

The effect of alliance block membership on innovative performance

Citation for published version (APA):

Duysters, G. M., Hagedoorn, J., & Lemmens, C. E. A. V. (2002). *The effect of alliance block membership on innovative performance*. (ECIS working paper series; Vol. 200206). Technische Universiteit Eindhoven.

Document status and date:

Published: 01/01/2002

Document Version:

Publisher's PDF, also known as Version of Record (includes final page, issue and volume numbers)

Please check the document version of this publication:

- A submitted manuscript is the version of the article upon submission and before peer-review. There can be important differences between the submitted version and the official published version of record. People interested in the research are advised to contact the author for the final version of the publication, or visit the DOI to the publisher's website.
- The final author version and the galley proof are versions of the publication after peer review.
- The final published version features the final layout of the paper including the volume, issue and page numbers.

[Link to publication](#)

General rights

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal.

If the publication is distributed under the terms of Article 25fa of the Dutch Copyright Act, indicated by the "Taverne" license above, please follow below link for the End User Agreement:

www.tue.nl/taverne

Take down policy

If you believe that this document breaches copyright please contact us at:

openaccess@tue.nl

providing details and we will investigate your claim.



The Effect of Alliance Block Membership on Innovative Performance

G. Duysters, J. Hagedoorn, C. Lemmens

Eindhoven Centre for Innovation Studies, The Netherlands

Working Paper 02.06

Department of Technology Management

Technische Universiteit Eindhoven, The Netherlands

September 2002

PRELIMINARY paper

September 2002

The Effect of Alliance Block Membership on Innovative Performance

Geert Duysters

Eindhoven Centre for Innovation Studies (ECIS)

P.O. Box 513

5600 MB Eindhoven

The Netherlands

g.m.duysters@tm.tue.nl

John Hagedoorn

MERIT,

Faculty of Economics and Business Administration,

University of Maastricht

PO Box 616

6200 MD Maastricht

The Netherlands

j.hagedoorn@mw.unimaas.nl

Charmianne Lemmens

Eindhoven Centre for Innovation Studies (ECIS)

P.O. Box 513

5600 MB Eindhoven

The Netherlands

c.e.a.v.lemmens@tm.tue.nl

ABSTRACT

This paper longitudinally explores the technology positioning strategies, i.e. block membership or non-block membership, in interorganizational networks that maximize innovative performance. Hence, we will derive some basic propositions on the effect of block membership on innovative performance under various network evolutionary conditions, i.e. structure reinforcing or structure-loosening developments in the industry. Empirical testing is performed on the microelectronics industry from 1980-2000.

1. Introduction

Over the past years, several authors have addressed the question of the effectiveness of relational and structural embeddedness on company performance (see, e.g. Rowley, Behrens and Krackhardt, 2000). Many authors have argued that strong ties are particularly effective under conditions of relative stability, whereas weak ties are particularly geared towards dynamic industry environments (e.g. Rowley et al., 2000; Uzzi, 1997; Larson 1992). Others (e.g. Hagedoorn and Duysters, 2002) have found that under conditions of turbulence a satisficing strategy employing many, seemingly redundant, alliances might be more effective to increase firm performance than an optimisation strategy that is geared towards bridging structural holes.

Although we share the notion of some of these authors that "... the degree of uncertainty and required rate of innovation in the environment influence the appropriate network configurations..." (Rowley, Behrens and Krackhardt, 2000: 370), we argue that these findings are, above all, contingent on the stage of a network's evolution. With the latter we refer to the evolution of a network that is either structure-reinforcing or structure-loosening (Madhavan, Koka, Prescott, 1998), caused by incremental technological developments or disruptive technologies (e.g. Bower, Christensen, 1995), respectively.

The main aim of our paper is to improve our basic understanding of how firms should position themselves under various network conditions, in order to maximize their

innovative rents. More in particular, we examine two basic strategies that can be pursued in terms of either block membership or non-block membership. Using Coleman's (1988) closure arguments and Burt's (1992) structural holes argument we will first address the effect of closure advantages and disadvantages as well as broker advantages and disadvantages on strategic block formation in (international) alliance networks. Then, we will content that these advantages are contingent on the stage of an alliance network's evolution. In particular, we will study the interrelationship between network evolution and block dynamics. In the next part, we will derive some basic propositions on the effect of block membership on innovative performance under various network evolutionary conditions.

2. Theoretical background

Research on alliances has made significant progress in exploring the question of why and when alliances are formed (Kogut & Zander, 1993; Powell & Brantley, 1992). More recently, research has also made progress in advancing our understanding of "with whom" firms are likely to form alliances (e.g. Gulati, 1995; Gulati, Gargiulo, 1999). In dealing with the competitive implications of alliances, research has either focused on the performance/financial benefits of alliance formation (Berg, Duncan, & Friedman, 1982; Hagedoorn, 1993) or examined the implications of trust, opportunism, partner rivalry, and sustained cooperation as a means of achieving competitive benefits (Gulati, 1995; Hill, 1990). Adopting a transaction cost perspective or a social network perspective, researchers have attempted to examine the relationship between governance mechanisms and the evolution of trust and its implications for realizing benefits of cooperation (Gulati, 1995). In examining the relationship between competition and cooperation, research (with the exception of the strategic behaviour approach) has largely focused upon the internal characteristics of the alliance. It is argued that it is important to acknowledge the mixed-motive nature (competition plus cooperation) of alliances and its implications for dependence, trust, and mutual benefit (Singh & Mitchell, 1996). Although this approach has served to considerably advance our understanding of the internal process of alliance dynamics, it is lacking in improving our current understanding of the external competitive implications of alliance relationships. In other words, despite its insightful focus on the alliance, this line of research has been primarily introspective and has not yet

begun to incorporate in its research domain the external competitive environment in which the alliance competes.

The rapid proliferation of alliances has not only ushered in a new era of cooperation among companies big and small, but it also started a new era of competition between alliances. Cooperative agreements have become an integral part and a cornerstone of competitive strategies. “Competition through cooperation” has become the mainstay of a firm’s attempt to gain financial and survival advantages. The virtual explosion of cooperative agreements on a worldwide basis has led to a new form of competition: group versus group rather than company versus company (Gomes-Casseres, 1996). Research by Gomes-Casseres (1996) and by Doz and Hamel (1998) is among the first to have explored the increasing frequency of collaboration as a reflection of a fundamental shift from the traditional form of competition (firm vs. firm) to a new form (group vs. group). By laying the foundation for this unexplored yet critical field of enquiry, these researchers have provided a basis for investigating the underlying principles of and antecedents to alliance competition.

We will address this important issue from a social networks perspective. This perspective explains the actions of actors in terms of their position in networks of relationships (e.g. Nohria, 1992; Gulati, 1998). From a social network perspective organizations are embedded in a set of social relations that is often referred to as their social capital. Thus, social capital refers to the network of relations as well as the resources that may be accessed and mobilized through that network (Bourdieu, 1986; Burt, 1992; Nahapiet and Ghosal, 1998; Lin, 1999). Social capital comprises aspects like social context, such as social ties, trusting relations, and value systems that facilitate the actor’s behavior if located within that context (Tsai and Ghosal, 1998). These different aspects of social context are labeled the structural, the relational, and the cognitive dimensions of social capital (Nahapiet and Ghoshal, 1998; Tsai and Ghosal, 1998). We will argue that network embeddedness can be seen as an important determinant of the innovative success of companies.

Embeddedness refers to the fact that economic action and outcomes are affected by the partners’ relations and by the structure of the overall network of relations (Granovetter, 1992; Gulati, 1998). Granovetter (1985, 1992) distinguishes relational, structural and positional embeddedness. Relational embeddedness focuses on the role

of direct links as a mechanism for knowledge acquisition (Gulati, 1998). Structural embeddedness stresses the informational value of the structural position that actors occupy in the network (Gulati, 1998). Positional embeddedness captures the actor's roles in the social system and refers to the impact of the positions actors occupy in the structure of the alliance network on their decisions in alliance formation process (Gulati, Gargiulo, 1999). Embeddedness implies that the behavior and relations of partner firms in the network influence the focal firm's actions. Firms are actually caught in a web of relations that on the one hand puts restraints on their behavior and on the other hand can be used to their advantage. Hereby, interconnectedness (structural embeddedness) involves norm creation at the network level; whereas relational embeddedness creates trust at the dyadic level (Rowley, Behrens, Krackhardt, 2000).

2.1 Block membership

Block membership can be seen as one of the strongest forms of social embeddedness. The effect of block membership on the innovative performance of companies can therefore be seen in the light of the current debate on the advantages and disadvantages of social embeddedness. In this debate on social capital (e.g. Rowley, Behrens and Krackhardt, 2000; Gargiulo and Benassi, 2000) the basic arguments stem from Burt's (1992) structural hole argument versus Coleman's (1988) closure argument. Coleman (1988) argues that being part of a dense and redundant network is advantageous since it involves trust and cooperation among its members. Hence, firms engage in local search as a result of their social capital (Burt, 1992) and embeddedness (Granovetter, 1985; Gulati, 1998). Existing inter-firm cooperative ties provide the infrastructure for future alliance formation (Chung, Sing, and Lee, 2000). In other words, the current relations of a firm stem from its prior relational activities and form the basis upon which the actor establishes future social relations (Gulati, 1998; Walker, Kogut and Shan, 1997; Chung, Sing, and Lee, 2000). Through these ties, strategic blocks (Nohria, Garcia-Pont, 1991) or cohesive subgroups (Wasserman and Faust, 1994) of densely connected partners emerge in the strategic alliance network. These blocks or groups are characterized by highly cohesive subsets of similar actors (Knoke and Kuklinsky, 1992). In either case, actors who maintain especially cohesive bonds among themselves are more likely to act "similarly, to

share information, to develop similar preferences, or to act in concert” (Knoke and Kuklinsky, 1992: 56).

On the contrary, Burt (1992) suggests that firms embedded in sparsely connected networks will enjoy brokerage advantages based on access to non-redundant information (Rowley, Behrens, Krackhardt, 2000). Through ‘information access, timing, referrals and control’ (Burt, 1992: 62) strategic opportunities are raised as firms form bridges between densely connected and redundant parts of the network and other non-redundant parts through structural holes or disconnects in social structure (Burt, 1992; Walker, Kogut and Shan, 1997). Such strategies enable those actors to access knowledge or information that has a high yield. In this context, direct as well as indirect contacts are found to be important. In terms of direct contacts, firms engage in local search based on social capital for extending their network. Regarding the indirect contacts firms should look for partners that have direct links to actors with whom oneself does not have strategic links. This enables them to bridge structural holes in the network. Since current alliance networks provide future alliance opportunities (Gulati, 1995; 1998; 1999), early participation may provide firms with potentially valuable possibilities for the future (Sarkar, Echambadi, Harrison, 2001). Thus, alliance proactive firms in networks are more likely to possess the specific knowledge that is required for identifying and selecting appropriate alliance partners (Sarkar, Echambadi, Harrison, 2001).

In spite of these theoretical contributions, the literature is quite inconclusive about the performance effects of group membership. There is, especially, a strong lack of systematic longitudinal empirical studies that examine these effects. In order to fill this void we will test a number of propositions, derived from our understanding of some basic relationships between cohesive group membership and innovative performance.

Propositions

Members of cohesive subgroups develop strong, cohesive ties through frequent interaction. Strong ties (Granovetter, 1973), are generally characterized by a solid, reciprocal and trustworthy relationship. This creates a large basis of trust and intimacy between the partners (Granovetter, 1973; Brass, Butterfield, Skaggs, 1998). Since trust is an important basis for knowledge sharing and joint learning, firms are

expected to be more productive in joint innovative activities. As those firms invest a substantial amount of time and energy to establish these strong relationships (Burt, 1992), changing transaction partners in the short run is not likely, since it involves significant switching costs and implies a risk that existing relationships will dissolve. Thus, when trustworthy partners are readily available, searching for or switching to new partners is hard to rationalize in the alliance formation process (Chung, Sing and Lee, 2000). Actors rather replicate their existing ties than search for new ones (Gulati, 1995, 1998; Walker, Kogut & Shan, 1997). As firms engage in local search, the basis of partner attractiveness and the ties between firms within blocks will remain or even strengthen (Madhavan, Koka, Prescott, 1998). In the context of strong ties and familiarity, joint innovative activities and the sharing of knowledge are expected to generate higher innovative performance than when firms follow an individual innovation strategy outside cohesive subgroups. Hence,

Proposition 1: Members of cohesive subgroups are more innovative than non-member firms.

However, as a result of (over)embeddedness (e.g. Uzzi, 1997), firms can also be constrained in their partner choice when facing opportunities for linking up with actors of another strategic block (figure 1). Once firms have established links with firms in a specific strategic block, the formation of ties outside that block can be difficult, because of the possible conflict of interest among its partners (Nohria, Garcia-Pont, 1991). This implies that some actors in blocks are locked in as a result of initial alliance choices and actors outside the block are locked out in order to prevent knowledge leakage to competing groups. Another reason for locking out actors of other groups is the implicit expectation of loyalty to group members, since many alliances preclude the parties from allying with firms from competing groups (Gulati,

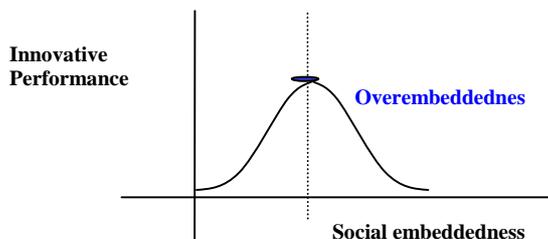


Figure 1. Overembeddedness

Nohria, Zaheer, 2000). As a result, certain partners are not available, because they are already tied to the focal firm's competitors. Actors have limits to the resources they can devote to the search

process for new partners. These resource constraints imply that ties with one actor

place constraints on ties with others (Gulati, Nohria, Zaheer, 2000). Therefore, some potential partners are simply excluded in the partner selection phase. This phenomenon of strategic gridlock (Gomes-Casseres, 1996) forces firms to engage in local search for partners within its own strategic block.

Thus, in most alliances, partners are chosen on the basis of prior positive experience, where they rely on their embedded relations and social capital. Hence, the decision with whom to partner is influenced by the network of past partnerships, (Gulati, Gargiulo, 1999) and depends on the embedded relations the firm is already engaged in (Granovetter, 1985; Gulati, 1998). As a result of this repeated alliance formation through local search and frequent interaction, the partners' relationship becomes strong and similar. Similarity facilitates information sharing since the strong relationship constitutes trust. Since there is frequent interaction and high commitment in the relationship, a strong basis of trust and intimacy between the partners (Brass et al., 1998; Granovetter, 1973a) is created. This is also referred to as the "familiarity breeds trust" phenomenon (Gulati, 1995). Similarity can be a stimulus for interaction, or can be the cause of attraction. Scholars often refer to "similarity breeds attraction" (Brass et al., 1998) that increases the firms' tendency to replicate their existing ties. In terms of learning we expect that, over time, overembeddedness (Uzzi, 1997) and similarity lead to decreasing opportunities for learning and innovation, (see figure 1). Thus,

Proposition 2: There is a curvilinear (inversed-U shaped) relationship between cohesive group membership and innovative performance.

2.2 Technology life cycles and strategic block formation

In contrast to the general conception of new life cycles born out of market needs (Sherwin and Isenson, 1967; Utterback, 1974) high technology industries are typical examples of markets created by radical technological innovations (Mueller and Tilton, 1969; Tushman and Anderson, 1986). At these early stages, there is often substantial uncertainty about the technological feasibility of an innovation and its potential market size.

Ultimately, those technologies which are most successful -in both technological terms and in meeting customer demands- will accumulate a critical mass and may set a technological regime and basic design. The emergence of a basic design leads to a substitution of radical technological development by more focused incremental cumulative improvements along a specific technological path or trajectory (Duysters, 1996). Incremental technological improvements are structure reinforcing since they enhance and extend the underlying sustaining technology, and thus reinforce the existing status quo (Tushman, Anderson, 1986; Madhavan, Koka, Prescott, 1998) and bases of competition. Such technologies are also accumulative and competence enhancing (Tushman, Anderson, 1986) and support the way the industry is functioning.

The establishment of a technological regime does not only lower technological uncertainty. Due to the adaptation of the basic design as the market standard uncertainty is also considerably reduced. From that point onward, cumulative improvements in technology are becoming more important than radical innovation. Since the industry is characterized by accumulative technological improvements, which are structure reinforcing, incremental innovation occurs through the interaction of many firms (Tushman, Anderson, 1986). This might lead to a situation in which cohesive subgroups thrive whereas firms that are particularly effective in bridging structural holes (Burt, 1992) are less effective. Under these conditions, when innovation depends on a series of interdependent innovations, independent companies will have a hard time coordinating and tying these innovations together (Chesbrough, Teece, 1996). Hence, we expect firms to integrate these innovations by engaging in strategic block formation. Through strategic block formation, the firms within the blocks can enhance and extend the underlying sustaining technology (Tushman and Anderson, 1986). In this way block members exploit their existing capabilities by linking up with firms in their own technology cluster to improve their innovative performance. Hence:

Proposition 3: In a situation of structure reinforcing cumulative technological change, cohesive subgroup members are more innovative than their non-group counterparts.

After a period of technological progress and considerable market growth, most industries undergo a phase of more moderate technological and market development. Saturation of demand is leveling sales growth towards zero, whereas technological progress seems to approach its natural limits. Faced with problems of advancing current technologies, firms need to invest an increasing amount of resources in R&D to make significant new progress. In order to speed up stagnating technological progress, firms should broaden their focus in search for alternative technologies. These search processes may eventually lead to new technological regimes or to the establishment of a new technological paradigm. Substitute technologies may offer better perspectives and may be able to trigger off new technological paths. These radical and disruptive technological innovations often drastically alter the price/performance ratio of high technology products and often act as forces of creative destruction, which threaten incumbent industry leaders and open up opportunities for new firms. Under these structure-loosening conditions it might be sensible for any organization to shift its attention towards the new technological paradigm. This “competence destroying discontinuity” (Tushman and Anderson, 1986; Madhavan, Koka, Prescott, 1998) alters the way the industry functions and can radically change the bases of competition in an industry. The shift in regime also reshuffles both the current bases of attractiveness and the existing ties of firms in blocks and may thus result in an out-block orientation in partner selection.

However, because technological change is radical and disruptive (Bower, Christensen, 1995), the impetus for cohesive group members to move into this technology is not very high. Then, the reputation effects within the group are not offset by the potential rewards that can be found in engaging into these new innovations. Furthermore, most cohesive subgroup members are characterized by strong inertial forces, which prevent them from engaging in more innovative relationships. Group think pressures might even lead to situations in which incumbents even tend to increase investments in the old technology rather than to switch to the new technological regime (Foster, 1986). The inability of these cohesive subgroup members to explore new technologies paves the way for non-cohesive subgroup firms to take advantage of the new technologies. Non-cohesive group members however may have created a radar function of alliances in order to scan the most promising technologies. They can expect high rewards for bringing a technological dominant product to the market. Thus,

Proposition 4. Under conditions of structure-loosening disruptive technological change, non-subgroup members have a higher innovation rate than their cohesive subgroup counterparts.

3. Concluding remarks

So far we have seen that a firm's innovative performance is contingent on *both* its position in various network settings, i.e. block-membership or non-block membership and is shaped by the nature of technological change and innovation, that is cumulative and incremental vs. disruptive and radical.

As we have described in our first proposition we expect that block-members are more innovative than non-members. However, as firms become overembedded, we expect in proposition 2 that block-members become less innovative. In a situation of cumulative change, as stated in proposition 3, cohesive group-members are more innovative than non-block members. In this case the state of overembeddedness (Uzzi, 1997) will be reached at a later point in time, because innovativeness is just supported by the virtues of closure and block membership. Then, through the strong ties, that represent trustworthy and reciprocal relationships, firms involved take advantage of the network externalities in their block. This makes them more productive in their joint innovative efforts, since these solid relationships are a means to transfer tacit knowledge in an exploitative learning environment. This state of overembeddness will be reached earlier in case of structure-loosening events, because they demand investments in new technologies instead of investing in the former technological regime. Therefore, we state in proposition 4 that under conditions of frequent and radical technological change, firms that are not restricted by block membership might be more effective in exploiting new technologies. Then these firms have the opportunity to link up with firms that have the most innovative technologies, without having to fear reputation effects that block-members have to face.

4. References

- Berg, S.J., Duncan, J., Friedman, P. 1982, *Joint Venture Strategies and Corporate Innovation*, Oelgeschlager, Gunn and Hain, Cambridge
- Bourdieu, P. 1986, The Forms of Capital, in: *Handbook of Theory and Research for the Sociology of education*, J.G. Richardson (ed.), New York, Greenwood, 241-258
- Brass, D.J., Butterfield, K.D., Skaggs, B.C. 1998, Relationships and Unethical Behavior: A Social Network Perspective, *Academy of Management Review*, 23: 14-31
- Burt, R.S. 1992, The Social Structure of Competition, in: N., Nohria, R.G. Eccles, (eds.) *Networks and Organizations: Structure, Form and Action: 57-91*, Harvard Business School Press, Boston
- Bower, J.L., Christensen, C.M. 1995, Disruptive Technologies; Catching the Wave, *Harvard Business Review*, January, 73 (1): 43-54
- Chesbrough, H.W., Teece, D.J. 1996, When is Virtual Virtuous? Organizing for Innovation, *Harvard Business Review*, January-February, 94 (1): 65-73
- Chung, S., Singh, H., Lee, K. 2000, Complementarity, Status Similarity and Social Capital as Drivers of Alliance Formation, *Strategic Management Journal*, 21: 1-22
- Coleman, J.S. 1988, Social Capital in the Creation of Human Capital, *American Journal of Sociology*, 94: 95-120
- Doz, Y., L., Hamel, G. 1998, *Alliance Advantage*, The Art of Creating Value Through Partnering, Harvard Business School Press, Boston, Massachusetts
- Duysters, G.M. 1996, *The Dynamics of Technical Innovation*, Edward Elgar Publishing
- Foster, R.N. 1986, *Innovation: The Attacker's Advantage*, Summit Books, New York
- Gargiulo, M., Benassi, M. 2000, Trapped in Your Own Net? Network Cohesion, Structural Holes and the adaptation of Social Capital, *Organization Science*, March-April, 11 (2): 183-196
- Gomes-Casseres, B. 1996, *The Alliance Revolution: the New Shape of Business Rivalry*, Cambridge, Harvard University Press
- Granovetter, M. 1973, The Strength of Weak Ties, *American Journal of Sociology*, 78: 1360-1380
- Granovetter, M. 1985, Economic Action and Social Structure: the Problem of Embeddedness, *American Journal of Sociology*, 91(3): 481-510

- Granovetter, M. 1992, Problems of Explanation in Economic Sociology in: N. Nohria, R.G. Eccles, (eds.) *Networks and Organizations: Structure, Form and Action*: 25-56, Harvard Business School Press, Boston
- Gulati, R. 1995, Social Structure and Alliance Formation Patterns: a Longitudinal Analysis, *Administrative Science Quarterly*, 40: 619-652
- Gulati, R. 1995, Does Familiarity breed Trust? The Implications of Repeated Ties for Contractual Choice in Alliances, *Academy of Management Journal*, 38 (1): 85-112
- Gulati, R. 1998, Alliances and Networks, *Strategic Management Journal*, 19: 293-317
- Gulati, R., Gargiulo, M. 1999, Where do Inter-organizational Networks come from?, *American Journal of Sociology*, March, 177-231
- Gulati, R. 1999, Network location and learning: the influence of network resources, and firm capabilities on alliance formation, *Strategic Management Journal*, 20: 397-420
- Gulati, R., Gargiulo, M. 1999, Where do Inter-organizational Networks come from? *American Journal of Sociology*, March, 177-231
- Gulati, R., Nohria, N., Zaheer, A. 2000, Strategic Networks, *Strategic Management Journal*, 21: 203-215
- Hagedoorn, J. 1993, Understanding the Rationale of Strategic Technology Partnering: Interorganizational Modes of Cooperation and Sectoral Differences, *Strategic Management Journal*, 14: 371-385
- Hagedoorn, J., Duysters, G.M., *Organization Studies*, Forthcoming
- Hill, C. 1990, Cooperation, Opportunism, and the Invisible Hand: Implications for Transaction Cost Theory, *Academy of Management Review*, 3(3): 383-397
- Knoke, D, Kuklinski, J.H., 1982, *Network Analysis*, Sage Publications, Series: Quantitative Applications in the Social Sciences
- Kogut, B, Zander, U., 1993, Knowledge of the Firm, Combinative Capabilities, and the Replication of Technology, *Organization Science*, 3(3): 383-397
- Larson, A. 1992, Network Dyads in Entrepreneurial Settings: a Study of the Governance of Exchange Processes, *Administrative Science Quarterly*, 37: 76-104
- Madhavan, R., Koka, B.R., Prescott, J.E. 1998, Networks in Transition: How Industry Events (Re)shape Interfirm Relationships, *Strategic Management Journal*, 19: 439-459
- Mueller, D.C., Tilton, J.E. 1969, Research and Development Costs as a Barrier to Entry, *Canadian Journal of Economics*, 2: 570-579

- Nahapiet, J., Ghosal, S. 1998, Social Capital, Intellectual Capital, and the Organizational Advantage, *Academy of Management Review*, 23 (2): 242-266
- Nohria, N. 1992, Is a Network Perspective a Useful Way of Studying Organizations? in: N., Nohria, R.G. Eccles, (eds.) *Networks and Organizations: Structure, Form and Action*: 1-22, Harvard Business School Press, Boston
- Nohria, N., Garcia-Pont, C. 1991, Global Strategic Linkages and Industry Structure, *Strategic Management Journal*, 12: 105-124
- Pfeffer, J. and Nowak, P. 1976, Joint Ventures and Interorganizational Interdependence, *Administrative Science Quarterly*, 21: 398-418
- Powell, W.W., Brantley, P., Competitive Cooperation in Biotechnology: Learning Through Networks in: in: N., Nohria, R.G. Eccles, (eds.) *Networks and Organizations: Structure, Form and Action*: 366-394, Harvard Business School Press, Boston
- Rowley, T., Behrens, D., Krackhardt, D. 2000, Redundant Governance Structures: an Analysis of Structural and Relational Embeddedness in the Steel and Semiconductor Industries, *Strategic Management Journal*, 21: 369-386
- Sarkar, M.P., Echambadi, R., Harrison, J.S. 2001, Alliance Entrepreneurship and Firm Market Performance, *Strategic Management Journal*, 22: 701-711
- Sherwin, C., Isenson, R. 1967, Project Hindsight, *Science*, 156: 1571-1577
- Sing, K, Mitchell, W. 1996, Precarious collaboration: Business survival after partners shut down or form new partnerships, *Strategic Management Journal*, 17: 99-116
- Tsai, W., Ghosal, S. 1998, Social Capital and Value Creation: the Role of Inter-firm Networks, *Academy of Management Journal*, 41 (4): 464-476
- Tsai, W. 2000, Social Capital, Strategic Relatedness and the Formation of Intra-Organizational Linkages, *Strategic Management Journal*, 21: 925-939
- Tushman, M.L., Anderson, P. 1986, Technological Discontinuities and Organizational Environments, *Administrative Science Quarterly*, 31: 439-465
- Utterback, J.M. 1974, Innovation in Industry and the Diffusion of Technology, *Science*, 198: 620-626
- Uzzi, B. 1997, the Social Structure and Competition in Interfirm networks: the Paradox of Embeddedness, *Administrative Science Quarterly*, 42: 35-67
- Walker, G., Kogut, B., Shan, W. 1997, Social Capital, Structural Holes and the Formation of an Industry Network, *Organization Science*, 8 (2): 109-125
- Wasserman, S., Faust, K. 1994, *Social Network Analysis, Methods and Applications*, Cambridge University Press



Eindhoven Centre for Innovation Studies

WORKING PAPERS

Ecis working papers 2001-2002 (September 2002):

- 01.01 H. Romijn & M. Albu
Explaining innovativeness in small high-technology firms in the United Kingdom
- 01.02 L.A.G. Oerlemans, A.J. Buys & M.W. Pretorius
Research Design for the South African Innovation Survey 2001
- 01.03 L.A.G. Oerlemans, M.T.H. Meeus & F.W.M. Boekema
Innovation, Organisational and Spatial Embeddedness: An Exploration of Determinants and Effects
- 01.04 A. Nuvolari
Collective Invention during the British Industrial Revolution: The Case of the Cornish Pumping Engine.
- 01.05 M. Caniëls and H. Romijn
Small-industry clusters, accumulation of technological capabilities, and development: A conceptual framework.
- 01.06 W. van Vuuren and J.I.M. Halman
Platform driven development of product families: Linking theory with practice.
- 01.07 M. Song, F. Zang, H. van der Bij, M. Weggeman
Information Technology, Knowledge Processes, and Innovation Success.
- 01.08 M. Song, H. van der Bij, M. Weggeman
Improving the level of knowledge generation.
- 01.09 M. Song, H. van der Bij, M. Weggeman
An empirical investigation into the antecedents of knowledge dissemination at the strategic business unit level.
- 01.10 A. Szirmai, B. Manyin, R. Ruoen
Labour Productivity Trends in Chinese Manufacturing, 1980-1999
- 01.11 J.E. van Aken
Management research based on the paradigm of the design sciences: the quest for tested and grounded technological rules
- 01.12 H. Berends, F.K. Boersma, M.P. Weggeman
The structuration of organizational learning
- 01.13 J.E. van Aken
Mode 2 Knowledge production in the field of management

- 01.14 A. Cappelen, F. Castellacci, J. Fagerberg and B. Verspagen
The impact of regional support on growth and convergence in the European Union
- 01.15 W. Vanhaverbeke, G. Duysters and B. Beerkens
Technological capability building through networking strategies within high-tech industries
- 01.16 M. van Birgelen, K. de Ruyter and M. Wetzels
The impact of attitude strength on the use of customer satisfaction information: An empirical investigation
- 01.17 M. van Birgelen, K. de Ruyter A. de Jong and M. Wetzels
Customer evaluations of after-sales service contact modes: An empirical analysis of national culture's consequences
- 01.18 C. Keen & M. Wetzels
E-tailers versus retailers: which factors determine consumer preferences
- 01.19 J.E. van Aken
Improving the relevance of management research by developing tested and grounded technological rules
- 02.01 M. van Dijk
The Determinants of Export Performance in Developing countries: The Case of Indonesian manufacturing
- 02.02 M. Caniels & H. Romijn
Firm-level knowledge accumulation and regional dynamics
- 02.03 F. van Echtelt & F. Wynstra
Managing Supplier Integration into Product Development: A Literature Review and Conceptual Model
- 02.04 H. Romijn & J. Brenters
A sub-sector approach to cost-benefit analysis: Small-scale sisal processing in Tanzania
- 02.05 K. Heimeriks
Alliance Capability, Collaboration Quality, and Alliance Performance: An Integrated Framework.
- 02.06 G. Duysters, J. Hagedoorn & C. Lemmens
The Effect of Alliance Block Membership on Innovative Performance