The Dark Side of Open Innovation. A Survey of Failed Inter-company Cooperation.

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Abstract

In recent years open innovation has been increasingly recognized as an important way of speeding up the innovation process. However, managers are concerned for new vulnerabilities, as their companies are becoming increasingly dependent on outside sources. The present paper presents the results of a survey among 32 managers of 12 failed inter-company collaborations. Based on the results it is concluded that cooperation clearly has its limits. The soft aspects proved much tougher to handle then the hard aspects of collaboration, but relationship harmony is not a goal in itself. Commitment counts, but clear upfront negotiations are a prerequisite for success.

Key words: open innovation, collaboration, failure factors

1 Introduction

Given the rapid development of technologies, the fast changing consumption trends and the ever increasing competition, even a large multinational firm's competitive advantage can only be temporary. As a consequence, firms have to innovate continuously in order to remain at the top of their industries. The pressure to do more with less inexorably pushes these companies to focus on their unique, hard to imitate and distinctive core competencies, continually nurturing and enhancing them, while abandoning those activities in which they do not posses distinctive competencies. In recent years, open innovation has been recognized as an important way of speeding up the innovation process. The capability of building and maintaining inter-organisational network relationships, such as joint ventures, license agreements, supplier-customer partnerships and strategic alliances are increasingly viewed as key to sustained competitive advantage.

These external relationships might be a reasonable response to the business pressures, but, at the same time, they may create new long-term dependencies and vulnerabilities, as companies are becoming increasingly dependent on outside sources for their technological advances (e.g. Millson et al., 1996, Jonash, 1996). For instance, if industry is going to entrust critical parts of its research to outsiders, there must be confidence that timing to produce results will be respected. Managers are concerned about security, cost-effectiveness and relevance of results, risk of knowledge spill-over and high co-ordination costs. They are also afraid that working closely with network partners will reduce the possibilities to relate to companies outside the network. In addition, even large innovative, so called prospector, firms, still have only limited experience in implementing open innovation concepts. Questions like: '*How can we open up our own*

innovation process without loosing our intellectual properties? How can we convince our partners to share their core capabilities with us? make many companies hesitant to shift to more open forms of innovation. Lichtenthaler (2008) concludes from a study of 154 middle and large technology-oriented firms in Germany, Switzerland, and Austria, whose main business is internal technology exploitation that many firms still pursue traditional closed approaches to innovation. His results suggest that Open innovation is at the moment mainly driven by larger companies, and that firms that are diversified at the product level tend to externally leverage technologies more actively than focused firms.

It is the objective of the present paper to address these questions by presenting the results of a survey among the managers of 12 failed collaborations. Thirty-two half structured interviews were held with general and R&D managers of twelve leading companies in technological collaboration about the complications and pitfalls encountered.

We have structured the paper as follows. Section 2 describes the theoretical foundation of the study. Section 3 describes the study sample and the methods of data analysis. In Section 4 the results are discussed, while in Section 5 the main conclusions are drawn.

2 Theory

According to Chesbrough (2003), innovative companies increasingly realize that the ‘closed’ model of innovation, in which the internal R&D department exclusively provides for new products and processes to foster the company’s growth, does not work any more in today’s highly dynamic business environment. As Quinn (2000) points out, in order to compete in current markets, cooperation within a network of partners is becoming more and more essential. As Gambardella (1992) states: *To be part of a network, and to be able to effectively exploit the information that circulates in the network, has become even more valuable than being able to generate new knowledge autonomously.* The ability to identify potential network partners and maintain existing relations with current partners are thus of crucial importance. Indeed Caloghirou *et al.* (2004), found in a European survey of over 500 firms in the chemical and telecommunication industry, that interacting with external partners enables a firm to access a variety of new knowledge and that interfirm linkages seem to promote innovative performance.

Chatterji (1996) divided the broad terrain of business relationships from outright acquisitions of small companies, via exclusive licensing of specific technologies, joint ventures, minority equities, options for future licenses and joint development to R&D contracts and seed funding of exploratory research at universities, independent research organisations and start-up companies. His study concentrated on technological collaborations (i.e. joint ventures, joint developments and R&D contracts) for a definite period, to achieve a common objective. These might or might not shift into long-term alliances. The focus is on the complications and pitfalls encountered by the management of the 'leading company'. The leading company brings in the original concept for the co-operation, where it is then further developed in co-operation with the partners, which add varying degrees of value (Lorenzi and Baden-Fuller 1995).

Before the concept of Open Innovation as such emerged, ideas about the importance of absorbing external knowledge and disseminating and exploiting internal knowledge that would

otherwise remain unutilized were formulated in the fields of industrial dynamics and applied evolutionary economics. Cohen and Levinthal's (1990) concept of absorptive capacity addressed the particular competence that companies build in R&D, not only for managing internal innovation but also for being able to access and absorb external ideas, science and other kinds of knowledge inputs to innovation. Rosenberg (1982), Lundvall (1992), Pavitt (1998), Omta (1995) and Von Hippel (1988) among others, have addressed the interactive, cross-disciplinary and (mostly) inter-organizational nature of innovative learning.

What Chesbrough (2003) has added in his book "Open Innovation", apart from offering a new term, is a more comprehensive and systematic study of the "internal" corporate modes of managing such externally oriented processes of innovation. He has more generally pointed to the emergence of a fairly radical organizational innovation in the way large high-tech corporations engage in technological innovation, from an introvert and proprietary to a (much more) extrovert and open paradigm. Although up to now, Open Innovation concepts have been regarded as relevant primarily to 'high-technology' industries, such as the ICT and pharmaceutical industry, Chesbrough *et al.* (2006) conclude that Open Innovation has utility beyond high tech industries and will become important also for more traditional and mature industries. But he has also argued that the specific level and mode of open/closed innovation is contingent on the particular industry. Gassmann (2006) identified the following factors that might make open innovation more/less appropriate as a strategic tool for innovation.

1. Globalization. According to Gassmann (2006) globalization tends to foster open innovation because it is characterized by higher mobility of capital, lower logistics costs, more efficient ICT, and increased market homogeneity across different countries. As a consequence, entry barriers for new international competitors are lowered, and this provides the companies that can innovate faster and are able to adapt better with an opportunity for competitive advantage. Anderson and Tushman (1990) argue, that Global industries favor open innovation models because this enables them to achieve economies of scale more swiftly than the traditional closed model and provides them with an opportunity to promote standards and dominant designs .
2. Technology intensity. The fact that in most industries, technology intensity has increased to such a degree that not even the largest companies can cope with or afford to develop technology on their own, also acts as a strong incentive for open innovation. Companies in high-tech sectors (e.g., semiconductors) show a higher propensity to cooperate, extensively using external sources to support product development in an environment characterized by rapid technological change (Miotti and Sachwald, 2003).
3. Technology fusion. Technologies are increasing morphing into new fields such as mechatronics, optronics and bioinformatics (Kodama, 1992). Consequently, industry borders are shifting or even disappearing. For example, IBM is ranked eighth in a list of the world's largest holders of biotechnology patents. The more interdisciplinary cross border research is required, the less a single company's existing capabilities are sufficient to provide successful innovations.
4. New business models. With the rapid shift of many industry and technology borders, new business opportunities arise. For example, the multimedia industry brings together firms active in sectors as different as hardware, software, telecommunication, information and entertainment. Consequently, new alliances have been formed, leading to complementary partnerships, e.g. Vodaphone-Swisscom, Sony-Ericsson or Sony-BMG. The main motives for these alliances are the sharing of risks, the pooling of complementary competencies, and the

realization of synergies. Companies also tend to acquire those innovations and technologies that fit their business model. For example, by sourcing technology and know how externally, Procter & Gamble generated new businesses with a US$5bn turnover during the last four years.

5. Knowledge leveraging. Knowledge has become the most important resource for firms. Despite discussions regarding tacit knowledge that is bound to specific persons (e.g. Nonaka, 1994), the mobility of knowledge has increased over the last decades. Open source software development can have thousands of decentralized programmers working on one platform and has become possible because of the special character of software: high separability and codability as well as its high knowledge intensity. Developing a car engine in open innovation modes is much more difficult – at least in the physical prototype stage. New ICT, especially the Internet, accelerated the knowledge diffusion process and increased the personal mobility of knowledge workers. Many specialized knowledge workers (e.g., freelancers, consultants or part-time engineers) make a living as portfolio workers, offering their service to different organizations at the same time. Instead of hiring the best engineers internally, companies are forced to act as knowledge brokers. New capabilities and organizational modes are needed to cope with this outside-in thinking.

3 Study sample and research methods

Thirtytwo half structured interviews were held with general and R&D managers of twelve leading companies in technological collaboration about the complications and pitfalls encountered. All managers had been actively involved in the preparation and/or the execution of the technological collaborations at issue.

Five collaborations took place in the energy sector. Three of them were initiated by different Dutch power plants and a central research institution concentrating on energy and environmental issues. The other two were initiated by the largest gas distributor in the Netherlands. The first collaboration was directed towards the development of a new simulation-based controlling system for power plants. Two others were directed towards the development of advanced controlling systems for small-scale power generation. The fourth concentrated on the development of environmental friendly wood and coal based energy generation. The fifth was concerned with advanced motor management. The partner(s) in the first collaboration was a US software company; in the second a Dutch manufacturer of energy controlling systems, in the third (another) US software firm and a Swedish wood supplier; in the fourth, three US power plant manufacturers; and in the fifth a Dutch manufacturer of motor systems.

In addition, three collaborations took place in the automotive industry. The first was a co-development of a new coating for motor bodies between two automotive companies in Germany and France, a large Dutch steel company and a Dutch-based multinational chemical conglomerate. The second was a long-term R&D collaboration of six motor body companies, currently concentrating on the possibilities of converting aluminium bodies. The third was a collaboration between a US car manufacturer and a multinational supplier of components.

The ninth collaboration was a co-development between the largest copier manufacturer in the Netherlands and its main suppliers to develop a new product family of high-end copiers. The tenth collaboration concerned a co-development of a multinational food processing company with

a supplier of flavour ingredients to develop a series of new healthy products that despite their lower salt and fat contents retain an excellent taste.

The last two collaborations were collaborative networks, the first in the field of software development and the other in the electronics industry. A world-wide operating software company, based in Ireland, daughter of a large multinational company, worked closely together in supplier-customer partnerships with their clients to provide them with tailor made software solutions. The other collaboration was a university-industry collaborative network in the area of high performance parallel and optical computing of four university departments in Great Britain, France, Germany and Italy with a Japanese electronics company.

4 Results

The interviews revealed that many complications and pitfalls were encountered in the different open innovation projects. R&D partnerships are mostly directed towards new technologies and/or markets. Therefore, careful upfront study is essential for a well-balanced assessment of the technological and business opportunities. In two cases the partners were so enthusiastic about the collaboration as such, that without further study the business opportunities were considered to be good. The respondents stated that, although no market turned out to exist for the developed product, there was gain of beneficial experience in terms of organisational learning and technical know how. MacLaghlan (1995) comments, that where termination of an R&D project can create trauma inside the R&D organisation of an individual company, this is even more so in a collaborative effort. Bruce *et al.* (1995) point in the same direction, by commenting that the collaboration as such might establish its own agenda. The overriding desire of the partners to ensure that the collaboration will be successful may cause that the partners become blind to technological and market reality.

In addition, insufficient monitoring of the R&D environment led to overlooking of obvious partners. This is often caused by insufficient management commitment to finding a partner. In one case it took 5 years (!) to find a partner with the required competencies. The resulting partnership missed the business opportunity, because the market had changed in the 5 year's period. In another case a leading university department in the country of the lead company was overlooked for more than half a year, because the company was searching world-wide, ignoring the possibility of finding excellence 'around-the-corner'. In two cases the technological capability and the financial resources of the partner turned out to be insufficient to conduct its part of the collaboration successfully.

Another major problem that emerged from the interviews was that the technological collaboration had evolved in a merely ad hoc way, while the interests of the company were insufficiently secured. In five collaborations, a lack of consistency with corporate interests was mentioned to have caused (severe) problems later in the collaboration. This included lack of clear agreements about the division of the financial and R&D efforts over the partners, and insufficient clarity about the way the collaboration should be organised and managed. The omission with the most severe consequences, however, was not putting a clause about the distribution of the potential gains into the contract. The partner stepped out of the collaboration to use the knowledge competitively.

A number of respondents stated, however, that, because in R&D partnerships the gains are often uncertain, and unexpected gains arise, it is very difficult or even impossible to capture them all in contracts. Too detailed contracts are also contra-productive. In two collaborations the respondents indicated that their (American) counterparts showed up at the constitutional meeting with their corporate lawyers and fist-sized contracts. This deterred the Europeans and extended the negotiations considerably.

However, the most important problem encountered was fear and distrust. Seven out of the twelve technological collaborations suffered of this at any time during the collaboration. Three collaborations actually failed, because one of the partners was more interested in the short term exploitation of strategic information than in the success of the joint programme. In pharmaceutical industry, where concentration tendencies are widespread (Omta, 1995), fear was expressed that the current R&D partner might later merge with a competitor, which could lead to drainage of sensitive information. One of the respondents of university-industry collaboration expressed the fear of leaking out of strategic information, because a number of the graduate students of the university department got jobs in competitors' R&D. Furthermore, respondents warn for asymmetric technological collaborations between large and small companies. The small partner may fear (or hope), that if the technological collaboration will turn out successfully, it will loose independence, being taken over by the financially stronger partner.

In three cases inter-cultural problems were encountered. In one case, language problems and cultural differences hindered open communication between Japanese and European companies. But interestingly, also with American companies problems arose. The problems caused by differences in negotiating culture were already mentioned. In two cases there were also complains about lack of openness and the provision of scanty, not up-to-date information by the American counterparts.

The partners of large R&D networks tend to underestimate the communication and co-ordination problems and costs which are encountered in large collaborations. Four large R&D partnerships ended in overrunning their budget. Obviously, management still encounters difficulties in coping with the co-ordination of networks. The central problem in this respect is the absence of a steering agency. It is the network, or rather the type of the structure of the network, which, to a large extent, determines how actors work together. Consequently, executing R&D within the confines of a network requires different steering solutions than the execution of in-house R&D. Moreover, the fit between the nature of the research problems to be addressed in the network and the type of the structure of the network is not always self-evident. Quite often the type of structure of the network is not explicitly chosen but merely an accidental choice, e.g. based upon previous experiences, as was found in a study of upstream R&D co-operation between firms and knowledge institutions within the biotech programme (Cabo *et al.*, 1996*)*.

The complications and pitfalls encountered in our study show that external relationships require constant management attention. In the following some managerial approaches are presented for each phase of the collaboration, which might be effective in reducing the social liability of these network relations.

A number of problems could have been avoided if the technology forecasting was more carefully assessed. Companies need to establish robust technology forecasting systems, which express the

technology needs for the next 5 to 10 years, and monitor and interpret the developments in the different technologies, the emerging trends in customer needs and competitor actions. Based on these forecasting activities 'technology road maps' can be set up, which link the future product plans to the technologies required achieving them. Many authors (e.g. Hamel et al. 1989, Roussel et al. 1991) have emphasised that firms should develop only few strategic technological capabilities and should outsource the other ones. The emerging role of R&D management is to balance the internal and external technological capabilities, by identifying the projects which are feasible to take out, and match these with external sources. Via management tools, such as the outsourcing and partnering matrix (Harris *et al.*, 1996), the firms can decide which technologies should be developed in-house, which in collaboration with one or more partners and which technologies are better outsourced.

Erens *et al.* (1996) concluded, based on a study of 50 companies in Europe, US and the Far East (including Airbus, Boeing, Canon, Hitachi, IBM, Matsushita Philips and Toyota), that many leading companies are too selfish in the search of an appropriate partner. They emphasise that companies should not only look at what they need and want from a potential partner, but also what they can deliver to a partner in terms of skills, market access and economies of scale etc. In addition they emphasise that the companies are too much oriented toward the hard aspects of the collaboration, whereas a good match of the soft aspects, including business culture and chemistry of (top) managers are far more important for successful co-operation. Bailey *et al.* (1996), based on a study of 70 UK based companies in different industry sectors, also conclude that selecting partners for collaboration on technical merits alone, how important as such, is clearly a sub-optimal solution. Interestingly, relying on the partner's track record in previous collaborations turned out to be a poor basis for collaborator selection, as well. The authors even call this: A recipe for disappointment. In short, a company has to be very careful in the selection of the potential partner(s). An ideal partner should:

- have an interest in and expect equal advantages of the collaboration.
- Have complementary technological capabilities and knowledge.
- Be capable and willing to share financial risks.
- Have no record of opportunistic behaviour in former collaborations.
- Have a business culture in favour of collaboration, with open communication and a quality vision. Its management should not be afraid of loosing some of its authority.

Less suitable partners are:

- partners with comparable core business and/or geographical markets. Security conflicts may easily arise where partners operate as direct competitors in other markets.
- Partners with business cultures which differ too far. Lorange *et al.* (1992) also identify compatible organizational cultures as being important, encompassing similar perception of the environment, organizational values and operational routines.
- Depending companies. This finding is in line with that of Saxenian (1990). The high-tech Silicon Valley companies ensure that they receive no more than 20% of any supplier's output to ensure that they do not become too dependent on external partners.

The complications learned that too extensive contractual arrangements should be avoided, because they are likely to be interpreted as distrust in the good intentions of the partner. However, we don't want go as far as Wolff (1994), who states that contractual arrangements are

only important in so far as they define the terms under which a partner may exit the collaboration. According to Chiesa and Manzini (1996), the partners should agree upon - the objectives of the collaboration, i.e. the expected results; the time required for the project; the expected contribution of each partner, in terms of time and resources; the organisational structure and the role of each partner (allocation of tasks); the co-ordination mechanisms; and criteria for assessing the collaboration's performance and evaluating results. In accordance with Chiesa and Manzini's conclusions, our respondents indicated that a contractual arrangement should minimal codify:

- the financial and personal responsibilities of the partners.
- The division of the possible gains among the partners.
- The way of knowledge protection, including patent and trade secret rights and confidentiality agreements.
- Criteria for measuring and monitoring progress, so that deviations can be identified and potential problems can be overcome. This includes milestones and deadlines of the project, responsibilities and accountability of the project team and the founding of a steering committee. For example, a contract between the biotechnology company Immunex and the pharmaceutical company SmithKline Beecham included a list of the principal scientists who would be responsible, a detailed schedule of at least weekly telephone conferences, and a provision for at least quarterly joint meetings (Leonard-Barton, 1995).
- Penalty clauses to discourage opportunistic behaviour.

5 Discussion and conclusions

Based on our results it can be concluded that high technology cooperation clearly has its limits. Therefore it should start small with a limited scope and time frame. It is important to realize that the further the partners' competitive goals diverge, the more their alliance potential converges. The soft aspects proved much tougher to handle then the hard aspects of collaboration, but relationship harmony is not a goal in itself. Commitment counts, but clear upfront negotiations are often a prerequisite for success.

The results clearly show that partnership management is to a great extent management of trust, and goes far beyond signing of confidentiality agreements and agree to guidelines. A collaboration to be effective requires the bridging across different business cultures and lines of responsibility in the participating companies. Lewis (1998) states that lack of trust is the major reason why many R&D managers don't think their alliances are working as well as they should. Based on a study of 84 alliances, Lorange *et al.* (1992) conclude that trust and commitment are necessary conditions for long-term collaboration. Alliances have to be designed to create win-win situations; rather than some form of a zero-sum game otherwise they will certainly fail (Rai *et al.*,1996). Bruce *et al.* (1995) comment, that the creation of a climate of trust might appear to be in direct conflict with the notion of establishing limits to the knowledge exchanged. It is the challenge for the partners to find the critical balance of openness and confidentiality. It seems feasible that over time, as trust is build up, the need to limit the scope of the collaboration might decrease. Trust is build-up by ensuring that partners receive suitable rewards for their efforts. To show their interest in the venture, each partner should contribute high-quality R&D staff. During the whole co-operation it is critical that the partners keep each other informed to what they are doing. The benefits of frequent communication in building up mutual understanding and in

checking on the progress of the collaboration saves time and costs by preventing far more costly adjustments later in the collaboration. To communicate frequently, sending all relevant memo's and team reports helps in creating a climate of trust.

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