

**FROM A CORPORATE VENTURE TO AN INDEPENDENT COMPANY:
IMPLICATIONS OF PARENT FIRM-SPIN-OFF FIRM RELATIONSHIP FOR THE
COMPETENCE DEVELOPMENT IN SPIN-OFF UNITS**

3.1 Knowledge creation and transfer in inter-organizational networks

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ABSTRACT

This paper explores how certain types of Finnish corporate ventures evolve into independent businesses. Attention centers on the evolution of relationships between parent and spin-off firms prior to and after separation. The transformation of an internal corporate venture into an independent business is contemplated through resource-based and resource dependence perspectives. The focus is on the changes in the knowledge and resource transfer between the spin-off and the parent. In addition, the implications of these changes for the direction and breadth of competence development activities within the spin-off firm are investigated. The results of this study are based on a survey of 50 technology-related spin-off firms from large Finnish industrial firms. Based on cluster analysis, we identified three distinct clusters of industrial spin-off firms. These clusters differ from one another in terms of the intensity of resource sharing linkages between the parent and the spin-off, timing of separation, evolution of the parent firm spin-off firm relationship, and the direction and breadth of their new product development activities.

Keywords: spin-off firms, inter-organizational relationships, resource-based theory

INTRODUCTION

Subsequent waves of corporate diversification and corporate refocusing have increased the number of divestments made by large, established companies during the past decades (Hoskisson and Hitt 1990; Markides 1992). These divestments include the formation of spin-off firms the business idea of which is based on the knowledge and competencies developed within the parent firm. Besides corporate refocusing, economic growth seems to promote the formation of spin-off firms by encouraging venture managers to leave their employment at a large corporation and to establish a company of their own (Garvin, 1983).

Previous literature reports spin-off firms being important agents of knowledge transfer from established corporations to new businesses, and some even go on to argue that they thus promote the prosperity and well-being of regions, industry clusters and nations (Roberts & Wainer, 1969; Lindholm-Dahlstrand, 1997; Dorfman, 1983; Dietrich & Gibson, 1994). Spinning off ventures often results in the emergence of networks where the parent firms and their spin-offs engage in various kinds of resource sharing. By preserving the relationship with its parent, the spin-off may combine the advantages of maintaining the entrepreneurship of a small firm and utilizing the existing assets of a large corporation (Teece, 1987). The vast asset base of the parent organization may serve to buffer the spin-off firm from initial risks of failure (Ito & Rose, 1994). Spinning off businesses may benefit the parent firm by decreasing the administrative burden, releasing funds for the development of core businesses, and serving as a means for exploring new, revolutionary ideas at arm's length from main stream businesses.

Relatively little is known about the processes through which the networks consisting of the parent firm and its spin-off firms come into being. This study aims at fulfilling some of these gaps in existing knowledge by exploring the evolution patterns of Finnish spin-off

firms. These are studied as they move from internal corporate ventures into independent businesses. Special attention is paid to the evolution of the parent firm - spin-off firm relationship prior to and after the separation. The transformation process of an internal corporate venture to an independent business is contemplated through the resource-based and the resource dependence perspectives, i.e. by exploring the changes in the knowledge and resource transfer between the spin-off and the parent. In addition, the implications of these changes on the direction and breadth of competence development activities within the spin-off firm are explored. The results of this study are based on a survey of 50 technology-related spin-off firms from large Finnish industrial firms. The spin-off firms operate in seven industrial sectors and were founded during the years 1987-1997.

DEFINITION OF A SPIN-OFF FIRM

The term spin-off firm has varying connotations in literature. One of the most inclusive classifications of spin-off firms was presented by Lindholm, (1994). According to Lindholm, the notion of spin-off includes divestments leading to the establishment of a new company, and entrepreneurial spin-offs. A common nominator for divestments is the transfer of the majority of the voting power from an existing legal entity to a new body or to another firm. An entrepreneurial spin-off occurs when an entrepreneur leaves his previous employment to start a firm of his own, and some knowledge transfer is involved in the process (Elfring & Foss, 1997).

To avoid some of the confusion that results from varying definitions of a spin-off firm found in previous literature, it is necessary to define what we mean by a spin-off firm in this particular study. This study focuses on new business formation based on the business ideas developed within the parent firm being taken into a self-standing firm. An additional

qualification of the study was to include only spin-off firms the establishment of which was initiated, or at least allowed, by the parent firm. This was done by excluding hostile or competitive spin-offs. Non-industrial spin-offs are also excluded.

THEORETICAL CONSIDERATIONS

The principal question we address in this study is “How do internal corporate ventures transform into independent businesses?” Specifically, how does the parent firm - spin-off firm relationship evolve during that process? This will involve our exploring how changes in the parent firm spin-off firm relationship affect competence-building activities in the spin-off venture.

Until now, these questions have remained mostly unanswered and generally unasked. Previous attempts to explain the role of corporate spin-offs as a means of knowledge transfer in interfirm networks have focused on some certain typologies of spin-offs, for instance spinning-off embryonic ventures or divestments of mature businesses. In this study, we strive for having a broader perspective by comparing various types of spin-off firms with a varying set of evolutionary patterns of parent firm-spin-off firm relationship.

The nature of this study is very much exploratory. We focus on identifying processes, through which Finnish corporate ventures evolve into independent organizations, simultaneously looking for links between these patterns and the renewal of the competence base of the spin-off venture. Regardless of the exploratory and descriptive nature of our research endeavour, we use the resource-based theory and the resource dependence theory derive meaningful variables based on which distinguishable evolution processes of spin-off firms can be identified.

The choice of these theoretical perspectives can be justified in the following way. It is possible to use the resource-based approach to explain the rate, direction, and performance implications of a diversification strategy (Mahoney & Pandian, 1992; Foss, 1996; Ramanjunam & Varadarajan, 1989). By examining relatedness or the resource complementarities at intra-firm and inter-firm level, the resource-based approach is able to shed light on the factors contributing to the nature and outcome of a spin-off arrangement. The resource dependence theory, in its turn, is helpful in identifying forces driving the changes in the parent firm - spin-off firm relationship.

Relatedness and the outcome of the spin-off arrangement

The main tenet of the resource-based literature is that the resources that firms possess or have access to vary. The heterogeneity and imperfect mobility of resources are seen as a source of competitive advantage (Barney, 1991; Peteraf, 1993). According to the resource-based logic, the success of an internal corporate venture is influenced by the nature of resources possessed by the parent firm. More specifically, the quality and quantity of assets available for the spin-off venture depend on the degree to which the resource bases of the spin-off venture and the parent firm are similar or complementary to each other.

It is proposed that ventures building on the existing capabilities of the parent firm will be associated with better resource endowments, faster learning processes and lesser resistance than unrelated ventures (Hamel, 1991; Sanchez, 1997). The superior performance of related ventures can be explained by the synergy effects associated with grouping together similar or complementary activities.

A high degree of similarities may have as a consequence that the two businesses can be managed with similar skills and knowledge. Strategic similarities in terms of similar

competitive structures, technologies and customers make it easier for the corporate management to allocate resources between businesses, to formulate and to coordinate business unit strategies, and to set and to monitor performance targets for business units (Grant, 1988). In addition, the parent firm's ability to recognize the value of new competencies is largely a function of its prior related knowledge (Cohen & Levinthal, 1990). In the words of Prahalad and Bettis (1986), strategically similar businesses can be managed using a single dominant logic.

Unrelated ventures, in their turn, face a much more unfortunate situation. First, the fact that they do not fit in the current resource base of the parent firm suggests the presence of less firm-specific resources. According to the resource-based logic, less firm-specific resources yield lower rents (Barney, 1991). Also, a resource will lose value when transferred to markets that are dissimilar to that in which it originated (Wernerfelt & Mongtomery, 1988).

In a similar vein, implementing radically new business ventures may be limited by a shortage of labor or physical inputs, shortage of finance, and the lack of sufficient managerial capacity (Mahoney and Pandian, 1992; Nelson and Winter 1982; Penrose 1959; Teece, 1988; Cohen and Levinthal 1990). Besides the lack of physical and human resources, established routines, (Nelson and Winter, 1982) existing dominant logics, (Prahalad and Bettis 1986) knowledge biases (Wright 1997) and structural inertia (Hannan and Freeman, 1989) may prevent the adoption of new perspectives, routines and new priorities required by a new business venture. Also, these factors may make the parent firm reluctant to make sizeable investments to enhance competence development in their unrelated ventures.

Concluding the discussion above, we expect that the evolution processes of related spin-off ventures differ significantly from those of unrelated ventures. We assume that related spin-off ventures have enjoyed a more legitimate position within the parent firm, and a better

access to resources than unrelated ventures. These differences are expected to translate into a faster speed of competence development, and ultimately, into superior financial performance.

Therefore, we assume that

Hypothesis 1: Competence building processes in related spin-off ventures differ significantly from those of unrelated spin-off ventures.

Changes in resource complementarities as a spin-off triggering factor

The resource dependence view sees organizations or inter-firm networks as settings in which groups and individuals with varying interests and preferences come together and engage in exchanges (Pfeffer & Salanick, 1978; Thompson, 1967; Aldrich, 1979). The exchange relationship is usually reciprocal in the sense that one party to exchange demands some actions from the other party in return for its resources. Reciprocal arrangements stabilize the inter-unit relationships by providing the element of commitment that binds the parties together. For the purposes of this study, the value of the resource dependence theory lies in its ability to identify incentives for initiating, continuing and terminating inter-organizational or inter-unit resource sharing relationships.

By combining the resource-based literature and the resource-dependence view, it is possible to explore the motivations for the spin-off. Both of these perspectives implicitly assume that synergy effects are one of the key factors in determining the satisfaction of parties to an exchange relationship. Resource complementarities are likely to increase synergy effects and decrease costs associated with competence acquisition from outside of the parent firm. What is largely neglected in previous diversification literature is that the resource needs of a venture are susceptible to changes in the course of the evolution of the spin-off venture. As a consequence, the capability of a parent firm to contribute to the development of its business

unit may change over time. This also applies to the capability of the spin-off venture to support the needs of the parent firm.

For instance, in order for the spin-off venture to embark on rapid growth, the parent firm may have to invest heavily in developing adequate marketing and distribution competencies. However, the principal motivation of the parent firm may only include the development of a component for its own use. As a result, the parent firm may perceive the costs of building a distribution channel for the spin-off venture too costly compared with benefits accruing from investing in one of its non-core areas. In a similar vein, the application of one of the core technologies of the parent firm into new markets might require substantial changes in the production processes, deemed too expansive by the parent firm. This may lead to a situation where the costs of continuing the relationship may exceed the benefits of accruing from the relationship. To sum up, the of lack of resources or failure to commit new resources may serve as potential barrier to the continuity of the parent-spin-off relationship, thus serving as a spin-off triggering factor. Hence, we expect that

Hypothesis 2: Changes in the parent firm spin-off firm relationship are associated with the changes in the resource complementarities between the parent firm and the spin-off firm. .

Relatedness and the evolution of the parent firm-spin-off firm relationship after the spin-off

The resource-based literature, the resource dependence view and some empirical studies (Ito, 1995; Lindholm, 1994) give reason to believe that spin-offs having shared resources with the parent firm prior to the separation are likely to remain *quasi-externalized*. Staying quasi-externalized means that they develop an ongoing relationship with the parent firm through equity or collaborative linkages. Resource-based literature suggests that the replication of resources previously provided by the parent firm tend to be slow, due to time compression diseconomies, asset mass efficiencies and asset interconnectedness (Dierickx

and Cool, 1989). In addition, organizational inertia (Hannan and Freeman, 1989) and existing dominant logics (Prahalad and Bettis, 1986) increase the likelihood of sharing a common asset base even after the separation from the parent firm. Thus, maintaining collaborative linkages may prevent the negative impacts of the separation, or a split-up of a previously common asset base, possibly leading to disregard of some previous knowledge (Von Krogh et alii., 1996; Ito and Rose, 1994).

However, maintaining ongoing relationship with the parent may also have negative implications for the development of the spin-off firm. Preserving a symbiotic relationship with the parent firm may expose the spin-off venture to the risks of relationship-specific investments. Highly relationship-specific investments decrease the ability of the spin-off venture to exploit its resources in exchange relationships with other firms than the parent firm and to build competencies unrelated to the needs of the parent firm. In addition, being too dependent on the parent as a main customer may act as a barrier to learning from other customers and applications (Elfring & Baven, 1996). This would mean that the those spin-off ventures that continue intensive resource sharing linkages with or are partially owned by the parent firm would not be able to diversify away from their original competence base.

Therefore, we expect that

Hypothesis 3a: The nature and the degree of resource complementarities between the parent firm and the spin-off firm can explain the nature of post spin-off parent firm spin-off firm relationship.

Hypothesis 3b: The nature of parent firm spin-off firm relationship affects the direction of post spin-off competence renewal processes within the spin-off venture.

To conclude the discussion above, both the resource-based theory and the resource dependence theory suggest that the relationship between the unrelated ventures and their parents would be drastically different from the one between the related ventures and their parents. We expect that these differences will translate into distinguishable patterns through

which these ventures evolve, become separated from their parent firms, and develop their competencies. In the following, we will use these few guidelines provided by theory to explore and describe the evolution patterns of Finnish corporate ventures to independent businesses.

METHOD AND DATA

In this study, we adopted a research design combining features both from quantitative and qualitative designs. Using the terminology of Creswell (1994), we used the dominant-less dominant design, where the quantitative paradigm dominates. However, some elements, such as the non-directional nature of our hypotheses” and the qualitative interview component at the data collection phase, are drawn from the qualitative approach. We felt that this approach would help us better understand a relatively little researched topic at hand.

Cluster analysis was used to explore the evolution patterns of Finnish industrial spin-off firms. The primary purpose of cluster analysis is to group objects based on the characteristics they possess (Hair et alii., 1995; Ketchen & Shook, 1996). Cluster analysis is a useful tool for data reduction in our study, since the open-endedness of our hypotheses makes it difficult to use more straight-forward multiple variable data analysis techniques, such as the multiple regression analysis.

Based on theoretical considerations discussed above, relatedness (resource complementarities between the spin-off venture and the parent), the maturity of the venture at the time of the separation, and post spin-off collaboration were used to cluster the firms. In addition, previous literature gives reason to expect that research and development intensity (Takahashi, 1995; Garvin, 1983) and parent firm ownership (Ito & Rose, 1995) are important determinants of the parent firm – spin-off firm relationships, and therefore, need to be

included in the cluster variate. The cluster solution was profiled on additional information on the evolution patterns of spin-offs.

Sample and data collection¹

This study is based on the data on evolution processes on 50 technology-related spin-off firms from large Finnish corporations. Since no existing database contains a complete record of technology-related ownership changes through spin-off arrangements, several search strategies were used to identify the spin-off firms from the largest Finnish industrial firms.² These search strategies included retrieving potential spin-off firms from the Talouselämä database³, contacting venture capitalists, the corporate managers, division managers and technology managers of the largest Finnish industrial firms to ask for their listing of spin-off companies. In addition, some potential spin-off cases were learned through colleagues.

These multiple search strategies yielded 129 cases for further analysis. To be included in our sample, the firm had to exploit competencies developed internally by the parent firm (this eliminates spin-offs acquired by the parent firm). Second, it was required that the spin-off firm was established during the years 1987-1997. Third, sell-offs in which another firm becomes the main owner of the firm were eliminated from the study. Fourth, the spin-off firm had to operate in an industrial sector, this also includes technical services. Finally, the spin-off firm had to operate in Finland. The application of the criteria described above eliminated 71 out of 129 potential cases. From the remaining 58 cases 50 were willing to participate in the study. This yields a participation percentage of 86%.

The spin-off companies operated in seven broad industrial sectors: chemicals, information technology, rubber and plastics, metals and machinery, electrical and optical equipment, transportation equipment, and printing and publishing.⁴ The average year of

establishment was 1992. On the average, the sample companies employed 112 persons. The average size of the companies was 146 MFIM (6,3 FIM ~ USD 1) in terms of annual sales.

Data gathering ⁵

After the identification of technology-related spin-off firms, each of the sample companies was contacted by telephone. The key respondents were persons knowledgeable of the history of the spin-off venture, mostly they were the CEOs of spin-off firms. Survey data was compiled through questionnaires and through face-to-face interviews. A single researcher gathered all the data during the fall 1997. Relying on only one interviewer might have introduced subjective bias into the interpretation of the results. To control for this bias, the questions were structured in a way that they measured facts rather than perceptions and opinions.

Operationalization of variables

Cluster variate: Questionnaires were used to measure the variables included in the cluster variate. The intensity of *pre-spin-off complementarities* indicates the extent to which the spin-off firm and the parent firm share similar or complementary resources. Technological complementarities were measured using three statements about the intensity of technological linkages between the spin-off firm and the parent firm. The items were measured using a seven-point Likert-scale, ranging from 1 (strongly disagree) to 7 (strongly agree). Production complementarities were operationalized in terms of three statements measuring the compatibility of the production facilities of the parent firm to the needs of spin-off venture. Marketing and distribution complementarities were captured using three statements about the extent to which the spin-off venture and the parent firm shared customers, sales force,

advertising and marketing functions. Cronbach's alphas show that these measures achieve an acceptable level of reliability.⁶

Vertical complementarities refer to the degree to which the products or services of the spin-off venture were sold to the parent firm. Vertical complementarities were measured as a percentage of sales sold to the parent firm.

Research and development intensity was measured as the percentage of expenditures attributed to research and development during the past three years prior to the study. This measure is consistent with previous literature (Gomez-Meijia, 1992; Zahra., 1996).

The achievement of certain milestones in the venture evolution was controlled by using the stage of growth model by Kazanjian and Drazin (1988, 1989). Based on the stage of growth model, the introduction of a product prototype, the ability to produce the product at a commercially viable scale, and the achievement of an established position in the market by the time of the separation from the parent firm serve as milestones in the evolution of a technology-based venture.

Parent firm ownership level was simply operationalized as the equity share of the spin-off firm held by the parent firm at the time of the study (Lindholm, 1994; Ito & Rose, 1994).

The intensity of post spin-off collaboration was measured by asking the respondents to indicate the intensity of technological, production, marketing and distribution collaboration with the parent firm. The intensity of post spin-off collaboration was measured on a three-point Likert scale.

Post spin-off growth was measured as absolute change in sales between 1997 and the year of establishment of the spin-off firm.

Data gathered through interviews: Interviews with the managers of spin-off ventures produced the basis for the descriptions of the evolution (3-5 pages) of each of the

sample companies. Interviews focused on the history of the spin-off venture, paying special attention to the motivations for starting the venture within the parent firm, and spinning it off. In addition, interviewees were asked to describe how the position of the venture, the parent firm spin-off firm relationship, and new product development activities had changed during the lifetime of the venture.

RESULTS

In cluster analysis, hierarchical agglomerative procedure was used. The distance between clusters was calculated using Ward's method, to minimize the within-cluster differences and to avoid the problem of chaining of the observations (Hair et al., 1995). The cluster solution produced by Ward's method and the cluster solutions produced by the average, single, and complete methods share many similarities.

In addition, we used a two-stage procedure recommended by experts to validate our cluster solution (Ketchen & Shook, 1996; Hair et alii.,1995). As a validity check, a nonhierarchical analysis was performed, this time taking the initial seed points (the cluster centroids) from the results provided by Ward's method. Just as found with Ward's method, the cluster sizes were 8, 18 and 22. Also, the cluster centroids are very similar. Except for only two clustering variables, parent firm ownership and the extent of vertical linkages, differ significantly across the clusters. The similarity of results from the two clustering methods confirms the results provided by Ward's method. In this paper, only the cluster solution produced by Ward's method will be reported here, since it provides the most easily distinguishable clusters with greatest conceptual clarity.

Since most distance measures are rather sensitive to differing scales and the magnitudes among the variables, the data was standardized before similarities were calculated. Standardization eliminates distortions resulting from the tendency of cluster

analysis to give more weight to variables with large ranges in defining the cluster solution than to variables with narrow ranges.

Three clusters emerged from the statistical analysis. Our criteria for settling down for a three cluster solution are both statistical and conceptual. First, agglomeration schedule showed that there is a fairly large increase in the value of coefficient from a three cluster solution to a two cluster solution, supporting the choice of the three cluster solution (SPSS Professional Statistics 6.1 pp. 90-91) ⁷. Second, the three cluster solution provides theoretical and conceptual clarity, thus adding to our understanding of the formation processes of spin-off firms.

The three cluster solution is examined from an inside-out perspective in Table 1. In inside-out perspective, the differences in the means of variables included in the cluster analysis were compared across the three clusters. The Mann-Whitney test indicates that except for post spin-off collaboration and pre spin-off complementarities, all the variables differ at a statistically significant level ($p=0.01$) across clusters one and three. Clusters two and three differ in terms of all the other variables but parent firm ownership level. The means of research and development intensity, technological complementarities, timing of separation, and parent firm ownership level differ at a statistically significant level between clusters one and two.

Table 1 Inside out analysis of the three cluster solution

Variable	Cluster 1	Cluster 2	Cluster 3
N	8	22	18
Overall level of pre spin-off complementarities	3,4	4,0	2,8
Vertical complementarities	0,06	0,15	0,32
Research and development intensity	0,85	0,11	0,063
Timing of separation-venture development stage	0	0,68	1,83
Parent firm ownership level	0,18	0,07	0,08
Post spin-off collaboration	1,50	1,52	1,1

*Note that two cases were eliminated from cluster analysis since they could not be combined to any of the existing clusters.

In Table 2, the three cluster solution is analyzed from an outside-in perspective. In outside-in analysis, the three clusters were examined in terms of spin-off firm characteristics

and post spin-off development of the venture. The focus of the analysis was on the development of the parent firm spin-off firm relationship, as well as the evolution of competence development of the spin-off venture. As Table 2 indicates, the three clusters differed from one another in terms of all these variables. The interpretation of the results of the cluster analysis will be presented below.

Table 2 Outside-in analysis of the three cluster solution ^a

Variable	Cluster 1	Cluster 2	Cluster 3
Spin-off firm characteristics			
Asset category	Scientific research assets (8/8)	Product innovative application assets (19/22)	Process innovative assets (15/18)
Novelty of the technology to the parent firm	Unrelated technologies (8/8)	Closely related technologies (18/22)	Old core technologies (18/19)
Novelty of markets to the parent firm	New (8/8)	New (22/22)	Old (18/18)
Status of the spin-off venture before the separation from the parent firm	Project team (7/8)	Business unit (19/22)	Subsidiary (18/19)
Post spin-off development			
Growth	0,90	16,8	25,0
Trend for post spin-off collaboration	Increasing (7/8)	Decreasing (22/22)	Stable (18/18)
Trend for post spin-off equity ownership	Increasing (5/8)	Decreasing (22/22)	Decreasing (18/18)
Introduction of new product applications of the original product	No (8/8)	Yes (19/22)	Yes (17/18)

^a Figures in parentheses indicate the ration of firms sharing the dominant characteristics of the cluster

Cluster 1: Spinning of novel technologies

The first cluster represents spinning off novel technologies. All the eight spin-off ventures in this cluster are engaged in developing leading edge, new-to-market technologies. At the time of the initiation of the project, there were neither markets nor competitors for the products being developed. In most of the cases, no dominant design existed. In some cases, even the potential application areas of the technology were unclear. Using the classification of assets for technological innovation by Christensen (1995), the spin-off firms in the cluster develop scientific research assets still far from reaching the stage where the commercial exploitation of competencies is possible. The companies in this cluster were engaged in the

development of biotechnology products, specialized equipment, optical components, electrical equipment, medical devices, or solutions related to intelligent networks.

In most cases, the idea for technology development came initially from outside the parent firm, most typically, from a research institute. The purpose of the ventures was to explore new business areas for the parent firm. Most of these ventures were initiated during the late years of 1980's when the Finnish economy was booming.

Ventures in the first cluster were usually organized as independent project teams under corporate headquarters with practically no linkages to other business units. The spin-off-triggering factor was the restructuring programs undertaken by the parent firm. The tacitness of the technological competencies being developed made it difficult for the parent firm to assess the true value of the technology. As a result, uncertainty about their commercial viability made embryonic ventures the first targets of refocusing activities.

The spin-off ventures in this cluster were separated from the parent firm at a very early stage of their development. In general, the parent firm acquired an ownership share of the newly formed spin-off firm. The ownership share served as an option to follow the development of technology at arm's length. After the divestment, spin-off firms typically broadened their ownership structure by allowing venture capitalists and governmental organizations invest in the venture. Infusion of new capital made it possible for the ventures to bring a product prototype or even the first product to the market. This caught the attention of the parent firm. In seven out of eight cases, the resource sharing between the spin-off firm and the parent firm increased during the post spin-off period.

The strengthening of operational linkages had implications for the development of technological competencies in the spin-off firm. In most cases, the spin-off firm decided to focus on product applications serving best the needs of the parent firm. The development and the exploitation of other possible product applications were either discontinued or postponed.

The fact that markets started to form around these new applications prompted the parent firms to tighter integration. Three out of eight spin-off firms in this cluster were acquired and re-integrated by the parent firm by the time of the study.

The spin-off firms in cluster one seem to be characterized with relatively low profitability and growth figures. This is understandable given the high research and development investments, and emerging markets.

Cluster 2: Divestment of new market applications of closely related technologies

The firms in cluster two can be labelled as divestments of new market or product applications of closely related technologies. The common nominator of the firms in the second cluster is that the technology base of the parent firm and the spin-off firm is essentially the same. However, the parent firm and the spin-off firm serve different markets.

Using the terminology of Teece (1982) and Christensen (1995), the competencies developed by the spin-off firms mainly fall into the category of product application assets. The firms in this cluster focus on renewing their functional application activities directed towards reducing uncertainty with respect to the user-interface. Firms in this cluster represent producers of specialized industrial machinery or industrial components, software services and integrated information technology systems.

The impetus for the initiation of these ventures within the parent firm was either to support the core businesses of the parent firm (12 ventures), or to exploit the possibilities of core technologies to the fullest (10 ventures). In the first case, the spin-off venture was set out to develop components, equipment or technologies that the parent firm could use to further develop its main stream business operations. In 8 out of 12 these vertical spin-off ventures,

supporting activities were not available at the market at the time of the initiation of the venture or they were considered a critical competitive advantage.

In most of the cases, the spin-off firm was able to use the research and development facilities of its parent. Close collaboration with the core business units provided important information concerning the user-interface, which ultimately improved the quality of the end product. By the time of the separation, the criticality of the supporting activities had diminished and their availability in the market had increased. Looking at the situation from the spin-off venture's point of view, the customer base needed to be expanded in order to increase the production volumes. After the separation, many spin-off firms started selling products also to the competitors of the parent firm.

The remaining 10 firms in this cluster applied the core technology of the parent in new product applications. Also in these cases, the parent firm had technological and production related complementarities to aid the evolution of the new, technology-based venture. However, the targeted clientele of the spin-off venture was very different from the customer base of the parent firm. In other words, the parent firm could not provide the spin-off venture with functional application assets or knowledge concerning design and service characteristics that can match the needs of the new clients. Usually the spin-off ventures in this cluster were separated from the mainstream activities by establishing an independent business unit or division.

The spin-off-triggering factor for the firms in cluster two was the unwillingness of the parent firm to support the diversification of the spin-off venture into new markets. After the establishment of the spin-off firm, the parent firms acquired a moderate ownership share of the spin-off venture and continue the exploitation of operational linkages. Nevertheless, as the spin-off firm introduced new product applications of the technology, the operational and equity linkages between the spin-off firm and the parent firm tended to weaken. Both vertical

and horizontal ventures were characterized with intense renewal of products, processes and technologies after the separation. The second cluster is characterized with relatively high growth and profitability figures.

Cluster 3: Divestment of old core competencies

The firms belonging to the third cluster can be best described as divestments of old core businesses of the parent firm. Fifteen out of eighteen spin-off firms were old established business units of parent firms. The technological competencies being developed were rather mature. Using the typology of Christensen, the technological assets being developed fall mainly into a category of process development assets, where the main focus was on the development of capabilities related to manufacturing technology, logistics, quality control and plant layout. Most of the ventures operated in low technology industry sectors, such as metals and machinery, standardized industrial components, as well as rubber and plastics. Firms in this cluster were separated from the parent firm in the mature stage of venture evolution.

The spin-off firms in the third cluster had once been closely related to the technology and the customer base of the parent firm. At the earlier stages of the venture evolution, these ventures had shared technology, production, marketing and distribution-related resources with the other business units of the parent firm. In the course of time, however, the parent firm decided to renew its competencies. As a result, the strategic importance of older business units for the parent firm gradually decreased. In the end, the spin-off units in this cluster were totally isolated from the other operations of the parent firm. Being characterized with steady cash flow and high profits, the spin-off units had long a legitimized position within the parent firm. The spin-off units in cluster three were characterized with a great degree of autonomy. In many cases, they were also located far away from the headquarters.

Restructuring policies in the parent firms served as a spin-off triggering factor. Except for the decrease in equity ownership, hardly anything changed in the parent spin-off relationship after the separation from the parent firm. As before the spin-off, resource sharing between the parent firm and the spin-off firm was non-existent except for two cases. The main challenges faced by the spin-off venture managers were associated with the improvements of process technologies and the development of new product generations. During the post spin-off period, these firms have been characterized with excellent financial performance in terms of growth.

DISCUSSION OF RESULTS

The results of this study are in line with the resource-based argument, according to which related ventures (i.e. clusters 2 and 3) enjoy a more favorable position within the parent firm. Empirical evidence shows that related spin-off ventures were more often able to launch a product prototype, produce products at a commercially viable scale and build well-functioning customer relationships than unrelated ventures. Maybe because of their maturity, related ventures grew more rapidly than unrelated ventures. Empirical evidence thus gives some preliminary support to Hypothesis 1 stating that competence building processes of related spin-off ventures differ from competence building processes of unrelated ventures.

Also, empirical evidence supports Hypotheses 2 and 3a according to which changes in the parent firm spin-off firm relationship are associated with changes in the resource complementarities between the parent and its spin-off. This is in line with the finding of Seabright et alii. (1992), suggesting that the dissolution of intra-firm or inter-firm resource exchange relationship may be caused by the changes in the capacity of the parties to fulfil each others' expectations. The empirical evidence on the evolution of spin-off ventures suggests that synergy effects between the spin-off venture and the parent firm are susceptible

to constant change. While initiating a technology-based new venture, parent firms are often ignorant of all the possible commercial applications of the technology being developed. As a result, the emergence of new promising business applications may drastically alter the ability of the parent firm and the new venture to continue the resource sharing relationship.

A closer examination of competence development processes in three clusters reveals interesting patterns of change in the degree of (dis)integration and in the degree of relatedness (resource sharing). As depicted in Figure 1 (Appendix 2), the parent-spin-off relationship in cluster one starts with low levels of relatedness and with relatively high levels of integration. Since the resource sharing relationship is regarded as dissatisfactory, at least by the parent firm, the disintegration process begins. After the separation and infusion of new capital, the emphasis of activity in the spin-off firm shifts from the development of product technologies to the development of market related competencies. This enables the parent firm to assess the true value of the technology. In most cases, the recognition of the value of technology leads to a tighter integration of the spin-off venture to the parent firm to enable knowledge transfer back to the parent firm.

The evolution processes of the firms in clusters two and three differ from the evolution processes experienced by the firms in the first cluster of novel technologies in many respects. Clusters two and three were at first characterized with a high degree of relatedness and knowledge transfer between the parent firm and the spin-off. In cluster two, the technologies developed by the spin-off venture were almost identical to the core technology of the parent firm. Only the clientele of the spin-off venture was totally different from the customer base of the parent firm. As the newly founded spin-off firm started to develop new competencies related to the user-interface by networking with its new customers, the degree of relatedness to the parent firm gradually decreased. This also led to the weakening of equity

and operational linkages, and consequently, diminishing knowledge transfer between the spin-off firm and the parent firm.

Cluster three, comprising old core technologies, differs from cluster two in terms of timing of spin-off and post spin-off development. Old core technologies were separated from the parent firm only after the venture had established its position in the markets. At the time of separation, technological and market relatedness between the parent firm and the spin-off venture was relatively low. Practically neither resource exchange nor knowledge transfer occurred across inter-unit boundaries. In cluster three, the parent firm-spin-off firm relationship had in most cases remained relatively stable after the establishment of the spin-off firm.

This study highlights the importance of intra-organizational and inter-organizational relationships for the renewal of the competencies in the spin-off firm, thus giving some support to Hypothesis 3b. In clusters two and three, the spin-off decision enabled moving further away from the technological base of the parent firm through the development of new competencies. In cluster one, the spin-off firm was able to develop competencies unrelated to the needs of the parent firm only during a short period of time after the establishment of a spin-off firm. When re-integrated back to the parent firm, the product applications were restricted to the markets currently served by the parent firm. It is possible that the renewal of competencies in cluster one requires that the venture is spun-off again.

While there are obvious similarities between all corporate activities to aggregate or divest, there are distinct cross-cultural differences that are critical to understanding the spin-off phenomena as studied herein. The examples studied herein are from the Finnish context and effectively demonstrate the spin-off process in Finland. This has some relevance in the neighboring Scandinavian countries but less as you move further away. In fact, the cultural

differences between Europe and the US and Europe and Japan can be so significant as to result in different definitions for the central concept of spin-off.

In the US, the spin-off concept is generally associated with the largest divestiture in US business history; the judicially mandated breaking off of the baby bells from mother AT&T. The second major sense of the word arises from the often reported but little studied phenomena of people with ideas about technology or technique failing to get a hearing in their organization thus they spin themselves off in their own firm. There are other senses of the term such as AT&T spinning off Lucent Technologies in order to avoid competing with their major customers and AT&T spinning off three additional portions of the remaining firm to increase focus and share price.

In addition, the motivations for spin-off, and the relationship between the parent firm and spin-off firm tend to vary across national boundaries. In a major Japanese study, Japanese firms are reported to spin-off their old core competencies in order to provide room and develop new ones. Japanese parent firms also tend to continue resource sharing with their spin-offs after the formal separation. American firms, on the other hand, tend to divest leading-edge technologies which do not fit into their established mainstream business operations (Takahashi, 1995). In addition, American firms tend to be reluctant to spin-off ideas and talent that could come back to compete with them, or rob them of innovative personnel. This might also explain why American parent firms are not so willing to continue a resource sharing relationship with their spin-offs as their Japanese counterparts. European firms tend to be more comfortable with the spin-off construct of new business formation. A European study suggests that vertically - related ventures are spun-off so that these ventures would be able to learn from other customers than the parent firm (Elfring & Baven, 1996). Obviously, future research is called for to add to our knowledge on cross-cultural differences in the evolution of the parent firm spin-off firm relationship.

NOTE ON RELIABILITY AND VALIDITY

When conducting a cluster analysis, the major statistical concerns are the representativeness of the sample, and multicollinearity (Green, 1978). In this study, the sample selection was done with great care. In addition, the participation rate was relatively high. Therefore, we can be relatively confident that the obtained sample is representative of the population. In addition, the correlation coefficients between the cluster variables were well below the multicollinearity threshold of 0.7, see Appendix 1.

Cluster analysis requires several methodological choices that determine the nature of a cluster solution (Hair et al., 1995; Ketchen et al., 1996). In this study, validity was assessed by applying alternative cluster solutions and comparing the results. The results showed that the solution remained relatively stable, regardless of the method used. For the profiling stage, we used variables not included in the cluster variate. The results reported in Table 2 show that these variables varied across the three clusters, thus increasing external validity.

Besides cluster analysis, perhaps the most significant factor affecting the internal validity of the study is the adoption of cross-sectional research design. A longitudinal research design would provide more fine-grained information about the relationship between ownership changes and competence development processes. One of the drawbacks associated with a longitudinal design is that it increases the amount of time needed to gather information from one firm, potentially leading to a smaller number of respondents. In this study, higher weight was placed on achieving a greater generalizability of results through a larger number of observations than gathering more fine-grained data on evolution patterns of industrial spin-off firms using a smaller number of cases.

The internal and external validity may suffer from the fact that the empirical data was gathered using a small number of spin-off firms and parent firms operating in Finland. Small sample size may have as a consequence that outliers have a substantially larger effect on statistical tests (Hair et alii 1995). Further empirical analysis indicated that findings are not determined by extreme observations. However, the results of this study need to be validated by a larger international sample of spin-off firms.

Another factor possibly decreasing external validity is the time period during which spin-off firms were founded. It is possible that an unusually severe economic recession of the early 1990's might have exerted an impact on company behavior and performance. The time period 1987-1997 was selected for two reasons. First, spin-offs became common in Finland only after the mid-1980's (Tuomela, 1995). Second, it would have been very difficult to find people able to answer to the questions on the evolution of spin-off firms established before the mid-eighties. Third, this threat is weakened by the fact that approximately half of the spin-off firms were separated from the parent firm during non-recessionary years.

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- ² The largest Finnish industrial firms were identified by using the 1990-1997 special issues of *Talouselämä* journal. *Talouselämä* journal is a weekly Finnish magazine focusing on issues related to corporate management and economics. 125 largest Finnish firms were selected for a more detailed analysis. These 125 largest Finnish firms generated a turnover of over 1000 million FIM and employed over 1000 persons. Of these 125 largest Finnish firms, 40 were considered industrial firms.
- ³ The *Talouselämä* database contains all the ownership changes in major Finnish corporations. The transactions the worth of which fall beyond 3MFIM are not systematically included in the database.
- ⁴ The industry class of each spin-off company was defined based on the NACE Industrial classification, common to the entire European Community.
- ⁵ This study is a part of a large research project on spin-off companies from large, Finnish organizations. The whole study is reported in Parhankangas, 1999.
- ⁶ The questionnaire items and Cronbach alpha's are available upon request from the authors.
- ⁷ The agglomeration schedule is available upon the request from the authors.

REFERENCES

- (1994) *SPSS Professional Statistics 6.1*. Chicago, SPSS Inc.
- Aldrich, H. 1979. Resource dependence and inter-organizational relations. *Administrative Science Quarterly*, 7: 419-454.
- Barney, J. 1991. Firm Resources and Sustained Competitive Advantage. *Journal of Management*, 17: 99 - 120.
- Bower, J., C. Christensen. 1995. Disruptive Technologies: Catching the Wave. *Harvard Business Review*, January – February: 43-53.
- Christensen, J. 1995 Asset profiles for technological innovation. *Research Policy*, 24: 727-745.
- Cohen, M.& D. Levinthal. 1990 Absorptive capacity: a perspective on learning and innovation. *Administrative Science Quarterly*. 35; 128-152.
- Creswell, J. 1994. *Research Design - Qualitative and Quantitative Approaches*. Sage Publications, Inc, USA.
- Dierickx, I. & K. Cool. 1989 Asset Stock Accumulation and Sustainability of Competitive Advantage. *Management Science*, 35: 1504 - 1511.
- Dietrich, G. & Gibson, D. 1992. New business ventures: The spin-out process. In F. Williams & D. Gibson, editors, *Technology Transfer-A Communication Perspective*. London: Sage Publications: 153-171.
- Dorfman, N. 1983. Route 128: The development of a regional high technology economy. *Research Policy*, 12, 6 : 299-316.
- Elfring, E. & N. Foss, N. 1997. Corporate Renewal Through Internal Venturing and Spin-offs: Perspectives from Organizational Economics. Working Paper, Publication Number 97-7. Copenhagen Business School, Department of Industrial Economics and Strategy.
- Foss, N. 1996. Knowledge-Based Approaches to the Theory of the Firm: Some Critical Comments. *Organization Science*, 7, 5: 470-476.
- Garvin, D. 1983. Spin-offs and the New Firm Formation Process. *California Management Review*, XXV, 2. : 3-20.
- Gomez-Meijia, L. 1992. Structure and process of diversification, compensation strategy, and firm performance. *Strategic Management Journal*, 13: 381-397.
- Grant, R. 1988. On “dominant logic”, relatedness and the link between diversity and performance. *Strategic Management Journal*. 9: 639-642.
- Green, P. 1978. *Analyzing multivariate data*. Himsdale Ill: Holt, Rinehart & Winston.
- Hair, J., Anderson, R., Tatham, & W. Black. 1995. Fourth Edition. *Multivariate Data Analysis with Readings*. New Jersey: A Simon & Schuster Company.

- Hamel, G. 1991. Competition for competence and interpartner learning within international strategic alliances. *Strategic Management Journal*, 12.: 83-103
- Hannan, M. & J. Freeman. 1989. *Organizational ecology*. Cambridge, MA: Harvard University Press.
- Hoskisson, R & M. Hitt. 1990. Antecedents and Performance Outcomes of Diversification: A Review and Critique of Theoretical Perspectives. *Journal of Management*, 16, 2.: 461-509.
- Ito, K. 1995. Japanese spin-offs: unexplored survival strategies. *Strategic Management Journal*, 16: 431-446.
- Ito, K. & E. Rose. 1994. The genealogical structure of Japanese firms: Parent-subsidiary relationships. *Strategic Management Journal*, 15: 35-51.
- Ito, K. & Rose, E. 1998 Corporate genealogy and the transformation of resources: A study of service firms in Japan A paper presented at the Academy of Management Conference, San Diego 9-12 August 1998.
- Kazanjian, R. 1988. Relation of dominant problems to the stages of growth in technology-based new venture. *Academy of Management Journal*, 31(2): 257-279.
- Kazanjian, R. & R. Drazin. 1989. An empirical test of a stage of growth progression model. *Management Science*, 35(12): 1489-1503.
- Ketchen, D. & C. Shook. 1996. The application of cluster analysis in strategic management research: An analysis and critique. *Strategic Management Journal*, 17: 441-458.
- Lindholm, Å. 1994. The Economics of Technology-Related Ownership Changes. A study of Innovativeness and Growth through Acquisitions and Spin-offs. Unpublished doctoral dissertation, Chalmers University of Technology, Department of Industrial Management and Economics. Gothenburg, Sweden.
- Lindholm Dahlstrand, Å. 1997. Growth and inventiveness in technology-based spin-off firms. *Research Policy*, 26: 331-344.
- Mahoney, J. & J. Pandian. 1992. The resource-based view within the conversation of strategic management. *Strategic Management Journal*, 13 (5): 363-380.
- Markides, C. 1992. Consequences of Corporate Refocusing: *Ex ante* Evidence. *Academy of Management Journal*, 35(2) : 398-412.
- Nelson, R. & S.Winter. 1982. *An Evolutionary Theory of Economic Change*. Cambridge, MA: The Belknap Press of Harvard University Press.
- Parhankangas, A. 1999. Divestments through spin-off arrangements: An empirical study of divestments through spin-off arrangements. A doctoral dissertation. *Acta Polytechnica Scandinavica, Series 99*. Finnish Academy of Technology, Espoo.
- Pavitt, K. 1991. Key Characteristics of the Large Innovating Firm. *British Journal of Management*, 2: 41-50.
- Penrose, E. 1959. *The Theory of the Growth of the Firm*. New York, NY, Wiley

- Peteraf, M. 1993. The Cornerstones of Competitive Advantage: A Resource-Based View. *Strategic Management Journal*, 14: 179 - 191.
- Pfeffer, J. & G. Salanick. 1978. *The External Control of Organizations. A Resource Dependence View*. New York, Harper & Row.
- Prahalad, C. & R. Bettis. 1986. The Dominant Logic: A New Linkage Between Diversity and Performance. *Strategic Management Journal*, 7: 485 – 501
- Ramanujam, V & P. Varadarajan. 1989. Research on corporate diversification: A synthesis. *Strategic Management Journal*, 10.: 523-551.
- Roberts, E & H Wainer. 1968. New enterprises on Route 128. *Science Journal*, December 1968: 78-83.
- Sanchez, R. 1997. Managing articulated knowledge in competence-based competition. In R. Sanchez & A. Heene, editors, *Strategic learning and knowledge management*. John Wiley & Sons: 163-187.
- Seabright, M, D. Levinthal & M. Fichman. 1992. Role of individual attachments in the dissolution of inter-organizational relationships. *Academy of Management Journal*, 35 (1): 122-160.
- Tuomela, K. 1995. Johdon yritysostot ja niiden aikaansaamat muutokset yrityksissä (A study on the intra-firm changes associated with management buyouts). Unpublished Master's thesis. Helsinki School of Economics and Business Administration.
- Takahashi, P. 1995. Strategic spin-offs and organizational change in the Japanese electric and electronic equipment industry. Unpublished doctoral dissertation. University of California at Berkeley.
- Teece, D. 1982. Towards an economic theory of the multiproduct firm. *Journal of Economic Behavior and Organization*, 3: 39-63.
- Teece, D. 1988. Technological change and the nature of the firm. In G. Dosi, C. Freeman, R. Nelson, G. Silverberg & L. Soete, L, editors, *Technological Change and Economic Theory*, Pinter: 256-281.
- Thompson, J. 1967. *Organizations in Action*. New York: McGraw Hill
- Von Krogh, G., J. Roos & T. Hoerem. (1996) Restructuring: Avoiding the phantom limb effect. In G. Von Krogh, & J. Roos, editors, *Managing knowledge-Perspectives on cooperation and competition*. Sage Publications: 137-154
- Wernerfelt, B & C. Montgomery. 1988. Tobin's q and the importance of focus in firm performance. *American Economic Review*, 78: 246-250.
- Woo, C, G Willard, G & U Daellenbach, U. 1992. Spin-off performance: A case of overstated expectations. *Strategic Management Journal*, 13: 433-447.
- Wright, R. 1997. Tangible integration versus intellectual codification skills: A comparison of learning processes in developing logic and memory semiconductors. In R. Sanchez & A. Heene, editors, *Strategic learning and knowledge management*., John Wiley & Sons: 83-100.
- Zahra, S. 1996. Technology strategy and new venture performance: A study of corporate-sponsored and independent biotechnology ventures. *Journal of Business Venturing*, 11: 289-321.

APPENDIX 1 Correlation table

	1	2	3	4	5	6	7	8
1 Production knowledge relatedness	1,000							
2 Technological knowledge relatedness	0,216	1,000						
3 Marketing relatedness	-0,029	0,481**	1,000					
4 Collaboration	-0,044	0,354*	0,344*	1,000				
5 R&D expenditures	-0,435**	-0,080	-0,054	0,154	1,000			
6 Parent ownership	-0,142	-0,50	-0,201	0,319*	0,208	1,000		
7 Vertical relatedness	0,101	-0,225	-0,041	-0,228	-0,198	0,101	1,000	
8 Maturity at the separation	0,419**	-0,158	-0,251	-0,429**	-0,405**	-0,256	0,198	1,000

Correlation is significant at the .01 level (2-tailed).

Correlation is significant at the .05 level (2-tailed).

APPENDIX 2

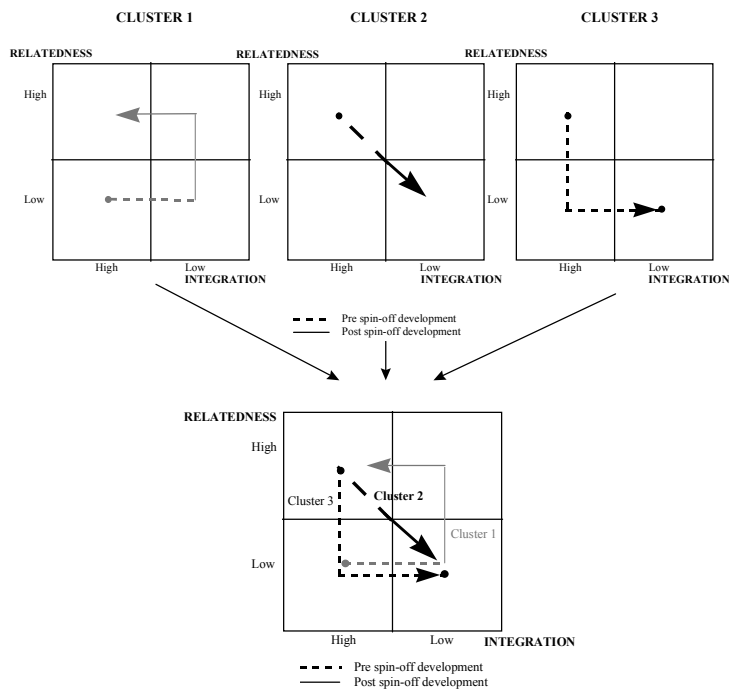


Figure 1 Comparison of disintegration processes across the three clusters