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Towards a resource-based view on corporate incubators

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Corporate incubators for technology development are a recent phenomenon whose functioning and implications are not yet well understood. The resource-based view can offer an explanatory model on how corporate incubators function as specialized corporate units that hatch new businesses. While tangible resources such as financial, physical and even explicit knowledge flow are all visible and therefore easy to measure, intangible resources such as tacit knowledge and branding flow are harder to detect and localize. Managing the resource flow requires the initial allocation of resources to the corporate incubator during its set-up as well as continuous resource flow to and from the technology venture by ensuring stability through senior management. Two level of analysis need to be distinguished: (1) resource flow between corporate incubator and technology venture, and (2) resource flow interface between corporate incubator and technology venture.

Our empirical findings are based on two phases: First, a benchmarking survey of 77 incubators conducted by the European Commission, and second, in-depth case studies of 25 companies through 52 semi-structured interviews with managers of corporate incubators of large technology-intensive corporations in Europe and U.S.

1. Introduction

1.1 Rise and fall of incubators

Incubators have emerged as a prominent organizational form of R&D management only recently. An incubator is an entity that 'hatches' new ideas by providing physical resources and support to nurture the growth of new business ventures which can be an independent start-up or an internal corporate venture (Allen and McCluskey, 1990; Hansen et al., 2000a). Although incubators have been around for some time, their most recent growth needs to be analyzed. From 1998 to early 2000 the number of for-profit incubators increased substantially along with a boom in venture capital. For example, in the U.S. the number rose to more than 900 incubators in contrast to 12 incubators in 1980 (NBIA, 2000).¹ While most of these independent for-profit

incubators have since ceased operations, corporate for-profit incubators continue to be important as an option for large, technology-intensive corporations.

In the late 1990s independent for-profit incubators were increasingly set up, leading to the creation of a group of new names and business models such as accelerators, hatcheries or greenhouses. These new for-profit incubators enhanced their services offered including:

- Space and professionally managed shared services in-house;
- Comprehensive coaching including strategic positioning of the start-up and operational changes;
- Board representations to support negotiation, structuring financing deals and recruiting;
- Networking and facilitation of partnerships;
- Synergies between the different portfolio companies; as well as
- Financing in the form of direct funding or via affiliated

¹ For example, the number of for-profit Internet incubators

doubled between December 1999 (112 Internet incubators) and May 2000, to 214 incubators, tapping opportunities of the New Economy (Hansen et al., 2000a, p. 8).

VC funds with often high equity stakes in the start-up.²

With the approach of active ownership incubators were quite successful from 1998 to 2000, fueled by new opportunities from the Internet boom and venture capitalists' and angel investors' increasing appetite for technology start-ups. Success was also marked by fast profits through Initial Public Offerings in the bullish financial market. After the market correction and rapid decline of Internet and high-tech businesses beginning in early 2000, many of these independent incubators shrunk or disappeared along with venture capital funds. However, corporate incubators have increased in importance (Figure 1). They have learned from the rise and fall of independent incubators and have taken over some of their processes, instruments and mechanisms.

Figure 1: Development of corporate incubators

Recent research has not distinguished between non-profit and for-profit incubators, which can also be differentiated by whether they are organized as independent organizations or linked to a corporation. *For-profit incubators* focus on financial returns for the owners. They achieve positive gains through service fees and equity stakes in new ventures in the medium-to long-term. For-profit incubators include *independent* for-profit incubators that aim to gain fast profits from successful start-ups, or *corporate incubators*, that want to extract value from their portfolio of technologies or explore new technology for their core business.

Corporate incubators are specialized corporate units that hatch new businesses and enhance a corporation's technology base to support its overall development and growth. The object of their support can be external or internal start-ups or intrapreneurs with a promising business idea or technology, which will be summarized hereafter as *technology ventures*. Corporate incubators realize technological options as part of an overall corporate mission and thus gain profits in the medium

to long-term. Being part of a larger corporation, corporate incubators take into account long-term strategic goals and the fit with the parent corporation but are also able to leverage the parent's resources.

1.2 Literature review on resource-based view and incubation

The resource-based view of the corporation has its roots in work of (Penrose, 1959; Chandler, 1977; Nelson and Winter, 1982) and describes how corporations can create a competitive advantage through core resources and capabilities (Wernerfelt, 1984; Hamel and Prahalad, 1990; Barney, 1991; Grant, 1991; Peteraf, 1993). Large corporations have extensive resources which are vital and therefore core if they are to meet four conditions (at least partially): The resource is valuable for the corporation, rare, hard to imitate and cannot be easily substituted (Barney, 1991).

Resources as the basic unit of analysis can be defined in a generic term as input through which the corporation can perform operations and thus create economic rents (Grant, 1991; Amit and Shoemaker, 1993; Black and K., 1994). Barney detects financial, physical, human and organizational resources (Barney, 1991), an idea which Grant extended with two other factors - technology resources and reputation (Grant, 1991). Itami and Roehl introduce the concept of 'information-based resources', which they name "invisible assets" (Itami and Roehl, 1987). These include management skills and experience, distribution control, corporate culture, consumer trust and brand image. (See also classifications by Aaker, 1989; Hall, 1992). One important but often overlooked catalyst is the management resource because the corporation's managers and management team will recombine the firm's resources (Penrose, 1959; Aaker, 1989). Resources are stocks while capabilities are resource flows (Dierickx et al., 1989).

According to Tushman it is puzzling why large technology corporations, despite their size and access to resources, often fail to develop and sustain their competitive advantage (Tushman and Anderson, 1997). Possible reasons could include their higher risk aversion leading to incremental rather than radical innovation, or that their bureaucratic structure and control systems impede intrapreneurship and the development of disruptive technology. Incubators can support enhanced technology development and commercialization. The formal operational link between centers of knowledge creation and an incubator facilitates the technological transfer to commercialized products Jaffe, 1989; Acs et al., 1994; Felsenstein, 1994; Westhead and Storey, 1995). Large mature corporations can also use corporate incubators to overcome innovation barriers, and thus pioneer new products or services and support the growth of the corporation (Burgelman, 1984; Vesper, 1990). Thus corporate incubators can be one option for large technology-intensive corporations to support their technology development.

The corporate incubator can support external entrepreneurs or internal intrapreneurs who pursue opportunities despite their resource constraints (Stevenson and Jarillo, 1990; Timmons, 1999) by filling their physical

² Overall, equity stakes were quick to realize financial gains, the higher and earlier the independent for-profit incubator was involved in the start-up. e.g. self-conceived idea (over 50%), business plan development (20-50%) and support market launch at a later stage in the start-up's life cycle (only 5-20%) of equity stakes.

as well as intangible resource and knowledge gaps. Achtleiter and Engel distinguish incubation services provided between financing, infrastructure, consulting and networks (Achtleitner and Engel, 2001a, p. 29). [See for other service clustering such as shared services, assistance and financing (Allen and Rahman, 1985; Schroeder, 1990; Westhead and Batstone, 1999; Achtleitner and Engel, 2001a; Seidel, 2001; Commission, 2002)]. Once technology ventures are selected into the incubator, the interaction mechanism between incubator manager and technology venture determines the scope of resource flows during the involvement phase (MacMillan et al., 1986; Lumpkin and Ireland, 1988; Rice, 1993; Rice and Abetti, 1993). Quality and output of business assistance vary, depending on the “co-production dyad”, with the incubator as producer of business assistance and the entrepreneur as consumers of those outputs (Rice, 2002). The incubator manager is often described as the “great man” (Campbell, 1989) providing networking, counseling, emotional support and expertise (Smilor and Gill, 1986; Rice and Abetti, 1992). Proactive management of the incubator manager builds the base for knowledge dissemination to the start-up through counseling and transfer of business skills and advice (Dierdonck, 1991; Westhead and Batstone, 1999).

While incubator managers stress the importance of physical goods, technology ventures tend to place greater value on intangible skills passed on through physical co-location. Also, the credibility that start-ups derive from affiliation with an incubator is important in terms of creating contacts with potential industry experts, customers, and suppliers. By examining the impact of the incubator manager responsible for the day-to-day support on resident start-ups in high-technology incubators, Seidel found four intangible resources to be most beneficial for the entrepreneur: network of contracts, CEO expertise from the incubator manager, regular performance feedback and benchmark against other entrepreneurs, and signalling effect through incubator affiliation (Seidel, 2001).

In their comprehensive worldwide survey of for-profit independent incubators, Hansen, Berger and Nohria found that networks are one of the most important factors for new ventures in the e-commerce economy. “Network incubators” create high value through providing access to potential customers, suppliers and service providers (Hansen et al., 2000a; Hansen et al., 2000b); similar findings for Germany were derived by (Achtleitner and Engel, 2001b).

In the case that the incubator cannot provide the missing resources and knowledge by itself, the incubator takes on the role of a broker or gate-keeper in coordinating third-party services (Colombo and Delmastro, 2002). Smilor and Gill introduced the concept of a “know-how network” of the incubator, which includes technical experts, marketing, intellectual property lawyers, accountants, potential debt or equity investors and other types of consultants or service specialists (Smilor and Gill, 1986). The importance of social networks for entrepreneurs has been widely examined (Birley, 1985; Aldrich and

Dubini, 1991; Hansen, 1995; Ostgaard and Birley, 1996). The incubator is able to extend the entrepreneurial network of the new venture to potential customers, suppliers and service contractors (Rice, 2002).

Besides the incubator literature that analyses how start-ups can support young companies by providing physical resources and support, corporate venturing focuses on how tools such as corporate venturing and intrapreneurship can enhance innovation in large mature corporations. Several programs of research have been conducted on intrapreneurship and its potential for creating new businesses rewarding the individual (Burgelman, 1984; Pinchot, 1985; Hisrich, 1986; Vesper, 1990; Bitzer, 1991; Dyckerhoff, 1995).

One of the biggest advantages of a corporate venture is its access to corporate resources such as capital, expertise, branding and networks. Comparing corporate ventures with independent entrepreneurial ventures, Shrader found that corporate ventures emphasize proprietary knowledge, marketing expertise and internal capital funds in contrast to independent ventures (Shrader and Simon, 1997). Since capital for the corporate venture is often provided in a political budget process (Burgelman and Sayles, 1986), the commitment of funds is not always consistent with the business development process and can be easily redirected (Fast, 1981). As well, access to time-sensitive resources can be delayed through bureaucratic decision-making (Kanter, 1989, p. 217). On the other hand, the corporate venture can use underutilized capacities of the corporation and therefore realizes economies of scale. The corporate venture can thus benefit from the corporation’s reputation and trademarks and can leverage these long-term relationships in order to gain access to a distribution system at low cost or to negotiate benefits from input suppliers (Caves and Porter, 1977). Finally, the corporate venture has strong marketing expertise and knows the needs of its customers. However, corporate venturing often receives little real corporate commitment in the form of continuous funding and reporting to senior management (Lerner, 2000, p. 445). “The typical corporate venture capital program has been terminated within four years of being launched.” (Gompers and Lerner, 2001, p. 145).

This paper analyses corporate incubators from a resource-based view by resource flow and resource source. From the wide range of resource classification, *resource flows* are distinguished between tangible or intangible, reflecting the extent of their flexibility for change (Chatterjee and Wernerfelt, 1991). While physical resources such as raw materials, equipment and production facilities can be more easily changed and imitated by competitors, intangible resources such as reputation or brand name, organizational culture and tacit knowledge do not appear on the corporation’s balance sheet, and thus are harder to change or even to copy. Resources include *tangibles*, such as financing, physical space and infrastructure, as well as harder to measure *intangible resources* such as management know-how, organizational skills and the enhancing of networks with potential customers. While physical resources can be easily changed and imitated, intangible resources are harder to understand and thus limit change or are copied. As seen in Figure 2, particular tangible and intangible

knowledge flow is comprehensive since it involves interaction and coordination inside the corporation as well as with outside networks, but often is hard to detect. Intangible resources create the iceberg effect under the surface. They are not immediately visible, but a project can go down if not conscious of the intangible flow.

Figure 2: Resource distinction

Regarding the *source of resources*, the corporate incubator can use its own resources, enhance its resources by leveraging the parent corporation or tap external resources outside the corporation. This paper excludes external resource sourcing which can come from a variety of sources such as public funding (e.g. federal laboratory, government agency) or outside investors (e.g. venture capitalists, banks angel investors) the latter reducing investment risk through diversification.

Managing the resource flow requires two level of analysis: (1) resource flow between corporate incubator and technology venture during the involvement phase of incubation; and (2) resource flow between corporate incubator and parent corporation during the initial set-up as well as continuous distribution to the portfolio of technology ventures.

Thus, the structure of this paper follows the distinction by source of resource: Section 2 describes the resource flow between corporate incubator and technology venture, while section 3 focuses on the resource flow between corporate incubator and parent corporation.

1.3 Research methodology and sample

Although corporate incubators have experienced a recent phenomenon of increasing empirical relevance, little research has been undertaken in this area. While the relationship and interaction between new ventures and investors such as venture capitalists and angel investors has been extensively researched, research on the nature of the relationship between the corporate incubator and the parent corporation, as well as the incubation process and resources provided, has been

limited. Furthermore, recent research has not distinguished between non-profit and profit incubators nor independent and corporate for-profit incubators.

Our research focuses on how large technology-driven corporations with substantial R&D units can derive competitive advantage by supporting the management of their technology through the use of corporate incubators. Our unit of analysis is the relationship and interaction of the corporate incubator with the parent corporation in the form of interface management. In order to gain deeper insights into corporate incubators and overcome the shortcomings of quantitative surveys, a qualitative approach was undertaken in the second research phase (Yin, 1994). To increase reliability, data was collected and analyzed through multiple sources of evidence such as archival records, company profiles, company records, company presentations, annual reports, press releases, and articles, as well as our own observations Eisenhardt, 1989; Miles and Huberman, 1994).

The research was carried out in two phases:

Phase 1 (2001): Analysis of a quantitative database of 950 European incubators, developed by the European Commission in 2001 and synthesis of findings from two benchmarking surveys conducted by the European Commission in 2001 for both sides of the dyadic relationship: European incubator managers (n=77) and start-up companies in the incubator (n=71). The European Commission's comprehensive database on incubators (Commission, 2002) comprised of over 950 incubators in the 15 EU member states, EEA countries (Norway, Iceland, Lichtenstein), Switzerland and the 13 candidate countries.³

Phase 2 (2001-2002): In-depth case studies of 25 European and American corporate incubators of large technology-intensive corporations. These operations were in high-tech industries such as computers, electronics, and communications equipment manufacturing. The research was based on 52 semi-structured interviews with managers of corporate incubators in 2001 and 2002.

About two-thirds of the case studies are from US-based technology-intensive companies, with one-third from European-based companies. These emphasize differences in the mission of the corporate incubator, differences that are reflected in structural and operational differences as well as how resources are utilized. While corporate incubators use different names such as incubator, accelerator, business innovation and venture fund, they were included in the study if their strategic mission dealt with hatching young enterprises for technology development.

2. Managing the resource flow between corporate incubator and technology venture

³ Methodological remarks: Cross tabs and correlations were used to analyse the relationship of different variables in the questionnaire. (1) Cross tabs were calculated for categorical variables with numerical variables being redefined. (2) Correlation analysis was only reported for statistically significant correlations. Due to the small sample size (n=77) for incubator managers and (n=71) for technology ventures the analysis distinguishes between four different significant levels: (a) p<.001, (b) p<.01, (c) p<.05, (d) p<.1; with p<.001 with the lowest probability of error.

2.1 Importance of resources

The transfer of tangible and intangible resources can be shown in the example of Ardent Communication Ventures, which *Cisco New Ventures* supported first through investment and other resource flows before its later spin-in. The idea of the traffic aggregation device for data, voice and video came from a Cisco employee who was ready to leave the corporation to start his own venture. In June 1996 Cisco's initial investment comprised of an equity stake of 32% and included a put/call option, requiring Cisco to purchase the start-up if the team was successful in 15 months. Other support of the start-up included licensing of its software and access to Cisco's testing and certification facility free of charge. Cisco provided engineering consulting service for a standard fee, which assigned Cisco's engineers temporarily to the start-up, flexible to their needs. Due to the close bond, Ardent Communication Ventures could define product specifications in line with Cisco's requirements. In June 1997 Cisco spun-in the start-up for \$232.5 million; three months before the put/call option materialized. This sped up the technological integration of the new technology venture into the parent. Furthermore, Cisco coordinated its marketing program with Ardent's one, which prevented the need to re-educate their customers.

Similarly, our analysis of the EU survey data on incubators also supported the importance of resources when comparing for-profit with non-profit incubators. The 'product' of the incubator, provision of management assistance to technology ventures, is determined by tangible and intangible resource flow. In our survey, 76.6% of for-profit incubator managers reported that raising financing at banks, venture capital corporations or grants is the most important in-house service of *tangible resources* they provide to their technology ventures (Figure 3). Slightly over forty-one percent (41.2%) cited human resource advice while 23.5% mentioned the offering seed financing by the incubator itself.

Figure 3: Tangible and intangible resource flow from incubator to technology venture

The provision of *intangible resources* from the incubator to the technology venture are found to be even more important by incubator managers for for-profit as well as non-profit incubators. Eighty-eight point two percent of for-profit incubators managers ranked forming a company as most important service

provided to their technology ventures, 82.4% cited pre-incubation and 64.7% mentioned networking with entrepreneurs and potential customers. This is surprisingly smaller than for non-profit incubators, 86.7% of which offered networking services. The second most important service provided is the development of new products (52.9%).

2.2 Management know-how as key intangible resource

The quality of intangible resources provided to the technology venture is largely determined by the management team of the incubator, comprised of the incubator manager and their staff, which von Hippel noted years before in his seminal paper analysing successful and failing new ventures (von Hippel, 1977): The technology venture's team educational background as well as the venture manager's previous organizational experience are key success factors.

Interestingly, the background of for-profit incubator and non-profit incubator managers do not differ substantially. There are two exceptions – more for-profit incubator managers have a real estate or property management background (29.4% for for-profit contrasting with 11.7% for non-profit incubators) while twice as many of the staff of non-profit incubators come from personnel management or education (45%).

The qualifications of the incubator manager and incubator staff are determined by industry qualification, as already described, as well as their background and experience. Staff of for-profit incubators have more background in training relevant to business incubation (45.5% with over 4 years experience), advising start-ups or small companies (25% respectively) and managing their own companies (23.1%).

The number of qualifications of an incubator manager is correlated to:

- The number of technology venture's employees ranging between 50-100 staff (.409)^b. As the size of the start-up company increases, the number of qualified incubator managers that are needed also increases.
- The number of staff which participated in training in the last 12 months (.254)^c. A qualified incubator manager looks after his staff to provide them with relevant training.
- The number of staff who managed their own companies or worked in business (.266)^e. A qualified incubator manager can also attract more qualified staff with business backgrounds.

Along these lines, the number of staff who managed their own companies or worked in business is weakly negatively correlated to the number of external services (-.214)^d. An incubator with more qualified staff requires a smaller number of external services since the incubator can offer them internally.

The scope of potential interaction between corporate incubator and technology venture is determined by their physical proximity (Allen, 1970). For the new technology venture, the physical proximity to different business units helps in receiving support, but even more importantly, it promotes access to customers and suppliers that provide feedback regarding market needs. Some incubators, such as

Siemens Technology Accelerator, do not relocate the entrepreneur into the incubator. Others demand relocation in order to have more interaction with the technology venture, such as with Bell Labs' discovery team, *Lucent New Ventures Group*. Lucent scientists are motivated through an incentive system, in which they receive phantom stock options for the technology venture's potential gains, while keeping Lucent's compensation package.

While the above discussion can describe the main resource flow from the incubator to the technology venture, resources also flow back to the incubator from its portfolio companies on a limited scale. Through cooperation with innovative technology ventures outstanding employees can be selected and transferred from the technology venture for special tasks in the parent organization. Spin-ins of technology ventures are another route to recognize and retain key researchers of small start-ups (less than 200 employees) as was undertaken by *Cisco New Ventures*. Rather than current physical assets, Cisco values intellectual assets of the technology venture more, since they represent the management team and engineers which will determine the next generation of products. To prevent the danger from transfer of key researchers to other corporations during or after the spin-in, Cisco New Ventures manages HR services actively through stock participation, bonus packages and definition of new responsibilities and career paths.

In summary, despite the different definitions of resources, a distinction between tangible and intangible resources is helpful. It can determine what kind of resource flows to the technology venture and how these can be measured and controlled by the incubator manager. For-profit incubators provide mainly the following tangible resources by themselves: helping to raise financing, which includes access to external VC funds or their own seed funding and human resource advice such as recruiting. In contrast to non-profit incubators, they mainly offer accounting and legal services externally. Regarding intangible resources, for-profit incubators focus support to the entrepreneur early on with pre-incubation services, such as assistance on how to write a business plan or incorporating the start-up. While the incubator manager often focuses on the transfer of tangible resources, intangible resources can often have a higher impact, despite being difficult to demonstrate.

3. Managing the resource flow between corporate incubator and parent corporation

3.1 Two directions of internal resource flow

One of the greatest strengths of the corporate incubator is its close link to the parent corporation, in particular corporate specialists such as patent lawyers, technology experts and corporate customers. Besides the initial resource allocation to the incubator during its set-up, the incubator's own resources are enhanced by continuous access to resources of the parent.

Understanding the interaction and resource flow between corporate incubator and parent corporation is still limited and must be researched further. While the transfer of tangible resources is easily visible, the exchange of intangible resources is less defined, and it might be even more important since this is where the incubator acts as a knowledge broker between the parent corporation and the technology ventures (Fernandez et al., 2000). In a continuing relationship, the corporation supports the incubator through providing advice, networking and marketing support and by sharing of R&D laboratory facilities and pilot production facilities. Patents are transferred non-exclusively from the parent through the incubator to its destination, the technology venture, providing the parent with the option to re-enter the field.

Motorola Ventures has access to the following corporate resources that it forwards to its technology ventures:

- Any number of relationships at any number of business units (access to its 35,000 engineers with plenty of technical support), including joint-development, software competencies, distribution opportunities (e.g. access to carriers), volume sales discounts;
- Transfer of non-core patents from the parent or discounted licensing intellectual properties' fees;
- Brand name and business relations; and
- No need for exclusivity agreement because that would preclude the start-up from competing efficiently.

The corporate incubator can coordinate its formal interface with the parent corporation through explicitly defined contact persons from the parent. These interface agents in corporate services such as R&D, legal and finance or market-near business units, are all part of a predefined process of advice to optimise the incubation process. For example, *BT Brightstar*, the incubator for the corporate R&D unit BT Exact from British Telecom, relies on a mentorship model to find promising technologies and patents to create a business plan. Similarly, *Siemens Mobile Acceleration* has appointed contact persons in the corporate center and major business units to standardize the process of support, which the technology venture receives from its parent corporation. A godfather or mentoring program ensures a close link and fit with the Siemens Mobile portfolio. If the incubator manager and its staff need to tap further information or networks from the parent corporation, the defined communication channels help to reduce search time for incubator staff as well as ensure commitment and support from the parent corporation. In the case of a spin-off of a technology venture at its incubation end, corporate finance and market business units might help to establish potential buyers for a trade sale or acquisition.

Internal resources also flow from the incubator back to its parents, in particular during the harvesting phase of the incubation process. After a successful incubation process,

the 'graduated' technology ventures can be incorporated or spun-in to existing core businesses or into a newly established business unit. For example, Panasonic Digital Concepts Center with its *Panasonic Internet Incubator* in Cupertino and San Francisco, California gives the Japanese electronic company visibility and access to technologies and players in the Silicon Valley; also offering the possibility to partner with the Silicon Valley venture community.

Lessons learned from the incubation process with technology ventures can be transferred back to the parent, particularly through R&D or market units. The corporate incubator can act as a knowledge broker to improve explicit and tacit knowledge flow since it holds organizational knowledge of who might know what within the organization (its gatekeeper function see Allen and Cooney, 1971; Tushman and Scanlan, 1981; Hauschildt and Chakrabarti, 1988). The corporate incubator can support knowledge-sharing between R&D and different business units and can transfer experience and how to support venturing activities and technology between research and market units. This decreases venturing costs and realizes economies of scale. Its informal organic structure, with little formalization and extensive contacts with knowledgeable experts throughout the corporation, behaves like a 'spider's web' supporting the knowledge transfer (Miles and Snow, 1986). An example of supporting knowledge transfer is *Nokia Ventures Organization*. It grants managers mobility to encourage a steady flow of information within the corporation. Employees from the business units can move into the incubator for a limited time to support their idea realization before they return back to their respective business units.

3.2 Stability of internal resource flow

Corporate incubation requires long-term corporate commitment by senior management to ensure stability of resource flow as was previously cited in the case of corporate venturing activities. Before benefits of corporate incubation can materialize, the program is often changed or even eliminated.

Once a corporation commits resources through design and set-up of a corporate incubator, the operation itself requires a lead-time until there is a future potential pay-off. During the operation process, the involvement phase in particular is the most time-consuming, and is extended further in case the exit options for technology ventures are limited in a down-turning economy. Therefore, to be effective an incubator should ideally be in operation for at least five to seven years to receive any return that Roberts called the "long-term persistence" (Roberts, 1980).

Because the corporate incubator is dependent on the parent corporation, its existence is closely connected with the well-being of the corporation, and not just its own success. Any change within the corporation such as new senior management, mergers, or financial drain; can all unfold as opportunities or threats to the

corporate incubator.

An example how appointed new senior management can change the strategic focus of the corporation and therefore end the resource flow to its incubator is *Bertelsmann Valley*. In April 2001, Bertelsmann AG, the media conglomerate with its headquarters in Guetersloh, Germany combined all of its venture activities into one unit called Bertelsmann Capital Ventures (BCV). The wholly-owned subsidiary of Bertelsmann AG had the mission to develop external technology-driven multimedia companies that can expand and complement Bertelsmann's core business. In January 2002, it merged with Bertelsmann Valley, a division of Bertelsmann Multimedia GmbH, which incubated external start-ups sourced through universities and trade fairs. With the departure of former CEO Thomas Middelhoff, Bertelsmann Capital Ventures was terminated after July 2002.

It may even be that a continuation of the incubator is threatened in light of internal changes despite its financial success, as in the case of *Lucent New Ventures* (LNV). Despite its financial and strategic success, averaging 50% of IRR annualized with equity gains particularly from three re-acquisitions, 80% of Lucent New Ventures was sold in January 2002 to Collier Capital, a London-based equity management company. This was due to the parent's financial woes that caused organizational restructuring, and to preserve cash reserves. Tensions arose between the incubator and business groups in 2001 because incubator managers received high returns from their equity stakes in successful technology ventures while company bonuses were frozen.

To ensure stability of resources from the parent, the corporate incubator should create some high-return success stories from its involvement in technology ventures in its early life. This can build the incubator's reputation for success internally, which is necessary to increase internal support for continuous resource flow.

4. Summary

The resource-based view offers a valuable framework to analyse how the corporate incubator can optimise scope and interaction of resource flow between (1) corporate incubator and technology venture, and (2) corporate incubator and parent corporation (Figure 4).

The quality of the exchange between incubator and technology venture depends on the incubator's resources, its degree of access to and quality of resources available from the parent corporation, as well as the openness of resource flow on the side of the receiving technology venture. The degree the resource's demand by the technology venture can be fulfilled by the incubator is closely linked with the scope of interaction, quality of relationship and trust between incubator manager and technology venture, which further research needs to analyse.

Figure 4: Corporate incubator's resource flow

Through positive 'network externalities' with the parent company, the corporate incubator can increase its access to the parent's resources outside of the incubator itself, such as financial and human resources or reputation and networks with potential customers (Penrose, 1959; Barney, 1991; Grant, 1991).

Regarding the managing of resource flow between corporate incubator and parent corporation differences may occur depending on the organizational structure of the incubator. If the corporate incubator is organized as a semi-autonomous unit, more resources might flow initially to the incubator to increase the level of

independence needed to operate as a profit center. Where the corporate incubator is part of a central or business unit R&D, it might have less of its own resources but a stronger network to resources from the central R&D and other support units.

In summary, resource flow is a two-fold process. Initially the incubator and technology venture receive resources which they return in in form of financial profit, but even more importantly through explicit and tacit knowledge to the corporation.

Further research is needed in several areas:

- In-depth longitudinal study on development of corporate incubators in the post new economy;
- Quantitative analysis of phase-dependent resource flow between the incubation stakeholders (early set-up versus harvest phase);
- Survey on success factors of technology ventures regarding type of resource flow, sophistication of management know-how, extent of networking quality and branding impact.

Our exploratory study provides a first insight into a resource-based view on corporate incubators and invites further development and applications.

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