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In Search for the Not-Invented-Here Syndrome: The Role of Knowledge Sources and Firm Success

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Extended Abstract

The not-invented-here (NIH) syndrome refers to internal resistance in a company against externally developed knowledge. Although previous research has shown that firms can benefit significantly from external knowledge inflows in terms of firm performance and innovativeness such positive effects from external knowledge sourcing cannot be taken for granted. The adaption of external knowledge requires flexible processes facilitating changes in the company's vision, strategy and culture and a welcoming attitude of employees towards externally generated knowledge. If such an attitude of the employees is missing they can show resistance against external knowledge and the expected benefits for the company fail to realize: this is the NIH syndrome.

The literature on the NIH syndrome is relatively scarce. Existing studies focus on potential antecedents of the NIH syndrome like team tenure and inappropriate incentive systems. In this paper, we argue and show that the occurrence of the NIH syndrome also depends on the source of external knowledge and the success of the company that aims at adapting the external knowledge.

Drawing from social identity theory we hypothesize that internal resistance is most likely to occur if knowledge is acquired from similar organizations. Individuals and working teams can feel their own expertise threatened when they valuate competitor knowledge and react with resistance against the externally generated knowledge. This hypothesis is supported by our finding that the NIH syndrome occurs when knowledge is acquired from competitors but not if knowledge is acquired from suppliers, customers or universities.

Further, we show that successful companies are most likely to experience the NIH syndrome (if knowledge is acquired from competitors). This is in line with our hypothesis that firm success increases the extent to which employees identify themselves with their company resulting in stronger in-group favoritism and a superior tendency to reject externally generated knowledge.

Our empirical analysis is based on a sample of German manufacturing firms.

Das Wichtigste in Kürze

Das Not-Invented-Here (NIH) (dt. “nicht hier erfunden”) - Syndrom bezeichnet unternehmensinternen Widerstand gegen extern generiertes Wissen und Know-How. Obwohl die einschlägige Literatur zeigt, dass externes Wissen einen positiven Effekt auf den Unternehmenserfolg und die Innovativität der Unternehmung haben kann, sind solche positiven Effekte nicht garantiert. Um externes Wissen aufzunehmen und effektiv zu nutzen, braucht ein Unternehmen flexible Routinen, die es ermöglichen, die Vision, Strategie und Kultur des Unternehmens an neues, extern generiertes Wissen anzupassen. Vor allem aber ist eine offene Einstellung der Mitarbeiter gegenüber dem externen Wissen eine Grundvoraussetzung. Wenn eine solche Offenheit der Mitarbeiter gegenüber externem Wissen nicht vorhanden ist, kann es sein, dass sie sich gegen das externe Wissen sträuben: das NIH-Syndrom tritt auf.

Sofern existieren wenig akademische Studien, die sich mit dem NIH-Syndrom befassen. Die meisten dieser Studien beschäftigen sich mit Faktoren, die ein NIH-Syndrom begünstigen, wie beispielsweise Kommunikationsprobleme innerhalb der Firma oder unangemessene Mitarbeiteranreizsysteme. In dieser Studie zeigen wir, dass auch die Quelle des externen Wissens und der Erfolg der Firma einen Einfluss auf das Auftreten eines NIH-Syndroms haben.

Wir beziehen uns auf die Theorie der sozialen Identität und stellen die Hypothese auf, dass interne Widerstände gegen extern generiertes Wissen besonders dann auftreten, wenn dieses Wissen von einer ähnlichen Organisation stammt. Einzelne Mitarbeiter und Arbeitsteams können dann ihre eigene Expertise in Frage gestellt sehen und mit Widerstand gegen das akquirierte Wissen reagieren. Wir finden empirische Evidenz für diese Hypothese, da sich zeigt, dass interne Widerstände auftreten, wenn externes Wissen von Wettbewerbern akquiriert wird, nicht aber wenn das Wissen von Kunden, Zulieferern oder Universitäten stammt.

Weiterhin zeigt sich, dass erfolgreiche Unternehmen eher von einem NIH-Syndrom betroffen sind (wenn sie Wissen von Wettbewerbern akquirieren). Dieses Ergebnis bestätigt unsere Hypothese, dass Mitarbeiter erfolgreicher Firmen sich stärker mit ihrem Unternehmen identifizieren, was dazu führt, dass sie eher dazu bereit sind, externes Wissen abzulehnen.

In Search for the Not-Invented-Here Syndrome: The Role of Knowledge Sources and Firm Success*

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Abstract

The not-invented-here (NIH) syndrome refers to internal resistance in a company against externally developed knowledge. In this paper, we argue that the occurrence of the NIH syndrome depends on the source of external knowledge and the success of the firm that aims at adapting external knowledge. In line with social identity theory, we hypothesize that internal resistance is most likely to occur if knowledge is acquired from similar organizations. This hypothesis is supported by our finding that the NIH syndrome occurs when knowledge is acquired from competitors but not if knowledge is acquired from suppliers, customers or universities. Further, we show that successful companies are most likely to experience the NIH syndrome (if knowledge is acquired from competitors). This is in line with our hypothesis that firm success increases the extent to which employees identify themselves with their company resulting in stronger in-group favoritism and a superior tendency to reject externally generated knowledge.

Keywords: not-invented-here syndrome; external knowledge sources; firm success; social identity theory; organizational identity

JEL: O31, O32, O33

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1. Introduction

Innovation management has to pay careful attention to the fact that the institutional locus of technological advances can lie outside of the firm's boundaries (Teece, 1986; 1992). The postulate that firms cannot rely on internally generated knowledge only has been conceptualized as the open innovation paradigm according to which the boundaries between firms and their environment became permeable so that knowledge flows more easily across firm boundaries (Chesbrough, 2003). External technological knowledge can complement in-house research and development (R&D) (Kogut and Zander, 1992; Teece, 1986; 1992; Laurensen and Salter, 2006; Chesbrough, 2003) by shortening development times (Hagedoorn, 2002), enabling synergies and generating efficiency effects (Veugelers, 1998), overcoming path-dependencies and triggering new technology developments (Teece, 1986). A skilled combination of external knowledge and the firm's own knowledge base can have substantial effects on firm performance and competitiveness (e.g. Rosenkopf and Nerkar, 2001; Cassiman and Veugelers, 2006).

Managing knowledge inflows from external sources is a complex task though (Lane and Lubatkin, 1998). Flexible processes facilitating changes in the company's vision, strategy and culture (Kanter, 1983) and supporting the implementation of new operating routines (Zollo and Winter, 2002) are prerequisites. The effectiveness of such means, however, relies crucially on the openness of the individual employees towards externally developed technologies (Lichtenthaler and Ernst, 2006). A welcoming attitude of employees towards new ideas cannot be taken for granted (Katz and Allen, 1982; Clagett, 1967).

This is because individuals are embedded in highly complex organizational knowledge creation processes. In order to cope with complexities organizations develop routines facilitating collaboration of employees with different backgrounds, know-how and employment histories (Dosi, 1982; Nelson and Winter, 1982; Teece et al., 2001). Individual employees, working teams and communities within the firm develop their own beliefs,

artifacts, habits and routines alongside their daily work (Dosi, 1982; Nelson and Winter, 1982; Garud and Rappa, 1994; Szulanski, 1999; Garud and Karnoe, 2001). While facilitating the processing of information which is consistent with existing competencies routines reinforce path-dependencies and limit the rate of integration of external knowledge and the production of radical innovations (Tripsas, 1997, Leonard-Barton, 1992). The assimilation of externally generated knowledge requires individual employees to change beliefs, to look beyond the boundaries of their communities and to break with routines.

Changing believes and breaking with routines can be a challenge for the employees. Within their company, individuals strive for self-enhancement so that they tend to favor their company as their "in-group" over other companies and aim for a positive distinction from other companies, their "out-groups" (Ashfort and Mael, 1989; Bartel, 2001). The acceptance of externally generated technologies enforces a comparison of the in-group's technological expertise with that of the out-group. This can constitute a threat for the perceived expertise of a group and, hence, for the self-concept of the group and its members. Employees, working teams and communities can respond to this threat with resistance towards external knowledge. This phenomenon is referred to as the not-invented-here (NIH) syndrome (Clagett, 1967; Katz and Allen, 1982; Lichtenthaler and Ernst, 2006).

Although an often discussed phenomenon among practitioners, the NIH syndrome has received relatively little attention in the academic literature (Katz and Allen, 1982; Clagett, 1967; de Pay 1989; 1995a; b; Boyens, 1998; Mehrwald, 1999; Menon and Pfeffer, 2003; Lichtenthaler and Ernst, 2006). The focus of previous studies on the NIH syndrome is on the antecedents of the NIH-syndrome (Clagett, 1967; Katz and Allen, 1982; Mehrwald, 1999) like group tenure (Katz and Allen, 1982), the lack of or negative group experience with external knowledge (Mehrwald, 1999), dysfunctional intra-organizational communication (Mehrwald, 1999) or inappropriate incentive systems (de Pay, 1989; 1995a,b; Mehrwald, 1999).

In this study we propose that the source of externally generated knowledge and the success of the company can be important antecedents for the occurrence of the NIH syndrome as well. First, in line with social identity theory (Tajfel, 1974; 1978; 1982; Tajfel and Turner, 1979; 1986; Turner et al., 1987) and the concept of organizational identity (Ashfort and Mael, 1989, Dutton et al., 1994), we suggest that the rejection of external knowledge is strongest if the out-group from which the knowledge is acquired is similar to the in-group. If the out-group shares characteristics important for in-group identification, like expertise in the same technology field or the same product market, individuals are most likely to fear their group identity threatened. In-group favoritism and a hostile behavior of individuals towards external knowledge can emerge as a defensive mechanism to restore group identity (Gabarott et al., 2009). Competitors are the most similar out-group for companies in terms of product market or technology market expertise as compared to suppliers, customers and universities. We empirically show that internal resistance against external knowledge only occurs when external knowledge is acquired from competitors.

Second, we establish a relationship between a firm's success and the occurrence of the NIH syndrome. The extent to which individuals identify themselves with their company increases with group success since success increases the group's distinctiveness and attractiveness (Dutton et al., 1994; Blanchard et al., 1975). A high confidence in the in-group's capabilities is often accompanied by an increased readiness to degrade outsiders' competencies and, hence, a decreased readiness to accept external knowledge (Katz and Allen, 1982). Since successful groups identify more strongly with their organization and are, hence, more likely to take defensive action against identity threats we hypothesize and show that the most successful firms are most likely to experience the NIH syndrome when knowledge is acquired from similar sources, i.e. from competitors. Our findings are based on a sample of firms in German manufacturing and allow us to derive important implications for innovation management.

The remainder of the paper is structured as follows. The next section presents a review of the literature on the NIH syndrome. Section 3 develops a theoretical framework and derives hypotheses. Section 4 introduces our data set and section 5 shows the empirical results. Section 6 concludes with a discussion of the results and managerial implications. The last section elaborates on the limitations of our study.

2. The NIH Syndrome: Where Do We Stand?

Clagett's (1967) experience at an engineering research center made him aware of frequent failures of implementations of external technologies caused by the NIH syndrome. Clagett (1967) analyzes several cases of successful and unsuccessful implementation of process innovations reporting notable resistance against externally developed knowledge. He argues that in order to reduce internal resistance it is important to have the engineers at the production sites involved in the whole process of problem definition, development and integration of the innovation. Clagett (1967), further, recommends that the person responsible for the introduction of an innovation should aim at reducing factors that hamper the adaption of the innovation rather than trying to establish support for the innovation.

Katz and Allen (1982) look into group characteristics facilitating the occurrence of the NIH syndrome. They emphasize the importance of project team tenure. Their study of 50 project groups within a R&D facility reveals two opposing effects of team tenure on group performance. On the one hand, project team tenure is associated with a building component in that it fosters group members' understanding of each other's capabilities and of the technologies they are entrusted with so that group tenure improves the working relationship. On the other hand, Katz and Allen (1982) show that stable team membership reduces communication within groups, across groups and with external parties. Individuals working in teams with stable membership tend to isolate themselves from sources providing critical evaluations, information and feedback which does not coincide with group ideas; this leading

to resistance against externally developed knowledge. In conclusion, Katz and Allen (1982) find a curvilinear relationship between tenure and group performance.

Extending Clagett's (1967) observation that the person responsible for introducing external knowledge plays a critical role for avoiding the NIH syndrome de Pay (1989; 1995a;b) argues that miscommunication within an organization and inappropriate incentive systems can be further antecedents of the NIH syndrome (Allen, 1977). A comprehensive study about the NIH syndrome is provided by Mehrwald (1999), who carried out a survey among 51 R&D managers and 89 scientists in 53 large companies in Germany. His findings largely confirm prior results by Clagett (1967) and Katz and Allen (1982). Mehrwald's (1999) work adds team experience with external knowledge as another important factor that can help avoiding the NIH syndrome. He, further, underlines the effect of inappropriate incentive systems on employees' intolerance against external knowledge (see also de Pay, 1989; 1995a;b).

Lichtenthaler and Ernst (2006) provide an extensive review of the literature on the NIH syndrome. They extent existing theory by considering external knowledge in-flows at different stages of the innovation process and by focusing on different organizational levels, e.g. individuals, groups, business units, organizations and inter-organizational levels. Similar to the concept of absorptive capacity (Cohen and Levinthal, 1989; 1990), Lichtenthaler and Ernst (2006) define knowledge management consisting of three "knowledge management cycles": knowledge acquisition, knowledge accumulation and knowledge exploitation (Hall and Andriani, 2003; Argote et al., 2003). At each cycle, the management needs to decide whether the innovation activity should take place internally or externally. At each cycle, an excessively negative attitude towards external knowledge but also an excessively positive attitude can occur. Both extremes can be detrimental for the knowledge management within the organization (Lichtenthaler and Ernst, 2006). Lichtenthaler and Ernst (2006) propose an integrated framework for the antecedents of resistance at the various innovation cycles and organizational levels and suggest possible conflict solutions.

The NIH syndrome, as we perceive it, situates at the knowledge acquisition level (see also Clagett, 1967; Katz and Allen, 1982; Lichtenthaler and Ernst, 2006). It can be caused by a lack of experience of the employees with external knowledge, prior negative experiences with external information, dysfunctional intra-organizational communication (Mehrwald, 1999) or a bureaucratic organization that inhibits effective communication (Allen, 1977). The NIH syndrome can also find its origin in a social environment which does not support a positive attitude towards external knowledge or an environment that is, in general, resistant to change (Mehrwald, 1999). Moreover, inappropriate incentive systems can stimulate employees' intolerance against external knowledge (de Pay, 1989; 1995a; b; Mehrwald, 1999). Further, individuals' commitment can limit the information flow across boundaries since a high commitment might cause reluctance towards external knowledge (Allen, 1977). In consequence, external knowledge can be wrongly evaluated (Mehrwald, 1999; Menon and Pfeffer, 2003), adaption can fail, projects can be delayed or canceled (Clagett, 1967; Katz and Allen, 1982; de Pay, 1989; 1995a;b) and, in the long run, the innovative performance of the firm can suffer (Lichtenthaler and Ernst, 2006).

We add to the previous literature by proposing the source of external knowledge and company success as further antecedents of the NIH syndrome. In the next section we derive our hypothesis from social identity theory and the concept of organizational identity.

3. Theoretical Framework

3.1. The NIH Syndrome on the Level of the Organization

Knowledge creation is a complex process involving different tasks and individuals with different backgrounds, interests and information. In order to facilitate the knowledge creation process organizations develop routines. Individual employees and working teams develop subroutines within the corporate context in order to support information processing and problem solving (Dosi, 1982; Nelson and Winter, 1982; Szulanski, 1996; Garud and Karnoe,

2001; Van Looy et al., 2001). Such routines evolve over time and are mainly tacit so that they are difficult to be imitated or changed (Teece et al., 2001). They create strong path-dependencies regarding the firm's innovation process. Garud and Karnoe (2001) define path-dependence as "*a sequence of events constituting a self-reinforcing process that unfolds into one of several potential states. The specific state that eventually emerges depends on the particular sequence of events that unfold*". Path-dependencies support cumulativeness in innovation and facilitate routinized tasks but are not supportive for the adaption of new and, in particular, externally developed innovations (Cohen and Levinthal, 1990, Leonard-Barton, 1992).

Path-dependencies are fostered by community formation, and vice versa. Within communities, common beliefs, artifacts and habits are developed alongside daily activities that create powerful path-dependencies (Van Looy et al., 2001). Such path dependencies affect the formation of expectations and the self-concept of individuals and teams (Garud and Rappa, 1994). Individuals identify themselves with their in-group and relate their self-concept and self-esteem to group membership as predicted by social identity theory (Tajfel, 1974; 1978; 1982; Tajfel and Turner, 1979; 1986; Turner et al., 1987) and the concept of organizational identity (Ahford and Mael, 1998; Dutton et al. 1994). Individuals strive for a positive social identity and engage in self-enhancement within their organization (Tajfel and Turner, 1986; Ahford and Mael, 1998) which can lead to in-group favoritism (Brewer, 1979; Ashforth and Mael, 1989; Abrams and Hogg, 1990; Tajfel and Turner, 1986). If individuals feel their organizational identity threatened they show a hostile behavior protecting their organization's self-concept.

External knowledge is a factor that can threaten the self-concept of organizational entities. The confrontation with external knowledge enforces social comparison between the in-group and the knowledge producing out-group and leads to a re-evaluation of the own organizational identity (Bartel, 2001). The acceptance and valuation of external knowledge can be perceived by insiders as a degradation of the own achievements, expertise and

competence of the in-group. In consequence, individuals tend to reject external ideas to defend their group identity (Tajfel and Turner, 1979; Brown, 2000). This attitude renders the acceptance, integration and application of external knowledge difficult or impossible: the NIH syndrome occurs. Hence, our first hypothesis reads:

Hypothesis 1: If firms source external knowledge the likelihood of internal resistance against new innovation projects increases: the NIH syndrome occurs.

3.2. Sources of External Knowledge and the NIH Syndrome

As argued in the previous section, internal resistance against external knowledge, the NIH syndrome, is consistent with the concept of in-group favoritism. Two important results of the social and organizational identity theory suggest that the out-group that generated the externally acquired knowledge should deserve attention when analyzing the occurrence of the NIH syndrome.

First, organizations tend to compare themselves with similar or proximal organizations (Ashforth and Mael, 1989; Bartel, 2001). Tensions and the feeling that the in-group's identity is threatened by outsiders intensify with increasing similarity between in-group and out-group (Tajfel, 1974; Tajfel, 1982; Abrams and Hogg, 1990; Branscombe et al., 1999) because similarity between groups increases their comparability (Caddick, 1982) and the boundaries between groups threaten to obliterate (Sanchez-Mazas et al., 1994). Individuals react with increased efforts to reassure distinctiveness and to reinstall the boundaries between groups which, in turn, strengthens the in-group bias (Jetten et al., 2003).

Second, individuals and organizations are capable of making social comparisons on multiple dimensions. In this sense, organizations can appreciate each other's expertise when they are superior on complementary or distinct dimensions (Ashforth and Mael, 1989). In-group favoritism is strongest on dimensions regarded as important for the in-group while out-group favoritism is likely to occur on dimensions that are less important for the in-group (Mummendey and Schreiber, 1984). In other words, groups are able to acknowledge each

other's differential expertise without compromising a positive differentiation. Applying these results to external knowledge acquisitions suggests that the source of external knowledge matters.

3.2.1. Heterogeneity of Knowledge Sources

Previous innovation literature has acknowledged the heterogeneity of different sources of external knowledge and its contribution to firm performance and innovation (e.g. Belderbos et al., 2004a; b). Prior studies distinguish between knowledge acquired from vertical partners (customer and suppliers), competitors and universities.

Knowledge from (lead) customers can help defining innovations and reduceing risk associated with their market introduction (Von Hippel, 1988; Brown and Eisenhardt, 1995). Innovations triggered by user needs can become a dominant design (Utterback, 1994). In addition, information from customers can make it easier to find the balance between performance and price. Customer knowledge can be, in particular, important for the development of novel and complex new products (Tether, 2002).

Supplier knowledge has been shown to be important for cost reductions within the firms' production process and product quality enhancements (Choi et al., 1996; Ireland et al., 2002; Saeed et al., 2005; Belderbos et al., 2004b). Information from suppliers can spur a fast delivery and decreased production lead time (Choi et al., 1996). From the suppliers point of view, speed and flexibility are valuable assets for hedging against uncertain demand by positioning the inventory in the chain and the available production capacity (Fisher, 1997). Suppliers, however, are often reluctant to make commitments since commitments lead to dependencies (Teece, 1998). This indicates the importance of a long term relationship between firms and their suppliers (Choi, 1996) for reducing uncertainty for both sides. Belderbos et al. (2004b) indicate that both customer and suppliers knowledge leads to labor productivity growth for the knowledge absorbing firm.

Universities and public research institutions are an important source for science-based knowledge. Scientific knowledge can increase firms' understanding of recent scientific and

engineering advances, facilitate the recruitment of R&D personnel, grant access to scientific networks and reduce costs for in-house R&D (Klevorick et al., 1995; De Backere and Veugelers, 2005). Knowledge from universities is often sourced when firms aim at opening up entirely new technology markets so that science can provide a roadmap for industrial research (Tether, 2002; Fleming and Sorensen, 2004). In addition, the generic nature of knowledge from universities and public research institutions leads to few appropriation issues as compared to rather applied knowledge produced for subsequent commercialization (Cassiman and Veugelers, 2002).

Among the knowledge sources discussed here competitors are the most sensitive source of knowledge. Competitors operate similar products and technologies in the same market under the same economic conditions and face similar problems, as for instance industry regulations, so that rivals' knowledge is most similar to the knowledge of the firm itself and may therefore be most valuable for improving own products, processes and strategies. Having too close ties to product or technology market rivals, however, bear the risk of disclosing own technological advances, on the one hand, and own strengths and weaknesses, on the other hand. The leakage of such information could strengthen the rival. Accordingly, firms are reluctant to share knowledge with rivals since appropriation is crucial (Czarnitzki et al., 2011).

3.2.2. Heterogeneous Knowledge Sources Through a Social Identity Theory Lens

Social identity theory indicates that social comparison is most crucial when it takes place between organizations which are most similar (Tajfel and Turner, 1986). With regard to external knowledge sources, competitors can be seen as the most similar type of organization. Competitors can be considered, on the one hand, as the most interesting source of knowledge for the focal company since rival firms have the most relevant knowledge about markets, products and technologies. On the other hand, the valuation of competitors' knowledge, technologies and products goes hand in hand with a comparison along the same dimensions of expertise and, hence, enforces the acknowledgment of own strengths and weaknesses. Social

comparison with competitors can trigger a strong need to differentiate the own group from the out-group. Individuals can react with increased efforts to reassure distinctiveness and to reinstall the boundaries between groups in order to protect their self-concept and the identity and integrity of their company. In order to safeguard organizational identity individuals can show resistance against competitor knowledge or degrade external knowledge from rivals.

With regards to other types of knowledge sources, organizations can make social comparisons along different dimensions and value complementary or different knowledge (Tajfel and Turner, 1986). Customers, suppliers and universities do not serve the same market and do not provide similar goods or services. The competitive dynamics between the focal organization and these types of knowledge sources are not strong enough to induce comparisons invoking actions of individuals to differentiate themselves, to safeguard their self-concept and the identity of the firm. Comparisons can be made along different dimensions so that the competencies of suppliers, customers and universities can be acknowledged without threatening the organizational identity of the firm. Boundary-spanning activities in order to allow and facilitate knowledge inflows from vertical partners and universities are, hence, expected to not conflict with self-concept of individuals and companies. Along these lines, we hypothesize:

Hypothesis 2: Internal resistance against new innovation projects is more likely to occur if the firm sources knowledge from competitors rather than from vertical partners (customers and suppliers) and universities.

3.3. Firm Success and the NIH Syndrome

In-group favoritism and defensive actions to preserve group identity can be triggered by out-group similarity as discussed in the previous section. In-group favoritism can also be determined by the extent to which individuals identify with the in-group. If the in-group consists of individuals that show a strong identification with the group there is a superior tendency towards in-group favoritism and a higher willingness to take defensive actions

against out-groups than otherwise (Branscombe et al., 1993; Doosje et al., 1995; Spears et al., 1997). Group members that identify strongly with their in-group are also strongly motivated to differentiate themselves from the out-group. In case, identification with the group is low group members may be insufficiently aware of or insufficiently interested in group identity so that they do not take actions to maintain group identity when it is threatened by an out-group (Jetten et al., 2003).

The extent to which individuals identify themselves with their company increases with relative group success since success increases the group's distinctiveness and attractiveness (Dutton et al., 1994; Blanchard et al., 1975). The more successful a group is the more self-esteem and satisfaction its members can derive from social comparison to other (less successful) organizations, the more individuals are tied to their organization. The willingness to take defensive actions against out-groups is higher for groups of high identifiers (Branscombe et al., 1993; Doosje et al., 1995; Spears et al., 1997) because the valuation of out-groups can evoke the feeling of inferiority vis-à-vis out-groups so that the self-esteem of a group and the individual members is threatened (Nadler, 1991; Nadler and Fisher, 1986). Hence, we suggest that internal resistance against external knowledge is strongest within successful firms.

Hypothesis 3a: Internal resistance against new innovation projects is more likely if a company acquires external knowledge and if the company is among the top performers.

A strong identification with the group as an internal factor provoking internal resistance should not render external factors such as out-group similarity (hypothesis 2) ineffective. On the contrary, it is much more likely that successful firms show a stronger tendency to reject external knowledge generated by similar out-groups, i.e. competitors, because knowledge from such sources constitutes the biggest threat to the group identity. Hence, we hypothesize:

Hypothesis 3b: Internal resistance against new innovation projects is more likely if a company acquires external knowledge from competitors (rather than from customers, suppliers and universities) and if the company is among the top performers.

4. Data, Definition of Variables and Descriptive Statistics

4.1. Data

The empirical analysis is based on the Mannheim Innovation Panel (MIP), a survey which is conducted annually by the Centre for European Economic Research (ZEW) on behalf of the German Federal Ministry of Education and Research (BMBF) since 1992. The MIP is the German part of the Community Innovation Survey (CIS) of the European Commission. Each CIS survey conducted in Germany includes questions on a specific topic. The special section of the 2003 questionnaire focuses on internal resistance as a hampering factor for innovation activities. A distinction of the hampering factors with regard to different knowledge sources a firm uses is available. The survey distinguishes between competitors, suppliers, customers and universities and other public research organizations. The survey from the year 2003 constitutes a cross-sectional database for our empirical analysis. We focus on manufacturing firms only and exclude firms operating in service industries. This leaves us with a sample of 905 firms. The next subsection presents definitions and descriptive statistics for the variables used in the empirical analysis.

4.2. Definition of Variables and Descriptive Statistics

The dependent variable measures internal resistance regarding innovation activities. The variable is based on the question whether innovation projects were delayed, canceled or not started at all in the period 2000-2002 due to internal resistance within the firm. In total, 47 firms admitted that innovation projects were delayed, 20 stated that innovation projects were canceled and 39 reported that innovation projects were not started due to internal resistance. Due to the small number of firms reporting either form of internal resistance we define a binary indicator that equals one if one of the innovation obstacles occurred and zero otherwise. In total, 90 firms reported that internal resistance had a negative impact on their

innovation activities.[1] The descriptive statistics are presented for the full sample and the subsamples of top performing and less well performing firms in Table 1.

The distinction between top performing and other firms is important to test our hypotheses 3a and 3b. Top performing firms are distinguished from others according to their return on sales. We split the sample so that one third of the firms are classified as top performers within the sample (at 7% returns on sales) and the remaining firms as medium or less well performing firms. It appears that there is no significant difference between top performing firms and others regarding the likelihood that they will experience resistance as the t-test for mean differences of both groups in Table 1 shows.

The regressors of main interest capture information about external knowledge inflows. We define a binary variable that equals one if external knowledge was acquired for a process and/or product innovation in the period 2000-2002. The majority of 617 sample firms reported external knowledge inflows. This binary variable allows testing whether the likelihood of internal resistance against innovation activities increases in the presence of external knowledge inflows (hypothesis 1). The descriptive statistics show no significant difference regarding knowledge inflows between top performers and other firms in the sample.

The survey allows us to distinguish between external knowledge from competitors, suppliers or customers (vertical relationships) and scientific institutions knowledge that led to a process and/or product innovation. Most of the firms (569) acquire knowledge from vertical relationships. A much smaller share of firms acquire knowledge from scientific institutions (121) and competitors (218). We expect that the NIH syndrome is most likely to occur if knowledge is acquired from competitors (hypothesis 2). Table 1 shows that differences between top performers and other companies occur with respect to the knowledge sources. As compared to the top performers, less well performing companies are more likely to source

[1] Note that firms can report several consequences of internal resistance (delays, cancelations, not started projects) at the same time.

knowledge from competitors and they are less likely to experience knowledge inflows from universities.

In addition to our main variables, we use a number of control variables. First, we use the number of employees as a measure for firm size. We expect that the conflict potential and, hence, the likelihood of internal resistance increases with the number of employees as large firms require a more sophisticated organizational structure. There might exist more communities within the firm, communication channels are presumably longer and there is a high chance that decision processes are more centralized (Allen, 1977). The average firm in our sample has about 428 employees. For the empirical analysis, the logarithm of firms' labor force is used to take account of the skewness of the firm size distribution.

Moreover, we control for firms' innovation activities. The survey would allow us to use firms' R&D expenditure as a measure for their innovativeness. R&D expenditure could be influenced by our resistance variable, however. For instance, if an innovation project is canceled due to internal resistance the R&D expenditure of that firm would be lower by definition. We, therefore, prefer using the firms' patent stock as a measure for the firms' innovation activities instead. The patent stock has the further advantage that it also accounts for firms' innovation success in the past. We calculate the patent stock as follows:

$$patent\ stock_{it} = (1 - \delta) patent\ stock_{it-1} + patent\ applications_{it}$$

We use a constant depreciation rate of knowledge (δ) of 15%, as is common practice in the literature (see Griliches and Mairesse, 1984). We expect that a firm with a large patent stock is more likely to experience internal resistance regarding new innovation projects as the conflict potential within firms is likely to increases with the number of R&D projects. Previous literature has shown that conflicts between different departments are more frequent in firms with a high R&D intensity (Robert, 2004; Laden, 1996; Mehrwald, 1999). The average firm in our sample has a patent stock of about 8.8. Since a firm's patent stock is typically highly correlated with firm size we orthogonalize this variable using the firm size variable. On average, a firm in our sample has a patent stock per employee of 0.02.

We also control for the human capital composition within a firm's labor force. We do so by defining a variable that captures the share of low skilled workers. The majority of employees are low skilled. Table 1 shows that this share is, however, significantly lower among top performing firms. We expect that the share of low skilled people affects the likelihood of resistance negatively. The higher the share of low skilled employees the less likely it is that the firms does a lot of innovative projects which in turn reduces the chance to face internal resistance against individual innovation projects.

Moreover, firm age is taken into account. The expected effect of age is ambiguous since, on the one hand, firms are developing routines over time which might help avoiding internal conflicts. On the other hand, firms are likely to grow, expand their market, product and technology portfolio over time which might increase the likelihood of internal resistance. Table 1 shows that the average firm in our sample is about 32 years old.

Furthermore, we control for firms being part of a firm group. We would expect that the conflict potential is larger in firm groups as decisions are often not made within the firm itself but are taken centrally (Clagett, 1967). Similarly, we would expect that there is a higher likelihood of internal resistance for firms which are head-quartered in a foreign country. The individual firm is in a greater distance to the head quarter in this case which complicates communication. Table 1 shows that more than 45% of the firms are part of a firm group. The share of firms being part of a group is significantly higher among the top performing firms. More than 12% of all firms have a foreign head-quarter. There is no significant difference between the two performance groups in this regard.

Lastly, we control for firms' industry affiliation by means of 9 industry dummies and for firm location in East Germany. East Germany was a planned economy until the fall of the Berlin wall in 1989 and was since then undergoing a transition process into a market economy. Recent studies have shown that East German firms lack behind West German firms in terms of productivity (Czarnitzki, 2005) and innovativeness (Czarnitzki and Kraft, 2006).

We want to allow for the possibility that this impacts the conflict potential within the firms. About one third of the sample firms (33%) are located in the eastern part of the country.

Table 1 about here

5. Empirical Results

We test our hypotheses using a series of probability models. The dependent variable is always the binary variable that indicates the presence of internal resistance against innovation projects. The main regressors are the three dummies for the source of external knowledge. We include firm size, the patent stock, the share of low skilled workers, being part of a firm group with a foreign head-quarter, firm age and eight industry dummies as control variables. The regression results are presented in Tables 2 and Table 3.

The first column of Table 2 presents the test for the presence of the NIH syndrome (hypothesis 1). The results show that the likelihood of internal resistance is not significantly affected by the dummy variable indicating external knowledge inflows. Although the estimated coefficient for external knowledge inflows is positive the effect is not statistically significant. Hence, we do not find evidence for the NIH syndrome for the average German manufacturing firm. Hypothesis 1 does not receive support.

The second specification in Table 2 distinguishes between different sources of external knowledge by including dummy variables indicating knowledge inflow from vertical partners (customers and suppliers), horizontal partners (competitors) and scientific organizations. If we allow for a heterogeneous response to the different types of knowledge acquisitions it appears that the NIH syndrome exists for knowledge inflows from competitors, confirming hypothesis 2. External knowledge inflows from competitors increase the likelihood of internal resistance increases by 35% at the means of all other variables.[2] There is no evidence that knowledge from vertical partners (customers and suppliers) or universities provokes internal resistance. This finding is in line with the prediction derived from social identity theory that

[2] The percentage change is the marginal effect for a discrete change of the dummy variable from zero to one.

resistance is strongest if the out-group is similar to the in-group. The valuation of knowledge from a similar out-group threatens in-group identity and individuals tend to show resistance against the external knowledge to preserve the organizational identity.

With regard to the control variables the results show that internal resistance is mainly determined by firm size. The larger the firm, the larger the innovation portfolio and, hence, the greater the conflict potential. There is a weak significant effect of firm location in Eastern Germany. In the formerly socialist part of the country internal resistance is less likely. All other variables, including the industry dummies, do not have a significant impact on the likelihood of internal resistance. LR-tests for the joint significance of the industry dummies cannot reject the null hypothesis that they are not jointly different from zero.[3] This shows that internal resistance is largely determined by unobservable factors.

Since we only observe a few firms that report internal resistance against innovative projects in our sample we repeat the regressions applying rare event logit models (King and Zeng, 2001; Tomz et al., 2003) to check the robustness of our results. These models take explicitly into account that the dependent variable takes the value one for a very low number of cases only. The last two columns of Table 2 show the results. It appears that the estimated effects are very similar to those found based on standard probit regressions.

Table 2 about here

Table 3 shows the regression results for the tests of hypotheses 3a and 3b. We distinguish between the top performing firms and firms with a medium or low performance. We repeat the regressions presented in Table 2 for both subsamples. The results show that there is, as before, no evidence for a higher likelihood of internal resistance if the firm experiences external knowledge inflows from any type of source, neither among the top performing firms (column 2) nor among the less well performing firms (column 1). This means that we do not find support for hypothesis 3a: the NIH syndrome is not more likely to occur among the top performing firms.

[3] The LR-test statistics are 4.26 for the first specification of Table 2 and 4.24 for the second specification respectively.

Columns 3 and 4 show the results for the existence of internal resistance in response to different sources of external knowledge distinguishing between top performing firms and others. It appears that the top performing firms are more likely to experience internal resistance if knowledge is acquired from competitors while there is not such an effect for the less well performing firms. Hence, we find evidence for our hypothesis 3b in that we show that the NIH syndrome occurs, in particular, within top performing firms if knowledge is sourced from competitors. The finding is in line with the argument that individuals within successful companies identify more strongly with their in-group so that the react defensively if their group identity is threatened by the expertise of similar groups.

Interestingly, there is weak evidence for the likelihood of internal resistance to decrease within the top performing firms if they are sourcing external knowledge from vertical partners. If top performers want to maintain their position it is crucial for them to have close contacts to suppliers and customers (Bower and Christiansen, 1995). The empirical results suggest that there exists a welcoming attitude against external knowledge from vertical partners among the top performing firms. Such firms are presumably more likely to engage in long-term relationships with their vertical partners. There is no such effect for the low or medium performing firms.

Regarding the control variables, we find for the subsample of medium or low performing companies that company size matters as we saw before for the full sample. For this subsample, the share of low skilled workers has a significant impact as well. The higher the share of low skilled workers the lower is the likelihood of internal resistance. Firm size and the share of low skilled workers have no effect within the subsample of the top performing firms. For top performers, however, we find that being part of a firm group impacts the likelihood of internal resistance significantly in a positive way. Also, this result is in line with social identity theory. The top performing firms see their expertise not only threatened but out-groups by also react defensive against groups within the same organization.

If the top performing firms are treated separately, industry effects matter. LR-tests reject that the eight industry dummies are jointly equal to zero at the 5% level of statistical significance (LR = 8.22** for model II; LR = 8.35** for model IV).[4]

As before we demonstrate robustness of our estimation results by employing a rare events model as an alternative estimator that accounts for the fact that our dependent variable takes the value one for a few observations only. The results are presented in Table 4 in the Appendix. Again, the results do not change if the alternative estimator is used.

Table 3 about here

6. Discussion and Managerial Implications

External knowledge can provoke resistance within companies. This phenomenon is referred to as the not-invented-here (NIH) syndrome. The NIH syndrome is well known among practitioners, but received relatively little attention in the academic literature so far (Katz and Allen, 1982; Clagett, 1967; de Pay 1989; 1995a; b; Boyens, 1998; Mehrwald, 1999; Menon and Pfeffer, 2003; Lichtenthaler and Ernst, 2006). Academic studies have identified several important antecedents for the occurrence of the NIH syndrome like group tenure (Katz and Allen, 1982), the lack of or negative group experience with external knowledge (Mehrwald, 1999), dysfunctional intra-organizational communication (Mehrwald, 1999) or inappropriate incentive systems (de Pay, 1989; 1995a,b; Mehrwald, 1999). These antecedents occur at the level of the team/project that is confronted with external knowledge inflows.

In this study we contribute to understanding of the NIH syndrome in that we argue and show that the occurrence of the NIH syndrome is facilitated by the similarity between the knowledge source and the focal company and by the success of the focal. Drawing from social identity theory and organizational identity theory (Tajfel and Turner, 1986; Ashforth and Mael, 1989), we argue that internal resistance against external knowledge is expected to be strongest if the out-group from which the knowledge is acquired is similar to the in-group.

[4] For the subsample of low and medium well performing firms the LR-tests on joint significance are not statistically different from zero. The LR-statistics are 7.03 for model I and 7.17 for model II.

If the out-group shares characteristics that are important for in-group identification individuals fear their group identity threatened and individuals might take defensive actions to reinstall the boundaries between the groups. We show that knowledge from competitors as the most similar out-group is most likely to provoke internal resistance as compared to knowledge acquired from suppliers, customers and universities. If the externally acquired knowledge comes from a similar out-group employees are most likely to refuse to value this knowledge and take defensive actions in order to avoid degradation of own technological expertise and a loss of group-identity. There is no evidence for internal resistance against knowledge acquired from suppliers, customers or universities.

Moreover, we show that the NIH syndrome against external knowledge from competitors is more likely to occur within successful companies. The success of a firm generates satisfaction among its insiders. In-group favoritism increases as does the readiness of insiders to reject external knowledge from competitors in order to avoid comparisons along the same dimensions of expertise to protect the group's distinctiveness and the self-esteem of the group and the individual members (Nadler, 1991; Nadler and Fisher, 1986). Resistance occurs as a way of affirming a positive social identity (Turner et al., 1987). There is no evidence that the average medium or low performing firms experience the NIH syndrome at all.

An interesting result on the side is that the internal resistance among the top performing firms is lower if knowledge is acquired from suppliers or customers. A likely explanation for this finding is that it is crucial for top performing firms to have close contacts to suppliers and customers if they want to maintain a high performance in the future (Bower and Christiansen, 1995). In line with social identity theory, suppliers and customer do not threaten group identification since suppliers and customers do not share characteristics that define the identity of the in-group. For our sample of German manufacturing firms, this is reflected in a welcoming attitude against knowledge from suppliers and customers.

Our results have important implications for management. We have shown that it is not only team-related factors and misaligned communication and incentive schemes that

facilitates the occurrence of the NIH syndrome as previous literature prescribes, but that the source of external knowledge matters, in addition. Managers should, hence, take the source of external knowledge into account when deciding on their knowledge integration strategies. If the loci of knowledge creation share important characteristics that distinguish and identity the in-group special means should be taken to support the adaption and integration of external knowledge. For instance, should the person responsible for introducing external knowledge who has a key impact on the success of external knowledge acquisitions (Clagett, 1967; Allen, 1977) be informed about a higher conflict potential associated with the respective innovation projects. Solutions how to prevent the NIH syndrome should be worked out by the management, the person responsible for introducing the knowledge and eventually with the employees involved before the innovation project is started. Such solutions can include the set-up of proper communication channels and an appropriate incentive system for all employees involved.

Moreover, firms can work on a more subtle level when trying to avoid the NIH syndrome. We argued that in-group identification is an important trigger of the rejection of external knowledge. Employees react defensively if they see their group identity threatened by external knowledge from similar out-groups. Firms can take means to steer the factors that define the perceived distinctiveness of the in-group relative to out-groups by emphasizing dimensions of superior expertise of the focal firm that are not shared by the specific out-groups other firms.

Our study is not free of limitations. One limitation stems from the fact that we use the company as the level of analysis. This has the two important advantages: First, it allows us to focus on a large set of firms in German manufacturing rather than on a few selected cases as has often been done by previous studies on the NIH syndrome. Second, it allows us to observe firms with different performance levels and different external knowledge sources. Hence, we consider a firm level approach as appropriate for establishing a link between firm performance, different knowledge sources and the occurrence of the NIH syndrome.

Nevertheless, the firm level approach comes at the cost of having to abstract from detailed team or the project level information. For instance, we cannot observe communication associated with a particular knowledge inflow or the appropriateness of the incentive systems within our firms. Since previous studies, reviewed by Ernst and Lichtenthaler (2006), established the importance of such team level factors our study has to be seen as complementary to those prior analyses.

A related disadvantage is that we do not have information on the innovation project level. This means that we cannot observe which projects rely on external information and against which project internal resistance occurs. For future work, it would be interesting to investigate whether our findings for different knowledge sources and the NIH syndrome hold at the project level.

References

Abrams, D. and M.A. Hogg (1990). *Social Identity Theory: Constructive and Critical Advances.* London: Harvester Wheatsheaf.

Allen, T.J. (1977). *Managing the Flow of Technology*. Cambridge: MIT Press.

Argote, L., B. McEvily and R. Reagans (2003). Introduction to the Special Issue on Managing Knowledge in Organizations: Creating, Retaining and Transferring Knowledge. *Management Science* 49(4), v-viii.

Ashforth, B.E. and F. Mael (1989). Social Identity Theory and the Organization. *Academy of Management Review* 14(1), 20-39.

Bartel, C.A. (2001). Social Comparisons in Boundary-spanning Work: Effects of Community Outreach on Members' Organizational Identity and Identification. *Administrative Science Quarterly* 46, 379-413.

Belderbos, R., M. Carree, B. Diederen, B. Lokshin and R. Veugelers (2004a). Heterogeneity in R&D Cooperation Strategies. *International Journal of Industrial Organization,* 22, 8-9.

Belderbos, R., M. Carree and B. Lokshin (2004b). Cooperative R&D and Firm Performance. *Research Policy* 33(10), 1477-1492.

Blanchard, F.A., L. Adelman and S.W. Cook (1975). Effect of Group Success and Failure upon Interpersonal Attraction in Cooperating Interracial Groups. *Journal of Personality and Social Psychology* 31, 1020-1030.

Bower, J.L. and C.M. Christensen (1995). Disruptive Technologies: Catching the Wave. *Harvard Business Review* 73, 43-53.

Boyens, K. (1998). *Externe Verwertung von Technologischem Wissen*. Deutscher Universitaetsverlag, Wiesbaden.

Branscombe, N.R., D.L. Wann, J.G. Noel and J. Coleman (1993). In-group and Out-group Extremity: Importance of the Threatened Social Identity. *Personality and Social Psychological Bulletin* 19(4), 381-

Brewer, M.B. (1979). In-Group Bias in the Minimal Intergroup Situation: A Cognitive-Motivational Analysis. *Psychological Bulletin* 86(2), 307-324.

Brown, R. (2000). Social Identity Theory: Past Achievements, Current Problems and Future Challenges. *European Journal of Social Psychology* 30, 745-778.

Brown, S.L. and K.M. Eisenhardt (1995). Product Development: Past Research, Present Findings, and Future Directions. *Academy of Management Review* 20(2), 343-378.

Caddick, D. (1982). Perceived illegitimacy and intergroup relations. In Tajfel (ed.): *Social Identity and Intergroup Relations*, 137-154. Cambridge, UK: Cambridge University Press.

Cassiman, B. and R. Veugelers (2002). R&D Cooperation and Spillovers: Some Empirical Evidence from Belgium. *American Economic Review* 92(4), 1169-1184.

Cassiman, B. and R. Veugelers (2006). In Search of Complementarity in Innovation Strategy: Internal R&D and External Knowledge Acquisition. *Management Science* 52(1), 68-82.

Chesbrough, H. (2003). Open Innovation: The New Imperative for Creating and Profiting from Technology. Boston: Harvard Business School Press, 2003.

Clagett, R.P. (1967). *Receptivity to Innovation – Overcoming N.I.H*. Master thesis, MIT.

Choi, T.Y. and J.L. Hartley (1996). An Exploration of Supplier Selection Practices across the Supply Chain. *Journal of Operations Management* 14, 333-343.

Cohen, W.M. and D.A. Levinthal (1989). Innovation and Learning: The Two Faces of R&D. *The Economic Journal* 99, 569-596.

Cohen, W.M. and D.A. Levinthal (1990). Absorptive Capacity: A New Perspective on Learning and Innovation. *Administrative Science Quarterly* 35(1), 128-152.

Czarnitzki, D. (2005). Extent and Evolution of the Productivity Deficiency in Eastern Germany. *Journal of Productivity Analysis 24*(2), 209–229.

Czarnitzki, D., K. Hussinger and C. Schneider (2011), R&D Collaboration with Uncertain Intellectual Property Rights, ZEW Discussion Paper No. 11-010, Mannheim.

Czarnitzki, D. and K. Kraft (2006). R&D and Firm Performance in a Transition Economy. Kyklos 59(4), 481-496.

De Pay, D. (1989). Kulturspezifische Determinanten der Organization von Innovationsprozessen. *Zeitschrift für Betriebswirtschaft, Ergänzungsheft* 1, 131-167.

De Pay, D. (1995a). *Informationsmanagement von Innovationen*. Gabler, Wiesbaden.

De Pay, D. (1995b). Organisationsmassnahmen zur Verkürzung der Innovationszeit Europäischer Unternehmen. *Zeitschrift für Betriebswirtschaft. Ergänzungsheft* 1, 77-102.

Doosje, B., N. Ellemers, and R. Spears (1995). Perceived Intragroup Variability as a Function of Group Status and Identification. *Journal of Experimental Social Psychology* 31, 410-436.

Dosi, G. (1982). Technological Paradigms and Technological Trajectories: A Suggested Interpretation of the Determinants and Directions of Technical Change. *Research Policy* 11(3), 147–162.

Dutton, J.E., J.M. Dukerich and C.V. Harquail (1994). Organizational Images and Member Identification. *Administrative Science Quarterly* 39(2), 239-263.

Fleming, L. and O. Sorensen (2004). Science as a Map in Technology Search. *Strategic Management Journal* 25(89), 909-928.

Fisher, M.L. (1997). What is the Right Supply Chain for Your Product? *Harvard Business Review* 75, 105-116.

Gabarott, F., J.M. Falomir-Pichastor and G. Mugny (2009). Being Similar versus Being Equal: Intergroup Similarity Moderates the Influence of In-Group Norms on Discrimination and Prejudice. *British Psychology Journal* 48, 253-273.

Garud, R. and P. Karnoe (2001). Path Creation as a Process of Mindful Deviation, in: Garu, R. and P. Karnoe (eds.), *Path Dependence and creation*, New Jersey: Lawrence Erlbaum Associates, Inc.

Garud, R. and M.A. Rappa (1994). A Socio-cognitive Model of Technology Evolution: The Case of Cochlear Implants. *Organization Science* 5(3), 344-345.

Griliches, Z., and J. Mairesse (1984). Productivity and R&D at the Firm Level. In Z. Griliches (ed.): *R&D, Patents and Productivity*: 339-74. Chicago, University of Chicago Press.

Hall, R. and P. Andriani (2003). Managing Knowledge Associated with Innovation. *Journal of Business Research* 56, 145-152.

Hagedoorn, J. (2002). Inter-firm R&D Partnerships: An Overview of Major Trends and Patterns since 1960. *Research Policy* 31, 477-492.

Hagedoorn, J. and G. Duysters (2002). Learning in Dynamic Inter-Firm Networks – the Efficacy of Multiple Contacts. *Organization Studies* 23, 525-548.

Ireland, R.D., M.A. Hitt and D. Vaidyanath (2002). Alliance Management as a Source of Competitive Advantage. *Journal of Management* 28(3), 413-446.

Jetten, J. and R. Spears (2003). The Divisive Potential of Differences and Similarities: The Role of Intergroup Distinctiveness in Intergroup Differentiation. *European Review of Social Psychology* 14, 203-241.

Kanter, R.M. (1983). *The Change Masters: Innovation for Productivity in the American Corporation*. New York: Simon & Schuster.

Katz, R. and T.J. Allen (1982). Investigating the Not-Invented-Here (NIH) Syndrome: A Look at the Performance, Tenure and Communication Patterns of 50 R&D Project Groups. *R&D Management* 12, 7-19.

King, G. and L. Zeng (2001). Logistic Regression in Rare Events Data. *Political Analysis* 9(2), 137-163.

Klevorick, A.K., R.C. Levin, R.R. Nelson and S.G. Winter (1995). On the Sources and Significance of Inter-industry Differences in Technological Opportunities. *Research Policy* 24(2), 185-205.

Kogut, B. and U. Zander (1992). Knowledge of the Firm, Combinative Capabilities, and the Replication of Technology. *Organization Science* 3(3), 383-397.

Laden, K. (1996). Not Invented There, or, "the Other Person's Dessert Always Looks Better!". *Research Technology Management* 39(6), 10-12.

Lane, P. J. and M. Lubatkin (1998). Relative Absorptive Capacity and Inter-organizational Learning. *Strategic Management Journal* 19(5), 461-477.

Leonard-Barton, D. (1992). Core Capabilities and Core Rigidities: A Paradox in Managing New Product Development. *Strategic Management Journal* 13, 111-125.

Lichtenthaler, U. and H. Ernst (2006). Attitudes to Externally Organizing Knowledge Management Tasks: A Review, Reconsideration and Extension of the NIH Syndrome. *R&D Management* 36(4), 367-386.

Laursen, K. and A. Salter (2006). Open for Innovation: The Role of Openness in Explaining Innovation Performance among U.K. Manufacturing Firms. *Strategic Management Journal* 27(2), 131-150.

Mehrwald, H. (1999). *Das 'Not Invented Here'-syndrom in Forschung und Entwicklun*g. Deutscher Universitaetsverlag, Wiesbaden.

Menon, T. and J. Pfeffer (2003). Valuing Internal vs. External Knowledge: Explaining the Preference for Outsiders. *Management Science* 49(4), 497-513.

Mummendey, A. and H.J. Schreiber (1984). "Different" just Means "Better": Some Obvious and Some Hidden Pathways to In-group Favouritism. *British Journal of Social Psychology* 23, 363-368.

Nadler, A. (1991). Help-Seeking Behavior, Psychological Costs and Instrumental Benefits. In: M.S. Clark (Ed.): *Review of Personality and Social Psychology* Vol. 12. Sage, New York.

Nadler, A. and D. Fisher (1986). The Role of Threat to Self-esteem and Perceived Control in Recipient Reaction to Help: Theory Development and Empirical Validation. In L. Berkowitz (Ed.), *Advances in Experimental Social Psychology* 19, New York Academic Press, New York, 81–121.

Nelson, R.R. and S.G. Winter (1982). *An Evolutionary Theory of Economic Change*. Belknap Press, Cambridge, MA.

Robert, R. (2004). Not Invented Here. *Marketing*, 34-36.

Rosenkopf, L. and A. Nerkar (2001). Beyond local search: boundary-spanning, exploration, and impact in the optical disk industry. *Strategic Management Journal* 22(4), 287-306.

Saeed, K.A., M.K. Malhotra and V. Grover (2005). Examining the Impact of Interorganizational Systems on Process Efficiency and Sourcing Leverage in Buyer-Suppliers Dyads. *Decision Sciences* 36(2), 365-396.

Sanchez-Mazas, M., P. Roux and G. Mugny (1994). When the Outgroup becomes In-Group and when the In-Group becomes Outgroup: Xenophobia and Social Categorization in a Resource Allocation Task. *European Journal of Social Psychology* 24, 417-423.

Spears, R., Doosje, B. and Ellemers, N. (1997). Self-stereotyping in the Face of Threats to Group Status and Distinctiveness: The Role of Group Identification. *Personality and Social Psychology Bulletin* 23, 583-553.

Szulanski, G. (1996). Exploring Internal Stickiness: Impediments to the Transfer of Best Practices within the Firm. *Strategic Management Journal* 17(1), 27-43.

Szulanski, G. (1999). Appropriability and the Challenge of Scope: Banc One Routinizes Replication. In G. Dosi, R.R. Nelson and S.G. Winter (eds.): *Nature and Dynamics of Organizational Capabilities*. Oxford University Press, New York, 69–98.

Tajfel, H. (1974). Social Identity and Intergroup Behaviour. *Social Science Information* 13(2), 65-93.

Tajfel, H. (Ed.). (1978). *Differentiation between Social Groups: Studies in the Social Psychology of Intergroup Relations*. Academic Press, London.

Tajfel, H. and J.C. Turner (1979). An Integrative Theory of Social Conflict. In W. Austin and S. Worchel (Eds), *The Social Psychology of Intergroup Relations*. 33-47. Brooks/Cole, California.

Tajfel, H. and J.C. Turner (1986). The social identity theory of inter-group behavior. In S. Worchel & L. W. Austin (Eds.), *Psychology of Intergroup Relations*. Nelson-Hall, Chicago

Tajfel, H. (1982). *Social Identity and Intergroup Relations.* Cambridge University Press, Cambridge.

Teece, D.J. (1986). Profiting from Technological Innovation: Implications for Integration, Collaboration, Licensing and Public Policy. *Research Polic,* 15(6), 285-305.

Teece, D.J. (1992). Competition, Cooperation, and Innovation: Organizational Arrangements for Regimes of Rapid Technological Progress. *Journal of Economic Behavior and Organizatio*, 18, 1-25.

Teece, D.J., G. Pisano and A. Shuen (2001). Dynamic Capabilities and Strategic Management. In Dosi, G., R.R. Nelson and S. Winter (eds.), *The Nature and Dynamics of Organizational Capabilities*, 334-363, Oxford University Press.

Tether, B.S. (2002). Who Co-operates for Innovation, and Why: An Empirical Analysis. *Research Policy* 31, 947-967.

Tomz, M., G. King and L. Zeng (2003). ReLogit: Rare Ecents Logistic Regression. *Journal of Statistical Software* 8(2), 1-27.

Tripsas, M. (1997). Unraveling the Process of Creative Destruction: Complementary Assets and Incumbent Survival in the Typesetter Industry. *Strategic Management Journal* 18, 119-142

Turner, J.C., M.A. Hogg, P.J. Oakes, S.D. Reicher and M.S. Wetherell (1987). Rediscovering the Social Group: A Self-Categorization Theory. Blackwell, Oxford.

Utterback, J.M. (1994). *Mastering the Dynamics of Innovation*. Boston: Harvard University Press.

Van Looy, B., K. Debackere and R. Bouwen (2001). Innovation as a Community-Spanning Process: Looking for Interaction Strategies to Handle Path Dependency, in: Garu, R. and P. Karnoe (eds.), *Path Dependence and creation*. Lawrence Erlbaum Associates Inc., New Jersey.

Veugelers, R. (1998). Collaboration in R&D: An Assessment of Theoretical and Empirical Findings. *De Economist* 146(3), 419-443.

Von Hippel, E. (1988). *The Sources of Innovation*. Oxford University Press, New York

Zollo, M and S.G. Winter (2002). Deliberate Learning and the Evolution of Dynamic Capabilities. *Organization Science* 13(3), 330-351.

Appendix

Table 4 about here

TABLES

Table 1: Descriptive statistics

	Full sample	Less well performing firms	Top performers		
#	905	675	230		
	Mean (st. dev.)	mean (st. dev.)	mean (st. dev.)	mean diff.[A]	
internal resistance	0.10	0.11	0.08	0.03	
	(0.30)	(0.31)	(0.27)		
external knowledge inflows	0.68	0.67	0.71	-0.04	
	(0.47)	(0.47)	(0.45)		
… from vertical partners	0.63	0.63	0.62	0.01	
	(0.48)	(0.48)	(0.49)		
… from competitors	0.24	0.22	0.31	-0.09	***
	(0.43)	(0.41)	(0.46)		
… from scientific	0.13	0.12	0.17	-0.05	**
institutions	(0.34)	(0.33)	(0.38)		
number of employees	427.94	454.05	351.33	102.72	
	(1366.96)	(1484.48)	(939.46)		
log(employees)	4.57	4.60	4.51	0.09	
	(1.65)	(1.66)	(1.63)		
share of low skilled	81.23	82.16	78.52	2.64	**
workers	(19.97)	(19.83)	(20.17)		
patent stock	8.83	5.61	18.28		
	(132.32)	(56.24)	(244.32)		
patent stock/employees	0.02	0.02	0.02	-0.00	
	(0.08)	(0.07)	(0.09)		
East Germany	0.33	0.33	0.33	0.00	**
	(0.47)	(0.47)	(0.47)		
part of a firm group	0.45	0.43	0.50	-0.07	***
	(0.50)	(0.50)	(0.50)		
… with a foreign head	0.12	0.10	0.19	-0.09	
quarter	(0.33)	(0.30)	(0.39)		
age	31.55	32.30	29.32	2.98	
	(35.73)	(36.73)	(32.59)		
log(age)	3.00	3.01	2.98	0.03	
	(0.98)	(1.01)	(0.92)		

[A] This column shows the differences in the means of top performing and less well performing firms for the variables of interest. Significance levels of t-test for a significant difference in the means are presented in the last column.
*,**,*** indicate 10%, 5% and 1% significance levels.

Table 2: Probit and rare events logit models for the likelihood of internal resistance

	I	II	III	IV
Estimation approach	probit	probit	rare events logit	rare events logit
	coeff. (s.e.)	coeff. (s.e.)	coeff. (s.e.)	coeff. (s.e.)
external knowledge inflows	0.21		0.41	
	(0.15)		(0.29)	
… from vertical partners		0.10		0.21
		(0.14)		(0.28)
… from competitors		0.27**		0.51**
		(0.13)		(0.25)
… from universities		0.02		0.09
		(0.15)		(0.28)
log(employees)	0.13***	0.12***	0.24***	0.22***
	(0.04)	(0.04)	(0.08)	(0.08)
share of low skilled workers	-0.01	-0.01	-0.01	-0.01
	(0.00)	(0.00)	(0.01)	(0.01)
patent stock/ employees	0.34	0.35	0.78	0.82
	(0.71)	(0.72)	(1.23)	(1.24)
East Germany	-0.26*	-0.28*	-0.49*	-0.53*
	(0.15)	(0.15)	(0.29)	(0.29)
part of a firm group	0.09	0.07	0.18	0.13
	(0.15)	(0.15)	(0.28)	(0.28)
… with a foreign head quarter	0.01	0.03	0.02	0.07
	(0.18)	(0.18)	(0.34)	(0.34)
log(age)	-0.02	-0.02	-0.03	-0.02
	(0.07)	(0.07)	(0.13)	(0.13)
constant	-1.44***	-1.41***	-2.58***	-2.56***
	(0.43)	(0.43)	(0.83)	(0.84)
N	905	905	905	905
Loglikelihood	-276.92	-274.74		

8 industry dummies are included in all specifications.
*,**,*** indicate 10%, 5% and 1% significance levels.

Table 3: Probit models for the likelihood of internal resistance: high performers versus median and low performers

	I	II	III	IV
sample	low and medium performers	high performers	low and medium performers	high performers
	return on sales <= 7%	return on sales > 7%	return on sales <= 7%	return on sales > 7%
	coeff. (s.e.)	coeff. (s.e.)	coeff. (s.e.)	coeff. (s.e.)
external knowledge inflows	0.22 (0.17)	0.27 (0.37)		
… from vertical partners			0.24 (0.17)	-0.67* (0.39)
… from competitors			0.19 (0.15)	0.79** (0.35)
… from universities			-0.06 (0.18)	0.52 (0.36)
log(employees)	0.16*** (0.05)	-0.03 (0.12)	0.15*** (0.05)	-0.09 (0.12)
share of low skilled workers	-0.01** (0.00)	0.00 (0.01)	-0.01** (0.00)	0.00 (0.01)
patent stock/ employees	0.49 (0.87)	0.29 (1.67)	0.44 (0.89)	0.44 (1.96)
East Germany	-0.26 (0.16)	-0.45 (0.40)	-0.28* (0.17)	-0.50 (0.42)
part of a firm group	-0.14 (0.17)	1.62*** (0.53)	-0.14 (0.17)	1.75*** (0.58)
… with a foreign head quarter	0.13 (0.23)	-0.35 (0.33)	0.15 (0.23)	-0.37 (0.37)
log(age)	-0.04 (0.07)	0.03 (0.18)	-0.04 (0.08)	0.06 (0.19)
constant	-1.22*** (0.47)	-3.63*** (1.17)	-1.22*** (0.47)	-3.58*** (1.17)
N	675	230	675	230
Loglikelihood	-215.33	-48.06	-213.90	-44.17

8 industry dummies are included in all specifications.
*,**,*** indicate 10%, 5% and 1% significance levels.

Table 4: Rare events logit models for the likelihood of internal resistance: high performers versus median and low performers

	I	II	III	IV
sample	low and medium performers	high performers	low and medium performers	high performers
	return on sales <= 7%	return on sales > 7%	return on sales <= 7%	return on sales > 7%
	coeff. (s.e.)	coeff. (s.e.)	coeff. (s.e.)	coeff. (s.e.)
external knowledge inflows	0.41	0.50		
	(0.32)	(0.72)		
… from vertical partners			0.45	-1.26*
			(0.32)	(0.73)
… from competitors			0.36	1.40**
			(0.29)	(0.66)
… from universities			-0.05	0.99
			(0.33)	(0.68)
log(employees)	0.29***	-0.04	0.27***	-0.16
	(0.09)	(0.22)	(0.09)	(0.22)
share of low skilled workers	-0.01*	0.01	-0.01*	0.01
	(0.01)	(0.02)	(0.01)	(0.02)
patent stock / employment	1.05	0.89	0.94	1.16
	(1.47)	(3.14)	(1.50)	(3.54)
East Germany	-0.50	-0.75	-0.54*	-0.83
	(0.33)	(0.74)	(0.33)	(0.77)
part of a firm group	-0.27	3.24***	-0.27	3.46***
	(0.32)	(1.15)	(0.32)	(1.20)
… with a foreign head quarter	0.28	-0.59	0.31	-0.64
	(0.42)	(0.61)	(0.42)	(0.67)
log(age)	-0.07	0.06	-0.06	0.15
	(0.14)	(0.33)	(0.14)	(0.35)
constant	-2.15**	-7.36***	-2.20**	-7.21***
	(0.90)	(2.41)	(0.91)	(2.39)
N	675	230	675	230

8 industry dummies are included in all specifications.
*,**,*** indicate 10%, 5% and 1% significance levels.