

June 2009



LUDWIG-
MAXIMILIANS-
UNIVERSITÄT
MÜNCHEN

FAKULTÄT FÜR BETRIEBSWIRTSCHAFT
**MUNICH SCHOOL OF
MANAGEMENT**

A Comparison of Information-Sharing between Scientists in Academia and the Industry

COMMUNIA CONFERENCE 2009, Turino

Carolin Häussler

Institute for Innovation Research, Technology Management
and Entrepreneurship (INNO-tec)
Ludwig-Maximilians-Universität München

Point of Departure

“It is the nature of the goals accepted as legitimate within the two communities of researchers, **the norms of behavior especially in regard to the disclosure of knowledge**, and the **features of the reward systems** that constitute the fundamental structural differences between the pursuit of knowledge undertaken in the realm of Technology and the conduct of essentially the same inquiries under the auspices of the Republic of Science”
(Dasgupta/David 1994, 495)



- Academic scientists should be guided by the ethos of the unconditional sharing of information (e.g., Merton 1973)
- Industrial scientists are expected to be secretive in order to secure the economic gains of research results (e.g., Rosenberg 1990; Dasgupta/David 1994)

Point of Departure: The “reality”

- Academic science
 - Withholding of information in academic science (Blumenthal 1997; Campbell et al. 2002; Walsh & Hong 2003; Walsh et al. 2007)
- Industrial science
 - Informal information exchange: steel and mini mill industry (Schrader 1991), wireless communication industry (Dahl & Pedersen 2004), French chefs (Fauchart & von Hippel 2008)
 - Selective revealing in embedded linux (Henkel 2006)

Research Question

- Do economic and social factors drive information-sharing?
- If so, how are the economic and social dimensions of information-sharing interrelated?
- Are there differences in the determinants of sharing behavior between academic and industrial scientists?

Gap in the Literature

- Previous studies provide merely pieces of the puzzle
- No comprehensive study exists that takes economic, social factors and their interrelation into account
- No study to date applies the same survey instrument to a sample of academic and industrial scientists

Economic factor

- Human action is the efficient outcome of rational individuals pursuing their self-interest (Hirshleifer 1985). Information is shared only if it is in the economic interest of scientists.
- Firm engineers take into account the intensity of competition between the involved parties (Schrader 1991).
- Academic scientists working in highly competitive fields are less likely to reveal information (Walsh et al. 2007, Haeussler, Thursby, Thursby 2009).

H1: The likelihood that academic and industrial scientists share information decreases with the economic value of the requested information.

Social factors

- Individuals are embedded in a social context that may result in generalized behavioral patterns that may contradict the purely utility-driven behavior of “homo economicus” (Granovetter 1985, 1992).
- Social exchange factors differ from economic factors in that they are associated with feelings of “unspecific” personal obligation, gratitude and trust, while purely economic exchange is based on private interest, namely to profit monetarily or careerwise (Blau 1964; Bouty 2000).

Reciprocity

- Reciprocity implies that the recipient of a favor from another party is obliged to reciprocate the gesture in order to maintain the balance of benefits and contributions.
- Industrial scientists expect the inquirers to reciprocate (von Hippel 1987; Schrader 1991; Bouty 2000).

H2: The likelihood that academic and industrial scientists share information increases with expected reciprocity.

Conformity with norm of communalism

- Norm encourages scientists to unconditionally share information.
- Scientists may comply because they may derive benefits from conforming to norms (e.g., legitimacy) that may exceed the costs of following norms (Azar 2004).
- A norm is as strong as it is respected and enforced in a community (e.g., Merton & Rossi, 1950; DiMaggio & Powell, 1983). The norm provides effective and legitimate rules for the behavior of scientists in communities where it is highly respected.

H3: The likelihood of information-sharing increases with the extent to which the community is perceived to conform to the norm of communalism.

Moderating effect I

- “(...) information must be given in order for it to be obtained” (Rogers 1982, 114)
- Scientists are interested in sharing information with individuals that are able and willing to reciprocate. The recipient of highly valuable information is much more indebted to the provider than a recipient of low-value information.

H4: The expectation of reciprocity moderates the negative impact of high economic value on the likelihood of that information being shared.

Moderating effect II

- When the community is perceived to respect the norm of communalism, the incentives for scientists to share precious information are much stronger as sharing increases their reputation without posing a risk to profits from their scientific advancement.

H5: The extent to which a scientist perceives his or her community to conform to the norm of communalism moderates the negative impact of high economic value on the likelihood of that information being shared.

Bio-sciences as Field of Study

- Highly competitive field characterized by great emphasis on IP protection (Cohen et al. 2002; Reynolds 2000).
- Building of collective knowledge is a key strategic task for success (Powell et al. 2005).
- Withholding of research results is significant in the bio-sciences (Campbell et al. 2000) but also some recent signs of open-source attitude (BIOS – Biotechnological Innovation for Open Science, BioForge)

Data

- Anglo-German Biotech Observatory Scientist Survey 2007
 - Sample: British and German Scientists that hold at least one EPO-Patent in the biotechnical area and/or at least one PubMed listed publication in the biotechnical area.
 - Final sample: 2452 scientists identified in the EPO-database; 2169 scientists identified in PubMed (33% and 23%). 1087 British and 3067 German bio-scientists filled out.
- For this study
 - Only British and German scientists that did receive a request for information in the last 12 months (non-publicly available information; not attributed to a collaboration project with inquirer): 341 firm and 1353 university scientists; 393 British and 1301 German scientists.

Descriptive Statistics: Dependent Variable

% Information shared	Mean	Std. Dev.	0% =1	1-49% =2	50-99% =3	100% =4
Industrial scientists	57.93	43.07	0.30	0.13	0.17	0.39
Academic scientists	85.19	29.80	0.08	0.07	0.13	0.72

Note: t-value=13.7 and p-value <0.001 for the difference in mean between % information shared for firm and university scientists

Factor Analysis

Variable	Economic value	Expected reciprocity	Norm conformity
Value of information for scientific research program	<u>0.79</u>	0.07	0.05
Similarity of research program with inquirer	<u>0.73</u>	0.16	-0.01
Likelihood of entering into co-authorship/co-inventorship in the future	0.10	<u>0.74</u>	0.12
Expected change of inquirer's willingness to provide information	0.05	<u>0.68</u>	0.18
Value of previous exchange with inquirer for inquirer	0.03	<u>0.63</u>	-0.11
Value of previous exchange with inquirer for scientist	0.13	<u>0.61</u>	-0.12
Inquirer is considered to be a close colleague	0.13	<u>0.71</u>	0.09
Open exchange is perceived to be usually practised among researchers	-0.05	0.05	<u>0.73</u>
The first to come up with new research results/ideas is highly esteemed	0.09	0.01	<u>0.75</u>

Note: The number of factors extracted was determined by the Kaiser criterion (Eigenvalue>1). KMO=0.75

Empirical Model

- Intervall Regression (0%; 1-49%; 50-99%, 100%)
- $\text{Sharing} = IV * \text{academic scientist} + IV * \text{industrial scientist} + \text{academic scientist} \dots$
- Whereby:
 - IV=independent variable
 - Industrial scientist=dummy (1 for industrial scientist, 0 otherwise)
 - Academic scientist=dummy (1 for academicscientist, 0 otherwise)

Results

Factor	Industrial Scientists	Academic Scientists
Economic value of requested information	- <input checked="" type="checkbox"/> ***	- <input checked="" type="checkbox"/> ***
Expected reciprocity	+ <input checked="" type="checkbox"/> **	+ <input type="checkbox"/>
Conformity to norm	+ <input checked="" type="checkbox"/> **	+ <input checked="" type="checkbox"/> **
Expected Reciprocity x Economic value of requested information	+ <input type="checkbox"/>	+ <input checked="" type="checkbox"/> ***
Conformity to norm x Economic value of requested information	+ <input checked="" type="checkbox"/> *	- <input type="checkbox"/>

Contribution

- Sharing and accumulation of knowledge
 - *Economic factors* guide academic and industrial scientists
 - *Social factors* ...
 - conformity to the norm of communalism guides academic and industrial scientists
 - expected reciprocity drives industrial scientists
 - Social factors support the sharing of high-value information. This finding speaks against Kim/Mauborgne (1998, 329) that “high-quality knowledge sharing will likely be stifled as long as quid pro quo attitudes toward cooperation prevail”.

Contribution

- IP protection mechanism
 - Norm based mechanism as complement to formal IP protection; community acts as a source of authority that credits those who conform, and calls for sanctions on violators (see Fauchart & von Hippel 2008).
- Institutional differences
 - Sharing of academic and industrial scientists is driven by economic and social considerations.
 - Among academic scientists, high level of expected reciprocity supports sharing of highly valuable information → “equitable exchange” (Bouty 2000).

Managerial and Public Policy Implications

- Industrial science: scientists take the economic interest of their employer into account but also consider social factors → more open firm policy.
- Academic science: The “unconditional contribution” to the “scientific commons” (Merton 1974) is challenged by individual scientists’ interest considerations.
- Public Policy: formal IP system is increasingly criticized having unintended effects (strategic patenting; EPO flooded by applications...); strengthening norms may help to establish a new incentive system that complements the formal IP system

Thank you for your attention!