

Leveraging Resources Under Threat of Opportunism: Predicting Networking in International Growth

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Abstract

This paper develops a set of hypotheses designed to predict the intensity of networking in the international growth of new, technology-based firms. The model draws on both the resource-based (or knowledge-based) and contractual views of the firm. The model is empirically tested with data from 86 new, technology-based firms in Finland. Mixed support for the model is found. Pointers for future research are discussed.

Introduction

During recent years, the resource-based view of the firm (e.g., Penrose, 1959; Wernerfelt, 1984; Rumelt, 1984; Conner, 1991; Peteraf 1993; Conner&Prahalad, 1996) has emerged as a popular reference framework for studies in strategy and management. The resource-based view of the firm seeks to complement the contractual (Williamson, 1985; Grossman&Hart, 1986; Holmström&Tirole, 1989; Hart&Moore, 1990) views of the firm by emphasizing the importance of firm specific resources in the generation of economic profit. The resource-based view suggests that the firm is not merely a nexus of contracts (Fransman, 1994), but also a knowledge-bearing entity, a repository of knowledge and competencies. The competencies are stored in, e.g., organizational routines and structures, in employees, and, for example, in the control and information systems of the firm. As knowledge and competencies are cumulative, and as it is more difficult to unlearn than it is to learn, knowledge and competence accumulation processes are essentially path dependent. This helps explain why firms are different, and may focus on exploiting their distinctive competencies.

One central point in the conversation between the resource-based and contractual views of the firm is whether or not notions such as opportunism and moral hazard constitute a necessary prerequisite in explaining the existence of firms. The proponents of the resource-based view argue that replacing these notions should at least sometimes be possible (Conner, 1991; Conner&Prahalad, 1996; Kogut&Zander, 1996). It is suggested, for example, that there are factors that help offset opportunism without recourse to explicit contractual deterrents. Such factors include the cumulative competencies and knowledge carried by the firm, and the social context in which every firm and economic transaction is inevitably embedded. Sometimes the social control of economic behavior is so strong that opportunism is given little room to operate. A well known example of such a situation is the Dutch diamond market, where large (and sometimes possibly even uncertain, in terms of outcome) transactions are sealed with a handshake, and where opportunistic behavior is not present (Granovetter, 1985). Focusing on knowledge accumulation and substitution, Conner and Prahalad (1996) point out situations where the strict application of opportunism-based arguments and knowledge-based arguments may lead to opposite predictions regarding the organization of economic activity.

The consensus that seems to be emerging from the dialogue between the two views of the firm is that both views have much to offer, and that it may even be possible to develop a unifying theoretical framework (Conner&Prahalad, 1996). From the perspective of research on new, technology-based firms, both the resource-based (or knowledge-based) and contractual views certainly have a rich potential to offer, even though the potential areas of application may slightly differ from each other. In this regard, a useful differentiating aspect is pointed out by Conner (1991), who argued that the resource-based view focuses on reaching for the *positive* through the exploitation of the resources of the firm, whereas the contractual view focuses on preventing the *negative*, that is, guarding against opportunism.

In the present study, we seek to draw upon the potential offered by both views by developing and testing a model of the international growth of new, technology-based firms. We believe that the international growth of new, technology-based firms provides a research setting where each of the two views have potential strengths. In international growth, information asymmetries are often large, and the opportunism-moderating influence of a common social context often weak, because the transacting parties come from different countries. In international growth, the potential for opportunistic behavior should thus be particularly important. On the other hand, new, technology-based firms themselves are highly knowledge intensive. The business idea of new, technology-based firms is based on exploiting their core technological competencies. This core resource is also constantly upgraded during the normal activity of the firm, as the new, technology-based firm learns from previous projects. There are thus often high potential value to be derived from the innovative combination of this core resource with external complementary assets.

The international growth of new, technology-based firms thus provides an example of a resource-intensive growth logic (innovative combination of firm specific resources with external complementary assets) in a context where the potential for opportunistic behavior is important (international growth). We should thus have a case where both the resource-based view and the contractual view of the firm should be of relevance, and where a model drawing upon each of the two views could be developed.

In the following, we will first review studies of the growth of small firms, focusing on international growth in particular. Then, we will develop a set of propositions that are combined into a model of international growth of new, technology-based firms. The model will be tested with data that has been compiled previously for another study (Salonen, 1995).

Models of the Growth of New, Technology-Based Firms

In his dissertation, Feeser (1987, pp 53-78) found that there is no generally accepted framework explaining the growth of new, technology-based firms. While the literature abounds with studies associating different industry and firm variables with firm growth, most studies are highly empirical in their orientation, lacking a consistent theoretical basis. The lack of well developed theories of causal relationships has also been highlighted by Cooper (1993).

The models proposed for depicting the growth of small firms are typically linear stage models, in which emphasis is placed upon creating a fit between the configuration of the organization and the stage of growth (see, e g, Greiner (1972), Churchill and Lewis (1983), Kazanjian (1983), Kazanjian and Drazin (1990), Eggers, Leahy, and Churchill, 1994). These models draw upon organization theory, and direct references to established theories of the firm are largely missing. In most linear stage models, implicit references to industrial organization economics can be found, however. For example, almost all models view the limits to growth as being determined by the market, the external environment of the firm. Co-operation between firms is not given much consideration. Instead, the firm is viewed as operating atomistically, keeping customers and suppliers at arms length. Particularly in the earlier models, all firms were assumed to be growth oriented, and the absence of growth was interpreted as failure. Such growth assumptions reflect the influence of Baumolian growth economics (Baumol, 1959). Later growth models have increasingly recognized the fact that most small firms depict only low degrees of growth orientation, and that many small firms go through growth reversal phases, where the small firm oscillates back to a smaller size (Eggers, Leahy, and Churchill, 1994).

The general lack of explicit references to theories of the firm in small firm growth models is a natural reflection of the fact that microeconomic theories were not directly used in strategic management research until late 1970's. Even then, the dominating influences came from the Bain-Mason paradigm and from the oligopoly theory, which were used by Porter (1980) as a basis for the examination of structural forces in a firm's operating environment (Foss, Knudsen, and Montgomery, 1996). Studies drawing on Porter's framework dominated the small firm growth studies (together with psychological-sociological studies) during the 1980's. As the influence of microeconomic theories over strategic management research has increased from the mid-1980's onwards, this picture has become richer, with an increasing number of small business growth studies making explicit references to microeconomic theory frameworks.

Garnsey (1996) has proposed a resource-based growth model of small firms that explicitly draws on Penrose's (1959) theory of the growth of the firm. Also the growth model by Garnsey is a stage model, but the stages are described in resource terms (e g, resource identification, resource mobilization, resource generation, resource maturity). The interesting point of Garnsey's model is that it uses systems theory to explain typical phenomena in the early growth of the firm, such as lock-in and growth reversal. Garnsey's model thus provides a good basis for linking the small firm to its environment through network relationships, a theme pursued by Autio, Garnsey,

and Yli-Renko (1997). Garnsey's model does not address issues related to international growth, however. This may possibly be a reflection of the fact that Penrose herself did not consider that there was a need for a special theory to explain the expansion of firms outside their national boundaries (Penrose, 1985, pp 14 - 15).

Even though there are a number of studies that focus on the international growth of new, technology-based firms (e.g., Cooper and Kleinschmidt (1985), Lee and Yang (1990), Tyebjee (1990), Lindqvist (1992), Czinkota and Ursic (1991), McDougall (1989), Bloodgood et alii (1995)), there seem to be no growth models that would have been explicitly developed for the international growth of technology intensive small firms. None of the growth models reviewed above addresses the problem of international growth. Also McDougall et alii (1994) point to a similar gap, noting that the existing theories of international expansion of the firm (monopolistic advantage theory, product cycle theory, stage theory, oligopolistic reaction theory, and internalization theory) are tailored to relatively large, established firms only. McDougall et alii proceed to suggest pointers for a more resource-based model of the international growth of new, technology-based firms. In their discussion, resource-leveraging and co-operative relationships occupy a central position. The importance of the use of network relationships has also been emphasized by Coviello and Munro (1995).

To summarize, the existing models and studies on the growth of small firms in general, and the international growth of new, technology-based firms in particular, only rarely rely explicitly on some established theory of the firm. Such models have recently started to appear, however, and the number of such models can be expected to increase, as the theories develop and their predictive power increases. In the following, we will discuss both contractual and resource-based pointers for the development of a model for predicting the international growth of new, technology-based firms.

Network Model of the Growth of New, Technology-Based Firms

Premises

As a starting point for our model development, we need to address the special characteristics of new, technology-based firms. We define new, technology-based firms as small and medium sized firms operating in high-technology sectors, as proposed by, e.g., Butchart (1987). It is typical for such firms that they base their business idea on exploiting their core technology resource. An important fraction of the personnel of such firms often has a degree in technology or in natural sciences (Rickne, 1996). This means that the core technology resource of new, technology-based firms is often largely carried by its employees, which makes this resource highly firm-specific and inalienable (Brynjolfsson, 1994). This resource is also a cumulative one, as the new, technology-based firm learns from its previous customer projects. This process continuously increases the distinctiveness of its core technology resource.

The above arguments prompt us to state our first premise in view of developing the model of international growth of new, technology-based firms.

Premise 1

New, technology-based firms are a particularly resource-intensive type of business firms. Their core technology resource tends to dominate other characteristics of these firms.

New, technology-based firms are also characterized by a high degree of resource dependency (Child, 1974; Pfeffer&Salancik, 1978). They often need to access and control external complementary assets in order to generate profit (Teece, 1986). The time windows, during which new, technology-based firms need to succeed in commercializing their products and services, are often short. This further emphasizes the need to access external complementary assets, as the time compression diseconomies involved in generating the necessary complementary assets may be significant (Peteraf, 1993). New, technology-based firms also often operate in systemic environments, in the sense that their specialized technology outputs are integrated to a systemic product. Eisenhardt and Schoonhoven (1996) also provide a resource-based motivation for alliance formation by new, technology-based firms, stating that alliance formation offers a number of advantages, such as learning, creation of legitimacy, and fast market entry. The accessing of external complementary resources and the exploitation of dynamic complementarities between small and large firms thus seems a natural avenue for growth seeking new, technology-based firms. This approach, the seeking of profit through the innovative combination of internal resources with external complementary assets, is also something that Conner (1991) emphasizes in her review of the resource-based view of the firm.

The above arguments prompt us to state our second premise in view of developing the model of the international growth of new, technology-based firms.

Premise 2

Growth oriented new, technology-based firms need to enter into network relationships in order to access external complementary assets

Our third premise is a corollary of the first and second premises. As stated above, our reasoning holds that new, technology-based firms need to leverage their resources by seeking profitable resource combinations in order to grow. Thus, their growth is more of the 'resource-intensive' type, as opposed to market-intensive growth. Market-intensive growth takes place predominantly through the expansion of manufacturing capacity, and the products are then sold in a market. In resource-intensive growth, the growth takes place through the leveraging of firm-specific resources: the firm grows with the value creating system to which it is locked in.

Premise 3

The growth of new, technology-based firms tends to be 'resource-intensive' growth. This means that the growth is sought through the innovative combination of firm-specific technology resources with external complementary assets.

We need to state one more premise in view of building our model. We do not expect growth orientation to be an inherent characteristic of all new, technology-based firms. The resource-intensive logic, that we expect most new, technology-based firms to adhere to, can in fact be expected to generally favor profitability over growth as a key managerial goal (Autio, 1996).

Empirical evidence supporting such a conclusion is abundant, see, for example, Utterback&Reitberger, 1982; Cooper, 1982; Davidsson, 1989; Autio, 1994; Kamshad&Hay 1996. Davidsson attributes the assumption of universal growth orientation to the general assumption of rational profit maximizing behavior among economic actors.

Premise 4

Most new, technology-based firms are not growth oriented by nature.

Antecedents of Network Relationships

Having stated the premises underlying the model building, we now turn to formulating the model-specific hypotheses. As stated in the introduction, international growth provides an example of a situation in which agency problems can be particularly severe. The new, technology-based firm needs to rely on its foreign partners in its supply of information concerning the foreign market. Such a situation exposes the firm to both moral hazard and to adverse selection. Adverse selection may occur when opportunistic foreign partners provide misleading information about their true abilities (Eisenhardt, 1988; Shane, 1996). It may be advantageous for the foreign partner to maximize the number of suppliers in order to be able to maximize her opportunities for cherry picking. Moral hazard occurs when the new, technology-based firm cannot monitor her foreign partners closely enough to prevent shirking. The lack of a shared socio-cultural context makes it less likely that the possible complaints of the new, technology-based firm will tarnish the reputation of the foreign partner in her home country.

International expansion can thus be expected to present a much bigger challenge for NTBFs whose growth we expect to be more of the resource-intensive type, as opposed to market-intensive growth. In market-intensive expansion, direct and indirect exports can be relied upon as the main mechanism of international expansion. As the relationship is more arms-length in character in traditional export relationships, agency problems are less acute (Lassar and Kerr, 1996). The more important the mutual dependencies become, the more important it becomes to find the right combination of control and cost efficiency.

In Penrose's theory, the management of the firm is identified as the key internal factor regulating the growth of the firm. She also identified opportunities for small firms to enter new 'interstices' (1959, p 224), citing the expansion of production investment by large firms as one rich source of such 'interstices'. However, the ability of the management to co-ordinate and control the activities of the firm is clearly put forward as the central growth regulating factor in Penrose's theory.

In small firms, we believe, the role of management is not as likely to be a growth constraining factor as it is to be a growth *enabling* factor. An experienced management is more likely to be able to set up collaborative relationships with other firms. This may due to, for example, the higher social visibility of an experienced management, its higher trustworthiness, and its previous industry experience (Eisenhardt&Schoonhoven, 1996, pp 140-141). We therefore expect that:

Hypothesis 1a

The more experienced and skilled the company management, the greater the rate of alliance formation

Hypothesis 1b

The greater the size of the top management team, the greater the rate of alliance formation

Our data does not allow us to verify Eisenhardt&Schoonhoven's hypotheses that the number of previous industry employers and the level of previous jobs by management team members correlate positively with alliance formation.

New, technology-based firms are often defined by their core technology resource. The qualities of this core resource influence the degrees of freedom available for the firm, for example, in terms of pursuing alternative avenues for growth. The resource-based view suggests that valuable, rare, imperfectly imitable, and non-substitutable resources are ones which provide potential for creating sustainable competitive advantage (Barney, 1991, p 116). Such qualities may also make a new, technology-based firm more attractive as an alliance partner, both because they limit the partner's possibilities of accessing similar resources elsewhere, and because non-substitutability makes it less likely that competitors will get access to a similar resource (Sapienza et alii, 1997, p 12). From the perspective of the new, technology-based firm, imperfect imitability and non-substitutability are qualities that help decrease the risk of the core technology being copied by the foreign alliance partner. A higher degree of inimitability also enables the new, technology-based firm to concentrate on learning from the alliance partnership, which may further enhance this non-imitability. From the transaction cost perspective, a high degree of inimitability and non-substitutability also help the new, technology-based firm to offset the effect of information asymmetries that work to the advantage of the alliance partner. As the products and services of the new, technology-based firm may be highly specialized, idiosyncratic investments are often called for from the alliance partner in order to accommodate the product or service. Such investments increase the dependency of the alliance partner of the new, technology-based firm, helping put the relationship on a more equal footing. Summarizing, we expect that:

Hypothesis 2

The greater the degree of appropriability of the core technology resource, the greater the rate of alliance formation

Above, we use the term 'appropriability' as a proxy for the joint effect of inimitability and non-substitutability.

The issue of growth orientation among new, technology-based firms was addressed above. New, technology-based firms often operate in information technology -intensive business environments where flexible specialization advantages are exploited. Such advantages often mean that rapid growth is not the most optimal avenue for developing the activities of new, technology-based firms. There are numerous reasons why profit maximization does not necessarily need to imply growth, and why the assumption of profit maximization itself does not necessarily hold for small firms (Sapienza et alii, 1997, pp 13 - 15). The owners of small firms may wish to remain independent, fear losing control, wish to avoid unnecessary risks, and simply value other managerial goals than rapid organic growth. The reasoning of Kogut&Zander (1996) suggests that the

firm has intrinsic value for the entrepreneur, as it strengthens her identity. Letting in outside investors and entering into numerous alliances would mean ceding control and risking a loss of a part of the identity of the entrepreneur. For such reasons, we think it is important to control for growth orientation in growth models of small firms. Keeping in mind that we expect the growth of new, technology-based firms to be of the resource-intensive type, we posit:

Hypothesis 3

The greater the growth orientation of a new, technology-based firm, the greater the rate of alliance formation

The hypotheses are illustrated in figure 1. The wording in figure 1 relates to the empirical data that we have. The dashed line between network relationships and international growth indicates our expectation that network relationships are linked to growth. Our available data does not allow us to rigorously test this expectation. Collection of new data is required to check this expectation.

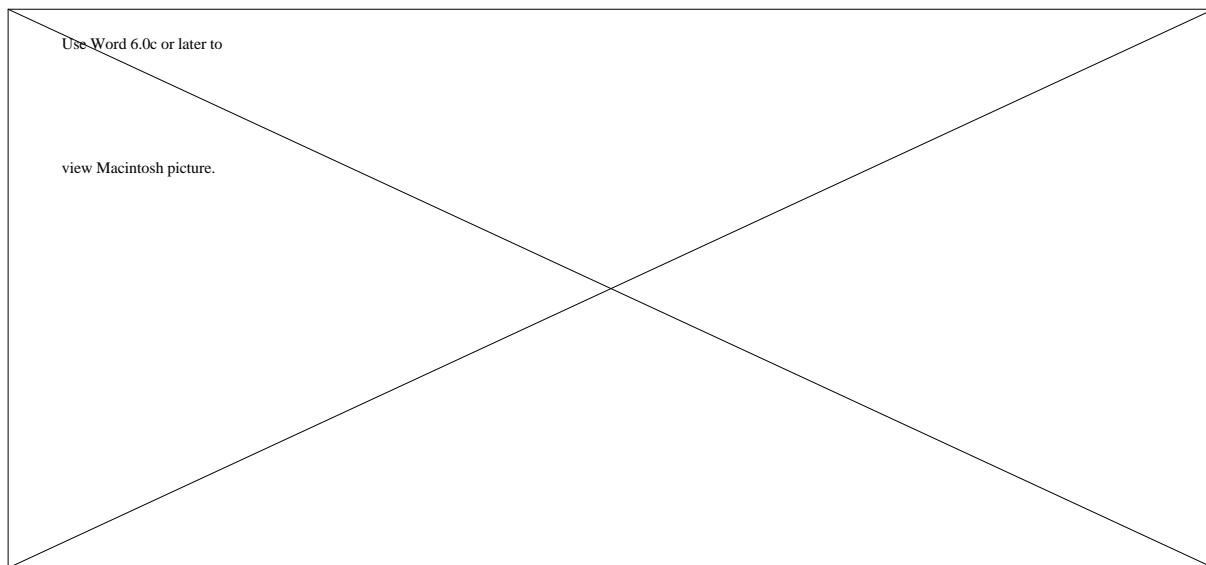


Figure 1 Model of the international growth of new, technology-based firms

Empirical Data

The model is tested using empirical data originally collected by Salonen (1995). Note that the empirical data was not collected for testing the model constructed here. The operationalization of some constructs, collaborative relationships and appropriability in particular, is not sufficient in this data. The data allows us only to explore, not rigorously test, the hypotheses.

The data was collected by a mailed questionnaire survey. The population was limited to independent electronics firms, founded in or after year 1970, and which were internationally involved in the spring of 1993 and based their business idea on exploiting advanced technologies.

Altogether, 139 firms met the criteria for inclusion in the population. The questionnaire was acceptably returned by 82 firms.

Secondary sources were used and demographic variables checked to assess possible bias in the sample (Binks and Jennings 1986, pp 4-5). The checks generated satisfactory confidence that the sample was representative and random enough. The basic statistics of the sample firms are shown in table 1.

Table 1 Basic statistics of the empirical sample

| Characteristic | Mean | Median | St dev |
|--|-----------|-----------|-----------|
| Age at the time of the interview | 11 years | 8 years | 6,7 years |
| Number of founders | 2,9 | 3,0 | 1,8 |
| Age at the time of going international | 4.8 years | 3.5 years | 4.8 years |
| Number of employees at the time of going international | 15,7 | 7,9 | 19,7 |
| Annual international sales at the time of going international* | 1,9 | 1,0 | 2,7 |
| Total annual sales at the time of going international* | 5,5 | 3,3 | 6,4 |
| Number of employees at the time of the interview | 21,7 | 10,0 | 26,5 |
| Annual international sales at the time of the interview* | 8,7 | 3,0 | 16,9 |
| Total annual sales at the time of the interview* | 15,7 | 7,5 | 23,2 |

* Millions of Finnish Markka; FIM 1 USD 0,22

Variables in the Model

As a proxy for appropriability, we used statement-style questions:

- A₁ We have developed our main technology product by ourselves*
- A₂ Our main technology product is unique in the world*
- A₃ Our main technology product is among the most technologically sophisticated on the market*
- A₄ It is difficult for competitors to imitate our main technology product*

The Cronbach Alpha for the construct was 0.7372. We also used R&D intensity and service intensity as proxies for appropriability. If the R&D intensity of the firm is high, it is likely to have developed more of its technologies by itself, which should increase appropriability. If the service intensity of the firm is high, inalienable human skills are relatively more used in customer service. The R&D intensity was measured as the percentage of R&D of the total sales of technology products. The service intensity of the product of the firm was assessed with a statement-style question: “*There is a considerable service component associated with our product, for example, design service.*”

The number and extent of the international collaborative relationships of the firms was evaluated by asking the respondents to indicate whether their firm had co-operation with any of the following: small foreign firm, large foreign firm, foreign research organization, foreign univer-

sity, potential foreign customer, foreign consultant, or foreign service organization. Regarding each of these partners, the respondents were asked to evaluate the extent of the cooperation on a Likert scale from 1 = no cooperation to 5 = extensive cooperation. The proxy used to indicate the total international collaborative relationships of the firm was calculated as the sum of the extent indicators for the different cooperation relationships.

Because nearly half of the firms did not indicate international collaboration as defined above, we also use a dichotomous dependent variable to distinguish between firms which had international collaborative relationships and firms which did not.

We also explored relationships between a number of variables and international growth. The rate of international growth was calculated as the value of international sales (S_n) divided by the number of years of international involvement (n): $SALGRW\#3 = S_n/n$. This variable indicates the absolute rate of international growth, and is thus likely to correlate positively with firm size.

As proxies of the managerial capability, we used the following variables

| | |
|-----------------|---|
| <i>EDUIND</i> | <i>index of the weighted average education level of the founders and managers of the firm; weights ranging from 1 for a secondary school education to 7 for a doctoral degree</i> |
| <i>AVGANAL</i> | <i>index showing how extensively a firm had analyzed its foreign customers, competitors, and possible partners before going international</i> |
| <i>BRDCOMP</i> | <i>index of the competence of the board of directors in a firm, in the fields of general management and the management of international operations</i> |
| <i>PREEXMNT</i> | <i>index of the previous experience of the management team of a firm, in the fields of general management and the management of international operations</i> |
| <i>LANGUAGE</i> | <i>the total number of foreign languages the management team was able to use</i> |
| <i>MTEAM1</i> | <i>size of the management team when the firm went international</i> |

As a proxy of the growth orientation of the firms, we used replies to the following statement: “How important was it, at the beginning of internationalization, for the firm to reach a substantial size fast? “

Findings from the Exploratory Analysis

Table 2 shows the results from the logistic regression analysis, in which the dichotomous indicator of international co-operation was used as the dependent variable. In all analyses, collinarity between independent variables, as well as the normality of residuals, were controlled. As can be observed, after backward elimination, only one of the proxies for inimitability and non-

substitutability indicates significant influences on collaboration, when collaboration is used as a dichotomous variable. This proxy is the service intensity of the product offering of the firm. In addition, the amount of preparatory analysis undertaken before going international appears as an almost significant influence.

Table 2 Results of logistic regression, dichotomous indicator of collaboration as the dependent variable

| Variable | B | S.E. | Wald | df | Sig | R | Exp(B) |
|--------------------|-------|-------|-------|----|---------|------|--------|
| Amount of analysis | .525 | .294 | 3.188 | 1 | .0742† | .112 | 1.691 |
| Service intensity | .560 | .222 | 6.380 | 1 | .0115 * | .215 | 1.751 |
| Constant | -2.94 | 1.244 | 5.604 | 1 | .0179 | | |

The variables not included in the equation were: R&D intensity, growth orientation, proxy for appropriability, previous management experience of the management team, education index of the management team, management team size, and the size of the firm at the time of the survey. Thus, hypothesis 1b and 3 are not supported by this analysis, and hypothesis 1a is given only limited support. The adjusted R square of the model is 65.2 %.

The results of a multiple regression analysis are shown in table 3. In the multiple regression analysis, we used the continuous indicator of international co-operation as the dependent variable. The same independent variables were used in this run as in table 2. This time, also R&D intensity appears as a significant influence, in addition to the amount of preparatory analysis and service intensity.

Table 3 Results of multiple regression, continuous indicator of collaboration as the dependent variable

| Variable | B | SE B | Beta | T | Sig T |
|--------------------|-------|------|------|--------|----------|
| R&D intensity | .025 | .007 | .345 | 3.502 | .0008*** |
| Amount of analysis | .810 | .346 | .230 | 2.344 | .0216* |
| Service intensity | .660 | .256 | .253 | 2.568 | .0122* |
| (Constant) | -2.23 | 1.36 | | -1.660 | .1009 |

The adjusted R square for the model is 0.25. The influences appear as more significant than in table 2. The hypothesis concerning the relationship between appropriability and interna-

tional collaboration gets stronger support, even though the primary proxy does not appear in this model, either. Importantly, none of the size related variables is indicated a significant influence.

We also checked the influences on international growth. The results of this analysis are shown in table 4.

Table 4 Results of multiple regression analysis, absolute international sales growth used as the dependent variable

| Variable | B | SE B | Beta | T | Sig T |
|------------------------------|-------|-------|-------|--------|----------|
| Previous industry experience | .057 | .0266 | .194 | 2.169 | .0332* |
| Language proficiency | -.380 | .207 | -.179 | -1.835 | .0704† |
| Education index | .315 | .158 | .185 | 1.999 | .0492* |
| Management team size | .380 | .181 | .224 | 2.094 | .0396* |
| Firm size (employees) | .042 | .009 | .456 | 4.616 | .0000*** |
| (Constant) | -1.93 | .923 | | -2.095 | .0395 |

The variables not included in the equation include R&D intensity, growth orientation, amount of preparatory analysis, service intensity, sum proxy for appropriability, market proximity, and amount of international co-operation. Thus, our expectation, that intensity of international collaboration is related to international growth, is not supported by this data. On the other hand, variables relating to qualities of the management team appear as significant. The findings thus suggest that management indeed constitutes a growth enabling factor. The strong influence of firm size is expected, as absolute international growth is used as the dependent variable.

Discussion

This paper has addressed the important topic of international growth of new, technology-based firms. This topic is particularly important for small open economies, such as Finland, where growth oriented technology-intensive firms have to start aiming at international markets at a fairly young age. Our data indeed shows, consistent with McDougall et al (1994), that the internationalization process of these firms was started early.

We have attempted to borrow from both the resource-based and contractual views of the firm in trying to predict the intensity of networking in the international growth of new, technology-based firms. Both views seem to have much to offer for understanding this phenomenon. The main thrust of the paper is in model development, and the model is tested with secondary data at this stage only. Our mixed support for H1 and H2 suggest that new, technology-based firms do try to leverage their strengths through alliances when they can, and that the appropriability of the core technology resource of the firm does influence this process. Although the support is mixed, all significant relationships are in the expected direction. As secondary data has been used, that was originally compiled for another purpose, we interpret the mixed support as satisfactory at this stage. Note that the operationalization of the extent of international collaboration was far from being an optimal one.

In this data, we could not support a relationship between growth orientation and collaboration. One possible explanation for this, in addition to the use of secondary data, may be that some firms collaborate in order to grow and some collaborate in order to avoid the necessity of growing to reach their targets. Further research is needed to check these alternative explanations.

We have just begun to understand the causes and effects of NTBF collaboration for internationalized ventures. Emerging work on barriers to growth--especially resource-based and goal-related causes-- are consistent with Penrose's original concepts and suggest that understanding firm growth requires a deep understanding of internal limits to growth. Further work on the use of collaborative relationships for growth and survival suggest a more complex relationship than originally imagined. This complexity is echoed here by the lack of a significant relationship between growth orientation and collaboration.

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