# Inside the black box of innovation: Strategic differences between SMEs.


## abstract

**The downsizing waves in large enterprises have turned the attention towards the SME as an engine of economic growth and employment. Based on the early Schumpeterian ideas of 'creative destruction', it is often thought that innovative SMEs may be the solution. But who are these innovative SMEs? Do they really create employment? Are they performing better financially? This paper explores these questions in a population of Flemish SMEs active in the chemical and textile sector. First, a novel methodology is constructed to identify 'innovative' companies. Second, it is shown that innovative companies do not necessarily create more employment. In contrast, among them, we find also the ones that downsize most. Third, we argue that innovation is reflected in the long term, but not the short term financial performance of the company. Again, we find that the set of innovative SMEs is very heterogeneous. To further explore the strategic differences between innovative SMEs, we open the black box of innovation and come up with a set of 18 strategic competence factors. Based on these factors, a typology of innovative SMEs is suggested along the lines of current strategic thinking: the Porterian innovators, the resource based innovators and the Schumpeterian pioneers.**

# Inside the black box of innovation: Strategic differences between SMEs.

**Introduction**

Both academics and practitioners have shown during the past decade a growing interest in SMEs as engines of innovative activity and economic growth. The reasons for this are multifold: First, new ways of measuring innovation have revealed that SMEs play a much larger role in the innovation process than thought before (Kleinknecht et al., 1993). Second, the general trust in large enterprises as job creators and engines of economic growth has been detoriated by the recent waves of outsourcing and downsizing (Besanko et al., 1995). Third, innovation has increasingly been put forward as a necessary condition for any company to create a competitive advantage. Innovation is in this case mostly defined much broader than mere introduction of technologically new products. It includes every novelty in the value chain, be it organizational, market or technology based (Kim and Mauborgne, 1997). The combination of these factors resulted in a widespread belief among the practitioners, both politicians and managers, that innovative SMEs have become the powerhouse behind our economy.

Despite this growing interest in the interlink between innovation and SMEs, we have relatively little knowledge about the behavior which typifies such an SME (Tidd et al., 1997). Many contributions to the topic come from economists who analyze the relationship between the size of a firm and its innovative output. This stream of research, which goes back to Schumpeter's later work, succeeded in showing the importance of SMEs in the innovation process of an economy. However, it fails to give a deeper insight. Many questions remain to be answered: do the innovative SMEs indeed create more employment, do they perform better, which strategies do they follow? One reason for this is that the economists analyze innovation magnitude as a result of variations in size and thus adopt the particular 'innovation' as a level of analysis, while the practitioner focuses on the 'enterprise' as a unit of interest. He is therefore more concerned with the question of what is going on inside this innovative SME.

This study departs from the practitioner's point of view. First, a novel method is proposed to identify innovative SMEs through the use of expert panels. Previous research mostly departed from patent databases (Griliches, 1984), product announcements (Audretsch, 1995; Kleinknecht and Bain, 1993) or questionnaires (CIS, 1993) as a way to identify innovative SMEs. A well-known draw back of these approaches is that they, each to a varying extent, do not cover SMEs or only a particular sub part of the SME population, namely the high tech ones. Therefore, we use the positive elements of each of the above and combine them in a novel method which enables us to identify innovative SMEs: Experts that belong to the sector federations, unions and various research centres were asked to identify a list of SMEs as innovative or not according to a number of criteria. The compiled answers allow us to identify those SMEs for which the expert answers converged. Using this method, we analyze two Flemish 2-digit sectors: chemicals and textiles, which are each split up into 7 sub-sectors.

Second, in line with the economic stream of research, we pose the research question whether the innovative companies in our two sectors perform better financially and employment wise than their non-innovative counterparts. We base ourselves on the economic literature which tries to link innovation and financial performance on the one hand and employment creation on the other

hand to formulate the hypotheses. These hypotheses are then tested in the sample of 413 SMEs in both sectors.

Third, the black box of innovation is opened. Whereas the innovative SMEs in the second part of the paper were treated as a homogenous group of companies, in the third part we analyze their heterogeneity. Therefore, a qualitative study of the business strategies followed by the SMEs which are identified as being innovative is performed. This qualitative part consists of in depth interviews with the owner or operational manager of 31 innovative SMEs, equally spread over the chemical and textiles sector. The main aim of this qualitative study is to open the so-called black box of innovation and analyze what the strategic differences are between innovative SMEs. Since few research exists which explicitly analyses innovation strategies, this third part remains exploratory.

**Literature review and formulation of the main research questions**

In their seminal work on SMEs and innovation, Acs and Audretsch (1990) revitalised the Schumpeterian idea of "creative destructors", arguing that small firms contribute about as many innovations as their larger counterparts in manufacturing. Moreover, in terms of innovations per employee, they found that small firms exceed the efficiency of large firms. In line with these findings, Hansen (1992) and Kleinknecht et al. (1993), among others, argued that the contribution which SMEs made to innovation was largely understated by measuring innovation through classic technological input or output indicators such as R&D expenditures and patents. Using innovation counts, they showed that SMEs produce a disproportional share of innovations, compared to their economic importance. Although the notion of disproportionality was put into question by Harrison (1994) and recently even empirically contradicted by Tether et al. (1997), the conclusion remains that SMEs are important contributors to innovation.

This empirical fact has to be complemented to the consistent finding of economic scholars that small firms create more jobs than large ones (Hall, 1987 ; Evans, 1987 ; Dunne and Hughes, 1994 and Hart and Oulton, 1996). The studies mentioned before usually perform an empirical test of Gibrat's Law (1931) which states that the growth rate of a firm in percentage terms is independent of its size as a null hypothesis. Their ability to reject Gibrat's Law in favour of small firms is challenging in the light of the rising unemployment rates in the late 1980s and early 1990s. These increasing rates have moved employment into the centre of the policy debate. Still, we should warn for over-optimism. Despite this statistical rejection of Gibrat's Law, the hypothesis that small firms grow faster than large ones remains weak since the regression models explain less than 5-10% of the variance in the growth rates. Moreover, Schreyer (1996) added recently a new dimension to the debate by showing that: small firms tend to have the lowest growth rates as well as the highest. In other words, growth in small firms seems to be very variable and heterogeneous with some small firms showing very high, and others very low growth rates.

This brings us to the link between innovation and growth. Greenan and Guellec (1995) argued that over a five year period innovative firms and sectors created more jobs than those that were not innovative. Innovative firms were identified as those that apply for patents that cover either process or product innovations. Using a broader definition of innovation, Kim and Mauborgne documented a number of case studies in which they linked the innovation dimension with growth. It seems thus logical to argue that we expect innovative SMEs to show higher growth rates than non-innovative ones.

**hypothesis 1: innovative SMEs, on average, create more employment than non-innovative ones.**

Although employment growth is an important political and corporate objective, it is not necessarily the main interest of any entrepreneur. The link between innovative and financial performance is complex and unclear (Tidd et al., 1996; Montgomery and Wernerfelt, 1989). Traditional accounting measures normally include profit as a part of the index whereas the financial measures are based on cash flow as a main element to value a firm. The main conclusion which can be drawn from this literature which discusses the link between innovation and performance is that both the traditional accounting and financial indicators concentrate too much on short-term measures of profitability reflecting a historic performance of the firm and therefore undervalue innovation. As a result, it is suggested to use market based measures such as Tobin's Q (Montgomery and Wernerfelt, 1989) or the market to book ratio as secondary indicators of a firm's innovative capacity. Whereas the classic accounting measures reflect the historic performance of a company, the market based ones, under the assumption that financial markets are efficient, incorporate the medium are long term potential of a company. Therefore they indirectly value innovation.

Unfortunately, most SMEs are not public so that market based measures, how useful they might be to evaluate the innovativeness or technology intensity of a public company, are simply impossible to calculate for private companies. Kay (1993) suggested that value added based measures can be used as an alternative. The main, though admittedly weak, argument used here is that a company *has* to create value added to survive in the long run. Although there exists no clear definition of value added, it essentially is simply the market value of the output minus the cost of the inputs. Operating profit is different since it relates the *value* of the output to the cost of the input, not taking into account the market appreciation. The more innovative the firm, the more it is able to create value, at least in an equilibrium. Tidd et al. (1996) recently found empirical support for this hypothesis in a sample including both large and small British firms.

In summary, we can conclude that it will probably be very difficult to find performance related differences between innovative and non-innovative SMEs. Still, in line with Tidd et al. (1996) and Kay (1993), we can expect that the innovative SMEs will create more value than the non-innovative ones. Hypothesis 2 reformulates this as follows:

**hypothesis 2a: innovative SMEs, on average, do not perform better financially than the non-innovative ones.**

**hypothesis 2b: innovative SMEs, on average, have more value creating capacity than the non-innovative ones.**

So far, we have treated innovative SMEs as a homogeneous group of enterprises to construct our hypothetical framework. As mentioned before, a second aim of the paper is to enter this black box of "innovation" and explore the heterogeneity within it. The strategic management literature offers a number of frameworks which can be used to analyse the competitive advantage of a company.

In the eighties, the Bain-type Porterian framework was the most popular (Porter, 1980). Porter hypothesises that structural industry conditions determine most performance differences between firms. Along the lines of this framework, we would expect that innovative SMEs differ most in their product-market choices. According to Porter, they might actively follow a strategy of cost leadership, product differentiation or focus on a particular niche. The most innovative SMEs are then expected to actively pursue any of these strategies.

Wernerfelt's (1984) seminal article launched a renewed interest in the "resources" of a firm as a determining factor of its performance. This article gives rise to a stream of research which has dominated the strategic management literature in the nineties: the "resource based theory of the firm", or in a more popular version ' the core competence idea" (Hamel and Prahalad, 1989). Leaving Bain and Porter's structure-conduct performance paradigm for what it is, these researchers emphasise the resources which a firm has built up in the past as a critical determinant of its performance. According to these scholars, if innovation is to determine performance, then the innovativeness component should be closely related to what the company past experience or skills. Besanko et al. (1996) give the example of "servitization" to illustrate this point. Let us take the well-known example of American Airlines: 30 years ago this enterprise got most of its revenues through air transport of passengers and cargo. While organising these activities, it elaborated a very advanced automatic reservation system which allows the company to organise its flights in an extremely efficient way. For the last ten years, American Airlines made more profit through commercialising its reservation system than through its main activity: air flights. Hence, the innovative behavior of the company is closely related to the core competencies which it has developed in the past. If we translate this to the SME sample, this means that those SMEs which have accumulated a certain experience or core competence can be expected to innovate based on this experience.

In the nineties, Teece et al. (1991) introduced a further distinction between "resources" and "capabilities". Put simply, resources are the *strategic assets* which companies have accumulated in the past while capabilities represent their current ability to deploy and rebuild these resources. Amit and Schoemaker (1993: 34) narrow the definition of resources to *stocks of available factors owned or controlled by the firm*, while capabilities are related to the flows. If we translate this theoretical concept to innovative behavior of SMEs, then we can expect that some SMEs organise themselves in such a way that they have the capabilities to be innovative. A typical example of this could be the pioneering entrepreneur who succeeds to compete with the big enterprises in his sector because he can faster respond to market changes or foresee them and has more control over his employees and production process.

Summarising, there are three different views in strategic management. Over the last two decades the strategic pendulum has shifted from an external focus 'looking at what your competitors do and choose the right product market niche' towards an internal orientation 'build on your own competencies'. We expect the strategies of innovative SMEs to be a combination of these external (product-market choice) and internal foci (resources and capabilities), since they are expected to be complementary (Clarysse, 1996). However, some innovative SMEs might specifically be external oriented, others internal oriented. Because the literature is very inconclusive, we do not want to formulate a formal hypothesis here. Instead, we prefer to keep the discussion open departing from a general research question. Research question 1:

**research question 1: innovative SMEs will have elements of each strategy, but some of them base their competitive advantage on product market choice, others on the cumulated resources and still others on dynamic capabilities**

Now that we have defined the theoretical background of the paper and the main research questions/hypotheses which are taken into account, we describe in the next section the population, sample and data collection.

**Data collection, definition of the population and sample**

We chose two sectors for this study on the basis of two criteria: first, they had both to be important for the Flemish economy and second, one of them needed to be classified as low tech (according to the OECD classification system, OECD (1997) and one had to be high tech. After several discussions with industrial experts, we agreed upon the textile (NACE 34) and chemical (NACE 25) industry.

Each of these industries can be further subdivided into 7 sub-sectors at the 4-digit level. For the textile industry, these are *wool ; cotton ; linen, hemp and ramie ; textile-refinement ; other textiles ; production of carpets, felt and oilcloth* industry. For the chemical industry this is *chemistry: basic industry* ; *production of paints and printing ; plastic processing ; production of soap-, wash- and other cleaners and cosmetics ; pharmaceuticals* and *other chemicals*.

To be included as an SME in our sample, we departed from the European definition and restricted it as follows: The enterprises need to employ **minimum 11 and maximum 250** employees, their maximum turnover is 1.6 billion BEF and the maximum balance total is 1 billion Bef. We explicitly did not taken into account the independence restriction because preliminary interviews showed that most enterprises which belonged to a larger concern, had a very independent strategy and behaved as SMEs rather than big enterprises.

The balance sheets compiled by the National Bank of Belgium were used as a primary source to extract those enterprises which fulfilled our criteria. We further complemented the initial set of SMEs with company lists which we received from the federations. In total, we identified 273 SMEs in the textile and 252 in the chemical sector. Table 1 shows the distribution of our companies in each of the sub-sectors.

**Table 1:** ***the distribution of the companies***

| Nace-code | Description industrial sector | Number of co. (in Flanders) | Number of. known co. [1] | Number of innovative co. |
|---|---|---|---|---|
| 431 | wool | 13 | 13 | 4 |
| 432 | cotton | 52 | 52 | 12 |
| 434 | linen, hemp and ramie | 21 | 21 | 3 |
| 437 | textile-refinement | 54 | 38 | 8 |
| 439 | other textiles | 48 | 19 | 5 |
| 438 | production of | 85 | 85 | 19 |

[1] Indicated as known or innovative by the team of experts.

| Nace-code | Description industrial sector | Number of co. (in Flanders) | Number of. known co. [1] | Number of innovative co. |
|---|---|---|---|---|
| | carpets, felt and oilcloth | | | |
| 251,252,253 | Chemistry: basic industry | 14 | 11 | 1 |
| 255 | Chemistry: production of paints and printing ink | 27 | 25 | 7 |
| 483 | plastic processing | 160 | 121 | 37 |
| 258 | chemistry: production of soap-, wash-, other cleaners and cosmetics | 14 | 11 | 2 |
| 257 | pharmaceuticals | 14 | 6 | 1 |
| 256 | Chemistry: others | 23 | 11 | 2 |
| **Total** | | **525** | **413** | **101** |

For each sub-sector, we identified **three** experts, which adds up in total to **42**. These experts from three different institutional environments: First, we contacted the sectoral associations such as federations and employer/employee organizations to identify one expert in each field. Second, we contacted the government instances such as the ministry of economic affairs and the different regional economic support institutes (GIMV, GOM, VEV) to identify one expert and finally, we contacted the RTD centres (collective centra, IWT) to select one. Each of these experts was contacted by telephone.

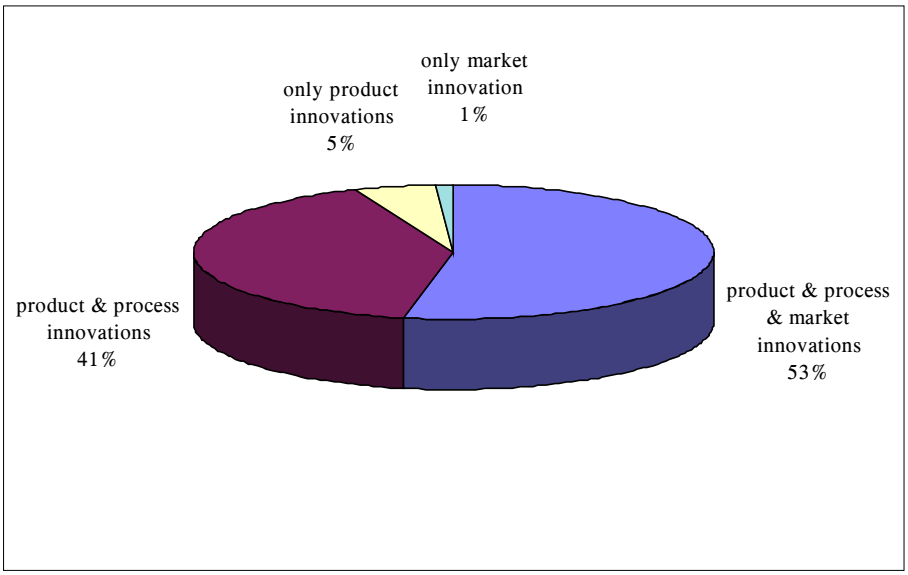
**Towards a definition of an 'innovative SME'**

What criteria then exist to classify 'innovative SMEs'? According to the OSLO manual an innovative firm is one that has *implemented technologically new or significantly improved products or processes or combinations of products and processes during the period under review.* We broadened this definition to include also the non-technological innovations. Hence, the experts were asked to classify a list of SMEs into five different classes of innovation: technological product innovation (radical + incremental), technological process innovation, organizational innovations and market innovations (see appendix 1 for an example). The expert had to indicate whether to their knowledge, the SMEs had, during the past five years, carried through any of the above. If the expert did not know a particular SME or only knew it by name, then we asked him to classify it as 'not known'. In a follow-up telephone interview, additional explanation about the innovation classes was given if necessary. If at least two of the three experts classified the SME as being innovative in one of the five categories, then we considered this to be an *innovative SME*. Consistently, we classified an SME as 'unknown' if it was not known by any of the two of the three experts.

Table 1 gives an oversight of the number of SMEs that were classified as being 'innovative SMEs' and 'unknown' SMEs, by sub-sector. In total, 73.4% of the SMEs in the chemical and 83.5% of those in the textile sector were known. Of those known SMEs, 27% were classified as being innovative in the chemical and 22.3% in the textile sector. The $\chi^2$-values indicate that the frequency distribution of the innovative SMEs among the 14 sub-sectors is not significantly different from the expected one, so that we can conclude that at the 4-digit level no sectoral

differences can be found concerning the degree of innovation. A similar test was performed to analyze whether the distribution of the 'not-known' SMEs was different from the one expected and similarly, we could not reject the null hypothesis of similarity. Hence, no one of the 14 sub sectors is underrepresented.

**Figure 1: Innovation profile of SMEs**




The initial distinction which was used between product, process and market innovation is rather common in the innovation literature. Part of it, namely the product-process difference, goes initially back to Schumpeter (1911) and has been often used and misused in a number of models and studies (see Archibugi et al., 1997, for a review). We found this distinction to be very vague. Despite the various attempts that have been done in this direction, we conclude that it cannot be used to classify innovative enterprises, or at least SMEs. In fact, as shown in figure 1, over 90% of the innovative SMEs in our sample were considered as being active in both product innovation and process innovation. This is in line with Archibugi's finding (1997) that 96.9% of the innovations fall into the grey zone or that almost all innovations can be chosen to be classified as either product or process according to the perceptual lens through which the innovation is analyzed. Building on these arguments, we will not further use the distinction between product categories but simply refer to SMEs as being innovative or not.

**Table 2*: Innovative SMEs***

| | some RTD in 1988* | some patent applications in 1988* | have introduced a new product in 1990-1993** | our definition |
|---|---|---|---|---|
| **percentage of SMEs** | 43.5% | 8% | 60.6% | 25% |

**based on Kleinknecht and Bain(1993), SME defined as enterprise between 10-199 employees, Dutch sample of all manufacturing sectors*

***Community Innovation Survey, SME defined as enterprise between 20-250 employees, Belgian sample of textiles and chemicals*

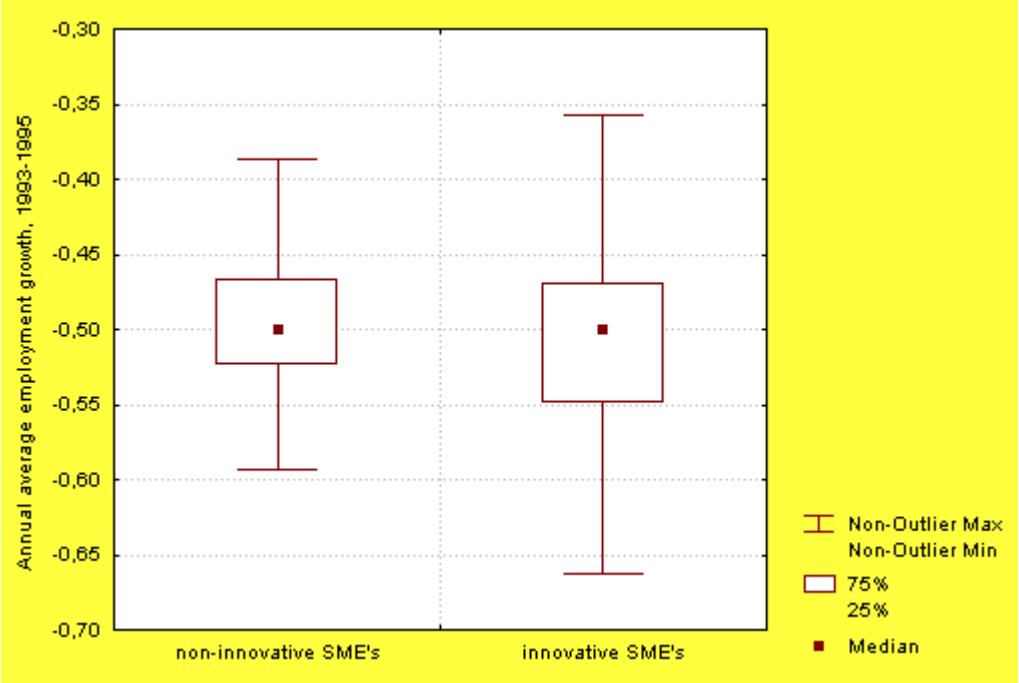
For what the data are worth, table 2 shows that according to the CIS (Community Innovation Survey), about 60% of the SMEs in the Belgian textile and chemical industry reported that they had introduced a new product during the last three years. This high percentage was also found in the UK Small Business survey (Tidd et al., 1997). The reason for this is that the criterion for being classified as innovative is not stringent. Every SME which says that it has introduced a new product or process in the proceeding three years is classified as 'innovative'. Hence, an industrial bakery which introduces a new 'croissant' is also considered to be innovative. However, if the introduction of such new products is a common feature in the sector, the innovation in a broad sense does not lead to a competitive advantage. Kleinknecht et al. (1993) show somewhat lower percentages. In a sample of Dutch firms, they find that about 42% of the SMEs in engaged in 'some RTD activities'. Although RTD is especially in the economics literature often used as a proxy for innovation, we do not think it is really the same. Take the case of many chemical SMEs which have one or two employees that perform activities such as quality control, experiments, tests, etc... If one asks the business manager whether his company performs some RTD, this person will say yes. Still, the company is not necessarily innovative. In the same book, the author mentions that only about 8% of the SMEs had patents applications. If we compare our findings, then the 25% we find lies somewhere in between the patenting SMEs and the innovation/R&D SMEs. This is to be expected since one the one hand we do not want to include only the high tech, but on the other hand we do not want to implement a too broad definition of innovation or RTD.

Concluding, we can state that the definition we use is: if there is a consensus between 2 out of 3 experts on the fact that an enterprise is involved in either product, process, organizational or market innovations, then it is considered to be innovative. This implies that only those SMEs which visibly distinguish themselves from the other ones in the group, so that a third person who knows in general terms the market, also can identify them will be included. In other words, if every SME has an ISO 9000 certificate in that market segment, then obtaining this certificate will not be considered on innovation for any of these companies (while it might be for an SME in a segment where this is unusual).

**Do innovative SMEs create employment?**

Our first hypothesis was that innovative SMEs indeed create employment. Logically, this means that the average employment growth of these SMEs should be higher than the one of the non-innovative enterprises. Figure 2 shows a box-whisker plot of medians and quartiles. We corrected for outlier bias by excluding (only in the plot, not the analysis) all observations which were at a further distances from the upper quartile (75%) than the upper quartile + the distance between the lower *and* upper quartile.

**Figure 2: Employment growth in innovative vs. Non-innovative SMEs**




The figure gives us the interesting result that actually the median (nor the means shown in table 3) differ, but there is a considerable difference in the standard deviations (variances)

**Table 3.** ***basic statistics on employment growth (annual average for 1992-1995).***

| | Valid N | Mean | Median | Std.Dev. |
|---|---|---|---|---|
| innovative SMEs | 66 | -,501433 | -,499931 | ,231700 |
| non-innovative SMEs | 167 | -,486099 | -,499894 | ,153517 |

t-value of means: 0,589 (n.s.)
F-ratio of variances: 2.27 ($p<0.01$)

The t-test of the means did not show any statistical differences. In our both samples, the SMEs lost employment. However, the F-test of the variances *does* indicate a significant difference in variation. As already indicated in figure 2, it seems that innovate SMEs both *create* employment and *destruct* employment, relative to their non-innovative counterparts. Both diverging tendencies tend to offset each other so that the net result is 0. One plausible explanation for this might be that certain types of innovators (for instance those which are basically focused on the introduction of new products) create employment, while others (for instance those that aim primarily at a more efficient organization) lay off people. A similar result was found by Greenan and Guellec (1995) in their study on the French manufacturing industry. There, they found that innovative enterprises which had primarily patents covering process innovations lost employees, while the ones with primarily product innovations created jobs. We will come back on this finding in the qualitative part of this paper, where innovation is studied in greater detail.

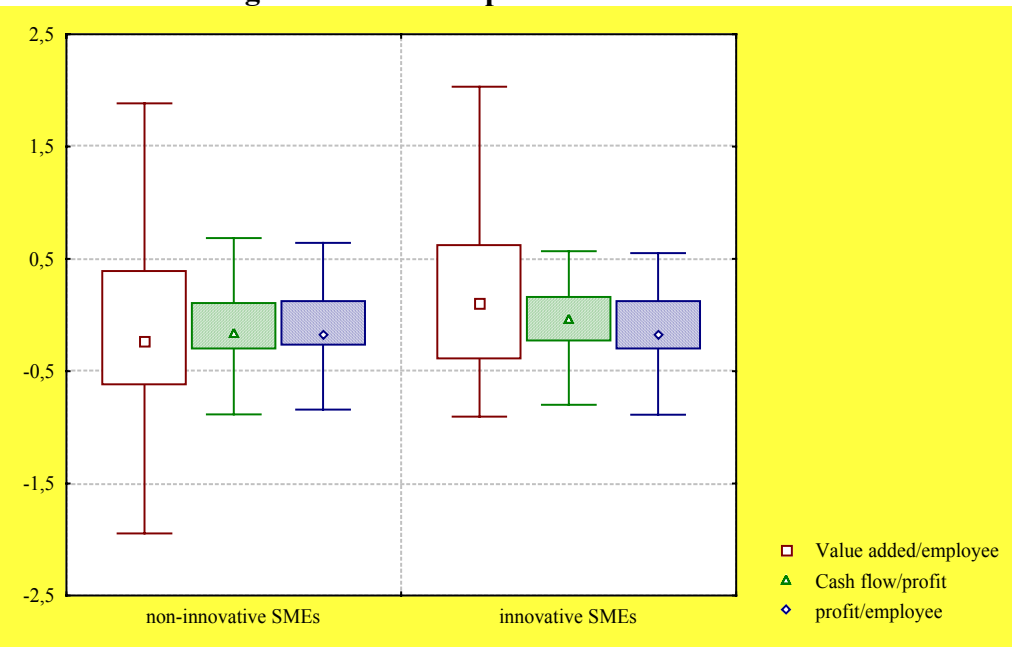
We further investigated the differences in employment creation between innovative and non-innovative SMEs after holding the sub-sectors or sectors constant (ANCOVA), but no additional insights were found.

**Do innovative SMEs perform better?**

The second hypothesis is related to the financial indicators of innovative SMEs. Practitioners want to have easy instruments to value innovation. We stated that the literature suggests that short term financial (cash-flow related) and accounting (profit related) indicators underestimate the value of innovations because they do not take into account the long term effects of these innovations. In other words, since innovation does not necessarily immediately result in good financial performance it is not reflected in the short term financial performance of a company. However, market or value added related indicators were assumed to take innovation activities into account.

Among the many variants of each indicator, we retained three basic types : value added by employee, cash flow over gross profit and profit before taxes by employee[2].

**Figure 3: Financial performance of SME's**




As in the previous section, we start with a descriptive box plot of median and interquartile range of the variables. To make the comparison between them easier, the values of each are shown in the number of standard deviations from the mean. It is clear that the medians of the value added by employee ratio are quite different between the two subsamples. For each other ratio, we can

[2] Since the variants of these indices heavily correlate, an alternative approach could be to identify the principal components (or factors) underlying the ratio's. This factor analysis (results available upon request) rendered three factors which represented the value added, profit and cash flow variants. To make the analysis easier to understand, we chose here to use the real ratios instead of the factors.

also conclude at first sight that the variation in higher in the non-innovative than in the innovative subgroup.

**Table 4.** ***financial, accounting and market performance differences (1995).***

| | Mean n-inn * | mean inn* | t-value | df | p | N-n-inn | N-inn |
|---|---|---|---|---|---|---|---|
| Value added/employee | 1878,8 | 2214,2 | -2,832 | 351 | ,00483 | 268 | 85 |
| Cash flow/equity | 35,410 | 45,345 | -,86 | 349 | ,38925 | 265 | 86 |
| Gross profit/employee | 172,19 | 328,27 | -1,3 | 286 | ,18497 | 209 | 79 |

inn=innovative SME

n-inn=non-innovative SME

*in 1000 Bef.

Table 4 further explores these initial ideas. We find that indeed the average value added differences of the innovative versus non-innovative SMEs are statistically significant different. This supports hypothesis 2b. If we take also the distribution shown in fig. 4 into account, then we can conclude that the better performance, on average, of the innovative SMEs results from the fact that they include lesser companies which do create very little or no value at all. They are the so-called sleeping SMEs. Again, this is in line with the suggestions of Kay (1993). Further, neither the profit nor the cash flow variable differ in a statistically significant way, although both are higher in the group of innovative SMEs than in the non-innovative subset. The low t-value might however be biased through the relatively high standard deviation (and hence standard errors) in each of our samples, so that we also did a non-parametric median test (Mann-Whitney U) to correct for that. In this test our Cash flow variable turned out to be significant at the 0.06 level. Hence, our hypothesis 2a only received mixed support. Indeed, profit does not differ between innovative and non-innovative SMEs. However, we all know how much can be relied on profit data drawn from a balance sheet. The cash flow ratio then tends to be significant, non-parametrically. This indicates that hypothesis 2a should be rejected, at least for the market performances differences. One explanation of this is found in Hall (1995). In a sample of the US manufacturing industry, she found empirical support for the hypothesis that a positive cash flow is related to (technological) innovation. This means that companies preferably tend to finance innovation with their own cash flow and not with foreign capital. This explanation receives thus also support in our sample of innovative SMEs.It is interesting to note that both for the performance and the employment growth indicators the variance of variables is very high. In the employment growth case, we added an explicit reason for this. In this case, we can conclude that the high heterogeneity made it difficult to interpret the results and needs non-parametric analysis. Non-parametrics are but a statistical tool to correct for this. A better, conceptual correction would be to open this heterogeneity which is exactly the topic of the remainder of this paper.

**Further data collection in a subsample of innovative SMEs**

Out of the 101 SMEs that were considered innovative in our sample were 50 selected (ad random) for further analysis. The owner or CEO of each of these SMEs was contacted for an interview. 35 of the 50 agreed to cooperate in the study. Finally in 31 of these, an interview of approximately 1.5 hour was performed. One of the companies was left out of the final analysis because it appeared not to be innovative at all. We considered it as a misclassification by our experts. Appendix 2 includes a list of the names of the SMEs and the persons contacted in each

of the SMEs. In the first part of the interview, we followed the Repertory Grid Technique as suggested by Reger and Huff (1993). In short, the owner-CEO was asked to compare his company strategically with the 2 main competitors in his market segment. These competitors could be large enterprises or SMEs. We asked which one of the two was closest to his company and why? Then we asked to compare the two competitors and add up their similarities and dissimilarities. Then, the same person was asked to compare their common strategy with his own. Finally we added up all the strategic dimensions which were communicated in the interview. All interviews were performed by two persons, one of which noted while the other probed. Afterwards a list of the dimensions which came out of the 31 interviews was compiled. We compiled a total of 18 strategic dimensions, each of which will be discussed in the next section.

**Strategic success factors of innovative SMEs**

Tables 5 a and b give the frequencies of the 18 strategic success factors which resulted from our interviews. Some of them like flexibility, customer orientation and focus on product quality are straightforward to understand and lie in the line of our expectations, but others are less evident. They are probably also the ones which reveal the most interesting insights. Below, we define each of them and give a typical example drawn from our interviews.

**Table 5a: Frequency table of the 18 strategic success factors (textile)**

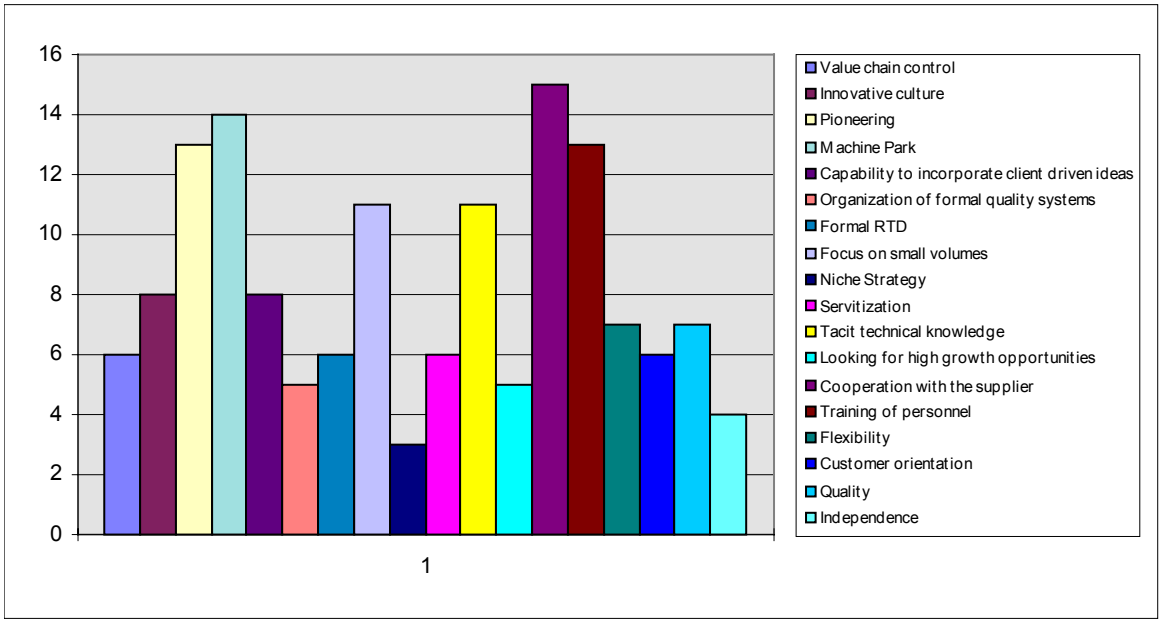
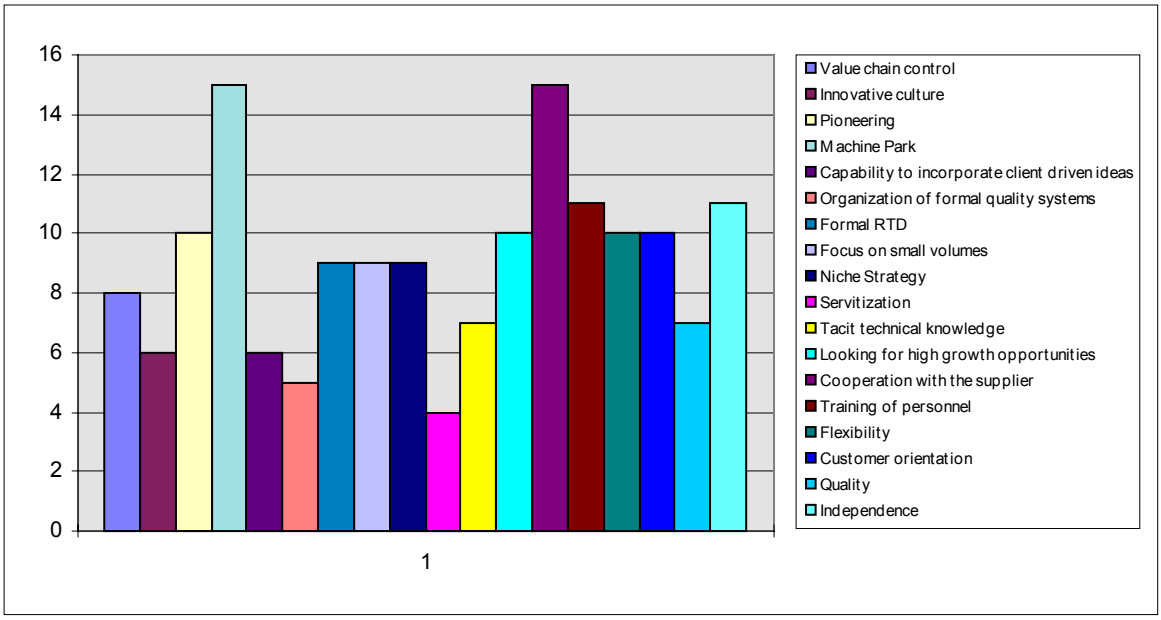



**Table 5b: Frequency table of the 18 strategic success factors (chemical industry)**




*1.Value chain control*

Some interviewees explicitly mentioned us their core capability lies, among others, in the fact that they fully control their value chain. A few among these even designed, produced and customised their own machines. Others worked with suppliers but kept close, informal, contacts with them, reflecting a real network organization as originally defined by Davidow and Malone (1992). Below we give some examples of this strategy.

> *Goeters "Ars et Labor" NV, a textiles company, is one out of five companies in Europe which can produce each link of the value chain. Goeters, the CEO of the company still designs all important equipment facilities himself. As a result the company develops, colours and produces for instance its own printing cylinders ; It refines woven textiles according to its own designs and takes care of preliminary and follow-up treatment on top of that; it also print exclusive collections.*
>
> *Dr. Fleerakkers, general manager at Sanico Inc. , a highly regarded drug producer (who works as a subcontractor for the biggest pharmaceutical companies in the world), claims you can find every single skill or activity the company needs within the company precincts (1 km²). Even their new production unit was completely constructed by their own people : they have got their own masons, architects, building engineers…*

*2. Innovative culture*

Some innovative companies completely depend upon the vision of one man : the entrepreneur. This dependence can endanger the company's future. Therefore it's recommendable a visionary director creates an innovation culture within his company so everybody, from the simple worker to top management shares the same purposes. With innovative culture we mean those elements

which are purposefully (though informally) implemented in the SME to stimulate innovation and creativity.

> *Mister De Corte , general manager at Belgian Sewing Thread Inc. (BST), encourages his employees to take initiative and look for breakthrough ideas. The ground floor can for instance put its ideas in an idea box (this is very new a traditional low skill sector such as the Flemish textile one). Every employee knows that his idea will be taken into consideration. De Corte also reports results from this initiative.*
>
> *Mister Joris Christiaens, general manager at Vitalo Inc. implements his vision concerning innovation in every single part of the company. He meets every employee (249) each day and constantly encourages them to improve, to think about new handling processes, in short, to be innovative. Each idea is taken into consideration. The company breathes out an atmosphere of perfection, of innovation. Profits are completely reinvested in the best materials and a large share is spent on hiring and training people.*
>
> *As Luc Bernolet, sales manager at Cobelplast, puts it : "You can never sleep!"*

### *3. Pioneering*

Some of our SMEs mentioned their ability to pioneer as a main strategic advantage. They create their own demand or are the first to sense a slumbering market need. Pioneering and first mover advantages have been discussed many times (Lieberman, 1991) and are closely related to Schumpeter's (1911) early ideas of 'creative destructors'. Because they are so important we still want to include two examples we encountered on them.

> *Ecover Products Inc. was the first to exploit commercially the ecological idea. They grew exponentially in the eighties by selling phosphate-free washings and detergents. They even created the "ecological firm" which is twice as expensive as a normal firm but almost entirely biodegradable.*
>
> *Alain Liétaer, general manager at Symaco Inc., set up a textile factory in 1979 when the whole sector went through a historical crisis. Liétaer nevertheless managed to grow steadily by means of a revolutionary new production technique which combined the traditionally separate processes of spinning and dying.*

### *4. Machine Park*

Having an up to date machine park might sound very logic if you want to stay competitive, but it is not. It normally requires the company make huge investments and therefore can significantly increase the business risk. Some of the interviewees explicitly mentioned their courage to take this business risk and hence invest in machines as a major element of their competitive advantage.

> *Vitalo Inc. manages to stay on top due to investments running up to 200 million BF each year. Their newest packaging machine e.g. makes 5000 revolutions per second. Mister Christiaens personally draws parts of the machines. All moulds are constructed within the company itself.*

*Building Plastics Inc., a roll-down shutters producer, disposes of the best machines in the world, the market's Rolls Royces. They also have machines with double moulds which are specially made on their request.*

*5. Capability to incorporate client driven ideas*

The sources of innovation form a topic which has been well documented by Von Hippel (1988), among others. He concludes that the actual source of the innovation will be dependent upon the profit prospects. If the supplier can gain most, it will be a supplier. If the client can gain most, it might be the client or customer. SMEs often have even less capacity to do internal research as the big enterprises which were studied by Von Hippel (1988). Therefore it is often concluded that they even rely more heavily on outside ideas than their big counterparts. Some of the SMEs explicitly identified the routines they had developed to learn from the customers as a competitive advantage.

*Cobelplast has developed a strong knowledge of the end users' , their clients' clients, needs so that they pull the innovation philosophy through the value chain and as a consequence force their clients to adapt to the end users' needs.*

*Vetex Inc., a waterproof, medical and industrial protective clothing producer, is part of the three highest regarded producers in Europe. Without displaying much commercial activity clients come automatically because they know Vetex can make their new ideas work.*

*Indupol International Inc., a plastics extruder, developed a unique data bank about the needs concerning driving comfort of truck drivers, chauffeurs, dealers etc. so that they always come up with new (market driven) ideas which convince their clients which are the big automotive companies such as MAN, Scania, Mercedes, DAF…*

*6. Organization of formal quality systems*

The adoption of formal quality procedures such as the ISO certificates are often considered major organizational innovations. ISO is only one of them, but many of our SMEs were proud to show their quality procedures and considered them as a strategic resource.

*Doctor Fleerakkers, general manager at Sanico Inc. stresses on the fact they're are already way beyond the ISO standards. The nature of the company, a highly regarded drug producer, demands very rigid safety procedures set down in a manual, the so-called "Site Master File" .Often SMEs only strive for an ISO standard because their clients want them to. Building Plastics, in order to penetrate the French market, had to obtain the French ISO-based NF standard for synthetic building materials.*

*7. Formal RTD*

A later Schumpeterian hypothesis is that formal RTD labs are the sole toy of the large companies. Only they are assumed to have sufficient economies of scale and market power to finance this kind of activity. However, some of our SMEs, the so-called high tech or new technology based ones, mentioned their big formal RTD activities as their core competence.

*Oxyplast Inc. is considered as the world's university of powder coatings. Their lab consists of eight researchers who dispose of a 30 million BF budget per year.*

*Cobelplast has only got clients who are market leaders (Nestlé, Danone, Colgate…) and buy their resources from the best suppliers in the world (BASF, DOW…). They organise a two-days brainstorming with their suppliers and their clients two times a year so that they've got access to the world's most renown laboratories.*

*Wattex Inc., a roofing producer, has got 180 employees of which 65(!) work in the lab. Their biggest competitor Hoechst has got a lab which is ten times bigger. Still Wattex manages to come up with better products. This is quite some performance because as opposed to Hoechst they haven't got a machinery on a lab scale so every test has to be performed on an industrial line and there are two tests a day!*

### *8. Focus on small volumes*

Porter's (1980) theory is still of much value to some SMEs. They follow a niche strategy or live in a dual economy. The focus on small volumes implies their ability to produce small volumes in which the big companies are not interested anyhow.

*The ecological wave on which Ecover could surf in the early eighties was soon to be recycled by the big brothers in the business such as Proctor & Gamble, Unilever, Henkel… which all launched "green" products and managed to convince the consumer there wasn't any difference anymore from Ecover's products. Ecover managed to survive although their products are more expensive by using the alternative distribution channel of the "organic shops". The volumes they produce and sell are marginal compared to volumes on the traditional market of supermarkets. As long as they stay small they're tolerated.*

*Mister Vanderbauwhede, general manager at Bubble and Foam Industries (BFI) cherishes the slogan "Small is beautiful". He likes to spread the risk over as large a market as possible (70% export). He looks for the most profitable segment in each market and then enters with small volumes not to disturb the market process. He often has to make a deal with the local giant which contains the exact quota he is allowed to sell in the region. His turnover is now over 1 billion Bef.*

### *9. Niche Strategy*

In addition to the small volumes strategy, some of our SMEs follow a very focused niche strategy. These niches differ qualitatively from the big markets. One can for instance produce high definition televisions for special types industrial machines. This is a very technical segment with high quality standards compared to the consumer market or other industrial markets. Because of the technicality, most big players are not interested, but a middle-sized firm can survive in them.

*Dr. Jan Jongbloet, general manager at Vetex, consciously chose the specialised segments of waterproof, medical and industrial protective clothing. All clients are also specialised companies. He therefore managed to build up quite some know-how which drives giants as DSM Chemicals to contact them on certain specialised issues.*

*10. Servitization*

The concept of servitization has become very popular in the production management literature and appears also in our interviews (Fry et al., 1993*)*. Servitization stands for the fact that traditional manufacturing companies increasingly choose to add value in the service part of the product by commercialising for instance the experience they have built up through their service after sales. Hence, instead of just selling a product (as they did before), they tend to offer the customer a 'service package' including the product component and the related services. Often this strategy allows them to charge higher prices.

> *Belfort International Inc. is a high plastic bag producer for super market chains. In the last decade they suffered from fierce competition and decreasing prices. In order to differentiate themselves from the competition, they started to specialize in the service component of the product. Instead of selling 'plasting bags' to their customers, they offer them a service package including: logistics support, stock management, demand forecast, assistance with packaging. Mr. Kerkhover summarized us their strategy as follows: our customers come to buy the service we give them, the plastic bags are only a part of this.*
>
> *Bospaint which started as a paint producer is now training retailers, consulting building contractors… They position themselves as a service company. When we asked Jan Bossuyt, general manager to position himself vis à vis his main competitors, he answered : "The others are paint producers"!*

*11. Tacit technical knowledge*

Nonaka (1991) was among the first to point at the extreme importance of the 'tacit' experience which some of the workers on the floor may have. A number of SMEs articulated exactly such a kind of knowledge to be their core competence in the industry.

> *Sluys international Inc. is a small enterprise (18 employees) which produces taste and smell ingredients. The business of smelling and tasting is not very easy. It requires a long time before a person has acquired the skill to distinguish the ingredients. The company's main advantage lies in its long tradition of skill development.*

*12. Looking for high growth opportunities*

A number of our SMEs had explicitly developed a strategy to find high growth potential niches. These are probably the SMEs which will create most employment. They differentiated themselves from their main competitors through their pro-active search for those market segments in which the demand is increasing.

*13. Cooperation with the supplier*

Next to the customer is the supplier identified as a frequent source of innovation. Because many SMEs do not have an own RTD lab or the technological knowledge to produce innovative products, many of them collaborate closely with their suppliers for problem solving activities. This kind of collaboration can be quite intensive and takes different forms. Some SMEs

mentioned the RTD lab of the supplier as a great help. Others organized team meetings with the suppliers to access their RTD facilities.

*14. Training of personnel*

A few SMEs mentioned that their high level personnel was one of the major strengths they could rely on. Their competitors, in this case often other SMEs, spend far less attention to the training of their people. These SMEs then mentioned their well-educated employee force as a real competitive advantage.

*15. Flexibility*
*16. Customer orientation*
*17. Quality*
*18. Independence*

Most SMEs we interviewed told us that their outstanding flexibility, their extreme orientation to the customer and willingness to satisfy that customer and their attention towards quality were extremely important elements in their strategic success. Since these components have been discussed into great detail in the literature, we do not come back to them here.

**Towards a typology of innovative SMEs**

*Method of Analysis*

The innovation success factors which are described in the previous section are a list which we compiled from the interviews. Formally are they entered as dummy variables in a table, taking the value 0 if a particular SME mentioned the item and 1 if it did not. In order to analyze the structure of this data set, we need to group SMEs according to their responses.

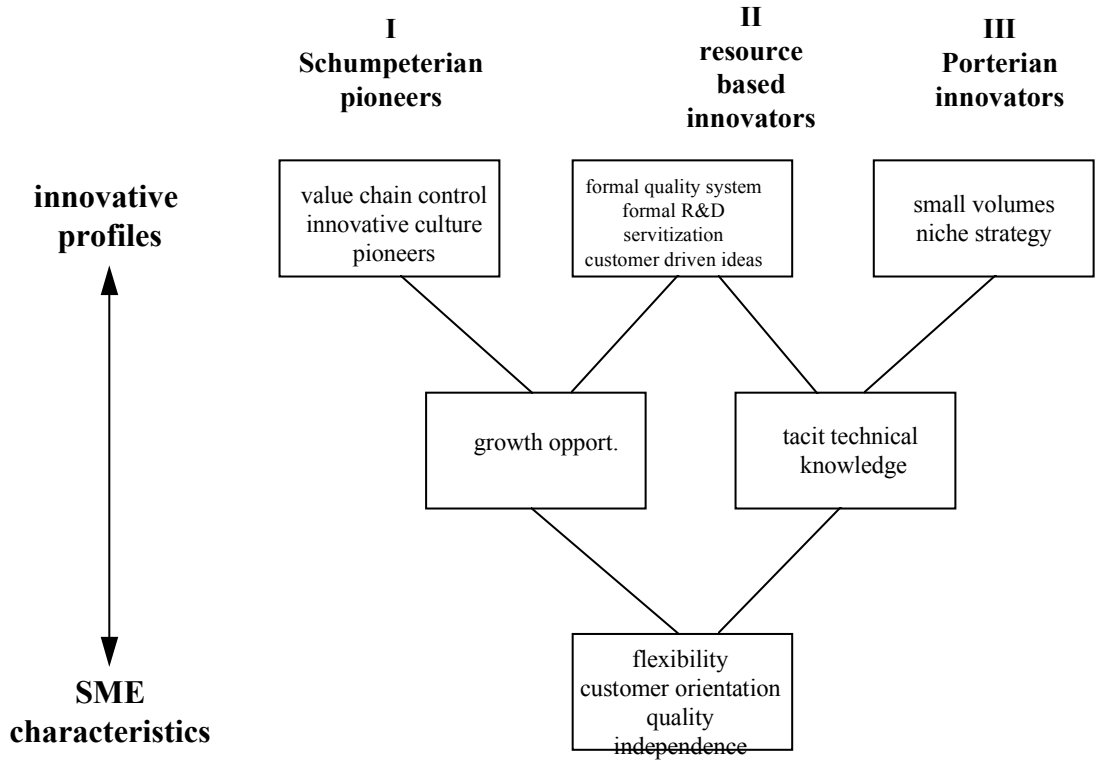
We used hierarchical class analysis to cluster the SMEs and innovation characteristics into different groups (Van Mechelen and De Boeck, 1990). Hierarchical class analysis is a tool used to cluster **objects** (here SMEs) according to their **properties** (here innovation characteristics) into different classes. Each of these classes or clusters is determined by a different set of properties. The classes are then called: classes of equivalent objects.

However, these classes are not 'deterministic' so that each element belongs necessarily to one of the classes. Instead, both objects and characteristics are clustered in a hierarchical way. Figure 4 shows the results of our class analysis using the **properties** as an input. We see that the lower the class (the higher up the inverted tree), the less specific it discriminates. For instance, customer orientation can be grouped in each of the three more specific classes. Similarly, a hierarchical tree was made to group the objects (here the SMEs). For confidentiality reasons, we were not able to show the results (but the hierarchy is summarised in figure 5).

Thus, the properties or innovation characteristics are grouped according to their equivalence. Their equivalence is maximal if the innovation characteristics are shared by exactly the same objects (the SMEs).

In order to determine the number of classes, we did not use the maximal equivalence criterion, but an optimal one. This optimal criterion is derived from analysing changes in the goodness of fit measure (GOF) if one additional class is added. For a model with 1 class the GOF is 0.478, with 2 classes it is 0.609, with 3 0.667 and with 4 0.695. Because the added information in the 4th model is marginal to the one in the third, we take the model with three as the optimal one.

**Figure 4: hierarchical class analysis of the innovation characteristics**




*Results*

The results of the hierarchical class analysis of the innovation characteristics are displayed in figure 4. Training of personnel and use of suppliers as sources of innovation are two properties which are not included in the model. This means that they do not reveal any information about the typology.

The figure shows that success factors such as *customer orientation, flexibility, quality focus and independent decision making* are common for all innovative SMEs in the study and probably discriminate SMEs from large enterprises. As described in the data collection part, we asked the SMEs to position themselves vis à vis their competitors. Since many of them competed with large enterprises, it is acceptable to argue that the innovation characteristics are typical for SMEs in general.

At the second level of the inverted tree display, we find the *growth opportunities* and the *informal technical knowledge* as a source of innovation. This means that these innovation factors

are on the one hand not idiosyncratic to a certain type of innovative SME, but on the other hand they are also not present for each SME. In terms of interpreting the hypothesis concerning the employment creating capacity of the SMEs, this is extremely important. One particular group (number 3) does not look at growth opportunities at all.

At one level higher, we find all the typical innovation characteristics. In general, three types of SMEs can be distinguished. The first we call *Schumpeterian pioneers*, the second group is labelled the *resource based innovators* and the third category the *Porterian innovators*. Each of them is described into greater detail in the next paragraphs.

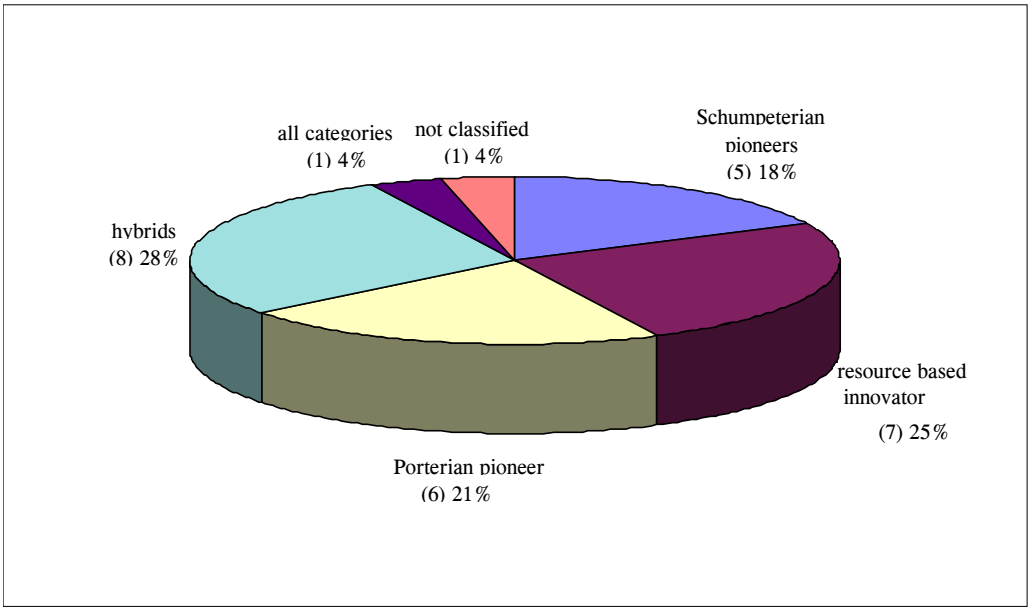
***Schumpeterian pioneers*** seem to correspond most to the imagination. They are in general the younger organizations which, inspired by a visionary leader, adopt a new technology and make a product out of it. These SMEs place much emphasis on creativity and have a real innovation culture. One very striking characteristic is that they, in a world of increasing outsourcing, purposefully choose to retain "*control*" over their value chain. They carefully screen each step in their production process and even, if possible, choose to design their own equipment. According to them, no supplier can guarantee sufficient quality for components of their new product. For many of them the clear understanding of the value chain involved also the elaboration of a technical know how on which they build their core competencies. It is important to note that these Schumpeterian pioneers have a clear growth strategy. The can be considered as employment creators. Still, they are very difficult to reach through government stimulated programs. Since all their activities are rather informal, they do not have the time to look for funding available in technology push programs.

***Resource based innovators*** are not the real Schumpeterian creative destructors anymore. In most cases they are in the mature stage of their business and company life cycle and they differentiate themselves from their competitors through the adoption of formal quality programs and small formal R&D labs. Interesting as well is the observation that this group of companies place increasing emphasis on the service component in their sector. Instead of producing a product and selling it to the customer, they offer a "total concept" which consists of both a product *and* a service component. Take the example of an SME producing paint. Instead of just selling pots of paint to its customers (the construction sector for instance), the company actively offers logistic support, it rents equipment to do the painting, it gives technical advice and service after sales. Still, despite the formal development engagement, innovations remain rather incremental and ideas for new products are customer driven. In this sense, they resemble most the innovative SMEs as described by the OECD. Remarkable as well is that this category expects to increase its employment, especially through the elaboration of their service component. The companies in this category generally know the technology policy programs, but find it very difficult to make the time to apply for funding. Some of them had small projects going on.

***Porterian innovators*** are the last category that can be distinguished. The Porterian innovators are normally world-wide considered to be technological leaders in their specific market segment. Their cumulated technical knowledge, which can either be tacit (know how to make things, Nonaka 1991) or explicit (in the form of patents) is their core competence. Because they mostly operate in very specific niches, they foresee little growth in employment. Part, but not all of them belong to the so-called group of new technology based firms. Some of these companies deliberately choose to stay research boutiques living on the royalties they receive from licenses instead of taking the risk to become a large manufacturing enterprise. Interestingly, the results show that this group of companies is the most successful in applying for RTD support. Especially

the subcategory of research boutiques frequently makes use of RTD support, but also the SMEs in this class which rely more on tacit know how to gain RTD projects.

**Figure 5: hierarchical spread of SMEs**




Not only the innovation characteristics are clustered in a hierarchical way, also the companies themselves are. Although we could not display the names of the companies in the kind of tree such as in figure 4, Figure 5 shows that almost 65% of the 32 SMEs which were studies could be classified into one of these pure 3 categories. 28% of the remaining SMEs were hybrids as their characteristics could match into 2 of the 3 categories. For instance, one of these hybrids is a pioneering company in a niche market with uncertain growth potential. One SME showed most of the characteristics that were discussed and should therefore be considered as an extreme case and another one could not be classified at all.

We can conclude that innovative SMEs are not a homogeneous group. Instead, three types could be distinguished that differ quite a lot between each other in terms of innovative profiles. Moreover, qualitative material shows that the relation between innovation and employment growth might be more complex than one would expect. In fact, not all innovative SMEs will create employment since some of them do not even pursue a growth strategy. This is consistent with the findings of Steward and Gorrino (1995), who introduce a new term: innovative fast growing SMEs to analyze the cross-section of innovators and growers. Especially the Porterian innovators seem to fall out of the boat. Still, they are the most active in their search for RTD subsidies.

## Conclusions, recommendations for innovation policy

In this paper, we analyzed the link between innovation and job creation on the one hand and innovation and performance on the other hand. Because of its high tech nature, we took the chemical industry as a sample and the textile industry was taken for its typical Flemish character. In contrast to most of the economic literature, innovation is analyzed at the level of the firm instead of project or product. To identify 'innovative firms', we developed a novel technique, inspired by the Delphi method. We found a higher percentage of SMEs to be innovative than the ones which 'patent' or have 'R&D expenditures'. This indicates that our definition is indeed broader than the pure technological one which is implicit in the patent or R&D one. Further, we also showed that the percentage of innovative SMEs is substantially *lower* than the one found in the CIS survey, despite their restriction towards technological innovation. This confirms our expectation that the CIS survey fails to identify innovative companies due to a lack of precise questions. One of the most remarkable observations in this descriptive analysis is that the *percentage SMEs that are innovative in the chemical and textile sector does not differ significantly*. This seems to suggest that we can make a distinction between technology intensive and non technology intensive and emerging or mature sectors. But, in both we will find innovative and non-innovative companies.

Further, we tested the value of our performance hypotheses. Regarding hypothesis 1, we found that innovative SMEs do not necessarily create more employment. Instead, the group of innovative SMEs included both the ones that create most employment and the ones that downsize most. Hypothesis 2a could not be rejected which means that innovative SMEs not be identified easily by their short term financial performance indicators (based on profit and cash flow). However, the value added by employee ratio was a clearly distinguishing criterion. Again, this suggests that innovation has long term and no short term implications.

The high variance in our sample of innovative SMEs did not allow us, however, to draw very strong conclusions about their performance or employment growth. Based on this, we further argued that much of the controversy lies in the heterogeneity of the concept 'innovation'. In short, what do we really mean by innovation? To further explore the concept, we performed in depth interviews in a sub sample of innovative SMEs.

Following a robust interview technique, better known as repertory grid, we found a set of 18 innovation characteristics. These characteristics comprise all dimensions which our SMEs identified as being crucial for their strategic positions, i.e. their core competencies and market positioning. Using hierarchical class analysis, we grouped the innovation characteristics and SMEs in three groups: the *Porterian* innovators, the *Schumpeterian* pioneers and the *resource* based innovators.

Porterian innovators have an external product/market focus and chose a particular niche to be successful. Their main competitive advantage is then their strategic positioning. Schumpeterian pioneers resemble the creative destructors so often referred to. They are the most entrepreneurial SMEs that break with traditional business rules. Finally, the resource based innovators are more mature SMEs that compete through exploiting as efficiently as possible their resources or core competencies. It is important to note that none of these categories are mutually exclusive. Although most companies can be categorised as emphasising one type of strategy, most of them combine different types. At the level of the innovation characteristic, this is even more mixed.

Therefore, we chose to display the clusters in a hierarchical way, showing that only a small set of characteristics are typical for a small number of companies, while most other ones are hybrids.

Going back to our question of departure, we can conclude (although based on very small numbers) that only the *Schumpeterian pioneers* really create employment. The resource based innovators have the objective, but this is not reflected in their past growth path and the Porterian innovators do not even include this as a strategic choice.

*What recommendations can now be drawn for innovation policy?*

The government actions constitute of two different policies which should go hand in hand, while remaining their own identity: RTD and innovation policy. RTD policy supports scientific knowledge creation through the direct support of government laboratories and the indirect support of industrial laboratories, while innovation policy aims to facilitate the development, the production and the commercialisation of new products and processes. Therefore it contributes on a shorter term to the competitiveness of a country or region than RTD actions.

Specific RTD actions for SMEs find their roots probably in the US, where the SBIR (Small Business Innovation Research) program was installed in 1982. By establishing this program, the US hoped that more federal research funds should go to small businesses. Under SBIR, each government agency and federal laboratory with more than $100 million in extramural research funds is required to set aside 2 percent[3] of those funds to be awarded competitively to small businesses (Brody, 1996). It is interesting to note that besides the high appreciation of the SMEs for these programs over 50% of the large enterprises rate the program as highly valuable. This indicates the high complementarity which exists between SMEs and the larger enterprises. Often, innovative SMEs transfer and commercialise bits of technology which is developed in the RTD labs of the large enterprises. The opposite is also true, large enterprises sometimes bring to market the products developed by the NTBFs which were discussed in section B. This dynamic complementarity between the large and small enterprises might be a topic of interest for government sponsored RTD. In Europe, not long after the establishment of SBIR, the UK launched SMART (Small Firms Merit Awards for Research and Technology, 1986). The rationale for the scheme is the failure of market processes to provide adequate funding for innovation in small firms, but as in the case of SBIR, the SMEs which mainly benefit are the NTBFs (Moore and Garnsey, 1993). Also the European Community has taken some RTD actions to favour participation of SMEs in the Framework Program.

All innovation policy actions however treat SMEs as a homogenous group of firms, being interested in RTD. We showed in this paper however that innovative SMEs differ very much from each other. Only the resource based innovators attempt to maintain a *formal* RTD centre, which nevertheless remains limited to three or four persons. Our interviews learned us however, that these formal initiatives are too small to sustain a gatekeeper, i.e. a person which keeps himself aware of government support. Instead, this group of firms was much more interested in indirect tax incentives or deregulation. Second, they were focusing much on the networking aspect. They were the ones collaborating with the big suppliers or buyers. Also there can innovation policy contribute.

[3] 1996. In 1997 the percentage is expected to rise to 2.5%.

The Porterian innovators are the group found to be most active in its search for government support. This is not surprising since many of them have a very 'defensive' strategy. They were operating in a mature market and then found a specialized niche which enables them to survive. However, they still remain quite vulnerable to environmental changes and look actively for government support to sustain their niche activity. Quite paradoxically, they are the group of firms for which job creation is not an issue at all.

Finally, the Schumpeterian pioneers are the most innovative and fastest growing firms. They are not interested in direct technology support because the projects they undertake are too risky and it takes far to long to receive this kind of support. We should note however that none of the companies we studied could be classified as a new 'generic' technology based firm. With generic technologies, we mean the small set of technologies (biotechnology, new materials, IT,...) which is predefined as being crucial for further economic competitiveness. If a company is one of the happy few that visibly contribute to such a technology (Innogenetics, Lernout and Hauspie, Xeikon, ...), then risky support *is* available. Our Schumpeterian pioneers experienced structural economic problems such as high personnel costs and regulation costs as being the main barrier to their growth.

In general, we can thus conclude that the current technology and innovation policy actions only serve the interest of a happy few or of the larger enterprises. This is so because they are very much technology driven and do not distinguish between different innovative SMEs. To do so, any government agency responsible for innovation support should actively visit SMEs and look which support can be given to the particular SME, based on its innovation profile. This needs a very decentralized innovation approach with sectoral or regional offices. CENTEXBEL is one of the vehicles which is closest to this objective. It also needs the government agency to change from a bureaucratic anonymous institute towards a dynamic SME mentality. The French and Dutch regional innovation networks can be taken as an example for this.

# REFERENCES


Acs, Z. J. and D. B. Audretsch *Innovation and Small Firms,*Cambridge, MA, MIT Press, 1990

Acs, Z. J. and S. Gifford, 'Innovation of Entrepreneurial Firms', *Small Business Economics*, 8, 203-218, 1996.

Amit, R. and P. Shoemaker. 'Strategic Assets and Organizational Rent', *The Strategic Management Journal*, 14, p. 33-46, 1993.

Archibugi D., R., Evangelista and R. Simonetti 'On the Definition and Measurement of Product and Process Innovations', in Shionoya and Perlman: *Innovation in Technology, Industries and Institutions : Studies in Schumpeterian Perspectives*, Ann Arbor : The University of Michigan Press, p. 7-24, 1997.

Besanko, D., D. Dranove and M. Shanley. *The Economics of Strategy*., John Wiley & Sons, Inc., 1996

Chan Kim, W.an R. Mauborgne, 'Value Innovation : The Strategic Logic of High Growth', *Harvard Business Review*, Jan-Feb, p. 103-112, 1997.

Dunne, P. and A. Hughes, 'Age, Size, Growth and Survival : UK Companies in the 1980's', *The Journal of Industrial Economics*, Volume XLII, No 2, June 1994

EFER, 'Europe's 500 : Dynamic Entrepreneurs : The Job Creators', A preliminary Summary of the Major findings, Gent, Belgium, November 16-18, 1995

Eurostat *'The Second Community Innovation Survey : core questionnaire'*, 5/3/1997

Evans, D.S. 'Tests of Some Alternative Theories of Firm Growth', *Journal of Industrial Economics*, 42, p. 567-581, 1987.

Fry, T.D. ; Steele, D.C. and B.A. Saladin. 'A Service-Oriented Manufacturing Strategy', *International Journal of Operations Management*, 14(10), p. 17-29, 1994.

Greenan, N. and D. Guellec 'Technological Innovation and Employment Reallocation. *OECD Working Paper*, 1995.

Griliches, Z; (ed.); *R&D, Patents, and Productivity*, The University of Chicago Press, 1984

Hall, B.H. 'The Relationship Between Firm Size and Growth', *Journal of Industrial Economics*, vol. 35, p. 583-606, 1987

Hall, B.H. 'Growth and Size of Firms', *The Economic Journal*, 106, p. 1242-1252, 1996.

Hamel, G. and C.K. Prahalad. 'Strategic Intent', *Harvard Business Review*, May-June, p. 63-76, 1989.

Hansen, J.A, 'Innovation, Firm, Size, and Firm Age', *Small Business Economics*, 4, 37-44, 1992, Kluwer Academic Publishers.

Harrison, B. *Lean and Mean*, Basic Books, New York: 1994.

Kay, *The Foundations of Corporate Succes,* Oxford: Oxford University Press.

Kleinknecht A. and J. O. N. Reijnen, 'Towards Literature-based innovation output indicators', *Structural Change and Economic Dynamics*, vol. 4, no. 1, 1993, 199-207

Kleinknecht, A. and D. Bain, *New Concepts in Innovation Output Measurement*, MacMillan, London, 1993

Nonaka, I. 'The Knowledge Creating Company', *Harvard Business Review*, Dec. 1991

Porter, M. *Competitive Advantage*, The Free Press, 1980

Schreyer, P. 'SME's and Employment Creation : Overview of Selected Quantitative Studies in OECD Member Countries', *STI Working Papers*, 1996/4.

Teece, D. 'Profiting from Technological Innovation : Implications for Integration, Collaboration, Licensing and Public Policy', *Research Policy*, 15, p. 285-305, 1986.

Tether, B. S., I. J. Smith an A. T. Thwaites, 'Smaller enterprises and innovation in the UK: the SPRU Innovations Database revisited', *Research Policy*, 2 p. 19-32, 1997.

The Washington Workshop, 'SME's : Employment, Innovation and Growth'*, Organisation for Economic Co-operation and Development,* OECD, 1996

Tirole, J. *The Theory of Industrial Organization.* MIT Press : 1989.

Tidd, J. 'Linking Technological, Market and Financial Indicators of innovation.', *Economics of Innovation and New Technology,* Volume 4, number 3, 1996.

Tidd, J.; Bessant, J. and K. Pavitt. *Managing Innovation: Integrating Technological, Market and Organizational Change*, Wiley, Chichester, 1997.

Van Mechelen, I. And P. De Boeck. 'Projection of a binary criterion into a model of hierarchical classes', *Psychometrica*, vol. 55, no 4, 1990, 677-694, 1985.
Von Hippel, E. *The Sources of Innovation*, Oxford University Press, 1988
Wernerfelt, B. 'A Resource-Based View of the Firm', *The Strategic Management Journal*, 5, p. 171-180, 1984.

Appendix 1

## Chemicals: pharmaceuticals

| Name of the company | city | not known | technol. prod.innov. | | procesinnovation | | market-innov. | others |
|---|---|---|---|---|---|---|---|---|
| | | | new | improved | technol. | organisat. | | |
| | | | | | | | | |
| Conforma | DESTELBERGEN | | | | | | | |
| Homeoden | ASSE | | | | | | | |
| Ciba-Geigy | GROOT_BIJGAARDEN | | | | | | | |
| Labo Qualiphar | BORNEM | | | | | | | |
| Kempisch laboratorium | HOOGSTRATEN | | | | | | | |
| Sanico | TURNHOUT | | | | | | | |
| Labo Wolfs | ANTWERPEN | | | | | | | |
| Medgenix Benelux | DENTEREGM | | | | | | | |
| Labo Smeets | WILRIJK | | | | | | | |
| Homeofar | KORTRIJK | | | | | | | |
| VSM Belgium | KONTICH | | | | | | | |
| Labo Vanda | NIEUWPOORT | | | | | | | |
| Purna Pharmac | PUURS | | | | | | | |
| Jaico | OPGLABBEEK | | | | | | | |
| Conti BPC | LANDEN | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

Appendix 2

| Company | numb. of employees | Interviewee | Function | NACE-code |
|---|---|---|---|---|
| ABBELOOS NV<br>Gottemstraat 25<br>8720 DEINZE | 111 | Koen Van Steendam | Boekhouding en Financiën | 432 |
| AXXIS NV<br>Wakkensesteenweg 47<br>Industriepark Zuid<br>8700 Tielt | 57 | Nico Koster | Product Development manager | 483 |
| BOSPAINT<br>Nijverheidstraat 81<br>9000 Gent | 134 | De heer Bossuyt | Algemeen Directeur | 255 |
| BST (Belgian Sewing Thread)<br>Oude Heerweg 129<br>8540 Deerlijk | 162 | De heer De Corte | Algemeen Directeur | 432 |
| BUBBLE AND FOAM INDUSTRIES (BFI)<br>Gijzelbrechtegemstraat 8-10<br>8570 Anzegem | 101 | Marc Vanderbauwhede | Bedrijfsleider | 483 |
| BUILDING PLASTICS<br>Flanders Fielsweg 41<br>8790 Waregem | 86 | Bernard Vercaemst | Commercieel Directeur | 483 |
| CLAMA MATTRESS TICKING NV<br>Oostkaai 38<br>8900 Ieper | 72 | Luc Clarys | Algemeen Directeur | 4335 |
| COBELPLAST<br>Antwerpsesteenweg 14<br>9160 Lokeren | 136 | Luc BERNOLET<br>Erwin KLÜNDER | Sales Manager<br>Market Development Manager | 483 |
| DIDAK INJECTION<br>Industrieweg 1<br>2280 Grobbendonk | 38 | De heer Sagon | Algemeen Directeur | 483 |
| ECOVER PRODUCTS NV<br>Industrieweg 3<br>2390 Malle | 38 | Ludo MARTENS | Product Manager | 258 |

| Company | numb. of employees | Interviewee | Function | NACE-code |
|---|---|---|---|---|
| GALENCO<br>Tervantstraat 21<br>3583 Paal | 23 | Dr. Vanderstappen | General Manager | 258 |
| GOETERS NV “Ars et Labor”<br>Herderstraat 4<br>9240 Zele | 170 | Henk Dedecker | Algemeen Directeur | 437 |
| INDUPOL INTERNATIONAL NV (Ind. Polyesterwerken) | 126 | W. S. Jansen<br>Theo Vancraenendonck | Gedelegeerd Bestuurder<br>Financieel Directeur | 483 |
| INJEXTRU PLASTICS NV<br>Felix D’Hoopstraat 176<br>8700 Tielt | 68 | De heer Luc Vervelghe | Plant Manager | 483 |
| LAVA NV<br>Rijksweg 138<br>8710 Wielsbeke | 49 | Patrick CALLENS | Administratief Medewerker | 4361 |
| LE LIS NV<br>Baantje 12<br>9220 Hamme | 96 | De heer WUYTACK | R&D Manager | 439 |
| LIBECO & LAGAE<br>Tieltstraat 112<br>8760 Meulebeke | 133 | De heer | | 434 |
| MAES MATTRESS TICKING NV<br>Blokellstraat 157B<br>8550 Zwevegem | 48 | De heer Maes<br>De heer De Waele | Algemeen Directeur<br>Financieel Directeur | 432 |
| MULTIFIX NV<br>Bosdel 43<br>3600 Genk | 25 | Piet Weltjens | Algemeen Directeur | 483 |
| NV BELFORT INTERNATIONAAL<br>Dellestraat 33<br>3550 Heusden-Zolder | 87 | François Kerkhoven | Financieel Directeur | 483 |
| OXYPLAST BELGIUM NV en LIBERT PAINTS &CO<br>Nekkersputstraat 189<br>9000 Gent | 62 | Jean-Jacques Libert | Bestuurder | 256 |

| Company | numb. of employees | Interviewee | Function | NACE-code |
|---|---|---|---|---|
| PAULY PAINT NV<br>Havenlaan 8<br>3980 Tessenderlo | 39 | De heer Jennen | Verkoopdirecteur | 255 |
| SANICO<br>Industrieterrein IV Veedijk<br>2300 Turnhout | 99 | Dr. Fleerakkers | Algemeen Directeur | 257 |
| SLUYS INTERNATIONAL<br>Heuvelstraat 3<br>2530 Boechout | 15 | De heer Mortelmans | Administration Executive | 256 |
| SYMACO<br>Industriezonde LAR, Blok A50<br>8930 Rokkem | 12 | De heer Alain Liétar | Algemeen Directeur<br>Gedelegeerd Bestuurder | 6116 |
| TASSIBEL NV<br>Koning Albertplein 3<br>9220 Hamme | 218 | De heer Feyt | Algemeen Directeur | 438 |
| TEXAM NV<br>Kouterstraat 221A<br>9130 Beveren (Waas) | 64 | Jo SIEMENS | Productie Manager | 438 |
| VERSTRAETE en VERBOUWHEDE<br>Waregemstraat 623<br>8540 Deerlijk | 85 | De heer Verstraete | Gedelegeerd Bestuurder | 432 |
| VERVERIJ TEN BOS NV<br>Fabrieksstraat 26<br>8540 Deerlijk | 38 | De heer DHEEDENE | Algemeen Directeur | 438 |
| VETEX NV<br>Schuttersstraat 1<br>8500 KORTRIJK | 29 | Jan JONGBLOET | Algemeen Directeur | 437 |
| VITALO PLASTICS NV<br>Bruggesteenweg 7, pb 8<br>8760 Meulebeke | 121 | Joris Chistiaens | Managing Director | 483 |
| WATTEX NV<br>Kalkestraat 24<br>9255 Buggenhout | 107 | De heer Baert | Algemeen Directeur | 438 |