	2.62	0.45	45	2
Fabric, metal products	2.50	2.33	0.66	342	16
Machinery	3.20	3.61	1.37	276	8
Electrical	3.68	4.09	3.19	477	29
Transport	3.13	3.68	1.76	239	19
Other	2.93	2.78	1.55	273	21
Average	3.04	3.04	1.11		
Total number				2931	158

Fractional response regressions – measures

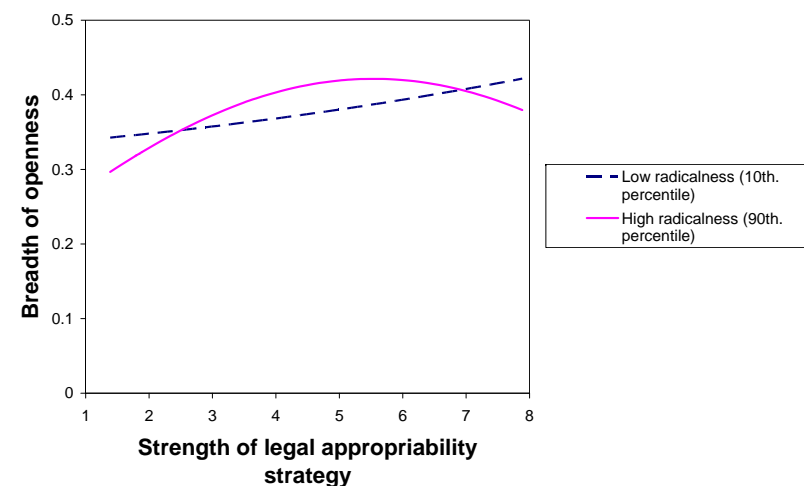
- **Dependent variable**
 - The breadth of openness (0-8 possible sources) divided by 8.
- **Independent key variable and moderators**
 - Legal appropriability strategy (0-9 – three underlying methods: Patents, registration of design, and confidentiality agreements)
 - Relative radicalness of innovations (the difference between the percentage of sales of products new to the market and the percentage of sales of products new to the firm or significantly improved products)
 - R&D start-up
- **Instruments for legal appropriability strategy** (and for appropriability strategy squared too)
 - Minimum efficiency scale
 - Industry-level average R&D intensity
 - Market size
- **Independent control variables**
 - Log of firm size (employment)
 - R&D intensity
 - 14 industry dummies, 12 geographical dummies

Descriptive stats

Variable	Mean	Std. Dev.	Min.	Max.	1.	2.	3.	4.	5.
1. Breadth of openness	0.39	0.26	0	1					
2. Legal appropriability	3.15	3.07	0	9	0.44				
3. R&D intensity	0.01	0.05	0	1	0.14	0.16			
4. R&D start-up	0.05	0.23	0	1	0.09	0.06	0.15		
5. Relative radicalness of innovations	0.44	0.13	0	1	-0.12	-0.04	0.00	-0.07	
6. Number of employees (log)	4.27	1.43	2.3	9.9	0.26	0.35	0.02	-0.03	-0.02

Independent variables	Model I		Model II		Model III	
	Coeff.	Std. Err.	Coeff.	Std. Err.	Coeff.	Std. Err.
Legal appropriability \square	0.27 **	(0.10)	0.27 **	(0.09)	0.27 **	(0.10)
Legal appropriability squared \square	-0.02 *	(0.01)	-0.02 *	(0.01)	-0.02 *	(0.01)
R&D intensity	2.09 ***	(0.51)	2.10 ***	(0.50)	2.15 ***	(0.52)
R&D start-up	0.38 ***	(0.08)	0.91 ***	(0.20)	0.86 ***	(0.21)
R&D start-up X legal appropriability			-0.16 **	(0.06)	-0.15 **	(0.06)
Relative radicalness of innovations	-0.92 ***	(0.15)	-0.92 ***	(0.14)	-2.31 ***	(0.47)
Relative radicalness of innovations X legal appropriability \square					1.26 **	(0.49)
Relative radicalness of innovations X legal appropriability squared \square					-0.13 *	(0.06)
Number of employees (log)	0.18 ***	(0.02)	0.18 ***	(0.02)	0.18 ***	(0.02)
Constant	-1.92 ***	(0.12)	-1.94 ***	(0.12)	-1.93 ***	(0.12)
No. of obs	2931		2931		2931	
Log likelihood	-1422		-1422		-1421	
Model chi-square	115 ***		117 ***		119 ***	
McFadden's pseudo R2	0.04		0.04		0.04	
ML (Cox-Snell) R2:	0.13		0.14		0.14	

\square indicates predicted variables from first-step negative binomial estimations.
One-tailed tests: † $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$.



Conclusions

- The existence and use of legal appropriability methods may provide confidence for managers to search more broadly in the external environment (up to a point).
- A very strong emphasis on appropriability** will limit attempts to draw in knowledge from many different external actors -> firms may become myopic in their search activities because of too strong an emphasis on appropriability (Levinthal & March, 1993).

Conclusions

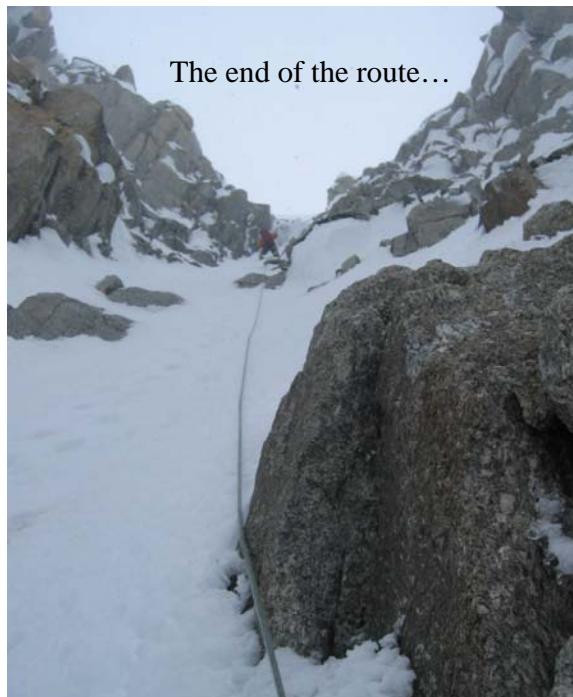
- Even though the danger of theft is great for **R&D start-up firms**, such organizations **need** to use external sources in order to draw together and integrate a diverse range of external inputs
- The results indicate that strong appropriability strategies can hinder R&D active startups from performing external search.
- We found that the **radical innovators** who apply a strong legal appropriability strategy are more likely to have a larger breadth of openness to external sources (up to a point).

Implications

- For the newer studies of absorptive capacity (of the “Zahra and Georg type”):
 - The paper suggests that potential absorptive capacity needs to be accompanied by a strategy for protecting the firm’s knowledge in order for the firm to be able to exploit new combinations;
 - the analysis implies that these aspects of knowledge exploration and exploitation go together.
- For studies of appropriability:
 - Perhaps the role of firm’s choices have been downplayed too much

Future research

- Analyzing external search within each individual knowledge channel (such as users, suppliers, universities etc.)
- Looking at how the level of complexity of an innovation shapes the way firms search for new innovation opportunities.
- Attempt to understand changes in innovative search over time.



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Organizing to Gain from User Interaction: The Role of Organizational Practices for Absorptive and Innovative Capacities

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Aims

- Examine how organizational practices may leverage the knowledge absorption from customers/users in the context of innovation.
- Identify some of the organizational dimensions of Absorptive Capacity that are needed to benefit from the “user/customer innovation model”

Background

- Dominant macro mode of explanation in strategic management.
- Firm-level outcomes explained *in terms of* firm-level knowledge constructs.
 - E.g., capabilities, dynamic capabilities, absorptive capacity.
- Organizational and individual-level antecedents are suppressed:
 - How does, e.g., absorptive capacity emerge? How exactly does external knowledge effect its influence on innovative capacity? What is the role of individuals and organization in this process?

User/customer-driven innovation

- The notion that interaction with users matters crucially for product and process innovations in a large number of industries has been well recognized for more than four decades (Linder, 1961; Freeman, 1968).
 - Users/customers possess “sticky” knowledge and information that is difficult to obtain/transfer without direct collaboration (von Hippel, 1998)
- ⇒ Not clear in existing literature how the relation from user/customer interaction to innovative capacity and revealed innovation is mediated/moderated by organizational (and individual-level) factors

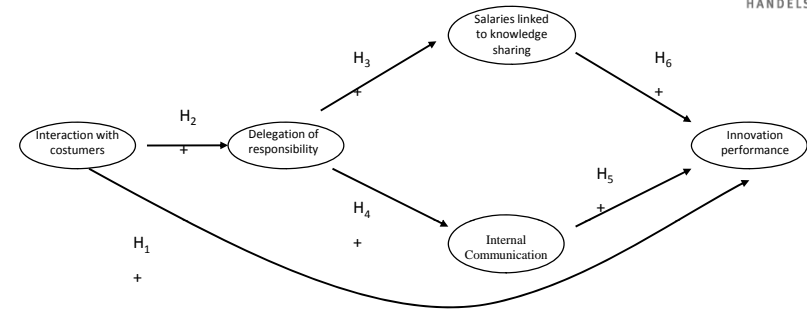
Knowledge Sharing and Innovation

- Various literatures examine knowledge sharing/transfer and innovation link.
- Existing literature mainly looks at *informal* organizational practices, social networks etc
- We take the position that administrative apparatus can be deployed to positively influence knowledge sharing.
- Incentive to invest in mechanisms that reduce the cost of knowledge sharing — increase inward-looking absorptive capacity — while increasing the cost of imitation by competitors.

“Inward and outward-looking” absorptive capacity

- Cohen & Levinthal’s (1990) distinction between:
 - “inward-looking” absorptive capacity.
 - “outward-looking” absorptive capacity.
- The former relates to the firm’s points of contacts with external sources of knowledge, while the latter refers to “the efficiency of internal communication” (1990: 133).
- We argue that different organizational practices are antecedents to inward-looking (communication, and knowledge sharing) and outward-looking (delegation) absorptive capacity, respectively.

Hypotheses



- H1. The more the focal firm engages in interaction with customers, the better its innovation performance.
- H2. The more the focal firm interacts with its customers, the more it will delegate responsibility.
- H3. The more the focal firm delegates responsibility, the more it will link salaries to knowledge sharing behavior
- H4. The more the focal firm delegates responsibility, the more communication will take place inside it.
- H5. The more the focal firm engages in internal communication, the higher its innovation performance
- H6. The more the focal firm links salaries to knowledge sharing, the higher its innovation performance.

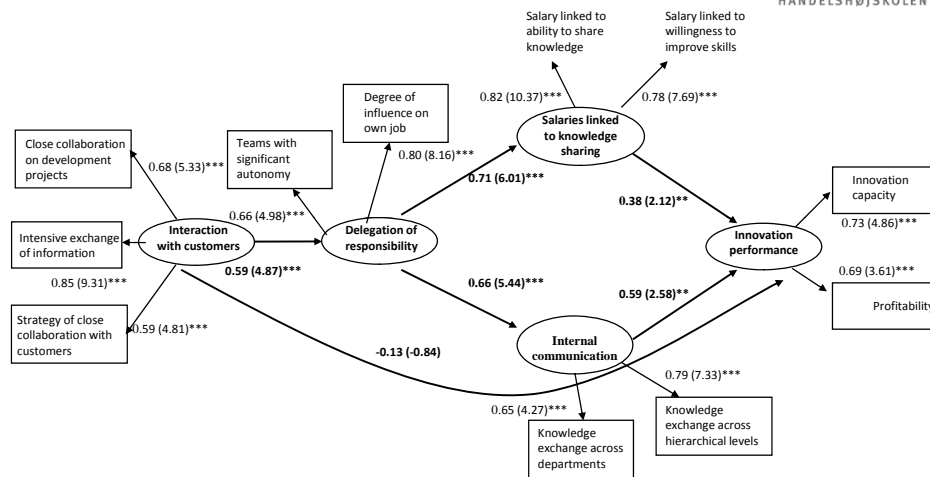
Data

- 2001: 1000 largest Danish firms (turnover in excess of USD 90; in 2000) received a questionnaire (DK context: LM firms).
- After two reminders, a total of 207 firms responded to the survey, providing a response rate of 21 percent.
- Only 169 responses were usable for statistical analysis.
- Respondent: CEO (in some cases the HRM-manager or other managers have responded).
- Test for non-response bias: chi² test and tests indicate no non-response bias.

Constructs and Items

Constructs and items	Factor loading**	t-value	R ² -value	Construct Reliability	Variance extracted by constructs	Variance shared between constructs
				0.76	0.52	0.34
<i>Interaction with customers</i>						
Customers involved in close collaboration	0.71	6.75	0.50			
Intense communication with customers	0.84	9.31	0.71			
Strategy of close collaboration with customers	0.60	5.64	0.36			
				0.71	0.55	0.34
<i>Delegation</i>						
Employees have influence on their own job	0.77	8.16	0.59			
Employees engaged in teams with high degree of autonomy	0.71	5.26	0.50			
				0.76	0.61	0.28
<i>Salaries linked to knowledge sharing</i>						
Salary associated with the ability and willingness to share knowledge	0.81	10.37	0.66			
Salary determined by the willingness to improve skills and upgrade knowledge	0.75	9.76	0.57			
				0.70	0.54	0.28
<i>Internal communication</i>						
Exchange of information between employees across departments	0.69	5.53	0.48			
Communication among employees and management	0.78	7.33	0.61			
				0.72	0.56	0.14
<i>Innovation performance</i>						
Innovation capacity of focal firm compared to competitors	0.79	4.74	0.62			
Profitability of focal firm compared to competitors	0.71	4.86	0.50			

Structural equation model

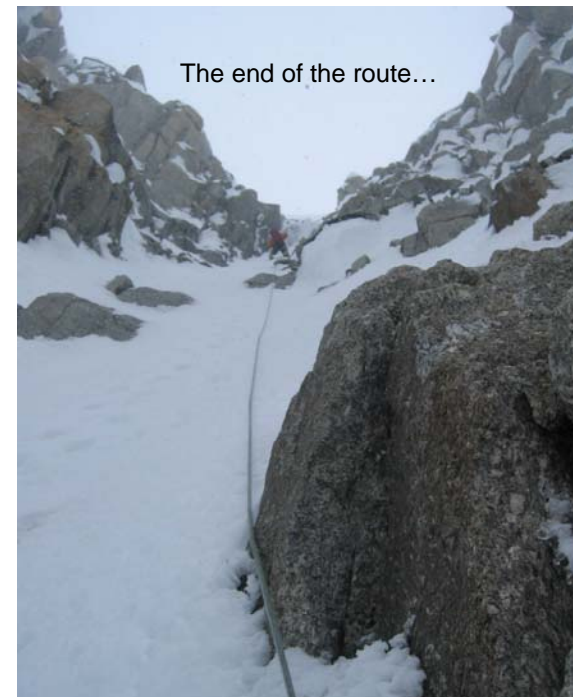


Conclusions

- Basic conjecture: Organizational practices influence the link from user knowledge to firm innovative capacity
- Our results support this conjecture.
- Contributions to two literatures: ACAP + Open/User Innovation
- Organizational variables and the specific focus on customers/user neglected in ACAP literature
- Organizational variables (and ACAP) seldom enter the user innovation literature.

Future Research

- Look at
 - Broader range of external knowledge inputs included in the “open innovation model” (not just customers/users).
 - E.g., do different kinds of external knowledge inputs require different organizational practices for resulting in innovation?
 - Broader range of “organizational practices,” including more informal practices, network relations etc.
 - E.g., are formal and informal practices substitutes or complements with respect to how they leverage knowledge in the context of innovation?



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Class work

- Using the recent article from the Economist
 - Read the article
 - Answer the related questions in small groups
 - We discuss the possible answers on class