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Venture Capital, Emerging Technology Firms and Value Added Beyond Financing

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By

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OUTLINE OF CONTENTS

Abstract: The present research project focuses on the mechanisms through which venture capital investors may add value to their emerging-technology portfolio companies. Drawing upon the resource-based and knowledge-based theories of the firm, communities-of-practice knowledge transfer literature, and the results of my interviews with VC investors and emerging technology start-ups, I have identified and explored the following two key value-adding mechanisms:

A. Non-financial resource-based contribution
B. Knowledge transfer

Focusing on these two mechanisms, I further examine the specific factors influencing the effectiveness of the resource- and knowledge-transfer processes. Finally, I demonstrate how, through the above-mentioned value-adding mechanisms, VC investors affect investees' R & D management decisions about which emerging technologies are worth pursuing and how to allocate scarce resources to technology pipeline projects.

INTRODUCTION

Research context. Emerging technology-based firms are highly dependent on external resources such as financing (Jarillo, 1989). To fund their growth, such high-potential ventures usually turn to venture capital investors, who have been shown to provide not only money, but also invaluable hands-on guidance in bringing emerging technologies to market (Hellman and Puri, 2000; Sapienza, 1992). Because of their experience with numerous ventures and their extensive exposure to financial, labor and other resource markets, venture capitalists are uniquely positioned to provide valuable assistance to their portfolio companies in key aspects (MacMillan et al, 1988). Academic research has identified some of these aspects to be serving as a sounding board to the entrepreneur team, enabling the firm to obtain alternative sources of equity or debt financing, interfacing with the investor group, and monitoring financial and operational performance (Gorman and Sahlman, 1989; Sapienza et al., 1996; Rosenstein et al., 1993). A venture capital investment relationship may also open up access to the resources of the vast venture capital investors' network of industry and financing contacts, including to those of their other portfolio companies. Such resources include distribution channels, production facilities, research and development, technology, and pricing benefits on certain products and services (Maula and Murray, 2000).

Venture capitalists generally spend half of their time in monitoring and managing post-investment relationships with an average of nine ventures each (Gorman and Sahlman, 1989). They have particular interest to guide their portfolio companies through such processes as:

- **Emerging technology assessment:** evaluating each technology against robust criteria to make sure that it is truly innovative, can be adequately protected through patenting, has sufficient market potential to justify the investment of time and resources, and has a clear path to commercialization.
- **Patent protection and enrichment:** ensuring that the potential of the technology can be exploited, both geographically and commercially, and that the patent strategy and execution are commercially sound.

- **Marketing:** based on thorough market analysis, developing a comprehensive marketing strategy for promising emerging technologies and identifying and pursuing the optimum commercialization routes.
- **Deal development:** negotiating each agreement with the goal of revenue maximization through approaches that range from out-licensing to the formation of new ventures and strategic alliances.

Therefore, it is expected that venture capital investors play a critical role in shaping investee decisions about **managing the R&D process:** choice of technologies that are deemed worth pursuing, resource allocation to technology pipelines and specific ways to participate in the process under extreme uncertainty of success.

Unit of Analysis. The main unit of analysis of this project is the relationship between an emerging technology-based firm and its most important venture capital investors (measured by ownership share). By in-depth analysis of the firm dyads, this research aims to add an alternative perspective on the existing body of academic literature on inter-organizational relationships, which is mainly focused on studies assessing the number of relationships and network structures rather than on evaluating specific relationships in greater detail (Stuart, 2000: 809).

RESEARCH PROBLEM

Building on existing theories and empirical research, the present study seeks to develop and validate a hypothesis model of the value-added mechanisms in the relationships between emerging technology-based firms and their venture capital investors. The main thrust of the model building is on the specific ways in which such value-added mechanisms shape the portfolio company's decisions about managing the R&D process.

The main research problem can be articulated as a question:

> **What are the key mechanisms through which venture capital investors add value to emerging technology-based firms?**

To approach the research problem, the first task is to conceptualize the value-added mechanisms, the way they function and the factors that influence them on the basis of extant academic literature and theory. Thus, the main research problem is divided in two generic research questions:

> **(1) What are the key mechanisms through which venture capital investors add value to emerging technology firms?**
> **(2) What factors influence the value-adding mechanisms?**

The above two research questions have normative implications for emerging technology enterprises where R& D capabilities determine the fundamental competitive advantage of the venture. Factors affecting venture capital investor value-added mechanisms have crucial influence on a portfolio company's R&D management decisions. Such decisions include choice of technologies that are

deemed worth pursuing, resource allocation to technology pipelines and specific ways to participate in the process under extreme uncertainty of success. In effect, the factors influencing investor value-added mechanisms may cause an entrepreneur's R&D efforts to be amply rewarded or abandoned without recovering any sunk costs, time and sweat equity. Hence, emerging-technology entrepreneurs would benefit from understanding how the investor-investee value-adding mechanism impacts their management of R&D and how to avoid identified threats that would leave them with less than what they deserve. Thus, the third generic research question is

(3) In what ways such value-added mechanisms and the factors that influence them might shape the portfolio company's decisions about managing the R&D process?

RESEARCH DESIGN

The conceptual frameworks are derived on the basis of review of research into venture capital and related fields as well as of existing theoretical models relevant to the analysis of the value-added provided by venture capital investors to their portfolio companies. Exploratory interviews with thirty-three (33) junior and senior managers of three (3) venture capital funds and fifteen (15) founders or senior staff of ten (10) emerging technology-based portfolio firms in the European Union were conducted. Substantial survey and interviewing data was collected that offered ample basis for analysis and follow-up qualitative interviewing to clarify findings and to triangulate data.

For the purposes of the present study, the researcher decided to use the aggregate qualitative interview findings in informing Research Questions No.1 and No.2. In addressing Research Question No.3, the researcher considered using a single case study in order to make the information easily available and contextually comprehensible. The case study is only a brief sketch of ways in which (non-financial) value-adding mechanisms might affect R&D choices and is meant to serve as a first-step toward a deeper, more specialized research in the area.

Due to the space and time limitation of the current study, the researcher concluded that building model hypothesis to be tested by using statistical methods would be accomplished better through a more substantial, follow-up research. Such hypotheses testing would likely be best conducted by confirmatory factor analysis, multiple regression analysis and structural equation modeling. Depending on the further goals of the research, Social Network Analysis (SNA) may be used to map the knowledge flows in dyads of venture capital investors and emerging technology firms.

CASE STUDY AS AN APPROPRIATE STRATEGY

Yin (1989), suggests that choosing a case study over other empirical methods might be reasonably made under three conditions:
(a) The *type* of research question being posed;
(b) The extent of *control* a researcher has over actual *behavioral* events; and
(c) The degree of focus on *contemporary* as opposed to *historical* events.

The first condition refers to the fundamental "who/ what/ where/ when/ why/ how" questions of most research studies. While any of these questions could generally be tackled by any research

approach, the degree of efficiency and effectiveness in accomplishing the task might vary considerably amongst the various research strategies. For example, "who/ what/ where" questions are suitably addressed through surveys and historical accounts. Case studies are more appropriate for dealing with "how" and "why" questions, which are explanatory rather than exploratory or descriptive in nature. In particular, the present research project best utilizes the case study approach since it is focused on "how" venture capital value-adding mechanisms influence R&D management decisions by emerging-technology portfolio start-ups.

As other methods such formal experiments and historical accounts are also employed to investigate these types of research question, the second and third conditions provide the necessary discrimination. Historical accounts are best used where there is no scope for control over, or insight into, contemporary events. Experiments require an ability to control and manipulate events in a direct, precise and systematic fashion, which is rarely feasible outside laboratory conditions.

DATA COLLECTION & TECHNIQUES

To meet the technical requirements of the case study for Research Question No.3, the researcher focuses on FUND, which is one of the three venture capital fund covered in this paper, and START-UP, which is a successful emerging technology firm in the portfolio of FUND. Semi-structured in-depth individual interviews were conducted with eighteen (18) FUND professionals, involved in developing and maintaining the relationship between FUND and START-UP. In terms of seniority, two (2) were Associates, five (5) were Executive Directors, and nine (9) were Managing Directors as well as the CEO and Acting CFO for the London Office.[1] Furthermore, interviews were conducted with START-UP's CEO and COO who were mainly responsible for coordination with FUND staff as well as START-UP's Head of R&D. The role of START-UP's CEO—the ultimate decision maker on the portfolio company's side—was re-constructed based on the above interviews both by FUND's and START-UP's staff.

Each interview with the twenty (20) individuals lasted no less than one hour, with the longest being over five hours. All respondents were interviewed once with the exception of Jones, Anscombe and Torvald (see Table 3.) who were interviewed seven, three, and two times, respectively. The interviews were taped and later transcribed; the researcher's observations and initial insights were recorded separately and immediately after the respective interviews. As a matter of research strategy, the iterative process of data analysis began during the interview as the researcher decided which follow-up questions to ask.

Starting with Jones, the researcher's primary contact at FUND, all FUND interviewees were specifically asked to list the names of all FUND professionals who, officially or informally, were contributing expert knowledge to the design and efforts of the investment relationship between FUND and START-UP in the studied period. Thus, the researcher was able to identify, contact, and interview all FUND employees that might have participated in value-adding processes around the relationship with START-UP.

As the requirements for effective data collection and analysis are provided in detail elsewhere (e.g. Patton 1987, 1990; Eisenhardt 1989,Yin 1989, 1993, Stake 1995), they would not be discussed in the present thesis.

[d] In FUND as in most other venture capital FUNDs, the managerial ladder is structured as follows (in ascending order of seniority): Analyst, Associate, Executive Director (called Vice President or Principal in the US), Managing Director or Partner.

Qualitative Interviews

Qualitative interviews—in opposition to "talking questionnaires" (Potter & Wetherell, 1987)—are relatively loosely structured and open to what the interviewee feels is relevant and important to talk about, given the interest of the research project. Advocates of interviews typically argue that this approach is beneficial inasmuch as a rich account of the interviewee's experiences, knowledge, ideas, and impressions may be considered and documented (Bryman, Bresnen, Beardsworth, & Keil, 1988; Fontana & Frey, 1994; Holstein & Gubrium, 1997; Martin & Turner, 1986). It is, however, important not to simplify and idealize the interview situation, assuming that the interviewee—given the correct interview technique— is a competent and ethical individual telling truths, a loyal servant of science who produces the data needed to reveal his or her "interior" (experiences, feelings, values) or the "facts" of the organization. The interview is a complex social event that calls for a reflexive approach in which a set of various theoretical viewpoints can be considered and, when there are reasons for doing so, applied. Reflexivity for me stands for conscious and consistent efforts to view the subject matter from different angles and avoid privileging *ex ante* a single perspective and vocabulary. A reflexive approach does not favor a particular ontology—objectivist or subjectivist—but could in principle be combined with various paradigms and specific theories; reflexivity means challenging and reconsidering assumptions and beliefs of what data are all about (Alvesson & Deetz, 2000; Boje, 1995).

o POSITIVIST VIEW ON INTERVIEWING

The positivist approach in interviewing wishes to establish a context-free truth about reality "out there" by following a research protocol and obtaining responses relevant to it, by limiting researcher influence as well as other potential sources of bias. "The interview conversation is a pipeline for transmitting knowledge" (Holstein & Gubrium, 1997: 113), through which researchers imitate quantitative ideals for data production, analysis, and writing. Rules, procedures, minimizing bias, detailed coding, large quantities of material, and so forth are emphasized both in methodological texts and in empirical writings (Eisenhardt, 1989; Glaser & Strauss, 1967). The ideal is a maximum, transparent research process, characterized by objectivity and neutrality.

However, the positivist approach is likely to be challenged by respondents who provide superficial and cautious responses such as elite individuals—namely, investment professionals as in this research. Issues of trust and limited control over the interviewee responses lead to such techniques as repeat interviews in order to establish better contact, to check for consistency over time and between situations; and to give both interviewees and interviewers a sufficient opportunity to reflect upon previous communication (Acker, Barry, & Esseveld, 1991).

o INTERPRETATIVE APPROACH TO INTERVIEWING

The interpretative approach—espoused by the present study itself—advocates establishing rapport, trust, and commitment between interviewer and respondent, particularly in the interview situation. This is necessary for the researcher to be able to explore the inner world such as meanings, ideas, feelings, and intentions or the experienced social reality of the interviewee. The typical goal of interview studies is to accomplish "deeper, fuller conceptualizations of those aspects of our subjects' lives we are most interested in understanding" (Miller & Glassner, 1997: 103). Interpretivists emphasize interactivity with and closeness to interviewees—seen as "participants." Fontana and Frey (1994), for example, suggest that the researcher may reject "outdated" techniques of avoiding getting involved or providing personal opinion and instead engage in a "real" conversation with "give and take" and "emphatic understanding."

Some researchers talk about "active interviewing" as an ideal form (Ellis, Kiesinger, & Tillman-Healy, 1997; Holstein & Gubrium, 1997). Here, the idea is that the researcher's interventions transform the interview subject "from a repository of opinions and reasons or a wellspring of emotions into a productive source of knowledge" (Holstein & Gubrium, 1997: 121), since "the subject's interpretative capabilities must be activated, stimulated and cultivated" (1997: 122). In certain respects, the present study has been an attempt to involve the high-intelligent and experienced respondents in reflecting upon the objectives of the project itself.

ANALYSIS STRATEGY

In order to answer all three research questions,[2] the researcher (a) reviewed existing theoretical and empirical academic studies related to value-adding mechanisms and venture capital investing and (b) supplemented theoretical modeling with empirical findings through interviewing. The latter was accomplished by designing coding frames to capture the emergent themes upon completion of the interviews. The software package for qualitative analysis QSR*NUDIST was utilized to tag the interview text within the coding frames. Interview data was also analyzed in conjunction with publicly available archival data (press releases and articles, non-confidential internal memos and staff presentations) in order to identify key themes and to filter out inconsistencies.

Finally, to present visually the data of the knowledge flows among the interviewed individuals at FUND, the researcher used NetMiner, software package for exploratory network data visualization (See Fig.1 through Fig.6). Each node represents an interviewee at FUND or START-UP who actively and consistently contributed expertise to the design, decision-making and execution of R&D processes at START-UP.

ETHICAL ISSUES

As empirical research oftentimes delves deeply into human relations, complex ethical dilemmas might arise. The present research has been conducted in a way intended to minimize such risks. In negotiating access to FUND, the researcher has made a commitment to preserve the anonymity of the target organization (FUND), its client (START-UP) as well as the privacy of the interviewed executives. Furthermore, it has been emphasized that the researcher would make every effort to reflect accurately the opinions of the interviewees as well as to present clearly all factual information communicated by the latter. FUND itself has been notorious in the venture capital industry for its secretive culture. Accordingly, the researcher has signed a confidentiality agreement with FUND that legally binds him to respect the ethical and otherwise concerns of the organization.

LIMITATIONS OF THE STUDY

Cross-sectional nature of the research: while the study is combines interview, survey and secondary data collected at different times, it is essentially cross-sectional. Such a design would likely limit the opportunities for claiming causality in the identified relationships purely on the basis of empirical findings.

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[2] **RQ#1:** What are the key mechanisms through which venture capital investors add value to emerging technology firms?

RQ#2: What factors influence the value-adding mechanisms?

RQ#3: In what specific ways such value-added mechanisms and the factors that influence them shape the portfolio company's decisions about managing the R&D process?

Limited geographical focus: the study is aimed to focus on European emerging technology firms only. The choice of the particular geographical depends on access and availability considerations. It is not be feasible within the project timeframe, budget and researcher expertise to cover both Europe and the US (or additional) continents.

Limited number of studied companies and industries: the study covers a sample of 10 emerging technology firms financed by multiple venture capital investors that fall within the spectrum of the Venture Economics index of high-technology firms: biotechnology, medical & health services, Internet specific & communications, computer software and services as well as computer hardware and semiconductors/other electronics. The small number of start-up firms (10), VC funds (3) and industries in which the portfolio start-ups operate (5) preclude substantial generalizability of the research results.

CONSIDERED TECHNIQUES FROM THE ET BOOK

In developing my research, I have examined two techniques—scenario planning (Schoemaker and Mavaddat) and knowledge network analysis (Lori Rosenkopf)—and one specific theoretical approach: alliance building for competitive advantage (Dyer and Singh).

Scenario planning

The objectives of scenario planning are to improve awareness of critical uncertainties, correct judgmental biases and improve decision making, develop more sophisticated "mental models" of the likely states of the world, facilitate learning and foster organization dialogue. It is appropriate to use when uncertainty is high, surprises may be costly, and the world (market, industry) could undergo qualitative changes. Scenario planning rests on the premise that the past is not a good model for future change. The steps in developing alternative scenarios include:

(1) Identifying basic trends—political, societal, legal, technological
(2) Identifying major critical uncertainties
(3) Preliminary, develop initial--perhaps extreme--scenarios
(4) Refining to coherent scenarios by constructing, for instance, correlation matrix for major uncertainties (positively correlated, negatively correlated, or uncorrelated) and then checking for internal consistency
(5) Building narrative scenarios (stories)

Knowledge network analysis

Knowledge network analysis is a way of conceptualizing, describing, and modeling industries and markets as sets of individual firms or groups linked to one another by specific relationships, whether these relationships are as tangible as exchange networks or as intangible as perceptions of each other's strategic positioning and competitive advantages. Network analysts believe that how a firm succeeds (or not) depends in large part on how that firm is tied into the larger web of industry connections. For example, such concepts as company brand, prestige, and reputation are important not because of their definitional characteristics but because of how firms structure their relationships with each other (and their customers) according to those characteristics.

Knowledge network analysis is not only a theoretical perspective based on social network paradigms: it is also a method for the analysis of market structure. Because it asks different questions than other types of social science research, it also gathers different data, performs different analyses, and

visualizes the results in different ways. Most importantly, this approach could prove useful in understanding a variety of topics, from the rise of industry monopolies to the spread of computer viruses, from the activities of CEOs to how employees are hired, from how teams reach consensus to how multinational corporations pattern their trading strategies.

Strategic alliances

Alliances are fast and flexible way to access complementary resources and skills that reside in other companies and have become an important tool for achieving sustainable competitive advantage. Particularly to high-tech firms, alliances offer:

- Opportunities to learn and acquire new technologies
- Access to complementary technological resources and capabilities that reside in other firms
- Access to new markets
- Access to resources that can enhance the competitive positioning of the firm such as through minimizing costs
- Opportunities to influence or even control technological standards

Companies tend to develop expertise on specific types of alliances — for example, those tied to research and development, marketing and co-branding, manufacturing, standard setting, consolidation joint ventures or new joint ventures. The issues involved in setting up such alliances can be very different. For example, whenever the success of an alliance depends on the exchange of knowledge — as is the case in R&D alliances — equity-sharing governance arrangements are preferable because they give both parties the incentives necessary for them to bring all relevant knowledge to the table. But when each party brings to the alliance an easy-to-value resource — as with most marketing and co-branding alliances — contractual governance arrangements tend to be more suitable. This insight is particularly relevant to analyzing VC investor behavior which usually exhibits a mix of both equity-sharing and contract governance throughout the lifecycle of the VC engagement with a portfolio company.

Alliances also tend to serve different purposes, depending on the stage of the portfolio company's (or its product) maturity:

- **Opening windows:** acquiring knowledge that will help the firm further develop the technology and/or reduce the uncertainty about the strengths of the technology relative to possible substitute technologies
- **Exploring options:** as technology and its substitutes mature, the firm may want to place calculated bets as to which would be the winning one by entering into strategic alliances. This is essentially an "options strategy"
- **Gaining position:** alliances could be used as a positioning strategy to promote a lower-cost structure, enter new markets or achieve competitive advantage.

Using the ET book methods in my research

I decided that scenario planning and knowledge network analysis would not fit the scope and topic of my study well, while the strategic-alliance approach was seen as especially inspiring departure point. First, scenario planning would require a macro-analysis of an entire industry or set of industries in order for me to realize the full potential of the method. This is unfeasible, given that my study sample of emerging technology firms spans several industries: from biotech to software to defense technology. Moreover, scenario planning is future-oriented and would not permit me to

analyze and describe the *current* value-adding mechanisms in VC and emerging technology firm relationships. This approach might be useful in building alternative scenarios for the ways in which such mechanisms would likely evolve given structural changes in the VC industry and continued interest to a specific subset of emerging technologies (biotech, for instance).

Second, the knowledge network analysis was more relevant to my topic, but was judged to be beyond the scope and means of my project. In particular, network analysis might require a large sample of firms and/or individuals which is unavailable. It necessitates significant time commitment from the studied objects to fill out longer standardized surveys—which they were too busy to pledge—and is highly sensitive to missing data. It also requires advanced knowledge of social network theory to interpret meaningfully the data and use of specialized software which is priced beyond the budget of the research.

However, I found the strategic-alliance approach as useful in informing my initial thoughts how to approach the research problem. In particular, Dyer and Singh draw upon the resource-based view of the firm and also single out the importance of knowledge as a strategic asset. While I do not adopt their analytical framework, I chose to base my project on the resource-based view of the firm and on its offspring, the knowledge-based view of the firm as most relevant to evaluating value-adding mechanisms that go beyond pure provision of financing. Dyer and Singh also prompted me to look deeper into inter-organizational relationships as a key factor in realizing the benefits from such mechanisms.

UTILIZED METHODOLOGY

Resource-Based View (RBV)

The resource-based theory of the firm views firm resources as the primary determinant of organizational competitive advantage. It is recognized that technology-based firms usually lack some critically important complementary resources typically possessed by large, industry-leading corporations. Thus, resource-combining alliances with venture capitalists and their other portfolio companies may be an important strategy for technology-based ventures. Complementarities are seen as an important determinant of potential for value creation in resource combining relationships between two companies.

Why use the RBV?

The resource-based approach is useful to predict the influence of resource complementarities in incentivizing VCs to invest in emerging technology start-ups more than just purely financial resources. VCs are particularly interested in building resources that are valuable, rare, non-imitable and difficult to substitute at the portfolio companies such as unique products and management teams, brand and networks of captive relationships. Such resources attract later-stage investors and interest in, and rights to, them may be sold for extremely large amounts of money, bringing exceptional profits to VCs. Concrete resources brought in by VCs to investee include access to distribution channels, production facilities as well as preferential pricing of input materials, and professional services.

RBV: a brief discussion

As mentioned above, resources that enhance the competitive advantage of firms must be valuable, rare, non-imitable and non-substitutable.

Valuable resources. Not all resources are valuable. Firm attributes, whether they are tangible or intangible, are strategically relevant only if they enable a firm to efficiently and effectively develop and implement a strategy that, in turn, generates superior performance. Of course, the value of the resources could not be evaluated independently of the market context within which a firm is operating. For instance, valuable resources are access to cheaper input materials, low labor cost, brand name and so forth. Of course, if all competing firms enjoy the same low-cost structure, low labor cost might not be a valuable resource—it all depends on the competitive landscape of the industry.

Rare resources. Resources are scarce to the extent that demand for them exceeds supply. As long as the number of firms that possess certain resources is less than the number of firms required to generate the perfect competition around the strategies whose choice and implementation is facilitated by the resources, then those resources can be considered as scarce. Such resources, for example, are employees with superior professional expertise in exotic areas—from talented computer programmers developing 4-G applications to finance specialists structuring complex derivatives to hedge a company's balance sheet against changes in interest rates.

Non-imitable resources. Some researchers such as Dierickx & Cool (1989) identify five characteristics of the processes through which resources are accumulated and that influence their imitability. First, resource accumulation takes time and is not linearly related to the investments made in resource acquisition: installing a proprietary risk-management IT platform will not immediately produce enhanced result as time and effort will be needed to fine-tune the firm's organizational procedures to comply with the system's reporting requirements, among other things. Second, a resource such as, for instance, a firm's reputation may facilitate accumulation of additional resource stocks such as a large customer base—but this may not be true of firms with insufficient track record. Third, resource accumulation is interconnected—this implies that additions to existing resource stocks are linked to the level of other resources stocks. For example, a firm cannot develop sophisticated R&D knowledge without access to state-of-the-art research facilities. Fourth, resources may erode, if they are not maintained. This happened to Yahoo, which ceased to invest heavily in Internet search-engine R&D in the late 1990's and was subsequently overtaken by Google in this aspect. Finally, it is oftentimes impossible to specify how resource stocks are accumulated. How did Pixar—the innovative animation studio—manage to become the leader in computer-generated graphics, despite its small size, relatively limited financial resources at the outset and formidable opponents? This causal ambiguity erects critical barriers to imitation of competitive advantages.

Non-substitutable resources. Resources are non-substitutable to the extent that they can be uniquely used to help conceive of and implement a strategy. To the extent that such a one-to-one correspondence exists between a resource and a strategy, the resource is non-substitutable. However, it is important to note that it may not be a single resource, but instead a bundle of resources that enable a firm to implement a strategy. Further, some of the resources within such a bundle may be substitutable. For example, Microsoft's near-monopoly in the PC software market combined with its extensive R&D pipeline, qualified personnel, debt-free balance sheet policy and

captive customer base enable it to execute its international expansion strategy through cash-only acquisitions of complementary players.

The RBV has important implications for the formation and performance for inter-organizational relationships between venture capitalists and emerging technology firms. The RBV highlights the role of resource complementarities influencing the alliance formation and performance. A relevant example would be the portfolio of emerging technology start-ups of a venture capital fund which is in a continuous process of commercializing the entrepreneurs' novel technologies by engaging the venture capitalists themselves, their law firm advisors, management consultants, industry and marketing partners, with each contributing unique and complementary knowledge assets. Das and Tang (2000) applied the RBV in their framework of alliance formation and performance. They recognized resource complementarities as one of the key drivers of alliance formation and performance enhancement. The failure of a number of high-tech and biotechnology start-ups in Oxfordshire that spun off Oxford University are illustrative cases. Resource complementarities are also important for alliances between small and large firms. Similarly, Teece (1986) argued that innovating firms without the necessary manufacturing and related capacities might die, even through they are the best at innovation. He recommended that innovating firms should in some cases establish a prior position in certain complementary assets in order to be able to capitalize on the innovations.

One stream of the RBV theory of the firm, which is particularly related to my interest in non-financial value-adding mechanisms in the context of emerging technology firms, is its application to inter-organizational relationships. In this stream, inter-organizational collaboration and alliances are usually viewed as a mechanism to share or acquire resources. An example would be situations where venture capitalists complete successive rounds of investments, with a lead VC fund supported by at least two other co-investing VC firms that effectively share the risk. In his research on the use of external resources, Jarillo (1989) found that entrepreneurial, fast growing firms used more external resources than their competitors. Eisenhard & Schoonhoven (1996) applied RBV to strategic alliances of young firms. In their analysis of a sample of 98 semiconductor firms, they found that firms entered into strategic alliances because of lack of internal resources in a vulnerable strategic position when pursuing innovative strategies in emerging competitive industries. Another reason why firms engaged in strategic alliances was because of opportunity to take advantage of their own capabilities such as a large, experienced management team. An example would be KKR, one of the leading leveraged buy-out firms, that has incredibly sophisticated and experienced team of experts which chooses to engage in various deals, if only to utilize their knowledge and update it (reputation is also a significant driver): cf. the recent bid for Safeway in the UK.

Problems with applying the RBV

RBV seems to offer an all-inclusive definition of resources. This all-encompassing notion of resources limits my understanding how the theory could be operationalized. It argues that resources may be valuable, but does not answer when, where, and how they can be useful, thus significantly reducing my ability to offer recommendations. This situations is exacerbated as, according to RBV's definition, resources are largely path-dependent and unique—hence, few things can be changed to enhance a firm's situation.

The RBV also excessively focuses on internal resources with the unit of analysis being a single firm and neglects the role of resources available through inter-organizational collaboration

Moreover, it neglects the product market in its exclusively resource-oriented focus—and this market is critical in understanding the value-added by VCs to emerging technology firms.

Knowledge-Based Perspective (KBV)
The knowledge-based view of the firm suggests that knowledge is the most valuable source of competitive advantage in a firm. Technology-based firms are necessarily limited in their knowledge of markets, competition, and technology financing decision-making and can potentially benefit from acquiring knowledge from experienced venture capitalists. For an emerging technology-based firm, venture capital investments may be a way to establishing resource and knowledge-sharing relationships with expert investors and their other portfolio companies.

Why use the KBV?
The knowledge-based approach is appropriate to predict the effect of knowledge complementarities in motivating VCs to add value to investees in addition to financing. In particular, emerging technology start-ups lack perspective on market structure, customer needs and dynamics of customer preferences, competitor intelligence and awareness of the systemic interplay among regulation, market development and key players' strategies in shaping future markets. VC investors have extensive networks in government, companies and various market intermediaries in addition to experience in bringing innovative products to market and thus can add value by transferring complementary knowledge to investees.

KBV: a brief discussion
The characteristics of the knowledge affecting the transfer of knowledge through organizational boundaries are relatively well researched. For instance, Inkpen & Dinur (1998) report that in their longitudinal analysis of five international joint ventures in automotive industry knowledge transfer was negatively related to the tacitness of knowledge and the organizational level at which the transfer took place.[3] Similarly, Simonin (1999) found in his analysis of 147 alliances by US multinationals that tacitness, complexity of knowledge, and cultural and organizational distance (mediated by knowledge ambiguity) were negatively related to knowledge transfer.

However, although tacit and ambiguous knowledge have been shown to be more difficult to transfer over organizational boundaries, empirical research has identified social capital and frequent communications as factors facilitating the knowledge transfer. For instance, Simonin (1999) found that collaborative know-how from past alliances was positively related to transfer of ambiguous knowledge. Mowery *et al.* (1996) found in their analysis of 792 alliances that equity joint ventures were more likely to be used to transfer complex resources than contract-based alliances. They also found that bilateral contracts were more effective than unilateral contracts for knowledge transfer.

Learning through inter-organizational relationships has been shown to be important or the performance of technology-based new firms. For instance, the research by Powell *et al.* (1996) examining panel data on alliances of dedicated biotechnology firms demonstrated that when the

[3] Tacit knowledge is highly personal and hard to formalize, thus making it difficult to communicate or share with others. Subjective insights, intuitions and hunches fall into this category of knowledge. Furthermore, tacit knowledge is deeply rooted in each individual's actions and experiences, as well as in the ideals, values, and emotions that an individual embraces. The subjective and intuitive nature of tacit knowledge makes it difficult to process or transmit the acquired knowledge in any systematic or logical manner.

knowledge base of an industry is complex, expanding, and widely dispersed, the locus of innovation will be found in networks of learning, rather than in individual firms. They found that in those situations, building external collaborations was central to updating the knowledge base of the firm.

Problems with applying the RBV

My major issue with the KBV is that it is highly abstract. The concepts are hard to measure, intangible and, thus, difficult to apply to specific cases. The theory also provides little guidance on choosing the level (unit) of analysis and is confusing with regards to the meaning of some widely used terms. Moreover, since knowledge is typically conceptualized as a resource that can be acquired, transferred or integrated to achieve sustainable competitive advantage, the KBV might be reduced to simply a special case of RBV, rather than a unique theory. Thus, using it as a distinct approach in my research may be questionable.

Communities of Practice Theory: Knowledge, Learning & Organizational Performance

Ethnographic research defines communities of practice (CoP) as constituted by people who are informally as well as contextually bound by a shared interest in learning and applying a common practice (Brown & Duguid, 1991; Lave & Wenger, 1991; Wenger, 1998; 2002).

What is a Community?

Here, the term "community" connotes the informal, personal basis of relationships; "community" also suggests that CoP boundaries do not coincide with geographic or functional boundaries in organizations, but rather with those of practice- and person-based social networks. Further implication of employing the term "community" is an emphasis on the central role of community-based artifacts such as equipment, forms, and policies that wield little independent influence in the organization apart from their context-specific interpretation and enactment by community members (Wenger, 1991).

What is Practice?

The term "practice" indicates that CoPs evolve around a shared practice, which may or may not correspond to an established function in the organization. It also suggests that community "practitioners" identify with their work in personal ways; "practice" essentially connotes "knowledge-in-action" (Schon, 1987), or "knowing" (Cook & Brown, 1996), and implies that practice is as much about learning as it is about doing. Wenger *et. al.* (2002) define practice as a set of socially defined ways of doing things in a specific domain: a set of common approaches and shared standards that create a basis for action, communication, problem solving, performance and accountability (Wenger and Snyder, 2002). A practice is thus what investment bankers or Xerox technicians (Orr, 1996) and Panafon employees (Tsoukas and Vladimirou, 2001) have developed, so that they could do properly their jobs and also experience fulfillment at work. Practice, in this sense, is doing within a historical and social context that endows what we do with structure and meaning. As Wenger argues (1998), practice is essentially social in nature and, hence, comprises both the explicit and tacit aspects of knowing and doing.

Practice: Explicit & Tacit Aspects

The explicit aspects involve language, tools, documents, images, symbols, well-defined roles, specified criteria, codified procedures, regulations, and contracts that divergent practices make

explicit for a multiple purposes. The implicit aspects, on the other hand, consist of the entirety of implicit relations, tacit conventions, subtle cues, untold rules of the thumb, recognizable intuitions, specific perceptions, well-tuned sensitivities, embodies understandings, underlying assumptions and shared worldviews, thinking styles, certain ways of behaving, and ethical stance (Wenger et. al., 2002; Wenger, 1998). Practice is thus a type of 'occupational' subculture that pulls the community together (Schein, 1996).

Theoretical Perspectives: Why do Communities of Practice (CoP) Matter?

CoPs are increasingly seen as important organizational phenomena, because a number of authors tend to link them with enhanced organizational performance—the primary concern of corporate management—particularly in knowledge-intensive firms such as R&D-intensive emerging technology start-ups (Hildreth et al., 2000; Lesser & Prusak, 1999; Wenger & Snyder, 2000). It is claimed that CoP "can drive strategy, generate new lines of business, solve problems, promote the spread of best practices, develop people's professional skills, and help companies recruit and retain talent" (Wenger & Snyder, 2000). The benefits of communities of practice, furthermore, are claimed to include:

- An incremental source of innovation (Brown and Duguid, 1991)
- A source of problem identification, learning and knowledge production (Lave and Wenger, 1991; Brown and Duguid, 1991, 2001; Wenger 1998)
- A well maintained repository of tacit knowledge (Brown and Duguid, 2001; Smith and Farquhar, 2000)
- The nexus of individual and organizational learning (Lave and Wenger, 1991; Brown and Duguid, 1991; Wenger, 1998)
- As providing firms with lower communication costs (Kogut and Zander, 1992, 1995)
- As having protective capability because of the community's reliance on tacit knowledge (Kogut & Zander, 1992, 1995; Liebeskind, 1996).

In more tangible terms, CoPs are found to enhance organizational performance by increasing the value of knowledge through growing the number of knowledge users, thus achieving returns to scale (Howitt, 1996). As learning in CoPs is more about becoming a practitioner than about learning of a certain practice, CoPs are empirically shown to impact significantly the performance of corporate training programs (Brown and Duguid, 1991). For instance, Xerox's Integrated Customer Service project demonstrates how understanding the role of CoPs in a workplace could lead to an on-the-job learning that is more effective at knowledge transfer than separating workers from the production process by assembling them in a classroom for extended periods (Stamps, 1997). Empirical studies of the biotech industry have also shown that technology cycle time is shorter in community-focused units as opposed to hierarchically organized ones (Judge et al, 1997), whereas innovation is more difficult in hierarchical bureaucracies (Dougherty and Hardy, 1996).

HOW MY THINKING ABOUT THE RESESARCH TOPIC HAS CHANGED AS A RESULT OF THE REVIEWED APPROACHES

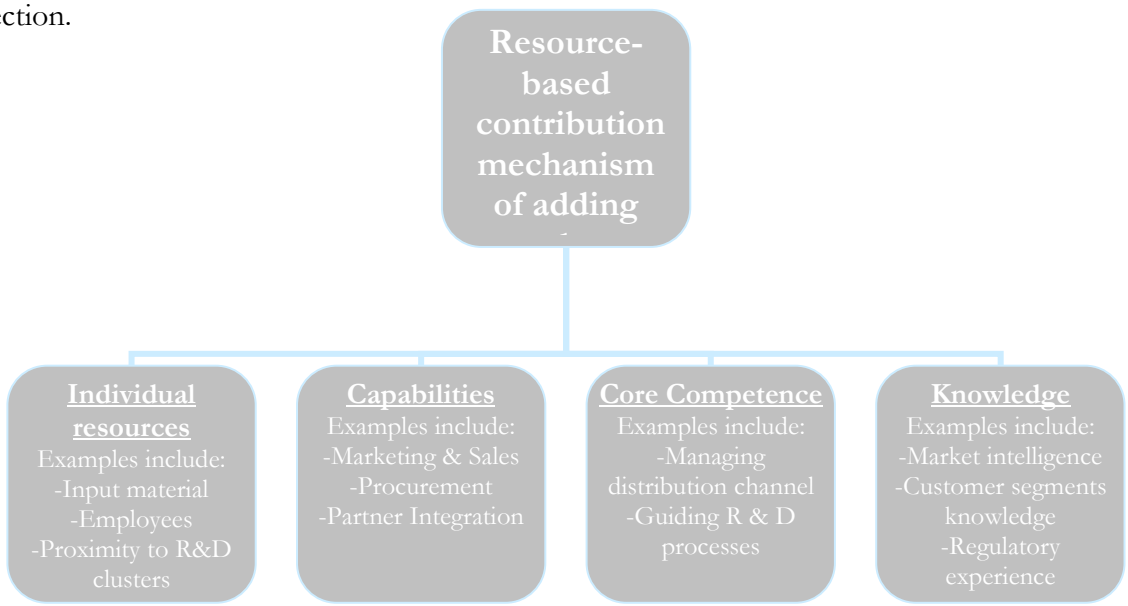
It would be fair to state that the three approaches I considered initially from the ET book helped make the major decisions how to design my research. First, scenario planning's macro- and future-oriented outlook alerted me to the fact that I needed to choose a much smaller-scale unit of analysis and to limit the time frame of the study by looking at the history and present of the emerging

technology firms under analysis, rather than the future. Second, knowledge network analysis' emphasis on transfer of knowledge helped me discern the importance of inter-organizational relationships and the critical importance of knowledge as a resource. It also encouraged me to look deeper in potential knowledge-transfer mechanisms such as communities of practice. Finally, the strategic alliance approach reinforced my conviction that I should indeed investigate inter-organizational relationships and further prompted me to adopt the resource-based view as a promising theoretical framework. My further review of RBV led to utilizing the KBV as a lens enabling me to single out knowledge as a major valued added by VCs to emerging technology firms.

VALUE-ADDING MECHANISMS: EMPIRICAL ASSESSMENT

RESEARCH QUESTION NO.1: RESOURCE-BASED CONTRIBUTION MODEL

Resources can be defined as strength or weakness factors for a firm (Wernefelt, 1984). Consequently, a core idea within the resource thinking is differing from competitors by exploiting a firm's unique strength resources and resource combinations. In this particular value-adding model, the term 'resources' is used as a higher-order concept including the following sub-concepts: individual resources, capabilities, core competence, and knowledge. The concepts are substantially interdependent and to some extent overlapping. They all can be seen as sources of the competitive advantage. The most obvious difference lies between individual resources and capabilities. The *resources* are inputs in a production process. Examples of the individual resources in the high-tech industry context are selected input materials ('smart-dust' composites), human capital (employees' skills), availability of financial capital, and favorable geographical location (proximity) relative to large R&D centers such as universities, government and corporate labs (e.g. Silicon Valley, Greater Boston area). A *capability* is a capacity of the resource combination to perform a certain task or action (Grant 1991, 1998). Examples of the capabilities are marketing and procurement capability. *Core competence* is also connected to the resource-based view. Core competence means a combination of skills and technologies that enables a firm to offer a particular benefit to customers. For example managing a distribution channel can form into core competence for a firm. Distribution channel in itself, however, does not represent core competence (Hamel and Prahalad, 1996). When looking at an emerging technology firm, mastering a production process of nano-nano composites based on a unique method might develop into core competence for a firm. Finally, *knowledge*—according to the knowledge-based view—is also seen as a special type of resources (Hoskisson et al. 1999). Knowledge includes several sub-concepts such as information, skill or know-how, explanation, and understanding (Wikström and Normann 1994). Information about markets and target customers is an example of knowledge that is perceived as weakness in many emerging technology start-ups. Knowledge transfer as a special type of resource contribution will be discussed in the subsequent section.

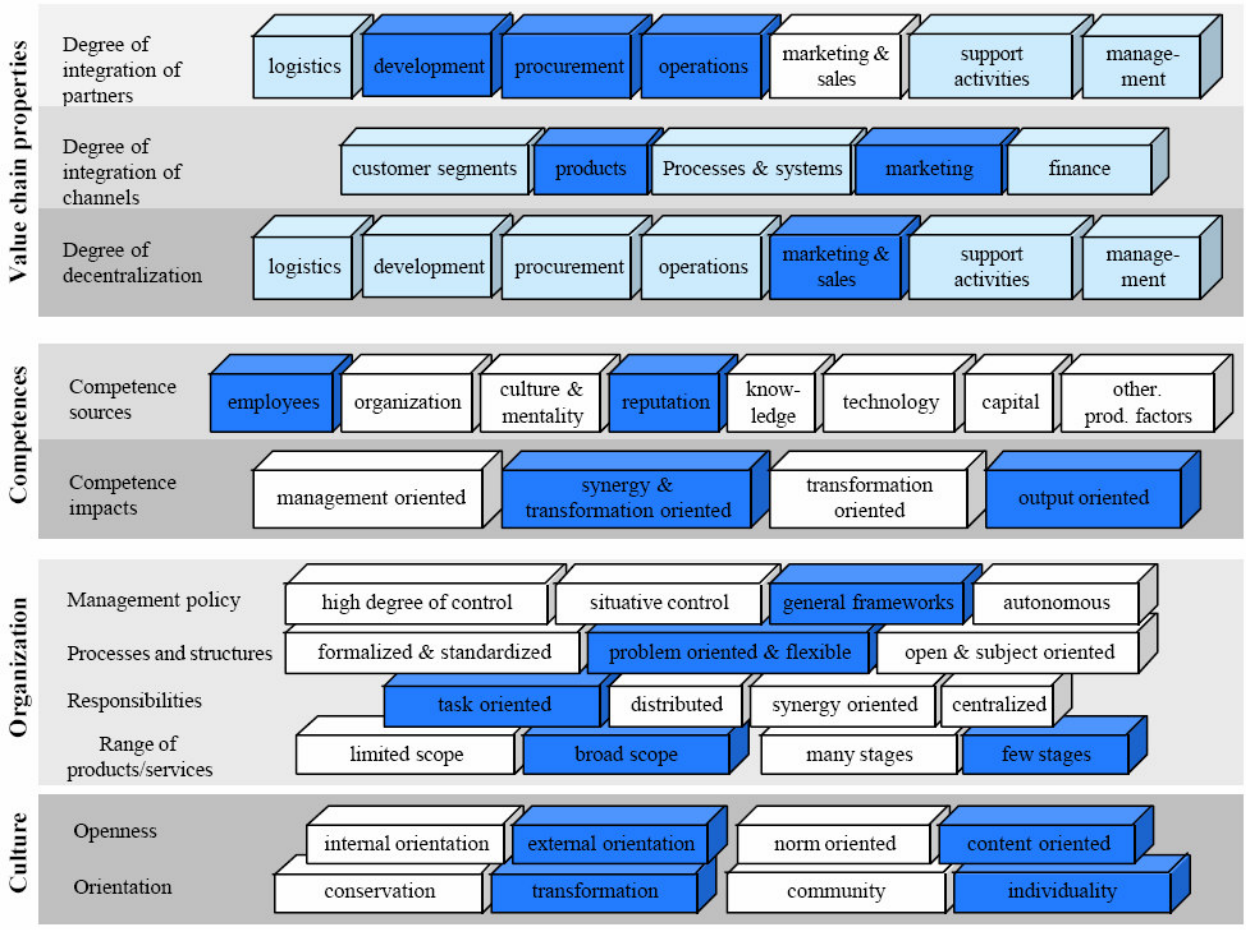


RESEARCH QUESTION NO.2: FACTORS AFFECTING THE RESOURCE-CONTRIBUTION MODEL

The factors affecting the resource-contribution value-added mechanism are investigated by studying the value chain of emerging technology firms, their competencies, organization and culture. Note that specific resources as per the value-adding mechanism above belong to various levels of the factor matrix below. Knowledge as a specific resource is further dealt with in a subsequent separate section on knowledge transfer. The matrix itself is built on interview data and direct coaching from two Managing Directors at FUND and reflects the entire sample of studies firms.

In the table below, the rectangles in **dark blue** denote the factors that—at the time of the study—favorably influenced the smooth resource-sharing relationship between FUND and START-UP. **White** rectangles denote areas identified as potential conflict areas impairing the resource-based value-added by FUND to START-UP interviewers. The rectangles in **light-blue** denote areas identified by interviewees at FUND and START-UP as requiring improvement and greater attention in VC-portfolio company relationships for enhanced resource sharing—yet not found to be particularly favorable or especially conflict-engendering to resource-based value-added processes.

Factor Matrix: Factors affecting the resource-based value-adding mechanism



The factors affecting the resource-contribution value-added mechanism are defined by the degree of integration of start-ups in the portfolio of a venture capital investor, the degree of integration of (sales) channels and the degree of decentralization (from the VC control). With regard to the *integration of start-ups* in the value-added chain, firms can be integrated in logistics, product development, procurement, operations, marketing & sales, support, and management processes. Multi-channel management, i.e. the *integration of sales channels*, can be centered around customer segments, products (e.g. common procurement), processes & systems (e.g. common platform), marketing (e.g. common pricing), finance or combinations of these. Regarding the (spatial) *decentralization of operations*, the same decentralization arenas can be differentiated as above.

The studied VC investor, FUND, encourages collaboration among its portfolio companies in all areas, but marketing & sales (due to radically different product mix of the investees). Product development, procurement, and operations are particularly notable for their implementation in close collaboration among portfolio firms. Further, a comprehensive multi-channel approach covering all aspects is followed. However, the largest extent of channel integration is reached for products and marketing. None of the activities are completely centralized. Among the decentralized activities, marketing & sales is considered to leave the highest autonomy to the portfolio companies.

Competencies can arise from employees, organizational capabilities (e.g. 'economies of scale'), corporate culture & mentality (e.g. innovation culture), reputation, knowledge, technology, or capital and other production factors (Lado et al. 1992, Hamel 1994). Regarding their *impact*, it can be differentiated whether the focus is on management capabilities, synergies and change capabilities, transformation capabilities or output-oriented capabilities (Heinrich, 2000**).** For FUND and its portfolio companies, employees and reputation are considered to be the most important sources for transformation oriented and output oriented competencies.

With regard to organization—management policies, processes & structures, responsibilities and the range of activities are differentiated (Bleicher, 1999). As basic *management policies*, a high degree of control, situative control, general frameworks (e.g. management by objectives) or total autonomy can be implemented. *Processes & structures* can be highly formalized and standardized, problem oriented and flexible, or open and subject oriented. *Responsibilities* can be defined in a task oriented, distributed (e.g. team organization), synergy oriented or centralized way. The *range of activities* can be small or broad, and activities can cover many production stages, but also only a specific stage**.** FUND and the management teams of the investigated portfolio firms organize their processes in problem oriented and flexible was and also manage by objectives. Responsibilities are task oriented, and job profiles usually cover a broad range of activities while focusing on specific production stages.

Finally, corporate culture is difficult to classify, but critical component. According to Bleicher (1999), openness and basic orientation are the most important criteria. Regarding *openness*, a primarily internally and externally oriented culture should be differentiated. It is important whether content (e.g. business problems) or norms are more important for employees. An organization's *basic orientation* is either more traditional (e.g. preserving values) or transformation oriented. Regarding the role of employees in the organization, more individuality oriented and more community oriented approaches can be observed. FUND, in particular, appears as a modern organization with external orientation, content orientation, transformation culture and individual focus. The investigated portfolio firms had too few employees

(under 15, on average), hence it was not possible to claim they have a distinct corporate culture (as opposed to a team identity, etc.).

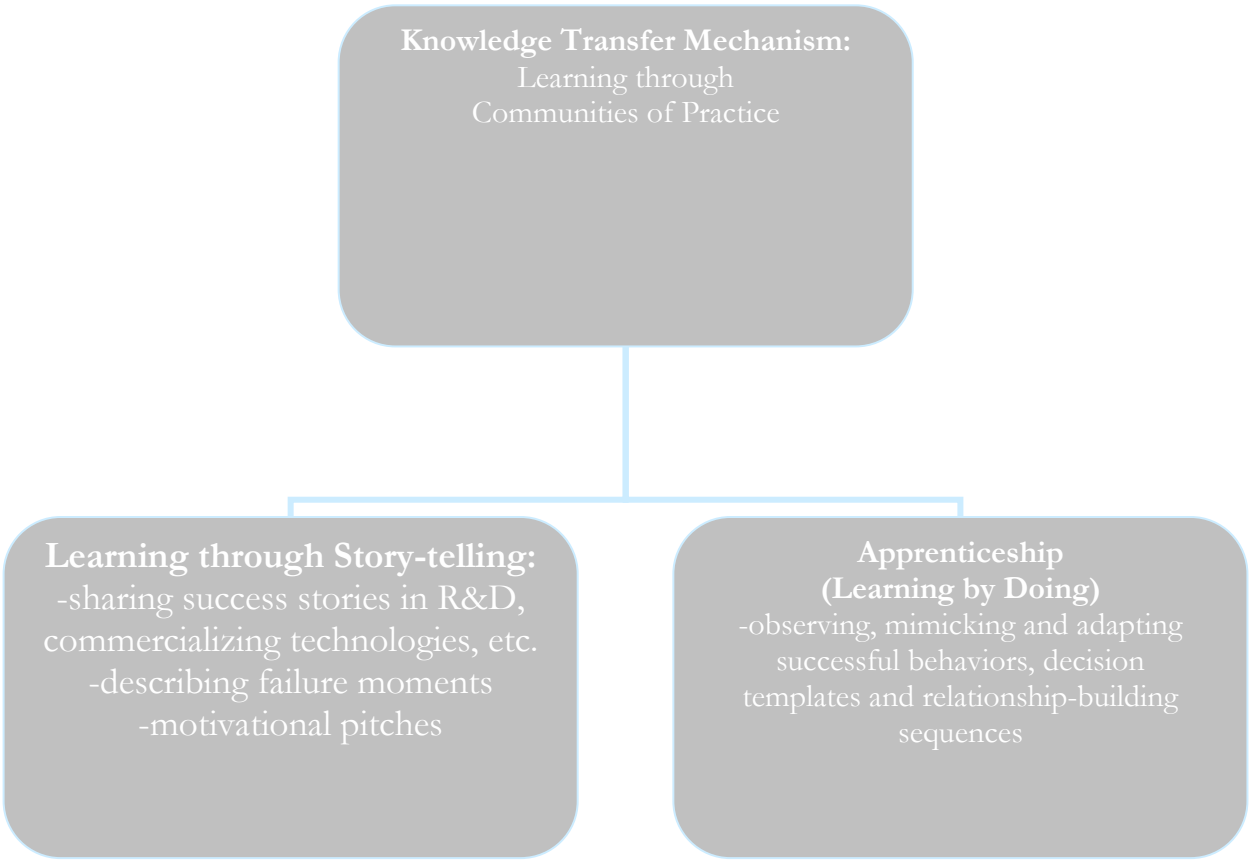
RESEARCH QUESTION NO.1: KNOWLEDGE TRANSFER MODEL

In exploring a knowledge transfer model, the researcher decided to focus on communities of practice, because this is a relatively understudied knowledge-transfer phenomenon that is particularly suitable for analyzing unstructured environments such as those in technology start-ups. In addition, mainstream knowledge-transfer mechanisms (training, coaching, lecture-based teaching, manual guides, etc.) are well explored elsewhere.

Communities of practice arise for two main interrelated reasons: (1) the inability of formal organizational routines to deal with dynamic problems (Brown and Duguid, 1991), and (2) difficulties associated with codifying certain organizational routines (Liebeskind, 1996). In other words, communities of practice emerge, because—for instance—emerging technology firms cannot overcome issues such as matching a radical innovation to future customer needs and markets or such as inability to re-peat the process through which a team of R&D scientists made a successful product. First, in dynamic environments it is difficult to anticipate all problems that can occur and to prescribe how they should be managed (Brown and Duguid, 1991). This would assume perfect rationality. As Simon (1957) pointed out, we strive to be rational, but inherent cognitive limitations impede us from having perfect predictive and interpretative skills. As a result, we are not able to predict every possible problem or to formulate appropriate routines to deal with these problems. Organizational studies demonstrate the value of dealing with unexpected 'shake-up's as a catalyst for growth (Meyer, 1982). More recent studies show the importance of responding to "disruptive technologies" (Christensen, 1997) or "discontinuities" (Foster and Kaplan, 2001) in order to thrive as market conditions change. **CoPs could thus be seen as informal social mechanisms that enable organizations to adapt to environmental pressures that trigger organizational crises and necessitate changes.**

Next, if we could codify routines, it is not certain whether they would be "perfectly" interpreted by the people using them. Even if our bounded rationality could be overcome, there are inherent challenges in formulating explicit routines. The difficulty in codification lies in the frequently tacit character of the knowledge on which routines are based, or in the fact that this knowledge is embedded in the individual (Nonaka and Takeuchi, 1995). Nelson and Winter (1982: 96-136) describe a type of tacit knowledge that is embedded in "routines" at the organizational level which no one person can understand completely. Moreover, since individuals are not necessarily aware of the knowledge that they possess, the question of what and whose knowledge should be codified arises (Polanyi, 1967). Furthermore, organizations might deliberately avoid to articulate all of their tacit knowledge base by imposing rigid organizational designs (formal hierarchies) and strict policies, because such a process could be costly as well as value destroying: once knowledge is codified, it could more easily leave the boundaries of the firm and thus lose its strategic value (Liebeskind, 1996). For instance, the process through which R&D teams arrive at innovative technologies is oftentimes left uncodified. **Therefore, CoPs could be viewed as informal structural phenomena that enable employees to function adequately at work through preserving, sharing and utilizing a firm's (tacit) knowledge base by circumventing organizational or institutional constraints (Brown and Duguid, 2001; Smith and Farquhar, 2000).**

Transferring tacit knowledge under such circumstances requires significant interaction and informal learning through storytelling and apprenticeship: two crucial processes which, arguably, only CoPs could provide (Snyder, 1996: 37-41). CoPs are thus probably the best vehicle for codifying knowledge, because they seem to overcome successfully the challenge of managing the interplay between tacit and explicit knowledge—what Cook and Brown (1999) describe as a "generative dance between organizational knowledge and organizational knowing" and also what Brown and Duguid (2000) refer to as a "balancing act between process and practice."



The differences between a community of practice and other similar organizational forms are summarized below.

Communities of Practice vs. other organizational structures (Wenger et al, 2002; Hackman, 1990; Brown and Duguid, 1991; Grandori 2001, Cohendet et. al. 2001)

	PURPOSE	Membership	Boundaries	Cohesion factors	LIFE SPAN

Community of Practice	To create, and transfer knowledge as well as to develop individual capabilities	Self-selection based on expertise or passion for particular topics	Blurred & interpretatively flexible	Passion, commitment, and identification with the group and its expertise	Organic evolution and dissolution: exists until relevant to the topic(-s) as well as until conducive to collective learning
Formal Department	To deliver a product or a service	Every one who reports to the group's manager(-s) based on the organizational chart	Clearly established	Job requirements and common goals	Permanent; only organizational restructuring could end its life cycle
TEAM ▪ *Operational*	To take care of an ongoing operation or process	Membership assigned by management	Clearly established	Shared responsibility for the operation	Exists until the operation is no longer needed
▪ *Project*	To accomplish a specified task	People who have a direct role in accomplishing the task; membership assigned by management	Clearly established	The project's goals and milestones	Predetermined ending (when the project has been completed)
Informal Network	To receive and pass on information, to know who is who	Friends and business acquaintances, friends of friends	Undefined	Mutual need and relationships	Never really start or end (exist as long as people keep in touch or remember each other

RESEARCH QUESTION NO.2: FACTORS AFFECTING THE KNOWLEDGE TRANSFER MODEL

Building social capital via mutual engagement. Members build their community through *mutual engagement* by interacting with one another, establishing norms and relationships of mutuality that reflect these interactions. To be considered competent is to be able to engage with the community and to be trusted as a partner in these interactions: e.g. the ability to speak a particular technical

jargon in the highly-specialized nano-nano composite research field. Through engaging with one another in the context of solving problems, communities are able to develop, maintain and reproduce their *shared repertoire* (see below). Mutual engagement serves a second purpose as well: through mutual engagement, individuals can acquire the ability to behave as a community member and to participate in the community (Lave and Wenger, 1991; Wenger, 1998). Within the community there are different levels of participation distinguished by the ability of a person to perform as a community member as well as by the degree to which a person is accepted as a community member.

Learning through joint activities. Members are bound together by their collectively developed understanding of what their community is about and they hold each other accountable to this sense of jointly-conducted projects. To be competent is to understand the enterprise well enough to be able to contribute to it.

Existence of shared repertoire. Communities of practice have produced a *shared repertoire* of communal resources such as language, routines, sensibilities, artifacts, tools, stories, styles, etc. To be competent is to have access to this repertoire and be able to use it appropriately. In this respect, the shared repertoire can be viewed as the means through which the community's problem-solving capacity is developed and disseminated as well as a manifestation of the accumulated tacit and explicit knowledge of the community (Boland and Tenkasi, 1995). Brown and Duguid (1991), in their seminal article on communities of practice, noted that a shared repertoire is formed, maintained and reproduced through three communication-based processes: *narration*, *collaboration* and *social construction*. The following discussion of these three processes follows the main propositions of Brown and Duguid (1991), also drawing upon relevant empirical literature.

Narration describes how people create and tell stories in order to improve their understanding of events. This is done through transforming incoherent accounts of events into a coherent story. Stories have an advantage over codified routines in that they are flexible and can therefore be adapted to each particular situation. The "richness" of stories fills in the gaps left by manuals. For example, Orr (1996) argues that the war stories shared by the Xerox repair technicians he has studied constitute a form of collective memory for their CoP, which enables them to diagnose hardware problems whose symptoms could not adequately be captured by formal (explicit) descriptions. Schank & Morson (1995), Davenport & Prusak (1998) and Denning (2001) explain that stories are often the best way to capture and transfer knowledge, because they integrate contextual information. Tsoukas and Vladimirou (2001) show how the Panafon call center's employees continuously exchange anecdotes that help them tackle complicated customer inquiries. Brown and Duguid further suggest that through story telling, people develop an understanding of the situation that encompasses cause and effect. Traditional midwifes in Yucatan, for example, make decisions how to assist a particular birth by sharing relevant stories that encompass not only their own experience, but also their mother's and grandmother's ones (Jordan, 1987). Of course, storytelling should not be viewed as neutral, since it can both bind and blind communities, if the stories' underlying assumptions are not questioned (Mezirow, 1991; Schein, 1985).

Collaboration, the second communicative process, refers to the joint character of the shared narratives; these are collaborative to the extent that they involve both storytellers and listeners. Through this interactive process, insights leading to the development of the community's and the individual's knowledge are formed, developed and exchanged. Further, given the collaborative

nature of stories, the individual member needs not know everything about how to solve problems, but can draw upon the cumulative knowledge of the community (Wenger, 1998, Tsoukas and Valdimirou, 2001). It has been argued in theoretical debates that collaborative storytelling and collective memory are of particular importance in the context of knowledge-intensive tasks that have often a complex character and require the cumulative knowledge of the group. (Teigland, 2000; Cross et al., 2002). However, few empirical studies applying CoP theory to knowledge-intensive tasks exist such as Storck and Hill's study of IT professionals in the Xerox Alliance (2000).

The second function of collaboration is to reduce ambiguity, or situations in which there are multiple conflicting meanings and people are not certain of the relevant questions to ask, or what are considered to be the right answers (Weick, 1979, 1995). Researchers have suggested that through collaboration community members are able to reduce ambiguity (Pava, 1983, Purser et al., 1992; Teigland, 2000). The reduction of ambiguity can be viewed as involving a series of iterative cycles in which 'the community'[4] discusses the problem at large and comes to some type of shared understanding of the situation (Weick, 1979). Ambiguity arises, because the meanings that people attach to situations are not a singular objective phenomenon, but are subjective, socially constructed and therefore multiple (Weick, 1979). For instance, Wenger (1998) describes how the insurance claims processors' CoP continuously discusses problems of classifying appropriately non-standard claims and how shared meanings about what is a non-standard claim and handling it properly are being built through negotiation within the CoP.

Social construction is the third element of *a shared repertoire* and refers to how meanings of one's activities are negotiated through dialogue with others to become accepted as knowledge (Berger and Luckman, 1966). Social construction takes place through narration and collaboration, the other two communicative processes. Brown and Duguid (1991) suggested that there is a second feature of social construction, *identity*, or how a person or group views and presents himself or herself. When individuals identify with a group, of which the community of practice can be considered one specific type, they adopt the dominant attitudes and values of the group (Ashforth and Mael, 1989). In communities of practice, this can take the form of adopting the behavior of other members in terms of the *shared repertoire* that defines the community. By being identified as a community member, he or she can access the cumulative knowledge embedded in the community (Brown and Duguid, 1991).

[4] Here, of course, the term "community" refers to communities in general, of which CoP is but one specific type.

Factors that Enable Development of Communities of Practice and thus Affect the Knowledge Transfer Processes (developed after Wenger, 1998; Brown and Duguid, 1991)

CONDITIONS & PROCESSES		
Learning through joint activities	**Building social capital via mutual engagement**	**Existence of shared repertoire**
○ Are there shared ways of engaging in doing things together? ○ What are the opportunities to negotiate a joint inquiry and generate important questions regarding the community's domain of interest? ○ Do members identify gaps in their knowledge and work together to address them?	▪ Are there sustained mutual relationships: harmonious or conflictual? ▪ Are members able to raise troubling issues during discussions? ▪ Is there a rapid flow of information and propagation of innovation? ▪ Is there absence of introductory preambles, as if conversation and interactions were merely the continuation of an ongoing process? ▪ Is there a substantial overlap in participants' descriptions of who belongs? ▪ Do members know what others know, what they can do, and how they can contribute to an enterprise? ▪ What events and interactions weave the community and develop trust?	(1) <u>Narration:</u> ▪ Do local lore, shared stories, inside jokes, knowing laughter exist? ▪ Is there a shared discourse reflecting a certain perspective on the world? (2) <u>Collaboration:</u> ▪ Do specific tools, representations and other artifacts exist? ▪ Does jargon and shortcuts to communication exist? Is it easy to produce new ones? (3) <u>Social construction:</u> ▪ Are there mutually defining identities? ▪ Are there certain styles recognized as displaying membership, leadership/followers hip?

CASE STUDY: EMERGING TECHNOLOGY FIRM AND ITS VENTURE CAPITAL INVESTOR

RESEARCH QUESTION NO.3: VALUED-ADDING MECHANISMS AND CHOICE OF TECHNOLOGY

This brief case study aims to illustrate how the identified resource-based and knowledge transfer value-adding mechanisms (and their constituent factors) used by FUND have influenced the management of R&D in START-UP. In particular, I am summarizing three subsequent **critical** decision points in the development of the nano-nano composite material technology that showcase the above:

1. **Framing future functional applications and markets** *(May 2000).* Here, a community of practice comprising FUND executives with specialist expertise transferred knowledge of functions and markets to the START-UP researchers and give a specific direction for the R&D efforts. See map of the knowledge flows in the community of practice below.

2. **Deciding how to segment the customers based on technical and marketing criteria** *(November 2000).* Here, resource-based value-added services by FUND (in particular, core customer competence and market knowledge) enabled START-UP to allocate scarce human resources and financial capital to engineering a product matching the needs of the most promising customer segment.

3. **Identifying the directly competing technologies/substitutes and deciding in market niche to compete** *(March 2001).* Here, FUND experts add value by leveraging the FUND's strong network (indeed, managing successfully relationships with its external stakeholders is a core competence of FUND) among state and European Commission regulators to offer discretionary tax-credits for environmentally-friendly technologies such as the nano-nano composite materials.

Profile of FUND. FUND is a 2.5 billion Euro private equity and venture capital fund based in Europe, but investing on a global basis. Its primary coverage industries are IT, healthcare, advanced basic materials, telecoms, retail & consumer, and leveraged transactions (LBOs). The FUND staff comprises 110 professionals who oversee a portfolio of 47 companies (as of December 2004).

Profile of START-UP. START-UP is a small emerging-technology firm founded by three doctoral students at the Imperial College in London upon their discovery of a nano-nano composite material for catalytic uses. FUND invested 7.5 million Euro in START-UP in 2000 during the first-round of financing and later supplied an additional 10 million Euros. The nanotechnology invented by START-UP received patent in 2003. The firm employs 10 more individuals in R&D and marketing/sales roles in addition to the founders. Three FUND professionals sit on the board of FUND and provide direct consulting/management services: Jones (Executive Director at FUND and member of the Materials & Manufacturing Industry Team), Torvald (Managing Director at FUND and member of the Chemical Technology Team) and Anscombe (Managing Director at FUND and member of the Automotive Industry Team).

Note: For a list of all interviewees at FUND and START-UP relevant to the case study, please refer to the Appendix.

FUND's unique technology: nano-nano composites for catalytic uses

START-UP has developed unique nano-nano composites for catalytic uses. This advanced composite material can be used in the next generation of vehicle catalysers. The key element of the technology is a layer of nonporous materials with nanoscale dispersions of the various phases—nano-nano composites—which is applied to the basic structure of catalytic converters common today. The new layer is particularly effective and fittingly designed for these applications. It also allows catalysers to run at higher temperatures, thus giving better performance. In the car industry, for example, little infrastructure adaptation is necessary. No patents were issued when the technology transfer activity was started at the time FUND invested; a patent approval has recently been attained through a sped-up process facilitated by FUND's connections.

The procedure for the production of the material is sketched briefly here. An alumina–ceria nano composite is used to have a finer grained catalytic material (3 μm thickness coating vs. presently 100 μm). This product allows thin coatings to be produced on a suitable substrate. A sol–gel method is used to hydrolyze a mixture of aluminum and cerium salts in the presence of urea. This precipitation method yields a voluminous transparent gel that is calcinated to produce a ceramic powder very suitable for catalysis applications. A wash coat consisting of a γ-Al2O3 catalyst support with a dispersed cerium oxide "oxygen storage" component and a noble metal (Pt, Pd, Rh) catalyst is generally used to coat a cordierite honeycomb structure.

MARKET ANALYSIS

The overall potential market was evaluated at first. Principal segmentation criteria were the following: (1) function of the catalytic materials; (2) nature of the pollutants to be eliminated; and (3) same market structure and relationships between key players.

Functional analysis

Concerns about automotive, industrial and domestic exhaust pollution have put forward the importance of catalytic purification. Under the pressure of the Euro2000 norms, the automotive industry had to improve the efficiency of catalytic converters. Research and development (R&D) is now mainly carried out by the catalyst manufacturers, who follow three main research tracks:

- Lower the light-off temperature to improve the efficiency of the engine;
- Obtain good DeNOx properties; and
- Put the catalytic converter closer to the engine, which produces the need to withstand higher ranges of temperature (above 1000 °C sustained).

In view of the new performances made possible by START-UP's nano-nano composites for the catalytic applications technology, several functions were envisaged and related to various applications (see exhibit below).

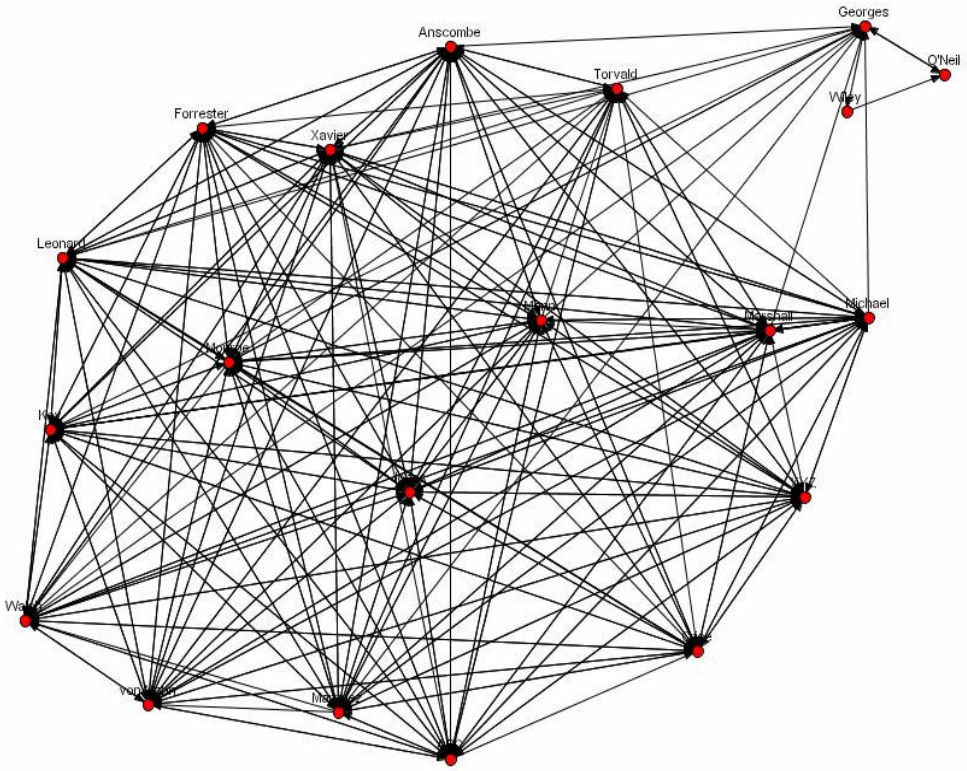
First Decision Point (May 2000): FUND helped frame the future functions, markets and applications for the nano-nano composite technology through the community of practice. This is

the first time the START-UP researchers fully realize the seemingly boundless potential of their innovative technology. Subsequently, they start developing prototypes of the composite material in view of testing each for the functions identified according to perceived customer needs.

Functional analysis of potential applications for the nano-nano composites

Functions and Benefits to Customers	Market/ Customers	Direct Application
Catalytic purification of exhausts: ▪ Lower costs ▪ Better engine performance ▪ Recyclable product	Automotive industries Auto parts industries Catalyzer manufacturers	Catalytic car converter
VOC purification: ▪ Lower investments ▪ Lower production cost ▪ VOC efficiency	Pollution-heavy industries (chemical, paper, petrochemical, gas, waste treatment and disposal)	Industrial purification system
Catalytic combustion: ▪ High-temperature efficiency ▪ Lower production costs ▪ Low emissions relative to traditional methods	Gas industry Heater manufacturers Power plant engineers Turbine manufacturers	Catalytic combustion unit for central heating units, industrial burners and gas turbines

Map of knowledge flows in the community of practice comprising FUND experts & START-UP researchers during First Decision Point. *(List of all members in the Appendix)*



Market segmentation
Segmentation was done on a technical and marketing basis, with the function of the catalyser material as the differentiating factor. Three segments were identified:

a) Catalytic car converters;
b) Gas equipment for purification of volatile organic compounds (VOCs); and
c) Catalytic combustion units.

The first segment: catalytic car converters. Catalysers are produced in Europe mainly by the three big manufacturers. These companies (the "big three") also coat the cordierite honeycomb furnished by small, non-strategic companies. Car part manufacturers only make the steel canning of the catalytic unit. These companies do not actually possess research teams working on catalytic exhaust converters, except for some companies, which want to become centres of expertise independent from catalyser manufacturers. Car manufacturers have technical R&D teams carrying out studies and making validation tests for new materials and processes. Possible customers for this market consisted of:

- Manufacturers of catalysers (the "big three" and the small manufacturers working in that field, often linked with major chemical groups);
- Automotive manufacturers; and
- The car equipment industry

In total, a test market consisting of about 135 companies was identified for this segment. The European market for car catalysers is about 900 million Euro, and the world market is around four times as big. The market is growing at 9% per year. In Europe, special emphasis is placed on diesel engine catalysers, whose market is expanding at 12% per year. Diesel catalysis is newer, and diesel engines are more common in Europe than in the USA, so that most of the research in this field is carried out in European plants. As millions of car converters are produced each year, the industrial process is fundamental. The "big three" are key players in the field as they are the only ones able to determine the industrial feasibility of a scientific project.

The second segment: gas equipment VOC purification systems. The main source of VOCs is domestic heating units, but the market is far too fragmented to bear costly developments such as the ones figured here. The biggest potential application in this field is the industrial treatment of VOCs, mainly in gas-related industries. These industries can make the biggest efforts to eliminate VOC pollution through research and installation of innovative equipment. They are financially strong and could be forced by European regulations and norms to develop catalytic techniques. Identified possible customers for this market were:

- Catalyser manufacturers (only a few companies in the EU are active in this field);
- R&D companies for the gas and petrochemical industry. (During exploitation, transport or refining of gas and fuels, huge amounts of VOCs are emitted. These industries are both centres of technology transfer and end-users).
- Gas equipment manufacturers (mainly turbines; manufacturers of heaters and burners did not show interest)

- Large chemical companies, which are able to transfer the technology and make further developments.

One problem is that these industries have already carried out extensive research in the field of VOC control. A test market consisting of about 70 companies has been identified for this segment. The market is global, worth 40 million Euro in Europe and 90 million Euro in the USA. European norms are expected to become stricter in about five years, with their impact on the European market difficult to evaluate.

The third segment: catalytic combustion units. Catalytic combustion is a low-polluting alternative to gas burners and gas turbines. The companies involved are small R&D outfits dealing with gas-related devices and specialized catalyser manufacturers, which are often engaged in long-term collaboration and development with the smaller R&D outfits. End-users, such as industrial or domestic burners or turbines manufacturers, only adapt these devices to their existing equipment. The identified potential customers for this market were:

- Catalyser manufacturers;
- Gas company R&D departments; and
- End-users, like burner and turbine manufacturers.

However, they will not become key players until regulations and norms are reinforced. A test market of about 22 companies has been identified for this segment. At the time of the analysis, US market size was around 35 million Euro (predominantly in California) and about 7 million Euro in the EU. This difference originated from the gap between EU and California regulations for turbine exhausts and pollution control. Pollution thresholds were lower in California.

Second decision point *(November 2000):* FUND contributed its core customer competence and market knowledge in nanotechnologies (resources) to the START-UP researchers, thus making it possible to allocate the valuable research personnel and financial capital to engineering prototypes for each segment. In particular, 70% of the funding and 50% of the personnel were allocated to the most lucrative first segment (car converters); 20% funding and 30% personnel were assigned to the second segment (VOC systems); and 10% funding and 20% personnel were devoted to the third segment (combustion units).

Competing technologies and actors

Most of the R&D work in Europe is concentrated on catalytic car converters, in particular purification of gas pollutants from diesel engines. The identified competing technologies and actors are summarized in the following exhibit

Competing technologies and their producers

Applications	Competing Technologies	Competitors/Producers
Catalytic car converters	Other material compositions, exhaust heater systems	Chemical industry, automotive industry, catalyzer manufacturers
	Combustion optimization	Car equipment

	systems (direct injection, common rail)	manufacturers, automotive and engine industries
Industrial purification systems (mainly for VOCs)	Physical techniques for aggregating and concentrating VOCs	Chemical industry
Catalytic combustion units for central heating units, industrial burners and gas turbines	Chemical techniques for precipitation of VOCs, carbon absorption	Petrochemical industry
	Biological degradation of VOCs	Manufacturers of biofilters
	Conventional burners	Manufacturers of heaters, burners and catalytic turbines

Third decision point *(March 2001):* FUND experts add value by identifying the competing technologies and by leveraging the FUND's extensive network with the European Union's environmental protection agencies to solicit tax-incentives for producers of environmentally-friendly technologies such as the nano-nano composite materials. In effect, FUND succeeded eventually to put at disadvantage (together with a coalition of other prominent VC funds invested in START-UP) chemical industry producers of industrial purification systems and to grab a significant market share at lunch of the product. Here, FUND used its core competence in managing successfully relationships with its external stakeholders to benefit the START-UP's research-and-development efforts. As a result of this competitive positioning, START-UP R&D re-focused overwhelmingly on engineering composite materials for VOC purification systems.

CONCLUSION

The present research project focused on the mechanisms through which venture capital investors may add value to their emerging-technology portfolio companies. Drawing upon the resource-based and knowledge-based theories of the firm, communities-of-practice knowledge transfer literature, and the results of my interviews with VC investors and emerging technology start-ups, I identified and explored the following two key value-adding mechanisms:

(a) Non-financial resource-based contribution
(b) Knowledge transfer

Focusing on these two mechanisms, I further examined the specific factors influencing the effectiveness of the resource- and knowledge-transfer value-adding processes. Finally, I illustrate in a brief case study how—through the above-mentioned value-adding mechanisms—VC investors influence investees' R & D management decisions about which emerging technologies are worth pursuing and how to allocate scarce resources to technology pipeline projects.

APPENDIX

UTILIZED CONCEPTS

Venture Capital. The National Venture Capital Association defined venture capital as: "money provided by professionals who invest alongside management in young, rapidly growing companies that have the potential to develop into significant economic contributors" (NVCA, 2001). Lorenz (1989) defined venture capital as long-term equity-based risk finance where the primary reward for the investor is capital gain. Bygrave and Timmons (1992:1) described venture capital as having a catalytic role in the entrepreneurial process, being fundamental value creation that triggers and sustains economic growth and revival. Wright and Robbie (1998) defined venture capital as investments by professional investors of long-term, unquoted, risk equity finance in new firms where the primary reward is eventual capital gain supplemented by dividend yield.

However, the above definitions primarily focus on the types of investments venture capitalists make and the rewards they gain from it. An alternative perspective that informs and inspires the present study is advanced by Gomper and Lerner (1999:2-4). They argued that venture capital can be regarded as a cycle that starts with the raising of a venture fund, proceeds through the investing in, monitoring of, and adding value to firms. The cycle continues as the venture capitalists exit successful deals and return capital to their investors, renewing itself as the venture capitalist raises additional funds. This definition points to the critical value-adding role of venture capitalists that extends significantly to the non-financial benefits the portfolio companies receive from the investor as a result of the investment relationship (Hellmann and Puri, 2000; Sapienza, 1992).

Resources. Penrose (1959:67) defined resources as "physical things that a firm buys, leases, or produces for its own use, and the people hired on terms that make them effectively part of the firm." Other authors such as Wernerfelt (1984:172) defined resources as "anything, which could be thought of as a strength or weakness in a given firm. More formally, a firm's resources at a given time could be defined as those (intangible and tangible assets) which are tied semipermanently to the firm." In particular, Wernerfelt (1984:172) listed as resources brand names, in-house knowledge of technology, employment of skilled personnel, trade contracts, machinery, efficient procedures, and capital. Barney (1991:101), in a similar fashion, defined resources as "all assets, capabilities, organizational processes, firm attributes, information, knowledge, etc. controlled by a firm that enable the firm to conceive of and implement strategies that improve its efficiency and effectiveness" (Barney, 1991: 101).

Authors such as Amit and Schoemaker (1993) see a difference between resources and capabilities: "Resources can be defined as stocks of available factors that are owned or controlled by the firm… Capabilities, in contrast, refer to a firm's capacity to deploy resources, usually in combination, using organizational processes, to effect a desired end."

Knowledge. An influential academic stream of research distinguishes two types of knowledge, tacit and explicit (Polanyi, 1958). This distinction has been the basis for the emergence of the knowledge-based view of the firm (Grant, 1996; Kogut and Zander, 1992). The KBV argues that because tacit knowledge is difficult to imitate and relatively immobile, it can constitute the basis for sustained competitive advantage (Kogut and Zander, 1993).

The relationship between the terms knowledge and resources varies in the literature. While physical resources such as land or money are clearly distinct from tacit knowledge possessed by the employees of the firm, there is a large overlap between the concepts. The present research focuses on the outcomes of relationships between emerging technology-based firms and their venture capital investors. In examining these relationships, I will refer to resource contribtuion when meaning contribution of, or access to, concrete resources such as distribution channels, production facilities and technology. When referring to knowledge transfer, I will mean the learning by portfolio companies from their venture capital investors that enables them to use their own resources more efficiently and effectively (Penrose, 1959: 76).

Knowledge Transfer. Knowledge transfer that enhances heterogeneous resource coordination requires a process of mutual perspective sharing to exchange individual knowledge between organization members (Tenkasi & Boland, 1996), mutual engagement and a shared repertoire (Wenger, 1998), the construction of collective meaning (Dixon, 1997), or uniform understandings across organization members of possibly different interpretations (Huber, 1991). For any coordinated action to take place, it is essential to (partly) know what others know. The issues involved in these delicate processes constituting learning and adaptive efficiency are, among others, the stickiness of information (Szulanski, 1996), and proprietary and political concerns related to agency problems.

Learning in Organizations. From an interpretivist perspective, learning in organizations is described in terms of negotiated order (Strauss, 1978), the negotiation of meanings (Wenger, 1998), alignment effects (Law, 1994; Suchman, 2000), or processes of collective sense-making (Weick, 1995). Practice-based theories of learning argue that it is acquired through participation in communities of practice (Brown and Duguid, 1991; Lave and Wenger, 1991; Wenger, 1998). Organizing, in this view, can be seen as an 'activity system' which reveals the tentative nature of knowledge and action (Blackler, 1993, 1995; Blackler et al., 2000), with incoherencies, inconsistencies, paradoxes and tensions being integral parts of every practice. Knowledge and action are located in ecologies of social–material relations (Fujimura, 1995; Star, 1995) and knowing is enacted (Weick, 1979), situated (Suchman, 1987), resilient, but provisional (Unger, 1987), public and rhetorical (Vattimo, 1985). Practice involves the accomplishment of alignments across human and non-human elements (Latour, 1986; Law, 1994) from a particular positioning at a particular time within a network of relations (Suchman, 2000).

Knowledge Networks. Social capital theory suggests that inter-organizational relationships facilitate the exchange of knowledge and resources (Nahapiet and Ghoshal, 1998; Tsai and Ghoshal, 1998). According to Nahapiet and Ghoshal, relationships providing access to the physical resources can be considered a higher-order resource for the individual or organization, hence the term 'social capital.' Social capital has several dimensions (Granovetter, 1985; Nahapiet and Ghoshal, 1998; Tsai and Ghoshal, 1998). Nahapiet and Ghoshal (1998) defined three of them: structural, relational and cognitive. The structural dimension refers to network ties, network configuration, and appropriable organization, while the relational one refers to assets that are based on relationships such as trust, norms, obligations and identification. The cognitive dimension refers to shared codes and language as well as shared narratives that facilitate a common understanding of collective goals and the proper ways of acting in a social system.

Complementarities. Complementarities refer to the degree the portfolio company and its venture capital investor firm (its network of contacts, in-house expertise, and its other portfolio investees) complement each other. The complementarities can be related in resources and capabilities, products and services, or some other aspects. Complementarities are not necessary related to the concept relatedness. The key determinant of complementarity is whether the success of one player is positively related to the success of the other player (Brandenburger and Nalebuff, 1996). Amit and Zott (2001) argued that, "complementarities are present whenever having a bundle of goods together provides more value than the total value of having each of the goods separately."

List of interviewees at FUND and MOTION with their job position and business unit

Company	Name	Position	Industry Group
FUND	Jones	Executive Director (ED)	Materials & Manufacturing *Account Manager for START-UP*
	Torvald	Managing Director (MD)	*Senior Account Manager for START-UP* Chemical Technology Group
	von Mahn	Executive Director (ED)	Hi-Tech/ Hardware Group
	Anscombe	Managing Director (MD)	*Senior Account Manager for START-UP* Automotive Industries Group
	Crise	Managing Director (MD)	Oil & Gas Group
	Mann	Associate	Leveraged Transactions Group
	XYZ	Acting CFO, London/Europe	Member of the Management Committee
	Marshall	Managing Director (MD)	Co-head of the Telecom Investment Group
	Michael	Managing Director (MD)	Head of Leveraged Transactions Group
	Forrester	Associate	Leveraged Transactions Group
	Leonard	Managing Director (MD)	Oil & Gas Group
	Marquez	Executive Director (ED)	Petrochemicals Group
	Key	Executive Director (ED)	Basic Materials Group
	Walsh	Managing Director (MD)	Co-head of Investor Relations Group
	Maister	Managing Director (MD)	Co-Head of Mezzanine Financing

	Xavier	Executive Director (ED)	Retail & Consumer Group
	Monroe	Managing Director (MD)	Member of the Management Committee
	ABC	Chief Executive Officer (CEO), London/Europe	
START-UP	Wiley	Chief Executive Officer (CEO)	Firm co-founder and co-inventor of the advanced composite materials technology
	O'Neil	COO	Firm co-founder
	Georges	Head of Research & Development (R&D)	Co-inventor of the advanced composite materials technology

Note: As requested by the interviewees, all names are changed to protect the respondents' identity

The Venture Capital Investing Cycle

Stage of Financing	Features
Deal origination	▪ Most deals are referred to by third parties ▪ Referrals by other VCs are often invitations to join syndicates. ▪ VCs are rarely proactive in searching out deals
Deal screening	▪ Most frequently-used screening criteria are: technology and/or market; stage of financing
Deal evaluation	▪ Decision to invest based upon expected return compared with level of risk. Factors considered include: ▫ Market attractiveness ▫ Product differentiation ▫ Management team capabilities ▫ Protection of business from uncontrollable factors, e.g., competition, product obsolescence.
Deal structuring	▪ VC funds use a wide range of approaches. An aim can be to help motivate managers to perform. ▪ Price can be determined by: quality of opportunity; past experience with similar deals and so on.
Post-investment activities	▪ Venture funds provide management guidance and business contacts ▪ Representatives of venture funds normally sit on boards of operating businesses; they assist with development of business strategy. ▪ Venture fund representatives can act as "sounding boards" for operating business management