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by

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INNOVATION NETWORKS OF HIGH TECH SMES: CREATION OF KNOWLEDGE BUT NO CREATION OF VALUE

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Abstract

This paper analyses the effects of innovation networks on product and process innovation and sales growth of high technology SMEs. Innovation networks are positively related to both product and process innovation, i.e. knowledge creation. One exception is the negative effect of innovation networks with suppliers on product innovation. Older SMEs are more product innovative than young SMEs. The positive relation between firm size and (process) innovation, disappears when networks are introduced into the analyses. The general conclusion is that vertical innovation networks remove the effect of firm size on process innovation. In other words, high-tech SMEs can 'borrow' size if they co-operate with customers, but especially with suppliers for process innovation. So smallness is not necessarily a disadvantage for innovation, as long as firms cooperate with other organisations. Innovation and networks do not seem to effect value creation, measured as sales growth.

JEL-classification: D21, D83, D85, L25, O31, O32

Keywords: innovation, innovation networks, high tech SMEs, firm growth

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Introduction

Innovation is said to be a matter of life and death for firms (Freeman, 1982; Baumol, 2002; Cefis and Marsili, 2005). It is crucial for value creation in firms, but it largely depends on (f)actors outside the firm. Innovation networks are of growing importance in the knowledge based economy, which is characterized by rapid change and obsolescence of knowledge and in which no single organization or individual will have access to all the knowledge necessary to innovate (Lundvall and Barras, 1997). The principal benefits of networking for innovation are the access to new markets and technologies, speeding products to market, and access to external knowledge (Pittaway et al. 2004). Cooperation in innovation between organizations is said to be of greater importance now not only for the success of firms abut also for the economic performance of regions (Sternberg, 2000). Small firms in particular lack the resources to innovate (see e.g. Nooteboom, 1999; Rogers 2002) and perhaps even to collaborate. Small and medium-sized enterprises (SMEs) can take advantage of (intraregional) networks as a means to enter international markets (Scott, 1996).

In the literature, SMEs are often viewed as a homogenous category. We focus on them here in an attempt to determine whether this assumption also holds for innovation and innovation networks. Although there is a huge amount of research on business networking, there are still several gaps in the literature that need to be filled. One of these gaps is the relationship between networking and different forms of innovation, especially process innovation (Pittaway et al., 2004), as most output indicators in empirical research are closely related to product innovations (Kemp et al., 2002). Our contribution to filling this gap is that we distinguish between product and process innovation.

The aim of this paper is to improve insight into the effects of innovation networks on product and process innovation and sales growth of high technology SMEs. We shall analyse the effects of innovation and networks on one particular indicator of business success, namely sales growth. Both the variables innovation and innovation networks were acquired by interviews with the owners-managers of SMEs. One of the advantages of this research method is that unlike research on patents, we could collect information on process innovations. Innovation networks are defined as relationships between firms and other actors that are perceived to be of importance for innovation. We focus on innovation networks with customers and suppliers. Four questions are central in this paper. First, how innovative are high-tech SMEs? Second, to what extent are high-tech SMEs involved in innovation networks? Third, how do innovation networks affect the innovative performance of high-tech SMEs? Innovation is said to be a key driver of competitiveness, which is a necessary condition for improved firm performance. In order to control for the effect of innovation and innovation networks on the sales performance of the firms, we will also answer a fourth

question: do innovation and innovation networks positively affect sales of high-tech SMEs? These research questions are summarized in figure 1.

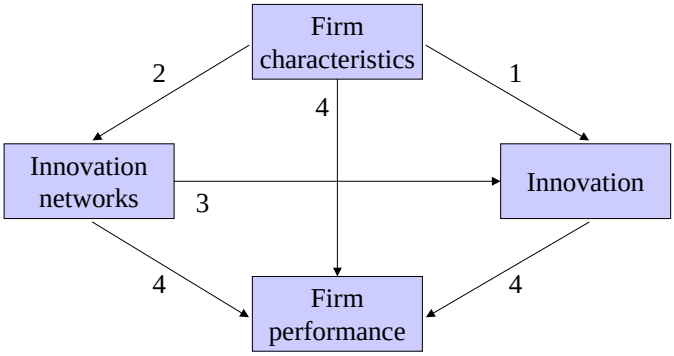

Figure 1: Research questions

We will start the paper with a review of the literature on innovation and networks. After this review we will present the research design of the empirical study. Next, the outcomes of the empirical study are presented and discussed. We will finish with a conclusion and discuss any implications for research and policy.

Innovation and networks: a review of the literature

Innovation and networks are central elements of a new wave of research on the systemic nature of innovation and competitiveness of firms, regions and countries (Nooteboom, 2000; Lundvall and Barras 1997). Research on the role of firms in innovation systems falls broadly under two headings: first, that which concentrates on the firm as a site of innovation, and second that which is concerned with firms embedded in 'innovative' networks (Bunnell and Coe, 2001).

Much of the work focusing on the firm as a site of innovation has been concerned with how firm size - and to a lesser extent, firm age – affects innovative potential. On the one hand, small firms are considered to be more flexible, and thus better adapted to fostering and adopting innovations than vertically integrated large firms (see e.g. Piore and Sabel, 1984). This seems to be confirmed by empirical evidence on the high (product) innovativeness of small firms (Acs and Audretsch, 1990). On the other hand, larger firms can more easily innovate than smaller firms due to the greater availability of internal knowledge ('absorptive

capacity': Cohen and Levinthal, 1990) and the greater capability of exploiting scale economies. The size advantage in innovation has also been confirmed in several studies (Huergo and Jaumandreu, 2004; Cefis and Marsili, 2005). Larger firms not only have more human resources, they also have more financial resources that enable them to invest in innovation projects, without depending on short-term reinvestment of profits. Research in the Schumpeterian tradition assumes that entrants – especially in high tech industries - tend to be highly (product) innovative, while older firms will become relatively less product innovative (Hansen, 1992), and focus more on process innovations. Entry is seen as a way in which firms explore the value of new ideas in an uncertain context (Audretsch, 1995). This is especially valid for firms in entrepreneurial regimes, such as high tech industries. Indeed, Huergo and Jaumandreu (2004) found that age had a negative effect on both product and process innovation (cf. Klepper 1996).[1] In contrast, Cefis and Marsili (2005) did not find any effect of age on (product and/or process) innovation. There seems to be a paradox in the findings that size is positively related to innovation and age negatively related, while entrants (young, but often small) are most likely to be innovative. This paradox can be solved when small entrants have distinct characteristics that outweigh their size handicap.

Spin-offs are a particular type of start-ups that are said to have an innovative advantage over de-novo entrants. Spin-offs are new firms started by entrepreneurs that use knowledge accumulated in their occupational career at organizations in related industries. This prior knowledge is said to improve the opportunity recognition process of founders (Shane 2000) or provide valuable knowledge about future changes in products, technologies or customer demand (Helfat and Lieberman 2002). These entrepreneurs may also use networks from their prior occupation, which might involve suppliers or customers of their start-up. Agarwal et al. (2004) mention that spin-offs are an important mechanism for knowledge spillovers between firms. All in all, the innovative performance of spin-offs is likely to be higher than that of other entrants.

The systemic nature of innovation also forces us to look outside the firm in order to explain its innovative performance. This means that we have to analyze the relationship between the nature of the firm and the networking behavior of the firm, and the effect of this networking behavior on the firm's innovativeness and ultimately on its market performance (i.e. its sales).

[1] Huergo and Jaumandreu's analyses (2004) show that the impact of age is highly non-linear, with a complex pattern: innovativeness decreases until the 20th year, then increases until the 30th, and then declines again. As most firms in high tech industries will be younger than 20, it is safe to assume a negative impact of age on innovation in high tech industries.

Networks and innovation

In the network literature, it has almost become an axiom that inter-organizational networks lead to more innovation (De Jong, 2005; Hanna and Walsh, 2002; Oerlemans et al., 1998; McCann and Simonen, 2006). Other authors have argued that it is not the number of network relations that matters for innovation, but the diversity (Gemünden et al., 1996; Ruef, 2002). At least the technological opportunities provided by customers, suppliers and competitors have a greater effect on the level of innovative output than inputs by scientific organizations (Klomp and Van Leeuwen, 1999). However, the effects of networks may be different for different types of innovation. For example, product innovation is more often affected by customers who deliver information about their needs and provide feedback on the functionalities of new products (Von Hippel, 1988; Boschma and Weterings, 2005). Process innovation, on the other hand, is more likely to depend on interactions with the suppliers who provide new elements to the production process and/or the organization of the firms. This confirms a value chain perspective (Porter, 1985), in which suppliers are more important for the 'production' process, and customers are more directly related to the output (i.e. product innovations).

The extent to which firms are involved in innovation networks not only depends on the nature of innovation, but also on the nature of the firm. Almeida et al. (2003) found that external learning increases with the start-up size of high tech (semiconductor) firms. This leads us to the size-innovation networks paradox: smaller firms more often need external learning, due to their resource-constrained position, but larger firms are better able to learn from other organizations (see the previous discussion on the relation between size and innovation).

Innovation, networks and firm performance

In evolutionary economics it is an axiom that innovation is necessary for a firm to survive (Freeman, 1982). While many studies have found a positive correlation between product innovation and small firm growth (see Storey, 1994), empirical research on innovation is still inconclusive on the relation between innovation and firm performance (survival and growth) (Sorenson and Stuart, 2000; Ortega-Argiles and Moreno, 2006). Brouwer et al. (1993), Roper (1997), and Kemp et al. (2002) found positive relations between product innovation and (employment and sales) growth at the firm level; Cooke and Clifton (2004) only found very weak correlations between (radical and incremental, product and process) innovation and growth (in profits, employment, and turnover); Freel and Robson (2004) found a negative relationship between product innovation and growth in sales.

Research design

This study is based on a survey that included semi-structured face-to-face interviews with 94 high technology SMEs in two urban areas (Greater Rotterdam and the Province of Utrecht) in the Netherlands. The firms interviewed were randomly selected from a database of high technology SMEs in the Netherlands prepared by EIM Business and Policy Research. SMEs were defined as enterprises with less than 100 employees. Why high-technology SMEs? First, we may assume that high-technology firms need more knowledge-intensive inputs than low- or medium-technology firms. Second, we assume that smaller firms have to rely much more on external sources of knowledge and innovation (see Acs et al., 1994).

The research sample consisted largely of computer service firms (77 out of the 94 SMEs interviewed; 3 firms were classified as other types of business services). The number of manufacturing SMEs was quite low (only 14). This small proportion is consistent with the profile of the Dutch economy. The Netherlands does not specialise in manufacturing and certainly not in high-tech manufacturing. Most computer service firms in the Netherlands, especially the small ones, serve the national market. The very small companies, mostly run by self-employed entrepreneurs, are 'craft' oriented. They build rather simple applications using standard software packages and often serve a regional market. There is no specific specialization that distinguishes computer service firms in the study regions from similar firms in other regions. Most operations are quite small: of the 94 firms interviewed, 74 were small, with 10 employees or fewer. Sixty firms had five employees or fewer. The survey focused on cooperation in inter-organizational networks. In this study on innovation networks, the perception of the key actor(s) in the firm is taken as a starting point. The criteria were: (1) whether the firms had co-operated in the preceding five years; and (2) whether this co-operation was perceived as important for (future) innovation (value 3-5 on a Likert scale of 1-5). This paper thus focuses on the ego-centric networks of high tech SMEs, not on the structure of the network of a focal actor. The current innovation literature is largely preoccupied with formal R&D and patent data. We have chosen to measure the *real* innovativeness of SMEs (i.e. the extent to which SMEs have introduced product and/or process innovations) which means that we measure innovation output. We made a clear distinction between the introduction of new products and processes in these SMEs. The firms were asked whether they had introduced new products in the last five years. They were also asked whether the firms had changed their processes (i.e. made them more effective by renewing them) in the same period. We also gathered information on other variables like firm age and size, and sales growth. An overview of the variables is shown in table 1.

Table 1 Variables used in the analyses

Variable	Description	Nr. (N)
Firm size	Number of employees (including entrepreneur)	min. 1, max. 75 median: 7
Firm age	Age in years since founding date	min. 1, max. 36 median: 7
Manufacturing	Dummy for manufacturing firms (all other: business services)	14 (94)
Innovation networks with suppliers	Dummy for links with suppliers; if firm valued (3-5 on a 5 point Likert scale) "cooperation with suppliers for innovation-related activities" coded 1, otherwise, coded 0	65 (94)
Innovation networks with customers	Dummy for links with customers; if firm valued (3-5 on a 5 point Likert scale) "cooperation with customers for innovation-related activities" coded 1, otherwise, coded 0	71 (94)
Diversity of innovation networks	Number of different types of links in innovation networks; if firm has no links coded 1, if only links with customers or suppliers coded 2, if links with both customers and suppliers coded 3	
Spin-off	Dummy for background founder; if "founder used knowledge from former employing organization" coded 1, otherwise coded 0	29 (94)
Product innovation	Dummy for product innovation; "firm developed at least one new product during the last five years" coded 1, otherwise, coded 0	57 (87)
Product innovative sales	Dummy for percentage of sales involving new products; "50 percent or more of the sales involved new products over the last five years" coded 1, otherwise, coded 0	21 (94)
Process innovation	Dummy for process innovation; "firm developed at least one new process during the last five years" coded 1, otherwise, coded 0	39 (91)
Firm performance	Dummy for sales change; if "turnover level increased in the last five years" coded 1, otherwise coded 0	63 (87)

The data are analysed with binary logistic regressions. In order to control for industry-differences, we also included a "manufacturing" dummy variable in the analyses.

Networks and innovation in high tech SMEs

Innovation in high tech SMEs

As noted in the introduction, the first research question is about the innovativeness of high tech SMEs. Only 20 SMEs had not innovated in the preceding five-year period. This means that almost 80 percent of the firms from the sample did innovate in some way in this period. As expected, this is relatively high in comparison with the innovativeness of the Dutch business population (63 percent innovates, see: Cefis and Marsili, 2005). It can be seen in the figure below that most of the non-innovators are less than five years old.

A negative relation was expected between firm age and product innovation. It has been argued in the literature that young firms, especially entrants, account for a relatively high share of product innovations. In this research, however, high tech SMEs older than five years are more likely to introduce a new product than firms that are younger than five years (see figure 2).[2] Perhaps firms younger than five years can more easily be seen as potentially innovative. In general, high tech SMEs focus mostly on product innovation.

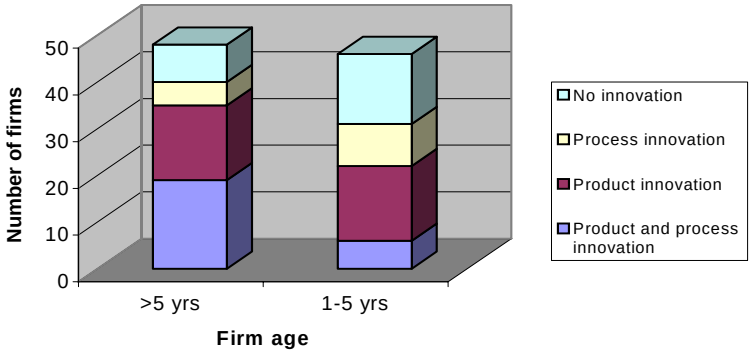

Figure 2. Firm age and innovation (N=94)

There seems to be a certain threshold size for product and multiple innovation; 40 percent of the self-employed – one-man 'firms' – introduced a new product, while more than 70 percent of the SMEs with more than five employees introduced a new product.[3] This threshold size is less obvious for process innovation. The larger SMEs have an innovation advantage for simultaneous process and product innovation. Small, young firms may lack experience (i.e. absorptive capacity) and resources to develop new products. Another reason that they do not develop new products might be that product innovation is negatively related to sales growth (in the short term). The smaller and younger high tech SMEs might fear this trade-off between product innovation and sales growth, the latter being crucial for young firms (Audretsch, 1995). We will discuss this issue in the section on innovation and firm performance.

[2] There might be two methodological explanations for the relatively low innovativeness of young firms: 1) the respondents have only taken innovations after their start-up into account (thus excluding the innovations with which they started the business); 2) not all young firms have had the full five years time to develop innovations, as some of them started less than five years ago.

[3] We did not control for firm size; as we could not count the number of innovations per employee (cf. Tether 1998). This would probably lead to a better innovation performance of smaller firms.

Networks of high tech SMEs

To what extent are high-tech SMEs involved in innovation networks (i.e. to what extent do they have relations with other firms and actors that they perceive to be of importance for innovation)? Almost 70 percent of the SMEs in this study are involved in an innovation network with (a) supplier(s). For innovation networks with (a) customer(s), this share is slightly higher (75 percent). Half of the high tech SMEs receive upstream as well as downstream information: they are involved in multiple innovation networks (innovation networks with suppliers and customers simultaneously). Less than 20 percent have innovation networks with other organizations (like intermediaries and knowledge institutes).

For SMEs, it can be assumed that it is more difficult to internalize external knowledge than for larger firms. Therefore, it is expected that SMEs might benefit more from innovation networks than large firms. This may be a reason for the high share of high tech SMEs that is involved in vertical innovation networks. The larger SMEs are more often involved in innovation networks with suppliers and multiple innovation networks than the smaller SMEs (with fewer than five employees). Alongside the fact that suppliers will have a larger incentive to cooperate with larger firms, this means that a certain threshold size might be needed to maintain innovation networks.[4] As a result, the smaller SMEs receive less upstream information than their larger counterparts. As well as the innovation disadvantages defined in the literature, this might be another reason why smaller SMEs introduce relatively few new products. Indeed, in multivariate statistic analyses, there appears to be a significant relation between firm size and innovation networks (see table 2).

Contrary to expectations, young firms are not less involved in innovation networks than their older counterparts. Time was expected to be a requirement for building relationships that contain useful information and knowledge. One possible explanation is that young high tech SMEs are relatively often spin-offs and that their entrepreneurs have already built up a network in their prior occupations. In our analyses, being a spin-off had a stronger (positive) effect on involvement in innovation networks (with suppliers and customers) than firm age, but both relations were statistically insignificant.

[4] Kleinknecht and Reijnen (1992) found a negative relation between size and innovation networks, but they excluded the smallest firms (fewer than 10 employees; as in Cefis and Marsili, 2005). One explanation for this seemingly contrasting outcome may be that there is an inverse U-shaped relation between size and participation in innovation networks.

Table 2. Logistic regression model for innovation networks of high-tech SMEs with suppliers and customers

	Innovation networks with suppliers	Innovation networks with customers
Independent variables	B	B
Firm size	.070*	.043*
Firm age	-.011	-.038
Manufacturing	-.620	.016
Spin-off	.549	.802
Constant	1.930	.576
-2 Log Likelihood	104.380	110.735
Model X^2	11.043**	.6222
Nagelkerke R^2	.157	.090

Significance: * < 0.10; ** < 0.05; *** < 0.01

Networks and innovation in high tech SMEs

In the section above we have explored the extent to which firms network for innovation. However, the most interesting question is: how do innovation networks affect the innovative performance of high-tech SMEs? This relationship was assumed to be positive. The relationship between innovation networks with suppliers and product innovation, however, is negative. The relationship between innovation networks and process innovation is positive and most obvious. Innovation networks with suppliers are most important for process innovation. see table 4), and for product innovation the innovation networks with customers. (see table 3). New products are often developed in cooperation with the user of the product, which has been suggested in earlier research (e.g. Von Hippel, 1998).

We also analysed whether spin-offs in general had an innovation advantage, and specifically whether young spin-offs had an additional innovation advantage. However, being a spin-off hardly seems to affect innovation.

Other authors have suggested that the diversity of networks might also be important for innovation. The diversity of innovation networks is indeed positively related to both product and process innovation. However, it only has a significant positive effect on process innovations. For product innovation, the presence of either innovation networks with customers (for product innovation) or innovation networks with suppliers (for process innovation) seems to be more important than the diversity emerging from the combination of these two types of networks.

Table 3. Logistic regression model for product innovation in high-tech SMEs

Independent variables	B	B	B	B
Firm size	.046*		.047	.045
Firm age	.084*		.093*	.084*
Innovation networks with suppliers		-.723	-1.084*	
Innovation networks with customers		1.463***	1.384**	
Innovation network diversity				.112
Spin-off	.520		.351	.490
Manufacturing	-.953		-1.020	-.979
Constant	-.425	.092	-.673	-.682
-2 Log Likelihood	99.521	103.180	90.522	99.440
Model X^2	11.716**	8.909**	20.714***	11.797**
Nagelkerke R^2	.175	.134	.295	.177

Significance: * < 0.10; ** < 0.05; *** < 0.01

Table 4. Logistic regression model for process innovation in high-tech SMEs

Variables	B	B	B	B
Firm size	.026*		.012	.012
Firm age	.017		.029	.029
Innovation networks with suppliers		1.318**	1.283**	
Innovation networks with customers		1.284**	1.191**	
Innovation network diversity				1.241***
Spin-off	.838*		.561	.554
Manufacturing	-.162		-.560	-.561
Constant	-.915**	-2.250***	-2.594***	-3.844***
-2 Log Likelihood	116.502	111.706	107.074	107.088
Model X^2	6.660	12.583***	16.087**	16.074***
Nagelkerke R^2	.096	.173	.220	.219

Significance: * < 0.10; ** < 0.05; *** < 0.01

Firm age has a positive effect on product innovation, and innovation networks (with customers) have an additional, independent positive effect. There is no significant relationship between firm age and process innovation. The fact that our research shows that firm age and product innovation are positively related could be explained by the relatively young age of most of the firms (the median is 7, see table 1). Firstly, this means that innovation efforts may be negatively influenced by the new firms' need to build up a viable customer base. Secondly, we defined product innovation as 'introducing a new product or service'. The time between

innovation input and output can lead to a positive relation between firm age and the product innovation of young firms.

Networks are not always positive for innovation: in fact, innovation networks with suppliers has a negative effect on product innovation. Process innovation is not affected by firm age or size, but is positively affected by innovation networks (both with suppliers and with customers). Firm size has an indirect effect here, and is positively related to innovation networks with suppliers (see figure 3).

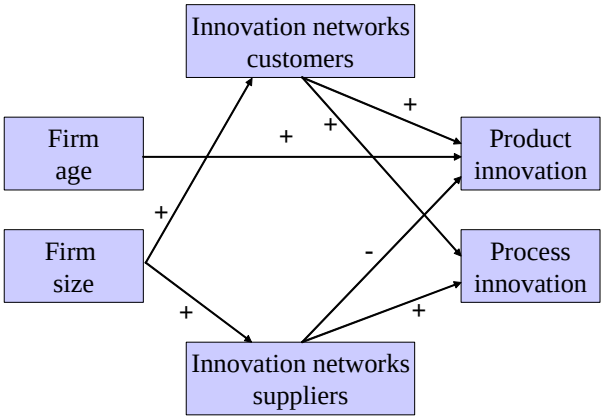

Figure 3. Network effects on innovation

If we compare the regression models with and without networks, it seems that networks cancel out the effect of firm size on process innovation. In other words, high-tech SMEs can 'borrow' size if they co-operate with customers or, in particular with suppliers for process innovation (see table 4). So smallness is not necessarily a disadvantage for process innovation, as long as firms cooperate with other organisations for innovation. The first and third estimation of table 3 suggest that this is the case for product innovation as well. However, the firm size coefficient does not get smaller (even though it becomes statistically insignificant) and thus does not allow far reaching conclusions.

Innovation, networks, and firm-performance

So far we have analysed innovation and innovation networks, assuming that they are valuable for firm performance. Can this be confirmed with our empirical evidence, or do they have perverse effects on performance? We have analysed this by using sales growth as an indicator

of firm performance. Both innovation and sales growth are common in the Dutch high tech sector. The way in which innovation relates to sales growth is illustrated in figure 4.

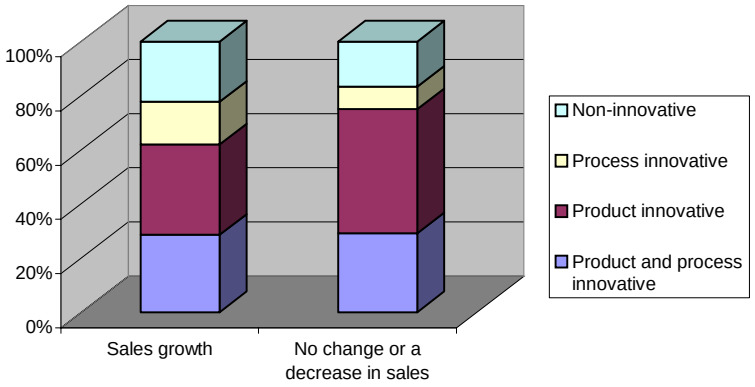

Figure 4. Innovation and sales growth (N=87)

Figure 4 compares the innovation activities of the firms that experience sales growth and those that do not. Surprisingly, the relation between product innovation and sales growth is negative. The reason for this (in the short term) may be that the resources that are used for product development cannot be used for sales activities at the same time. For small firms, there is a trade-off between R&D and sales. More than half of the firms examined do not have more than five employees, which may mean that employees and owners do not have enough time to spend on both R&D and sales activities. This is especially the case when sales are growing and a growth in production is needed, which consumes all the employees' time. In the Dutch high-technology sector, this is the case of the growing firms, almost 40 percent of which did not develop new goods or services, significantly more than the 25 percent of the non-growing firms. At a later stage, product innovations may lead to better performance, indicating a time lag in the effect of innovation on sales. Another explanation for the negative coefficient of product innovation may be that firms developed new products in response to declining sales. Unfortunately, tracing the origins of the regression results is complicated by the fact that sales growth is measured over the same period as innovation.

The majority of firms (73 percent) expanded their sales volume. There seems to be a positive relation between innovation networks and sales growth: firms that did not grow were less involved in innovation networks. However, the relations between innovation networks and sales growth are not statistically significant (see table 5).

Table 5. Logistic regression model for sales growth in high-tech SMEs

Independent variables	B
Firm size	.131**
Firm age	-.028
Manufacturing	-.023
Spin-off	-.405
Product innovation	-.676
Process innovation	.117
Innovation networks with suppliers	.830
Innovation networks with customers	1.158
Constant	-.526
-2 Log Likelihood	79.772
Model X^2	19.372**
Nagelkerke R^2	.300

Significance: * < 0.10; ** < 0.05; *** < 0.01

We also used another metric of product innovation: namely, the percentage of sales involving new products. This variable (whether more than 50 percent of the sales involved new products) had the same negative effect on sales growth. There might also be a size threshold (i.e. having the marketing capabilities) for successfully commercialising new products. In order to test for this, we also included the interaction effects of product innovation with firm size, which did *not* turn out to be statistically significant.

As mentioned before, most of the firms are relatively young. Innovating and networking are long-term activities. Therefore, the innovation activities, as well as the network activities, are likely to pay out at a later stage. To prove this, a longitudinal analysis is needed.

Conclusions

Do networks matter for innovation? The aim of this paper has been to provide insight into the effect of innovation networks on product and process innovation, and, ultimately, also on the performance of high technology SMEs. We have shown that innovation networks have a positive effect on both product and process innovation, i.e. knowledge creation. One exception is the negative effect of innovation networks with suppliers on product innovation. Also in contrast to our expectations, older SMEs are more product innovative than young SMEs. This might be explained both by our research method and the time needed to commercialise new products in high tech industries. From this perspective, firms younger

than five years can be seen as *potentially* innovative. The positive relation between firm size and (process) innovation, disappeared when we introduced networks into the analyses. The general conclusion of our analyses is that vertical innovation networks remove the effect of firm size on process innovation. In other words, high-tech SMEs can 'borrow' size if they co-operate with customers, but especially with suppliers for process innovation. So smallness is not necessarily a disadvantage for innovation, as long as firms cooperate with other organisations.

We found no effects of innovation and networks on value creation, measured as sales growth. The variables in this research were measured at one moment in time. Some relationships between these variables may become apparent at a later stage, because of time lags in the mechanisms (networks and innovation; innovation and sales growth). Neither did we analyse the innovation intensity of the firms: occasional innovators may be less successful (in terms of sales growth) than a minority of continuous innovators. A longitudinal research design might solve these research problems. In this study, we also used single equations. Some of the relationships in this research, however, may be characterized by causalities in different directions (sales growth, innovation, networking). By using simultaneous equation models in future research these different causalities can be tested.

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