

**In search of performance for manufacturing SMEs:  
A taxonomical approach**

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**Abstract**

In this paper, we propose a taxonomical approach to organisational performance, that is, a holistic, multidimensional and integrated approach for a deeper understanding of the performance management task faced by SME owner-managers. The first research objective is to identify performance configurations or gestalts that allow one to characterise manufacturing SMEs in a meaningful and eloquent manner with regard to their organisational performance. The second objective is to determine the extent to which these configurations are conditioned by the environmental and organisational context in which performance is managed. To answer these questions, the results of an empirical study of 205 Canadian manufacturing SMEs are presented. Three configurations are found, that is, global performers, gazelles, and mature performers. These configurations are characterized and contextualized.

**Introduction**

In an economy that has become global and knowledge-based, and facing increasing pressures from their business partners, small and medium-sized enterprises (SMEs), and manufacturing SMEs in particular, face new challenges with regard to performance management (Raymond, 2003). Not only must they maintain their competitive position in order to survive and grow but they must also simultaneously manage other important aspects of performance such as innovation, productivity and profitability. But is it realistic to ask this of SME owner-managers? Is it possible to grow, be innovative and achieve high levels of operational and financial performance all at once, and under what conditions? The notion of performance management has thus become a focus of interest for researchers and practitioners in the SME domain (Garengo, Biazzo, and Bititci, 2005). Moreover, there is a need for further understanding of what constitutes organisational performance, whatever the type of organisation, and of the conditions under which it is achieved in manufacturing SMEs (Epstein, 2004).

In this paper, we propose a holistic approach to organisational performance, that is, a multidimensional and integrated approach for a deeper understanding of the performance management task faced by SME owner-managers. From this perspective, the various dimensions of performance cannot be treated independently of one another and must be in some “state of balance” (Ridgway, 1956). Going beyond purely financial considerations, such an approach is meant to allow for a greater alignment of resources and activities upon the strategic objectives of the firm (Lorino, 2001) and a better understanding of their role in the attainment of performance by manufacturing SMEs.

Based upon the contingency theory that underlies a configurational or “gestalts” approach that originates in the strategic management literature (Van de Ven and Drazin, 1985), one would expect the nature of performance management in SMEs to be revealed by the extent to which the different dimensions of performance such as growth, productivity and profitability are in some form of equilibrium (Miller, 1996). As this approach has yet to be taken in study of the performance of SMEs, it leads us to the following research questions: To what extent are the various dimensions of organisational performance aligned in a coherent manner? In other words, are there performance configurations or gestalts that allow one to characterise manufacturing SMEs in a meaningful and eloquent manner with regard to their organisational performance? And to what extent are these gestalts conditioned by the environmental and organisational context in which performance is managed? To answer these questions, the results of an empirical study of 205 Canadian manufacturing SMEs will be presented.

## **Conceptual and Empirical Background**

A consensus on the definition of organisational performance is yet to be achieved. Organisational performance is a complex and multidimensional construct (Carton and Hofer, 2005). As identified by authors such as Quinn and Rohrbaugh (1983) and Tangen (2004), two perspectives are dominant, one being objective/economic/rational (productivity, efficiency, profitability, competitiveness, etc.), the other being subjective/political/systemic (coherence, value of human resources, satisfaction of stakeholders, adaptability, etc.). Defining and evaluating organisational performance thus constitutes a complex problem (De La Villarmois, 2001).

To further complicate the situation, the notion of organisational performance has evolved over time (Marchand and Raymond, 2006) and with it, the aspects of performance measured and managed in business organisations, following changes in the business, technological and social environment. Beyond financial performance (profitability, liquidity, financial health), new principles of performance measurement appeared in the 80s that put more emphasis on cause-effect linkages (e.g., cost drivers in activity-based costing), thus providing a prospective view of operations and production management. Also, in line with Skinner’s (1974) early work, a preoccupation with strategic alignment became more apparent, notably with Kaplan and Norton’s “balanced scorecard” framework (1992). A number of researchers have thus shown interest since the early 90s in an holistic approach of organisational performance linked to organisational and managerial development in both large and small business enterprises (Bourne, Mills, Wilcox, Neely, and Platts, 2000). Performance definition was then founded on the firm’s strategic objectives and on the interests and expectancies of an enlarged number of partners that included not only owners and stockholders but also other important stakeholders such as customers, employees, suppliers and governments (Bititci, Carrie, and McDevitt, 1997). In a context of sustainable development, the notion of organisational performance continues its evolution, while the

stakeholder group is extended to include society and future generations (Neely, Adams, and Kennerly, 2002). For instance, Lorino (2001) defines performance as a relative notion associating value and cost, where value is determined according to society's needs, and cost is a monetary measure of the resources consumed.

A holistic perspective of organisational performance takes into account a diversity of organisational performance dimensions, but also requires these dimension to be seen as integrated within a "performance logic" (Marchand and Raymond, 2008), a notion that refers to the set of cause-effect relationships by which organisational determinants (e.g., management practices) result in the form of increased or decreased performance. Causal paths of performance thus inter-relate these determinants and results. Initially, these causal paths are specific to each firm, and refer to a state of ideal equilibrium also specific to each firm (Drucker, 1954; Ridgway, 1956). To the specific performance logic of an organisation, ideally corresponds the performance management logic of that organisation (Lorino, 2001). An imbalance between the various dimensions of performance may have negative consequences, and drivers of excellence may become destructive forces. In effect, a condition of sustainable performance would be the attainment of some form of dynamic equilibrium among performance dimensions rather than a strong result on one dimension or another.

Different performance measurement frameworks have been proposed by researchers to simplify the task of modelling the firm's performance logic (e.g., Fitzgerald et al.'s "results and determinants framework", 1991; Kaplan and Norton's "balanced scorecard", 1992; Brown's "process-oriented framework", 1996), each of them adopting a specific management perspective (Neely, Mills, Platts, Richards, Gregory, Bourne, and Kennerley, 2000) and underlining a specific enterprise model (Rolstadas, 1998; De Toni and Tonchia, 2001). Frameworks based on a multiple-stakeholder perspective of performance have more recently been proposed (e.g., Bititci et al.'s "integrated performance measurement system", 1997; Neely et al.'s "performance prism", 2002).

There is, however, an expressed need for more empirical knowledge on the performance management practices of SMEs (Garengo et al., 2005). Given that the theoretical approaches (e.g. performance measurement frameworks) developed have been mostly oriented toward the large enterprise, these approaches would not necessarily be compatible with performance management practice in SMEs (Hudson, Smart, and Bourne, 2001). In particular, differences could be found with regard to the organisational dimensions that must be considered and to the type of performance indicator to be defined or selected. In addition, SMEs' context, their resource constraints, their strategic flexibility and their need for results in the short term would not be taken into account.

Developing new markets and new products are among the strategies devised by SMEs to increase their competitiveness when facing with an environment that is growing more hostile, more turbulent and more complex (Özsomer, Calantone, and Di Benedetto, 1997). World-class SMEs in particular would follow a strategic approach, based on innovation, by which they detect and seize opportunities (Sambamurthy, Bharadwaj, and Grover, 2003; Wade and Hulland, 2004). Innovation is thus of crucial importance as a dimension of the organisational performance of SMEs within highly competitive business environment (Acs and Audretsch, 1990).

Following their review of the literature on performance measurement in SMEs, Garengo et al. (2005) confirm it should take into account the organisation in its entirety and integrate all functions/dimensions in balance with the importance given to each (in view of the firm's strategic objectives). Notwithstanding the complexity of the construct/concept of organisational performance, litera-

ture indicates recurrent performance dimensions and measurement scopes: financial performance, performance of the manufacturing strategy or operational performance (e.g. productivity, production cycle, flexibility, quality), social performance (e.g. human resource management) and managerial performance (e.g. innovation and knowledge management) (Marchand and Raymond, 2008).

Furthermore, the most relevant dimensions of performance are not necessarily the same for all stakeholders (Helfert, 2003; Neely et al., 2002). As shown in Table 1 managers, for instance, will be more interested in productivity, shareholders will focus on profitability, bankers on solvency and profitability whereas governments will mainly look to growth in employment. For world-class SMEs, innovation will be of prime importance not only for managers, but for also all value chain stakeholders (employees, suppliers, customers) (Chesbrough, 2003). This perspective can be enriched in specific situations when for instance large enterprises must evaluate the profitability, productivity and innovation capability of manufacturing SMEs as business partners within subcontracting network (Julien, Raymond, Abdul-Nour, and Jacob, 2004). Solvency is also of particular interest to managers, considering the financing problems encountered by many innovative SMEs even if they are productive and profitable. This is another justification for a holistic analysis of performance in the SME context. For SMEs, growth, profitability, productivity/efficiency, solvency and innovation have been identified as of particular importance (e.g., Raymond and St-Pierre, 2007; Wolff and Pett, 2006),

**Table 1: Performance Dimensions of Interest to Stakeholders**

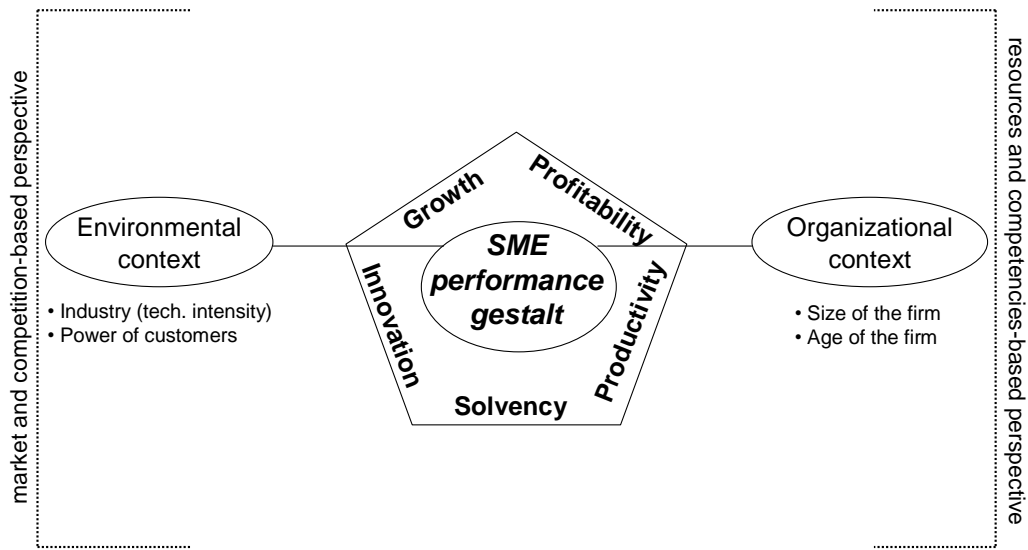
<b>Dimension</b>	Growth	Profitability	Productivity	Innovation	Solvency
<b>Stakeholders</b>					
Shareholders	√	√√	√	√	√
Owner-managers	√√	√√	√√	√√	√√
Employees	√	√	√	√	
Customers				√√	
Suppliers				√	
Bankers	√	√√			√√
Government	√√	√	√	√	

Adapted from Helfert (2003)

## **Research Model**

As presented in Figure 1, the research model integrates two strategic development perspectives originating in strategic management research. The first perspective focuses on the imperatives of competition, considering the enterprise as a set of strategic activities, aiming for adaptation to an industrial environment by searching for a favourable competitive position in the market (Teece, Pisano, and Shuen, 1997). The second perspective conceptualises the firm as a set of resources and competencies, that is, assets, processes and knowledge that possess an inherent value, considering that it is the resources unique to each enterprise that should constitute the essence of its strategy (Barney, 1991). While the premises that found these two perspectives differ, certain researchers have demonstrated that they are complementary (Spanos and Lioukas, 2001).

**Figure 1: Research Model on the Performance of Manufacturing SMEs**



The research model stipulates that the performance of a manufacturing SME is contextualised with regard to the business environment (industry and power of customers) (Mauri and Michaels, 1998; Raymond and St-Pierre, 2004) and the organisation (size and age of the firm) (Smith, Guthrie, and Ming-Jer, 1989; Durand and Coeurderoy, 2001). Moreover, the organisational performance of these firms is approached from an integrated perspective under five aspects, that is, growth, profitability, productivity, innovation and solvency. The basic proposition underlying this model is that the firms that one could qualify as “global performers” are those that succeed in innovating and growing while adequately managing their strategic resources and capabilities without compromising on their productivity, their solvency and their profitability.

### **Research Method**

The research data were obtained from a database created by a university research centre that contains information on 205 Canadian manufacturing SMEs. With the collaboration of an industry association to which most of these firms belong, the database was created by having the SMEs' chief executive and functional executives such as the controller, human resources manager and production manager fill out a questionnaire to provide data on the practices and results of their firm and add their firm's financial statements for the last five years. In exchange for these data, the firms are provided with a complete comparative diagnostic of their overall situation in terms of performance and vulnerability (further information on the diagnosis system and on data collection and validation can be found in St-Pierre and Delisle, 2006).

For the study's purposes, a SME is defined as an enterprise with more than 20 employees and less than 250, corresponding to the definition used by the European Union. The median size of the sample firms is 49 employees, whereas annual sales range from 1 to 55 million dollars (CAN), the median

being 5.6 million. More than fifteen industrial sectors are represented, including metal products (25.9 % of the sampled SMEs), plastics and rubber (15.1 %), wood (13.7 %), electrical products (6.8 %), machinery (5.3 %), food (4.9 %) and furniture (4.9 %). Being relatively representative of Canadian manufacturing SMEs with regard to size and sector, a third of the sampled SMEs (33 %) operated in industrial sectors of low technological intensity, 49 % in sectors of medium-low intensity and 18 % in sectors of medium-high intensity, following to the OECD's (2005) classification. There are no high-tech firms in the sample.

Each one of the five aspects of performance, that is, growth, profitability, innovation, solvency and productivity is evaluated by a performance indicator. These indicators were chosen in reason of their scope and theoretical utility as research variables, that is, their explanatory potential and predictive adequacy with regard to the organisational performance of manufacturing SMEs, given their repeated use in previous empirical studies in strategic management, small business and finance. Thus growth is measured by the average growth in net sales over the last three years, profitability by the return on assets, innovation by the percentage of sales from new or modified products, solvency by the level of indebtedness, and productivity by the gross margin per employee. The descriptive statistics of the performance indicators and contextual variables can be found in Appendix A, whereas their inter-correlations can be found in Appendix B.

## **Results**

The alignment perspective of organisational performance adopted in this research is based on an internal congruence conceptualisation, whereby fit or co-alignment is seen as a pattern or gestalt, that is, a set of relationships, which are in a temporary state of balance. Adopting this perspective implies that "instead of looking at a few variables or at linear associations among such variables we should be trying to find frequently recurring clusters of attributes or gestalts" (Miller, 1981, p.5).

### **Characterising the Performance of Manufacturing SMEs**

As most appropriate to a gestalts perspective (Venkatraman, 1989), the cluster analysis technique was used to test the research questions of the study. This approach aims to group organisations into clusters such that each cluster's membership is highly homogeneous with respect to certain attributes. Here, the attributes (or clustering variables) are the components of organisational performance, namely growth, profitability, productivity, solvency and innovation. A second aim is that each group differs from other groups with respect to these same characteristics. The SPSS TwoStep clustering algorithm was used as it can handle a large number of cases and automatically determines the optimal number of clusters. A three-cluster solution was found to be most parsimonious in identifying groups of firms that could be clearly distinguished from one another, based on a meaningful pattern of relationships among the clustering variables.

Table 2 presents the means of the clustering variables for each of the three clusters. One-way analysis of variance (ANOVA) was used to evaluate the equality of variable means across the clusters and thus assess the distinctiveness of each derived cluster. The ANOVAs were repeated with size of the firm, and age of the firm, power of customers and industry as covariates in order to control from the possibly confounding effect of these variables. No such effects were found. F-tests confirm that

these means differ significantly across the three groups for all clustering variables. Added tests of significance of pair-wise contrasts (Tamhane's T2 test) indicate certain similarities however.

The first and smallest cluster identified by the analysis is made up of 49 enterprises (24 %) that were named *Global Performers*. The first group clearly dominates the other two in terms of solvency, productivity and profitability. The second cluster comprises 71 SMEs (35 %), named *Gazelles*. This group is leader of the three in terms of growth but is the laggard in terms of solvency, noting however that the *Global Performers* attain almost the same growth rate but with significantly less indebtedness. It is rather in terms of innovation that the *Gazelles* clearly dominate the other two groups, with an average rate that is more than twice as high. The last and the biggest of the three clusters is composed of 85 firms (41 %) that were labelled as Mature Performers. These firms significantly lag the other two in terms of growth and productivity, but show more solvency and equal profitability when compared to the *Gazelles*, and a level of innovation that is equal on average to that of the *Global Performers*.

**Table 2: Performance Profiles Resulting From the Cluster Analysis**

profile	<i>Mature Performers</i> mean (n = 85)	<i>Gazelles</i> mean (n = 71)	<i>Global Performers</i> mean (n = 49)	Anova F	Anova F with covariates <sup>a</sup>
Performance					
Growth					
sales growth	0.06 <sub>2</sub>	0.29 <sub>1</sub>	0.22 <sub>1</sub>	19.7***	15.6***
Profitability					
return on assets	0.08 <sub>2</sub>	0.10 <sub>2</sub>	0.24 <sub>1</sub>	76.8***	74.0***
Productivity					
Gross margin per empl.	19 720 <sub>3</sub>	24 680 <sub>2</sub>	47 104 <sub>1</sub>	50.2***	45.7***
Innovation					
new product sales /sales	0.19 <sub>2</sub>	0.64 <sub>1</sub>	0.29 <sub>2</sub>	63.4***	52.8***
Solvency					
indebtedness	0.55 <sub>2</sub>	0.70 <sub>3</sub>	0.46 <sub>1</sub>	33.6***	28.0***

\*\*\*:  $p < 0.001$

<sup>a</sup>Size of the firm, Age of the firm, Power of customers, and Industry

Nota. Within rows, different subscripts indicate significant ( $p < 0.05$ ) pairwise differences between means on Tamhane's T2 (*post hoc*) test.

It is important to recall at this stage of the analysis that the three profiles of organisational performance were identified here a posteriori, that is, on an empirical rather than theoretical basis. These profiles thus constitute a taxonomy rather than a typology of the manufacturing SMEs studied (Miller, 1996). One must then contextualise this taxonomy with regard to the business environment and the organisation in order to better specify its implication for the understanding and management of performance.

### Contextualising the Performance of Manufacturing SMEs

There is also the question of ascertaining if the three performance gestalts that emerged are conditioned by the environmental and organisational context. Thus, one-way analyses of variance were used to test for differences in industry, power of customers, size and age of the firm across the three groups

of SMEs. As presented in Table 3, an F-test indicates that group means significantly differ across groups for power of customers and age of the firm. Added tests of significance of pair-wise contrasts confirm that the *Global Performers* show less customer dependency and thus should have more control over their rate of growth and innovation as there would be less pressure in this regard from customers. And *Gazelles* are younger than the other groups, as would be expected in high-growth firms and highly innovative firms, that is, firms whose products are less mature.

**Table 3: Context Variables by Performance Profile of Manufacturing SMEs**

profile	<i>Mature Performers</i> mean (n = 85)	<i>Gazelles</i> mean (n = 71)	<i>Global Performers</i> mean (n = 49)	Anova F
Industry (technological intensity)				
low-tech	0.36	0.31	0.31	0.4
medium to low-tech	0.45	0.46	0.59	1.4
medium to high-tech	0.19	0.23	0.10	1.5
Power of customers				
% sales to 3 main customers	0.45 <sub>2</sub>	0.46 <sub>2</sub>	0.34 <sub>1</sub>	4.1*
Size of the firm				
number of employees	68	70	71	0.1
Age of the firm				
number of years since creation	34 <sub>1</sub>	22 <sub>2</sub>	30 <sub>1</sub>	8.8***

\*:  $p < 0.05$     \*\*\*:  $p < 0.001$

*Nota.* Within rows, different subscripts indicate significant ( $p < 0.05$ ) pairwise differences between means on Tamhane's T2 (*post hoc*) test.

These results are interesting in many aspects and demonstrate that performance indicators used by researchers have to be defined carefully. More specifically, performance indicators cannot be considered as substitutes for one another. Economic performance, as measured by growth and innovation, can alter financial performance, and the organisational context should be taken into consideration to better understand growth and the pressure that it imposes on the development of SMEs. A holistic perspective on performance is thus particularly useful in apprehending the behaviour of SMEs.

Not surprisingly, *Global Performers* are also more independent, mature and relatively less innovative firms that have succeeded in terms of profitability and solvency because their environment is probably more stable. To the opposite, *Gazelles* that attract so much governmental attention for their contribution to employment creation and their dynamism could be considered as “temporarily” vulnerable enterprises due to their high innovation and solvency rates. But, this high degree of innovation contributes to their lower profitability and productivity because *Gazelles* do not adequately master their new products' characteristics, given their frequent renewal of products.

Intuitively and from an organisational perspective, these results seem fully justified. Moreover, they reveal specific SME profiles that should be taken into account in future studies, notably when researching on innovation because of its particular effects, and considering the SMEs' age, growth rate and customer dependency. This is a critical issue as the most innovative SMEs are also the fastest



growing firms and the most indebted. This last result also highlights the apparent vulnerability of these firms and should be researched with more depth in the future.

### **Implications and Limitations**

Researchers and practitioners could benefit from certain implications of this research. Being among the first to describe and conceptualize the performance of manufacturing SMEs from a holistic and integrated perspective, through the five dimensions that are growth, productivity, profitability, innovation and solvency, this study has provided a new taxonomic approach to the characterisation of these enterprises. In particular, a solution is provided to the difficult question of integrating innovation within the firm's overall performance (Epstein, 2004). This performance-based characterisation of enterprises contrasts with the more usual approach that is based on strategy (e.g., Miles and Snow, 1978; Miller, 1981). Here, instead of holistically characterizing the organisation in terms of environment and strategy and then linking each strategic configuration to a specific dimension of performance, it is performance that is holistically characterized and then linked to specific aspects of the firm's environment and strategy, thus creating a potential for new insights on the environment-strategy-performance relationship for future research that adopts this approach.

The configurational approach to organisational performance taken in this study could serve as a basis for identifying the various aspects that must be taken into account when studying the performance management system of SMEs and using the system classification frameworks developed to this effect (Marchand and Raymond, 2008). It could thus constitute the conceptual foundation and methodological core of such a system aimed at developing the performance management competencies of SMEs. Designed from complementary strategic perspectives, the system could help in identifying the strengths and weaknesses of the SME with regard to its resources and competencies, and its opportunities and threats with regard to its competitive position. By allowing the firm to better visualize and deepen its understanding of its performance logic and the relationship between its strategic development and its performance, the system would produce more relevant, reliable and actionable information on the transformation of strategic investments into increased innovation, growth, productivity and profitability. An interesting result is the link discovered between these variables and indebtedness. The holistic approach taken here is particularly useful in demonstrating that indebtedness can be associated to high-performance SMEs in economic terms and not only to financially distressed firms.

This approach also provides a new answer to the necessary trade-off between the standardisation of performance measurement required for comparative evaluation or benchmarking purposes and the customisation required for an optimal performance configuration that is specific to each firm, that is, taking into account its strategic objectives and contingencies.

This investigation has limitations that must be mentioned. While the firms surveyed are fairly representative of the general population of Canadian manufacturing SMEs in terms of size and industry, there might yet exist a sample bias in that these are firms that have chosen to undertake a benchmarking exercise. As such, these firms could differ from the general population in terms of strategic capabilities and innovation (Cassell, Nadin, and Gray, 2001). Finally, given that the attainment of a performance gestalt can be studied as a dynamic process, a longitudinal study could reveal results that a cross-sectional study cannot, notably causal links among the various aspects of performance. A more

dynamic perspective could also ascertain the stability of the gestalts and their eventual link with the firm's age and strategic development level.

## Conclusion

Facing competition that has become global and under pressures from their business partners, many manufacturing SMEs must increase their performance in all aspects, be it in terms of innovation, productivity, growth and financial health. In this more turbulent environment, achieving strong growth while increasing productivity and profitability, even if it implies self financing, is just not a dream but an actual reality for a number of these firms. Their management of performance implies that researchers must not only help managers in identifying all relevant performance dimensions and associated performance indicators but also in acquiring a deeper knowledge and finer comprehension of the inter-relationships among these dimensions and indicators, that is, explicitly rendering the firm's "performance logic". This also implies that further research must focus on developing and implementing performance management information systems that support this logic and thus enable managers to better cope with increased performance demands.

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## Appendix A: Descriptive Statistics of the Research Variables (n = 205)

Organisational Performance indicator	mean	median	s. d.	min.	max.
Growth					
sales growth <sup>a</sup>	0.18	0.13	0.25	-0.29	1.85
Profitability					
return on assets <sup>b</sup>	0.13	0.11	0.10	-0.13	0.45
Productivity					
gross margin per employee <sup>c</sup>	27 983	23 034	19 069	1 115	117 430
Innovation					
sales of new & mod. products / sales	0.37	0.30	0.32	0.00	1.00
Solvency					
indebtedness <sup>d</sup>	0.58	0.60	0.19	0.14	1.33
Size of the firm					
number of employees	70	49	52	20	240
Age of the firm					
number of years since creation	29	24	18	5	116
Power of customers					
% of sales to 3 main customers	0.43	0.40	0.25	0.00	1.00

<sup>a</sup>average growth in net sales over the last 3 years

<sup>b</sup>earnings before income taxes / total assets

<sup>c</sup>gross profit / number of employees

<sup>d</sup>total debt / total assets

## Appendix B: Correlation Matrix of the Performance Indicators and Covariates

correlation (n = 205)	1.	2.	3.	4.	5.	6.	7.	8.
Growth								
1. sales growth	-							
Profitability								
2. return on assets	.34***	-						
Productivity								
3. gross margin per employee	-.00	.29***	-					
Innovation								
4. sales of new&mod. prod./sales	.06	.02	-.01	-				
Solvency								
5. indebtedness	.05	-.37***	-.13	.06	-			
Size of the firm								
6. number of employees	.06	.04	.23***	-.07	.11	-		
Age of the firm								
7. number of years since creation	-.22**	-.13	.12	-.21**	-.20**	.15*		
Power of customers								
8. % of sales to 3 main customers	.19**	-.10	-.29***	-.04	.07	-.12	-.09	-
Industry (technological intensity)								
9. low-tech, med.-low, med.-high	.05	-.12	.17*	.10	.08	.12	-.13	.00

\*: p < 0.05    \*\*: p < 0.01    \*\*\*: p < 0.001 (two-tailed)