

A Panel Study of Firm Growth among SMEs in Networks

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ABSTRACT. An underlying assumption in SME literature, as well as among policymakers, is that networks are good *per se* especially for SMEs. Through accessing and utilising external resources in the network, the SME can overcome some of the assumed disadvantages of limited size. Thus networking is assumed to enhance small firm performance and thereby small firm growth. This article investigates this assumption. Analysis of panel data ascertains that a substantial number of SMEs are actively networking and that the level of networking has been maintained over a five-year period. In spite of this there is no evidence of associated short-term benefits such as growth in employment or growth in total sales resulting from the networking activities. The analyses suggest, however, that networking is associated with high growth in the geographic extension of markets, which suggests that networking sustains long-term objectives of the firms.

1. Introduction

Networks and the importance of belonging to, or having a network, has been the focus of numerous scientific articles the last 10–15 years. We find them in the strategy field, entrepreneurship area, the literature concerning industrial districts, and lately in the field of innovation theory. The network can be a useful metaphor. It emphasises the ties or relationships between independent entities. Importantly, the network perspective focuses on structural properties, such as the strength or type of these relationships. The relationships may symbolise channels for distribution

of material goods or information, power or influence structures, elements of processes, etc. Consequently, seemingly identical depictions of networks may represent very different phenomena; for instance the consolidation of resources in strategic alliance networks (Ahokangas, 1998) or the value creation in industrial processes (Tikkanen, 1997).

One early contribution to the current interest in business networks was the book by Piore and Sabel (1984) which was followed by a series of studies. Several of these demonstrated that the network concept was also very useful in entrepreneurship research (e.g. Aldrich and Zimmer, 1986; Birely, 1985; Starr and MacMillan, 1990; Dubini and Aldrich, 1991; Larson, 1992; Johannisson, 1987, 1996; Johannisson and Senneseth, 1993). The major focus in these studies has been to describe, define and classify the properties of the network, that is, types, strength and contents of relations and structural properties of the network.

In the entrepreneurship theory the basic argument is that the entrepreneur uses or utilises his or her personal network in the venturing process (Johannisson et al., 1994; Johannisson, 1996). Some of the arguments concerning the benefits from belonging to a network used in the entrepreneurship theory concern the organising of the venture (Larson, 1992; Dubini and Aldrich, 1991). The basic arguments in the industrial district literature are that the network supplies or can supply the firm with resources, which otherwise would not have been available to the firm, and that the network offers flexibility when organising production (Piore and Sable, 1984; Easton, 1992; Håkansson and Johanson, 1993).

Common to all of the above theories is the notion that an individual firm will benefit from belonging to a network. The industrial district

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literature and the entrepreneurship theory argue that in the long run all network participants will benefit through increased availability of resources. Innovation theory argues that belonging to a network will increase the individual firm innovation rate, and the strategy theory argues more indirectly that it will increase the firm's competitive advantage and in the long run its profit and survival. Importantly, these assumptions on the long-term benefit for the individual firm have only to a limited extent been verified by empirical evidence. The main support has been the argument that if the benefits over time are not positive the firm will leave the network.

Our purpose in this study is to investigate this, almost normative, perception of networks. The cited examples of theoretical perspectives illustrate the variety of mechanisms which are utilised to explain the positive effects of the networks. The network metaphor captures an agglomeration of possible explanations for the benefits to individual firms from structured interaction with other firms. At this stage we will not discriminate between these mechanisms but focus on the axiom *network is good*.

2. Networks and benefits

Very few network studies focus on the long term economic benefits of the individual firm. There can be several reasons for this. One is the difference in focus. Network theory is a structural theory in the sense that it deals with the structural properties of inter-firm relations (Wassermann and Faust, 1994). In this respect the focus of interest has often been the network per se, and not the individual firms which constitute the network.

However, the decision of individual firms to enter, remain or retract from networks, is based on the perceived long-term benefits to the firm. The assessment of benefit must therefore be based on firm level measures. It is highly important to be aware that different benefits are inter-related. Furthermore, there will always be a time interval between stimulus and the manifestation of anticipated benefits, specific to the process in question (e.g. ECON, 1998).

Performance and dimensions of growth

The public discussion on the role and importance of SMEs may give the general impression that growth of individual firms is the normal and desired development pattern. The fact is that for most of their existence most SMEs are not growing, and the growth rates for most firms are small (Storey, 1994; Wiklund, 1998). Growth of individual firms is furthermore closely related to the objectives of the owner (Davidsson, 1989; Storey, 1994), it is strongly contingent upon external conditions, and may materialise in other firms than the firm which created the basis for the growth (Rosa, 1998).

In spite of this, we will argue that it is reasonable to presume that sustained growth in general must be associated with (perceived) good performance. This is true whether the growth is externally financed, or financed by the proceedings from existing business. Successful growth will also require that the firm, in addition to being profitable, can adequately organise extension of resources and the value creation process, increase its control systems, expand its markets, etc. Although growth measures are usually one dimensionally, they therefore implicitly also capture multidimensional performance. It is important to emphasise that the opposite argument cannot be made: the absence of growth cannot be construed as an indicator of inferior performance.

The notion of "growth" presupposes that measures of size exist. The growth is defined as the change in size over any given time interval, and the growth rate can be represented by the linear interpolation between the observed size at the beginning and end of the interval (Havnes, 1998). Although the observation interval in principle can be made infinitely small, there are always practical limits due to the discontinuous changes in all relevant dimensions of size. The length of the observation interval is decisive for the research instrument's sensitivity in recording actual fluctuations in size.

Multiple measures of firm size are available and relevant. Employment is frequently encountered in the public discussions, and so are various combinations of firm assets. These measures represent different dimensions of size. It is convenient to categorise the various measures of size

in three main dimensions related to (a) the firm's resource basis (i.e. capacity), (b) its value creation (i.e. utilised capacity) and (c) its markets (i.e. limits to capacity utilisation). For the purpose of clarity we will in this study focus on one measure within each of these categories. We recognise that this is a limitation in view of the complex nature of each of the size dimensions, but we feel that it can be justified for this exploratory study in view of the strong correlation usually found between size measures (Laursen et al., 1999).

From a firm perspective employment represents an important resource, whether it is their working capacity or the competence of the personnel. A further reason for the popularity of employment as size measure is that it is fairly standardised and open to categorisation as well as easily measured directly.

The most precise measure of the firm's value creation would be its added value. However, the added value cannot be measured directly but must be computed from costs and sales. Due to national differences in accounting laws as well as practices of periodisation, accurate and comparable measures of added value are rarely available. In its place the total sales capture much of the same, have standardised content and can be measured directly in all firms.¹

The market potential of any firm is represented by the total consumption of its products and the actual amount of this consumption that has been supplied by the firm. To most SMEs this information is rarely available as an actual measure. However, the number of markets where the firm is active is a good indicator of its present market potential. The distance to its furthest markets is, likewise, a good indicator for its future potential to expand its markets. In spite of the importance of the market share for SMEs with products with predominantly local markets, we propose that measures of the number of markets and their distances will provide a good proxy for the size of the market. This is especially relevant for the SME in the manufacturing industry where market shares often are low.

The performance of any firm will, in addition to the internal factors, be influenced by a number of external factors. These will range from structural elements such as population density, communication systems, distance to large markets

and legal structures; through general economic fluctuations and industry specific conditions; to employment markets, access to raw materials and local competition. Within the European setting of our data, the fluctuations of these external factors will to a large degree be country specific. Since our objective is to control for the possible combined influence of external factors, not to estimate their relative importance, we will here use the categorical variable "nationality" as proxy for the combined influence of all external factors.

In this study we will look into the assumption of a firm specific benefit from belonging to a network. Our argument is that if there is a firm specific benefit it should be manifest in 1) an increase in market share, 2) and/or increase in total sales 3) and/or increase in number of employees (Mazzarol, 1998). If this is not the case the individual owner-manager can not be regarded to be a rational actor in the marketplace.

The main concepts and their presumed relationships are outlined in Figure 1.

Our main hypothesis is that firms with large networks will exhibit better performance than firms with small networks, and consequently that firms with networks will perform better than firms without any network.

H1: Firms scoring high on the network index will score high on one or all of the performance indicators.

Both the entrepreneurship theory and the industrial district literature argue that the effect on the firm level is not a short-term, but a long-term phenomenon. If this is the case there is reason to assume that the firms receive the benefit at different speeds and/or different points in time. Furthermore, the manifestation of results should appear at later points in time than their causes. This means that if a firm has a large network at time t it should perform better at the time $t + 1$.

H2: Firms scoring high on the network index at t score high on one or more of the performance indicators at $t + 1$.

As a direct extension of these two hypotheses, another interesting problem relates to the possible relationship between growth in the network and performance. Finally, we will therefore test the hypothesis:

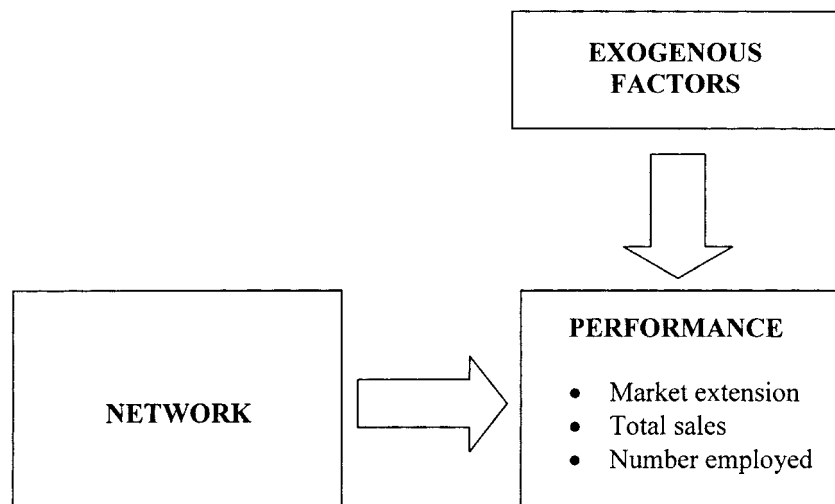


Figure 1. Network, exogenous factors and performance.

H3: Firms going from a low/medium network score to a high network score will score higher on the performance indexes in the period that follows.

3. Data

The outlined research problem requires monitoring of characteristics and performance of identifiable firms over time, which implies panel data. This type of data has been found in the Interstratos data set (Haahti, 1995; Havnes, 1998). The Interstratos project collected in the period 1991–95 five yearly data sets from small and medium-sized manufacturing enterprises in 8 European countries.² The samples were stratified in five industry sectors and five size categories ranging from 1 to 499 employees.³ Identical sampling criteria and questionnaires were used in all countries, and the same mailing lists were used each year. The total data set includes over 20,000 observations of firms (cases). Among these are 1,700 firms which have been responding in four or five of the yearly surveys. These 1,700 firms constitute the panel sample, which we have used in our analyses in this study.

The Interstratos project was set up to examine the strategies for internationalisation of SMEs. As part of the research model measures of external co-operation and performance were naturally included. The associated variables were not

designed for the purpose of measuring the concepts included in our research model. Nevertheless, at this stage the benefits of available panel data are assessed to outweigh the drawbacks of using data which are not ideally adapted to the model. A total of 36 variables have been used to measure networking and 19 variables have been used to measure performance (see Havnes, 1998).

Measures

“Networking” is now increasingly being used to depict any type and intensity level of interaction between persons or firms. In order to avoid an all encompassing concept we will apply a more strict interpretation and require that the firm itself regards this interaction to be strong in the meaning commitment. The chosen criterion for the existence of a network relationship is therefore that the firm considers that there is a co-operation with another firm.

The variables used as indicators for our independent variable networking are multiple response question indicating 12 different potential areas (expanding product spectre, sales, financing, manufacturing, etc.) of co-operation with other firms. A high number of areas of co-operation for a firm are taken as an indication that a large part of the operation of the firm is engaged in external interactions. An increasing number of areas of co-operation are therefore an indicator of increasing

importance of the networking activity. Furthermore, co-operation may on the one hand merely mean an increased capacity, or on the other hand a real extension beyond present capabilities. If the partner is foreign, it can be assumed that the complementary value is higher than if the partner is domestic. Similarly, it can be assumed that the complementary value is higher if the venue of co-operation is foreign than if the venue is domestic. Co-operation in a foreign market with a foreign partner will also represent higher risk, and hence higher commitment when sustained, than co-operation in domestic markets with a domestic partner. Both the complementary element and the risk element indicate that co-operation in a context of high cultural distance should weigh more than in a context of low cultural distance. These considerations have been combined by creating an index for the strength of the networking activities of each firm and each of the five years of observation.

The networking index for the year t is computed as:

$$netind_t = \sum_i n_{(t,i)} c_i \quad (1)$$

where n counts the number of areas of co-operation and c is a weighing factor.

The subscript i indicates one of the four possible contexts for the co-operation. c_i is the arbitrarily selected weighting factor used for this context. Its selected values are: domestically with domestic partner ($c_i = 1$), domestically with foreign partner ($c_i = 2$), abroad with domestic partner ($c_i = 3$) and, finally, abroad with foreign partner ($c_i = 4$). For each of these contexts the number of areas of co-operation have been counted ($n_{(t,i)}$). Finally, the networking index has been linear calibrated to a scale from 0 (zero) to maximum 10. The limitations in available variables have not allowed us to include a direct measure of the number of network relationship, nor a direct measure of the strength of these relationships. However, we feel confident that these two important dimensions to a large degree are reflected by our networking index as discussed above.

The performance of the firm has been measured along three dimensions, the number of employees, the value of total sales and the extension of the

firm's markets. For each of these growth has been calculated as the relative change over each one-year interval:⁴

$$\Delta x_{t,t+1} = \frac{x_{t+1}}{x_t} \quad (2)$$

The number of employees has been referred to the same date in each year and in each country. The total sales have been measured as sales during the previous calendar year, measured in national currency. These two dimensions are to a large extent overlapping. However, the emphasis on efficiency and new technology as well as new organisation of the value adding chain, tend to change the relationship between employment and total sales (ENSR, 1996).

The market extension index captures how the firm extends the geographic area for its operation, most importantly represented by the markets where it is active. Two elements are here considered to be significant: first of all the number of markets (m = number of countries), including domestic markets, where the firms have been selling over the past year; secondly, the distance to the most distant market (c.f. discussion in Havnes 1998). The distance is here measured on an ordinal scale with increasing value for: domestic ($d = 1$), neighbouring country ($d = 2$), other Western European country ($d = 3$) and world-wide ($d = 4$), which is presumed to coincide with increasing cultural distance. These two dimensions have been combined in the market extension index (Havnes, 1998) which has been calculated for each one-year interval as:

$$mext_{t,t+1} = \frac{m_{t+1}}{m_t} \times \frac{d_{t+1}}{d_t} \quad (3)$$

There is a discrepancy between the available measures and the ideal measures. Value creation or profits would, as an example, clearly be preferential to total sales as performance measure. However, international data in these areas would be highly biased due to national adaptations to different laws and practices regarding accounting, employment, etc. Total sales, on the other hand, reflect production volumes and product price levels which are increasingly becoming similar in different markets. Furthermore, total sales can in the long run not continue to grow unless there is an associated profit.

4. Analysis

The average values for the networking index each year are set out in Table I.

Correlation factors were used to assess the possible relationships between the networking index and the growth rates for employment, for total sales and for market extension. Interestingly, all correlation factors for growth in total sales and for growth in employment were very small and, with a few exceptions, not statistically significant at a $\alpha = 0.05$ level. Therefore, there was no reason to pursue further analysis of possible direct interaction of the networking index and these variables. Statistically significant correlation coefficients of 0.2 to 0.3 for the networking index and growth in market extension indicated that further analysis were warranted for this growth measure.

Networking propensity

For the analysis of networking propensity the firms were classified in categories according to the size of the networking index each year. The categories were chosen so that a "high" networking group constituted approximately the upper quartile of the firms, the "none" networking group had no

reported networking, while the intermediate firms were categorised as "medium" networking. It is interesting to note that 40 to 50 percent of the firms were not actively networking in the meaning that they were not co-operating with other firms, see Table II.

As demonstrated by Table III, there are significant national differences in the propensity for networking. The main difference is in the frequency of firms without any networking. In Austria, the Netherlands, Sweden and Switzerland 50 to 75 percent of firms reported having no networking, while in Belgium, Finland and Norway less than one third of the firms were in this category in their reports from 1993. The data from the other years display some deviations from this, but the general picture is identical.

Growth in market extension

The interaction between networking and growth in market extension was first investigated by analysis of variance (ANOVA). There were significant differences in growth in market extension between the three network categories (sign. < 0.001), for all combinations of years of network category and

TABLE I
Networking firms and their average networking index, 1991–1995

	1991		1992		1993		1994		1995	
	N	%	N	%	N	%	N	%	N	%
Average networking index for networkers	0.0554		0.0536		0.0535		0.0572		0.0583	
Standard deviation networking index	0.0706		0.0657		0.0652		0.0707		0.0703	
Number of networking firms	735	53%	789	61%	756	52%	761	53%	747	57%

TABLE II
Propensity for networking

Networking category	1991		1992		1993		1994		1995	
	N	%	N	%	N	%	N	%	N	%
None	656	47	511	39	708	48	676	46	577	44
Medium	383	28	463	36	375	26	409	29	417	31
High	352	25	326	25	381	26	352	25	330	25
Valid	1391	100	1300	100	1464	100	1437	100	1324	100
Missing	309		400		236		263		376	
Total	1700		1700		1700		1700		1700	

TABLE III
National differences in propensity for networking, 1993 data

Network category	Austria		Belgium		Finland		The Netherlands		Norway		Sweden		Switzerland	
	<i>N</i>	%	<i>N</i>	%	<i>N</i>	%	<i>N</i>	%	<i>N</i>	%	<i>N</i>	%	<i>N</i>	%
None	331	57	12	34	11	12	15	75	29	31	236	50	74	45
Medium	145	25	8	23	32	33	1	5	29	31	124	26	36	22
High	102	18	15	43	53	55	4	20	36	38	26	24	54	33
Total	578	100	35	100	96	100	20	100	94	100	100	100	164	100

Pearson Chi-square: Value = 114.9; 12 df; sign. 0.000.

growth index for market extension. We therefore have indications of interaction, but no indication of any direction of the influence. The analysis was taken one step further by investigating the average values of the networking by *T*-tests. Again all combinations of years for networking categories and growth in market extension were tested. These results are summarised in Table IV.

There is no consistent difference between firms with None and Medium networking intensity regarding their growth in market extension. Firms with High networking intensity have consistently higher growth in market extension than the two other categories. The fact that this general picture was similar for all combinations of years, networking categories and growth in market extension suggests that the results are robust. However, the consequence is also that the analyses so far give no indication of the direction of any possible causality.

If high networking intensity should be the cause of growth in market extension then a firm changing into the High networking category from any of the two other networking categories, should subsequently have stronger growth in their market

extension index than the firms that persisted in the None or Medium categories. This was tested by firms moving from None and Medium categories in 1991 to High category in 1993, versus the firms that persisted in the two lower categories.

The results from the *t*-tests of average growth in market extension index are set out in Table V. Both of our “new” networking categories exhibit increasing growth rates for their market extension index. This can supposedly be attributed to an experience or learning effect. However, it is interesting to note that the firms, which increase their networking intensity, exhibited considerably higher growth in their market extension than firms that remained consistently at a lower networking intensity did. This is a support for the supposition that networking precedes growth in market extension.

The results outlined in Table V are strong support for the assumption that networking precedes growth in market extension.

Control for other influencing factors

A correlation analysis did not suggest any direct relationship between employment and growth in

TABLE IV
Summary of differences in growth of market extension

Networking categories comparison	Results of <i>t</i> -tests
None and medium	Inconclusive, not statistically significant.
None and high	Consistent highest values for growth in market extension for high networking, statistically significant.
Medium and high	Consistent highest values for growth in market extension for high networking, statistically significant.

These results are not statistically significant at a $\alpha = 0.05$ level for None-Medium comparison, and statistically significant at a $\alpha = 0.001$ level for the two other combinations.

TABLE V
Testing mean growth in market extension as function of network change

Interval market extension growth	Category network change 1991–93	N	Mean value growth in market ext. index	t-test for equality of means		
				t	df	Sign.
1991–92	Stable	733	4.76	–3.99	818	0.000
	Growth	87	9.36			
1992–93	Stable	637	5.36	–5.60	769	0.000
	Growth	134	11.74			
1993–94	Stable	628	4.95	–7.21	746	0.000
	Growth	120	12.96			
1994–95	Stable	616	5.98	–6.36	735	0.000
	Growth	121	14.46			

market extension. Nevertheless, there is still a possibility that the results we have reported above are influenced by the bias introduced by under representation of the smallest firms in our stratified sample. To control for this, the above analyses have been repeated for the categories of smallest firms (1–9 employees) and largest firms (100–449 employees) separately. Although there are minor variations in the actual results, the general picture, as well as the outcome for all statistical tests, is identical to those reported above for the total sample.

Our initial model includes a set of external factors, for which we have argued that the nationality of a firm represents a good proxy. The above analyses have therefore also been repeated for five of the seven countries in the sample. (There were too few firms from the two remaining countries.) As indicated by the national differences in propensity for networking, we also find national differences in the growth in the market extension index as well as national differences in the interaction between the networking index and the market extension index. One example is that for Finland the changes in market extension index for the period 1992–93 is different than for the other countries. This coincides with the economic recession in Finland during this period. Nevertheless, in spite of these differences we also find a repetition of the general interaction patterns across countries: the category of firms with highest networking index is distinguishable from the remaining firms by their higher average growth in market extension index in all countries.

5. Discussion and conclusion

Returning to our hypotheses we find partly support for H1. Our data confirms that there is an interaction between the networking index and growth in market extension. There is no support for a similarly hypothesised interaction between networking and growth in employment, nor for growth in total sales.

We have found no support for H2. On the contrary, neither correlation coefficients, analysis of variance nor *t*-tests could give any indication of the time sequence of networking activities and the performance indicators.

Hypothesis H3 has been supported. The data indicates that transcending from a lower to the highest category of networking precedes increased growth in market extension.

As discussed initially, we have only one measure available for each of the size dimensions: resources, value creation and markets. Although we claim that these measures capture several main elements of the concept “size of the firm”, we also recognise that these only allow us to study the phenomenon of growth in discrete points where the reality should be represented by spatial continuity. Even if our observation and analyses in these points may be correct, we face the danger of drawing wrong inferences regarding growth as a continuous process between our observation points (Havnes, 1998).

Using the networking index as single measure for the network is at first sight too simplistic. It will apparently not give access to information on

important structural aspects of networking such as the number of relationships and their strength. However, our networking index includes qualitative (foreign or domestic partners and venues) as well as quantitative (number of fields of co-operation) information. It is reasonable to assume that the number of fields of co-operation will have high correlation with the number of network ties of any firm. Similarly, it is reasonable to assume that co-operation with foreign partners and in foreign countries will have higher costs and therefore is associated with higher perceived value and commitment. Therefore, we feel safe to assume that our networking index capture the same dimensions, but with less precision, as direct measures of number and strength of relationships of individual firms would have. Nevertheless, our networking index carries no information on the relative importance of networking as opposed to intrinsic activities and external interaction, which does not have a networking nature. Neither does this index capture the dynamics related to changing roles of the participants of a network, nor on the total structure of the network.

It would clearly have benefited our modelling, as well as our analysis to have more and better measures for the concepts. This is the “cost” of using data that were not initially collected for the study of networking. However, in our opinion the benefits from having access to a large panel data set, representing development over five years and seven countries outweighs the costs in view of the objectives for this study. The fact that the outcomes of all statistical tests have been consistent over the entire five-year period indicates that our findings are robust. The main consequence of the lack of detail and complexity in our measures is therefore related to lacking ability to delimit the area(s) where interaction between networking and performance can be expected. Furthermore, our chosen approach does not allow us to study the mechanisms of the networking process. This would only be possible with a case study approach.

Our model and our analyses are only investigating causality at the first level: the firm’s decision to be in a network due to the direct benefits to the firm. There is however, also a possible second level where a specific firm is so interesting, e.g. due to profitability or growth, that

the other firms in the network chose to make participation in the network attractive to this firm.

In spite of these limitations we have been able to verify that nearly one half of the panel firms have been networking in each of the years in the five-year period, and the average level of networking, measured by our networking index, has been very stable. In spite of this we have not found any support for the hypothesis that networking has given short-term benefits such as growth in employment or in total sales. We have, however, been able to identify interaction between networking and growth in the geographic extension of the markets of the firms. This can be interpreted as an effort to reduce the long-term risk, and thereby the costs of the firm.

6. Implication for policy and further research

Our findings indicate that policy measures to encourage networking can not be expected to be effective if the objectives were to increase employment in individual firms or to strengthen firms through growth in total sales. Such policy measures would be better suited if the objective were long term strengthening of firms through widening the geographic scope of their markets.

The implications of our findings for further research go through two lines. Firstly, there is a need for a more detailed delimitation of growth phenomena related to networking. For this purpose panel studies of the same type as the Interstratos study is required. However, the actual variables must be selected according to a research model where networking and growth are the main topics. Secondly, case studies are required to explore the actual mechanisms and rationale for networking activities at firm level. By combining the results from these two approaches we believe that it is possible to fill the “void space” between our “discrete points of knowledge” regarding networking.

Notes

¹ The problems of using value creation in international comparative research are the same as encountered with profits. This is discussed by Haynes (1998).

² There have been some alterations in the composition of the Interstratos group since it was founded in 1991. The present composition of the Interstratos group is: Austria: J.

Hanns Pichler, Peter Voithofer; Belgium: Rik Donckels, Ria Aerts; Finland: Antti J. Haahti (Chairman), Petri Ahokangas; The Netherlands: Yvonne Prince; Norway: Per-Anders Havnes, Arild Sæther; Sweden: Carin Homquist, Håkan Boter; Switzerland: Hans Jobst Pleitner, Margrit Habersaat. In addition, a number of associated researchers have made valuable contributions by using the Interstratos data set in their research.

³ The industry sectors are: textile and footwear; food, beverage and tobacco; mechanical engineering; electronics and electrical equipment; wood and furniture. The size categories: 1–9, 10–19, 20–49, 50–99, 100–499 employees, coincided with EU definitions of small and medium-sized firms at the start of the project. EU has since redefined these categories, and also reduced the upper limit to 249 employees (ENSR, 1996). The panel sample includes firms from Austria, Belgium, Finland, The Netherlands, Norway, Sweden and Switzerland.

⁴ This or the equivalent $\delta t = 1 - \Delta t$ are the most frequently used measures of growth, although they both inflate the measure of growth when the initial value is low. The practical consequence is that a firm, which adds the same number of employees or the same additional value of sales in each of the five year of the observation period, will appear to have decreasing growth. Although other measures may to a certain degree compensate for this, all alternative growth measures also have their intrinsic weaknesses. See discussion by Wiklund (1998).

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